Adap-tive reuse for hous-ing

Adaptive Reuse
for Housing

Hilde Remøy
Gerard van Bortel
Erwin Heurkens
Roeli van Venrooij

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Editors: Hilde Remøy, Gerard van Bortel, Erwin Heurkens en Roeli van Venrooij

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Foreword

Hilde Remøy

To address the current housing shortage in the Netherlands, approximately 90,000 new homes need to be added to the housing stock annually. Adaptive reuse of vacant buildings for housing contributes to achieve this aim. Until around 2014, adaptive reuse was seen as a solution to office market vacancy, which surged from around 5% nationwide in 2001 to nearly 15% in 2013. The high vacancy rates were partly a result of the dotcom crisis and the financial crisis. These crises, along with technological advancements and an increase in flexible working, led to a reduced need for office space, while an oversupply of office buildings was developed and constructed.

After 2014, a tipping point became apparent. Adaptive reuse was increasingly driven by the demand side of the housing market rather than the supply side of the office market. The focus on sustainable construction and the greening of the existing building stock increased. In the publication preceding this book *Transformatie van kantoorgebouwen* (Adaptive reuse of offices) from 2007, sustainability was hardly mentioned. At most, adaptive reuse was noted as inherently sustainable because the building was reused. However, due to rising energy costs, the costs of building materials, and the climate crisis, sustainability aspects such as energy-efficiency, circularity, and adaptability have become much more important, though they are not yet fully applied in the market.

Currently, the Netherlands has a high demand for housing, and at the same time many buildings remain vacant. Numerous urban areas comprise outdated office buildings that are no longer in demand or in (full) intended use. Across the country, churches are increasingly left vacant due to aging populations and secularisation. Industrial real estate loses its function as industries relocate from city centres to more accessible locations or abroad. School buildings are left empty as neighbourhoods age. Hospitals are vacated due to new concepts and scaling up of healthcare. Retail space is becoming vacant due to centralisation and online shopping. Thus, buildings originally constructed for these (and other) purposes can be adapted into housing.

The fusion of old and new buildings can potentially contribute to preserving local identity. When architecturally interesting buildings are involved, adaptive reuse also contributes to preserve cultural heritage. Adaptive reuse can support the greening of the building stock, reduce demolition waste and the use of raw materials. Moreover, adaptive reuse could contribute 10-15% to annual housing production.

The conclusion seems logical: adapt vacant buildings into housing. But it's not that simple. The owners of vacant properties and housing developers are not always able to agree on feasible plans for the building's future destination. Adaptive reuse is different from new construction and therefore requires a different approach. There are also various financial, economic, legal, and policy challenges, such as uncertainty about financial feasibility and fear of lengthy procedures. This is why we have taken the initiative to publish this book now, at a time when we are amid both a housing crisis and a climate crisis. With this book, we aim to provide more insight into the opportunities and challenges of adaptive reuse. We give voice to actors who have gained experience from different perspectives, and we discuss projects that showcase the breadth of Dutch adaptive reuse practices.

This book was written by researchers from the TU Delft, but also various experts from industry contributed. This has resulted in a wide range of themes. Adaptive reuse is examined from different angles, with a focus on feasibility. We then discuss adaptive reuse as a sustainable design, development, and management strategy. The role of different actors is highlighted in the perspectives section: property owners, investors, developers, as well as housing associations, architects, users, and governments. Finally, we present a number of adaptive reuse projects to illustrate best practices.

The book aims to share knowledge about the adaptive reuse of vacant real estate into housing. In summary, the book aims to:

- **inspire:** demonstrate that adaptive reuse is possible and desirable, offering prospects for sustainable urban development;
- **illustrate:** opportunities and substantiate with thematic reflections, compelling case studies, and other data;
- **inform:** about critical success factors, challenges, feasibility studies, visions and roles of parties, literature, and projects;
- **connect:** build bridges between different parties such as governments, builders, and consultants;
- **programme:** : identify gaps in knowledge and skills and guide the agenda of construction practice, science, and politics.

This book is intended for stakeholders in adaptive reuse projects, including owners, investors, designers, consultants, builders, and (future) users. It can also be used as a learning tool in education, both at universities and colleges, as well as in vocational and postgraduate education.

This publication is a translation of the book Transformatie naar woningen (2024). It is written within a Dutch context. Throughout this book, when nothing else is stated, we refer to Dutch adaptive reuse projects, the perspectives of the Dutch industry, and sustainability and feasibility within the Dutch context.

Acknowledgments

This book was edited by Hilde Remøy, Erwin Heurkens, Gerard van Bortel, and Roeli van Venrooij of the Department of Management in the Built Environment at the Faculty of Architecture and the Built Environment at Delft University of Technology. Thomas Snoek, together with Hilde Remøy and Roeli van Venrooij, formed the editorial team for the case studies and description of adaptive reuse projects.

The topic of adaptive reuse has been on our education and research agenda for nearly thirty years. This book is a successor—seventeen years later—to *Transformation of Office Buildings* (Adaptive Reuse of offices), which was published in Dutch in 2007, edited by Theo van der Voordt, Rob Geraedts, Hilde Remøy, and Collin Oudijk. Sadly, Rob Geraedts passed away in October 2023. We would like to thank Theo and Rob (posthumously) for initiating that book!

We owe a great debt of gratitude to all the authors who contributed chapters to this book. We would also like to thank the graphic designer Véro Crickx and the copy editor Els Brinkman (NL version) for their contributions and hard work on the book. Thanks also to the members of the editorial board for their constructive comments: Theo van der Voordt (emeritus associate professor at TU Delft), Erna Van Holland (NRP, National Renovation Platform Foundation), Janneke Kamstra (Central Government Real Estate Agency), and Layla El Kamali (Ministry of the Interior and Kingdom Relations). We would like to thank NRP and SKG (Foundation for Knowledge in Area Development) for their substantive input and for suggesting projects.

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Contents

Projects

Feasibility

The feasibility of an adaptive reuse project is assessed based on economic, financial, technical, functional, social, and legal aspects. These aspects are addressed and tested in different ways throughout the successive phases of an adaptive reuse project. Whether a project is considered feasible or not depends on the initiators and the other actors involved in the project. They may emphasise different aspects depending on their objectives. To support initiators and other actors in the adaptive reuse process and in conducting feasibility studies, many different tools, step-by-step plans, and checklists have been developed. Most of these focus on a specific aspect of adaptive reuse, such as the 'Office Transformation Meter,' which supports decision-making about adaptive reuse of offices into housing. Other tools focus on assisting in the selection between different future functions, such as the 'Guide to Reuse'. The following chapters address various feasibility aspects and present several tools to support adaptive reuse.

1

The market for adaptive reuse to housing

Peter Boelhouwer and Hilde Remøy

Since the end of the economic recession in 2014, the housing market has become significantly tighter and has developed into a seller's market. There is a shortage of housing in various categories. The question is whether, in addition to new construction and better utilisation of the existing housing stock, adaptive reuse of existing buildings can also offer a solution to reduce the current housing shortage. This chapter first examines the dynamics of supply and demand in the housing market. Subsequently, market aspects of adaptive reuse are explained. Finally, a reflection on market conditions for successful adaptive reuse of vacant real estate into housing is provided.

1.1

Developments in the housing market

The Dutch housing market in 2024 can be characterised as extremely tight. By the end of 2023, the housing shortage had risen to 4.8% of the total housing stock (approximately 390,000 homes) (Gopal et al., 2023). Such a shortage has not been recorded in the Netherlands since 1970. There are several reasons why a rapid improvement is not expected in the coming years. For example, the number of building permits issued in 2022 and 2023 has dropped significantly (CBS, 2023). In addition, due to a steep rise of construction costs, high capital market interest rates, and NOx limitations, a part of the already granted housing projects has been delayed or not realised at all. The expected new construction is between 60,000-65,000 homes in the years 2024-2025. This contrasts with the national government's goal to build 90,000 homes annually over the next seven years.

The housing shortage is also reflected in several housing market indicators. For example, the average waiting time for social housing in many large Dutch municipalities has now exceeded ten years, rental prices in the private rental sector have risen significantly in recent years, and housing shortage has never been higher since measurements began in 1965 (according to the NVM shortage indicator for the housing market).

In addition to a quantitative shortage, there is also a qualitative mismatch due to changing requirements and possibilities, as well as demographic changes (specifically aging and shrinking household sizes).

The housing market consists of 58% owner-occupied homes and 42% rental homes, most of which are owned by housing associations. The associations own 28% of the total housing stock. After World War II and until 1990, homes in urban expansion areas were built with 70% in the social sector and 30% in the market sector. In the 1990s, this policy was reversed in most cities. The focus shifted to building more expensive homes in the private sector. As a result, 30% of the homes were developed by housing associations and 70% by the private market. Current housing policy is once again shifting towards more affordable housing, with two-thirds of new construction required to be in the social and affordable segments and one-third in the expensive segment.

In the current housing market crisis, disadvantaged groups are the most affected. In the social rental sector, this is evident in long waiting times, and in the private rental and homeownership sectors, in high initial rents and purchase prices. Against this backdrop, the political choice to build two-thirds of new housing in the affordable segment is understandable. However, there are also valid arguments for focusing more on mid-priced and expensive rental and private housing. Building homes in these categories generates longer moving chains (on average three to four moves), which meets the housing needs of more households and makes it financially easier to proceed with area developments that have stalled due to rising interest rates and construction costs. Moreover, expensive homes tend to have higher construction quality and future value. “A moving chain is a series of linked moves caused by the creation of a new home or the availability of an existing home, for example, due to the death of residents or relocation” (CBS, 2020).

Overall, especially in larger area developments, a more differentiated residential programme seems to be the most sensible choice. Developing expensive homes takes a lot of time, and there is a significant risk of insufficient demand or a drop in demand. With declining production and increasing demand, certain groups (low-income) may not be reached at all. In the development of large-scale locations, differentiation is also important to prevent the concentration of low-income groups elsewhere. In restructuring, the needs of current residents should not be forgotten. For those who cannot or do not want to move to a more expensive home, affordable housing should remain available in their own neighbourhood. In addition to price differentiation, it is also wise to anticipate the expected growth in the elderly population. With an adequate supply for the elderly, not only can the demand for care be reduced, but turnover increases, making homes available for families and starters. Moreover, clustered living arrangements where the elderly can look out for each other likely yield significant savings in care and welfare budgets.

Finally, it is important to maintain sufficient flexibility in housing development planning. Due to the large housing shortage, increasing the number of completed homes the most important goal. Too rigid planning will jeopardise this goal.

1.2

Office surpluses

After World War II, the development of office buildings was primarily focused on reconstruction and expansion. In the 1940s and 1950s, the preference was given to the reconstruction of industry and addressing the large housing shortage, which led to slow office construction. It was also difficult to obtain high quality building materials. Office users during this time were usually owner-occupiers. It wasn't until the 1960s that office construction took off, and new phenomena emerged, such as the rental office and the multi-tenant building. The business services sector was clearly on the rise during this period. Office-based organisations wanted to be flexible to grow and relocate. Money was preferably invested in the business itself rather than in the building. At the same time, office buildings were discovered as attractive investment properties. Since then, renting office space has become the most common contract form for office accommodation. Tenants are increasingly less attached to the building they occupy. Office work is changing, tenants want flexibility, and lease contracts are becoming shorter. The demand for office space is dynamic, but the supply is not. The amount of office space in use is levelling off. After years of growth, much office space has been withdrawn from the stock over the past decade and, partly due to the significant housing shortage, has been transformed into housing. The total amount of available floor space has remained stable during this period, reflected in a vacancy rate of around 8% (Cushman & Wakefield, 2023).

The office market has developed into a replacement market. There is no longer a demand for quantitative expansion. What is newly built is primarily to replace old buildings. Since new construction continues, an oversupply is created, resulting in a buyer's market. Office users move to higher quality office buildings and locations, and the quality demands of office users are increasing. Buildings and locations are aging. An increasing portion of this outdated supply is difficult to let without modification, even with strong growth in office uptake. For some buildings, the term 'structural vacancy' can be used. Repurposing or demolition with new construction is often the only solution for these buildings. The buildings in question are outdated and do not meet, for example, energy efficiency requirements. The locations are not well accessible and have few amenities (Cushman & Wakefield, 2023).

Many experts see structural vacancy primarily as a location problem, as poor buildings in a good location, could be refurbished and re-leased as an office building.

The office market has developed into a typical replacement market; there is no longer a demand for expansion.

Problematic locations include office and business parks from the 1980s, situated along highways, that are poorly accessible by public transport and have parking standards that do not meet current demand. The development of these locations is well explained by the circumstances at the time. The primary focus was on car accessibility for office users. The market was booming, there was political support for expansion, and inner cities were closed off to new developments. Due to high demand for office space, construction took place wherever possible. These monofunctional locations are now, 30 years later, functionally and economically outdated. Newer highway locations do not face the same problems but are designed based on the same concept. Most likely, if these locations are surpassed by new developments in terms of accessibility and working environment, a similar aging process will happen.

One of the main reasons for the rapid aging of offices is that the work environment has become an increasingly important asset in today's tight labour market. Employers attract employees not only with a good salary but also with good secondary benefits. The work environment plays an increasingly important role in this. Employees prefer working in an urban area with many amenities rather than in a monotonous business park. Soft factors such as representativeness, appearance, and atmosphere have become just as important as hard factors like accessibility.

Other real estate sectors have also seen large surpluses in recent years. Due to online shopping and an oversupply of retail space, retail properties show high vacancies. However, there are significant differences in the market. Specific area and building characteristics explain the attractiveness of inner-city shopping areas to consumers and the demand for retail space from retailers. Research by Van der Wal et al. (2016) indicates that medium-sized cities struggle to compete with large cities. The COVID-19 pandemic led to more retail spaces becoming vacant. Through the adaptive reuse of retail space, the vacancy rate was reduced to 5.5% by the end of 2022 (Locatus, 2023).

Other types of real estate that could be adapted into housing include for example schools and churches. In 2020, the Netherlands still had 7,110 churches. 5,285 were still used as churches. However, this number is rapidly declining, with 20 to 80 percent at risk of closing by 2030. More than 1,500 have already been transformed, and many others have gotten a secondary function. (Reinstra & Strolenberg, 2020).

1.3

Is there a market for adaptive reuse?

The previous section described why adapting structurally vacant real estate into housing can contribute to expanding the housing supply while also providing a solution for properties that have lost their function. The location of the properties is an important factor in this. Locations in the city centre, in residential neighbourhoods, or on the outskirts are usually suitable for adaptive reuse into housing. However, vacant office, logistics, and industrial real estate, is often located in office and industrial areas that are not desirable as residential locations. As part of an integrated area transformation, however, the adaptive reuse of existing real estate could be a feasible alternative to further urban expansion.

Transformed buildings in the city centre are a valuable addition to the existing residential stock, accommodating different types of apartments. The location and typology of the building help define target groups: the potential buyers or renters. Possible target groups include students, starters, small families, empty nesters, and seniors. Students, starters, and small families prefer to live centrally and close to amenities. Their homes can deviate from the standard in size and spatial programme. The income of these groups varies. Homes in the mid-segment (purchase prices up to 440,000 euros and rental prices up to 1,200 euros) are most aligned with these target groups. Empty nesters and seniors also prefer to live near amenities. They often want to live in a familiar neighbourhood or close to children and friends. Comfort is important to these groups, but their budget varies. Seniors have increasingly higher incomes, remain healthy longer, and when they leave a home they own, they have access to substantial wealth. They want to live independently for as long as possible and desire a comfortable rental or owner-occupied apartment, separate from but with access to care and services. Unfortunately, there are not many of these types of homes available.

TABLE 1.1 Example of costs and benefits of alternatives

	HIGH	MEDIUM	LOW
Office rent per m²	500	300	150
Capitalisations factor	12	10	9
Office value per m²	6000	3000	1350
Housing value per m²	8000	6000	3000
Housing value per m², after cutting loss	7200	4800	2400
Remaining for renovation, per m²	1200	1800	1050

Aantal gecreërde woningen door transformaties

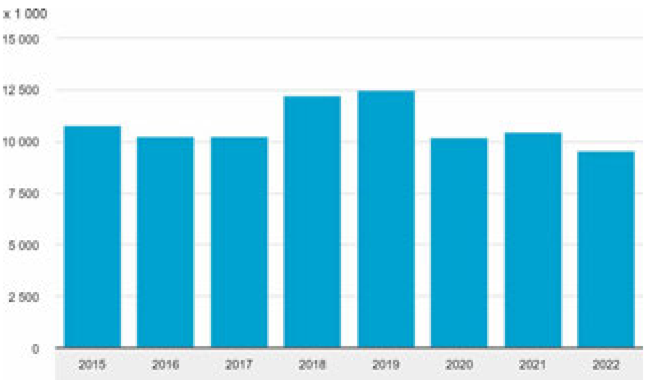

FIG. 1.1

Woningtransformaties naar oorspronkelijk gebruiksfunctie (2022)

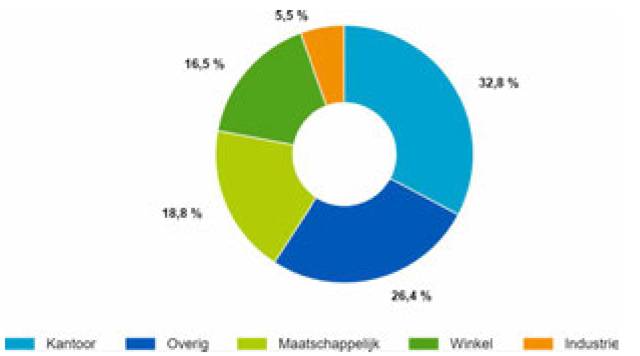

FIG. 1.2

FIG. 1.1 **Number of houses added through adaptive reuse from 2015 to 2022**
Source: CBS, 2023

FIG. 1.2 **Housing by adaptive reuse by orginal function in 2022**
Source: CBS

Owners of vacant real estate might choose to adapt their property themselves. A feasibility study of the possibilities of the current function or adaptive reuse into housing is done by comparing the revenues, costs, and returns of these alternatives.

In Table 1.1, the number of square metres of offices refers to the lettable floor area, and square metres of housing refers to the usable floor area. The latter does not include the main entrance, shared circulation areas, and storage spaces. This example assumes direct sale of apartments after adaptive reuse, assuming also that the offices are rented out for five years. Several options are compared. The first option is to wait for an office tenant who will rent for five years. If this is not successful, the option is not financially feasible. The second option is to adapt the building into housing. This means new investments, but prevents further losses. The example highlights the conflict between existing owners and new users. Higher office real estate values mean less budget for the adaptation. In this calculation example, VAT is not included, as VAT in adaptive reuse depends on the nature of the work and the actors involved in the adaptive reuse (RVO, 2017).

Although often financially feasible, adaptive reuse of vacant office real estate into housing will not contribute to significantly reduce office market vacancy and address the housing production backlog. Figures 1.1 and 1.2 show the number of homes added through adaptive reuse in recent years.

Figure 1.1 shows that the number of homes added annually through adaptive reuse fluctuated between 10,000 and over 12,000 homes in the period 2015-2022. This represents approximately 15% of the annual housing production during this period. This number has been on the rise since 2013; in 2012, only 6,500 new homes were added to the housing stock through adaptive reuse. However, the number of homes realised through adaptive reuse has been slightly declining again since 2020. This development, and the number of 9,600 homes in 2022, is quite far removed from the political aim of 15,000 homes per year (Rijksoverheid, 2022).

1.4

Conclusion

This chapter shows good arguments from both the housing market and the office market to continue transforming excess office space into housing. Even though the number of office to housing adaptations has increased over the past decade, expectations for adaptive reuse to reduce the housing shortage should be tempered. Over the past 10 years, adaptive reuse has contributed approximately 10% to the housing production, though this share seems to decline.

Not achieving the desired number of new homes per year through adaptive reuse should not discourage those involved in adaptive reuse. Even lower numbers could make a significant contribution to reducing the housing shortage. When these adaptations are in an urban environment, they also meet the needs of small households that prefer to live in central locations. Additionally, the prices of office real estate have fallen reasonably in recent years, making it easier to create a viable business case. Earlier, this was a significant obstacle, as the adaptive reuse of office space into housing often meant a substantial write-off of real estate value. Moreover, in the coming years, more offices will become obsolete due to stricter energy efficiency requirements. A choice will then inevitably have to be made between renovation, demolition, or adaptive reuse.

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Financial feasibility of adaptive reuse to housing

If it does not yield, it will not proceed

Peter de Jong and Michaël Peeters

The adaptive reuse of offices into residential spaces is a significant topic in the current housing shortage and urban regeneration. This adaptive reuse involves various financial aspects that present both opportunities and challenges for developers. When evaluating the financial feasibility of a adaptive reuse project, the focus is often on maximising the reuse of existing structures. This aligns with sustainable and circular objectives. However, from a purely financial perspective, this is only sometimes straightforward. Existing building structures impose constraints that may lead to suboptimal outcomes after adaptive reuse. The project may not achieve the desired returns if the financial evaluation is based solely on conventional market assessments. The key lies in value determination, which should encompass both financial and social components. Only an integrated assessment can thoroughly understand the feasibility of future-proof (adaptive reuse) projects.

2.1

Introduction

The adaptive reuse of offices into housing is a growing trend in the real estate sector, driven by the changing needs of urban areas and the benefits of reusing existing structures (Guerritore & Duarte, 2019). Additionally, land is scarce, and there are increasingly stringent regulations for new construction projects (Aalbers, 2019). While clear ecological and social benefits are associated with adaptive reuse projects—such as reducing urban sprawl and better utilising already developed spaces (Cho et al., 2009)—financial feasibility often remains a critical factor in the decision-making process (Li & Zhang, 2014). This chapter explores the complex interplay between these adaptive reuse projects' financial, sustainable, and social aspects.

From a financial perspective, feasibility revolves around the initial redevelopment costs, complemented by other dimensions such as maintenance efficiency, energy savings, and, not to be overlooked, the potential increase in property value (Alvise Baradin et al., 2022). The urgency of sustainability aspects is becoming increasingly apparent. Energy-efficient installations, the reuse of materials, and the reduction of CO_2 emissions are not only desirable from an ecological standpoint. Still, they can also result in financial savings through, for example, subsidies, higher market value, or increased liquidity and market attractiveness (Bindewald, 2013).

The financial feasibility should be an integrated assessment considering ecological sustainability and social impact.

From a social perspective, these adaptive reuse projects can benefit society. For instance, they can help address the growing housing shortage in many cities. Moreover, if executed well, they can enhance social cohesion by creating mixed-use living, working, and recreational zones, which, in turn, can stimulate the local economy.

Therefore, the financial feasibility of a project should be considered in collaboration with others. It requires an integrated assessment that considers ecological sustainability and social impact. This complex interweaving of factors makes the topic particularly relevant for a wide range of stakeholders, from developers and investors to policymakers and eventual residents. This chapter will examine these aspects in detail, supported by concrete examples and technical details, to paint a holistic picture of what financial feasibility truly means in sustainable adaptive reuse.

2.2

Financial parameters and methodologies

Financial parameters (Taylor et al. 2023)

- **Investment & Financing:** This includes all initial costs for purchasing the property and the adaptive reuse itself, as well as financing methods (equity, loans, subsidies).
- **Operational costs:** These are the ongoing costs, such as maintenance, energy consumption, and management costs, that must be included in the feasibility calculation.
- **Netto Present Value (NPV):** The NPV of the project is calculated to evaluate the long-term profitability. .
- **Internal Rate of Return (IRR):** This represents an investor's expected return.
- **Risk Analysis:** Variables such as market value, occupancy rates, interest rates, and other uncertain factors must be assessed.
- **Sustainability Premiums:** These are potential financial incentives for sustainable initiatives, such as energy savings and subsidies. .
- **Social Returns:** Although more challenging to quantify, social benefits like improved liveability and societal contributions can be included in some models.

Taylor et al. use Remøy & Van der Voordt (2007) as a starting point and numerous MSc theses. This explains the strong similarities with the further elaboration of the Transformatiemeter kantoren (see "11. Transformation meter for offices"), this list of financial parameters, and the transition to calculation methods.

Calculation methods

- **Cost Price Calculation:** A detailed estimate of all costs involved in the adaptive reuse.
- **Break-even Analysis:** Calculating the point at which total revenues will cover expenses.
- **Cash Flow Analysis:** A time-oriented overview of income and expenses.
- **Sensitivity-analysis:** Varying critical variables within a model to see the effect on the outcome.
- **Life Cycle Analysis:** This includes Life Cycle Cost Analysis (LCCA) and Total Cost of Ownership (TCO) to the integrated value-based business case (Hoendervanger & Van der Voordt, 2023). The commonality among these cost analysis is a deep look at sustainability and long-term costs and values.

Conceptual Approaches

- **Triple bottom line:** This approach considers social, ecological, and financial factors in addition to financial factors for a more holistic evaluation.
- **Real options analysis (ROA):** This method considers the value of future options and flexibility within the project
- **Value Creation Through Sustainability:** This approach views sustainability initiatives as value-creating financially and intangibly.
- **Public-Private Partnerships(PPP):** In some cases, collaboration between public and private entities can improve financial feasibility.

Combining these parameters, calculation methods, and conceptual approaches can conduct a thorough financial analysis. This enables stakeholders to make well-informed decisions based on immediate costs and benefits and consider long-term sustainability and social impact.

In real estate development, transforming offices into housing is among the most challenging yet rewarding ventures. However, the risks are significant and can have substantial financial consequences, making a comprehensive risk analysis indispensable.

One of the critical concerns is financial risk. Despite careful budgeting, the initial costs of an adaptive reuse project often exceed expectations due to unforeseen expenses, such as structural defects that need to be corrected or delays in the supply of materials. These costs can quickly escalate, thereby undermining the project's financial feasibility.

FIG. 2.1 **Number of homes added through adaptive reuse from 2015 to 2022**
Source: CBS, 2023. The approach to adaptive reuse versus supply determines it, but with a volume of more than 2 million m², it makes a relevant contribution to the housing task. There will be a focus on more adaptive reuse for housing purposes, while more supply will also arise due to improving environmental requirements.

Vacancy (n), also vacant in the previous year in the Netherlands, by reference year (Selection: offices)

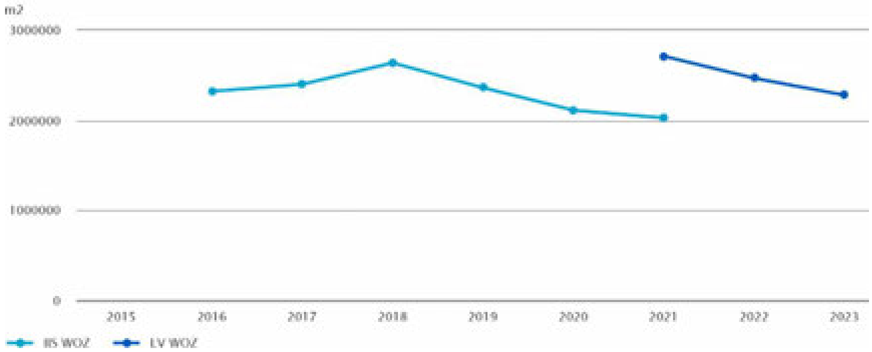

FIG. 2.1

In addition to financial considerations, market risk plays a crucial role. Adaptive reuse projects often have long lead times, during which market conditions can change. If the demand for housing in a particular region decreases or interest rates rise, this can significantly affect the project's ultimate profitability.

Furthermore, there is regulatory risk. A project may be delayed or even halted if it does not comply with changing building decrees or environmental regulations. Moreover, additional sustainability requirements, such as using sustainable materials or energy-neutral solutions, may be imposed, which can increase costs.

In risk analysis, European regulations offer essential tools, such as the EU Taxonomy, the Sustainable Finance Disclosure Regulation (SFDR), and the Corporate Sustainability Reporting Directive (CSRD). These instruments have far-reaching implications for how investors and institutional players evaluate and report on projects. The EU Taxonomy provides a classification system that helps investors identify sustainable activities. Adaptive reuse projects focused on reusing existing building materials and minimising energy consumption can be particularly attractive in this context. The SFDR requires financial market participants to report openly and in detail about the sustainability of their investment decisions.
This means that developers and investors engaged in transforming offices into housing must consider a range of ESG (Environmental, Social, and Governance) criteria that may affect the attractiveness of their project to potential investors. Under the CSRD, companies must disclose non-financial information, including their impact on the environment and social issues. This increases transparency and can positively affect the valuation of adaptive reuse projects. Projects that offer clear social value, such as creating affordable housing, could be especially appealing to investors looking to align their portfolios with these new reporting requirements.

In this context, it is also important to maintain sight of the social perspective. A successful adaptive reuse offers financial returns and contributes to societal goals, such as reducing housing shortages and promoting social cohesion. Therefore, it is essential to balance financial feasibility, sustainability, and social impact.

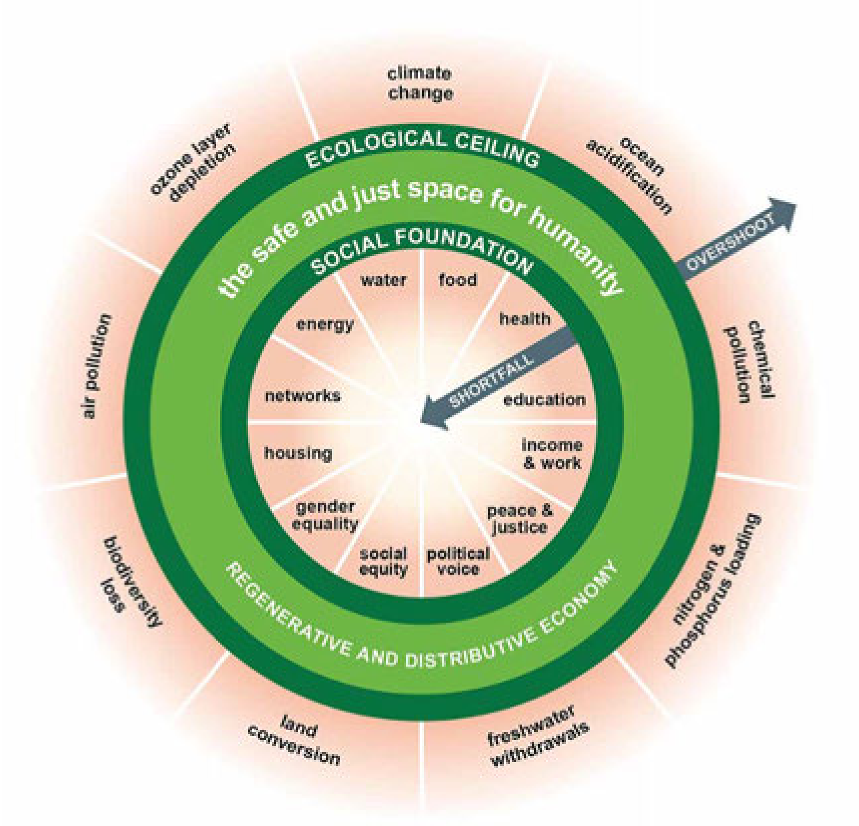

FIG. 2.2

FIG. 2.2 **Social foundations and ecological ceilings**
Source: Raworth 2017

Therefore, the success criteria for an adaptive reuse project are not solely financial. Achieving a sustainable, socially beneficial, and financially feasible project requires a versatile approach that harmonises these various aspects. Adhering to regulations, actively responding to market developments, and minimising financial risks are just some of the many factors that contribute to the ultimate success of an adaptive reuse project.

The success of, for example, the adaptive reuse of the Studentenflat Aan 't Verlaat (see '4. Temporary Adaptive Reuse by SHS Delft') lies mainly in the clever use of the existing situation, legislation, and context. Financially, it is more about the costs of organising the process than about construction costs. If all the complex agreements are well arranged, transforming a sister flat into a student flat is no longer complicated.

Doughnut economics

For a pragmatic view of adaptive reuse at this moment, '22. Adaptive reuse from the Developer's Perspective' provides the necessary insight. In real estate development, and therefore also for adaptive reuse, the concept of 'doughnut economics,' as developed by economist Kate Raworth (2017), offers an interesting future perspective for balancing financial, social, and ecological factors (Turner & Wills, 2022). This model suggests focusing on economic growth and considering social foundations and ecological ceilings. In other words, it is about finding a 'safe and just space for humanity,' a space that is both economically viable and ecologically responsible.

In adaptive reuse, this could mean that, in addition to striving for financial returns, deliberate choices are made to contribute to social welfare and ecological sustainability. Adhering to principles from doughnut economics can also help minimise regulatory risks, especially if governments begin to enforce stricter environmental and social standards. The choice of circular materials and construction methods should not only be seen as a cost but also as an investment in sustainability and social well-being. The same applies to incorporating social amenities into the project, such as affordable housing segments, which can contribute to social cohesion and local community support.

Considering doughnut economics, it becomes clear that success criteria for an adaptive reuse project go beyond mere financial feasibility. They encompass financial, social, and ecological considerations, resulting in a balanced project that is profitable, sustainable, and socially responsible. This integrated approach makes a project successful in the complex and ever-changing context of contemporary real estate development.

From a global perspective, doughnut economics is related to the global redistribution of resources and inherently to the limitation of growth—countries where the focus must be on reducing consumption due to ecological ceilings versus countries that still need to catch up to achieve social foundations. This does not make shrinkage a goal. Even limited growth can provide space for future-proof development (Swets & Ederveen, 2023).

While the focus on this alternative economy may still be too overarching for this contribution, two pragmatic main lines can be drawn from the preceding: 'building what is possible' and 'the perspective on time.'

FIG. 2.3

2.3

Building what is possible

FIG. 2.3 **SUM: Adding extra floors to gallery flats**

The newest addition to the Delft campus is the Flux building. Due to uncertainties about future demand, it was decided to construct an interfaculty, temporary, and demountable educational building, which can be reassembled and reused elsewhere. The building is circular, with reused materials at the front and a modular and reusable setup at the back. It is, of course, self-sufficient in energy. The fact that reused furniture is more expensive than new but is still used shows that a broader value concept has been applied. The savings on materials through reuse were considered in the decision-making process.

In adaptive reuse, reuse is already secured at the forefront. The most successful adaptive reuse projects are those where the preservation of the existing structure is optimised. The Solar Decathlon projects demonstrate that this can be future-proof (resource-positive).

The MOR (Modular Office Renovation) project used a cross-section of a floor in the Marconi Towers in Rotterdam as the basis for a pavilion. These office buildings have been standing for more than fifty years and can last for another 150 years. It is certain that these towers will undergo several functional changes in the future. Through its modular approach, the MOR demonstration pavilion can accommodate the transition from living to working and vice versa. With a well-thought-out architectural, energy, and climate design, the pavilion—and the towers—will continue to generate energy and contribute to better air and environmental quality.

The SUM project in The Hague also focuses on adaptive reuse, in this case, the renovation of gallery flats with an additional floor that increases density by 50% and meets the resource-positive requirement. The added value is the inclusive approach, which involves residents in the transition from the old to the new form. This project, too, was carried out with many partners and thoroughly evaluated for feasibility. Remarkably, the feasibility is related to scale. While a single additional floor quickly becomes uneconomical, an acceptable cost level for social housing is achieved when at least eight gallery flats are realised within a project. The original gallery flat was designed for SUM in The Hague. With hundreds of such gallery flats "at demolition height" (built between 1960–1970) in the surrounding area, the need arises to consider construction flows rather than projects. Resource-positive and biobased construction can also be applied in adaptive reuse, whether you ever want (or should) do anything else.

2.4

The perspective on timed

The most significant risk to the feasibility and quality of projects is the need for more time. When stakeholders prioritise their short-term interests and choose a hit-and-run approach based on those interests, it can lead to compromised project outcomes. In real estate, value is also tied to time: buildings are not just designed for their first use, but they can repeatedly deliver value over time. Project approaches where stakeholders can transcend their immediate concerns to work together toward a future-proof result and adjust as necessary are based on a long-term trust relationship. The breadth of perspective and the time considered are essential in the previously mentioned life cycle analysis.

FIG. 2.4 **All relevant costs and values must be considered for the total cost of ownership, as shown in this diagram from NEN-ISO: Buildings and Constructed Assets: Service-Life Planning (2008)**

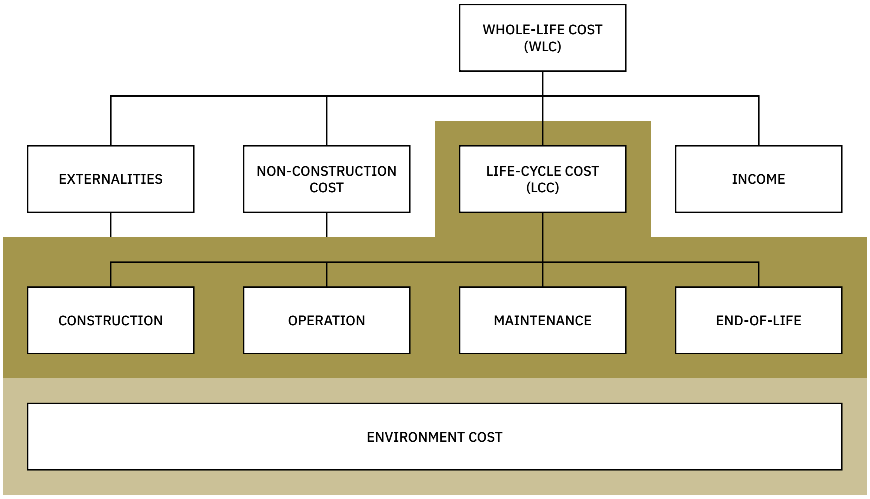

FIG. 2.4

In Figure 2.4 of the TCO (Total Cost of Ownership) model, specifically applied to construction, this breadth is well expressed, but the duration still needs to be clearly defined. The cost item "end-of-life" suggests that it pertains to the building's lifespan, which in a more modern approach would relate to the costs of dismantling and organising reuse rather than demolition. Nevertheless, this is a phase transition with transaction costs and significant residual value, which must be considered in the design and maintenance of the building.

Mathematically, it is a scheme for cash flows in which actual, societal, and environmental costs are weighed against actual, societal, and environmental benefits. The time axis is relatively long, and the result is less exciting as long as there is a sufficient balance at intermediate points.

To illustrate, here is an example from our campus: how to deal with CO2 pricing. First, the breadth helps by not only considering the buildings but also the location, including all green and energy provisions. The expectation is that CO2, like other emissions, will be taxed, linked to emissions, at a price per ton. We can save that money for prevention now, which will also be the goal if such a tax is introduced. The advantage of a future lower emission is straightforward and can also be factored into the cash flow. An additional advantage for the university as a research institution is that (research into) prevention provides a competitive advantage, which can also be assigned a value.

2.5

Conclusion

As the chapter's subtitle suggests, if it doesn't benefit, it won't work. To make this variant of an old adage future-proof, the benefits, what we want to build, and our perspective on time must be redefined.

This chapter provides an analysis of the financial feasibility of transforming offices into residential spaces. We have seen that such projects require a multifaceted approach, where economic aspects are considered, ecological sustainability, and social impact. It has become clear that the key to success lies in carefully balancing these three pillars:

1. **Financial Considerations:** Adaptive reuse projects require thorough financial planning and risk management, considering the significant investments and uncertain market dynamics. The feasibility of these projects strongly depends on detailed financial analysis and realistic profit projections.

2. **Ecological Sustainability:** The role of sustainability in such projects cannot be underestimated. By choosing green solutions and reusing materials, these projects can contribute to a better environment while delivering financial benefits.

3. **Social impact:** Transforming office spaces into residential buildings offers a unique opportunity to address social issues. This includes reducing housing shortages and promoting community spirit. Integrating social values into the evaluation of projects can lead to more inclusive and cohesive communities.

The adaptive reuse of office spaces into residential buildings requires a strategic approach that looks beyond just financial aspects. By maintaining a balanced focus on financial feasibility, ecological sustainability, and social impact, such projects can be profitable and socially valuable. Developers, investors, and policymakers must collaborate to achieve these multidimensional goals while pursuing innovative and sustainable solutions for urban development.

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3

Legal Framework

Rules for the adaptive reuse to housing in the Environment and Planning Act

Fred Hobma

This chapter discusses the rules that apply to the adaptive reuse of buildings into housing under the new Environment and Planning Act (Dutch: Omgevingswet). The focus is on three components: (1) the legal-planning procedures that must be followed for adaptive reuse; (2) the technical quality level that the new homes must meet; and (3) participation requirements for adaptive reuse projects. The participation requirements are new compared to previous legislation. The rules for adaptive reuse relate to the procedures that must be followed and the minimum quality level of the adaptive reuse design. Knowledge of the rules is important because the procedures affect the timeline, and the quality requirements affect the costs of an adaptive reuse project.

3.1

Introduction

Every adaptive reuse into housing requires legal 'permission' from the municipality. Obtaining this permission is an essential part of the adaptive reuse process. The process of acquiring municipal approval is not always straightforward. With the implementation of the new Environment and Planning Act, new rules apply to the adaptive reuse of real estate. Prior to the enactment of this law, adaptive reuse projects were often made possible through the so-called "small cases" regulation (Dutch: kruimelgevallenregeling) of the Environmental Permitting Decree (Dutch: Besluit omgevingsrecht). This regulation no longer exists under the Environment and Planning Act. This chapter discusses which legal and planning procedures now apply. Furthermore, this chapter examines the minimum technical quality standards that the design of the homes must meet to obtain an environmental permit for a so called ‘construction activity’. Finally, the participation obligations for adaptive reuse project initiators are discussed. The Environment and Planning Act includes rules for participation that did not exist before.

Obtaining legal permission is an essential part of the process of converting properties into housing.

3.2

The legal and planning basis for adaptive reuse under the Environment and Planning Act

Which main routes for obtaining a legal and planning basis for the adaptive reuse of real estate does the Environment and Planning Act recognise?

Amendment of the physical environment plan plus an environmental permit for in-plan physical environmental plan activities

If the adaptive reuse project is not yet fully defined, the initiator can submit a request to the municipality for an amendment to the physical environment plan (Dutch: omgevingsplan). The competent authority is the municipal council or the mayor and aldermen after delegation by the municipal council. An amendment to the physical environment plan can take place based on what the law calls "a balanced allocation of functions to locations" (Article 4.2, paragraph 1 of the Environment and Planning Act). An adaptive reuse project can very well meet this criterion.

The amendment of the physical environment plan follows an extensive procedure that, according to the General Administrative Law Act, takes six months, but in practice often takes more time. Exceeding the 26-week period has no major consequences for the municipality. Although the initiator can demand a penalty from the administration if it exceeds the deadline, it is of limited use. The penalty is low and capped at around €1,500 in total. Moreover, even if the administration has to pay a penalty to the initiator, the initiator still does not have the required government decision.

The amended physical environment plan serves as a basis for later assessing an application for an environmental permit for a so-called " physical environmental plan activity" (Dutch: omgevingsvergunning voor een omgevingsplanactiviteit) once the project is sufficiently developed. Based on the physical environment plan, such an environmental permit for a physical environmental plan activity may be required. This is the case if the adaptive reuse project falls under one of the activities for which the physical environment plan indicates that an environmental permit is needed. In short, the physical environment plan determines for which activities—this can very well include an adaptive reuse project—an environmental permit for a physical environmental plan activity is required. The requested environmental permit is then assessed against the criteria outlined in the physical environment plan, which can vary by municipality. Generally, these criteria pertain to:

1. The maximum or minimum height or a range of building heights at a specific location;
2. Densities, ranging from a simple plot ratio (a maximum percentage of the plot area that may be built upon) to complex ratios such as a floor space index;
3. The appearance of buildings at the location, including colour schemes and materialisation;

4. The use of the buildings, for example, for residential or commercial purposes;
5. Regulations regarding the number of parking spaces on the property to meet the building's parking needs;
6. Rules to determine if the building fits within the existing urban structure.

Since this main route for obtaining a legal and planning basis for adaptive reuse assumes that the adaptive reuse project fits within the amended physical environment plan, the required permission is called an "environmental permit for an in-plan physical environment plan activity." In principle, the assessment period for an application for an environmental permit for an activity that fits within the physical environment plan is eight weeks. In practice, this can also take (much) longer. Under the Environment and Planning Act, there is no longer a "lex silencio positivo" where environmental permits are automatically granted by law if the eight-week period passes without a decision from the board of mayor and aldermen. As mentioned, the Environment and Planning Act no longer includes this. Therefore, there is no strict deadline for the assessment of the permit application by the board. However, the imposition of a penalty is still possible.

This section has discussed the environmental permit for the "physical environment plan activity." For an adaptive reuse project, an environmental permit for a "construction activity" is also required. This does not concern the legal and planning aspects of the adaptive reuse project but the technical aspects. Section 3 will elaborate on this further.

Environmental permit for an out-of-plan physical environment plan activity

The main route of the "environmental permit for an out-of-plan physical environment plan activity" can be chosen by the initiator if the adaptive reuse project is quite far along in its development. This route is an alternative to the main route of amending a physical environment plan as discussed in the previous section. If the adaptive reuse project conflicts with the physical environment plan, that conflict can be resolved by the board of mayor and aldermen through the granting of an environmental permit for an out-of-plan physical environment plan activity. Just like with the amendment of the physical environment plan, the criterion on which the permit can be granted is "a balanced allocation of functions to locations." This requires a well-founded justification from the board. However, there is an important difference from the in-plan environmental permit. The difference is that an environmental permit for an out-of-plan physical environment plan activity is subject to essentially the same substantive requirements as the establishment or amendment of a physical environment plan. This means that preparatory research is needed on matters such as soil, traffic, flora and fauna, and archaeology. Additionally, the directive rules (Dutch: instructieregels) from the national government and the province for environmental plans must also be followed. Directive rules are, as the name suggests, instructions from the national or provincial government to (in this case) municipalities. An example is a directive rule to keep routes for pipelines transporting natural gas and hazardous substances free from construction. Therefore, the preparation by the initiator of an application for an environmental permit for an out-of-plan physical environment plan activity will take much more time than the preparation of an environmental permit for an in-plan physical environment plan activity. The competent authority for granting an environmental permit for an out-of-plan physical environment plan activity is, in principle, the board of mayor and aldermen. However, the municipal council can pre-emptively designate cases in which the council provides a binding recommendation to the board. Essentially, this involves a "list" of construction projects for which, if they are involved in a request for an environmental permit for an out-of-plan physical environment plan activity, the municipal council is de facto empowered to make the decision.

The decision period for an application for an environmental permit for an out-of-plan physical environment plan activity is generally eight weeks. This period can be extended once by six weeks. However, there are several situations where the eight-week period does not apply, and instead, a 26-week period is relevant. In this context, Article 16.65, paragraph 4 of the Environment and Planning Act is relevant. This article stipulates that the 26-week period can be applied by the board of mayor and aldermen to the application: (a) if it concerns an activity that has or could have significant effects on the physical living environment, and (b) where various stakeholders are expected to have objections. This can, of course, also apply to adaptive reuse projects. It should be noted that in practice, the 26-week period can be (significantly) longer.

As under the previous law, stakeholders can also use appeal options under the new law to challenge a physical environment plan or environmental permit. For example, it is not uncommon for residents to appeal against the granting of an environmental permit due to concerns about the number of parking spaces available for the future residents of the building to be transformed. In such cases, residents often fear that there will be insufficient parking space in the area after the building is transformed into a residential function.

An example of this (under the old law) is the case that led to the ruling of the Administrative Jurisdiction Division of the Council of State on October 10, 2023 (ECLI:NL:RVS:2023:3776). This case involved the adaptive reuse of an office building into apartments. For the 41 apartments, 70 parking spaces were required (57 parking spaces for the residents and 13 parking spaces for visitors of the apartments). Fifty of the required parking spaces were to be provided in the basement of the building. The board of mayor and aldermen allocated 20 already existing parking spaces to the adaptive reuse project. However, according to the judge, this was unjustified. The judge determined that only 13 of the existing parking spaces could be allocated to the adaptive reuse project. Therefore, the decision of the mayor and aldermen to grant the permit for the adaptive reuse project was not properly prepared, according to the court.

3.3

The technical quality level of the homes to be built

In addition to the environmental permit for the (in-plan or out-of-plan) physical environment plan activity, the initiator will also need to obtain an "environmental permit for the construction activity." After all, it is basically prohibited to carry out a "construction activity" without an environmental permit (Article 5.1, paragraph 2, Environment and Planning Act). In short, a design within the framework of the construction activity is assessed against technical requirements.

Under the old legislation, the technical requirements for the design were included in the Building Decree. Under the Environment and Planning Act, they are included in the Building Decree for the Living Environment (Dutch: Bbl: Besluit bouwwerken leefomgeving). It is important that, regarding adaptive reuse, the requirements in the Bbl are substantively quite comparable to the requirements from the Building Decree.

Like the Building Decree, the Bbl contains specific technical requirements for renovations. The Bbl regulations are national regulations that are the same for every municipality. Furthermore, it is relevant that the Bbl regulations are formulated as a minimum quality level. They reflect the socially acceptable minimum. The legislator considers it sufficient if construction is carried out at this minimum quality level, but it is very possible that the Programme of Requirements contains a higher quality level. The standards of the Bbl are of a public law nature. The requirements in a Programme of Requirements are determined based on an agreement (private law). A correct Programme of Requirements is at least at the level of the regulations of the Building Decree for the Living Environment.

As indicated, the Building Decree for the Living Environment contains the technical regulations that buildings must comply with. But it is important to note that there are significant differences in the number and level of regulations between new construction, renovation, and existing buildings. This is evident from Section 5.3 of the Bbl. There are three quality levels: for new construction, renovation, and existing buildings. The category "new construction" refers to buildings that are truly newly built. "Renovation" concerns the alteration of buildings that were previously constructed. Adaptive reuse projects must comply with these renovation regulations. The "existing" category refers to buildings that have been constructed and are not being renovated. This last category must also meet certain minimum technical requirements. An example is, in short, that they must be windproof and waterproof.

The reason for the tripartite division is that the legislator considers it irresponsible to apply high new construction standards to buildings that are being renovated or already exist and are not being renovated (the "existing" buildings). That would be technically and financially (for the building owners) unfeasible. It is also difficult to justify that buildings, for example, built in the eighteenth century with a permit based on the rules in force at the time, should suddenly have to comply with current energy regulations. In summary, the regulations for newly constructed buildings are higher than those for buildings to be renovated, and those for buildings to be renovated are higher than those for existing buildings.

The law, concerning the technical assessment of the design, assumes a "reasonableness test" (Dutch: aannemelijkheidstoets)." Article 8.3b of the Quality of Living Environment Decree (Dutch: Besluit kwaliteit leefomgeving) states that an environmental permit for a construction activity is granted if "it is reasonable to assume" that the design complies with the regulations of the Building Decree for the Living Environment (Bbl). It is important to know exactly which regulations of the Bbl a design is assessed against. For adaptive reuse (= renovation in terms of the Bbl), the environmental permit is only granted if it is reasonable to assume that the rules of Chapter 5 (renovation and relocation of a building and change of a functional use) and Section 7.1 (construction and demolition activities on buildings) of the Bbl are met. Article 5.4 of the Bbl indicates that, in principle, the "legally acquired level" (het rechtens verkregen niveau) is the starting point for adaptive reuse. Article 5.5 of the Bbl clarifies what this means:

1. The quality level of a building or part thereof after a renovation shall not be lower than the permissible quality level immediately prior to that renovation.
2. If the quality level referred to in the first paragraph is lower than the level for existing buildings prior to the renovation, the level for existing buildings shall be the minimum quality level to be maintained, notwithstanding the first paragraph.
3. If the quality level prior to the renovation is higher than the level for new construction, the level for new construction shall be the minimum quality level to be maintained, notwithstanding the first paragraph.

In short, the "legally obtained level" refers to the level that the building to be renovated had prior to the adaptive reuse. However, Section 5.3 of the Building Decree (Bbl) indicates that for certain aspects, such as energy efficiency, the legally obtained quality level does not apply during renovations, as it may be relatively low, but rather a higher level is required. This level is summarised as slightly lower than the level for new construction.

The "legally obtained level" is a minimum level that must be achieved during renovations. It is therefore entirely possible that a design "voluntarily" exceeds that quality level. However, it is also possible that a transformed building largely (except for the aspects mentioned in Section 5.3 of the Bbl) retains the technical quality level of the original building. This can be confusing for buyers or tenants of apartments in a transformed building. They may have thought that the homes were built to the quality level of new construction, but this is by no means necessarily the case. Disappointment may ensue.

An example is the case that led to a ruling by the Arbitration Board for the Construction Industry on March 22, 2023 (no. 37.314). The dispute concerns whether the new construction or the lower renovation requirements (as per the Building Decree) apply to the apartment. The arbitrator considered the following:

"The apartment building was completely newly constructed, starting from the preserved foundation of a demolished office building. Therefore, the project would fall under 'renovation' as defined in the 2012 Building Decree, and the relevant requirements would apply to the apartment building."

"However, this was not evident at all to the clients from the sales documents. These documents depicted a typical new construction, without any reservation regarding potentially lower requirements applicable to renovations. The fact that the permit issued by the municipality was based on a renovation situation does not change this. This permit is not part of the contract documents and was not made known to the clients in any other way when entering into the construction contract."

"Therefore, in the arbitrator's opinion, the clients were entitled to expect that the apartment building to be realised would comply with the requirements applicable to new construction."

Table 3.1 provides an overview of the differences between the environmental permit for the construction activity and the environmental plan activity.

TABLE 3.1 Differences between environmental permits for construction and environmental plan activity

ADAPTIVE REUSE PROJECT		
	Activity	**Activity**
Name of the environmental permit activity	construction activity	physical environment plan activity
Where the assessment rules are located	building decree for the living environment (national)	physical environment plan (local)
Character of the assessment rules	technical	spatial
Content of the assessment rules	– load-bearing capacity – stability – fire resistance – energy performance – daylight – and more	– height – density – appearance – use – parking – and more

3.4

Participation

The Environment and Planning Act assigns, unlike the old legislation, an important role to participation in the environmental permit process. This is significant for adaptive reuse projects, which typically take place in an already built and thus used environment. Notably, the Environment and Planning Act includes rules for privately organised participation. This means that it is not the government, but the initiator of the adaptive reuse, who must organise the participation.

There is a difference regarding participation between a physical environment plan activity that fits within the physical environment plan (within-plan environmental plan activity) and a physical environment plan activity that conflicts with the physical environment plan (outside-plan physical environment plan activity).

Environmental plan activity fits within the physical environment plan

The applicant for the environmental permit must provide information about participation. The applicant is required to indicate *whether* participation has taken place. In principle, the applicant does not *need* to organise participation around the construction plan. However, if participation has occurred, the permit applicant must describe how it was conducted and what the results were through a written description (Article 7.4 of the Environmental Regulation).

If no participation has taken place, this cannot be a reason for the municipal executive (the mayor and aldermen) to dismiss the application. The application must still be assessed according to the assessment rules of the physical environment plan. These rules generally concern building dimensions (such as building height or building coverage percentage), architectural design (aesthetics), and parking.

Even though there is no strict obligation to organise participation for a within-plan physical environment plan activity, it is still useful to do so. This is based on the idea that it is beneficial to inform the surrounding community about an upcoming environmental permit application, to possibly adjust construction plans based on received feedback, and to identify any potential issues that could lead to legal resistance.

Environmental plan activity does not fit within the physical environment plan

A stricter participation requirement applies to activities that conflict with the current physical environment plan. For these outside-plan physical environment plan activities, the municipal council can mandate participation for an environmental permit application (Article 16.55, paragraph 7, Environment and Planning Act). The participation requirement does not apply to all outside-plan physical environment plan activities, but only to certain activities specified by the municipal council in a council decision. This could very well apply to buildings being transformed into residential units. In other words, if applicable, participation is linked to the permit application and pertains to a building. Therefore, the participation concerns the scale of the building.

There are two ways in which participation requirements may vary between municipalities. Firstly, one municipality may require participation for certain construction projects (including adaptive reuse) with a minimum number of residential units, for a change of function, or in specific areas such as in or near nature reserves, while another municipality may not. Secondly, the law does not prescribe how participation should be organised or who should be involved. Therefore, differences between municipalities in this regard are also to be expected.

If the initiator does not comply with the participation requirement, the mayor and aldermen will give them the opportunity to supplement the application. If the permit applicant fails to do so, the mayor and aldermen can dismiss the application. This serves as a penalty for not following the participation requirement. If the permit applicant does meet the participation requirement, the mayor and aldermen will consider the outcome as part of the decision on whether the outside-plan activity is acceptable (in terms of the Environment and Planning Act: whether there is a "balanced allocation of functions to locations"). The lack of support from the community for the project does not have to be decisive. In other words, despite the lack of support, the mayor and aldermen can still decide to grant an environmental permit for the outside-plan activity if there are other reasons indicating that there is still a balanced allocation of the function in question for that location. The reverse also applies: the presence of community support should not be the sole argument for determining that there is a balanced allocation of the function to the location. The governing body must also be able to consider other factors, such as the project's costs, the relevance of nature (impact), and the interests of those who were not represented in the participation process.

3.5

Conclusion

An initiator of an adaptive reuse into residential units needs approval from the mayor and aldermen (B&W) in the form of an environmental permit. Obtaining an environmental permit takes considerable time in practice and is therefore a crucial element of the entire adaptive reuse process. In fact, it involves two environmental permits: one for the legal and planning approval (environmental permit for a within-plan or outside-plan physical environment plan activity) and one for the legal and technical approval (environmental permit for a construction activity). Additionally, the Environment and Planning Act contains rules about participation that did not exist before. These will often be applied in adaptive reuse projects because they typically involve activities that conflict with the current physical environment plan, and it is likely that many municipalities will designate outside-plan adaptive reuse projects as ones for which participation is mandatory. Notably, it is the initiator (= permit applicant) who must organise the participation and submit a report of it to the authorities.

Assuming that the initiator of the adaptive reuse first wants to obtain legal and planning certainty through an environmental permit for a (within-plan or outside-plan) physical environment plan activity before incurring costs for a detailed construction design, which forms the basis for the application of an environmental permit for a construction activity, this results in the following timeline. The timeframes mentioned are indicative and not strict deadlines. This means that they can be exceeded by the mayor and aldermen (Dutch: B&W: Burgemeesters & Wethouders) without significant consequences.

TABLE 3.2 Timelines for environmental permit application for construction projects

		TIME		
Amendment to the physical environment plan (26 weeks)	➔	**Environmental permit for within-plan physical environment plan activity** (8 weeks) + Indicate in the application whether participation has taken place	➔	**Environmental permit for construction activity** (8 weeks)
		OR		
Environmental permit for outside-plan physical environment plan activity (8 weeks or 26 weeks by decision of mayor and aldermen if there are significant impacts on the living environment or if various stakeholders are expected to have objections) + Include a participation report with the application if it is a project designated by the municipal council as one for which participation is mandatory			➔	**Environmental permit for construction activity** (8 weeks)

A point of concern is and has been that users of apartments created through adaptive reuse will often be unaware of a lower technical quality level compared to new construction, especially in cases where the adaptive reuse has been carried out at the legally obtained level, unless they receive active information.

Temporary Adaptive Reuse by SHS Delft

Jessica Balla-de Boer and Marieke Meyer-van Hall

Vacant real estate and a shortage of student housing are two well-known problems that the city of Delft faces. Empty buildings carry a high risk of squatting, dilapidation, and vandalism. Students in the Netherlands increasingly have difficulties finding housing. For example, students whose study location is too far from their parental home to commute daily during the week often end up staying at crowded campsites. Moreover, the master's programs in Delft attract many international students, for whom housing in Delft is also essential. In the 1990s, the municipality of Utrecht found a solution to both problems by transforming a vacant office building into student housing. This led to the establishment of the Foundation for Temporary Living (Dutch: Stichting Tijdelijk Wonen, STW). This foundation has since transformed several office buildings in Utrecht into affordable housing for young people. Inspired by this, the municipality of Delft started a search in February 2011 for students capable of realising a similar initiative in Delft.

Together with four fellow students, Marieke founded the Foundation for temporary adaptive reuse for student housing (Dutch: Stichting Herontwikkeling tot Studentenhuisvesting Delft, SHS Delft) that year. This foundation set out to find vacant office buildings with the goal of transforming them into temporary student housing until a permanent purpose for the building was found. The board of the foundation consists of four to five students, with half of the board members being replaced every six months. After a year on the board, members continue for another year as part of the advisory council. Jessica, for instance, was part of board five and six. The board members, along with the advisory council of former board members, are supported by a five-member Supervisory Board (experienced real estate professionals) that also ensures the continuity of the foundation. While students typically lack practical experience, they are ambitious and enthusiastic, allowing them to approach adaptive reuse projects with a fresh perspective. This chapter discusses one of the temporary adaptive reuse projects of SHS Delft, specifically the project *"Aan ’t Verlaat."* The corresponding project description is also included in this book (Project 14).

4.1

Founding SHS Delft

The idea of converting vacant offices into affordable (student) housing was very appealing. However, several challenges were encountered right from the formal establishment of the foundation. This step required notarial procedures, for which the costs had to be covered from the foundation's account. At that time, there were no financial resources available, and a mailing address was also needed to open a bank account. Since there was no office yet, this seemed like a complex situation. With a dose of creativity, perseverance, and support from the Supervisory Board, SHS Delft was eventually founded in October 2011, making the start possible.

4.2

Suitable vacant buildings

The municipality of Delft had already provided an initial list of vacant office buildings. In the early stages, most of the exploration involved cycling around the city to scout these buildings and add other vacant properties to the list. A vacant office building is not necessarily suitable for (temporary) adaptive reuse. The following factors are important to investigate:

Surroundings of the Building

For an adaptive reuse into student housing, accessibility by bicycle and public transportation is essential. How easily can the university and supermarkets be reached by bike? If these amenities are not near the building, the location will also be less attractive to students. According to research and experience from SHS Delft, the maximum cycling distance from home to the university accepted by students is twenty minutes. Parking near the building is less relevant for student housing. However, it is important that the surroundings do not pose any danger, unpleasant odours, or noise pollution, as student housing creates a new living environment.

Construction/Framework/Heights

These elements of a building are expensive to modify, so it's best not to start altering them in a temporary adaptive reuse. When inspecting a building, careful attention should be paid to these aspects. A ceiling height of 2.6 metres is desirable for student rooms, especially if installations need to be integrated or relocated. For the adaptive reuse into student housing, it is ideal if rooms between 20 and 30 square metres are available or can be created. Based on SHS Delft's experience, smaller rooms are also possible. A room of approximately 12 square metres is suitable for rental to students.

Existing stairwells

Existing vertical circulation points in a building, such as stairwells, are difficult or impossible to modify. Therefore, stairwells must be positioned in such a way that all future student rooms can make use of them. When creating (student) housing, it is necessary to comply with the Building Decree. For example, a tall office building requires at least two stairwells, and the distance between the stairwells must not exceed 60 meters (an escape route may be no more than 30 meters to the next compartment) (see "8. Fire Risks of Building Adaptive reuse and Energy Transition").

Sanitary facilities

These are usually easier to modify. An office building typically does not have enough toilets, bathrooms, and kitchens for the new use. The more sanitary facilities an office building has, the better. These modifications to the vacant building can be quite costly. It's important when analysing a vacant building to determine whether the necessary facilities can be added in a logical location, including the necessary piping. Consider also the connection of the sewage system. It is usually possible to enlarge the connection to the main sewer, but these costs should be accounted for in advance.

Insulation, heating and ventilation

These structural properties of the building are important when creating individual (student) rooms. Insulation of the exterior walls is necessary to maintain the room temperature, but sound insulation between rooms is also something to consider. Heating is required in every room, and ultimately, the temperature should be adjustable for each room. For ventilation, each room needs an openable part in the window frame (such as a window or hatch) to allow fresh air. Enough windows (whether they can be opened) is also crucial for the required daylight entry.

Condition of maintentance and potential monumental status

These factors can ultimately cause complications. If the building has been designated as a monument, little to no alterations can be made ("Cultural-Historical Value"). This will make a (temporary) adaptive reuse significantly more difficult. If the building is in poor condition, it will make the financial aspect of an adaptive reuse less attractive (Van der Voordt 2007).

4.3

Feasibility of temporary adaptive reuse

If the above analysis turns out positive, discussions with the property owner can begin. However, the experience was that most owners were not particularly enthusiastic and were not convinced of the feasibility of temporary adaptive reuse. As highlighted in the project descriptions, experience in adaptive reuse plays a significant role in the (perception of) feasibility of a project. The initial doubts arose mainly because SHS Delft consisted of five inexperienced students. The successful and comparable STW Utrecht, along with the experienced Supervisory Board that supports, advises, and ensures continuity in the projects, helped to provide reassurance.

Property owners often have questions such as: Where does the foundation's money come from, and who guarantees the rent for the property? What happens to the property during the temporary adaptive reuse? Will I still be able to rent out the property after it has been temporarily transformed? And how do I get the (student) tenants out of the property once I have rented it out permanently?

It is essential to make clear agreements on these issues. Within SHS, it was important to determine how long the vacant property could be rented and at what rental price to conduct a cost-benefit analysis. The prior property analysis and a timeline are necessary for this. This allows for an estimate of how long the adaptive reuse would take. The more modifications that were needed, the less attractive the temporary adaptive reuse became, both financially and in terms of the rental period.

The Crisis and Recovery Act played an important role in the feasibility of temporary adaptive reuse. Previously, under this law, properties could only be rented out for five years, which challenged the financial feasibility of the adaptive reuse. After the law was amended to allow ten-year leases, several projects became much more attractive

The Crisis and Recovery Act played an important role in the feasibility of temporary adaptive reuse.

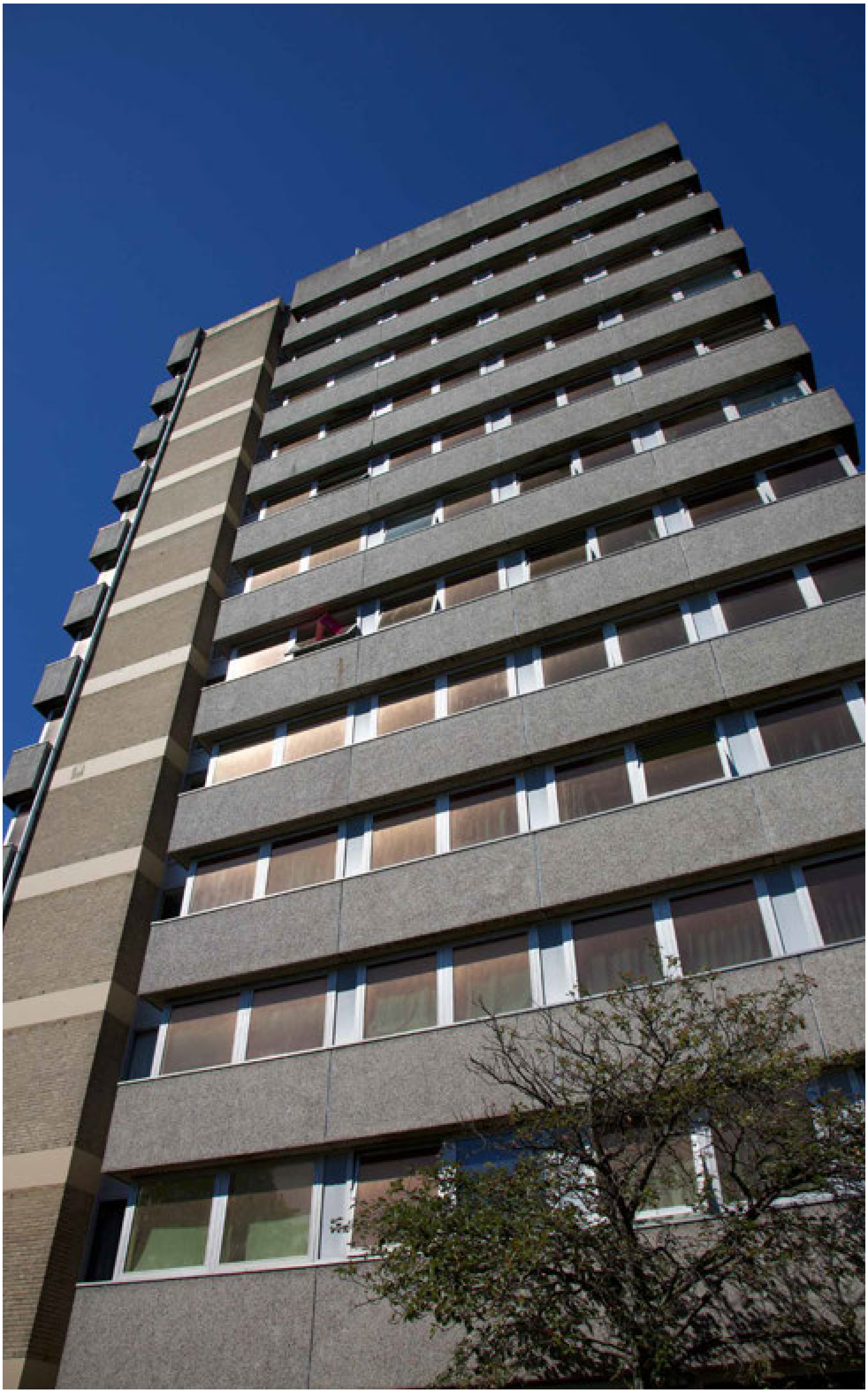

FIG. 4.1

FIG. 4.1 **Zusterflat, Aan 't Verlaat, Delft**

If the cost-benefit analysis turns out positive and the owner is enthusiastic about temporarily renting out their property, the next steps are initiated. Funding is needed for the adaptive reuse, but at this point, there is no rental income. Additionally, the foundation is not risk-bearing, not profit-making, and the board members do not have the capital to absorb risks. Therefore, the search for investors begins. Fortunately, through their own networks and those of the Supervisory Board, there are always enough investors who have confidence in the projects, enabling the plans for temporary adaptive reuse to be carried out successfully.

4.4

Lease agreement

If the feasibility of the temporary adaptive reuse is confirmed after completing the property analysis, the cost-benefit analysis, and discussions with the property owner, and if an investor has been found, the adaptive reuse plans must be formalised in a lease agreement with the property owner. In the first year of SHS Delft, the Aan ‘t Verlaat building was identified as a suitable and feasible project (see project description 'P14. Aan ’t Verlaat'). Signing the first lease agreement for the foundation was, of course, nerve-wracking, but also a significant victory! It marked a new and binding step towards the actual temporary adaptive reuse—the original goal for which SHS Delft was established.

The disadvantages of vacancy were clearly visible in the Zusterflat: deterioration, pollution, and apparently, homeless people had temporarily lived on the upper floors. Remarkable discoveries were made as every corner of the empty building was explored and mapped out. Preparations for the necessary permits could then begin.

4.5

Permits

Environmental permit

For a temporary adaptive reuse, the Crisis and Recovery Act (Dutch: *Crisis en herstelwet, Chw*) is applied, with its amendments coming into effect on November 1, 2014. The Chw was introduced in 2010 and facilitates short application procedures, thereby encouraging innovative and sustainable projects. The Chw was also used to experiment in the lead-up to the implementation of the new Environmental Planning Act. The Chw was the way to obtain a permit for a temporary deviation from the zoning plan (i.e., "acting in violation of spatial planning regulations") within an eight-week procedure period. In other permanent cases, amending spatial planning regulations requires an extended procedure of approximately 26 weeks (*Informatiepunt Leefomgeving 2023)*.

When a project fits within the zoning plan, no spatial substantiation is required. However, in the case of (temporary) adaptive reuse, it is often the case that the original function (e.g., office) does not match the intended function of "residential." In such cases, it must be proved that the temporary activities are not in conflict with good spatial planning. This can be proved through a (well-prepared) spatial substantiation (Peutz 2023; see also "3. Legal Framework"). For our first project, we enlisted a third party to help with all the documentation required for the permit application. Many studies need to be conducted, and it must be substantiated why the adaptive reuse does not conflict with good spatial planning. A spatial substantiation typically includes studies in areas such as archaeology and cultural history, business activity nuisance, flora and fauna, water management, external safety, air quality, soil quality, and noise.

In a temporary adaptive reuse, it is important to specifically focus on the minimal necessary changes. Try to avoid permit-requiring modifications such as changes to the load-bearing structure, adding staircases (staircase openings), creating additional windows, setting up rooftop terraces, or adding new construction. This approach simplifies the permit application process considerably. In the case of the Zusterflat, a building permit was specifically requested only for adjustments to the load-bearing structure, the addition of windows, and the addition of housing in the low-rise section. Although the Zusterflat had partially been used as an office, its original function was housing for nurses during a time when living space was scarce. Therefore, the floors already had sleeping areas, kitchens, and sanitary facilities. The floors with existing bedrooms required only minimal adjustments. The design with changes to the existing situation is a balance between making as few modifications as possible and using the space as efficiently as possible.

Demolition notification

Once the permit is approved, the renovation can begin. If demolition work is involved, a demolition notification must be submitted at least four weeks in advance. Additionally, a notification should be given to the municipality two working days before starting. If asbestos removal is involved, this must also be included in the demolition notification. After the completion of the work, the municipality must be informed within one day.

Usage Notification (Fire Safety Use)

For a building housing more than fifty people and which has a residential function for room-by-room rental, a usage notification must be made. This notification must be submitted to the competent authority no later than four weeks before the building is put into use. The submission requirements are the same as those for an environmental permit for fire-safe use (Article 1.19 of the Building Decree 2012). The competent authority only needs to send an acknowledgment of receipt in response to the notification (Nieman 2013).

4.6

Renovation

As emphasised earlier in the discussion on permits, it is advisable to limit temporary adaptive reuse changes to the original building. Every modification incurs costs, and the building may ultimately need to be restored to its original state. During the renovation (and the planning stage), it is important to consider asbestos. Buildings constructed after the World War II until 1993 are likely to contain asbestos (Rijksoverheid 2023). In a temporary adaptive reuse, it is desirable to avoid asbestos removal as much as possible, to reduce costs. However, an investigation is required to determine what is necessary.

In the case of the temporary adaptive reuse of the Zusterflat, asbestos elements were covered, and residents were informed about a drilling ban in specified asbestos-containing walls to minimise the necessary interventions. The remaining asbestos in the Zusterflat was professionally removed. It was quite impressive for a group of students to see people walking around in 'space suits' and to witness the installation of airlocks and showers for the safe removal of asbestos. Samples were tested in a high-tech van, and eventually, approval was given that the asbestos removal had been completed.

In the Zusterflat adaptive reuse project, SHS Delft collaborated with technical contractor TBK and construction contractor BBR. As part of an affordable temporary adaptive reuse, future residents participated in the work in exchange for a rent reduction. SHS Delft took on the role of main contractor itself, due to the challenge of finding a main contractor willing to accommodate the self-sufficiency of future residents. Enthusiastic contractors and residents started the project with great optimism. For more details about the process, please refer to the project description.

The tasks that did not require a building permit were carried out first, even before the permit for the renovation work was obtained. The goal was to have the building ready before the start of the new academic semester. However, it was risky to begin before the permit was secured. This was not because it was prohibited, but because costs were incurred before it was certain that the temporary adaptive reuse would be formally approved. Additionally, an unexpected issue arose when a load-bearing wall, not shown on the plans, was discovered after a certified demolition worker began removing it with a sledgehammer. This was resolved with the use of supports and an amendment to the permit application.

Vacant buildings (even during construction) are often targets for burglary, such as the theft of boilers, stovetops, and faucets from sinks. Fortunately, with the increasing activity in the building and the implementation of vacancy management, the copper theft in the flat was stopped, along with the leaks caused by the stolen pipes. Prospective residents were given the opportunity to assist with small tasks and were also able to act as temporary guards by staying on the floors of the building that were prioritised for habitation. This was made easier by the fact that kitchens and bathrooms were already present.

In the adaptive reuse process, the following factors must be considered:

- Temporary occupancy during renovation to prevent theft and squatting;
- Participation processes during temporary rental to engage prospective tenants;
- Execution of non-permit-requiring activities to shorten planning time;
- The presence of asbestos.

4.7

The opening

Temporarily transforming a building and thus contributing to alleviating the housing shortage for any target group naturally calls for a celebratory opening. The SHS board is eager to highlight temporary adaptive reuse to raise awareness of the adaptive reuse theme. In the case of the adaptive reuse of the Zusterflat, the permanent establishment of the Crisis and Recovery Act (Chw) was a crucial factor. This led to the idea of inviting Minister Blok, responsible for the significant amendment to the Chw, to perform the opening. With a toast and a beer at the bar in the common area, Minister Blok, together with Alderman De Prez, officially opened the former Zusterflat, which got the name "Studentenflat Aan ’t Verlaat." Soon after, other successful temporary adaptive reuse projects followed, such as the Paviljoens Aan ’t Verlaat, Jaagpad in Rijswijk, and Abtswoude Bloeit in Delft. Currently, the foundation is working on transforming three office buildings on Polakweg in Rijswijk, where 344 student apartments are being created. The office buildings will be connected via a shared outdoor space 2435

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4.8

Conclusion

A collaborative approach to address the issues of vacant (office) buildings and the shortage of student housing can lead to innovative solutions. Nowadays, student housings is even with housing of other groups, such as the elderly or asylum seekers. In practice, however, temporary adaptive reuse is mainly used as placemaking rather than as a solution to the housing shortage. Currently, Van Manen is working on the repurposing of the Pesthuis complex in Leiden, with the goal of creating a mix of functions that makes the complex accessible to everyone (Van Manen 2023). While it has been vacant, the building has been used several times over the past summers by "De Buurt," a temporary hotspot featuring culture, hospitality, and events. This quickly demonstrated that the location is very suitable as a meeting place, which bodes well for the repurposing of the building. Temporary adaptive reuse is a form of vacancy management temporary experimentation.

Based on our experiences with temporary adaptive reuse at SHS Delft, we would like to offer the following advice:

- If the housing shortage among the target group is severe, there will be people interested in vacancy management and self-sufficiency. Harness this determination to complete the renovation as quickly as possible (and avoid delays and unnecessary costs due to break-ins).
- Use the knowledge of others and don't reinvent the wheel.
- Aim for minimal changes; simply use whatever is still functional.
- Think creatively and outside the box (just like in your studies).
- Put your project in the spotlight and share the knowledge you've gained during the temporary adaptive reuse

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Technological Research

A, B, C, D, and then... Experiences with the ABCDº-research method to gain insight into the future resilience of buildings

Hielkje Zijlstra

Since 2006, I have been working on the development and implementation of a research method for analysing the architectural and spatial qualities of buildings, so that these can play a role in future planning. By including both the original situation and the changes over time in the analysis, a well-considered design can be made. The elements being assessed can vary. In the ABCDº research method (Analysis of Buildings from Context to Detail over Time), architectural and structural elements are identified alongside contextual factors (Zijlstra 2009). Other methods place more emphasis on cultural-historical values (Pereira Roders 2007 and Kuipers and De Jonge 2017). In education at TU Delft (Heritage & Architecture), students apply various methods in their graduation projects (Clarke, Zijlstra, and De Jonge 2019). The ABCDº method originated from my PhD research 'Building in the Netherlands 1940–1970' (Zijlstra 2006). The Post Office in Amsterdam was one of the case studies and proved to be a good example of how this method can make the qualities of a building clear before a potential repurposing takes place. Unfortunately, the Post Office was eventually demolished. The library (OBA), the conservatory (ODE), and the headquarters of Booking.com were built on its site. These buildings may eventually face the same question: Can this design also serve another function, and what can remain, and what must change? During the symposium 'Designing in Analogy with the Existing', organised by Architectenweb and Winhov at Pakhuis de Zwijger on October 9, 2023, the speakers agreed: first thoroughly understand a building before making a design for its repurposing (Architectenweb 2023

5.1

Development of the ABCD°-method

A building must first be the subject of research before one can form a vision about possible and desired changes in its use and function. In addition to art historical aspects, social factors, and urban characteristics, particular attention is needed for construction aspects. These aspects are typically underrepresented in architectural history research (Hendriks and Van der Hoeve 2009), yet they provide a perspective on what might be important from a historical standpoint. Understanding construction aspects is essential to delve into the underlying design and construction methodology of an existing building. From this viewpoint, I conducted my PhD research on Dutch buildings from the period 1940–1970 (Zijlstra 2006), which I then developed into the ABCD° research method (Analysis of Buildings from Context to Detail over Time) (Zijlstra 2009). Only a portion of the buildings from the post-war reconstruction period have been designated as national or municipal monuments. Most, however, have been left unprotected or have already been significantly altered or demolished. In my research, alongside literature and archival research, the building itself serves as the primary source of information.

The ABCD° method was developed based on an analysis of seven examples. Students have applied the method in their educational projects, and I have used and further developed it for external clients, including TNO, Bertus Mulder, and Erasmus Medical Centre. A key aspect of this approach is the analysis of all elements at three moments in time: inception, existence, and progression (or decline). From these time perspectives, the contextual, architectural, and construction elements are analysed. This analysis provides a framework for assessing to what extent a building can accommodate functions other than the original ones. The principles of the original design are therefore incorporated into the ABCD° method. Understanding these principles is essential for making informed decisions regarding interventions in the building.

To gain insight into the condition of a building, it is essential to understand how it was constructed and how it has withstood the test of time.

FIG. 5.1

FIG. 5.1 **The Groothandelsgebouw in Rotterdam**
The Groothandelsgebouw in Rotterdam has undergone several major renovations and, over time, has accommodated various functions thanks to its generous dimensions, multiple access options, and solid use of materials.

5.2

Analysis framework

The Groothandelsgebouw in Rotterdam has undergone several major renovations and, over time, has been able to accommodate various functions due to its generous dimensions, multiple accessibility options, and solid material use.

To understand the current condition of a building, it is important to know how it was constructed and how it has endured over time. Changes and adjustments have always been made. To determine whether a building can continue to function in the future, it is crucial to understand why these changes and adjustments were made. The first step of the analysis framework is divided into three temporal layers:

— **Inception:** what was the original intention of the architect, and how was the building delivered (situation -1)?
— **Existence:** what is the current state, what has changed, and why (situation 0)?
— **Progression:** wWhat can or cannot be modified for future use, and in what way (situation +1)?

The analysis of the building's elements is conducted using research questions specific to each temporal layer. In the ABCD° research, the elements are divided into three categories:

- **Context:** commission, location, and architect
- **Architecture:** design process, building type, and space
- **Building components:** (load bearing) structure, material use, and installations

The focus is on the building and its constructional and technical qualities. Cultural-historical values are generally not included in this matrix. In the method documented by Kuipers and De Jonge in 2017, however, valuation serves as the starting point for research.

TABLE 5.1 Research matrix ABCD° research method.

		INCEPTION -1	EXISTANCE 0	PROGRESSION +1
Context	Commision			
	Location			
	Architect			
Architecture	Design proces			
	Building type			
	Space			
Building compontents	(Load bearing) structure			
	Material			
	Installatiions			

The table should be filled out during use and has therefore been intentionally left blank.

To analyse a building in its current state, all elements should be considered for each time layer. Conclusions are drawn about what the original intention was, what the current state is, what has changed and why, and what factors should be considered for the future.

It is crucial that the analysis and conclusions are drawn from the building itself. What is important for this building, considering its past and the changes needed for the future? Significant attention is given to the construction/detail level (the technical aspects), as this is highly influential in determining the technical (im)possibilities of a building in the future. Regarding sustainability, the argument of "not demolishing" is no longer sufficient on its own. Sustainability could be a new layer of information to add to the ABCD° matrix. Similarly, (e.g., cultural-historical, economic, social) values could also be added, gradually creating a more comprehensive picture of the building. Key sources of information include professional literature, archival documents, interviews, and a physical visit to the building to observe, photograph, and document it.

5.3

Analysis of the Stationspostkantoor Amsterdam

The Stationspostkantoor is an excellent example of how the ABCD° research method can be applied, and it is therefore further elaborated below.

The expedition and office building for the Dutch Post (the state postal company PTT) was constructed on the Oosterdokseiland in the city centre in two phases between 1953 and 1968. The design was by architects Ben Merkelbach and Piet Elling; Merkelbach was involved as the city architect (the collaboration between the Merkelbach and Elling offices ended in 1955) and worked solely on the site planning.

Due to the requirements set by the aesthetic committee led by Cornelis van Eesteren, most of the building was not allowed to extend more than sixteen meters above street level. As a result, the building was divided into three sections: the low-rise Briefpostgebouw (Letter Post Building) and the Pakketpostgebouw (Parcel Post Building) with the high-rise block of the Administratiegebouw (Administration Building) placed above it. The Briefpostgebouw was the first to be completed, in 1962. It consisted of a large hall that filled most of the triangular site. Since the specific mail sorting system to be installed was not yet known at the time of the project commission, a large column-free space was created. The transfer section of the building, with its own platform along the railway line, was covered with the characteristic concrete shell roofs, which also appear in the lower part of the Pakketpostgebouw. The large hall was equipped with sawtooth roofs, allowing daylight to enter throughout the space. Later, most of these light openings were closed off. The hall's 41-meter clear span over a length of 100 meters and a free height of 8.50 meters allowed for the installation of an entirely new sorting system in 1980, prompted by the introduction of postal codes in the Netherlands. Basements were constructed beneath all buildings for the loading and unloading of mail by vehicle.

The Pakketpostgebouw (Parcel Post Building) was positioned underneath the Administratiegebouw (Administration Building). The distribution of mail, to and from the trains at the platform and the trucks in the basement, dictated the layout of the buildings. The Administratiegebouw was situated 22 meters above the ground floor and began with a double-height floor. The canteen/recreation hall on the top floor also featured a double-height ceiling. The building was equipped with large shafts for installations, and there were ample staircases and elevators. The natural stone facade cladding was still in excellent condition in 2003. The aluminum window frames were already fitted with double glazing.

At the end of the 20th century, it was decided to discontinue mail distribution by train in the Netherlands and instead use only trucks. The mail distribution centres were relocated to the outskirts of the city. The site on Oosterdokseiland became available and was included in the planning for the IJ waterfront. Renovation was considered with nuance (Van den Eerenbeemt 1990). The Briefpostgebouw was demolished in 2003 to make way for the new public library of Amsterdam (OBA Oosterdok), designed by Jo Coenen within the master plan of Erick van Egeraat.

FIG. 5.2

FIG. 5.2 **Stationspostkantoor Amsterdam, original situation**
Source: Siliakus 1972

FIG. 5.3 **Demolition of Briefpostgebouw in 2003**

FIG. 5.4 **P akketpostgebouw as temporary location of Stedelijk Museum Amsterdam (SMCS) in 2004**

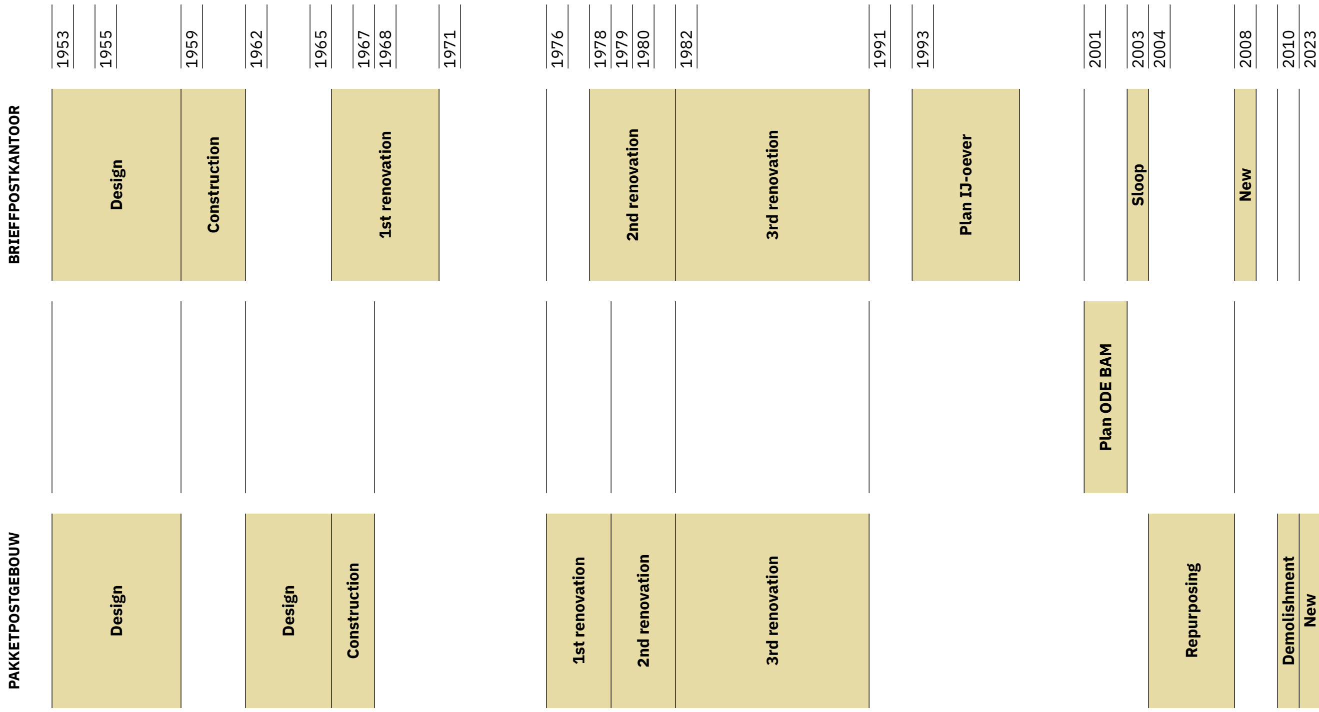
FIG. 5.5 **Administratiegebou with restau-rant11 in 2004**

The intention at the time was to dismantle the Pakketpost- and Administratiegebouw (Parcel Post and Administration Building) and redesign them as office spaces according to the design by Van Egeraat. However, when the office market collapsed in 2004, immediate planning was put on hold. This allowed the Pakketpostgebouw to temporarily house the Stedelijk Museum Amsterdam (SMCS), and the Administratiegebouw (Post CS) above it provided space for various companies, including architecture firms (such as Jo Coenen & Co and Zwarts & Jansma), film studios, artists, the furniture showroom Post Amsterdam, and the popular restaurant '11' on the eleventh floor, which offered a beautiful view over Amsterdam (Huisman 2012). After these companies left, the last remaining parts of the buildings were demolished in 2010. However, part of the basements was reused. On a section of the site where the former Stationspostkantoor stood, the Conservatorium van Amsterdam (ODE) was built by the Architekten Cie. Next to the Conservatorium, UNStudio and Royal Haskoning DHV designed the headquarters of Booking.com, located on the tip of Oosterdokseiland. One of the many restaurants and "experience worlds" within the building was named Club 11, referencing the once-popular restaurant 11 (Thomas 2023). The building also houses over forty apartments.

FIG. 5.3

FIG. 5.4

FIG. 5.5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1971
1976
1978
1979
1980
1982
1991
1993
2001
2003
2004
2008
2010
2023
Design
Construction
1st renovation
2nd renovation
3rd renovation
Plan IJ-oever
Sloop
New
Plan ODE BAM
Design
Design
Construction
1st renovation
2nd renovation
3rd renovation
Repurposing
Demolishment
New

FIG. 5.6

FIG. 5.7

Fig. 5.6 **Timeline based on the ABCDº analysis of the Stationspostkantoor in Amsterdam.**

FIG. 5.7 **New construction on Oosterdokseiland in Amsterdam: the library, the Conservatory, and the headquarters of Booking.com in 2023**

5.4

Finding following on the ABCDº analysis of the Stationspostkantoor

The Stationspostkantoor by Merkelbach and Elling could have been perfectly repurposed and reused in its entirety for constructional, functional, and programmatic reasons. In 2003, the building was in exceptionally good condition, both structurally and materially, regarding its exterior. Due to its generous dimensions and large clear spans, it had the capacity to accommodate necessary changes over the years.

The greatest strength of repurposing this building lies in the fact that, due to necessity, everything had to remain possible during the design process. This led to the use of dimensions based on an excess of space. Both the low-rise Briefpostgebouw, with a partially clear span of 41 meters, a basic measurement of 7.50 meters, and a free height of 8.50 meters, and the Pakketpost- and Administratiegebouw, with grid dimensions of 7.50 and 9.00 meters by 6.00 meters and a floor height of 3.60 meters in the high-rise and 4.40 to 11.80 meters in the low-rise, could have easily accommodated alternative layouts, functions, and uses. The large hall of the Briefpostgebouw could have housed the library or the conservatory, with an additional structure built above it. The structure of the Administratiegebouw would have been well-suited for conversion into residential units. The apartments could have been created in multiples of 7.50 x 6.00 meters = 45 m² and could be connected in two directions. A central corridor could have been an option, with an internal connection to a higher or lower floor per unit, allowing for spatially interesting residences with optimal access. The east side offered a grand view of the IJ, and on the west side, there was the possibility of situated terraces overlooking the city centre. The lower floors could have been ideal for functions such as museums or creativity-driven businesses, and the rooftop structure could have retained the restaurant combined with conference facilities. By preserving as much of the original facade materials as possible, the Stationspostkantoor would have had the opportunity to regenerate and evolve into a building with its own character, rooted in its history. This would have added a new layer in time on both an architectural and urban planning scale.

Internally, some interventions had been made in the buildings over time, but if desired, the interiors could have been refinished in the spirit of the original architect. Alternatively, an updated use of materials could have been well-suited for the interior, given that by 2003, little of the original interior remained, and restoration was not considered, as buildings from the post-war reconstruction period had not yet been selected for monument designation at that time. The building could have withstood many alterations, but significantly fewer square meters would have been realised compared to the current new construction. The question of what is more sustainable—reuse or demolition/new construction—remains unanswered in this case as well.

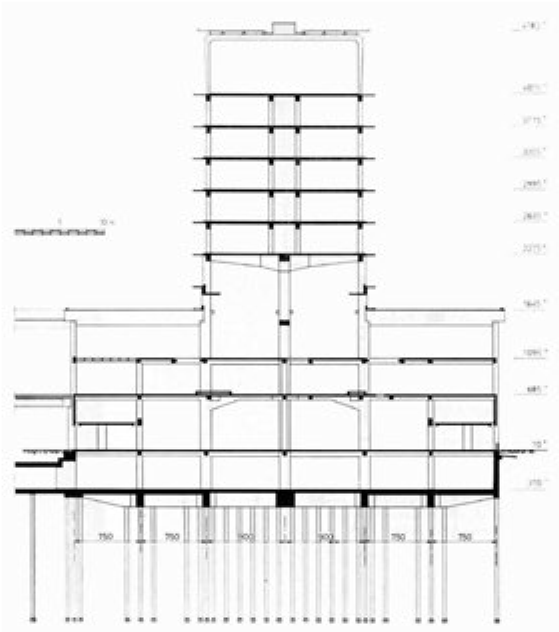

FIG. 5.8

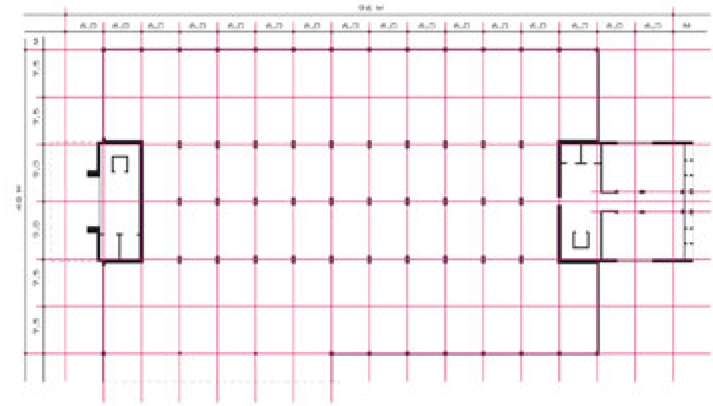

FIG. 5.9

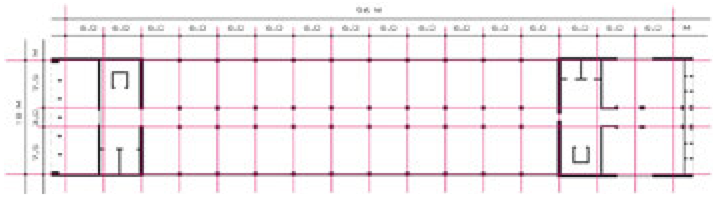

FIG. 5.10

FIG. 5.8 **Cross-section of the Pakketpost- and Administratiegebouw of the Stationspostkantoor**
Source: De Ingenieur Bouw- en Waterbouwkunde (1966)

FIG. 5.9 **The dimensions of the Pakketpostgebouw of the Stationspostkantoor**

FIG. 5.10 **The dimensions of the Administratiegebouw of the Stationspostkantoor**

5.5

General conclusions based on the ABCD°-research method

By creatively managing the existing building stock in the Netherlands, several pressing issues arising from space shortages can be resolved. Buildings sometimes regenerate spontaneously, as was initially the case with the Stationspostkantoor in Amsterdam, but demolition could not be avoided under market pressure. This dilemma is particularly prevalent in prime inner-city locations. The debate over which approach is more sustainable also plays a role here. Many buildings, whose qualities can be analysed and where new possibilities can be created with respect for the existing structure, offer excellent opportunities for unique living, working, and recreational spaces. If we understand what is possible by investing in research prior to the design process, such as with the ABCD° research method, we can manage our built environment consciously and sustainably. This approach gives buildings the chance to continue rather than decay. Technically outdated buildings can be rejuvenated for the next generation through the application of innovative technical solutions. This extra layer in time provides urban continuity and adds new qualities through additional functions.

Another conclusion from my PhD research is that possibilities for expansion or changes foreseen in the original design are often utilised. For example, an additional floor was added to the Palace of Justice in Arnhem, an extra layer was added to the

Rijksverzekeringsbank in Amsterdam, and extra floors were inserted between existing levels in the Stationspostkantoor in Rotterdam. Sometimes, original ideas that were not implemented at the time are eventually carried out, such as the opening of the voids in the Provincial Library in Leeuwarden. Additionally, during redevelopment, a thorough analysis can lead to a well-considered decision on what should be preserved and what should not. For instance, the laboratory tower of the Erasmus Medical Centre in Rotterdam was retained, while many of the surrounding buildings were renewed, partly to create much better access to the hospital for visitors at ground level.

In designing the building for Booking.com on Oosterdokseiland in Amsterdam, Ben van Berkel considered preparing the office portion for potential later conversion into residential use: “At the Zuidas, we designed an office tower that can transform into residences. The utility shafts and stairwells are positioned in locations suitable for both residences and office spaces. However, the client for Booking.com did not want this, and the office floor plans are too deep for that purpose” (Laarakker 2023). It primarily comes down to making additional openings and optimising access through elevators, stairwells, and potentially adding natural light.

It is also important to invest in excess space during the creation of a building: in length, width, and height, in allowable loads, and in infrastructure. This additional space can be utilised later to implement changes. For this reason, the budget during the building's development phase should not be overly constrained. On the other hand, a tight budget can be advantageous during building maintenance and when making changes over time. For instance, during the third renovation of the Rijksverzekeringsbank in Amsterdam, Fokkema & Partners restored the interior designed by architect Dirk Roosenburg from 1940 in 2012 (Groen 2012 and Zijlstra 2006). This allowed the original qualities to survive without the interior being too influenced by trends. In the Booking.com office, many restaurants were designed by various interior architects. These interiors are unlikely to survive the next user or tenant, despite all the good sustainable intentions.

Finally, I would like to add a note regarding material use. It is often believed that returning a building to its state at the time of completion is the only correct approach. However, this too requires further investigation. In the case of the Groothandelsgebouw in Rotterdam, Joop van Stigt restored the original appearance of exposed (grey) concrete in the facade in 2004 (see fig. 1). The building was indeed delivered in 1950 with exposed concrete, but architect Maaskant originally intended for a white building. Unfortunately, the marble aggregate intended for the concrete was cut from the plan due to budget constraints, leaving a grey building at completion. The concrete quickly became dirty and was insufficiently waterproof. In 1963, the facade was coated white (Zijlstra 2006). Therefore, I believe that a white finish would better honour the original design intentions than the current grey. The grey cement layer added to the concrete now requires extensive maintenance due to adhesion problems.

FIG. 5.11

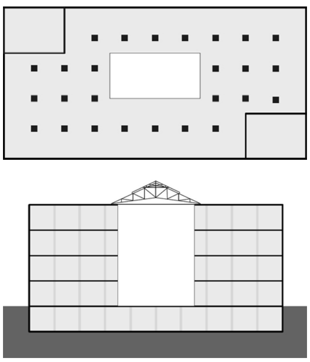

FIG. 5.12

FIG. 5.12 **The facade of the Groothandelsgebouw before and after the 2004 renovation**

FIG. 5.13 **Floor plan and cross-section of the atrium type based on research into eight former V&D department stores**
Source: Zijlstra ea 2021

Regarding long-term ABCD° research, it is interesting to link more typological research to the analysis of buildings. Since functions change but space remains constant, a typology based on spatial aspects is useful for gaining insight into the possibilities of buildings with similar spatial-typological structures. Heritage & Architecture began exploring this at TU Delft in 2020–2021 (Zijlstra et al., 2021). Research on, for example, eight former V&D buildings in the Netherlands shows that repurposing always reverts to the original spatial layout of these buildings: large open floor areas surrounding an atrium with natural light. This demonstrates that many new functions are possible. In Amsterdam and Rotterdam, the V&D department stores were redeveloped, with much of the office space around the atrium restored to its former glory.

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Load-Bearing Structure and Facade

Rijk Blok [1959-2022] and Niels Oudenaarden

The technical properties of a building's load-bearing structure often significantly influence the possibilities for repurposing or adaptive reuse. The structure has a very primary role and, for this reason, often constitutes the most permanent part of the building. At the same time, the characteristics of the structure can make certain changes to a building either easy or difficult to achieve. Research shows that three fundamental functions and properties of the load-bearing structure directly impact a building's conversion capacity: the independence of the structure, the load-bearing capacity, and the space provided by the structure. This chapter delves into the theory of these three properties and, through practical examples, demonstrates how the existing structure can positively or negatively affect the conversion capacity.

Just like the load-bearing structure, the facade also has a significant impact on adaptive reuse of a building. It is one of the most visually defining elements of the building and serves as the barrier between the exterior and interior climates. If the existing facade meets the requirements of the intended conversion, it can simply be retained. However, in most cases, new demands and requirements regarding the interior climate will be implemented during adaptive reuse. Often, a new function will require (significant) modifications to the facade. The second part of this chapter describes various levels of intervention, illustrated with a range of practical examples.

6.1

Load-Bearing Structure in Relation to other 'Building Layers'

To assess the properties of the structure in more detail and possibly even quantify them, a simple building model can be used. Stewart Brand (1994) and Bernard Leupen (2002) previously defined building models in which different 'building layers' are distinguished, each with its own specific function. These models make it possible to further examine (un)changeability and lifespan. The building layers used in this chapter are:

- **Structure:** columns, beams, load-bearing floors, foundation etc.
- **Building envelope:** facades, roof, seperation between inside and outside
- **Installations:** pipes, systems for energy, water, etc., and their space
- **Space plan:** partition walls, doors, ceilings, interior layout, finishes
- **Circulation:** stairs, elevators, corridors, galleries

FIG. 6.1

FIG. 6.1 **Layers vertical**

Elements of the theoretical building layers: structure (concrete column, beam, load-bearing wall), installations (pipes, fixtures), space plan (partition walls, usage, interior layout, finishes), and facade (window frames) are individually identifiable.

The relationships between the structural building layer and the other primary building layers can be represented in a simple diagram.

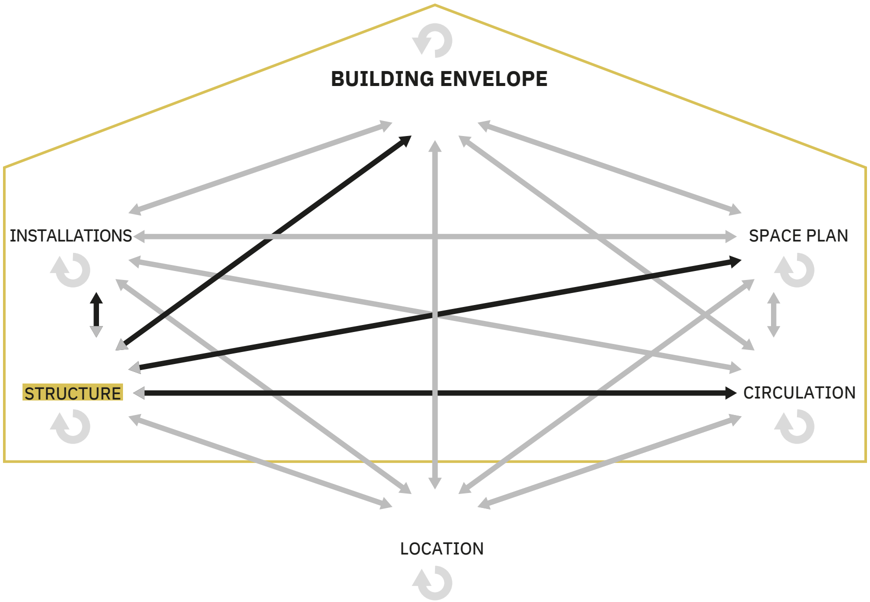

FIG. 6.2

FIG. 6.2 **Flex relationships**
Ten theoretically possible flexibility and adaptability relationships between the building layers within the structure.

Ten theoretically possible flexibility and adaptability relationships between the building layers within the structure. The four flexibility relationships of the structural layer with the other building layers are highlighted in bold.

In this model, the incoming arrows represent the degree of adaptability or active flexibility of the building layer itself. Active flexibility of the structure refers to the conversion capacity of the structure itself, specifically the extent to which this building layer is hindered or not by the other relevant building layer when implementing changes and adjustments to that layer. The outgoing arrows indicate the passive flexibility of this building layer. Passive flexibility of the structure is its ability to facilitate changes to other building components without the need to alter the structure itself. The question here is to what extent the structural layer enables or restricts changes or adjustments to other building layers. To answer this question, it is necessary to carefully consider these relationships. By using the three mentioned basic properties—independence, load-bearing capacity, and space—in combination with the relationships with the other building layers, one can evaluate at the building level how easily changes or adjustments can be implemented. Excess in these three properties allows a structure to possess a high degree of passive flexibility.

Independence

The basic property independence refers first to any functional division of the structure with other building layers. Loadbearing facades or loadbearing partitions combine the functions (building layers) construction and space plan, thus adjusting the facade or layout, for example, much more complicated more complicated. Independence relates to function division, but also to sub-connections. Are the connections demountable or not? Is the order of assembly of components such that disassembly of building layers is prevented? avoided? Pipes embedded in a concrete floor, for instance, are hardly adaptable, if at all adaptable.

Load-bearing capacity

Sufficient load-bearing capacity determines the possibilities for easy adaptive reuse to, for example, use functions with higher variable loads. The possibilities for freely erecting and modifying partition walls, installing or modifying additional installations on floors or roofs, re-levelling floors with an additional of floors with an additional finishing layer (without removing the old layer) et cetera depend on the load-bearing capacity of the structure. This concerns the passive flexibility of the structure. Also, the possibilities of modifying the structure itself, the adaptability or active flexibility of the structure depend on its load-bearing capacity of the structure. Easily extending a building by, for example topping up depends on the load-bearing capacity of the existing structure, e.g. on the existing example of the existing columns and foundation.

Space

Sufficient (flexible) space for each of the other building layers makes adaptation and modification to other building layers easier. Sufficient space is needed to accommodate the building functions to be modified (space plan) and to provide proper accessibility. Sufficient height for the use (functional clear height) is of course necessary, but also sufficient height to accommodate, for example, new pipes behind a false ceiling or under a raised floor. Sufficiently accessible vertical shaft space facilitates any necessary modifications to the installations. Table 6.1 shows the flexibility relationships of the structure with the other building layers are briefly characterised. The diagram can be used when drawing up a checklist with which the structure can be assessed for its flexibility.

For each of the fields, one can consider to what extent the structural system meets the required capacity. Overcapacity implies flexibility. Undercapacity means that it must be investigated whether the required capacity can be increased and what efforts and measures (costs) this will entail.

TABLE 6.1 Matrix of Flexibility Relationships of the Structure with Other Building Layers

STRUCTURAL FLEXIIBILITY RELATIONSHIPS		**BUILDING LAYER**				
		SPACE PLAN	BUILDING ENVELOPE	INSTALLATIONS	CIRCULATION	
Structure	**Independence** – Layer function – Layer connection					$R_{independence}$
	Structural capacity					$R_{load\ capacity}$
	Space (height) (surface)					R_{space}
Resulting scores:		$R_{spaceplan}$	$R_{building\ envelope}$	$R_{installations}$	$R_{circulation}$	

6.2

New flexible support structures

When designing new structures with a long to very long expected lifespan, such as those for high-rise buildings, it is valuable to give adequate attention to the three fundamental properties: independence, load capacity, and space. Comparing and optimising structural design variants based on these flexibility attributes can lead to a structural design with significantly greater passive flexibility. Increased structural flexibility, possibly achieved with minimal additional investment, enhances the potential for a longer high-quality functional lifespan of the structure. Repurposing and conversion become easier as the structure scores higher on these three basic properties in relation to other building layers. At the same time, it becomes clear that providing extreme overcapacity in one property without sufficient attention to the other properties is not very useful. For example, when designing a structural system where the load capacity for variable floor loads is so high that it can also be used as retail space in the future, it is also necessary to create sufficient space, such as clear height, for future necessary installations. Quantifying these properties to assess the structural flexibility of both newly designed and existing structures is the subject of research at the TU/e Unit Structural Design and Construction Technology.

6.3

Structural Interventions in Existing Structures

Today, aspects such as flexibility and adaptability have gained a more prominent place in the design process. Often, this focus is still on the layout of a building within the same type of function (e.g., office, retail, or residential). Since much of the current building stock considered for functional changes was not designed with flexibility and conversion capacity in mind, structural modifications are almost always necessary during adaptive reuse. These changes can range from minor adjustments to highly complex alterations. Structures that are sufficiently flexible may not require significant modifications. The complexity and cost of structural interventions are closely related to the extent to which the intervention necessitates altering the load-bearing forces within the structure. The two main variables here are the magnitude of the forces to be redirected and the distance over which these forces need to be moved or rerouted.

Attaching new wall systems, facade systems, and installations is often straightforward if it doesn't involve significant changes in loads and force distribution. Making small openings in floor fields for installations, as well as creating large openings for new atriums or stairwells, can also be relatively simple if there are few or no forces to redirect. For instance, removing entire floor fields between existing load-bearing beams may have minimal impact on force distribution. Conversely, a minor intervention can sometimes have major repercussions. If a proposed opening or passage intersects structural zones with extensive reinforcement or prestressing strands, even a small opening can become problematic. Such openings often require additional structural measures to be implemented.

Some examples of structural interventions with minimal changes to the force distribution can be seen in the repurposing of the former Slavenburg's Bank office in Eindhoven into a dental practice (design by Eendracht bv). The main load-bearing structure of the former office building consists of cast-in-place columns, beams, and system floors. The new function as a dental practice required a new staircase and additional vertical shafts for the installations. Creating the necessary openings in the floors involved removing part of the floor fields between the main beam and the existing lift shaft. The span of the new stairs, including the landings, reaches from the existing concrete beams on the left side to the existing concrete lift shaft on the right. Additionally, a new vertical shaft was created on the right side. In this way, the existing force distribution was altered minimally.

FIG. 6.3

FIG. 6.4

FIG. 6.5

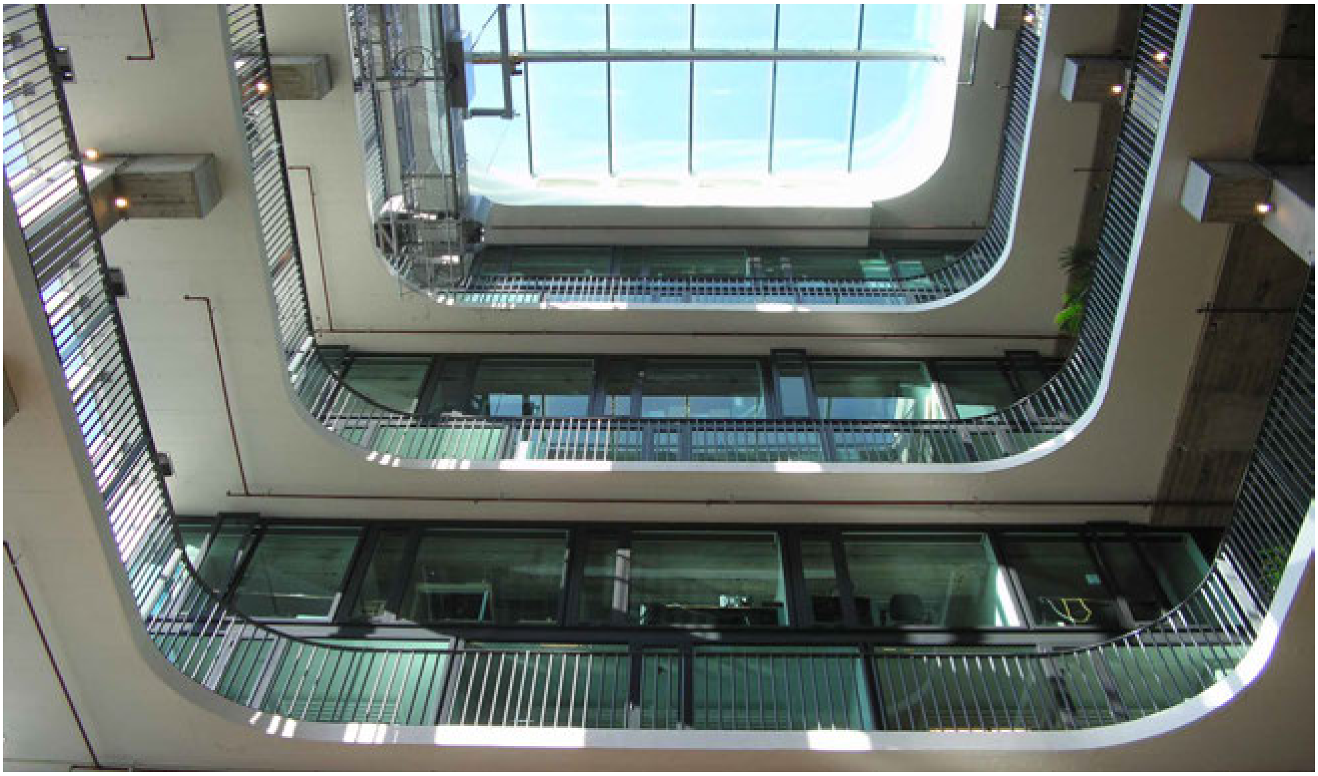

FIG. 6.6

FIG. 6.3 **Former Slavenburg's Bank Office**

FIG. 6.4 **t Execution of demolition work for a new floor opening for the stairwell**

FIG. 6.5 **Stairwell**
The new stairwell photographed from the first floor during construction, with the new stringers installed and newly constructed partition walls.

FIG. 6.6 **Atrium in Vertigo, Faculty of Architecture, TU/e Eindhove**

Another example of a structural intervention with minimal changes to the existing force distribution is the Vertigo building: an adaptive reuse project of the former Chemistry Laboratory into the Faculty of Architecture at TU/e.

To bring more light into the adjacent office spaces, the Vertigo building was equipped with a new atrium. The structural intervention is clearly recognisable. The top members of the continuous portals (see fig.) were cut off, and the associated floor fields were largely removed. The architect's original idea to create a second atrium on the opposite side of the building was found to be structurally unfeasible, as this would have significantly impacted the force distribution, particularly concerning wind loads, and thus the building's stability.

6.4

Adding extra floors

When adding extra floors to buildings, if the increase in bending moments can be avoided by ensuring that the vertical load transfer is mainly handled through axial forces (compression and tension) on the existing vertical load-bearing elements, the structural modifications can remain relatively simple. However, it may be necessary to adjust the existing stability provisions to accommodate the additional horizontal loads (wind). Existing structures, where the elements for vertical load transfer (columns) were designed using relatively conservative methods, often still have sufficient overcapacity to allow for the addition of one or more floors upon closer inspection. In many cases, the existing foundation capacity, such as that of the foundation piles, is crucial. Various techniques are available to strengthen existing foundation structures if needed.

FIG. 6.7

FIG. 6.8

FIG. 6.7 **Bryant and May Match Factory, Bow Quarter, London**
Example of a significant and therefore costly intervention in the existing load-bearing structure: addition of new extra parking floors and modification of the existing structure.

FIG. 6.8 **Bryant and May Match Factory, Bow Quarter, Londen**

FIG. 6.9 **Adding Floors to an Existing Building**
Example of adding two relatively light-weight timber frame (HSB) floors to an existing building.

Removing or relocating structural elements, especially in areas where the loads are greatest, such as columns on the ground floor of a multi-story building, can be extremely complex and, in most cases, unfeasible.

An example of a larger structural intervention is the repurposing of the historic industrial building, Bryant and May Match Factory in London, into a residential building with a parking garage in the early 1990s. To achieve the required parking capacity, it was necessary to use multiple floors for parking. The relatively large floor height made it possible to remove one floor level in sections of the building and replace it with two parking floors. Existing columns in the basement and on the ground floor had to be reinforced, and additional columns and foundation elements had to be added in certain areas.

FIG. 6.9

6.5

Intervention levels in the facade

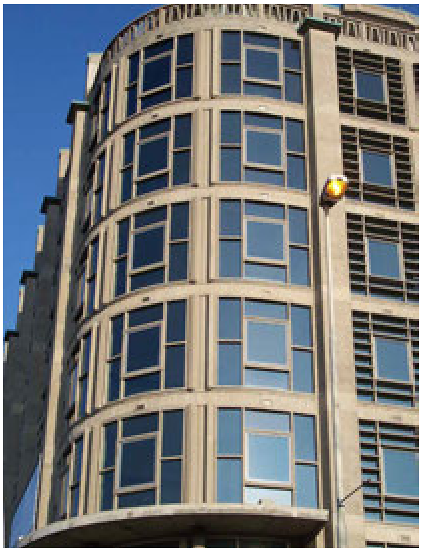

FIG. 6.10

FIG. 6.11

FIG. 6.12

FIG. 6.10 **Groothandelsgebouw, Rotterdam**
Adjusting: Replacing single glazing with double glazing.

FIG. 6.11 **De Baanderij, Amsterdam**
Extending: Adding sun shading devices.

FIG. 6.12 **SCHUNCK Glaspaleis, Heerlen**
Replacing: Installing a new facade with the same appearance.

The recognisability of a building in its environment is strongly determined by the main lines of the facade. These are often influenced by the structure and the load-bearing framework of the building. The reason is that the facade must transfer all its forces, both its own weight and other loads acting on it, to the structure. Therefore, the facade and structure are physically closely connected. This can be seen, for example, through a recognisable structural grid in the facade or the merging of both into one whole.

If the facade is still largely in good condition and can be made suitable for the new function with relatively minor improvements, simply adjusting the facade may suffice. Examples include adding insulation or replacing windows. If new components or functions are added to the existing facade, it is considered an extension. This can occur when the facade only partially meets the new requirements but still can or must be retained. A small-scale example of this is the installation of sunshades. A larger-scale example of extension is enclosing a gallery with screens to reduce noise. When it is not possible to adapt the existing facade to the new situation, it becomes necessary to remove the existing facade and replace it with a new one. This provides greater freedom to tailor the new facade to the building's new function.

6.6

Relationships of the Facade with Other Building Layers

For each building, or even for each facade, the various levels of intervention can be considered and sometimes applied simultaneously. Therefore, in the case of certain buildings, the role of the facade in adaptive reuse has been further examined by taking the facade as the starting point and describing its relationship with the other primary building components. For this, refer to the previously presented building model with the described building layers.

The analysis focusses on both the situation before the adaptive reuse and the intended situation after the adaptive reuse. The analysis reveal that the facade has a clear relationship with all building layers. However, these relationships change when a building undergoes intervention. The facade plays an important role as a "data carrier." The story of the building and the changes it has undergone are largely embedded in the composition of the facade. The period of construction, changes in the building's use, and the evolving intentions of clients and architects are often recognisable. These characteristics and information can largely be inferred from the materials and techniques used. Additionally, visible differences in material degradation, adaptation, and repairs also document the building's history.

A general role for the facade in adaptive reuse projects cannot be universally defined. The analysis shows that the physical distinction between the facade and other building layers is not always clear. This ties into the concept of independence. Each building presents its own limitations, and it is often necessary to leverage the existing qualities of other building components. Integrated solutions are commonly employed. Below are some examples of the possibilities.

Sufficiently flexible structures will need little to no modification during adaptive reuse.

EXAMPLE A

De Witte Dame, Eindhoven

A building where the structure and the facade design are clearly interconnected is De Witte Dame in Eindhoven. The facade is an integral part of the primary load-bearing structure. The grid of the structural framework strongly influences the clean lines of the facade. During the adaptive reuse of the former Philips factories into a library and cultural centre, these major lines in the facade along the main road were preserved. This is especially evident at the central entrance, where entire floor levels were removed, creating a large atrium and outdoor space, eliminating the need for window frames.

FIG. 6.13

FIG. 6.14

FIG. 6.15

FIG. 6.16

FIG. 6.13 **De Witte Dame: facade view seen from the Bijenkorf**

FIG. 6.14 **De Witte Dame: central entrANCE**

FIG. 6.15 **De Witte Dame: original panel division in the facade**

FIG. 6.16 **De Witte Dame: panel division in the facade after adaptive reuse**

At the rear of De Witte Dame, the approach to the facade was even more drastic. To restore De Witte Dame to its original size and proportions, all later additions were demolished. At the points where these former buildings connected to the main structure, curtain walls with large glass panes were installed. These large glass panes mark the connection points like scars, thereby preserving a part of the building's historyt.

FIG. 6.17

FIG. 6.17 **De Witte Dame: Curtain walls as scars**

In addition to its separating function, the facade also plays a connecting role. For example, to ensure a healthy and comfortable indoor climate, sufficient ventilation and natural light are necessary. Therefore, it is not always possible or practical to merge the functions of the facade and structure literally.

EXAMPLE B

Van Nellefabriek, Rotterdam

The Van Nellefabriek, one of the icons of the Nieuwe Bouwen movement, features one of the earliest applications of a metal curtain wall combined with a concrete mushroom structure. This allowed the structure to be set back from the facade, creating a transparent building with extensive natural light.

FIG. 6.18

FIG. 6.19

FIG. 6.18 **Van Nellefabriek: high transparency in facade**

FIG. 6.19 **Van Nellefabriek: climate buffer combined with circulation**

Due to its status as a national monument, the facade design and transparency of the Van Nellefabriek could not be altered. Combined with the strength of the structure, this made it necessary to fully preserve the facade. Therefore, an additional zone was created behind the facade, maintaining a moderated climate compared to the outside environment. On the shaded side, this zone was made accessible to the building's users by incorporating the office circulation into it. The existing operable windows allow for additional ventilation of the corridors if needed. On the sun-exposed side, the zone functions as a type of climate facade, with sunshades installed, windows that can be mechanically opened, and the option to heat the zone collectively. This setup helps to prevent extremely hot or cold conditions.

In addition to changing and often stricter requirements, technological developments play an important role. This includes new techniques for climate control (such as low-temperature heating [LTV] and thermal energy storage) along with the corresponding control technologies. These systems are largely tailored to the functions, layout, and size of the spaces within the building. By utilising and integrating architectural solutions, particularly at the facade level, the necessary capacities for installations can be significantly reduced. An integrated approach can greatly enhance the future value of buildings that may initially seem to have limited prospects. Existing qualities can be uncovered and better utilised.

EXAMPLE C

25 kV, Rotterdam

In the multi-tenant building 25 kV, only one of the four enclosed facades was thoroughly addressed. This facade was completely replaced with a glass box that was suspended from the existing structure. As a result, an atrium was created that extends the entire height of the building, serving as a buffer between the office spaces and the external climate.

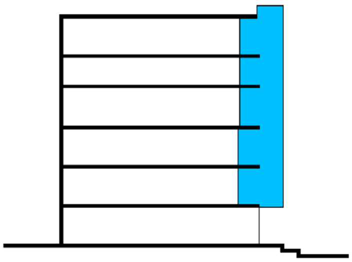

FIG. 6.20

FIG. 6.21

FIG. 6.22

FIG. 6.20 **Schematic representation of the facade zone in the 25 kV building**

FIG. 6.21 **25 kV building: original facade Photo: RWA, 1998**

FIG. 6.22 **25 kV-building: facade after adaptive reuse**

This atrium also serves as a functional zone, integrating not only circulation but also shared amenities such as restrooms, kitchens, and seating areas. The regulation of the moderate climate within the atrium is achieved through operable elements in both the roof and on the ground and first floors. Overheating in the summer due to solar radiation is prevented by the cantilevered floors and the building's orientation to the east. In winter, the atrium benefits from additional warmth due to the low sun angle. Supplemental heating is provided by the radiant heat from the heating system's pipes, which run uninsulated through the atrium. These pipes are installed to allow small heating units to be placed in the offices, enabling individual temperature control.

6.7

Conclusion

In summary, it can be concluded that the flexibility properties of the support structure play a very important role in both existing and newly designed buildings. The possibilities for future adaptive reuse or repurposing are strongly related to this. Being able to properly evaluate and quantify these properties makes it possible to better respond to the relationship between the technical properties and the lifespan of buildings.

The primary function of the facade is to separate the interior and exterior climates. Additionally, the facade plays an important role in the building's appearance and contributes significantly to its identity. The design of the facade is primarily determined by the possibilities and limitations presented by the building. Specific requirements and preferences are established based on the building's function, resulting in integrated solutions that blur the distinction between the facade and other building elements. Due to the wide variety of facade types and levels of intervention, it is difficult to define a general role for the facade in adaptive reuse projects.

Although integrated solutions may initially seem limiting in terms of adaptive reuse possibilities, they often reveal unexpected opportunities to enhance the overall usability of the building when approached with an open mindset.

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7

Installations

Wim Zeiler

Installations play a crucial role in an adaptive reuse project. This is due to the changing functional and capacity requirements, as well as the significant impact on the required budget for the conversion. The share of installation costs is larger than in new construction projects. Opportunities lie in utilising part of the existing installations. However, challenges arise in balancing the original functionality with the newly required functionality of the building being transformed. This is particularly relevant in the adaptive reuse of offices into residential buildings, where the requirements for liveability and comfort are entirely different. This results in substantial differences in the number of installations needed in offices compared to those in residences. The process of adjusting and renewing installations occurs in several steps. A well-considered selection and evaluation of alternatives is essential. This chapter outlines the various steps. By applying these steps and paying close attention to the selection and evaluation process, an integrated design can be achieved. This approach fosters better collaboration among all parties involved in the adaptive reuse process. During the design phase, installations, construction, and assembly in the existing situation are considered. This ensures that all aspects from the different parties are addressed during the conversion of a building.

7.1

Spatial Conceptual Classification of Installations

In the conceptual classification by Schalkoort et al. (1995), three types of installations are distinguished:

- Central installations
- Installations for the distribution of heat, cold, and fresh air
- Installations for the diffusion of heat, cold, and air in the space to be climatised, referred to as 'end devices.'

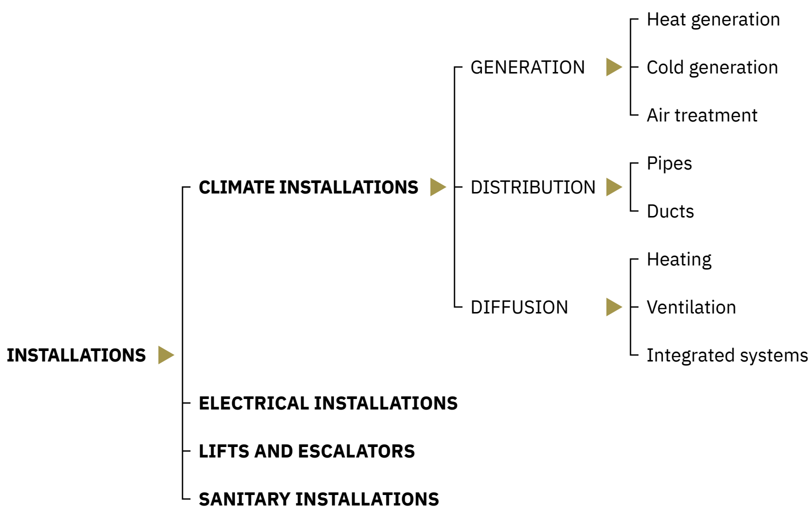


FIG. 7.1 **Different Types of Installations**

FIG. 7.1

Within the various types of installations, three subsystems can be distinguished according to the carrier-integration principle: generation (integration), distribution (carrier), and diffusion (integration). Understanding these subsystems in terms of functions, operating methods, design, and architectural requirements is important. It provides the context without going into detail about all the components that make up such a subsystem. The next step is to determine the required space to accommodate these installations in the building. Installations from the generation subsystem are placed in specific "technical rooms," while those from the emission subsystem are placed in the space itself. Often, the installation components of the distribution subsystem have the most significant impact on the structure of a building. Heat, cold, and fresh air are transported and distributed via pipes or air ducts. Horizontal transport occurs in suspended ceilings, crawl spaces, raised floors, parapets, etc., while vertical transport occurs in shafts. According to the Dutch building decree, the minimum clear height for a new residential building is 2.6 meters. For office buildings, the minimum is 2.4 meters for new construction. However, for existing building both residential and office buildings must have a minimum clear height of 2.4 meters. Careful consideration is needed when applying suspended ceilings or raised floors to accommodate pipes or ducts, as these can affect the available headroom.

Pipes and ducts can also be left "exposed," provided they are well-insulated and have a durable outer casing. Examples where pipes play a dominant role in the facade design include the Centre Pompidou in Paris and the Lloyd's building in London. The following sections will discuss the key aspects of analysis, selection, and evaluation in the context of adaptive reuse objectives.

7.2

Adaptive reuse from Office to Residential Building

There are significant differences in specific aspects of installations between offices and residential buildings:

- Installation Setup: Offices typically have a centralised installation system for ventilation, heating, and sanitation, whereas residential buildings are equipped with individual installations.
- Sanitary Facilities: Offices generally lack facilities such as showers and bathtubs.
- Sanitary Density: The sanitary density per person in offices is much lower than in residential buildings.
- Installation Capacity: The required installation capacity for internal sewage, (hot) water supply, and electricity in offices is much lower than in residential buildings.
- Lighting and Electrical Needs: Offices have a completely different lighting plan compared to residential buildings. The demand for electrical power, outlets, and other electrical infrastructure also differs significantly in terms of coverage and distribution.

This means that when transforming an office building into residential units, cold and hot water installations, sewage, and electrical installations need to be added to the building. Given the financial constraints, it is interesting to explore the possibility of utilising the existing collective systems for ventilation and heating. Regarding heating installations, this is possible if the building management system allows for individual control of the spaces. However, often a decentralised approach with individual systems per unit is chosen instead of the collective systems typically used in office buildings. For ventilation, the capacity of the reused systems is generally adequate for residential use (1 $dm^3/s/m^2$ for office buildings and 0.7 $dm^3/s/m^2$ for residential buildings). However, each residential unit has spaces with different ventilation needs:

- living room and bedroom 0,7 $dm^3/s/m^2$
- kitchen 21 $dm^3/s/m^2$
- bathroom 14 $dm^3/s/m^2$
- toilet 7 $dm^3/s/m^2$
- bathroom + toilet 14 $dm^3/s/m^2$

To provide varying ventilation capacities, the mechanical ventilation system needs to be individually adjustable. Additionally, separate extraction systems are required for contaminated, humid air from kitchens, toilets, and bathrooms. New extraction fans, extraction grilles, extraction ducts, and fans need to be added. For the supply of air, the existing mechanical system can often still be used.

Often, the existing lowered ceiling needs to be entirely removed. The many necessary modifications lead to unacceptable quality loss in practice. This means that all existing pipes, ducts, and cable trays become visible, which is unacceptable.

The required electrical installations will be entirely new, starting from the central main distribution in the technical rooms.

The drinking water installation per dwelling consists of hot and cold water pipes and often an electric boiler with a storage tank of 40-80 litres to meet the desired comfort level. In existing buildings, there are often only central facilities for the sanitary groups, so a completely new decentralised setup is needed. To transport the water to all floors, a (modified) pressure boosting installation is often necessary. The installation of new drinking water systems, internal sewage, and mechanical extraction can be done in various ways. Due to the dimensions and required slope, sewage is the most difficult to fit in (Kendall, 2005). Often, a new system will need to be additionally added. A significant question is whether the building can be provided with sufficient sewage pipes, especially in the horizontal plane. The routing of the sewage is often the biggest problem. Placing sewage pipes in, for example, a plenum space (a special, structurally isolated space) is often not possible due to the required slope and partitioning requirements. In principle, there are the following main variants for pipe routing (Nooijen, 2005):

1. **Pipes under a raised floor:** Both the corridor and the adjacent bathrooms are equipped with a raised floor. The pipe in the corridor is a collector pipe to which all pipes from the apartments on a floor are connected. This collector pipe is sloped and connected to vertical pipes installed in service shafts..

2. **Pipes under the floor:** In this case, only a raised floor is used in the bathrooms. The sewage runs from the bathrooms through collector pipes in the lowered ceiling of the underlying floor. These pipes are connected to the main collector pipe running in the lowered ceiling of the corridor on the lower floor and connected to vertical pipes installed in shafts.

3. **Grinding unit + pressure pipe:** Here, wastewater and ground faecal matter are collected in a reservoir installed under a raised floor in the bathrooms. A pump ensures that the wastewater and faecal matter are pumped through a pressure pipe to a main pipe. This main pipe is in the lowered ceiling in the corridor, from which it continues to vertical pipes in service shafts.

4. **Separate pipe shafts:** IEach apartment, with a combined bathroom and kitchen, has its own pipe shaft running through all floor levels. This pipe shaft contains the necessary vertical pipes. The sanitary fixtures are installed around these pipe shafts, allowing for direct connections.

For variants 1 and 3, the pipes for each apartment remain on the same floor level, eliminating the need for floor penetrations. This reduces sound transmission between apartments. However, the horizontal movement of pipes can still cause noise disturbances. With a raised floor having a clearance of 250 mm, the required slope (1:100) can be achieved. Additionally, the pump in variant 3 can cause noise issues and the system is prone to malfunctions and maintenance problems. Variant 4 has the advantage of allowing direct ventilation for the internal drainage system via the vent pipe with a vent cap on the roof. For variants 2 and 4, vertical openings need to be made in the floor. Making openings is less problematic than installing raised floors with various level issues. When it comes to raised floor systems, using a computer floor has clear advantages over a hollow floor. The higher investment is offset by increased flexibility and faster construction speed.

Stephen Kendall (2005) presents an alternative method for organising piping systems. His approach involves two steps: using sanitary fixtures with rear discharge and defining three vertical zones in the walls. Figure 7.2 illustrates Kendall's method for organising piping systems.

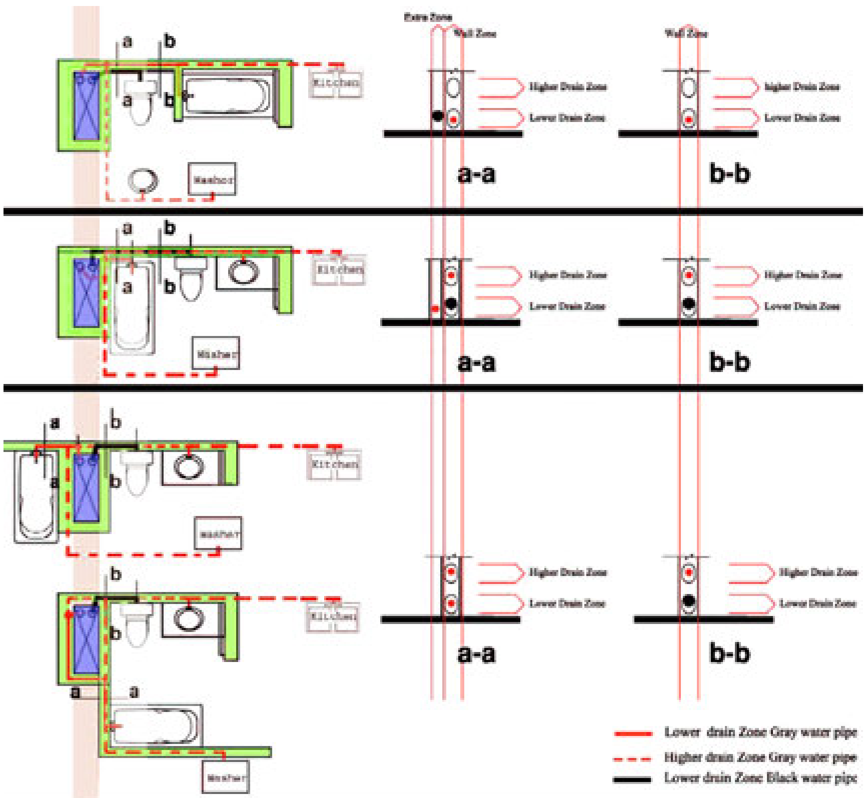


FIG. 7.2

FIG. 7.2 **Arrangement of piping systems according to Kendall (2005)**

The vertical zones are divided into low, middle, and high zones. The lowest zone is reserved for toilets, showers, and bathtubs; the middle zone for sinks and washing machine connections; and the high zone near the ceiling for a potential sprinkler system.

The required slope for drainage determines the maximum distance from the shaft penetration at which a specific sanitary fixture can be placed without exceeding the defined vertical levels of a zone. By defining these vertical zones, the horizontal zones or the maximum distances from the fixtures to the shaft connection are also determined. Depending on the desired fixtures, a double wall width may sometimes be necessary to accommodate the pipes without intersections (as indicated by the extra zones in the figure). Kendall's approach ensures a clear organisation of possibilities and provides a method to further map out options within a chosen main variant.

7.3

Adaptive reuse of Non-Office Buildings into Residential Buildings

Much of the above-mentioned issues also apply to non-office buildings. Additionally, there are more aspects that require attention, as these buildings often have different installation provisions. Furthermore, the modular integrations are often much more customised compared to the frequently grid-structured offices. This significantly increases the complexity.

Installations play a crucial role in an adaptive reuse task.

7.4

Adaptive reuse of Non-Office Buildings into Non-Residential Buildings

The variety of building types (schools, warehouses, barracks, watermills, churches, industrial spaces, shops, and museums) often requires project-specific solutions. Frequently, there is such a change in functionality that a completely new setup of installations is necessary. For example, the requirements for climate control are much higher when converting a building into a museum compared to converting it into a residential building. On the other hand, the requirements for sanitary facilities are often more comparable, and adjustments to the existing provisions may be sufficient.

7.5

Selection and Evaluation of Installations

In the world of installations, many paths lead to Rome. It is important to make well-founded choices, but this is often problematic. Costs at the early stages of a design are only a constraint without a concrete plan yet. Since the most crucial decisions are usually made right at the start of a project, it is essential to support the evaluation based on the limited information available. The evaluation process aims to make meaningful statements about the expected performance of installations relative to the usability objectives as outlined in the Programme of Requirements. Such an evaluation can eliminate certain system alternatives, which then do not need to be considered in the next design phase, where integration of the building and installations is addressed. In this phase, the system choice is finalised, taking into account building alternatives.

Cost/Benefit Considerations

In building adaptive reuse projects where similar functionality is required concerning the technical installations, maintaining and slightly adjusting the existing installations is quite feasible. However, for significant changes in functionality, the situation is entirely different. In the cost/benefit assessment, removing the existing installations becomes a realistic option, often except for heating and ventilation systems. The possibility of reusing installations is therefore limited and often only feasible after extensive modifications. Making a well-considered choice from the various options for replacing or expanding the installations is crucial.

Architectural Considerations

The focus in adaptive reuse is often primarily on the metamorphosis of the visual appearance and interior of the building. Technical installations might receive attention too late, even though they can be more critical in these projects than in new construction. Significant changes, such as altering the amount of glass in the facade to dramatically change the architectural appearance, can have substantial consequences for the installations. For example, the cooling load may increase significantly, leading to overheating of the building on sunny summer days. This is something to be very alert about. Replacing or removing existing shading devices is also an important consideration.

Within the construction process, many different parties and disciplines are involved. The individual architectural components and systems, including the structure (foundation, skeleton, and service floors), the building envelope (facade and roof), and the installations and interiors (finishes and furnishings) are often developed independently of each other, even though an integrated approach is necessary. A primary aspect of an integrated approach is the application of level-thinking. The physical components of a building and decision-making moments in the construction process can be organised into different levels. This serves as the basis for the analysis of the building and installations.

7.6

Morphological Map

After analysing the installations, the design process can begin. As an example, we discuss the development of a new facade concept for the renovation of an existing office (Dartel, 2005). The possibilities are presented in the 'morphological overview' (see illustration). Morphology is an arrangement of objects from a certain perspective. This perspective is based on specific criteria or characteristics and presents 'all' conceivable solutions for a particular problem from a given viewpoint (Eekels & Roozenburg, 1978). It is an arrangement of objects based on certain criteria. During the analysis, one might look for the sub-functions that need to be fulfilled and the possible methods to achieve this, after which all theoretically possible realisations for each sub-function are inventoried. The essence of the morphological approach is the strict separation between generating 'principal solutions' and choosing among them. The morphological method is often used in combination with a step model of the design process, such as methodical design. The method is based on the idea that a design can gradually develop step by step (Roozenburg & Eekels, 1991). Table 7.1 shows the various possibilities for each sub-function in the complete morphological overview. Variants can also be combined. For illustration, five new combinations for the facade system are depicted.

The variants can be evaluated based on set criteria for functionality and feasibility. After assessing the combinations, a choice can be made for one combination, which will then be developed in detail. Table 7.3 shows the results of this evaluation. This table shows that combination 4 has the highest score in both functionality and design. This combination can then be further developed in detail.

TABLE 7.1 Morphological overview of functions and solution variants

FUNCTIONS	VARIANTS	
A. CLIMATE INSTALLATIONS		
Ventilation	– Natural – Mechanical	– Combination – Double facade
Heating	Watersystems (natural air circulation) – Floor heating – Radiator heating – Ceiling heating – Wall/Facade heating – Convector heating	Air systems (forced air circulation) – Air – Induction sysem – Ventilation/Convector system
Cooling	Watersystems (natural aircirculation) – Cool ceiling – Floor cooling – Window/Split unit	Air/water systems (forced air circulation) – Constant volume system – Multi-zone systeem – Variable volume system – Induction system – Ventilation/Convector system Other: Window/Split unit
B. OTHER INSTALLATIONS		
Elektricity/Data	– In the facade – On the facade – In the floor – On the floor – Under the floor	– At the bottom of the facade – At the top of the facade – Along the facade – Spread
Sun protection	– In the glazing – In the cavity	– Outside – vertical – Outside – horizontal – Inside – vertical
Licht regulation	– Transparant elements – Licht reflectors – Reflective slats	
Te openen ramen	– Casement window – Pivot window – Hopper window – French window	– Pivoting window – Slidinig window – Fixed window

TABLE 7.2 Morphological overview of different variants in facade systems

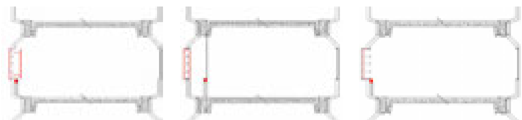
MORFOLOGICAL OVERVIEW		VARIANTS		
		VARIANT 1	VARIANT 2	VARIANT 3
SUB-FUNCTIONS	**A Climate installations**	Double facade includig induction-unit		
		Second skin facade	Second skin facade	Climate facade
				
	B Other installations	Sun protection in air ventilation; electricity/data bottom of facade; casement window; light regulation in glass		
		Second skin facade	Climate facade	Existing facade
				

TABLE 7.3 Scores of five variants in terms of design and use

SCORES VARIANTS		COMBINATIONS				
		1 / COMBI 1	**2 /** COMBI 2	**3 /** COMBI 3A	**4 /** COMBI 3B	**5 /** COMBI 4
						
Critical succes factors in design						
A Is the facade lightweight?	1	No	No	Yes	Yes	Yes
B Can the facade be prefabricated?	2	Yes/No	Yes/No	Yes	Yes	Yes
C Is the system easily accessible?	2	Yes	Yes/No	Yes/No	Yes/No	Yes/No
D Mutation capacity of the system?	2	Pos/Neg	Pos/Neg	Pos/Neg	Pos	Pos/Neg
E Position of installation known before production?	2	Yes	Yes	Yes	Yes	Yes
F Guarantee of facade design?	1	No	No	Yes	Yes	Yes
G Possibility of opening windows?	1	Yes	Yes	Yes	Yes	Yes
Total		**14**	**12**	**18**	**20**	**18**
Critical success factors in use						
H Is the system maintenance friendly?	1	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
I Does the system contribute to comfort?	2	Yes	Yes	No	Yes	No
J Is the system sustainable to use?	1	Yes	Yes	Yes	Yes	Yes
Total		**7**	**7**	**3**	**7**	**4**

Positve = 2 points | Pos/Neg = 1 point | Negative= 0 points | Yes = 2 points | Yes/No = 1 point | No = 0 points

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Fire Risks of Adaptive reuse and Energy Transition

Ruud van Herpen

This chapter discusses the fire risks involved in building adaptive reuse and energy transition. The public law objectives that must be safeguarded are the same in almost all countries: personal safety of building users and emergency responders, and the safety of neighbouring plots (third-party properties). Damage to the environment and public space does not play a role in public law building regulations. Damage to one's own building is also not a public law objective but a matter for the building owner and the insurer. Damage limitation goes hand in hand with 'resilience' in the event of a fire. Resilience is the ability of a building to survive a fire and prevent a total loss. This can be considered a sustainability aspect.

Sustainable buildings generally have a higher probability of a burn-down scenario compared to traditional buildings, even though resilience in the event of a fire aligns with sustainability goals. Additionally, public safety goals can be compromised by innovative developments. Moreover, the aging building population in Western Europe poses an additional threat to public safety goals, since they need more time to evacuate.
Public law regulations provide concrete (prescriptive) rules to achieve the safety objectives. Such prescriptive rules cannot anticipate changing boundary conditions. The boundary conditions that are important in a fire situation can be divided into three subsets:

- Fire and fuel characteristics
- Building characteristics
- Human characteristics

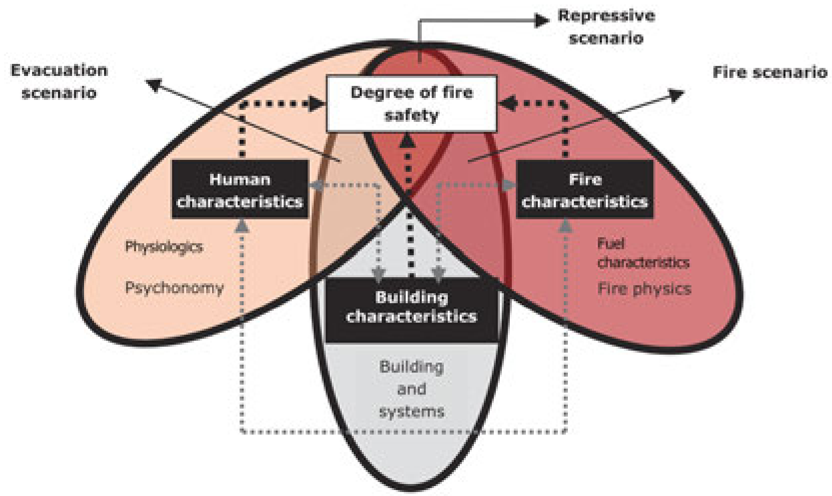

FIG. 8.1 **The three subsets with boundary conditions that determine the fire risk**

FIG. 8.1

As a result, innovative developments do not fit into the fire safety regulations. The regulations are based on aditional buildings. The fire risk introduced, for example, using biobased materials, PV panels in or on roof and facade constructions, and retrofitting of existing buildings is therefore not covered by public law regulations. The residual risk increases, which also increases the likelihood of a total loss scenario.

Higher fire resistance requirements are imposed on the load-bearing structure of residential buildings than on buildings with other functions.

Building regulations typically assume an evacuation concept: in the event of a fire, the entire building is evacuated. However, as the mobility of residents decreases due to aging, this evacuation concept becomes less straightforward. In such cases, a 'stay-in-place' concept might be more appropriate, but this requires different standards for structural design and fire safety systems.

8.1

A risk based approach to fire safety

Subgoals of risk sub systems in fire safety

Building regulations include many provisions regarding the fire safety of a building. These provisions are grouped into subgoals (or risk subsystems) that must work together to ensure the main goals mentioned in the previous chapter:

0 Limitation of the spread of fire within the building (fire compartmentalisation)
1 Limitation of the spread of smoke within the building (smoke compartmentalisation)
2 Preservation of the building (load-bearing structure)
3 Preservation of escape routes and attack routes (load-bearing structure and separation constructions)
4 Limitation of fire spread to the surroundings (neighbouring properties)

Risk Subsystem 0 involves probability control. This risk subsystem is effectively present in all subsequent risk subsystems, which mainly focus on effect control. Probability control is only marginally addressed in public regulations. The provisions are primarily aimed at effect control. Only the likelihood of an incipient fire developing into a potentially hazardous fire is somewhat limited by setting requirements for the fire resistance rating of separation constructions.

In a performance-based approach (risk-based approach), where an acceptable level of safety risk must be achieved, probability control is just as important as effect control. This is why it is explicitly defined as risk subsystem 0.

Risk subsystems 4 and 5 have a direct relationship with the public safety objectives. The other risk subsystems are seen as Lines of Defence (LOD), intended to buy time so that the main objectives are practically achievable. Therefore, LODs are generally less reliable than risk subsystems 4 and 5, meaning that the failure probability of LODs is relatively high.

Rule based or Risk based Assessment?

The risk subsystems or sub-goals in the previous list are concretised in building regulations through generic prescriptions. These prescriptions are broadly applicable and do not consider project-specific characteristics. A more precisely defined safety level can be achieved by defining the acceptable risk for each sub-goal rather than relying on generic prescriptions. This approach can accommodate the specific characteristics of the building, its occupants, and the fire (or fuel). This is most simply done by setting limits on the failure probability of the risk subsystem. The failure probability in each risk subsystem is determined by comparing the Available Safe Time (AST) with the Required Safe Time (RST).

A risk subsystem is considered successful when:

— AST > RST + safety margin [min.] Or:
— AST > γ x RST [min.], where γ represents the safety factor.

This means that the Available Safe Time (AST) must be greater than the Required Safe Time (RST), with the safety margin (or safety factor) determining the level of safety. These times can be actual clock times, such as those needed for personal safety (e.g., evacuation routes and firefighting access). Alternatively, they can be fictional time scales, such as an equivalent fire duration according to the standard fire curve (see Fig. 3), required for fire-resistant separation construction and load-bearing structures. In all cases, AST and RST are project-specific, allowing for customised fire safety solutions.

For the Lines of Defence (LOD's), a small safety margin is generally sufficient. The failure of the LOD's is ultimately acceptable, provided that all individuals (building occupants and emergency responders) have reached a safe place. The safety factor applied between AST and RST should be around a factor of 2 for personal safety. For the LOD's, this can be significantly lower, around a factor of 1. An exception to this is the load-bearing structure risk subsystem, as this subsystem is a prerequisite for personal safety.

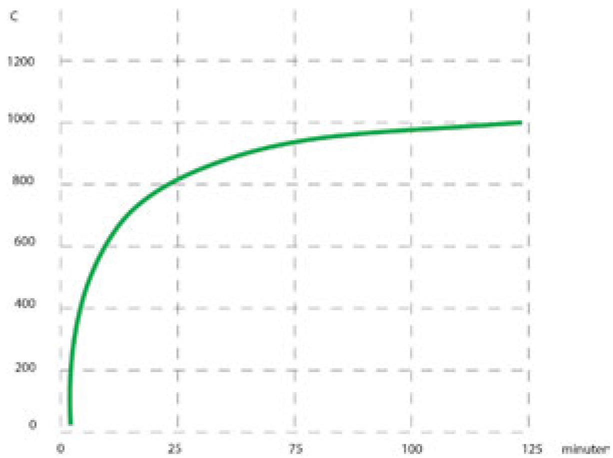

FIG. 8.2

FIG. 8.2 **Standard fire curve, predefined temperature development**

Interrelation of Risk Subsystems

Risk subsystems are interconnected, meaning that a potential safety shortfall in one risk subsystem can be compensated by an excess of safety in other subsystems. The "stay-in-place" concept, where instead of evacuating the building, occupants remain in safe compartments and wait out the fire, utilises this principle. This concept is useful when evacuation routes cannot be used for certain reasons. The safety shortfall in the evacuation subsystem must then be compensated by more reliable Lines of Defence (LOD's), such as load-bearing structures, fire compartments, and sub-compartments. When LOD's form the core of the "stay-in-place" safety concept, a safety factor of 2 or higher will also be necessary.

Conversely, it is also true that with a high level of evacuation safety, such as through quick alarms and short evacuation times, the LODs weigh less heavily. In this case, all building occupants must be self-reliant and able to evacuate independently.

8.2

Fire Risks of Adaptive reuse to Residential Buildings

Relevant building and fire characteristics and consequences of adaptive reuse

When a commercial building, such as an office building, is converted into a residential building, certain fire risks are inevitably introduced. A residential building is fundamentally different from a commercial building. When converting an office building into a residential building, each residential unit becomes its own fire compartment. The number of fire compartments increases, compared to the original situation. Additionally, the fire load in residential functions is larger than in an office building. There can be no restrictions imposed on this aspect, as interventions in the private domain of residents are simply not possible. As a result, the thermal load on load bearing and separation constructions increases during the adaptive reuse to a residential building. This has implications for the risk subsystems related to maintaining the building (load-bearing structure) and limiting the spread of fire (fire compartmentalisation).

In the building regulations, therefore, a higher fire resistance requirement regarding structural failure is imposed on the load-bearing structure of a residential building compared to buildings with other use functions. The question then arises whether the load-bearing structure is suitable for the adaptive reuse of a building into a residential one. Often, the quality of the load-bearing structure is unknown or no longer traceable.

For the separation constructions that serve as boundaries of fire compartments, this distinction is not present in the building regulations. As a result, a fire separation in a residential building is less reliable than a fire separation in a non-residential building, even when they meet the same requirements.

Figure 4 shows the probability distribution of the thermal load during a fire in a residential function, expressed in an equivalent fire duration according to the standard fire curve (SFC). This only considers the fire load resulting from the interior furnishings of the building. The building itself is assumed to be non-combustible.

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FIG. 8.3

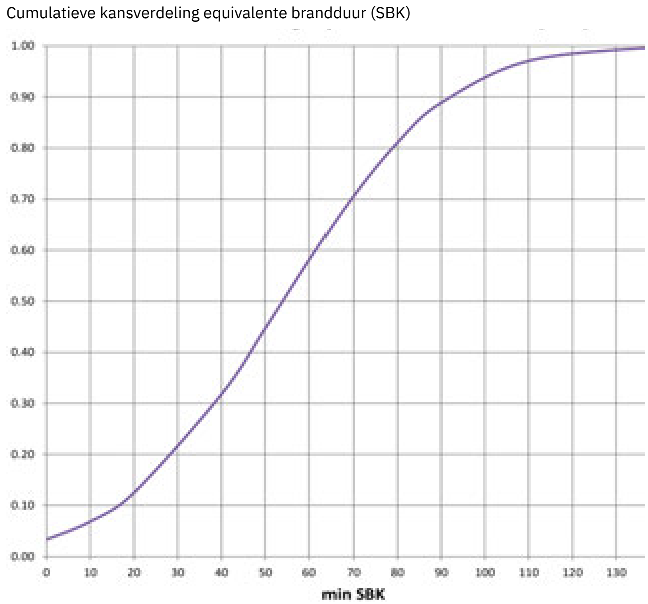

FIG. 8.4

FIG. 8.3 **Fire in Grenfell Tower in London (2017): an example of failing to contain the spread of fire and smoke**

FIG. 8.4 **Cumulative probability distribution of the thermal load during a fire in a residential function, expressed in minutes**

For the separating constructions that serve as boundaries of fire compartments, this distinction is not present in the building regulations. As a result, a fire separation for a residential function is less reliable than one for a non-residential function, even when they meet the same requirement.

Figure 8.3 shows the probability distribution of thermal load during a fire in a residential function, expressed in an equivalent fire duration according to the standard fire curve (SBK). Only the fire load from the building's interior furnishings is considered here. The building itself is assumed to be non-combustible.

From Figure 8.3, it can be seen that a 30-minute fire-resistant separation construction in a residential function has a reliability of approximately 22%, and therefore a failure probability of 78%. For a 60-minute fire-resistant separation construction, the reliability is approximately 58%, meaning a failure probability of 42%. Fire compartmentation is therefore a Line of Defence with low reliability. If no intervention occurs during the fire scenario, a full burn-down scenario for a residential building is not unlikely. Fortunately, fire service deployment can usually prevent this. In the Netherlands, fire services are well organized and have a dense distribution network.

The Influence of External Separation Constructions in Adaptive reuse

In reality, the failure probabilities of fire-resistant separation constructions in residential functions are even higher than what Fig. 4 suggests. Figure 4 only considers the separation construction itself, focusing on the direct path of fire penetration. However, adjoining constructions that extend along the fire-resistant separation construction, such as facades and roofs, also play a role in the failure probability of the separation construction. The adjoining constructions introduce a flanking path for fire spread.

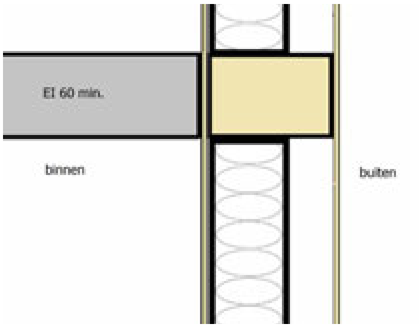

FIG. 8.5

FIG. 8.6

FIG. 8.7

FIG. 8.5 **Principle of a fire-stop in the facade at the location of a fire-resistant wall in cross-section**

FIG. 8.6 **Fire in the lightweight extension (upper floors) of the residential complex on Joan Muyskenweg in Amsterdam**

FIG. 8.7 **Fire in the lightweight extension (upper floors) of the residential complex on Joan Muyskenweg in Amsterdam. After the fire, the extension was completely rebuilt with approval from the fire department in accordance with the original plans**

Through this flanking route, heat transfer can occur by conduction, convection, or radiation. Especially continuous cavities can transport heat quickly and unhindered via this flanking route. Even direct fire spread is possible, when there are continuous layers of combustible materials present.

The connection of a fire-resistant wall to the facade and roof requires careful detailing. Fire-stops are always necessary in facades and roofs with continuous cavities and/or combustible material layers at the connection to a fire-resistant separation construction. A firestop is a non-combustible barrier that seals a continuous cavity and interrupts combustible material layers at the location of the connection of the fire-resistant separation construction to the facade or roof. Even then, the behaviour of the flanking construction is difficult to predict. Building constructions deform due to high thermal loads, resulting in gaps, cracks, and fissures. A notable example is the fire in Grenfell Tower in London, where all fire-stops in the facade failed.

When transforming a building into a residential building, the risk of flanking fire spread through facades and roofs is significant. This is because there will be more internal fire-resistant walls in the building, as each residential unit becomes its own fire compartment. These new fire-resistant walls connect to existing facades and roofs, often with little consideration given to the risk of flanking fire spread.

This issue also arises when adding a few residential floors to existing buildings. Due to the constraints imposed by the underlying building and its foundation, the new floors must be lightweight, often constructed using steel framing, timber framing, or cross-laminated timber (CLT). As a result, these constructions often have many continuous cavities and combustible material layers, which can facilitate rapid fire spread across multiple compartments. The fire in the residential complex on Joan Muyskenweg in Amsterdam (2023) is an example of this problem (Fig. 6).

The fire at the Startblok Riekerhaven residential complex in Amsterdam (2023) also illustrates the issue of fire and smoke spread through continuous cavities (Fig. 7). This complex, which consists of 'container homes' intended for young first-time buyers, naturally features numerous cavities that can facilitate unexpected paths for fire and smoke spread. Both the residential complex on Joan Muyskenweg and the Riekerhaven complex complied to public regulations.

Fire protection system level in residential buildings

In a residential building, each apartment is considered the private domain of its occupants. As a result, this private domain cannot be monitored with fire detectors that alert the entire building to allow for evacuation and complete clearance. Such a fire alarm and evacuation system cannot be certified, as residents are not required to provide access to their apartments. Consequently, the system is deemed insufficiently reliable and is not mandated for residential functions. Only the smoke detector in the apartment's common area is required, and its sole purpose is to alert the occupants of the apartment where the fire is occurring.

Due to the potential delay in alerting all residents and their awareness of the situation, long evacuation times must be anticipated in residential buildings. Escape and attack routes must therefore remain usable for extended periods. Especially in residential buildings with airtight external separation constructions (facades and roof), the overpressure in the apartment where the fire is developing can rise significantly (up to more than 1000 Pa). This poses a problem for escaping from the burning apartment as residents may not be able to open the apartment door, and it also increases the risk of internal smoke spread. The internal separation constructions are less airtight than the external constructions, causing smoke to spread more rapidly through the building than before. Attention to the airtightness of internal separation constructions is therefore required; achieving an airtightness with a Qv;10 value comparable to that of external separation constructions should be pursued. Alternatively, installing a residential sprinkler system could be considered, which would slow down the temperature rise in a burning apartment and limit the overpressure.

The impact of the building population

Even when internal smoke spread is limited and escape routes remain usable for an extended period, the safety of residents can still be compromised in the event of a fire. The population in the Netherlands is aging, which also affects the building population. According to the law, residents can remain self-sufficient and continue living independently even if they are less mobile or not mobile at all. In such cases, self-evacuation during a fire is not feasible, and there is often no internal organisation to evacuate residents in residential buildings. Although there may be safe escape routes within the building, residents may not be able to use them.

FIGS. 8.8 and 8.9 **Residents (left) and the Vertical Escape Route (right): A Mismatch**

FIG. 8.8

FIG. 8.9

The evacuation concept mandated by building regulations is no longer viable for a building population that has reduced mobility. A "stay-in-place" concept, where residents remain in their units (except for the unit where the fire originates), seems more applicable. However, the implications of a stay-in-place concept are significant. The Lines of Defence—particularly the structural framework, fire compartmentalisation, and sub-compartmentalisation—must be much more reliable than what is achieved with current regulatory standards. Increasing fire resistance and smoke resistance requirements with 30 to 60 minutes is therefore necessary.

8.3

Fire risks in the energy transition

Probability and effects

The adaptive reuse of buildings into residential buildings is often accompanied by an energy transition aimed at creating a more sustainable building. However, this energy transition increases the fire risk of buildings. For example, photovoltaic (PV) panels on facades, on or in roofs, energy storage batteries, and electric vehicles located in or near the building all represent additional ignition sources. Thus, the probability of starting a fire increases.

The energy transition only makes sense if a (residential) building is well insulated. When combustible insulation is used in external separation constructions, it creates a path for fire spread along the fire-resistant internal separation constructions. The facade completes the fire compartmentalisation poorly if no barriers or firestops are applied at the points where the fire-resistant internal separation constructions meet. Combustible insulation can include materials such as EPS, PUR, PIR, or even bio-based insulation materials.

An example of increased failure risk of fire separations due to retrofitting of facades and roofs of existing ground-level residences is the fire at a residential block in Presikhaaf, Arnhem, in 2023. Existing homes were fitted with a new outer shell as part of the energy transition, added over the existing facades and roof. The new outer shell consisted of EPS insulation with an external plaster layer on the facade. For the roof, a similar outer shell was applied, finished with PV panels. Both the combustible insulation layer in the new outer shell and the cavity between the new outer shell and the existing external separation constructions extended across the fire-resistant walls. This allowed the fire to spread easily throughout the entire residential block. The use of firestops at the party walls could have potentially prevented this scenario.

FIG. 8.10 **Fire in residential block in Presikhaaf, Arnhem (2023): fire spread through the new outer shell**

FIG. 8.10

Use of sustainable materials

The energy transition goes hand in hand with the use of sustainable, often combustible materials. Biobased materials are always combustible. Wood is also popular as a construction material, such as in lightweight additions using timber frame construction or cross-laminated timber (CLT). As a result, the fire load in the compartment (housing unit) is increased by the fire load of the construction materials.

FIG. 8.11 **Cross-laminated timber in residential construction serves as both load-bearing element and separation construction**

FIG. 8.12 **Charring in wood: the charred layer and the reduced cross-section**

FIG. 8.11

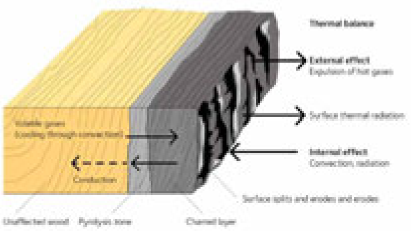

FIG. 8.12

Cross-laminated timber is popular in residential construction because it allows for prefabricated wooden walls and floors that function both as the load-bearing framework and fire separations between fire compartments. According to building regulations, these wooden structural and partition elements can be sufficiently fire-resistant without additional protection, provided the design accounts for the charring depth that occurs in the wood over the period the wall or floor must remain fire-resistant. If the reduced cross-section after this period is still adequate to provide sufficient load-bearing capacity and thermal resistance, the wooden component can be considered fire-resistant. Using a conservative charring rate of 0.8 mm/min, the charring depth after 60 minutes is 48 mm, leading to a significant reduction in cross-section.

However, fire resistance does not automatically imply that the construction will survive the fire. A fire-resistant construction is not necessarily fire resilient. Building regulations allow for a burn-down scenario, provided that the structural framework and fire compartments give building occupants enough time to reach a safe place. The likelihood of a burn-down scenario increases when the building structure is combustible, as is the case with CLT buildings. This does not mean that such buildings are necessarily less safe, but they are less resilient in the event of a fire. This is inconsistent with the objectives of a sustainable building..

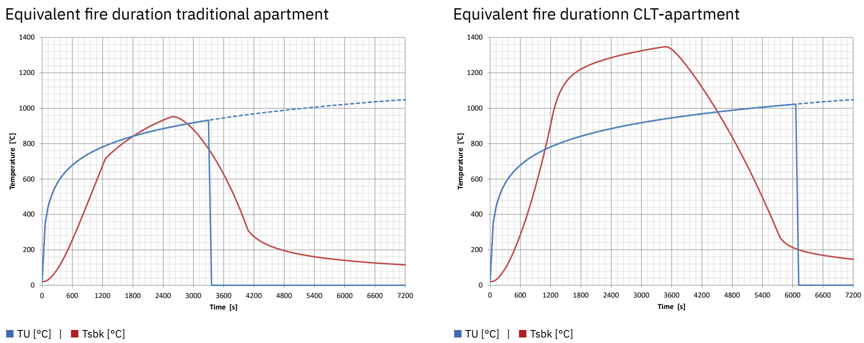

FIG. 8.13

FIG. 8.13 **Natural fire curve and corresponding equivalent fire duration according to the standard fire curve for a traditional apartment (left) and a CLT apartment (right)**

Figure 13 illustrates this. The thermal load in the event of a fire on load-bearing and separating constructions of a traditional non-combustible apartment averages about 55 minutes SFC. When the same apartment is constructed using cross-laminated timber (CLT), the thermal load increases to approximately 105 minutes SFC. When 60-minute fire-resistant constructions are applied, their failure probability in the CLT apartment is nearly 100%.

Not only from a sustainability perspective is a resilient building desirable, but also from the perspective of an aging building population. Timely evacuation from a building in the event of a fire is no longer a given, making a burn-down scenario unacceptable. Therefore, a fire-resilient building is more future-proof.

What applies to cross-laminated timber also applies to timber frame construction and biobased structures. The risk of a burn-down scenario increases, whereas a smaller risk is desired. Reducing the risk of a burn-down scenario can be achieved by isolating the permanent fire load (the fire load of the building construction) from the variable fire load (the fire load from the compartment's furnishings). Fire-resistant protection can help with this. However, it is also possible to manage the fire source in such a way that the fire spread is stopped before the constructions begin to burn. An automatic fire suppression system (such as a sprinkler system or water mist system) reliably controls a local fire, thereby preventing the burning of the construction.

Sources of Ignition in the Building Envelope

In sustainable buildings, the use of photovoltaic (PV) panels, which can partly meet energy needs during the summer period, is a popular measure. PV panels can be installed on or in the roof or facade. Integrating PV panels into the roof or facade is often preferred for aesthetic reasons, where they also serve as finishing elements. With integrated PV panels (BIPV: Building Integrated Photovoltaics), an ignition source is introduced into the building envelope. This can have significant consequences if the building envelope is combustible.

Behind the PV panels, a ventilated cavity is necessary to cool the back of the panels under heavy sun exposure. Additionally, this cavity is also essential from a building physics perspective to remove condensation caused by moisture transport from inside to outside. This makes it challenging to isolate the sources of ignition from combustible construction materials.

FIG. 8.14

FIG. 8.14 **Residential building with continuous integrated-PV facade in Bremen without the application of firestops**

The application of firestops at the locations of the fire-resistant internal walls seems the most feasible solution. This would prevent a burning facade from spreading to other fire compartments. It means that cavity dimensions need to be limited. At each fire-stop location, provisions for cavity ventilation and moisture drainage must be included. This presents a design challenge in detailing.

For non-integrated PV panels on roofs, the solution is simpler. A fire in the PV panels can be isolated by a 20 to 30-minute fire-resistant barrier. A tiled roof (with ceramic or concrete tiles) meets this requirement. A flat roof with a gravel ballast layer also suffices. There are also fire-resistant coatings for roof coverings that can provide the necessary protection, eliminating the need for a gravel ballast layers.

8.4

Conclusion

IThis chapter has examined the fire risks associated with building adaptive reuse and energy transition. The fire risks of such innovative concepts are not adequately covered by public regulations. As a result, a rule-based assessment of the fire safety of transformed buildings with energy transition is insufficient. A performance based (risk-oriented) approach is more robust and future-proof, though it does lead to a higher level of fire safety provisions.

When transforming a building into a residential building, it is important to consider that the fire risk of the building increases due to the change of the building function. The reliability (read: fire resistance) of the load-bearing structure must be enhanced. Additionally, many new internal fire separations will be introduced in the building, which will connect to the existing facade and roof structures. The connection detailing is crucial to prevent flanking fire spread and smoke propagation through facades and roofs. Fire-stops are almost always necessary in these connection details.

Moreover, when anticipating an aging building population, which reduces the possibility of fully evacuating the building, a resilient building in case of fire is desirable. This automatically leads to a more sustainable building. In that case, fire resistance levels for load bearing and separation constructions should be 30 to 60 minutes above the legally required level.

When the adaptive reuse is accompanied by energy transition, a resilient building in case of fire is practically a prerequisite. The energy transition aims to create a more sustainable building, but it also introduces a higher fire risk. Therefore, sprinkler protection seems almost inevitable in residential buildings. The alternative is to fully isolate the permanent fire load of the building from the variable fire load within the building. In such a case, combustible constructions must be protected with at least 60 minutes of fire resistance. If there are also ignition sources within the structure, such as integrated PV panels, those ignition sources must also be isolated from the combustible construction layers. A fire resistance of 20 to 30 minutes will suffice for this purpose.

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Collaboration in area transformations to housing

Erwin Heurkens

Area transformations generally involve the conversion of existing office, commercial, retail, or industrial areas into spaces where residential functions become increasingly dominant. Adaptive reuse naturally occurs within such area transformations as well. However, on an area level, there are often considerations that go beyond individual buildings or plots, which can also be crucial for achieving successful building transformations to residential use. A key characteristic of these area transformations is the large number of diverse stakeholders who collaborate, to varying degrees, on the transformation of an area. This chapter discusses the involved parties, a specific form of collaboration (Developing Apart Together), and the partner selection method that are important for effective and sustainable collaboration in area transformations to residential use.

9.1

Area Transformations and Housing

The housing market and spatial planning have not been as high on the societal, political, and policy agenda as they are today in decades. Urban infill within existing urban areas has been a focal point for the national government, provinces, municipalities, and the business sector for some time now, following decades of focus on urban expansion. Initiatives like the programme "Urban Transformation: More Space for Housing" (see stedelijketransformatie.nl) reflect this shift. Various studies have shown that there is potential to realise hundreds of thousands of homes within existing urban areas, partly through the addition of housing in transformation areas (Brink Management and Advice, 2017).

The shortage of (affordable) housing is not the only pressing spatial issue. Given the number of (sometimes conflicting) challenges and spatial demands currently facing the Netherlands—such as those related to housing, employment, energy, the circular economy, and climate adaptation—the spatial puzzle is challenging. The transformation of existing urban areas must also contend with this integrated challenge. Simply adding more affordable housing through the transformation of existing office, commercial, retail, or industrial areas is too simplistic. Housing cannot always fully replace existing functions but must be realised in harmony with existing functions and without conflicting with them. In short, achieving area transformation plans with more housing—where spatial considerations about functional compatibility are made in a coherent manner—depends on the collaboration between multiple parties. Let's take a closer look at these parties, their interests, goals, and roles in area transformations.

Housing and spatial planning haven't been this high on the agenda in decades.

9.2

Parties Involved in Area Transformations

Unlike expansion areas or inner-city areas owned by the municipality or a single market player, area transformations are characterised by a multitude of land and property owners with diverse interests. The main groups of land and property owners involved in these transformations can be distinguished as follow:

Private land and/or property owners with business operations as a goal

In area transformations, companies often play a role, especially those that depend on a specific location for their continuity. Examples include water-related industries like concrete plants or clusters of companies in the same sector, such as ICT firms. Investments in their own land or property primarily serve their own economic business objectives and continuity. If their operations are thriving and there are no major expansion plans, these parties often remain firmly rooted in their location and may oppose new transformation plans involving residential functions. This resistance could stem from the fact that adding residential areas would require them to invest in safety measures and noise and odour control.
However, there are also parties planning to relocate their operations elsewhere, as their current location no longer suits their needs—often due to limitations on expansion. For instance, water-related businesses might seek alternative locations. Finding a new site for these companies could be beneficial, as it would free up space for residential development. Additionally, some businesses might see an opportunity to collaborate on housing projects, particularly those in retail, office, and logistics sectors, because the new residents could become customers or potential employees. In summary, the interests, goals, and roles of these companies can vary widely, influencing their potential for collaboration in area transformations.

Public Land and/or Property Owners with Public Management and Redevelopment as Objectives

Municipalities (or other public entities) often own land for their own public purposes. This includes not only municipal offices but also properties and land designated for utilities such as energy generation, waste processing, and public transport hubs. These functions are often essential for the operation of the city and region, and municipalities rarely repurpose them for residential development. They manage these areas and buildings, investing in them as necessary.

Additionally, municipalities sometimes own land or acquire land specifically for (re) development and transformation. They do this by issuing tenders for private developers, who, through various selection methods, are given the opportunity to develop this land with new real estate, transform existing buildings, or undertake a combination of both. The selection methods used by municipalities to engage with the market for these purposes can vary, and will be discussed further.

In area transformations, municipalities sometimes lease land, where companies only own the buildings on that municipal plot. After the lease period ends, municipalities can choose to extend the lease to the current lessee, re-lease it to another party, or sell it to another party. This summary of the municipality as a landowner shows that public interests and goals in transformations can vary significantly.

Private land and/or property owners with a focus on real estate (re)development

In addition to public parties, there are also real estate developers who have selectively acquired land ownership to realise residential developments. However, the acquisition of land by developers and developing contractors occurs to a limited extent. This is often due to the financial risks involved and because municipalities have more instruments to acquire land, which may then possibly be reissued through tenders. Therefore, market parties are often dependent on municipalities but are also indispensable for the realisation of more housing in area transformations.

The market demand for urban living is, depending on location and price level, generally sufficient for market parties to want to engage in residential development. Additionally, market parties typically see the need for innovation and cooperation, where realising sustainable area transformations increases their growth potential and competitiveness. Nevertheless, the financial feasibility of area transformations is often under pressure because the costs (particularly land and material costs) exceed the benefits. Especially if affordability is an important component of municipal tender requirements, collaboration with housing corporations is sought, housing units are made smaller, or public parties are asked to apply for subsidies. In short, market parties see an opportunity to invest in area transformations when it comes to housing, but they also need to have a viable business case.

Private land and/or property owners with real estate-operation and management as their objective

A separate category here includes land and/or property owners, such as investors and housing corporations, who already own property for operation and management purposes. Real estate or institutional investors in area transformations typically have invested in offices or multi-tenant commercial buildings. If these investments are yielding returns, there is often no impetus to transform them into residential properties. However, if there is (structural) vacancy, there may be an opportunity for transformation. Convincing these parties of the importance of transforming vacant buildings can be challenging, especially if they are not based in the city or country where the transformation is taking place. With local investors, it is often more evident and easier to explore transformation plans and potentials. Housing corporations with holdings in transformation areas are not very numerous. If they are present, their role is often limited to the management and operation of social housing and potential investments in sustainability and energy efficiency. Due to their broader objectives and potentially existing ownership positions, housing corporations might also be interested in reinvesting in new social housing projects within these areas.

Private real estate users (tenants) with a focus on property use

Finally, there is a significant group of non-owners—real estate users or tenants—who can play a role in increasing the potential for residential functions in transformation areas. Local (renting) entrepreneurs, residents, and office workers can, through area initiatives like placemaking, amplify the need for spaces such as restaurants, shops, and other amenities, thereby indirectly increasing the demand for housing in the area. Therefore, it is essential to collaborate with this group of stakeholders on area transformation projects, as their initiatives can support the intended residential function. The next section discusses what the multitude of different parties and ownership relations means for collaboration.

9.3

Broad collaboration and fragmented land ownership in area transformations

Within an area transformation, especially in large areas with complex challenges, multiple forms of collaboration are often required. Firstly, there is the so-called broad area network, which can consist of public, private, and social parties. This network is sometimes referred to as the "coalition of the willing." These are parties that are generally open to spatial changes and investments in the area and seek collaboration while keeping their own interests in mind. The area network is used by these parties to organise meetings and to work together on certain issues such as forming a vision for the area, placemaking, programming, and participation processes. Additionally, for specific themes, sub-areas, or projects, a more formal organisational structure with a limited number of parties may be necessary.

Due to the large number of parties involved in area transformations, we see a broadening and layering of collaboration, sometimes referred to as public-private-social partnerships (PPMS). However, it is rare to find formal collaborations where these three groups are equally represented. Therefore, the PPMS is currently best viewed as an area network organisation rather than an operational partnership. What is more commonly seen in area transformations is that public, private, and social organisations collaborate in various configurations to implement plans.

Firstly, the importance of private-private collaboration in area transformations is significant. For example, developing market parties often collaborate with other developers or housing corporations to create comprehensive development plans that include various living environments and (affordable) housing types. Additionally, private-private collaboration occurs between developers and companies that own land, aiming to create integrated development plans with live-work combinations. We also see private-private collaborations among existing businesses, such as Business Investment Zones (BIZ), where property owners pool resources to fund investments in the quality of the environment and real estate.

Secondly, there are private-civil collaborations, where developing parties work together with, for example, social entrepreneurs or other area and building users to design plans for placemaking in public spaces and collective facilities at the building level. In such activities, the boundary between collaboration and participation is not always clear. Various forms of social engagement aimed at creating support are common.

Finally, it is quite common for public-private collaborations in area transformations to take on lighter forms of cooperation, primarily focusing on integrated area vision formation, attracting and pooling public and private financing, and planning the phasing of area transformations. However, it is not typical for municipalities and developing parties to acquire and consolidate land to develop an entire area integrally, mainly due to a key characteristic of area transformations: fragmented land ownership. Coordinated collaboration among different parties presents a significant challenge due to this fragmented ownership. Unlike areas owned by municipalities or a single market party, area transformations are characterised by numerous lands and/or property owners with diverse interests. Nevertheless, there are strategies that can enable (public) parties to steer the spatial coherence of the areas to be transformed (Hobma et al., 2019). These strategies include plot development, organic development, Developing Apart Together (DAT), and land consolidation.

In area transformations, all four strategies—plot development, organic development, Developing Apart Together (DAT), and land consolidation—are employed, and sometimes even a combination of these strategies is used within a single area. However, in the following section, we will focus solely on the DAT collaboration model. There are several reasons for this choice. Firstly, plot development often involves very limited collaboration, mainly concerning building adaptive reuse; we will exclude this because our focus is on area-level collaboration. Additionally, in organic development, the municipality has limited control over the pace of transformation. This strategy is therefore less effective when there is an urgent need for more housing, unless the existing parties are committed to this goal. Finally, land consolidation is highly capital- and time-intensive due to the large number of landowners who need to cooperate, making it rare in practice and often counterproductive for the rapid realisation of housing. Moreover, true collaboration at the area transformation level is primarily found in the DAT collaboration model.

9.4

Developing Apart Together: The collaboration model for area transformations

In this section, we will discuss the characteristics, as well as the advantages and disadvantages, of the Developing Apart Together (DAT) collaboration model (Hobma et al., 2019, pp. 12-16; De Zeeuw, 2018, pp. 114-116). DAT is a very light form of public-private partnership. Under this model, each party develops their own plots individually, but within a collectively agreed-upon vision. This approach can involve new owners, parties that have acquired land positions specifically for this purpose, or existing landowners.

While there is coordination between public and private investments, there is no creation of a heavy public-private partnership or governance structure. As a collaboration model, DAT is also referred to as a "joint venture ultra/super light," where the following main tasks are allocated to public and/or private parties:

1. **Vision Development and Coordination:** Parties collaborate to develop a shared vision for the area, ensuring that all individual developments align with this vision.

2. **Investment in Public Spaces:** Public entities are typically responsible for investing in infrastructure, public spaces, and utilities, ensuring that the area transformation is supported by adequate facilities.

3. **Private Development:** Private parties focus on the development of their respective plots, whether for residential, commercial, or mixed-use purposes, while adhering to the agreed-upon area vision.

4. **Minimal Governance:** The DAT model avoids the creation of complex governance structures, relying instead on a shared commitment to the area's vision and mutual coordination between the involved parties.

This model is particularly effective in scenarios where there is a need for flexibility, a low level of interdependence between the developments, and where the focus is on ensuring that each party can proceed with their projects with minimal bureaucratic oversight. However, this also means that the success of DAT largely depends on the willingness of all parties to adhere to the common vision and to collaborate effectively without a formalised governance structure

- Initiative: Can be initiated by either the municipality or the market.
- Land Acquisition: Each party is responsible for acquiring land individually (if necessary at all).
- Land Development: Each party handles their own land development.
- High-Level Planning: Conducted jointly by all parties.
- Detailed Planning: Each party is responsible for their own detailed planning.
- Real Estate Development: Primarily managed by the market (private developers).
- Real Estate Management: Primarily managed by the market

The added value of collaboration lies in the potential for increased density and the coordination of the phasing of development plans within the area transformation. Land acquisition, particularly by municipalities, can be limited to a few plots. Additionally, parties can (re)develop on their own plots within the framework of prior agreements. In the phases leading up to real estate development, there is a need for collaboration between parties to align plans and investments at the area level. To meet this need, a light area organisation is often established to manage tasks that concern the entire area. This recognises the necessity of cross-boundary collaboration to achieve the desired quality and density in the area.

FIG. 9.1

FIG. 9.1 **Piushaven Tilburg**

EXAMPLE

Developing Apart Together: Piushaven, Tilburg

An example of the DAT approach can be found in Piushaven in Tilburg (see piushaven.nl). Since 2001, work has been underway on this 60-hectare harbour-related industrial site to create a mixed residential and work area through 15 sub-plans. The overall programme of Piushaven includes approximately 1,500 homes and about 38,000 m² of gross floor area for business spaces/facilities, including the redevelopment of the AaBe complex (a former textile factory and industrial heritage site), and recreational facilities (including a harbour park).

Several organisations are active in the area to promote collaboration and coherence. The municipal Piushaven project office, with an area director, ensures the daily coordination and execution of the area development. The Piushaven Quality Team oversees the urban planning quality and coherence of the entire area transformation, consisting of an external supervisor/chair, an external member of the environmental committee, and a municipal project manager and urban planner. The Quality Team reviews project designs from individual developers and advises the municipal government. Additionally, there are Plan Teams for each project, consisting of residents (and businesses) who contribute ideas and provide advice on the plans.

The joint organisation can take the form of an informal network organisation based on a collaborative intent, but it can also be established through a foundation. This organisation typically consists of the previously discussed "coalition of the willing," mainly private, social (and sometimes public) parties that wish to transform the area and are supportive of adding residential functions. The tasks and responsibilities of the area organisation include determining:

— the overall programme;
— density, building heights, public spaces;
— phasing of public and private investments;
— joint marketing, promotion, placemaking, and (cultural) events;
— ongoing area planning and design of public spaces (including parking);
— organisation of resident and business participation;
— coordination between projects and construction activities;
— coordination of sales and rentals;
— logistics and mobility;
— planning of shared and community facilities.

The range of tasks varies in composition and intensity, and each area transformation requires a tailored approach. Typically, the market parties, businesses, and municipalities within the area fund the area organisation, which does not itself engage in major investments, land acquisition, land exploitation, or real estate development. A crucial factor for the success of the DAT relationships is having a dedicated person leading the area organisation who can connect and maintain the commitment of the involved parties.

The advantages of the DAT (Developing Apart Together) collaboration model are:

— collaboration with limited capital expenditure: Parties can work towards a common goal without requiring large amounts of capital;
— limited capital burden for municipal initiators: Municipalities only need to acquire select properties, minimising their financial burden;
— reduced process costs: Parties can develop their own plots at their own pace, independently of other parties, avoiding lengthy processes such as land swaps and subsidy applications;
— simple governance structure: The area organisation operates without a complex governance structure;
— *coalition of the willing*: Active parties in the area, along with the municipality, form a cooperative group focused on common interests;
— shared costs: The modest costs of the area organisation are collectively borne by the involved parties;
— encouragement and comfort for market parties: The organisational model incentivises market parties to expand their positions and/or exchange or reorganise land to create better plots for development.

The disadvantages of the DAT (Developing Apart Together) collaboration model are:

— limited control: Steering possibilities are restricted to the content and firmness of the agreements between the members of the area organisation;
— potential delay in development: Not all "willing" parties may feel the same urgency to develop, which can extend the duration of the area transformation, potentially negatively impacting the ability to meet housing needs.

- resistance from unwilling parties: Parties that are not part of the coalition of the willing and are not bound by the agreements may oppose the collective plans, creating obstacles to progress.

Regarding the 'unwilling' parties, there are several alternatives to ensure progress in the area transformation and to create a coherent area:

- organise a participation process as a private and/or public entity to explore whether there are plans and investments from the unwilling parties that could be integrated into the area transformation planning (for an extensive discussion on participation in area transformations, see Verheul et al., 2021).
- limit the plan boundaries to the area of the cooperating partners (*the willing*).
- incorporate the plots of the unwilling parties, meaning develop around them.
- explore the possibility of relocation if the plots are essential for the transformation, possibly facilitated through planning and financial means, where municipal flexibility in terms of available plots elsewhere can be important.
- voluntarily acquire the critically positioned plot that complicates the realisation of an integrated area transformation, possibly after exercising the right of first refusal.
- amend the planning framework for the essential plot so that the existing function is frozen and has no expansion possibilities, thereby exerting pressure on the owner to eventually sell.
- forced acquisition of the essential plot through expropriation, which is rarely practiced as it is considered a last resort (*ultimum remedium)*.

9.5

Partner selection: the municipal market selection method in area transformations

Within the DAT (Developing Apart Together) collaboration model, it may sometimes be necessary or opportune to engage market parties who do not yet own property in the area transformation with a residential objective. If the municipality owns land and/or real estate, they can sell it to market parties for the (re)development/transformation into housing through a tender or selection method. A widely used market selection method in area transformations is partner selection. This selection method is suited for projects with significant societal impact, high-risk profiles, long lead times, and many stakeholders, which is often the case with area transformations. Generally, four aspects play a role in the selection of a future partner: the party's vision, their approach, their commitment, and their profile (For a detailed explanation of the partner selection method, see Akro Consult 2019, pp. 127-132, and Van Zessen 2020).

After awarding the contract, the parties focus early on optimising mutual interests based on general principles and a description of goals (instead of specifying results). Municipalities then closely collaborate with the selected market party or consortium on an area transformation plan. Collaborations that arise from partner selections offer many advantages and make it possible to (Akro Consult 2021):

- leverage the creativity and innovative capacity of the market without losing sight of public and social goals and their evaluation;
- collaborate openly and transparently to achieve plan optimisations;
- concretise the ambitions of the client, translating them into joint ambitions and making them feasible based on market information;
- accelerate the planning process, as public and private parties develop plans simultaneously rather than sequentially;
- discuss and, if necessary, stretch the development framework during the collaboration to achieve shared ambitions;
- reduce transaction costs, as only the collaborating parties need to fully develop a plan.

Once the collaboration partner has been identified, the actual collaboration process and planning begin. During this initial period, the foundation for sustainable cooperation must be established and secured. Four key factors are central to this:

- continuously keep joint and opposing interests sharply in focus.
- work in manageable phases to reduce risks and create flexibility in programming, allowing for decisions on whether or not to proceed with the partner.
- clearly describe and structure the process, the project organisation, and the decision-making and information lines as a prerequisite for continuity in collaboration.
- foster trust by focusing on personnel, experience, knowledge, competencies, and informal contact moments.

The partner selection method and the subsequent collaboration process between public and private parties can be seen as the "formal" collaboration component of an area transformation based on a Developing Apart Together (DAT) model. In addition to this, various other "informal" forms of collaboration can also be incorporated within the DAT model, one of which is a joint area organisation. A market party selected to transform a portion of the area can, of course, also participate in the DAT area organisation. This approach fosters private-private and private-community collaborations on specific area themes or projects.

The selection of market parties naturally does not apply to private parties who already own land; they have the right to self-realisation to (re)develop or transform their parcels if this aligns with the environmental plan.

9.6

Conclusion: area transformation as a significant component of the shift toward residential development

This chapter has aimed to provide an overview of the characteristics, key considerations, and benefits of collaboration in area transformations where residential development is a significant objective. The variety and diversity of stakeholders, the fragmentation of land ownership, and the long duration of area transformations mean that there is no one-size-fits-all model for collaboration. However, coordinated collaboration is essential: no single party can add a residential function to an area undergoing transformation without considering the interests of others and the spatial-planning requirements. The example of the area organisation within the Developing Apart Together (DAT) collaboration model demonstrates that various parties can work together to set a direction for an area through a shared strategy and vision, allowing for the development and transformation of buildings on their own land within these frameworks. Such collaboration also offers ample opportunity for new parties, particularly housing corporations and developers, to join, commit, and contribute to a collective area transformation strategy. Importantly, this method of collaboration aligns with the recent trend toward lighter, phased, capital-extensive, and relational forms of collaboration in area development. As a result, it is expected that these approaches will also take on a more sustainable character. Collaboration in area transformations with these characteristics thus constitutes a significant component of the overall transformation effort toward residential development.

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Collaborative Housing

Collectively self-organised housing through Adaptive Reuse

Darinka Czischke and Gerard van Bortel

Collaborative housing is on the rise in Europe, including in the Netherlands. Amid an unprecedented housing crisis, more and more people are seeking ways to secure future-proof housing by joining forces with others. Key concepts in this trend include community-oriented, sustainable, and affordable. However, these initiatives have been slow to get off the ground in the Netherlands. Why is this so? What can we learn from other European countries? And what potential lies in transforming existing buildings into collectively self-organised housing forms? This chapter provides examples of projects where buildings with non-residential functions have been converted into different types of collaborative housing. The chapter explores the key features, challenges, and opportunities of these transformations through existing literature and the discussion of two concrete cases.

10.1

Introduction

Collective, self-organised, and self-managed housing initiatives have grown over the past decades. They represent social innovations attempting to address a range of crises, particularly the declining affordability of housing, environmental degradation, weakened care systems, and increasing loneliness among certain social groups.

Collaborative housing encompasses a variety of models, such as cohousing, cooperatives, Community Land Trusts (CLTs), and ecovillages, amongst others. While most research and media articles on these developments focus on new construction projects, the adaptive reuse of existing buildings into collaborative housing forms is a promising trend. The availability of underutilised or vacant buildings, such as schools, warehouses, and farms in rural areas, provides opportunities for self-organised groups to convert these buildings into housing projects that combine private dwellings with several types of shared spaces.

Following this introduction, the chapter describes the key characteristics of collaborative housing forms, including social organisation, architectural features, and the main legal and financial aspects. The third section presents two examples of adaptive reuse of diverse types of buildings into collaborative housing forms in the Netherlands and Austria, respectively. A fourth section outlines some of the main challenges and facilitating factors that emerged in these cases. The chapter concludes with a reflection on what is needed in practice to promote collaborative housing forms through the adaptive reuse of non-residential real estate

10.2

Basic Characteristics of Collaborative Housing

Collaborative housing is a term used as an overarching concept that encompasses a wide range of collectively self-organised and self-managed housing forms. Central to this type of housing is the presence of a significant degree of cooperation among (future) residents and between them and external actors and stakeholders to realise the housing project. Collaboration here refers to coordinated actions to achieve a common goal. This cooperation can take place at various stages of the project—sometimes from the concept, design, and development stages—and can extend to daily maintenance and management.

Collaborative housing forms can vary in ownership structure, legal conditions, and organisational characteristics. Common features include a high degree of social interaction among residents and the presence, to varying extents, of shared goals and motivations related to the housing project, such as ecological sustainability or social inclusion.

There are several defining characteristics of collaborative housing forms. These projects are always intentional, meaning that the people involved in the project genuinely want to live in this way. It is not something they do out of sheer necessity; rather, it is something they are personally very committed to. They aim to realise this project together with others because they share a common vision of how they want to live. This also involves many collective decision-making processes, as the end-users—the residents in this type of housing—are central throughout the entire process.

The end-users are involved as a collective at every step. This approach is quite different from the standard way of developing housing projects. Particularly in the Netherlands, conventional housing projects are typically led by professional parties, such as developers, housing associations, and builders.

Another distinguishing feature of collaborative housing forms is the significant degree of shared spaces and communal use. This means that individual households within the group have their private spaces, usually consisting of a bedroom, a small living room, a kitchen, and a bathroom. Additionally, the collective often has several spacious communal areas, such as a shared kitchen and dining room, a laundry room, and even facilities like a workshop, a gym, and, in Nordic countries, often a sauna.

Several tasks and responsibilities are often shared by the group, such as participating in working groups for the realisation and management of the housing project. This management also includes organising social activities. All of this requires collective decision-making, which is often the most complex aspect of collaborative housing. Collective decision-making presents various challenges related to group dynamics, conflict resolution, and process facilitation.

All the above means a prominent level of involvement and effort required from the end-users, which is something central to collaborative housing models. The residents are actively involved in every step of the project (Brysch & Czischke 2022). In most cases, collaborative housing is fully or partially realised through self-building, where the residents invest a lot of energy themselves; in other words, they contribute with "sweat equity" to the construction of the common housing project (Mullins & Moore 2018).

10.3

The history of collaborative housing

Historisch gezien bestaan er al meer dan een eeuw verschillende modellen van Historically, various models of collectively self-organised living have existed for over a century. Collaborative housing can be found in different forms around the world.

In many countries, collaborative housing forms have become widespread, often with government support. Over time, the collective ethos and shared goals have sometimes given way to more market-oriented thinking and a focus on financial returns.

Collaborative housing, often organised in the form of cooperatives, represents a hybrid model that has proven highly adaptable to changing macroeconomic and political conditions. This means that collaborative housing is characterised by a varying mix of community-oriented thinking, market dynamics, and attention to public values such as sustainability and social inclusion.

IIn several countries, collective forms of housing have become widespread, often with government support. Sometimes, the collective ideals and shared goals have been replaced by a more market-oriented mindset and a focus on financial returns. Collective housing forms, often organized as cooperatives, represent a hybrid model that has proven to be highly adaptable to changing macroeconomic and political conditions. This means that collective housing is characterized by a shifting mix of community thinking, market thinking, and attention to public values such as sustainability and social inclusion.

In countries like Sweden and Denmark collaborative housing models have a long tradition and include the Kollektivhus model in Sweden and the Bofællesskab model in Denmark. The latter emerged in Denmark in the 1980s and later became globally known and rebranded as "cohousing" in English. In recent decades, there has been a resurgence of interest in new and revised forms of housing cooperatives, cohousing, and Community Land Trusts (CLTs), the latter being a model originating from the U.S. and currently being explored and developed in various European countries. These collaborative housing models are adapting to new economic, political, and social developments across European societies. .

Collaborative housing is about people coming together with a shared vision of how they want to live.

10.4

Collaborative housing versus Conventional Housing

What is the difference between conventional housing and collaborative housing? Collaborative living is about people coming together with a shared vision of how they want to live, investing their time, skills, and efforts in a process of co-producing their private and communal living spaces. In contrast, conventional housing typically consists of standalone units with entirely private spaces, whether in private ownership or in the rental sector.

In the private rental sector, shared housing is becoming increasingly common in cities worldwide, especially as housing affordability worsens. Shared living arrangements in the conventional rental market typically involve renting a home with others, often strangers and sometimes friends, on a temporary basis. In these arrangements, each person has limited private space, usually just their bedroom, while most communal areas are shared. This type of housing is typically offered by a landlord, either private or institutional. There is no collective goal or shared responsibility for the realisation or management of living space. Although this form of housing is often referred to as "cohousing" in the private rental sector, it does not actually constitute collaborative living.

10.5

Examples of Collaborative Housing through Building Transformations

The growing popularity of collaborative living is most evident in new construction projects today. Unfortunately, examples of existing buildings that have been transformed into collaborative housing are still relatively rare. However, there are some interesting cases. Below, we present two collective living projects that have been developed through the physical adaptive reuse of buildings originally constructed for non-residential purposes.

FIG. 10.1

FIG. 10.1 **Nieuwlandstraat, Amsterdam**

EXAMPLE A

Amsterdam, Netherlands – Nieuwlandstraat (school)

Pieter Nieuwlandstraat 93-95, originally designed as a primary school in 1893, was built during the same period as the rest of the Dapperbuurt neighbourhood in Amsterdam and is one of the few remaining original buildings in the immediate area. The building, with its striking red brick facade, is classified as a municipal monument. It has 1,155 square meters of interior space and a backyard of 130 square meters. In the 1980s, when the neighbourhood underwent significant redevelopment, the building was renovated. The school was replaced by a 'multifunctional centre,' and the western wing of the ground floor became the neighbourhood centre De Werf, which later merged with the welfare organisation Dynamo. The other parts of the building were used as offices, educational space, and a daycare centre. After Dynamo and the daycare centre left, the building was temporarily rented out as office space but remained largely vacant during the 2000s.

After years of legal, bureaucratic, and financial struggles, the social housing association Soweto acquired the property at Pieter Nieuwlandstraat in November 2015. Soweto was founded by housing activists and currently has more than a hundred members. The association has its roots in the Amsterdam squatting movement, established in response to the erosion of social housing in the Netherlands and the criminalisation of squatting. Soweto stands for solidarity, sustainability, and self-management in housing.

The acquired school was transformed into a residential space with the professional support of an architect and countless volunteers. This was not an easy task and involved clearing out a centuries-old attic and undoing a rather unattractive 1980s-style renovation. New interior walls were installed, pipes were laid, and roof extensions were added. The central heating system was also refurbished. The work required two years of effort from the residents, but the result was worth it.

The purchase of the building and its renovation were made possible through a mortgage from the German GLS Bank, loans from supporters, and a relatively small amount of bonds with a maturity of five, ten, and fifteen years. The building is rented and managed by three independent associations, each with its own organisational characteristics: the eleven-member housing group, the volunteer organisation that manages the public space, and the association that manages the building, uniting all parties involved. Soweto is a member of the international Mietshäuser Syndikat, an organisation rooted in Germany. Soweto supports initiatives to start other housing groups and collective living projects.

Living and working spaces in Soweto are not rented directly by Soweto to individual tenants but rather to an association that represents the building itself, known as the "building association." In this association, the different tenants collaborate to manage the property. It is the building association that decides on the allocation of spaces to tenants.

FIG. 10.2 **Sargfabrik, Vienna**
Source: Haeferl / Creative Commons Attribution-Share Alike 3.0 Unported license

EXAMPLE B

Sargfabrik – Vienna (factory)

The Sargfabrik is a mixed-use project located in the 14th district of Vienna. The complex is situated on the original site of an old coffin factory (hence the name Sargfabrik), with a residential building on one side overlooking Matznergasse. The property was purchased by the Association for Integrative Living and developed into a residential home inhabited by the members of the association. In addition to the residential function, the building also includes a children's home, cultural centre, seminar house, bathhouse, café-restaurant, playground, and rooftop garden.

In the mid-1980s, a group of committed individuals envisioned a housing association that would collectively provide space for various lifestyles and cultural opportunities. This group founded the Association for Integrative Living (Verein für Integrative Lebensgestaltung - VIL). After years of planning, their vision of an open and self-determined way of living became a reality in 1996; what started as a social experiment evolved into an urban residential project with cultural and political aspirations.

In 2000, more people joined the initiative with a new building in the same neighbourhood, called MISS Sargfabrik, which houses a library, a communal kitchen, and other shared spaces. To achieve these goals, the association manages the collective planning, construction, and operation of the project. The project's philosophy on communal living dictates that everyone can participate in activities, but participation is not mandatory. Additionally, the housing project welcomes people with special needs and other socially disadvantaged groups, mixing residents of different ages and backgrounds. Lastly, ecological aspects are considered, such as optimised energy consumption, green electricity, composting, and solar-powered hot water production.

FIG. 10.2

10.6

Challenges and Facilitating Factors

The above cases show several common characteristics, both in terms of challenges and facilitating factors. These are also reflected in the literature that deals with the adaptive reuse of several types of utility buildings into collaborative housing forms. In this section, we delve deeper into some of these challenges and facilitating factors.

Facilitating Factors

Both cases began with a building that was vacant or underutilised, ready for repurposing, and a group of people with a sharp vision of how the building could be used after adaptive reuse. Additionally, it was essential to have an individual or a group of people with the capacity to bring the project to the attention of key decision-makers within the municipality and potential financiers, respectively, to obtain permits and funding. In both cases, an existing or new association was established to fulfil this function. As Overtoom et al. (2019) point out, "the decision-makers need to be in influential positions within the organisation to overcome obstacles" (p. 8). Moreover, in addition to the significant involvement of the residents' group in the project, research shows that successful collaborative housing initiatives require support from professionals who can assist the group in developing a feasible project plan (Czischke 2018; Brysch et al. 2023).

Another facilitating factor is the presence of regulatory frameworks that ease the realisation of collaborative housing. As mentioned earlier, these frameworks are still underdeveloped in the Netherlands (Czischke et al., 2023). Countries and cities where these housing forms have been established for decades have gradually adapted by incorporating planning and financial regulations that allow for housing layouts with smaller private living units in exchange for, for instance, larger communal spaces. These new "housing standards" should be integrated into Dutch legislation, not only for new construction but also for adaptive reuse.

Finally, being part of a broader urban policy, such as a neighbourhood renewal program, can be a facilitating factor, as in the case of the Sargfabrik in Vienna. In this project, a mixed-use programme on the ground floor of the building has become a vibrant asset to the neighbourhood over the years.

Challenges

Research on collaborative housing shows that one of the main obstacles to developing new housing is the high cost of land, especially in urban areas (Czischke et al., 2023). This issue also arises with vacant properties on which available plots are scarce. While some municipalities in Europe have active land policies that encourage self-organised groups to acquire a site or building to develop their projects, this is rare in the Netherlands. The municipality of Amsterdam has established a groundbreaking scheme to allocate new construction sites to housing cooperatives, but there is no similar policy for vacant buildings.

In collaborative housing projects, residents plan to live there for an extended period. Therefore, they expect to be continuously engaged with their homes and to adapt the housing over time, in line with their changing needs. As described in the case of the Sargfabrik, collaborative housing requires regulations that facilitate adaptive reuse. When such regulations are absent or inflexible, adaptive reuse becomes a greater challenge.

10.7

Conclusions

In this chapter, we provided a brief overview of the concept of collaborative housing and how this type of housing can be developed through the adaptive reuse of existing buildings. We illustrated this with two case studies and drew on existing literature to discuss some of the key challenges and facilitating factors in these projects.

There are several advantages associated with transforming a building through a residents' collective. From the perspective of the end-user, the involvement of residents in the adaptive reuse process enhances the quality of living and the sense of home (Overtoom et al. 2019). This is due to the time and effort that future residents invest in the project. This contrasts with a conventional project, where a profit-driven developer typically makes plans for an unknown future end-user. Additionally, the involvement of future users during the adaptive reuse process fosters social bonds between them, creating a sense of community (Strobel 2006). Furthermore, there is evidence that more sustainable building practices, such as the use of environmentally friendly technologies and materials, are applied in collective adaptive reuse projects (Strobel 2006; Brysch et al. 2023).

Despite the potential benefits, we must also consider the challenges of collaborative housing projects, such as the inward-looking nature of some initiatives. While some collaborative housing projects are created by exclusive, affluent white middle-class households, there is evidence that this is rapidly changing, and these projects are becoming more diverse and inclusive. The examples in this chapter highlight the potential for social and architectural diversity that the adaptive reuse of buildings into collaborative housing can bring, especially when these projects are developed in close cooperation with the municipality and local partners in the neighbourhoods where the projects are located.

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Transformation Meter for Offices

A tool to assess opportunities and risks of Adaptive Reuse

Rob Geraedts [1951-2023], Theo van der Voordt and Lizanne Espinal

Rob Geraedts passed away in October 2023. We are honoured to dedicate this chapter posthumously to Rob.

How can an owner, potential buyer, developer, or investor know if a vacant office building is suitable for conversion to housing and to what extent this is functionally, technically, and financially feasible? This is an important question, especially in a time of high vacancy rates and a strong demand for housing. This chapter discusses the so-called transformation meter, also called a conversion potential assessment tool: a checklist that helps determine which characteristics of the market, location, building, and involved parties are favourable or unfavourable for a successful transformation, potential risks, and how these risks can be mitigated. The transformation meter is phased from a "quick and dirty" general assessment to a more detailed analysis. Additionally, the role of this tool in the decision-making process regarding a go/no-go decision—whether to proceed with further planning or to stop investigating feasibility—is discussed. The chapter concludes with a brief discussion of other tools available for assessing the opportunities, obstacles, and risks associated with repurposing buildings.

11.1

Adaptive reuse Potential from Office to Residential Use

For experienced professionals, an initial exploration of a vacant or soon-to-be-vacant office building can relatively quickly provide insight into the possibilities and barriers for repurposing it into residential use or a combination of residential and other functions. According to experts from the industry, the likelihood of a successful conversion to residential functions mainly depends on three factors:

1. **Duration of Vacancy:** The longer an office building remains vacant, the more likely the current owner is willing to either sell the property or pursue repurposing it themselves.

2. **Cause of Vacancy:** Market, Location, and/or Building. If a building is vacant due to a temporary downturn in the office market (more supply than demand), repurposing may not be the best option. When the office market rebounds, continuing to use the building as office space might be more profitable. However, in cases of structural vacancy and a tight housing market (more demand than supply), repurposing the building into residential units could be a viable option. This decision depends on the suitability of the location for residential use and the building's potential to be transformed into an attractive residential space for specific target groups. Financial feasibility is also a critical success factor.

3. **Municipal Policy:** If the building is designated for office use, cooperation with and support from the municipality is necessary to change the designation (see Fred Hobma's chapter on the Dutch Environment and Planning Act: '3. Legal Framework'). If the vacant office building is located in an area where the municipality prioritises housing, repurposing it into residential units is promising, as it aligns with municipal interests. Buildings located in a (re)development zone designated for office use are more likely to be renovated and reused as office buildings rather than converted into residential spaces.

These factors clearly indicate what a property owner or potential buyer (typically a commercial developer or housing corporation, and occasionally a residents' collective) should first consider when considering the repurposing of a vacant office building into residential units. Important considerations include: What is the state of the local office and housing markets? How long has the building been vacant? Is there demand for housing, and in what categories (target groups, price levels)? Where is the building located, and how favourable is the location for housing development? What does the building itself allow, and where might there be potential bottlenecks? How does the municipality view repurposing, and are they willing to amend the current designation if necessary?

For a preliminary scan of the location and the building, developers often apply their own veto criteria, such as proximity to amenities, the building's year of construction, energy label, a favourable structural grid for accommodating residential units, sufficient depth to ensure adequate daylight in the residences, financial viability, and minimal complications. Based on this initial assessment, a decision is typically made to either proceed with further planning for repurposing (go) or to abandon the project (no-go). This evaluation often also considers the option of demolition and new construction as an alternative.

A decision to proceed with repurposing (a go) requires a further exploration of opportunities and risks, the creation of a plan, and a more detailed mapping of costs and revenues.

11.2

Office Transformation Meter

To efficiently and systematically determine whether a vacant office building has sufficient potential to be converted into housing, the so-called transformation potential meter, in the Netherlands known as the "office transformation meter," was developed. Elsewhere this meter is called a conversion potential assessment tool (Geraedts et al., 2018). Using various checklists, this tool allows for the assessment of which characteristics of the location and building are favourable or unfavourable for successful transformation. The instrument can assist involved stakeholders in making informed decisions and in checking during the planning process whether they are still on the right track. The first version of the transformation meter dates back to the late 1990s, and it has since undergone several updates, as noted in the accompanying text box.

Development of the Transformation Meter

The development of the transformation meter dates back to the late 1990s, a time when there was a record number of vacant office buildings (Geraedts et al., 1999). The Transformation Meter 1.0 was primarily based on literature review (Geraedts & Van der Voordt, 2002-2003). With input from practical applications and its use in numerous graduate studies at the Faculty of Architecture at TU Delft, the transformation meter was further refined. During interviews with parties involved in various repurposing projects, questions were asked about which aspects they considered important at both the location and building levels for a successful transformation. Additionally, research findings related to housing preferences in relation to location and building characteristics were utilised.
In 2007, two new steps were added: a scan for financial feasibility and a checklist how to cope with risks (Geraedts & Van der Voordt, 2007). In 2012, the Dutch Building Decree (‘Bouwbesluit’) was amended. An update to the transformation meter was published in 2018, incorporating these changes and adjusting the description of criteria so that a positive score would contribute to the likelihood of success (Geraedts et al., 2018). The Dutch Environment and Planning Act (Dutch: Omgevingswet), includes the technical requirements from the Building Decree in the new "Bouwbesluit bouwwerken leefomgeving" (Bbl), which was published in October 2023 (www.wetten.overheid.nl; https://www.bblonline.nl/docs/wet/bbl). For existing buildings constructed before January 1, 2024, the 2012 Building Decree remains applicable to assess whether the building meets the permit requirements of its construction year. In the latest version of the transformation meter (discussed in this chapter), these updates have been incorporated. Additionally, financial feasibility has been prioritised in the assessment of adaptive reuse potential, cost data has been updated, criteria now also include the maximum distance to stairs and elevators, and more detailed information has been added regarding the maximum desired distance to various amenities.

Five steps

The transformation meter consists of five steps, with Step 0 being the preliminary task of identifying vacant office buildings. Step 1 is a quick scan based on a limited number of veto criteria, divided into the aspects of Market, Location, Building, and Organisation. If a building does not meet these criteria, it is eliminated as a potential candidate for transformation and adaptive reuse, resulting in a no-go decision. Step 2 involves a quick scan of financial feasibility. If this criterion is not met, the repurposing is also ruled out, unless there are societal reasons that outweigh a negative or insufficient financial outcome. Step 3 is a more detailed feasibility scan. Gradual criteria for the location and the building are assessed to determine which characteristics are favourable or unfavourable for transformation and repurposing. Step 4 expresses these findings in an overall score, indicating whether a building is hardly transformable or highly transformable. Depending on this outcome, a decision is made between a go or no-go. Step 5 consists of a Risk Inventory Checklist and suggestions to reduce these risks.

The sequence of steps can vary depending on the project. Although it makes sense to start with a quick assessment of veto criteria, evaluating gradual criteria and risks, as well as exploring ways to meet certain criteria and mitigate or reduce risks, can significantly influence financial feasibility. Table 11.1 provides a summary of the five steps. The following sections will discuss each step in detail.

TABLE 11.1 The steps of the transformation meter

STEP	ACTION	LEVEL	RESULT
Step 0	Inventory of vacant offices	Building stock / office market	Insight into which office buildings are vacant and their locations
Step 1	Quick scan: Evaluation of adaptive reuse potential based on veto criteria	Location Building	Rapid selection of offices; suitable/not suitable for further investigation > go/no-go
Step 2	Quick scan: Exploration of financial feasibility	Building	Insight into financial feasibility; Cost-benefit analysis > go/no-go
Step 3	Evaluation of location and building based on gradual criteria	Location Building	Judgment on the adaptive reuse potential of the office building > go/no-go
Step 4	Determination of transformation class	Location Building	Transformation class of the office building > go/no-go
Step 5	Risk Inventory Checklist	Location Building	Risks and opportunities to reduce risks > go/no-go

Step 0: Inventory of supply and demand at the area Level

The real estate market's demand for residential space and the availability of vacant office buildings are crucial factors in the likelihood of successfully repurposing offices into residential units.

General data on Dutch office vacancy rates, both nationally and at regional or urban levels, can be found in sources such as the National Vacancy Monitor from Statistics Netherlands (CBS) and various reports, such as NVM Business 2022. At the local level, it's important to understand which office buildings within a municipality or specific area are (structurally) vacant or are expected to become vacant soon, and to know the demand for different types of housing. Key sources include the municipality, real estate agents, industry literature, and personal observations.

Repurposing empty office buildings into dwellings only makes sense when these dwellings meet a need. The supply (empty office building) must match the demand (for dwellings), both quantitatively and qualitatively, in terms of location, living environment, and characteristics of the dwellings after repurposing. For data on the Dutch housing market, see resources like the site of Housing Research Netherlands, abbreviated as WoON (www.woononderzoek.nl/). Knowledge of the local housing market and the wishes and preferences of potential target groups is necessary as well. Based on various housing studies, Table 11.2 shows which aspects are important to many people when choosing a home.

TABLE 11.2 Relevant Aspects on the Demand Side (Geraedts & Van der Voordt 2007

LOCATION (HOUSING ENVIRONMENT)			**BUILDING (HOUSING)**		
1.	REPRESENTATIVES		**1.**	DWELLING TYPE	
	a	Characteristics of Surrounding Buildings	**2.**	ACCESS	
	b	Social image	**3.**	DWELLING SIZE	
	c	Vibrancy		**a**	Number of Rooms
	d	Green character		**b**	Living Room
2.	FACILITIES			**c**	Kitchen
	a	Shops		**d**	Bedrooms
	b	Hospitality industry		**e**	Sanitary space
	c	Schools		**f**	Storage space
	d	Bank/post office	**4.**	SPATIAL LAYOUT OF THE DWELLING	
	e	Medical services	**5.**	EQUIPMENT	
	f	Leisure facilities	**6.**	OUTDOOR SPACE	
3.	ACCESSIBILITY TO PUBLIC TRANSPORT		**7.**	OUTSIIDE AND INSIDE VIEW	
	a	Distance to Bus Stop	**8.**	ENVIRONMENTAL ASPECTS	
	b	Frequency and Time schedule		**a**	Heating
	c	Distance to Tram or Metro		**b**	Ventilation
	d	Frequency and Time schedule		**c**	Noise and acoustics
	e	Distance to Train Station		**d**	Sunlight and daylight
	f	Frequency and Time schedule		**e**	Energy consumption
4.	ACCESSIBILITY BY CAR			**f**	Use materials
	a	Distance to Highway	**9.**	GENERAL CONDITIONS	
	b	Traffic Flow		**a**	Accessibility
	c	Parking Availability		**b**	Safety
				c	Adaptability
				d	Adequate management
			10.	COSTS	
				a	Purchase price/rent level
				b	Additional costs

Differences Between Target Groups

An attractive and safe living environment, type of housing, housing size (size of the living room, number of rooms), the ratio between price and quality, affordability, and rental or purchase options are important factors for all target groups. Accessibility by public transport, parking availability, and proximity to shops are also high on many people's wish lists. Criteria and prioritisation mainly focus on price and quality level, preference for a single-family home versus an apartment, and living in an urban environment with many amenities versus a quiet residential area with lots of greenery. Preferences are especially dependent on age, life stage, household composition, and financial capacity. For students and starters, repurposing into relatively small and inexpensive homes can be a suitable choice. When it comes to high-rise office buildings, adaptive reuse into residences for households with young children is less suitable. Converting them into apartments for seniors may be a better option. Based on differences in housing desires and preferences, five demand profiles have been compiled, see Table 11.3.

Redevelopment of vacant office buildings into housing is only worthwhile when it meets a need.

TABLE 11.3 Five demand profiles for urban redevelopment projects

TARGET GROUP 1: STARTERS	TARGET GROUP 2: STARTERS	TARGET GROUP 3: YOUNG DUAL-INCOME HOUSEHOLDS
Young, low-income single persons /Group living	Young, low-income single persons /Semi-independent living	Young couples with dual incomes / semi-independent living
LOCATION (LIVING ENVIRONMENT)	LOCATION (LIVING ENVIRONMENT)	LOCATION (LIVING ENVIRONMENT)
1. Urban environment, rich in amenities	1. Urban environment, rich in amenities	1. Urban environment, rich in amenities 2. Suburban residential environment (space, greenery) 3. Easily accessible by car 4. Appropriate parking facilities
BUILDING (DWELLING)	BUILDING (DWELLING)	BUILDING (DWELLING)
2. Unit in a group of 3-7 residents 3. Living/bedroom approximately 22 m^2 4. Shared sanitary facilities; 1 shower/toilet per 4 units 5. Shared kitchen 6. Shared outdoor space 1.5 m^2/unit 7. Shared bicycle storage 8. Shared laundry room 9. Total 50 m^2; usable area 35 m^2	2. Semi-independent unit with communal facilities 3. Living/bedroom approximately 22 m^2 4. Sanitary facilities per 2 residents 5. Kitchen per 2 residents 6. Shared outdoor space 1.5 m^2/unit 7. Shared bicycle storage 8. Shared laundry room 9. Total 50 m^2; usable area 35 m^2	5. Large luxury apartment 6. Private outdoor space

TARGET GROUP 4: SENIORS 55+	TARGET GROUP 5: SENIORS 55+
Low to average income	Above average income
LOCATION (LIVING ENVIRONMENT)	LOCATION (LIVING ENVIRONMENT)
1. Safe living environment 2. Daily shops and public transport within walking distance (< 500 m) 3. Preference for an urban environment 4. Goede parkeervoorzieningen 4. Suburban residential environment (space, greenery)	1. Safe living environment 2. Shops, greenery, bank, post office, and public transport within walking distance (< 500 m) 3. Easily accessible by car 4. Appropriate parking facilities 5. Partly urban, partly suburban environment
BUILDING (DWELLING)	BUILDING (DWELLING)
5. Preferably no ground-floor dwelling 6. Presence of an elevator 7. Preferably no internal stairs 8. At least a 3-room apartment 9. Living room 25-30 m^2; bedroom > 11.5 m^2 10. Direct connection between living room, main bedroom, and bathroom 11. Extra attention to sound insulation 12. Adaptable in case of physical impairments	6. Preferably no ground-floor dwelling 7. Presence of an elevator 8. Preferably no internal stairs 9. Porch entrance; preferably no gallery entrance 10. 4/5-room apartment 11. Living room 30-40 m^2; large kitchen 12. Direct connection between living room, main bedroom, and bathroom 13. Spacious bathroom 14. Balcony or rooftop terrace 10-15 m^2 15. Extra attention to sound insulation 16. Adaptable in case of physical impairments

Comparison of Demand and Supply

In terms of location, demand and supply can be compared relatively easily. The location of an empty office building can be assessed based on the presence of nearby amenities, distance to public transport, vibrancy, and social safety. However, comparing supply and demand at the building level is more complex. Some characteristics of an empty building (supply) primarily represent conditions that make the adaptive reuse to certain types of housing either straightforward or difficult and costly. For instance, this applies to the load-bearing structure and installations. These features do not directly appear in a demand profile for residents.

The extent to which the supply meets current housing desires and preferences can only be determined once a preliminary adaptive reuse plan has been developed. This is also necessary to estimate how many housing units can be accommodated, depending on the types and sizes of the dwellings.

Step 1: Quick scan based on veto criteria

Step 1 involves a preliminary, rapid, and relatively low-effort scan of an empty office building using nine veto criteria, divided into four aspects: Market, Location, Building, and Organisation/Actors (see Table 11.4). A veto criterion means that if the criterion is not met (Judgment 'No'), the adaptive reuse to residential use is almost impossible. Further detailed research (Steps 2-5) is then unnecessary. In the process of surveying empty offices in a municipality or specific area, this quick scan allows for a swift selection of potentially interesting properties. When redeveloping a specific vacant office building, it also quickly becomes clear whether adaptive reuse is feasible. Depending on the context, the user can add or remove veto criteria.

The veto criteria apply to every target group. Veto criterion 1 is self-explanatory. Veto criteria 2 and 3 pertain to the building's location. If the municipality does not permit a change in the purpose of an office building or if the building is situated in an industrial area with serious health risks, further investigation into transforming it into residential use is of little value. Veto criterion 4 concerns the minimum ceiling height, which is currently set at 2.10 meters (requirement for existing buildings). In practice, a minimum height of 2.60 meters is often required for habitable spaces. Veto criteria 5-9 (organisation) relate to the most directly involved stakeholders. An enthusiastic initiator is essential for feasibility. This could be a developer, the municipality, a housing corporation, or an enthusiastic group of residents. In practice, these stakeholders might overlap, for example, if a municipality owns the building and wants to redevelop it itself.

In the column 'Source,' the method for obtaining the necessary information is indicated. The final column records whether the criterion is applicable or not. If one or more veto criteria are not met, the vacant office building is generally ruled out for conversion to residential use, unless the criterion is 'correctable.' For instance, this could be achieved by negotiating with the municipality for more flexible handling of the zoning plan.

TABLE 11.4 Quickscan based on veto criteria

ASPECT	VETO CRITERION	SOURCE	ASSESS-MENT YES	NO
MARKET			YES	NO
1. Demand for housing	1. Demand for housing for local target groups	Municipality or real estate agent		
LOCATION				
1. Urban environment	2. Zoning plan change permit	Environment & Planning Act; municipal policy		
	3. No health risks from odor, noise, pollution	Observation on-site; real estate agent		
BUILDING				
2. Dimension of the shell	4. Free ceiling height > 2,60 m	Observation on-site; building plans		
ORGANISATON/ACTORS				
3. Initiator	5. Presence of enthusiastic initiator with influence	Local research		
4. Developer / investor	6. Meets the requirements regarding location and accessibility	Developer		
5. Owner	7. Meets the requirements regarding the size and character of the building	Developer		
6. Municipality	8. Willingness to sell the building	Owner		
	9. Positive attitude towards conversion	Municipality		
		Result quickscan		

Step 2: Quick scan of financial feasibility by means of key figures

If repurposing is not financially feasible, further development of the plan doesn't make sense. For an initial exploration of the financial feasibility of repurposing projects, key figures are used in step 3. It appears to be difficult to find reliable current key figures. Developers, contractors and architectural firms that frequently conduct repurposing projects and can compare projects with each other do have key figures, but they are not publicly accessible.Interesting Dutch sources with key figures include:

- project analysis, e.g. by Gelinck & Strolenberg (2014);
- data on building costs (https://www.bouwkosten.nl; https://www.bouwkostenkompas.nl/en)
- Vastgoeddata (https://www.vastgoeddata.nl); ;
- the pdok dataset with current geo-information https://www.pdok.nl);
- data on WOZ-values (property values) (https://www.wozwaardeloket.nl);
- CBS statistics on purchase and rental prices of homes (http://www.opendata.cbs.nl/statline);
- BDB index figures http://www.bdb.nl) that provide insight into cost developments of wages, materials, and equipment, with a distinction between cost price development without market effects (structural figures) and including market effects (cyclical figures).

Costs

The market value or acquisition costs of an empty office building depend on several factors: the book value of the building, the owner's willingness to depreciate the value if necessary and within fiscal-legal limits, the duration of vacancy, location and building characteristics, and the negotiation space between the owner and a potential buyer. Renovation costs depend on the building's maintenance condition, the level of interventions required, the extent to which the building needs to be renovated or expanded, the grid size and placement of (structural) walls (due to the possibilities for integrating residential units), and whether additional amenities such as outdoor space or a parking garage have to be added (Mackay et al. 2009; Remøy & Van der Voordt 2014). Major cost generators include demolition costs, facade adjustments or replacements, interior walls, piping and installations, acoustic measures, and finishing levels. Fitting many small units is generally more expensive than larger units due to the large number of kitchens, sanitary facilities, and piping. Asbestos removal is also costly. Adding additional floors is expensive but can be highly profitable.

In a study on the repurposing of offices into care housing, six intervention levels were identified (Remøy & Van der Voordt 2011), ranging from simple basic measures to make a building ready for new functions (cleaning, painting, wallpapering) and a light renovation, to extensive modifications and complete stripping plus new installations. The costs vary accordingly. The level of intervention must be determined for each function. Key questions include: What quality level is being pursued? Which building components and materials can be reused? What exactly needs to be demolished and replaced?

Due to the large number of influencing factors, the range of acquisition and renovation costs is quite broad. In a conversation with an experienced project developer, a price of around €500 per square meter of gross floor area (GFA) was mentioned for the purchase price, which can rise to €1,500 per square meter of GFA in prime locations and may be lower in peripheral municipalities, with a lower limit of €250 per square meter of GFA. In the same conversation, a range of €1,500 to €2,500 per square meter of gross floor area was mentioned for construction costs.

In the 58 documented projects from an earlier version of this book (Van der Voordt et al. 2007), all of them from the Netherlands, the purchase price ranged from zero (when the building remains in ownership or is rented) and a symbolic transfer price of €1 for a vacant church, to over €800 per square meter. Renovation costs ranged from €212 to €1,900 per square meter. The ratio of acquisition costs to renovation costs varied correspondingly, from 0.02 to 2.20, with an average of 0.49. This means that renovation costs are on average about twice as high as acquisition costs.

In the 26 Dutch projects investigated by Gelinck and Strolenberg (2014), investments ranged from a few tens of euros per square meter to €2,400 per square meter of rentable floor space. In nearly half of these projects, less than €1,000 per square meter was invested, and in some adaptive reuse projects, even less than €500 was spent (not up to new construction quality). The most expensive projects were historic buildings where restoration was also carried out. The analysed projects are respectively more than seventeen and ten years old. Therefore, the figures are outdated but provide an idea of the practical range.

Revenues

Aan de opbrengstenkant is bepalend hoeveel woningen van een bepaald type en prijsOn the revenue side, it is crucial to determine how many homes of a particular type and price level can be created for which target groups. This primarily depends on the building's capacity and the grid size of the supporting structure. To estimate the number of possible residential units, a preliminary design is often used, based on the existing floor plans.

Dutch housing selling prices (2024) Selling prices and revenues from rent depend on the location, dwelling type, size of the dwelling, spatial layout, housing quality, and available facilities like (private) parking facilities. Nowadays sustainability, energy label, and monthly energy costs are important as well. Selling prices have immensely increased in the last decade. The current average selling price of Dutch houses range from around € 2,000 per m2 in the upper north part of the Netherlands till € 7,187 per m2 in Amsterdam. The average selling price is about € 460.000 per dwelling.

Dutch housing rent prices (2024) Rent prices show large bandwidths as well. For instance, the price of student rooms varies from about € 375 – over € 700, with an average of about € 420 euro. The average rent level per square meter is about € 21/m2. The maximum price for a student room depends on the scarcity in a particular city. Amsterdam is the most expensive city, with an average room price of € 961. € 493 per month is paid for a room of 15m² on average, which is €36 per m² per month. The second most expensive city is Utrecht, with an average rent of €837. More affordable options can be found in Wageningen (€ 354), Enschede (€ 366) and Leeuwarden (€406).

A student room usually falls into the category of non-independent living space. This is a living space where one or more facilities in the home are shared with co-residents. There is a maximum amount of rent that may be charged for non-independent homes. This maximum can be calculated using the Rent Assessment Committee's points system. For instance, a room of 15m², with a shared kitchen, toilet, bathroom, outdoor area and bicycle shed may cost a maximum of € 216 per month in basic rent according to the points system. Two rooms of 25m² in total, with their own kitchen and bathroom plus shared toilet and outdoor area may cost a maximum of € 380 per month in basic rent according to the points system. It is important that the ‘bare’ rent is separated from the service costs (gas, water, electricity, cleaning of circulation space).

The prices for a studio are a lot higher. On https://kamernet.nl/huren/studio-nederland 71 studios are presented for rent, with rental prices ranging from € 430 per month for a furnished studio of 30 m2 in Sittard, in a student house, to € 2,500 euros per month for a furnished studio of 32 m2 in Amsterdam, including fixed costs (energy and service costs), and a deposit of no less than € 5,000.

For independently occupied rental properties, rents in social and mid-range rental housing are regulated. There is a maximum amount of rent that may be charged according to the housing valuation system (Dutch: Woonwaarderingsstelsel, WWS), mentioned in the Dutch Residential Rental Prices Decision of the government. The number of housing valuation points determines the maximum allowable rent for social and mid-range rental housing. The number of WWS points largely depends on the surface area, but other factors also play a role, such as the degree of insulation of a home, location, and whether it is an existing or new home.

In addition, social rental housing is capped based on provisions in the Housing Act 2015, and in the mid-range rental segment in the Affordable Rent Act, which was introduced this year.

Table 11.5 provides an indication of potential rental yields for different types of housing (price level 1-1-2024). For social rental housing, the upper limit is 144 WWS points, with a maximum rent of € 879.66. For mid-range rent, the upper limit is 186 WWS points, with a maximum rent of € 1157.95. As shown, there is often no direct relationship between the surface area of a home and the maximum rent. The table does not contain an indication of rental prices in the private rental sector, because location is often decisive there. For properties in the private sector (rents above €1,100) and rental by a commercial entity, a Gross Initial Yield (GIY) of between 4% and 7% is typically used in the Netherlands. Currently, developers are working with a lower GIY, ranging from 3.5% to 5%.

TABLE 11.5 Indicative rent revenues for Different Housing Types (price level January 2024)

HOUSING TYPE	TARGET GROUP	Indicative Rent		Indicative Floor area
		Social rent Price level as of 1 January 2023	Mid rent Price level as of 1 January 2023	
Room	Students	< € 434[1]	n/a	15-25 m²
Studio	Studenten/Young People/People in Urgent Need/Status Holders	< € 434	n/a	25-35 m²
2-bedroom apartment	Single and Two-Person Households	€ 647,19[2] € 808,06[3]	€ 808,06 € 1.100	35-45 m²
3-bedroom apartment	Single and Two-Person Households/Young Families	€ 647,19 € 808,06	€ 808,06 € 1.100	45-75 m²
4-bedroom apartment	Two-Person Households/Families	€ 693,60[4] € 808,06	€ 808,06 € 1.100	75-95 m²

1 Quality Discount Threshold for Rent Allowance.
2 Capping Threshold for Rent Allowance for Single and Two-Person Households.
3 Liberalization Threshold/Social Rent Sector Boundary/Rent Allowance Threshold.
4 Capping Threshold for Rent Allowance for Three or More Person Households.

Residual Value Calculation

In practice, the residual value approach is widely used. This method involves:

1. Calculating the potential revenue from the new use (for residential properties: revenue from sale or rental).
2. Determining the costs for building modification.
3. Calculating the residual value, which is the revenue minus the renovation costs.

Once the purchase price and renovation costs are known, and the required return on investment is established, it becomes clear what the maximum investment budget is for purchasing a vacant property. This calculation can be carried out for various new functions to determine the so-called Highest and Best Use (HBU) after repurposing. Sometimes a negative outcome is accepted, for example, if the repurposing of a property is socially urgent or offers opportunities for profitable projects elsewhere. In such cases, the shortfall or unprofitable portion is usually covered by the general company reserve.

Financial feasibility can be improved by expanding the building, either horizontally or vertically, by adding extra floors, or by incorporating commercial functions, often in the building's base. For students and starters, it may be an option to share certain spaces and facilities or to carry out some of the work in-house by self-employment. Sometimes it is possible to make use of subsidies.

Input for an Investment and Exploitation Plan

Once a preliminary cost-benefit analysis has been conducted based on key figures and a preliminary design with different housing types and floor plan optimisation for the existing office building, this information can be used by the initiator or developer for decision-making. Developers mainly focus on the volume of the building, the number of residential units it can accommodate, and, in the case of partial vacancy, the current lease agreement, which they convert into net present value. One of the interviewed developers uses a rule of thumb that a capitalised rental value greater than €4,000/m² generally indicates a positive outcome.

For further decision-making, a more detailed investment budget and operating calculation are required, based on an element budget (often prepared by a cost specialist) and a cash flow calculation ('Discounted Cash Flow'). For various calculation methods, we refer to the chapter by Peter de Jong and Michaël Peeters on financial feasibility ('2. Financial Feasibility'). Additional requirements may be set regarding the profitability of a project. Often, consideration is given to an increase in land value during the operational period and the residual value in case of eventual disposal or demolition. This means that the office building is not depreciated to zero over the operational period, but a realistic residual value is determined. The residual value can be positively influenced by using flexible built-in packages, allowing the building to be adapted for other functions in the future.

Step 3: Feasibility Scan Based on Gradual Criteria

If all questions in the veto scan from Step 1 are answered with 'Yes', and the financial feasibility scan from Step 2 is positive as well, this indicates potential suitability for repurposing. In the next stage, a more detailed scan with gradual criteria can provide a more accurate picture of the opportunities and obstacles for repurposing. A gradual criterion means that the individual assessment of this criterion does not lead to an approval or rejection of a building for adaptive reuse; instead, all gradual criteria together provide a nuanced view of the repurposing potential of a building. Criteria are partially dependent on the context. It may happen that a gradual criterion is a veto criterion for certain parties, or conversely: a veto criterion is not decisive for a no-go. For example, some developers do not buy office buildings with an energy label lower than C (which has been mandatory for office buildings in the Netherlands since 2023). If repurposing proves unfeasible, the building might still be rented out as an office after some refurbishment. A monument is attractive for living, but monument status also entails complex and restrictive regulations. The weight of such criteria can vary by project and stakeholder.

Table 11.6 presents the gradual criteria for a feasibility scan of the location. The location scan consists of seven main criteria, divided into functional, cultural, and legal aspects, along with 21 sub-criteria. Table 11.7 provides guidelines for acceptable walking distances to various amenities. These guidelines are appropriate for densely populated cities in The Netherlands, and less appropriate for suburbs and on the countryside. The guidelines can be altered depending on the context. Table 11.8 outlines the parking standards for residential buildings in The Hague. - Norms are specified for various types of housing and sizes, and vary depending on the location within The Hague. Table 11.9 lists the gradual criteria for an assessment at the building level. The building scan consists of 14 main criteria, divided into functional, cultural, technical, and legal aspects, along with 28 sub-criteria.

Every question answered with ‘Yes’ in the gradual assessment of the location and the building indicates a favourable condition for conversion to residential use. The importance of the criteria varies by target group (see Table 11.3). For instance, students prefer to live close to entertainment options, while young families with children prefer to live in a quiet residential neighbourhood.

Important sources for obtaining the necessary data include conversations with the building owner, the municipality, local real estate agents, personal observations of the area, Google Maps, local maps, an inspection of the office building, and the previously mentioned databases such as government geodata (www.pdok.nl).

TABLE 11.6 Feasibility scan location based on gradual criteria

ASPECT	GRADUAL CRITERIA LOCATION	ASSESSMENT	
FUNCTIONAL		YES	NO
1. Urban location	1. Building in suitable area (not on remote industrial estate or office park)		
	2. Good sun exposure		
	3. Good view from building > 75% floor area		
2. Distance to and quality of amenities	4. Distance to grocery store for daily shopping 450-1000 m		
	5. Neighbourhood meeting places < 500 m		
	6. Restaurants/bar 500-1000 m		
	7. Basic medical facility 450-1000 m		
	8. Sports facilities 300-900 m		
	9. Educational facilities 250-900 m		
3. Public transport accessibility	10. Distance to small train station < 2 km and to main train station < 5 km		
	11. Distance to tram stop 200-500 m		
4. Car accessibility and parking	12. Distance to parking space 100-200 m		
	13. Good traffic flow		
	14. For urban areas: – Central areas > 0.9 parking spaces/100 m² office space – Pre-war city neighbourhoods > 1.1 parking spaces/100 m² office space – Post-war suburban areas > 1.4 parking spaces/100 m² office space		
CULTURAL			
5. Representatives	15. Centrally located (not near highways)		
	16. Other buildings present in immediate surroundings		
	17. Vibrant environment		
	18. Good reputation/positive image; no vandalism		
	19. Good air quality, minimal pollution and noise		
LEGAL			
6. Urban location	20. Noise level on facade < 50 dB		
7. Land ownership	21. Land owned or with long leasehold		
	Total location score (= number 'Yes')		
	Default weighting	5	
	Weighted total score		
	Maximum location score: 5 × 21	105	

TABLE 11.7 Acceptable Walking Distances to Various Amenities According to the Dutch Knowledge platform CROW

ACCEPTABLE WALKING DISTANCES FROM HOME TO...	
parked car	100-200 m
parked shared car	100-350 m
parking space with charging station	100-200 m
mailbox	150-450 m
waste container	50-150 m
bus stop (local bus)	200-500 m
bus stop (long distance bus)	250-900 m
supermarket	450-1.000 m
city centre/shopping area	500-1.500 m
workplace	250-1.000 m
school	250-900 m
restaurants, cafés	500-1.000 m
doctor/physiotherapist/pharmacy	450-1.000 m
hospital	450-1.000 m
cinema/theatre	450-1.000 m
indoor sports facility	300-800 m
outdoor sports facility	400-900 m

FIG. 11.1

FIG. 11.1 **Project De Meester (P.11)**
Parking policy was a major complication within this project.

TABLE 11.8 Parking Norms in The Hague for Different Types of Housing in Three Zones: Central Areas, Pre-War City Districts, and Post-War Suburbs

TYPE OF HOUSING	CENTRAL AREAS			PRE-WAR CITY DISTRICTS			POST-WAR SUBURBS		
	Rent	Buy	Visitor	Rent	Buy	Visitor	Rent	Buy	Visitor
APPARTMENTS									
< 40 m²	0,1	0,2	0,05	0,2	0,2	0,1	0,33	0,33	0,15
41-70 m²	0,2	0,33	0,05	0,33	0,5	0,1	0,4	0,66	0,15
71-100 m²	0,33	0,5	0,1	0,5	0,75	0,1	0,66	0,8	0,15
101-160 m²	0,4	0,75	0,1	0,5	1	0,1	0,75	1	0,15
>161 m²	0,5	1	0,1	1	1	0,1	1	1	0,15
SINGLE-FAMILY HOMES									
< 40 m²	0,2	0,25	0,05	0,33	0,4	0,1	0,5	0,5	0,15
41-70 m²	0,33	0,5	0,05	0,5	0,5	0,1	0,66	0,66	0,15
71-100 m²	0,4	0,75	0,1	0,66	0,8	0,15	0,75	1	0,2
101-160 m²	0,5	1	0,1	0,75	1	0,15	1	1,5	0,2
> 161 m²	0,6	1	0,1	0,75	1	0,15	1	2	0,2
CARE HOMES									
Care Housing up to ZZP 3	0,1		0,1	0,2		0,15	0,3		0,2
Care Housing ZZP 4 to 10	0		0,1	0		0,15	0		0,2
STUDENT HOUSING									
Student housing	0		0	0,05		0	0,1		0,05

TABLE 11.9 Feasibility Scan of Building Based on Gradual Criteria

ASPECT	GRADUAL CRITERIA BUILDING	ASSESSMENT	
FUNCTIONAL		YES	NO
1. Construction or Renovation Year	1. Building > 3 years old		
	2. Building renovated > 3 years ago		
2. Vacancy	3. Building is completely vacant		
	4. Building has been vacant > 3 years		
3. Building Capacity	5. Building capacity > 100 housing units/30 m²; Capacity depends on developer/investor; usually between 500-5,000 m²		
	6. Housing layout adaptable for local target groups		
4. Expandability	7. Horizontal expansion possible (no adjacent buildings)		
	8. Vertical expansion possible (no sloping roof/light construction)		
CULTUREEL			
5. Representativiteit	9. Recognisable compared to surrounding buildings		
	10. Achievable own residential identity		
6. Cultureel erfgoed	11. Not a (protected) monument		
7. Ontsluiting (ingang, liften, trappen)	12. Clear, safe, and visible building entrance		

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TABLE 11.9 Feasibility Scan of Building Based on Gradual Criteria

ASPECT	GRADUAL CRITERIA BUILDING	ASSESSMENT
TECHNICAL		
8. Maintenance State	13. Well-maintained (exterior and load-bearing structure)	
9. Dimensions - Shell	14. Sufficient building depth for corridors and homes with acceptable depth dimensions	
	15. Structural grid > 3.60 m	
	16. Floor height < 4.00 m	
10. Load-Bearing Structure	17. Safe condition of load-bearing structure (walls, columns, floors)	
11. Facade	18. Connection possibilities or grid < 5.40 m	
	19. Facade (openings) adjustable	
	20. Windows in facades can be reused/operated	
12 Installations	21. Sufficient shaft space feasible	
JURIDISCH		
13. Milieu	22. Absence of large amounts of hazardous materials	
	23. Sound insulation of floors > 5 dB	
	24. Good thermal insulation of facades and/or roof	
	25. Daylight access ≥ 10% floor area of new units	
14. Eisen Besluit bouwwerken leefomgeving; bereikbaarheid; vluchtwegen	26. Elevators present/feasible in building > 4 floors	
	27. (Emergency) staircases present or feasible	
	28. Distance from new units to stair and/or elevator < 45 m	
	Total Building Score (= number of 'Yes' answers)	
	Default weighting	3
	Total Weighted Building Score	
	Maximum Total Weighted Building Score	84

Step 4: Determination of the Transformation Class

Based on the gradual criteria for the location and the building, the transformation class of the building i.e., its conversion potential, can be assessed. The total scores for the location and the building are determined by multiplying the total number of 'Yes' answers by the weighting factors for the location and the building. Currently, the default weighting factor for the location is set at 5 and for the building at 3. Therefore, the maximum score for the location is 21 × 5 = 105, and for the building, it is 28 × 3 = 84, making a total maximum score of 189. The minimum score is zero if neither the location nor the building scores positively on any criterion. Based on the maximum and minimum scores, a classification into five different transformation classes has been made, as shown in Table 11.10.

TABLE 11.10 Determination of the Transformation Class

TOTAL SCORE LOCATION AND BUILDING	TRANSFORMATION CLASS
Weighted total score < 60	Class 1: Not transformable
Weighted total score 61-90	Class 2: Hardly transformable
Weighted total score 91-120	Class 3: Limitedly transformable
Weighted total score 121-160	Class 4: Transformable
Weighted total score > 160	Class 5: Very well transformable

For example, if 15 location criteria are positively scored and 18 building criteria are positively assessed, the weighted total score would be 15 × 5 + 18 × 3 = 129. This building falls into Class 4 and thus seems transformable into residential units. The transformation class is only an indication of the likelihood of successfully repurposing vacant office buildings into homes. The default weighting factors of 5 and 3 for location and building are somewhat arbitrary and can be adjusted by the user, either for the location and building as a whole or for each criterion individually. The classification into five transformation classes is also adjustable. Determining the transformation class is particularly useful when multiple buildings are involved, such as for a quick scan at the urban or district level or for a large portfolio. This enables to select office buildings that score high on adaptive reuse potential.

The accompanying box provides an example of a feasibility analysis based on the gradual criteria of the transformation meter.

FIG. 11.2

FIG. 11.3

FIG. 11.2 **Facade Alexanderveld 125 The Hague**
Source: W. Sybrand van Erve

FIG. 11.3 **Vogelvlucht Alexanderveld 125 The Hague**
Source: W. Sybrand van Erve

EXAMPLE A

Office Building Alexanderveld 125 in The Hague

The gradual criteria from step 3 and the transformation class in step 4 4 have been applied to the current main police headquarters at Alexanderveld 125 in The Hague. Based on the weighted total score of the gradual criteria for the location (= 75) plus the building (= 60), totalling 135, this project falls into Class 4: transformable. The building, designed by Wouter Sybrand van de Erve, dates from 1958 and was extended in 1981. It is a municipal monument, except for the later extension on Burgemeester Patijnlaan. The monument status was granted because Van de Erve is one of the prominent architects of the post-war period, and some of his earlier-designed buildings have been demolished. The building is also a representative and well-preserved example of office buildings from the reconstruction period www.monumentenzorgdenhaag.nl/monumenten/alexanderveld-125126) .

For several reasons, the building is of interest for potential conversion into residential use. In 2018, it was decided to construct a new headquarters for the police in the Binckhorst area. After the move to the new headquarters, the current building will be disposed, along with several other police buildings (Elisabethhof in Leiderdorp, Parkweg in Voorburg, and Overgoo in Leidschendam). According to Vastgoeddata.nl 2023, the Alexanderveld 125 office has an energy label of G. Starting from 2023, office buildings with an energy label of D or lower can no longer be used. Continuing to operate it as an office building would require a significant investment. An option to extend its lifespan is to convert the building to another use, such as residential. The building has some advantages. A few years ago, during a thorough renovation, asbestos was removed, a new air conditioning system was installed, lighting was improved, and a temperature regulation system using underground water was set up. The building has its own parking lot for 390 cars, partially below ground and partially under the extension. If this is insufficient, a developer could target a demographic that requires less parking space (such as students) or offer alternative solutions, such as car-sharing programs. What also makes the building interesting is its large size (approximately 48,317 m²). This size offers the potential to create a significant number of residential units. However, the size can also be a drawback. For a contractor, the large scale presents risks, and not every contractor may be willing to take on these risks. Additionally, a residential building of this size would put pressure on the existing local amenities and infrastructure.

Step 5: Risk Inventory Checklist

When the feasibility scans from step 1 and 3 indicate that the office building has potential for conversion to residential use based on its location and building characteristics, and the financial feasibility analysis from Step 2is also positive, the next phase in the planning process involves a more detailed exploration of potential risks and solutions to mitigate or manage these risks. Based on experiences from numerous projects, a risk inventory checklist has been developed, divided into risks related to the market and location, and risks related to the building itself, as outlined in Tables 11.11 and 11.12. The checklist is not exhaustive; the risks listed in the tables are categorised into functional, technical, cultural, financial, and organisational aspects.

TABLE 11.11 Risk Inventory Checklist Market and Locatio

MARKET AND LOCATION	RISK	SUGGESTIONS FOR SOLUTIONS
1. Functional	1. Insufficient parking spaces	Dependent on target groups; discuss parking standards; consider a parking garage.
	2. Lack of amenities	Include small-scale amenities within the building; collaborate with other parties.
	3. Lack of public transport	Consult with public transport authorities; collaborate with other parties.
	4. Unclear routing to the building	Analyse surroundings and possibly relocate the building entrance or add an additional entrance.
2. Technical	5. Odor nuisance	Insulation for the affected facade(s).
	6. Noise pollution	Explore exemption possibilities; add extra noise insulation to facade(s) or consider a secondary curtain wall.
3. Cultural	7. Poor reputation and/or unsafe neighbourhood	Improve the neighbourhood in collaboration with other parties; specific choice of target group to create a positive image.
4. Financial	8. Excessive purchase price of homes	Increase revenue by combining with (commercial) functions; adapt the design; focus on high income target groups.
	9. Poor let ability of dwellings	Enhance price-quality ratio; choose different target group.
	10. Need for additional amenities	Improve financial feasibility by including commercial functions.
5. Legal	11. Zoning plan change needed; zoning procedures	Consult with local authorities; ensure alignment with municipal policies.
	12. Land ownership: leasehold	Unfavourable for land value development; attempt to buy out leasehold.
	13. Soil contamination	Obtain a clean ground certificate from the owner; negotiate a lower sale price due to remediation costs.
	14. Maximum building height restrictions (e.g., due to heritage or air traffic regulations)	Investigate possibilities for horizontal expansion.

TABLE 11.12 Risk inventory checklist building

BUILDING	RISK		SUGGESTIONS FOR SOLUTIONS
1. Functional	1	Incorrect assumptions about building possibilities	Analyse form factors/ratios; gross-net ratios; expansion options (e.g., adding floors).
	2	Building too shallow	Adjust residential floor plans; increase depth with new facade/foundation; external galleries.
	3	Building too deep	Adjust residential floor plans; 'core out' the building (introduce new daylight); centralise entrances.
	4	No basement available (e.g., for parking/ storage)	Add a basement (depending on foundation and access possibilities).
	5	Excessive floor height	Introduce lightweight intermediate floors/mezzanines with lightweight interior walls.
	6	Non-opening windows	Replace (part of) the non-opening windows or complete facade renovation.
	7	Limited wall connection options to facade	Connect walls to (glass) panels or complete facade renovation.
	8	Absence of outdoor space	Dependent on target audience; consider prefab/French balconies; recessed facades; rooftop terraces; interior courtyards.
	9	Insufficient elevators/stairs (considering escape route requirements)	Install new elevators/stairs within the building (e.g., in a monument) or externally.
	10	Inadequate access options	Analyse various access options (e.g., corridors, galleries, central access).
	11	Insufficient quality/quantity of existing internal walls	Modify existing walls and/or add new walls (consider future flexibility).
	12	Insufficient water tightness of sanitary units	Add watertight finishings; install prefab sanitary units
2. Technical	13	Wrong assumptions about technical building characteristics	Check actual technical building characteristics, also regarding state of maintenance
	14	Insufficient or poor climate installations	Replace technical services by installations that fit with dwellings
	15	Insufficient pipes, ducts, and shafts	Expansion (consider fire separation per unit; cutting possibilities in existing floors).
	16	Insufficient water supply	Expand supply (consider individual regulation/measurement).
	17	Insufficient electrical supply	Expand (consider individual metering; CAI; telephone; individual regulation/ measurement).
	18	Insufficient sound isolation of floors	Improve isolation e.g., by adding a screed (concrete or 'floating floor'); insulate ceilings
	19	Inadequate thermal insulation of the facades	Improve insolation (outside or inside); add curtain wall
	20	Inadequate thermal insulation of windows	Replace by double or triple HR glazing; add curtain wall
	21	Inadequate thermal insulation of the roof	Insulate existing roof (outside or inside); replace by new roof; add top floors.
	22	Presence of moisture	Analyse causes (construction moisture, leaks, rising/penetrating moisture, condensation).
	23	Poor condition of joints	Clean and regrout facade (partially or completely).
	24	Insufficient daylight entry and solar access (< 10% floor area)	Use central corridors, additional atriums, bay windows, new larger windows; apply for exemptions if needed.
	25	Poor/dangerous condition of load-bearing structure	Renovate (consider additional reinforcement, shotcrete, adhesive reinforcement, auxiliary structures; fire resistance).
	26	Limited load-bearing capacity or poor foundation	Renovate; consider adding piles (steel, pressure or pulsation piles); spiral injection; ground displacement).
	27	Insufficient load-bearing capacity for adding top floors	Use lightweight steel and/or timber-frame construction for adding top floors

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TABLE 11.12 Risk inventory checklist building

BUILDING	RISK		SUGGESTIONS FOR SOLUTIONS
3. Cultural	28	Constraints due to municipal monument status	Early consultation with heritage protection agencies.
	29	Poor recognisability of the building	Add new facade elements; incorporate balconies, residential entrances.
	30	Entrance not clearly identifiable as such	Emphasise with an awning or relocate to a more visible position.
4. Financial	31	Difficulty in acquiring the property	Phased acquisition; initially leasehold, later freehold; joint purchase with others.
	32	Large investment required in early stages	Conduct financial feasibility analysis.
	33	Financial feasibility issues	Analyse expansion possibilities; combine with other (commercial) functions; seek subsidies.
	34	Risk of vacancy and deterioration (e.g., due to long development procedures)	Limit vacancy period through temporary rental or anti-squatting measures.
5. Legal	35	Presence of asbestos; removal compliance with costly regulations	Negotiate a lower purchase price or require an asbestos-free certification from the seller.
	36	Restrictions by Building Decree	Obtain exemptions for outdoor spaces, ceiling heights, accessibility, daylight, thermal/ sound insulation.
	37	Uncertainty about building permits	Early local consultations on requirements and required documentation.
	38	Insufficient integration of fire safety requirements	Early consultation on requirements and necessary documentation (access, escape routes, etc.).

FIG. 11.4

FIG. 11.5

FIG. 11.4 **Campus Diemen Zuid**
Source: Van Wijnen

FIG. 11.5 **Vibrancy Campus Diemen**
Source: Van Wijnen

EXAMPLE B
Risk Reduction: Campus Diemen South project, carried out by Van Wijnen

The former office park Diemervijver faced significant vacancy issues. It has been transformed into a student campus with approximately 936 units. The location's advantage is its proximity to metro and train station Diemen Zuid. Initially, there were few amenities, but the client saw the value and necessity of investing in these to enhance the feasibility of repurposing the site for residential use. Functions were added to the building plinths (supermarket, restaurants, cafes, gym), and the public space was redesigned to create a more attractive environment for students, including seating areas and a tennis court.

EXAMPLE C
Risk at the Location Level: Noise Pollution

Risk: Many urban locations are situated near roads, railways, and industrial functions. With the change in function to residential use, much stricter requirements apply, such as the maximum allowable noise load on the facade, necessitating additional measures.

Solution: Exemptions are often possible, allowing for slightly higher values. Noise pollution can also be mitigated through measures within the residences (sound insulation) and by installing noise barriers along the source. Another option is to place functions with less stringent noise requirements, such as workshops or wet rooms, on the facades most exposed to noise.

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EXAMPLE D

Risk at the Building Level: Financial Feasibility Issues

Risk: Offices often have a high purchase price, renovation costs may be higher than expected, and/or the office building may be too small to achieve a balanced budget.

Solution: Investments to make the existing building suitable for residential use can be recouped by expanding the building, both horizontally and vertically (adding floors). If these expansions stay within the existing ground area, no additional land costs are incurred. To add floors, the structural framework must be strong enough or able to be reinforced to support the additional levels. Expansions are subject to the conditions of the location. For building expansions, permission is required from various municipal departments (urban planning, image quality, building supervision, fire department). Another way to improve financial feasibility is by adding commercial spaces, office spaces, or commercially renting out the ground floor and parking areas. Agreements can be made with the municipality regarding subsidies and necessary exemptions from the Environment and Planning Act (Bbl), for example, concerning daylight access, elevators, accessibility, and soundproofing materials. If certain requirements are not mandatory, construction costs can be significantly reduced. Of course, safety must not be compromise

11.3

Related instruments

The transformation meter for offices is specifically designed for repurposing offices into residential units. The principles and criteria are also applicable to other types of repurposing with minor adjustments. For instance, repurposing offices into hotels or combinations of new functions (see Chapter 12 for Michel Hek's Repurposing Guide). Together with architects from the BNA, a checklist was developed for repurposing offices into care homes (Remøy & Van der Voordt 2011). Additionally, the repurposing potential of other types of buildings, such as bank buildings, churches, asylum centres, industrial heritage, cultural heritage like municipal and national monuments, retail spaces, senior living complexes, and temporary use has been investigated. Consulting and engineering firms often use their own tools, such as the ABT-quick scan, focusing on technical aspects. Many instruments are described in a previous book on the conversion of offices into residential units (Van der Voordt et al. 2007). This book also describes the so-called vacancy risk meter: a tool to predict which office buildings are at increased risk of vacancy (Geraedts & Van der Voordt 2007). For the repurposing of national real estate at the portfolio level, an evaluation plan was developed by the Atelier Rijksbouwmeester, considering the societal interests of local residents (Remøy et al. 2013). Internationally, opportunities, obstacles, and risks of repurposing have also been mapped and assessment criteria developed (Bullen & Love 2011; Dyson & Love 2015; Misirlisov & Günce 2016; Baker et al. 2017; Chen 2017; Ragheb & Naguib 2021; Singh & Solanki 2022; Vafaie et al. 2023). Many criteria overlap. A good comparison of different multicriteria models can be found in Nedeljkovic et al. (2023).

11.4

Conclusions

Previous applications have shown that the transformation meter is a useful tool for systematically determining which vacant office buildings are suitable for repurposing into residential units, progressing from a broad overview to more detailed analysis. During exercises with architects, it was observed that they often first examine the location and building characteristics, then draft residential units into existing floor plans, and only subsequently use the transformation meter as a check for “have we considered...?” (Remøy & Van der Voordt 2011). Developers typically work intuitively based on professional knowledge and experience. For them, the transformation meter is also useful as an assessment tool and for comparison with their own criteria. For public parties and less experienced stakeholders, the transformation meter can be useful from the outset, supporting decision-making for a go or no-go and further planning development.

Possibilities for further improvement of the transformation meter include making the criteria more visual (photos, principle sketches), digitising the tool, and documenting experiences in professional practice, including transformation scores and cost/benefit analysis, to provide more reference material.

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Guide to Reuse

Practical Experiences with the Instrument Guide to Reuse

Michel Hek

When repurposing vacant buildings, the process often begins with identifying a new function that aligns with the building's characteristics and context. The choice for changing the function is frequently made based on intuition. Often, there is a lack of solid justification for the functional, market, and financial feasibility. For this reason, the Guid to Reuse (Dutch: Herbestemmingswijzer) was developed in 2003. This was subsequently incorporated into a publication of the book Herbestemmingswijzer (2004). Now, twenty years later, the methodology has evolved with practical experiences and new applications. This chapter will further explore the importance of repurposing, the functioning of the instrument, and the interesting spin-offs it has produced.

12.1

What is the Guide to Reuse?

The Guide to Reuse is a tool designed to align market demand with the supply of buildings. The methodology specifies the possibilities for repurposing a building and consists of several steps. In this process, decisions are made regarding potential new uses for the building. By following the guide systematically, the possible use of the building is developed and supported by financial substantiation. The guide can be used by property owners, governments, or market parties to quickly gain insight into the potential of a building at an early stage. Based on this, (strategic) decisions can be made regarding actions such as purchase, sale, or repurposing.

12.2

Importance of an Integrated Approach to Adaptive Reuse

Adaptive Reuse is currently receiving significant attention within the real estate world. The increasing structural vacancy is prompting owners, users, and policymakers to consider alternative possibilities for their buildings. Additionally, the concept of sustainability plays a crucial role in the preservation and management of buildings.

Organisations change, as does society, leading to buildings becoming vacant and in need of new uses. Examples include agricultural and religious properties. Many of these categories of buildings are already vacant or are expected to become vacant in the coming years, sometimes on a structural basis.

Building and/or location function changes are increasingly occurring within the framework of integrated area development. These developments become part of a larger whole. Redevelopment tasks should not be viewed solely at the building level. An integrated approach to a building and its immediate surroundings increases the chances of project success. By exploring the possibilities of the location from the surrounding area, a targeted approach can be proposed at the building level. This requires a clear vision for the area and not just a focus on the individual building. Therefore, it is crucial to make informed choices regarding area use and to substantiate these choices clearly. With knowledge of the market, the location, the building, and the context, a well-supported use for existing property can be determined. The guide to reuse does not only look at mono-functional possibilities; rather, functional mixing is of interest. By selecting a good combination of functions, an existing building can achieve a profitable second life.

12.3

How Does the Repurposing Guide Work?

Using the guide, a new and well-supported use can be identified at the earliest stage, with a general understanding of the building and its location. It explores the possibilities of functional mixing. A solution with only one function is not excluded, but the range of options to be examined is broader. By systematically going through the various phases, the new use of the building is distilled from coarse to fine detail.

In 2003, the basic system of the guide was developed. Practical experiences have contributed to changes in the method, adapting it to the needs of the tasks. Whereas the focus was initially on the technical elements of the building, it has now shifted to integration within the environment and market potential (who is interested in realising a new use and has the financial means to do so).

The methodology now consists of three phases. By following these steps, the potential use of a building is distilled, supported by a financial foundation, and tested against the market.

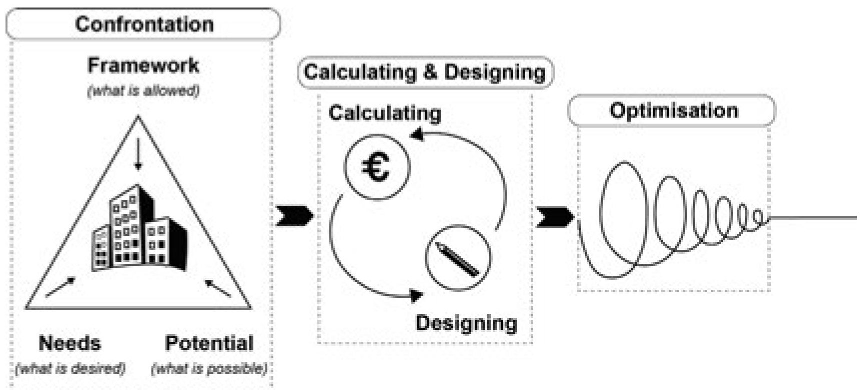

FIG. 12.1

FIG. 12.1 **The working of the guide to reuse (2024)**

Phase 1. Confrontation

In the Confrontation Phase, a balance of functions that can be applied within the building is sought. In the original setup from 2003, the methodology was focused on the building's technical aspects. This remains an important part of the adaptive reuse guide, but now the approach considers multiple perspectives on the task/building. The following perspectives are examined:

- **Frameworks:** This involves examining what is possible (laws/regulations) or (un) desirable.
- **Potential:** Based on societal, technical, financial, and procedural feasibility, an investigation is conducted into the functions that can be accommodated within the building.
- **Need:** Research into market demand reveals the need. This involves using demand studies for residential, commercial, retail, and socio-cultural markets.

The confrontation of frameworks, potential, and need leads to a selection process of possibilities for a building. The interesting aspect of the methodology is that it can clarify where there are tensions in the solutions. For example, the zoning plan may often be too restrictive for future uses. Identifying the potential of the building and its surroundings can encourage involved parties (such as municipalities and/or provinces) to align and, where possible, adjust their visions accordingly.

In many cases, an initial calculation exercise results in a project being deemed unfeasible.

Phase 2. Calculating & Designing

Practical experience has shown that while selecting functions is valuable, the immediate question often becomes: what will it cost? Therefore, it is crucial to quickly gain a (broad) view of the business case for the project. To accommodate the functional possibilities within the building, an interactive session of calculating and designing takes place.

- **Calculating:** Through a comprehensive cost and revenue approach, the financial feasibility and the range of the plan can be evaluated.

- **Designing:** Conceptual possibilities for the building are explored. This involves investigating the (multifunctional) use of the floor plan based on functional requirements. Also, a general building layout is needed, including the interrelationships and space requirements of the individual functions.

At the end of this phase, there is clarity on the financial challenge. This provides stakeholders with insights into the variables that can be adjusted to improve the financial outcome. Often, an initial financial calculation reveals an unfeasible project. The method of cutting costs solely on investments does not always yield the desired result. This may require a reassessment of the concept, where adding extra space (if possible) or adjusting the concept can lead to additional revenue potential.

Phase 3. Optimalisation

Based on the building concept and its financial implications, optimisation of the entire process can be pursued. This may include applying for subsidies, securing financing, and generating interest among potential parties or users for the concept. In this phase, the foundation for the building's business plan is established. The building owner now understands the possibilities and has the financial backing for them. At this point, a decision can be made to either further develop the plan for execution or use the plan with this financial backing as a key component in the sales process.

12.4

Application Possibilities

The Herbestemmingswijzer is used not only to assign new uses to existing buildings but also for various other purposes. These include:

- Determining Value Potential: Assessing the value potential of buildings.
- Feeding Urban Redevelopment Projects: Providing applicable functions for specific locations in urban redevelopment projects.
- Evaluating Heritage Value: Assessing the heritage value of buildings using the adaptive reuse potential.
- Testing Flexibility of New Constructions: Evaluating the flexibility of multifunctional new construction projects for future use.

Several application possibilities are explained below.

Market Assessment

The Guide to Reuse focuses on selecting suitable functions. To ensure the realization of a repurposing project, it must be known in advance whether there is actual interest from market parties to establish themselves in the building or invest in it. In practice, there appears to be significant demand for a justification or substantiation of the project's likelihood of success. In other words: are the functions suggested by the method actually feasible in practice? To support this, a market assessment has been added to the method. This provides an independent evaluation of the quality and potential of the market and/or location. The building and/or location is described, the surrounding area is analyzed, and zoning and policy plans are examined. Additionally, insights are provided into market players, realized purchase and/or rental prices (for the intended functions), competing supply, new development plans, current and future market demand, and expected trends in value and rental prices. The conclusions reflect the opportunities and position of both the client and the building..

Value Potential

For property owners looking to sell or acquire a potential redevelopment property, determining market value can be challenging. According to valuation guidelines, the market value of a property reflects its highest and best use—the most effective and use that maximises productivity within the property's legal, physical, financial, and factual constraints, thus generating the highest value. The Herbestemmingswijzer can demonstrate what the most probable use is and calculate the future costs and revenues. With this data, the maximum selling price can be determined. In the case of a potential purchase of a redevelopment property, the Herbestemmingswijzer can establish the maximum purchase price. This is done from a distinct perspective: instead of identifying new functions the building can accommodate; it calculates the maximum price a building can cost while remaining profitable for redevelopment. Numerous valuations of historic properties (often with many separate outbuildings) have been conducted using the Herbestemmingswijzer to determine their value.

FIG. 12.2 **Monumental farm region Zuid-Holland**

FIG. 12.2

EXAMPLE A

New Use for Monumental Farms in South Holland

The province of South Holland owns various farms that were acquired for infrastructure development or to achieve environmental goals. Many of these farms are currently vacant or temporarily occupied. Given that some of these farms have (national) monument status, maintaining these buildings is crucial. Finding a new use is essential for the future preservation of these structures.

For the province of South Holland, a specific application of the Herbestemmingswijzer has been developed, which includes all concepts for agricultural heritage. Redevelopment into housing (with various housing forms) is one option, but the focus is on finding a broader (social) use. The suitability of the location and building characteristics for the intended new functions is assessed. Based on the results, a range of solutions is presented, complete with a market assessment and financial justification. This results in several interesting concepts as potential uses for the existing farms (and associated outbuildings). For a similar project, see the Project Description 'P.5 Friesland, Farm Koldyk'.

Redevelopment of Sites

Advisory work on adaptive reuse is not only conducted at the building level. Increasingly, function changes occur within the framework of comprehensive area development (see chapter '9. Collaboration in Area Transformations to Housing'). This means looking beyond individual buildings to an integrated approach to the site, which enhances the project's chances of success. By examining the potential of the site, targeted solutions can be proposed at the building level. Therefore, the Herbestemmingswijzer has been adapted and expanded for redevelopment assignments.

For this application, the focus is on the urban planning context of the task. In the confrontation phase, the criteria have been adjusted. Location criteria are oriented towards the changed demand. This includes not only quantitative criteria (such as plot size, distance to highways) but also financial-economic criteria (such as market areas for businesses, economic impacts of proposed functions, and duration of stay within a market area).

Initially, less emphasis is placed on building performance and more on location characteristics. How can functions be combined on a plot to support each other and make the project feasible? Once the vision for the site is established, the individual buildings are thoroughly examined for potential uses that fit within the site concept.

Market consultations

Building owners who wish to sell a unique property often opt for a market consultation before the sales procedure. This involves gauging interest from market parties (such as developers, investors, or locally involved stakeholders) regarding their interest in purchasing or participating in the process. This is typically applied to buildings where a simple "for sale" sign cannot be placed—such as national heritage properties or those not publicly listed. This approach helps quickly identify potential concepts for the building and then test these concepts in the market.

While the Herbestemmingswijzer remains a tool, the ultimate decision to invest in the building and realise the concept rests with the (future) owner. Informing market parties early about why certain concepts are more viable than others help generate interest in purchasing and saves time (and thus money) in the final development of a plan. For some building owners, this has become a standard part of their process for selling unique real estate.

FIG. 12.3

FIG. 12.3 **Kessler Park in Rijswijk**
Source: Wonen at the park

EXAMPlE B

Kessler Park in Rijswijk

Kessler Park is located in the office park Plaspoelpolder in Rijswijk. Shell operated an office and research facilities here from the 1960s until just over five years ago. After Shell decided to relocate its activities, they, together with the municipalities of Rijswijk and The Hague and the province of South Holland, developed a new vision for the area in preparation for the sale of the complex.

The herbestemmingswijzer was used to arrive at two interesting concepts, which generated interest among market parties. The focus was not only on the potential of the buildings but on the location's potential. The key question was how a development like Kessler Park could contribute to a positive boost for the entire Plaspoelpolder area.

The integration of housing with a campus development emerged as the most supported concept from the market consultation. This approach led to a promising development opportunity. Over the coming years, the area will evolve into a vibrant mix of living, working, research, and educational spaces.

12.5

Reflection

The Transformation Meter is a valuable tool for determining a suitable new use for a building. However, its application does not mark the end of the thinking process or creativity. On the contrary, it provides a foundation for further development of practical implementations.

Rationality

For the willingness to repurpose a vacant building, as with new construction, requirements of return and utility must be met. The final realisation must be financially viable. Therefore, the decisions made during the process need to be clear and rational. In repurposing and reuse projects, it is increasingly important to demonstrate that an existing building will be economically viable after repurposing. This means that the commercial aspect cannot be underestimated, as it often determines whether to proceed with reuse or repurposing. When parties are willing to invest themselves and take on financial risk, it can stimulate repurposing and reuse projects. Finding the right balance between enthusiasm for the process and meeting the required conditions is crucial for the success and feasibility of the project.

Multifunctionality

Repurposing projects almost invariably require the integration of multiple functions. Often, buildings are too large to find a single function or user, and a monofunctional solution carries a higher risk of failure. If a single user leaves, the concept for the building—and potentially for the area—becomes untenable. This has been particularly evident in the monofunctional policies of recent decades, especially on large-scale office locations. Introducing multiple functions in repurposing projects increases the vitality of the area. Additionally, multifunctionality ensures that if one user leaves, the concept for the remaining users can still be maintained. Continuity is crucial for repurposing projects. Having multiple users within a building provides a more dynamic appearance and can also enhance the neighbourhood's character and vitality. The introduction of an unconventional function can positively impact the building or area, making it more appealing. Relying solely on residential use for many buildings risks developing a new form of monofunctional policy.

Cultural-Historical Value

Roeli van Venrooij

The value of a building often extends beyond its physical aspects. Buildings carry historical, social, and symbolic meanings intertwined with the identity of the community. The concept of 'culture-historical value' encompasses these dimensions and serves as a guide for preservation and repurposing. The challenges of adaptive reuse therefore extend beyond technical aspects and often involve complex societal discussions. Societal, emotional, aesthetic, and functional values play a crucial role in the decision-making process surrounding adaptive reuse of cultural heritage.

In 2000, Barend Jan Schrieken developed the 'Cultural-Historical Value Meter,' a systematic method for decision-making in the conversion of churches. This chapter delves into the meaning of cultural-historical value, the various classifications of monuments in the Netherlands, and the policies employed by the government. Additionally, it offers an extension to Schrieken's existing step-by-step plan. This plan provides structure through the various stages of adaptive reuse. The chapter provides insights into the opportunities and challenges associated with maintaining or adding value to our cultural heritage.

13.1

Context and Rationale for the Instrument

The Netherlands boasts a rich history reflected in its building stock. Buildings shape the character of cities, villages, and areas. Each structure tells a story about the time it was designed and built. However, distinguishing what makes a building "historical" or, more specifically, "cultural-historical" can be challenging. To address this, it's essential to first outline the concept of culture within our society. When an object, phrase, song, or symbol is considered part of Dutch culture, it naturally adds value to Dutch heritage. Consequently, it is important to explore how this value can be preserved within the built environment.

In 1860, a significant step was taken toward structured value assessment of built heritage with the establishment of the Committee for the Discovery, Preservation, and Promotion of Remnants of National Art. Known as the Stuers Committee, this pioneering body laid the groundwork for monument conservation in the Netherlands. It marked the beginning of a systematic approach to valuing and preserving Dutch cultural heritage. The formation of the Dutch Archaeological Society (Dutch: Nederlandsche Oudheidkundige Bond) in 1899, followed by the Heemschut Association in the same year, further advanced the legal protection of monuments. In 1903, the Dutch government initiated the first State Commission for the Inventory and Description of Dutch Historical and Artistic Monuments, which set the stage for the statutory protection introduced by the Monuments Act of 1961 (RCE, 2014). In 2016, the Heritage Act (Dutch: Erfgoedwet) was introduced, consolidating various regulations concerning cultural heritage, including the Monuments Act 1988 and the Cultural Property Preservation Act, among others (Ministerie van OCW, 2021). The Cultural Heritage Value Meter (Schrieken, 2000) emerged as a tool designed to assess the conversion potential of church buildings. This tool, also featured in the precursor to this book, Transformatie van Kantoren (2007), has since evolved. The revised version of the Cultural Heritage Value Meter now encompasses a broader range of monumental buildings in the Netherlands, integrating additional aspects beyond the original scope.

The challenge of the adaptive reuse of cultural-historical buildings often lies in the societal debate that takes place between the organisations involved.

13.2

What Precedes the Adaptive Reuse

The challenge of transforming culturally historic buildings often lies not only in the technical aspects of the structure but significantly in the societal discussions among involved parties. Buildings carry emotional and aesthetic value that must be acknowledged and addressed. As highlighted in the project 'De Heilig Hartkerk' in this book, the emotional value of a building can be so powerful that an adaptive reuse process might extend up to 30 years. Such prolonged periods of inactivity can lead to neglect and deterioration of the building. In decision-making for the repurposing and conversion of a culturally or historically significant building, it is crucial to consider not just the technical, functional, financial, and location-related aspects but also the cultural and historical characteristics (Schrieken, 2007). Local authorities bear the responsibility for weighing these characteristics appropriately

13.3

Cultural-Historical Properties

In the context of the built environment, cultural-historical value refers to the significance and relevance of a building or (natural) area in terms of history, architecture, and social meaning. The concept encompasses various dimensions, including architectural value, historical significance, social involvement, and symbolic value. The cultural-historical value of heritage is formally established by the government. The Cultural Heritage Agency of the Netherlands (Dutch: Rijksdienst Cultureel Erfgoed, RCE) employs an integrated approach for assessing the value of built cultural heritage (RCE, 2014). The laws and regulations that apply to a monument depend on the protected status of the building. This status is often reflected in general rules regarding permits. .

Government Monument Policy

There are three formal types of cultural heritage in the Netherlands:

- **National monument:** he protection of these is regulated under the Heritage Act and the Environmental Act
- **Provincial monument:** the protection of these is regulated on a provincial level
- **Municipal monument:** the protection of these is regulated on a municipal level

National monument

The RCE, on behalf of the Minister of Education, Culture and Science, designates national monuments and grants subsidies for restoration and maintenance. The RCE also advises municipalities as the competent authority on modifications to both built and green national monuments. The Heritage Act provides guidance on the valuation of cultural heritage and the care of cultural assets in government ownership. The Environment and Planning Act (Dutch: Omgevingswet). regulates the handling of cultural heritage in the physical living environment. In 2023, there are 61,729 national monuments in the Netherlands (RCE, 2023).

Provincial monument

Provincial monuments are designated for objects of regional importance. There are only two provinces in the Netherlands that have designated provincial monuments: North Holland and Drenthe. A provincial monument receives protection from the province. Each of these provinces has its own regulations for the designation and management of provincial monuments (Ministry of General Affairs, 2022).

Municipal monument

Objects with a municipal monument status are often of local or regional importance. Typically, the Mayor and Aldermen have the authority to designate an object as a monument. A municipal ordinance regulates that for activities such as renovation, relocation, or demolition of a municipal monument, a building permit from the municipality is required (Monumenten.nl, 2022a).

The policy regarding municipal monuments varies from one municipality to another. For instance, the municipality of Rotterdam not only has municipal monuments but also distinguishes objects that are characteristic of a neighbourhood by assigning them a dual designation in the zoning plan as "cultural history." The municipality of Amsterdam uses a different system, categorising monuments into various order classes (see project description 'P10. W99').

Relevant Laws and Regulations

In the context of the reallocation of monuments and churches, the Environment and Planning Act is of crucial importance, as permits are required for modifications to protected monuments. The increasing relevance of church conversions is evident from the fact that, after residential houses, municipalities receive the most permit applications for churches (Erfgoemonitor, 2017; Remøy, van de Putte, and Espinal, 2021). The environmental permit assesses reallocation in relation to the zoning plan, including considerations regarding areas classified as (national) monuments. In this process, the structure vision, the visual quality plan, and the zoning plan play an essential role, focusing on the preservation of cultural-historical values. A change in function can occur through either a zoning plan amendment or a permit for deviation from the zoning plan, requiring thorough research (Hobma & De Jong, 2016). In cases of significant function changes to a protected monument, it may be considered to remove the building from the national monuments register (Remøy et al., 2021).

13.4

Step-by-step plan

The step-by-step plan provides structure in the decision-making process for the potential adaptive reuse of cultural heritage. The step-by-step plan from 2000 focused mainly on the possible repurposing of churches. The new step-by-step plan focuses not only on churches but also on the adaptive reuse of monuments. The plan can be divided into three phases: 1) Initiative and project formation, 2) Function selection, and 3) Further development of the project. In phase 2, the potential new function is examined (function selection model). Additionally, a tool has been developed to assess the cultural-historical value before and after adaptive reuse (CHW-meter).

TABLE 13.1 Step-by-step plan

PHASE 1: INITIATIVE
Initiative
Define policy
For a Team
PHASE 2: BUILDING SELECTION & PROGRAMME CHOICE
Functional analysis of the building
Exclusion criteria
Function selection (function selection model)
Determine Cultural-Historical Value (CHW-meter)
Calculate & Design
Decision-making
FASE 3: FURTHER DEVELOPMENT

Fase 1: Initiative

The start of a project always begins with an initiator. This initiative can be taken by a private party (such as a developer), an owner who has a vacant building and wishes to renovate or transform it, or someone looking to sell the property. As church communities shrink and merge with other churches (often out of necessity), many churches become partially or fully vacant, leading to financial difficulties for these communities (Schrieken, 2007). When such a situation arises, action must be taken. As discussed earlier, the local government (municipality) serves as the point of contact. The RCE provides advice to the municipality and can be involved in the development process. For provincial monuments, the municipality also holds authority. Since adaptive reuse involves changing the function of the property, the initiator must always apply to the municipality to amend the spatial plan (see '3. Legal Framework'). Additionally, for the conversion of a monument, another procedure is initiated, namely the permit application for modifications to a monument. In practice, many monuments, including churches, naturally, have a public function. Changes to such a building not only affect its function but also its interaction with society. Therefore, it is essential that the initiator and the government define policies. Increasingly, urban development involves creating an area vision, where collaboration—often with the municipality—already considers the potential of cultural heritage (see '9. Collaboration in Area Transformations to Residential Use'). When such a vision exists, part of the planning process has already taken place, and the initiator must take this into account. Such a vision may also have been formulated for a church building. In 2019, the RCE provided guidelines for municipalities and church communities. These guidelines offer the building blocks to formulate a vision for churches (Ministry of OCW, 2019). Between 2019 and 2021, 240 municipalities actively worked on creating a vision for churches. This church vision concerns the process and how discussions should be conducted when churches are closed or sold (Ministry of OCW, 2023).

It is advisable for the initiator to involve the government in the planning process at an early stage. For adaptive reuse of a church, it is important that the church board (or a representative of the church board) forms a team with an independent project manager before involving the municipality. This approach can save time and prevent redundant work (see 'P0. Introduction to Projects').

The goal of this phase is to develop an action plan and set the conditions for making a well-considered choice of function for monumental buildings and church properties (Schrieken, 2007).

Phase 2: Building selection and programme choice

In the second phase, various aspects are examined, which together create a holistic view of the complexity involved in the adaptive reuse of heritage (and churches). Figure 13.1 provides an overview of these aspects.

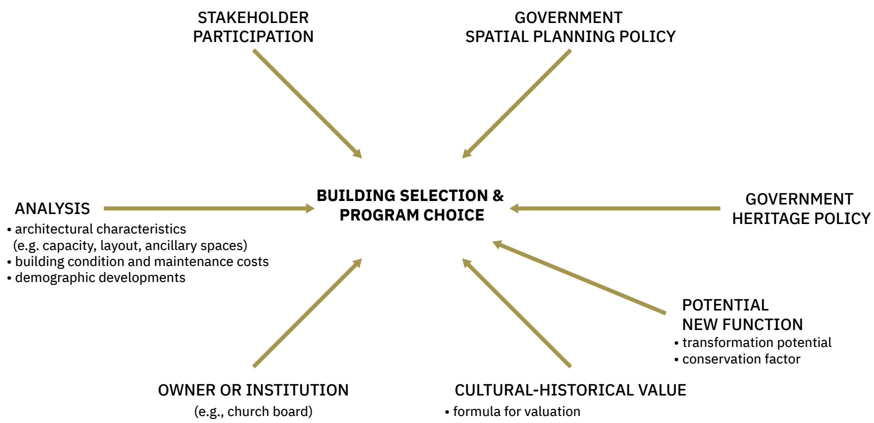

FIG. 13.1

FIG. 13.1 **Building Selection and Programme Choice**

Exclusion Criteria

Based on an initial rough analysis of the facets in figure 13.1, several possibilities for the building and location can already be excluded. Harsh conditions such as the characteristics of the building, organisational policy, government policy, or restrictions on interior changes due to its monumental status can rule out certain functions of the building. Table 13.2 provides an overview of such criteria.

TABLE 13.2 Exclusion criteria

EXCLUSION CRITERIA	EXAMPLES
Institution Policy	Church policy: exclusion of commercial functions such as a nightclub
Municipal Policy	Commercial functions Parking restrictions (parking policy)
Monument Policy	Restrictions on changes to exterior/interior
Building Properties	Minimum height/widt Minimum surface area Light access Outdoor space
Location Properties	Urban location Parking availability
Market Demand	Office when other offices are vacant Theatre when a new theatre is nearby

Function Selection

In the 2000 step-by-step plan, a list was included that compares the requirements of 19 distinct functions (Table 13.3) with 47 aspects of the building and location (Table 13.4). These functions were originally selected based on successful case studies where church buildings were repurposed for these functions. However, over the past 24 years, many more adaptations of (church) buildings have been realised. An update to the list of functions now includes examples such as 'School' (Heilig Hartkerk Deventer), 'Community Centre' (Bernadettekerk Spoordonk), 'Culture and Overnight Stays' (Westerkerk Utrecht), and 'B&B' (Pieter Stuyvesantkerk Peperga).

TABLE 13.3 Twenty-Three Examined Functions

1. Reuse for another Christian denomination[1]	13. Large retail
2. Reuse as a mosque[2]	14. Restaurant
3. Student housing	15. Daycare centre
4. Youth/student housing	16. Nightclub
5. Family housing	17. Medical centre
6. Senior housing	18. Gym
7. Small-scale offices	19. Storage/warehouse
8. Large-scale offices	20. School
9. Library	21. Community centre
10. Theatre/cinema	22. Culture and lodging
11. Funeral home	23. Bed and Breakfast
12. Retail stores	

1[1]. Only for churches (Schrieken, 2007)
2[2] Added by Van Venrooij (2024)

FIG. 13.2 **Transformation of the monumental Heilig Hartkerk in Breda (P1) into residential units**
Source: HMV Architects

FIG. 13.2

The cultural-historical value meter can also be used for other cultural-historical buildings. The idea behind the model is that a building can be assessed against 47 aspects to determine whether it is suitable for a particular function. The calculation in the model is structured as follows:

$$\textit{Suitability of function} = \sum_{47i=1}((w_a(i)+CF_{tech}9(i)\bullet CF_{tijd}(i)\bullet(5-w_a(i)))\bullet w_e(i))$$

Where:

$$\textit{Weighted score per aspect} = (w_a+CF_{tech}\bullet CF_{tijd}\bullet(5-w_a))\bullet w_e$$

w_a = Rating of the aspect (0-5)
CF_{tech} = Correction factor for technical possibilities (0; 0.5; 1)
CF_{tijd} = Correction factor for time (0; 0.5; 1)
w_e = Weighting factor of the aspect (0-3)

The rating score of an aspect is determined per function and has a weighting between 0 and 5. For example, when it concerns student housing, hospitality services in the area are relevant, so this aspect would get a weighting factor $w_e = 3$ krijgt. However, hospitality is irrelevant for a daycare centre, so a weighting factor $w_e = 0$ would be assigned. The weighting factors can thus be determined by per aspect and per function. Table 13.4 provides the list of aspects.

In the calculation, two correction factors are also included. The technical possibilities correction factor CF_{tech} accounts for the ability to correct an aspect through technical or financial intervention. For example, if it is impossible to meet the parking requirements and there is no technical solution, the factor $CF_{tech}=0$ is applied. If an aspect is technically and financially correctable $CF_{tech}=1$, but would take years to accomplish, the factor $CF_{tijd}=0$ gegeven. Estimating financial costs at this stage is often challenging. For this reason, if there is uncertainty about the costs, the factor $CF_{tech}\neq0$ is considered, as the financial implications will be reassessed in a later step. Based on the calculation outcome, the functions with the highest score can be further developed (Schrieken, 2007).

Rekenen en Tekenen

In an iterative process, sketch designs are created for the functions to be further examined, which are then roughly calculated (Schrieken, 2007). It is wise to involve a contractor and a construction cost expert early on, as simple standard figures are insufficient for evaluating distinct functions within a specific building (see 'P0. Project Introduction'). Based on these calculations, the sketch designs can be adjusted. From these designs, quantities and dimensions can be derived, which are then used to assess the financial feasibility using the residual value method (see '2. Financial Feasibility').

TABLE 13.4 Categorisation 53 aspects (Schrieken, 2007)

1. Representativeness of Location	**8. Load-Bearing Structure**
1.1 Urban location	8.1 Condition of load-bearing structure
1.2 Presence of other buildings	8.2 Layout of load-bearing structure
1.3 Vibrancy of public space	8.3 Floor height
1.4 Green space (within a 500m radius)	8.4 Maximum floor load
1.5 Social environment, public space image	**9. Facade**
1.6 Danger, odour, and/or noise pollution	9.1 Facade layout
2. Distance/Quality of Facilities	9.2 Facade adaptability
2.1 Shops (daily amenities)	9.3 Facade openings
2.2 Neighbourhood meeting places	9.4 Windows in facades
2.3 Restaurants and cafes	**10. Access**
2.4 Post office/bank	10.1 Building entrance
2.5 Medical facilities	10.2 Emergency exits/stairwells
2.6 Sports facilities	10.3 Maximum distance to stair/elevator
2.7 Education	**11. Installations**
3. Public Transport Accessibility	11.1 Ducts/shafts
3.1 Distance to train station	11.2 Air treatment in main spaces
3.2 Distance to metro/bus/tram	**12. Environment**
4. Car Accessibility/Parking	12.1 Sound level on the facade
4.1 Obstacles/hindrances in access roads	12.2 Floor sound insulation
4.2 Distance to parking spaces	12.3 Sunlight access
4.3 Number of parking spaces per 200 m² NLA	12.5 Harmful substances
5. Building Representativeness	**13. Sustainability***
5.1 Recognisability of the building	13.1 Facade heat insulation
5.2 Ability to create a distinct identity	13.2 Roof heat insulation
5.3 Condition of maintenance	13.3 Window insulation
5.4 View	13.4 Presence of sustainable materials
6. Building Size/Layout	13.5 Sustainable installations
6.1 Floor area	13.6 Use of solar panels
6.2 Free space area	13.7 Green roof
6.3 Presence of auxiliary space	
7. Expandability	
7.1 Horizontal expandability	
7.2 Vertical expandability	
7.3 Basement	
7.4 Outdoor space	

** Added by Van Venrooij (2024)*

Cultural historical value

The Cultural-Historical Value Meter from 2000 identified the indicators used to measure cultural-historical value by utilising the Concept Indicative List of criteria from the National Heritage Agency Monument Inventory Project as a foundation. However, over the years, there have been some changes to the valuation criteria for cultural heritage. For this reason, a new list of criteria has been developed, which aligns with the valuation criteria from the RCE from 2019 (Ministry of OCW, 2020c). These valuation criteria are shown in Table 13.5.

TABLE 13.5 Characteristics of cultural historical value

ASPECT		SCORE	WEGING	MAX. SCORE	
1.	**Cultural-Historical Value**				
1.1	Historical Expression	0-4	2	8	
1.2	Landscape Expression	0-4	1	4	
1.3	Technological Contribution	0-4	1	4	
13.4	Innovative Value (degree of innovation in construction and technical aspects)	0-4	2	8	
13.5	Memorial Value	0-4	2	8	
Subtotal			**8**	**32**	**20,5%**
2.	**Architectural and Art-Historical Value**				
2.1	Architectural Significance	0-4	2	8	
2.2	Masterly Work	0-4	1	4	
2.3	Aesthetic Quality (visual attractiveness and artistic value)	0-4	3	12	
2.4	Artistic Material	0-4	2	8	
2.5	Exterior-Interior Coherence	0-4	1	4	
Subtotal			**9**	**36**	**23%**
3.	**Situational and Ensemble Value**				
3.1	Essential Part of Object	0-4	1	4	
3.2	Defining Character	0-4	2	8	
3.3	High-Quality Context (value in relation to historical and urban environment)	0-4	3	12	
3.4	Interior Contribution to Overall Value	0-4	1	4	
Subtotal			**7**	**28**	**18%**
4.	**Integrity and Recognisability**				
4.1	Integrity-Recognisability	0-4	3	12	
4.2	Technical Integrity (preservation of original technical aspects)	0-4	2	8	
4.3	Accumulation of Phases (preservation of historical building and usage phases)	0-4	1	4	
4.4	Ensemble Integrity (in relation to urban, village, or landscape environment)	0-4	3	12	
Subtotal			**9**	**36**	**23%**
5.	**Rarity**				
5.1	Absolute Rarity	0-4	3	12	
5.2	Exceptional Rarity	0-4	3	12	
Subtotal			**6**	**24**	**15,5%**
Total			**39**	**156**	**100%**

The method for determining cultural-historical value before and after conversion follows the methodology from 2000. When evaluating each feature or aspect, a rating is assigned, considering a "preservation factor." This preservation factor indicates how much of the specific feature or aspect remains in its original state, how well it has been preserved. The CHW meter uses fixed weighting factors per aspect. It is important to note that the weighting of the criteria is not set by the RCE but has been determined by the author. The total score, calculated by multiplying the scores per aspect (column 2) by the weighting factor (column 3), results in a relative score on a scale from 0 to 156 points (column 4).

Conservation Factor
The conservation factor indicates the extent to which the previously determined cultural-historical value of the building is preserved after adaptive reuse. For each potential function, an assessment is made of how much of each aspect is retained and what the new value becomes. The conservation factor reflects the ratio between the original cultural-historical value and the value after adaptive reuse to a specific function (Schrieken, 2007). A high conservation factor indicates that the original cultural-historical value remains well preserved after adaptive reuse. This can be viewed positively when granting a permit, as it demonstrates that the monument is being treated with care and that the proposed conversion does not significantly diminish its cultural-historical value (Ministry of OCW, 2020a).

Decision-making
Based on the function selection, financial feasibility assessment, and the cultural-historical value meter, a decision can then be made whether to transform a cultural-historical building (or church). The choice of which function to transform into depends on the outcome of the analysis. The added value of this methodology is that the choice does not automatically fall on the project version with the greatest financial benefit. By making the qualitative elements of our culture quantifiable, value preservation and creation can be achieved.

Phase 3: Development and Construction Process

If adaptive reuse proves feasible, the project proceeds to the development and construction process. Sometimes this follows the traditional Design & Build model, but in practice, such complex conversions are often carried out by a construction team (see 'Introduction to Projects').

13.5

Reflection

The cultural-historical value meter describes an approach to determining the functional choice when transforming cultural heritage, with a focus on church conversions. It provides an understanding of cultural heritage and reveals the historical, social, and symbolic significance that lies behind it. This chapter demonstrates that the challenges of transforming cultural heritage go beyond technical aspects and are intertwined with complex societal issues. Social, emotional, aesthetic, and functional values are essential factors in the decision-making process regarding cultural heritage.

The updated steps of Schrieken (2000) serve as a guiding tool, making the practical execution of the various phases of adaptive reuse more manageable.

In practice, instruments like these are not frequently used. Most projects begin with a dream, a desire, or an idea from an initiator. However, many monumental buildings in the Netherlands stand vacant, ranging from factories and warehouses to schools, offices, palaces, and churches. The use of the cultural-historical value meter by municipalities and interest groups can help spark discussions about the reuse and conversion of these buildings and stimulate new initiatives.

Projects in this book with a monument status

National monument

Heilig Hartkerk, Breda
Veemgebouw, Eindhoven
VB gebouw, Eindhoven
Eiffelgebouw, Maastricht

Municipal monument

W99, Amsterdam: monument waardig (orde 2)
De Meester, Haarlem
EICAS, Deventer

Weeshuis, Gouda

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Sustainability

The construction sector places significant pressure on the environment, being one of the largest consumers of natural resources and producers of waste. Adaptive reuse aligns with the principles of the circular economy by extending the lifespan of existing buildings and avoiding and reducing demolition waste. Circular adaptive reuse aims to minimise negative environmental impacts, not only by reusing buildings but also by considering the reuse of components, products, and materials within the building. Key principles for circular and sustainable adaptive reuse include adaptability, adaptability and reuse of buildings, components and materials.

When considering the adaptive reuse of a building, initiators face a range of requirements. Balancing financial returns with the preservation of historical values can complicate efforts to incorporate measures of circularity and energy efficiency. This highlights how different values and value assessments can influence each other and impact decisions for sustainable, energy-efficient adaptive reuse. Ultimately, value cannot be assessed without assessing sustainability. The following chapters will discuss several aspects of environmental and social sustainability.

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14

Value of Adaptive Reuse

Hilde Remøy

Adaptive reuse of a building occurs when one or more actors determine that the building has sufficient value and quality to support new uses in the future. The drivers behind adaptive reuse are societal, financial, and functional in nature. Societal drivers include the demand for urban living and government policies, such as the ladder for sustainable urbanisation (Ministry of Infrastructure and Water Management, 2017). After periods of vacancy and neglect, adaptive reuse can promote sustainable urban intensification (Bryson, 1997).

In both the Netherlands and internationally, the reuse of surplus office buildings is a significant driver, spurred by the demand for housing and the aging stock of office spaces in older districts (Clifford et al., 2019; Remøy, 2010). Temporary adaptive reuse is also employed to create temporary housing, such as for students and refugees. Additionally, temporary adaptive reuse often serves as a strategy to initiate broader area transformations (Wilkinson et al., 2021; Mazzarella et al., 2022).

Adaptive reuse frequently generates indirect value by increasing the value of properties surrounding an adapted building. This raises the question: who benefits, and who pays? This chapter explores the value aspects of adaptive reuse, with a focus on the adaptive reuse of heritage properties.

14.1

Experience Value

Experience value refers to the value that an individual or group attributes to a building at a particular time and in a specific context. This value can be critical in the preservation of a building, especially when adaptive reuse is functionally feasible but financial profit remains uncertain. Two of the most frequently asked questions in adaptive reuse decisions involve the meaning and measurability of this experience value. To answer these questions, not only the building itself should be assessed, but also the relationship between the building and its surroundings (how the building interacts with its environment and what effects the environment has on the building). Reuse is about recognising and enhancing the unique qualities of the building and its context in contrast to new construction.

Experience value encompasses many aspects, and each person perceives it differently based on their background. A clear-cut definition of experience value is not possible due to its nuances, subjectivity, and the specific situation of each building. However, by specifying the different aspects of experiencing value, the concept becomes more meaningful and objective. Benraad & Remøy (2007) distinguish seven different aspects: familiar ugliness, cultural-historical value, symbolic value, traumatic experience value, use value, intrinsic value, and the relationship between the building and its location. These value aspects were also discussed by Remøy (2014).

Familiar Ugliness

Many adapted buildings are preserved because they are considered important, even if they do not have a status as listed monuments. In Eindhoven, the Philips buildings were gradually recognised as heritage, some receiving a national monument status, such as Vredeoord, the Klokgebouw, and the former headquarters. However, this recognition is relatively recent. For instance, the Witte Dame (former Philips light bulb factory) was initially scheduled for demolition. While most people found the building ugly, artists advocated for its reuse. Eventually, it was renovated and influenced the development of the surrounding area. In this case, the building's apparent ugliness proved significant and may hold meaning for other buildings in the urban context.

The way a building is perceived can be decisive for its preservation.

Cultural-Historical Value

The cultural-historical value of a building is another reason for its preservation. A building forms part of the city's history. However, this does not automatically mean that every old building with a specific style is of historical significance. Uniqueness plays a role. The Royal Palace on the Dam in Amsterdam, for example, was originally built as a city hall. The best architects of the Golden Age were commissioned. This building holds both historical and architectural value. Another example of cultural-historical value is the uniqueness of certain historical building types. For instance, the last remaining farmhouse from a specific period is valued for its uniqueness in terms of typology and building tradition.

Symbolic Value

Symbolic value can be distinguished from cultural-historical value. The Great Church in Veere, Zeeland, is now a national monument. The church was completed in 1521, and while it was too large for the small community that used it, it was built big enough to accommodate the entire village. The church lost its function after the Reformation. In 1686, it suffered from a fire, and in 1811, Napoleon repurposed it as a military hospital, leaving the building without a function. To prevent further damage, the State acquired the Great Church in 1881, making it the first Dutch national monument. Since then, it has been under the care of the Government Real Estate Agency (Dutch: Rijksgebouwendienst). The building symbolises the church's ambition in the fourteenth century and the importance of faith. Artists have painted it, and poets have written about it. Although maintaining the building is costly, plans in the 1990s to transform it into homes were rejected. Private use was held unsuitable. In 2004, the church was transformed into a cultural venue is still in use.

Traumatic Experience Value

A building can be negatively perceived due to activities that took place in it. These experiences do not necessarily relate to the building itself but are often projected onto it. This demonstrates how subjective experience value is. Nineteenth-century textile factories are examples of this. While workers often laboured under terrible conditions, both they and their families valued the buildings because they are part of their history. Some of these former textile factories have now been designated national monuments, such as the Tricotfabriek in Winterswijk.

Use Value

Use affects how a building is perceived. If it no longer meets current use standards, it becomes functionally obsolete, and its experience value depends on its use value. An example is the Lucia project in Rotterdam. The building was originally designed as a garage on the ground floor with rentable office space on the upper floors. However, in 1955, it was constructed as a garage with a school and a gym on the top floor. Later, the building was used as a municipal office. Its large floor height allowed for the creation of 'micro-apartments' for students, with additional space achieved through elevated sleeping mezzanines. The building is now a national monument and is considered to have significant monumental value.

Intrinsic Value

The intrinsic value of a building is its inherent worth. When alterations are made, this value reflects the potential for new uses within the building. A building is transformed when it has the potential to accommodate new functions. This potential for functional change is also known as adaptability or usability. Intrinsic value can also apply to parts of a building. If the structure of a building is useful but the facades are not, the structural components may be reused, thus giving them intrinsic value. The vision for the building's future use often determines whether resources can be allocated to build upon its intrinsic value. Intrinsic value is a prerequisite for experiential value, but it cannot be entirely separated from experiential value. The intrinsic value of a building often becomes apparent after renovation and is frequently dependent on the vision of an individual or group. In this sense, intrinsic value aligns with the concept of highest and best use.

Relationship Between Building and Location

The adaptive reuse of existing buildings can be a catalyst for redevelopment, the experiential value of a building driving broader changes. In a deteriorating area, the adaptive reuse of a building with symbolic or cultural-historical value can reverse the decline of the neighbourhood. This can attract investors, encouraging them to transform or renovate other buildings. Adapted buildings help carry forward the identity of the district. In some cases, temporary adaptive reuse can play a role in area redevelopment, as place making initiative. The building, particularly its new function, becomes a precursor to desired or planned developments. The relationship between the building and its location is always significant, and in area transformations, this relationship must be well integrated. The functions assigned to existing buildings are crucial in this regard.

14.2

Adaptive reuse of Existing Buildings – A Heritage Strategy

The adaptive reuse of existing buildings has evolved into a strategy for preserving heritage (Plevoets & Van Cleempoel 2012; Vafaie et al. 2023). Heritage is a broad concept. UNESCO defines heritage as significant when it holds exceptional universal value (World Heritage Centre 2008). Exceptional universal value means that the heritage transcends national boundaries and is of common importance for present and future generations of humanity. Heritage reflects the diversity of communities and how the past has shaped the environment. In the Netherlands, heritage is classified as a national monument or a municipal monument, but it can also refer to buildings that do not have protected status but are characteristic of the period in which they were constructed. These might include older industrial buildings without recognised monumental value or newer buildings representing their era or with unrecognised architectural value.

14.3

Economic Valuation of Heritage

Multiplicity of Adaptive Reuse Value

The fundamental emotional aspects associated with the experience of a building are generally perceived as being completely incompatible with economics. This conflict is often encountered in practice. Arguments for the preservation and adaptive reuse of buildings are usually based on financial and functional grounds. However, arguments for heritage preservation are typically rooted in archaeological, architectural, or cultural-historical value assessments, not in an economic interpretation of value (Ruijgrok 2006). These values clash when the financial benefits of new uses for heritage buildings must be weighed against potential harm to their monumental value. Therefore, there is a search for economic factors to guide decision-making regarding heritage adaptive reuse.

Heritage value can be broadly divided into economic and non-economic values (Bazelmans 2013), where economic value refers to monetised value. This broad concept makes economic value difficult to qualify and quantify, especially when the heritage site has lost its functional use. Barentsen et al. (2015) argue that quantifying the price premiums of heritage adaptive reuse can justify and encourage adaptive reuse. The non-economic value of adaptively reused heritage is widely recognised, and research has shown that preserving heritage delivers significant value to society (Persoon & Remøy 2021; Gram 2018; Domingo 2015; Ahlfeldt & Maennig 2010; Navrud & Ready 2002).

Direct and Indirect Economic Value

Ruijgrok (2006) defines three different types of economic value of heritage: residential comfort value, recreational value, and bequest value. These values can be measured using techniques like hedonic pricing models (revealed preference techniques) or contingent valuation methods (stated preference techniques), which are often used in cost-benefit evaluations and can also be applied to measure the economic value of heritage. These methods reveal people's willingness to pay for living in, visiting, preserving, and admiring heritage. Determining the economic costs and benefits of heritage creates opportunities to support investment decisions for private and public entities. Moreover, it allows the costs of heritage loss to be included in the cost-benefit analysis of new developments on historical sites.

Both recreational value (e.g., entrance fees, etc.) and residential comfort value can be expressed in monetary terms and are therefore considered direct value of heritage. One way to determine this value is by subtracting investment costs from the revenue. The value is thus determined based on the income from the new use.

High experience value can increase the indirect value of a building.

High experience value can increase the indirect value of a building by having positive effects on tourism, the economic structure, the job market, and the living and working environment. The architectural quality of a monument and the quality of its surroundings contribute to social benefits, such as reduced vandalism and improved (social) safety, which in turn raises the market value of the building and its environment. In this way, the characteristics of spatial quality can be linked to the economic, social, cultural, and environmental dimensions of society.

Expressing indirect value as financial value is challenging. Research by Van Duijn and Rouwendal (2013) and Van Duijn et al. (2016) demonstrates indirect value, showing that households are willing to pay more to live in or near cultural heritage sites. The research further indicates that cultural heritage positively impacts the attractiveness of cities. Therefore, cities should encourage the use and reuse of heritage. However, the positive effect on attractiveness can also contribute to the unaffordability of housing near cultural heritage sites (Been et al. 2016). This effect should be considered in decision-making regarding the reuse of heritage.

14.4

The Value of Adaptive reuse

When a building reaches the end of its functional or economic lifespan, it is evaluated, and a strategy for renovation, adaptive reuse, or demolition is established. Renovation or adaptive reuse occurs when the building is assessed, and one or more stakeholders recognise the (potential) qualities of a building. Adaptive reuse is only feasible if the involved actors have a vision for the building's future potential. In deciding whether to reuse and adapt a building, the relevant forms of experience value are weighed against potential utility, financial value (Remøy 2014), and environmental impact (Baker et al. 2021).

Persoon investigated the added value of homes surrounding the adaptive reuse of heritage buildings (Persoon & Remøy 2021). Firstly, it was found that simply putting the building back into use after adaptive reuse adds value. Before adaptive reuse, there was a noticeable price drop, likely due to the decay of vacant buildings and prolonged construction activities that can last for years. As previous research (Koppels et al. 2011) has shown, a vacant building negatively impacts the surrounding area, contributing to deterioration and vandalism, which in turn leads to price declines. According to Persoon and Remøy (2021), the highest price increase from heritage adaptive reuse is not observed directly adjacent to the building, but rather a few hundred meters away. This aligns with research by Li and Brown (1980) and can be explained by potential nuisances of new activities. Homes located a few streets away are not affected by events, for example, but still benefit from the adaptive reuse. These homes, therefore, have a higher price premium. Beyond a certain distance, the price premium decreases again, depending on the type and scale of the adaptive reuse project.

Persoon's research concluded that heritage adaptive reuse positively affects surrounding housing prices. The added value observed cannot be fully attributed to the adaptive reuse alone; other developments in the surrounding areas and the growing popularity of the neighbourhoods may have also contributed.

The adaptive reuse of heritage offers several benefits, such as recreational value and acting as a local economic engine, thereby serving the public interest. However, private parties, often the initiators of adaptive reuse, do not profit from these benefits. Persoon's research shows a significant indirect effect of adaptive reuse on the prices of surrounding homes. This price premium could stimulate private investments. Building on this, a municipality could more actively use adaptive reuse as part of strategic urban planning tool and as a catalyst for area transformation.

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15

Adaptive Capacity

Bob Geldermans

In Einstein's theory of relativity, space and time are fused into the concept of "spacetime" (Einstein 1905). While this theory may seem abstract and far removed from the building sector, it is intrinsically linked to how materials and buildings relate to us—particularly when "sustainable" is not just a hollow term but the outcome of design and construction processes. The time and space required to extract, grow, cultivate, and replenish raw materials can essentially be considered as design criteria as well (Carpenter 2002; Ashby 2002). This notion also applies to the understanding that activities and interventions before, during, and after the usage of a building must be considered integrally. Unlike space, time seems to have only one dimension and one direction, defined by the Oxford Dictionaries as “the indefinite continued progress of existence and events in a linear direction from past, through present to future” (Oxford Dictionaries 2023). Perhaps this is why the building sector struggles to account for temporal concepts. Nonetheless, designing and constructing for change is the only way forward, as buildings and infrastructures are dynamic configurations. Regardless of their intended functional lifespan, they must anticipate change. Such change can be driven by various social, technical, environmental, economic, or legislative factors. And because the future is largely unpredictable, assumptions made during the design and construction phases are often unreliable. The COVID-19 crisis, for example, demonstrated how temporary but profound shifts in daily living and working environments can occur. On a more structural level, factors like aging populations, increasing diversity, and the growing number of single-person households (De Jong et al. 2019) bring significant challenges to the housing market. This makes functional transformations of the built environment necessary—ideally not for just one change, but for multiple iterations where the building structure allows for it.

Adaptive design and construction are, in most cases, simply logical. In architecture, adaptive design can be defined as "a design feature that embodies spatial, structural, and service strategies that allow for a degree of flexibility, responding to changing operational parameters over time. This reflects the view of buildings as imperfect objects, whose forms continually evolve to align with functional, technological, and aesthetic metamorphoses" (Schmidt et al. 2010).

15.1

Open Building and Tempo-Layering

Architecture can indeed be encoded with a degree of freedom, allowing it to evolve over time in response to various stimuli. These stimuli can include environmental triggers, mechanical activation, or changes in temperature, for example (Xia et al. 2022). On the other hand, this freedom is also found in the degree of 'Open Building,' introduced by Habraken in the early 1960s as a response to uniform mass housing construction in urban areas worldwide (Habraken 1961). Whereas it previously seemed to be part of 'good design' to allow for changes, this resilience largely disappeared in the wave of large-scale and industrial housing construction. Adaptive capacity is the core of Open Building (OB). Regarding the physical structure, OB aims to enhance the potential for change by reducing the tension between building components, specifically between the infill and the structure (‘support’ or ‘base-building’) (Schmidt et al. 2010). However, the concept is rooted more in social rather than technical considerations. OB starts from the desire to empower users by decoupling private infill from collective and structural parts, in technical, organisational, and regulatory terms. This implies new ownership models and opens opportunities for an advanced infill industry focused on what users can control behind their front door (Geldermans & Rosen-Jacobson 2015; Kendall 2010; Kendall 2015; Kendall & Teicher 2000). So far, the concept of structure/infill is more common in commercial typologies than in the housing sector, but OB principles have indeed found their way into several housing projects, both nationally and internationally. Examples in the Netherlands include Molenvliet (Papendrecht), Pelgromhof (Zevenaar), Beatrixlaan (Voorburg), Keyenburg (Rotterdam), Solids (Amsterdam), and Patch 22 (Amsterdam).

Open Building aims to empower users by decoupling private infill from collective and structural parts.

An international example is NEXT21 in Osaka, Japan. NEXT21 is an experimental multi-family housing project built in 1993 by Osaka Gas Co. It demonstrates an integrated approach to sustainability with three pillars: ecological considerations, energy-saving comfort for residents, and the ability to meet changing individual and societal needs. With an open support structure and flexible infill, NEXT21 anticipates a long lifespan for the housing. The architect responsible, Yositika Utida, invited thirteen other architects to design the eighteen individual housing units, indicating that he did not want to create a building but rather a three-dimensional urban design. Each housing unit meets a predefined household profile and targets different types: singles, couples, couples with children, single parents with children, and other configurations. The floor plans are adaptable and follow a modular grid system. The subsystems can be autonomously adjusted, avoiding interference with other housing units. In its thirty years of existence, NEXT21 has been assessed on multiple parameters such as energy performance, water usage, biodiversity, and user perception. The latter was done through interviews with temporary users, after a period of five to seven years. However, the higher initial costs have so far proven to be a barrier to replicating this approach in the current Japanese construction sector (Geldermans 2020).

Another concept for dynamically visualising architecture, which has been applied for decades, is the concept of Pace-layering (also known as Shearing Layers of Change or S-layers), introduced by architect Frank Duffy and developed by Stewart Brand (Duffy 1992; Brand 1994). The S-layers are a crucial concept in linking socio-cultural user-driven dynamics to the technical operationalisation of material flows, initially focusing on capital costs. According to Duffy, changes within a building after fifty years cost three times as much as the original building. The expenditures for the structure are overshadowed by the cumulative financial impacts of using the interior and service installations over multiple generations (Brand 1994). From this financial perspective, Brand identified six layers with different rates of change in their components: the geographical environment (Site); the foundation and structural elements (Structure); exterior surfaces (Skin); the 'working internals' of a building: wiring, plumbing, HVAC, etc. (Services); the interior layout (Space-plan); and the furnishings (Stuff).

15.2

Change-Oriented Design

Adaptive design (also known as Change-Oriented Design, Design for Change, DfC) is associated with multiple goals that evolve over time. The circular economy (CE) addresses this by providing concrete incentives from social, ecological, and economic perspectives. The underlying idea is that shifting the focus from 'take-make-waste' to 'take less, make better, waste not' benefits all pillars of sustainability. The basic rule is simple (apply an integrated approach to design, production, construction, operation, maintenance, repair, disposal, and reuse), but it implies a systemic transition that is inherently complex (Grin et al. 2011; Loorbach et al. 2016). Despite straightforward design guidelines, ongoing assurance and monitoring are very challenging due to distributed control over materials and components. Robust data management is required to effectively manage network dynamics (Pagoropoulos et al. 2017).

Table 15.1 shows a matrix connecting the layers of change (S-layers) with circular strategies, analogous to the different stages of built elements over time (Cramer 2014). This supports the process of knowledge and know-how exchange among stakeholders in circular projects. The method is driven by communication between knowledge domains, highlighting the transdisciplinary nature of value networks. It reveals interpretational differences as well as knowledge gaps that require additional data or research.

On the vertical axis of Table 15.1, a building is divided into layers with varying material turnover rates, with the longest expected lifespan at the bottom and the shortest at the top. The horizontal axis displays circular strategies: from avoiding material use to the most optimal route for reusing materials, bridged by adequate operational management (Bocken et al. 2016; Potting et al. 2017; Geldermans 2016). In other words, looping from one beginning to another. Each cell allows for specific considerations, discussions, responsibilities, data, and input from third parties..

TABLE 15.1 Circular Design & Impact Matrix for Transdisciplinary Decision-Making in Building Design

STAGE		DESIGN & CONSTRUCTION OF BUILDING AND CONSTITUENT PARTS			OPERATION OF CONSTITUENT PARTS			DISCHARGE AND REAPPLICATION OF PARTS		DISCHARGE AND RECYCLING OF MATERIALS	
		Avoid material use	Narrow material flows (use less)		Slow material flows (use longer)					Close material loops	
		Avoid intervention	Reduce materials	Apply reclaimed materials	Maintain product	Repair product	Adjust product	Reuse product (redistribute)	Remanufacture product parts	Recycle materials	Bio-recycle materials (nutrients)
STUFF	Part 1										
	Part 2										
	Part 3										
	Part 4										
	Part 5										
	Part 6										
	…										
SPACE-PLAN	Part 1										
	Part 2										
	Part 3										
	Part 4										
	Part 5										
	Part 6										
	…										
SERVICES	Part 1										
	Part 2										
	Part 3										
	Part 4										
	Part 5										
	Part 6										
	…										
SKIN	Part 1										
	Part 2										
	Part 3										
	Part 4										
	Part 5										
	Part 6										
	…										
STRUCTURE	Part 1										
	Part 2										
	Part 3										
	Part 4										
	Part 5										
	Part 6										
	…										

Source: Geldermans 2016, based on Brand 1994, Bocken et al. 2016, and Potting et al. 2016

The matrix in Table 15.1 fits into a broader tradition of holistic management. Not least referring to the values-based and proactive decision-making approach to manage complexity, as first developed by Alan Savory in the 1960s (Gosnell et al. 2020; Savory & Butterfield 1999). Adaptable, circular built environments require human systems that co-evolve with natural systems (Mang & Reed 2012). Thus, we need new innovations, but we can build on old concepts to unravel the complexity involved in designing and building our living environments. In this respect, progress can be interpreted in multiple directions: forward and backward, but also upward, downward, and around.

Technically, adaptability can be facilitated by carefully considering dimensions and connections in the design. Durmisevic (2018) identifies three essential design dimensions for adaptable, 'reversible' buildings: spatial adaptability (volumes, positions, capacity of the space); structural adaptability (functional and technical independence of the structure); and material adaptability (physical interchangeability of elements). Design for Change and Design for Disassembly are thus strongly interconnected. But that is only the beginning. The design must be implemented in a constructive assembly that aligns with the design. Additionally, downstream interventions such as maintenance, repair, and deconstruction should not create barriers to continuously respecting the design intentions. This requires resilience from stakeholders, along with thorough data and knowledge exchange. For adaptive reuse, the reality is sobering: in addition to the fact that the real estate stock is often not designed for change and disassembly, the conversion to residential use must accommodate new desires and requirements. However, the (design) technical profile of an existing building is often not the decisive obstacle; rather, other aspects are usually at the root, as will be highlighted in the next paragraph.

15.3

From Idea to Implementation

How can the concepts be applied in the adaptive reuse from utility buildings to residential spaces? There are intriguing practical examples, although they operate with varying degrees of success. While adaptation and renovation of outdated utility buildings can prove to be a successful real estate strategy, adaptive reuse into residential use still occur only on a small scale. Through a meta-study of the conversion of fifteen existing buildings into residential units in the Netherlands, Remøy et al. (2014) revealed the drivers for converting existing utility properties into housing, as well as the opportunities and risks that arise during the renovation process (Remøy & Van der Voordt 2014). The results are still relevant today and show that various legal, financial, technical, functional, architectural, and policy issues determine the opportunities and risks of conversion. The financial aspect proves to be a barrier, alongside urban planning policies and gaps in knowledge. According to an online experiment in the Netherlands, the challenge is that potential residents may not be interested in renting a unit in a converted office or industrial building (Glumac & Islam 2020). 220 respondents of various ages and household compositions were confronted with the choice of renting a residential unit in a repurposed office or industrial building. Five discrete choice models were used to measure preferences for living in a converted building and to test for perceived and unperceived taste heterogeneity. The results show that nearly

70% of respondents prefer renting a home in a converted building, regardless of its previous use. The size of the apartment and having a private outdoor space were found to be the most influential features.

The programme "Transformation of Commercial and Social Real Estate to Housing in Almere" was relatively successful in transforming office spaces into residential units between 2016 and 2018. In its wake, the Almere Housing Workshop initiated a "Transformation Experiment" to explore how vacant office buildings could be innovatively converted into attractive and affordable homes. Potential residents were given the opportunity to develop these homes themselves via a digital design concept. The aim was to carry out the adaptive reuse experiment in a vacant building in Almere or elsewhere in the country, as many cities face the problem of vacant office buildings. However, it proved impossible to establish a viable business case, and by the end of 2019, the project was discontinued (Woningbouwatelier 2020). The sensitivity of the real estate market to economic cycles was a key factor: the economic upturn in 2018 disrupted the plans. Project developers and investors, initially enthusiastic, faced too many financial risks. Economic factors and the pressure on urban zoning balances are therefore more likely reasons for the lack of adaptive reuse, rather than a shortage of office buildings with sufficient adaptability.

Jobsveem in Rotterdam (Mei architects 2008) is an example of a successfully executed adaptive reuse. The warehouse, built in 1913, had a closed character to protect the stored goods from excessive daylight, rain, and wind. With its repurposing into a residential building, daylight has been introduced into the building. Glass atriums allow light to enter in a concentrated manner while preserving the warehouse's characteristic appearance (Mei architects 2023). The glass and steel sections highlight the monumental features that have been restored in the former warehouse. The atriums house the main staircases, elevators, and entrances. The floors have an open layout, unobstructed by load-bearing walls. This same flexibility is evident in the floor plans. Jobsveem demonstrates how the adaptive reuse of existing real estate into housing can be successful, although the location and the monumental industrial character are crucial factors. Many vacant commercial properties today lack this advantage, but future-proof layouts can often still be achieved. Kendall et al. (2001-2004) used a capacity analysis as a design methodology to assess the adaptability of an existing office building in Detroit (United States). Using an Open Building perspective, floor plans were revised based on the structural constraints of the existing context and adapted vertical technical shafts. This led to a range of possible layouts for independent (residential) units, providing the developer with a degree of flexibility for future use (Kendall 2003).

A more recent example is the Walden building in The Hague, developed by RE:BORN. The building, which previously served as a municipal office building but had been vacant for some time, was redeveloped between 2018 and 2023 following the guidelines of "dynamic, cherished & sustainable." RE:BORN measures the impact in economic terms (investment, operational, and adaptive reuse costs and real estate value), emotional terms (needs, appearance, quality, health), and ecological terms (materials, energy, water, nature). For the economic impact, a breakdown into S-layers is applied: Structure, Skin, Space-plan, and Services. This allows for a detailed assessment relative to a reference scenario. Walden is currently used for apartments, office space, and a fitness centre (RE:BORN 2023).

15.4

Outlook: Quantifying and Innovating

Aan meetbaarheid van adaptief vermogen wordt al lang gesleuteld. Een prominent The measurement of adaptive capacity has been under development for a long time. A prominent concept is the FLEX framework, developed by Rob Geraedts from 2014 to 2016, with a long history of measuring the future value of buildings through characteristics of adaptive capacity (Geraedts 2016). In the latest version (FLEX 4.0 2016), 44 key indicators have been identified based on the S-layers, see Table 15.2.

The Adaptive Capacity Building Method by W/E Adviseurs and Dutch Green Building Council is the development of a broader methodology described in the report "Buildings with Future Value!" (Brink Groep 2014). The method is based on two dynamics: Usage Dynamics, the requirements for a building to adapt to changing needs of user organisations within its current use function; and Repurposing Dynamics, the requirements for a building to accommodate other use functions (W/E Adviseurs & Dutch Green Building Council 2023). Essential (key) indicators and additional indicators are distinguished within different forms of adaptability, in line with the key indicators from Table 15.2.

These and similar concepts provide a measurement methodology to assess and facilitate the adaptive reuse of office buildings into residential units, also considering legal requirements concerning load-bearing capacity, sound insulation, fire resistance, sanitary facilities, and installation technology. At the same time, this aligns with design principles of disassembly, supporting 'circular building' both qualitatively and quantitatively. An important term in this context is 'residual value': by linking disassembly with the value of building components, circular building can also be more firmly embedded financially. This aligns with the introduction in the Netherlands of 'Het Nieuwe Normaal', which sets a higher standard for circular building, focusing on environmental impact, material use, and value retention (Het Nieuwe Normaal 2023).

Finally, the focus shifts to innovations that could potentially facilitate breakthroughs in adaptive reuse, namely box-in-box solutions. A box-in-box adaptive reuse is an effective way to quickly, efficiently, and sustainably utilise an empty construction context for the housing market. Several players in the market have stepped into this gap. While completely rebuilding vacant properties may not yet be feasible, box-in-box modules can offer quick and temporary relief. Such modules are often made of wood, contributing to a shift in thinking about building materials and CO2 storage. Thanks to the use of CNC production methods and digital design techniques, these building systems can be made optimally usable and adaptable. As this form of housing addresses both vacancy and affordable housing, it holds significant social value.

TABLE 15.2 FLEX 4.0-Framework with 44 Key Indicators

1. SITE		1	Surplus of site space
		2	Expandable site/ location
		3	Multifunctional site/ location
2. STRUCTURE	**Measurements**	4	Surplus of building space/ floor space
		5	Available floor space of building
		6	Size of building floors
		7	Surplus free of floor height
		8	Measurement system; modular coordination
		9	Horizontal zone division/ layout
	Access	10	Access to building: location of stairs, elevators, core building
		11	Presence of stairs and/or elevators
		12	Extension/ reuse of stairs and elevators
	Construction	13	Surplus of load bearing capacity of floors
		14	Shape of columns
		15	Positioning obstacles/ columnsin toad bearing structure
		16	Positioning of facilities zones and shafts
		17	Fire resistance of main loadbearing construction
		18	Extendible building/ unit horizontal
		19	Extendible building/ unit vertical
		20	Rejectable part of building/ unit horizontal
		21	Insulation between stories and units
3. SKIN	**Facade**	22	Dismountable facade
		23	Facade windows to be opened
		24	Day light facilities
		25	Location and shape of daylight facilities
		26	Insulation of facade
4. SERVICES / FACILITIES	**Measure & Control**	27	Measure and control techniques
		28	Customisability and controllability of facilities
	Dimensions	29	Surplus of facilities shafts and ducts
		30	Surplus capacity of facilities
		31	Modularity of facilities
	Distribution	32	Distribution of facilities (heating, cooling, electricity)
		33	location sources of facilities (heating, cooling)
		34	Disconnection of facilities components
		35	Accessibility of facilities components
		36	Independence of user units
5. SPACEPLAN	**Functional**	37	Multifunctional building
		38	Distinction between support• infill(fit-out)
	Access	39	Access to building: horizontal routing, corridors, gallery
	Technical	40	Disconnectible,removable, relocatable units in building
		41	Disconnectible,removable, relocatable interior walls
		42	Disconnecting/detailed connection interior walls; horizontal/vertical
		43	Possibility of suspended ceilings
		44	Possibility of raised floors

Source: Geraedts 2016

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Circular and Adaptable Building Transformation

An Overview of Strategies

Mohammad B. Hamida and Vincent Gruis

Population growth, market dynamics, real estate vacancies, and building obsolescence are some of the triggering factors for adaptive reuse. In recent decades, many adaptive reuse projects have been carried out, partly as a solution to vacant buildings (see Chapter 11: Office Transformation Meter). Recently, adaptive reuse is also seen as a promising component of the transition to a circular economy, as it facilitates the reuse of materials and products, reducing the need to produce new materials. To promote circularity in the built environment in a circular and futureproof manner, adaptive reuse projects need to be carried out in a circular and adaptable manner.

This chapter presents a conceptual model bringing together a series of practical and applicable strategies for circular and adaptable adaptive reuse. This model is a useful and informative tool for investors, designers, developers, and contractors.

16.1

Introduction

There are many triggers for adaptive reuse, such as population growth, market dynamics, vacancy, and building obsolescence (Ross, 2016). Adaptive reuse is a well-known form of building alteration in the built environment (Wilkinson, 2014). In the Netherlands, many of the canal houses in Amsterdam have already been transformed for new functions (Remøy, 2014).

Adaptive reuse is also in line with the principles of circular economy (CE) (Kaya et al., 2021), as it extends the lifespan of existing buildings and reduces produced waste from demolition (Foster, 2020). However, the adaptive reuse process must also be carried out in a circular and adaptable manner to achieve the maximum benefits for our environment. The combination of circularity and adaptability in adaptive reuse offers many advantages, such as long-term functionality and efficient use of resources in the built environment (Hamida et al., 2023a).

This chapter provides an overview of strategies for circular and adaptable building transformation. First, it offers an overview of the concept of 'circular building adaptability' and its determinants according to Hamida et al. (2023b). Second, it presents a conceptual model for the most practical and applicable strategies, derived from literature and case studies (Hamida et al., 2023a, b). Table 16.1 provides an overview of the five case studies used in this chapter.

TABLE 16.1 Overview of the five case studies

ASPECT	**CASESTUDIES**				
	CASESTUDY 1	CASESTUDY 2	CASESTUDY 3	CASESTUDY 4	CASESTUDY 5
Location	The Hague	Harderwijk	Amsterdam	Bodegraven	Rijswijk
Old function	Office building	Office building	Office towers (former bank)	Gymnasium	Office building
New function	Mixed-use residential	Residential care	Mixed-use buildings	Office building	Student housing
Reason for Adaptive Reuse	Vacancy	Vacancy and obsolescence	Change of owner and user	Underutilisation	Vacancy

Adaptive reuse is in line with the principles of a circular economy. The lifespan of existing buildings can be extended and waste produced from demolition can be reduced.

16.2

Circularity and adaptability in buildings: The concept of circular building adaptability

Hamida et al. (2023b) define circular building adaptability as "the capacity to contextually and physically alter the built environment and sustain its usefulness, while keeping the building asset in a closed-reversible value chain." They identified ten determinants of a building's circular adaptability (see Fig. 16.1).

- **Configuration Flexibility:** The ability to reconfigure spaces without using external resources or generating waste.
- **Product demountability:** The ability to dismantle building components without causing damage or waste while enabling their reuse in another location or building.
- **Asset multi-usability:** The ability to use building facilities and spaces by different users.
- **Design Regularity:** The ability to incorporate a regular pattern into the building spaces and components.
- **Functional convertability:** The ability to change the function of a building, contributing to its longevity and value preservation.
- **Material Reversibility:** The ability to reuse construction products and recycle materials.
- **Building Maintainability:** The ease with which the functional and technical lifespan of the building and its components can be extended.
- **Resource Renewability:** The ability to integrate renewable resources for water, energy, and materials within the building.
- **Volume scalability:** The ability to divide or expand the size of the building and its spaces.
- **Asset Refit-ability:** The ability to equip the building with new technologies without generating waste.

The determinants of circular building adaptability can be promoted through passive, active, and operational strategies. Passive strategies are design-based solutions applied to a building in such a way that its spatial configuration does not require further intervention or investment after transformation. Active strategies involve solutions that require future adjustments in the design or user interventions, such as the use of disassemble products. Operational strategies focus on process-based solutions, such as implementing a material passport, which supports the use of both passive and active strategies. Most strategies can promote more than one determinant (see Fig. 16.2).

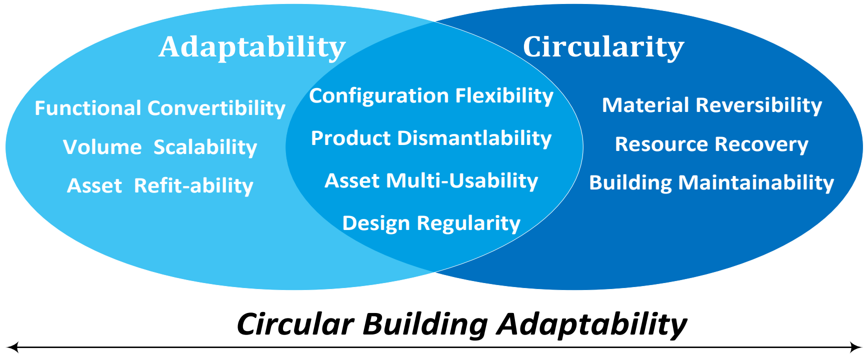

FIG. 16.1

FIG. 16.1 **Determinants of circular building adaptability of according to Hamida et al. (2023b)**
Source: Hamida et al. (2023b)

16.3

Strategies for Circular and Adaptable Building transformation

In this section, we present a conceptual model for a series of practical and applicable strategies to implement circularity and adaptability in building transformation (see Fig. 16.2). This model includes 25 strategies, comprising eleven passive, five active, and nine operational strategies.

Strategies for configuration flexibility

In the conceptual model, four strategies for flexibility in building configuration are identified: standardisation of design, separation of building layers, use of adjustable building components, and use of detachable products. The first two strategies are effective for both circularity and adaptability because they facilitate the reuse of components and materials within the value chain (Geldermans, 2016). These strategies are applicable to various construction products and components, such as standardised detachable walls. For instance, a transformed gymnasium into an office building in Bodegraven has a detachable system of interior wall panels (see Fig. 16.3). The used wall panels in this building have integrated heating system with flexible skirtings underneath containing electrical wiring. This allows users to easily alter the layout of, for example, an office (Hamida et al., 2023a).

Strategies for product demountability

As shown in Fig. 16.2, demountability of products can be promoted through three strategies: standardisation of design, separation of building layers, and the use of demountable products. The same strategies can also enhance the configuration flexibility in building. Using dry connections instead of wet connections is advantageous for the demountability of construction products (Geldermans, 2016).

FIG. 16.2 **Conceptual model with strategies for a circular and adaptable building transformation**

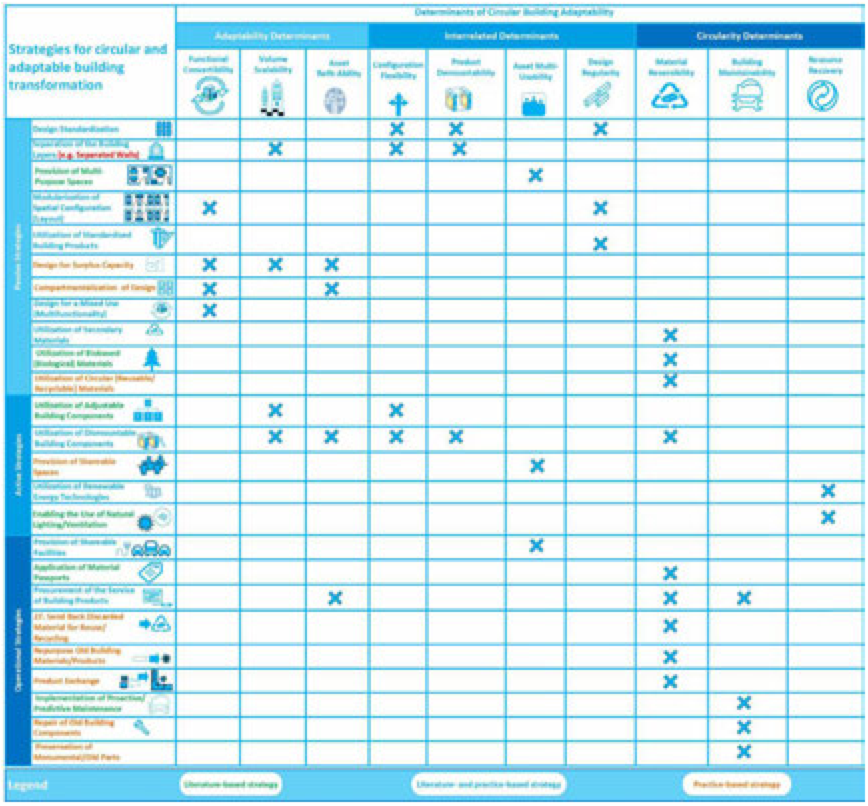

FIG. 16.2

FIG. 16.3 **Wall Panels with an Integrated Heating System**

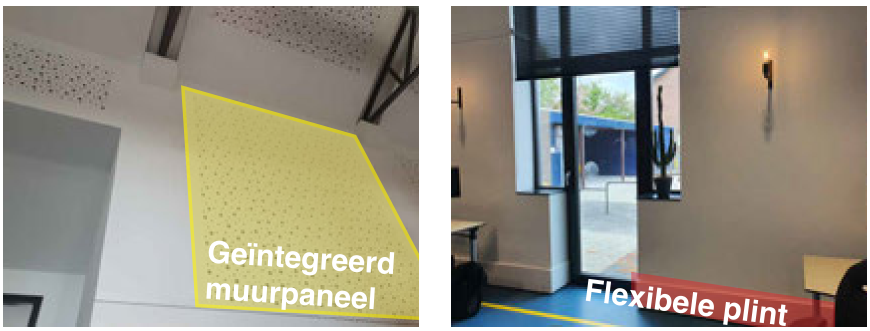

FIG. 16.3

A real estate developer of two adaptive reuse projects used standardised and demountable building products and organised these products according to their expected lifespan (Hamida et al., 2023a). The concept of shearing layers by Brand (1994) was applied here (see 'Strategies for Function Adaptability'). All walls and facades are demountable in both projects.

Strategies for asset multi-usability

For asset multi-usability, various solutions are available for both building products and spaces (Hamida et al., 2023b). This can be achieved by providing divisible and/or multi-functional spaces (Zimmann et al., 2016) or by offering shared facilities (Foster, 2020). For example, there are circular adaptive reuse projects where spaces such as kitchens, toilets, and co-working areas can be shared. Shared co-working spaces and meeting rooms are integrated into the towers of a transformed bank into mixed-use buildings (case study 3) (Hamida et al., 2023a).

Strategies for design regularity

There are three passive strategies for introducing regularity into a building design (Hamida et al., 2023b): standardisation of the design, modularisation of the spatial configuration, and the use of standardised building products. The first two strategies can be difficult to implement in adaptive reuse projects if the original building was not designed to be modular or standardised (Hamida et al., 2023a). One real estate developer applied all three strategies in the adaptive reuse of an empty office into a mixed-use residential building (Fig. 16.4). The design of the apartments and components is standardised. The spatial configuration is also modular. The new facade is prefabricated, standardised, and also detachable.

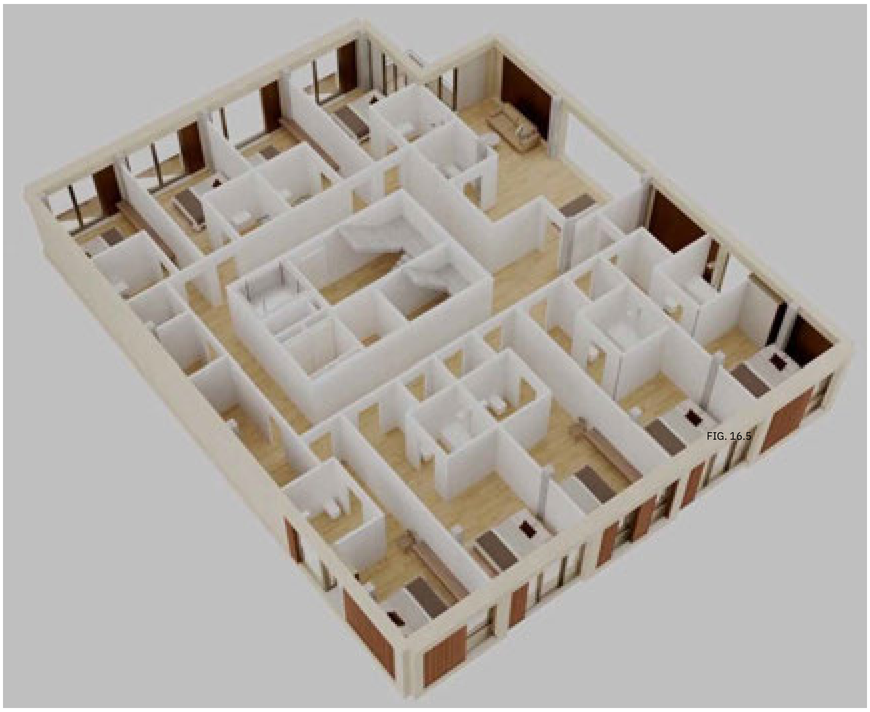

FIG. 16.4

FIG. 16.4 **A 3D rendering of the floor plan of an office in The Hague that has been transformed into a mixed-use residential building**
Source: Oneplanetcrowd, 2022

Strategies for Functional convertibility

Similar to design regularity, functional convertibility for a frater part is based on passive strategies pertaining to spatial and geometric characteristics of buildings. There are several strategies to enhance the functional convertibility in buildings. One strategy is to modularise the spatial configuration, which allows spaces to be easily reconfigured as user needs change over time. Another strategy is to design surplus capacity by ensuring that building spaces and systems can accommodate future changes or increased demands without requiring major modifications. Compartmentalising the design is also an effective strategy for functional convertibility which involves dividing spaces into separate compartments to facilitate flexible use and rearrangement according to varying needs. Lastly, designing for multifunctionality ensures that spaces can serve multiple purposes, which helps the building adapt to different uses over time.

The real estate developer from case study 1 implemented all these strategies using Brand's (1994) sharing concept. The developer identified all potential future building functions (including school, hotel, and healthcare) and their requirements. The functional convertability was then promoted by designing the first three layers (site, structure, and skin) according to the maximum requirements of these potential functions, while the design of the remaining three layers (services, space, and stuff) was tailored to the new function (see Fig. 16.5). This approach enables possible building modifications for future functions.

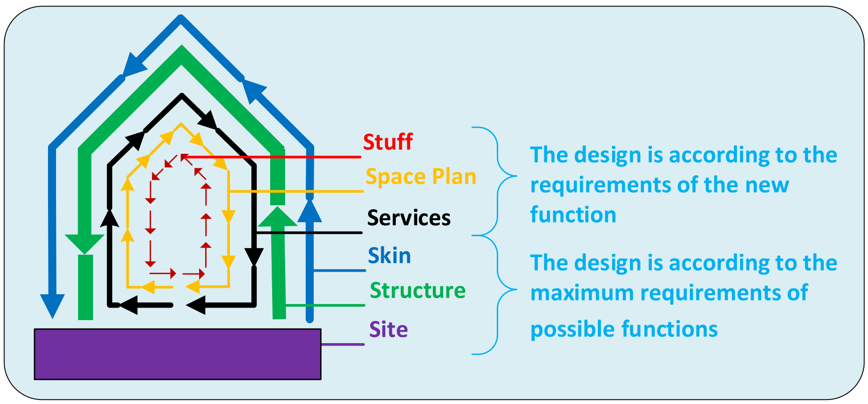

FIG. 16.5 **Design for adaptability of function through the application of Brand's (1994) building layers concept**
Source: Hamida et al., 2023a

Compartmentalisation of the design is a strategy to facilitate future adaptive reuse and changes in function. In this strategy, the configuration and systems of a building are divided into compartments that can be used and adapted independently, with each part having its own shafts, systems, and resources. This strategy was also implemented in case study 1 (Hamida et al., 2023).

Strategies for material reversibility

The circular economy model of the Ellen MacArthur Foundation, known as the "butterfly diagram" (2019), distinguishes between technical and biological material loops. For a technical loop of building materials, secondary- (reused/recycled) products and circular (reusable/recyclable) materials can be utilised. For a biological loop, the use of biobased materials is necessary.

For enhancing the reusability of building assets, the use of demountable products is recommended as it enables the removal and reuse of products and building changes without waste production (Akhimien et al., 2021; Eberhardt et al., 2022; Geldermans, 2016).

Operational strategies are crucial for supporting the reusability and recyclability of products and materials (Hamida et al., 2023b). Five operational strategies that promote reusability are possible, namely: the implementation of material passports, purchasing building products as a service, returning old materials for reuse/recycling, reusing old products for other purposes, and product exchange. In addition to the first strategy (implementation of material passports), we have found examples of the application of the other four strategies in various adaptive reuse projects (Hamida et al., 2023a).

Different second-hand building products were reused for other applications during the adaptive reuse of a gymnasium into an office (case study 4) (Fig. 16.6). For instance, pipes from an old heating system were repurposed as handrails, also roof timber was reused in the construction of a small middle floor and finishes (Fig. 16.6). Additionally, roof timber was also repurposed for furniture. In case study 4, the flooring of the gym hall n was reused from a previous project.

FIG. 16.6

FIG. 16.6 **Second-hand building products repurposed for other applications in the adaptive reuse of a gymnasium into an office in Bodegraven**

The purchase of building products as a service (such as operational leasing) can enhance the technical cycle of building materials, as the supplier can consider the reuse of returned products afterward (Ploeger et al., 2019). A real estate developer of an empty office building leased the facade as a service after its adaptive reuse into a mixed-use residential building (case study 1). The facade is flexible and demountable, allowing the developer to return or replace it in the future (Hamida et al., 2023a).

Strategies for building maintainability

There are four operational strategies to promote building maintainability: purchasing building products as a service, implementing proactive maintenance, repairing old building components, and preserving monumental elements. Purchasing building products as a service can facilitate building maintainability because the supplier has an interest in maintaining these products during their service life (Ploeger et al., 2019).

Repairing old building components and preserving monumental elements have already been implemented in two circular adaptive reuse projects (Hamida et al., 2023a). In case study 3, old elevators were repaired (Fig. 16.7, left). In the gymnasium transformed into an office (case study 4), the floor was preserved (Fig. 16.7, right).

FIG. 16.7

FIG. 16.7 **Examples of the repair of old building products and the preservation of monumental elements in two adaptive reuse projects**

Strategies for resource renewability

Using renewable energy sources and facilitating the use of natural ventilation/lighting are strategies that promote resource renewability. The use of solar panels is a prominent example (Hamida et al., 2023). The developer of the transformed gymnasium utilised efficient solar panels that generate more electricity than the building requires (Fig. 16.8). In this project, the excess energy produced is used for other uses such as charging electric vehicles.

FIG. 16.8 **Solar panels on the roof of the sports hall to office transformation**

FIG. 16.8

Strategies for volume scalability

Separation of building layers, designing for surplus capacity, using adaptable building components, and employing demountable products are four strategies for volume scalability. Separating walls from the load-bearing structure is an example of the separation of building layers (Hamida et al., 2023a), as it allows the walls to be moved easily as well as independently of the load-bearing structure (Alhefnawi, 2018). Designing for surplus capacity paves the way for functional adjustments and expansions (Pinder et al., 2017). Using adjustable building components and demountable products (such as plug-and-play) also facilitates physical modifications, waste reduction, and spatial expansions (Scuderi, 2019). For example, the developer of case study 1 used a flexible facade that allows for changes, additions, or merging of balconies (Hamida et al., 2023a) (Fig. 16.9)

FIG. 16.9 **Flexible façade in a transformation project**
Source: Real estate developer's website, case study 1

FIG. 16.9

Strategies for asset refit-ability

Building managers may need new installations, systems, or other components (Webb et al., 1997). Strategies that promote this capability include designing for surplus capacity, compartmentalising the design, using demountable products, and procuring building products as a service. Designing for surplus capacity makes it easier to provide new or additional building installations or systems (Kyrö et al., 2019). The earlier mentioned example of designing the first three building layers according to the maximum requirements of potential future functions is a means to facilitate providing new systems. Compartmentalising the design allows for additions only where needed. In case studies 1 and 2, this is achieved by incorporating multiple service shafts (Hamida et al., 2023a). Using demountable products makes replacement technically possible, while procuring building products as a service allows for "upgrading" the service at the end of their service life (Webb et al., 1997).

16.4

Conclusions and recommendations

Building transformation is not only a means to bring new life to existing buildings, but also an opportunity to enhance the adaptability and circularity in the existing real estate. The combination of strategies that increase the circularity and adaptability of a building through adaptive reuse brings several benefits, such as extending lifespan, efficient use of resources, and reducing waste in the short and long terms. Our recommendation is to systematically apply all the various strategies in all renovation and adaptive reuse projects. This approach will enhance the resilience and futureproofing of our building stock. Further recommendations include:

- **Implement strategies** that promote more than one determinant of circular building adaptability, such as using demountable products, standardising the design, and separating building layers.
- **Facilitate future building transformation** and changes by designing for surplus capacity, modularising spatial configurations, compartmentalising the design, and designing for multifunctionality;
- **Close the material loop and reduce waste** by using second-hand (reused/recycled) products, biobased materials, circular (reusable/recyclable) materials, facilitating natural ventilation/lighting, creating shareable spaces, procuring building products as a service, preserving monumental elements, and repairing old building components.

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Energy Transitions

Reconciling Conflicting Demands with a Paradox Perspective

Angela Greco

When a building becomes vacant, real estate developers, investors, and owners are faced with competing demands. The need for quick financial returns might conflict with the investment required to preserve historical values, a challenge that is exacerbated when energy efficiency measures need to be integrated. With the urgency to accelerate the energy transition of existing buildings, these demands increase in magnitude and complexity and prioritising one demand over another can have long-term negative consequences for the Dutch real estate market.

This chapter introduces a paradox perspective on the challenges and conflicting interests hindering the energy transition. A paradox approach acknowledges that these tensions are interconnected and persistent. Compromising can be counterproductive, as ignoring conflicting demands can lead to negative unintended consequences.

The chapter begins by providing an overview of some of the main challenges relevant to achieving energy efficiency in the adaptive reuse of existing buildings. It then introduces the basis of paradox theory and its related approaches. A paradox perspective is relevant for researchers and managers dealing with competing demands, as well as for designers who can leverage paradoxes to identify creative solutions.

17.1

Introduction

Transforming existing buildings to enable changes in function can be a promising solution to meet various societal needs. We can convert existing buildings to address housing shortages, create hybrid building functions, and stimulate social interaction in public spaces. Building adaptive reuse also has the power to enhance social connections in public spaces, helping reduce loneliness, which is particularly important among the elderly. Irrespective of its specific goal and societal benefit, every building adaptive reuse constitutes the ideal moment within a building's lifetime for deep energy renovations. Yet, despite the opportunity to advance energy performance provided by transformation, the decisions made during this moment seldom lead to optimal sustainability outcomes.

While the energy crisis increases incentives to accelerate large-scale energy renovations, a faltering economy creates substantial obstacles for property owners. Issues related to structural stability, safety, and social well-being are also increasingly threatening the resiliency of the built environment, especially for historical and cultural heritage. These effects are exacerbated by increasingly frequent extreme weather conditions. Land subsidence in Venice and cracks in the Amsterdam quays are clear examples of problems manifesting equally in less popular cities and towns.

In such a complex environment, property managers, owners, and local authorities responsible for future-proofing existing buildings struggle to reconcile various conflicting demands. For example, in response to the need for rapid implementation and expansion of large-scale energy retrofits, architects and designers are compelled to assemble ready-made, plug-and-play solutions and replicate best practices across multiple buildings quickly. However, these approaches can be detrimental to local identity and cultural values embedded in existing architecture and building heritage. While this can be achieved through unique architectural elements consistent with original (construction) traditions, preserving the local historical character can slow the renovation process pace. How can we combine speed and scale to enhance local identity and historical character?

Decisions during the adaptive reuse process are highly complex and rarely lead to optimal sustainability outcomes.

Despite the significant investments Europe has made over the past decade to address this challenge, the pace of transformation, renovation, and retrofits needs to increase (Filippidou et al., 2017). With a few brilliant exceptions, many current approaches rely on individual considerations made ad-hoc for each specific case and context, where one aspect (e.g., energy efficiency) is prioritised over another (e.g., preserving architectural and social identity).

All these efforts have been crucial in increasing existing knowledge and have contributed to the renovation of a small portion of the existing buildings in the EU, including historic offices, public buildings, and utility buildings. However, the existing building stock still falls short of meeting the needs of current and future generations. At the same time, the decay of buildings has numerous impacts on local communities, such as threatening tourist attractions or destabilising surrounding structures. Adding to this complexity is the fact that the current ambitious climate goals remain largely unattained (Dupont & Van Eetvelde, 2013).

To navigate the complexity of these multiple demands, owners, investors, and architects should embrace a systems approach to building transformation. This approach balances conflicting requirements by offering innovative solutions that respect local identity. While some solutions may be technological, there are also other creative possibilities to explore. For example, restoring historic buildings or blending traditional architectural elements into new designs enriches the unique character of the surrounding environment. This not only helps safeguard cultural heritage but also boosts community well-being by nurturing a sense of belonging and pride. To enable a systems approach to building transformation, this chapter introduces the concept of paradox.

17.2

The Paradox Perspective

While paradoxes are a well-studied concept in organisational studies, they are still relatively new to managers in the built environment. (Greco et al., 2021). Leveraging paradoxes to design new strategies has been shown to promote positive social changes (Smith et al., 2013; Sharma & Bansal, 2017), enable the simultaneous achievement of multiple goals (Smith & Besharov, 2019), accelerate innovation (Andriopoulos & Lewis, 2009; Raisch & Zimmermann, 2017), improve sustainability (Jay, 2013; Hahn et al., 2018), and enhance creativity (Rubin et al., 2023).

Designers inspired by paradoxes can focus on contradictions in any intervention and transform these into productive synergies (Sharma et al., 2022). Contradictions that need to be converted into synergies to improve sustainability outcomes include generalisability versus individuality, short-term versus long-term, current versus future generations, user comfort versus property value, tenants versus owners, businesses versus communities, and new technology versus historical architectural value.

A paradoxical approach is particularly relevant for the energy transition of existing buildings because the energy transition constitutes a 'wicked problem' (Rittel, 1967).

'Wicked problems' are systemic, have multiple underlying causes, took a long time to manifest, and take a long time to be resolved (Irwin, 2015). Attempting to address 'wicked problems' without understanding and leveraging its inherent paradoxes carries two significant risks: solving only the symptoms rather than the root causes of the problem (Irwin, 2012), and solutions might result in unintended negative consequences (Greco & Long, 2022). To illustrate the value of a paradoxical approach in the context of this book, the next section discusses the 'wickedness' of the energy transition in existing buildings.

17.3

The 'Wickedness' of the Energy Transition for Existing Buildings

The energy transition for existing buildings involves not only identifying and implementing measures to increase energy efficiency but also improving indoor climate, utilising sustainable energy sources, and promoting occupant engagement and awareness regarding energy use (Greco et al., 2016; 2017).

Depending on the building typology at hand, current technologies offer a broad range of possibilities to meet high standards for energy efficiency. Architects, property developers, and building owners are increasingly aware of the need for large-scale energy retrofits and are more willing than ever to invest in energy measures. However, the pace of energy retrofit is too slow, and we need to collectively accelerate this process.

By 2050, the European building stock must be CO2-neutral. To achieve this goal, approximately 200,000 homes per year in the Netherlands would need to be transformed to meet energy-neutral standards. An energy-neutral building produces all the energy it needs from renewable sources on-site (D'Agostino & Mazzarella 2019). Renovating 200,000 homes per year translates to an average of about 4,000 homes per week to be renovated. However, the current pace of adaptive reuse is very slow. For the social housing stock alone – which represents about one-third of the total housing stock, this percentage would need to increase by a factor of 20(Filippidou et al. 2017). If the current pace continues, the climate goals set in international policies will not be achieved (Filippidou et al. 2017). Key barriers include a lack of funding and a shortage of construction companies capable of performing the necessary number of interventions (Faber & Hoppe 2013).

Even with a strengthened construction workforce, automated building process, and increased human and financial capital, the challenge is far more complex than a mere numbers game. Despite ongoing renovations, the current pace is too slow, and the buildings being renovated are not contributing as much as needed to meet climate goals. Not only is energy renovation not ambitious enough—most efforts are currently focused on achieving energy labels A and B (Rijksdienst voor Ondernemend Nederland 2022)—but retrofits from energy label G to A save an average of three to four times less energy than predicted (Majcen et al. 2013; Van den Brom et al. 2019). Even when ambitious goals are set, the gap between design and practice often hinders actual progress in energy performance. The causes of this gap between design and practice in terms of energy performance are multiple and closely interwoven. First, the theoretical models used to formulate energy labels assume ideal behaviour from end-users and optimal operation of technology, which rarely occurs in practice. As a result, energy savings are significantly less than expected, and payback times much longer. Second, the business case remains largely decisive in every step of the decision-making process, which can lead to the use of cheap and low-quality materials, and minimal to neglected investment in user-oriented design. Third, design and decision-making processes predominantly occur within companies, with little room for user involvement, co-creation, and open innovation. This can result in actual user behaviour not aligning with the intended use of the building. Fourth, the construction sector is notably fragmented. This means that the various components, systems, and parts of buildings do not work in harmony, as the design would require. Fifth, learning from past mistakes is not encouraged and thus is not common practice. Companies rarely adjust contemporary designs and projects based on what went wrong previously, and there is little feedback between parties to formalise lessons learned and facilitate problem-solving. Issues that are visible in the short term are often resolved ad hoc and with minimal effort, while many errors (e.g., in installations and insulation) may take years to be discovered and addressed, if ever. Although policymakers are increasingly aware of these challenges and are trying to create financial incentives to promote energy-neutral homes, such as the energy performance compensation, they still need to implement measures that effectively address (parts of) these problems, such as quality control regulations (Cozza et al. 2020).

The slow pace of the energy transition, the gap between design and practice, the fragmented collaboration in the building management value chain, and the need for thorough performance monitoring are significant barriers to the energy transition, but they are not the only ones. These issues are key characteristics of what is referred to in the literature as a 'wicked' problem. Setting more ambitious energy goals alone is not sufficient, as demonstrated by the two case studies discussed below. These cases were selected because, even though no functional change is required, they illustrate the unintending consequences of trade-off decision that are not paradoxical, hereby neglecting other demands in building transformation.

EXAMPLE A

Three Vacant Houses: No Functional Change Needed, Yet Still Not Energy-Neutral?

In 2021, a housing corporation (referred to as Alpha) with approximately 8,500 households set the mission to transform its entire portfolio to CO2-neutral standards by 2040, and to build more homes to address the housing shortage, as outlined in agreements with the municipality.

After the strategy was approved by the supervisory board, three homes in a complex of six suddenly became vacant. One tenant had recently passed away, and the other residents had moved out. These homes, dating from the 1960s, were in need of renovation and contained asbestos that needed removal. This situation presented an excellent opportunity to renovate the three homes to high energy standards. After all, one reason social housing associations are reluctant to renovate is the disruption tenants will experience from the renovation work.

Before deciding what to do with these homes, the finance department explored the possibilities and calculated several scenarios. The following options were considered:

1. Renovate to energy label;
2. Renovate to near-zero energy standards;
3. Demolish and replace with new construction;
4. Sell.

The calculations revealed that none of these options were financially feasible. Renovating to high energy standards was financially unviable because the housing association could not simply raise the monthly rent to recoup the investment. The maximum rent for low-income tenants is largely regulated by the government. According to the finance manager of the housing association, the only viable solution was to sell the homes. Consequently, the housing association decided not to renovate or demolish but to sell the three homes.

EXAMPLE B

'One House per Day' and Achieving a Fully Carbon-Neutral Portfolio

In 2015, housing corporation Bèta set the ambitious goal of making its entire portfolio of approximately 20,000 homes carbon-neutral by 2030, under the slogan ‘one house per day’. This goal significantly exceeded the national Energy Agreement, which set targets for housing corporations to achieve an average energy label B by 2020 and to become carbon-neutral by 2050 (Tambach et al. 2010).

In 2016, after several hundred homes had been made carbon-neutral, Bèta began to experience several unintended negative consequences. A 2017 benchmark report from Aedes (the umbrella organisation for Dutch housing corporations) revealed that Bèta scored poorly compared to other corporations due to the heterogeneity of their housing energy profiles: they had relatively few carbon-neutral homes and many with poor energy labels. In contrast to Bèta's extensive renovations aimed at meeting ambitious energy goals, other housing corporations had opted for less drastic renovations by targeting energy labels B or C. These corporations achieved a higher average performance score.

As a pioneer in the energy transition, Bèta also faced challenges involving tenant engagement during renovations. Many tenants were unsure how to heat their homes after their old gas boilers were replaced with geothermal heat pumps. Initially, the housing corporation had not properly informed tenants about the operation of the new system. This discomfort resulted in negative coverage on local television and in newspapers, which reported that the strategy did not account for tenant needs. This sequence of events led to a loss of legitimacy for Bèta, high staff turnover, and financial losses. In 2017, just two years after the new strategy was launched, Bèta’s CEO resigned, and the carbon-neutral strategy was halted.

EXAMPLE A and B: The Same Ambition, Opposite Approaches, Yet Similar (Lack of) Paradox Management

The dilemma described in Case A is known as the short-term versus long-term paradox, where short-term solutions jeopardise long-term solutions and vice versa. A compromise solution (selling the properties according to the business case logic) is harmful overall. Although selling or demolishing properties with poor energy labels helps improve the average label score at the portfolio level, this strategy contradicts Alpha's environmental mission hindering it overall. Firstly, this can only be done for a small portion of the portfolio, not for the entire housing stock. Secondly, CO2 neutrality also considers the stored energy in materials, which requires the reuse of existing construction materials, while the demolition (and new construction) process is highly energy intensive. Moreover, the strategy of selling or demolishing, is focused on the short term.

In contrast, Case B prioritised sustainability over financial gain. Although this was initially commendable, Beta's rapid renovation pace prevented learning from existing mistakes and adapting the implementation of the adaptive reuse (e.g., providing more information to tenants). The high speed of renovation hindered experimentation and the mitigation of negative consequences once they emerged. Furthermore, this approach had insufficient impact on a critical performance indicator: reducing the average energy label.

Although these two examples are quite different and demonstrate opposing approaches to sustainability—Case A prioritising finances and Case B prioritising energy—they both settle on a compromise in the paradox between economic and ecological interests, with one side receiving excessive emphasis while the other is almost entirely neglected. Optimising only one side leads to unintended consequences, causing damage to another aspect of the system at a later stage. Long-term versus short-term, environment versus finances—these are just a few paradoxes that impede property managers in achieving a future-proof built environment.

The two examples discussed above illustrate the specific problems faced by the energy transition of the Dutch building stock. Given the characteristics of the Dutch built environment, the adaptive reuse of social rental housing plays a fundamental role in achieving energy goals, as these homes account for about one-third of the total housing stock in the Netherlands (Centraal Bureau voor de Statistiek 2017). Therefore, housing corporations are stakeholders capable of accelerating the transition by influencing the market for energy-neutral construction and advancing affordable technical solutions (Greco et al. 2017). However, the primary goal of housing corporations is to provide affordable housing for low-income tenants. The social mission of these corporations often clashes with the environmental goals of housing and community development actors, including the corporations themselves (Greco et al. 2021). Like housing corporations, other stakeholders also grapple with such tensions during a building adaptive reuse process. Therefore, all involved parties will need to navigate through paradoxes.

17.4

A paradox approach to adaptive reuse tensions

Achieving sustainability while making homes and neighbourhoods safe, resilient, and inclusive involves addressing numerous interdependent—often conflicting—sustainability demands and dilemmas. Some of these contradictions or dilemmas are defined by management researchers as ‘paradoxes. Paradoxes are seen as conflicting yet interconnected elements that cannot be resolved with a compromise approach. Choosing one aspect over the other often leads to unintended negative consequences. Therefore, a paradoxical approach means opting for both/and, rather than either/or. Systems research has shown that very complex problems, which lack straightforward solutions, are often full of paradoxes. The adaptive reuse of existing buildings is such a complex socio-technical transition, rife with conflicting tensions.

The construction sector faces multiple paradoxes, such as competing versus collaborating and individual versus collective renovation of homes, with the constant risk of unintended negative consequences. For example, if management attempts to standardise processes, they might lost touch of individuality; if the implement site surveillance through continuous, workers might perceive a loss of autonomy; and if buildings are increasingly controlled digitally and many functions are automated, users may feel disempowered, potentially widening the social divide among people of different ages, incomes, or cultures.

Often, companies working under time and budget constraints with numerous conflicting demands, tend to simplify paradoxical relationships. This leads to misjudgements, which can result in multiple unintended consequences. For example, they might opt for a lower environmental goal to maximise profit, reduce construction quality to shorten execution time, or discourage local community involvement to meet pre-existing agreements with contractors. A paradoxical approach involves seeking "and-and" solutions rather than "or-or" compromises. This means that in every design, all diverging interests need to be navigated. For instance, how can a neighbourhood restructuring plan accommodate the interests of individual homeowners while simultaneously encouraging collective action to accelerate sustainability transitions?

For example, take Case B. Following an action research project (Greco et al. 2023), Beta decided to focus on the paradoxes of 'imposed versus co-designed' and 'communication versus participation'. A paradoxical approach means identifying actions that address both interests, while remaining vigilant for symptoms of unintended negative consequences that arise when only one interest is considered. For instance, solely communicating to tenants instead of involving them in the design process might lead to faster implementation but could result in insufficient understanding and acceptance of the new systems by the tenants. This, in turn, could lead to negative feedback and a loss of legitimacy, as experienced by Beta. Striking a balance between communication and participation can ensure both timely implementation and tenant engagement and satisfaction.

Focusing on tenant participation during project execution can lead to higher satisfaction, but it also poses the risk of overwhelming housing corporations with design demands, which could result in long-term disappointment. Conversely, relying solely on communication without participation may lead to unintended consequences, such as tenant complaints, improper use of installations, or, in the worst cases, the abandonment of energy-neutral renovations, as demonstrated in Case B. So, should housing corporations choose between participation and communication? The answer is no: they must strike a balance, emphasising one over the other depending on the stage of the renovation process.

Finding both/and solutions—rather than settling for either/or choices—is often easier said than done. In the energy transition, gaining a broader perspective is crucial, as Schad & Bansal (2018) suggest, by zooming in and out to uncover new possibilities. Zooming out from a specific building and shifting attention to the surrounding area and finding solutions at the neighbourhood level could, for example, be essential for achieving energy neutrality (Kerstens & Greco 2023). If sustainable energy technologies cannot be installed in a historic building because it would compromise the cultural heritage and identity of the structure, a positive energy balance might still be achievable by identifying complementary buildings in the neighbourhood with which energy can be shared (Brozovsky et al. 2021). Balancing ecological needs with individual user requirements could be facilitated by a process perspective that leverages (for example, digital) innovations to identify new business models (Greco & Olivadese 2022). Still, 'wicked problems' rarely have simple solutions. New digital platforms, however, might offer the flexibility to customise processes while addressing conflicting customer demands simultaneously.

In conclusion, research suggests that managers who recognise and address paradoxes make better decisions and reduce the risk of unintended negative consequences (Maurer, 2002). A paradoxical approach adds significant value by tackling complex challenges—such as converting buildings into housing—from multiple angles. Key factors that promote this approach include fostering an open organisational culture that embraces conflicting ideas and encourages innovation. Strong leadership is also essential for navigating opposing demands and maintaining balance. However, obstacles like rigid organisational structures, resistance to change, and a short-term focus can impede the adoption of paradoxical thinking. To encourage its use, especially in building transformation, organisations should create a culture of continuous learning. Forming interdisciplinary teams can also be a powerful way to bring together diverse perspectives and expertise, which is critical for successfully applying a paradoxical approach.

If we come together to embrace paradoxical thinking and make decisions that transcend polarities, we can fast-track the energy transition of existing buildings while preserving and transforming our architectural heritage. In doing so, we will not only enrich the lives of future generations but also pave the way for a more sustainable, balanced world. By harnessing the power of paradox, we can create a future where our buildings are not just functional, but also ecologically responsible and deeply connected to the needs of both people and the planet.

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Urban manufacturing versus Housing

From Central Business to Central (Re)Manufacturing District?

Karel Van den Berghe

Manufacturing and housing in urban areas are related. The aim of this chapter is to critically contextualize the causality of why we need housing in cities. Causality describes the relationship between cause and effect. In this context, living in the city is seen as an effect of a certain cause, but this cause evolves over time and with geographic development. This chapter proposes that we are at the beginning of a new era where the cause for needing housing in the city is changing. This shift could be particularly significant for Dutch cities. The central message of this chapter is that it is necessary to both acknowledge this potential change and understand its implications for transforming buildings and areas into housing in practice. This leads to the central research question of this essay: What is the role of urban transformation today for the future development of cities?

To answer this question, a brief description will first be provided of how the city can be seen as a causal result of a societal need for added value. This explains why certain cities emerged, disappeared, or adapted for specific reasons. Next, the industrial city will be discussed as a significant turning point for the role of cities in modern society. Following the description of the post-industrial city, it will be explained that the heyday of this era is likely over, suggesting that the reasons for needing to live in the city may change. The chapter will conclude with an answer to the research question.

18.1

The city

It is often overlooked that cities originated with a purpose (organically) and, consequently, have not always existed and can also disappear. A comprehensive explanation is that cities emerged as a response to the need for added value (Scott, 2021), a value that could be realised because the necessity of constantly moving around to obtain food became less urgent. This disappearance of necessity could have resulted from the emergence and scaling up of agriculture to produce larger food supplies, or from some parties providing food to others, thus freeing up time for other activities. The (potential) added value then consists of the time that can be used for trade. For example, surplus food or other valuable resources might allow more time for spreading religions. This can lead to, among other things, the development of abbeys, monasteries, pilgrimage sites, or spiritual centres; military purposes; or functions for economic gain such as mining.

All factors contributing to added value have an important geographical element, often referred to as proximity. To realise the added value of trade, developing a religion, military buildup, or extraction, people and activities needed to be close to each other, often for a relatively permanent period. Some of these places grew into what we would today call villages or cities, but many of these places have also disappeared. This process continues today: a city is not a given and can therefore also disappear.

It is often overlooked that cities have been created with a purpose; they can also disappear.

In other words, the existence of a city is driven by added value, usually a societal value resulting from a combination of causes. To achieve this added value, actions are needed. Normally, if not always, these are spatial interventions. Actions such as building a dock or train station, constructing a market hall for trade, a fortress with a moat, or a factory, or establishing a temple or church. Thus, this is a reciprocal phenomenon. On one hand, a city can only exist if there is added value. A city without activity is a ghost town, and these ghost towns from history risk disappearing quickly, physically and eventually from memory. On the other hand, added value is often only realised if there is a city. Throughout history, cities have often been the breeding grounds for art, religion, political movements, financial development, and innovation.

18.2

The Industrial City

The added value of cities has long been rooted in a variety of reasons, some of which have been previously mentioned. Each historical city in the Netherlands has a unique origin story, partly distinguishing it from other cities. Conversely, the existence of cities was often redefined throughout history, for instance, shifting from a military to an economic or religious value. This chapter, however, focuses particularly on the impact of the Industrial Revolution on cities. The Industrial Revolution brought profound changes to many cities. Beginning in the United Kingdom during the late eighteenth century, its major effects soon became evident in cities such as Manchester, Liverpool, Dortmund, Lyon, Osaka, and closer to home in cities like Ghent. The city as a source of added value found a new role. To seize the opportunities presented by the Industrial Revolution, there was a need for labour, capital, trade, infrastructure, knowledge, and political power. Many of these resources were concentrated in cities. It is no coincidence that the first large industrial factories often arose in the heart of medieval centres, sometimes even housed in former abbeys or castles. During the nineteenth century, this growth only intensified, with cities expanding significantly, exemplified by the nineteenth-century ‘belt’ of workers' houses surrounding the medieval centres of many cities. The (explosive) demand for housing in cities, although the Industrial Revolution had less impact on Dutch cities (see Mokyr, 1974 for more information), was a result of the need for labour required by urban factories. Consequently, urban built environments, such as housing, trade centres, scientific institutions, and ports, became essential for labour, trade, innovation, and coordination during the Industrial Revolution. Simultaneously, many cities gained significant new importance due to the Industrial Revolution.

18.3

The Post-Industrial City as a Result of (Hyper)globalisation

The impact of the Industrial Revolution on cities was not exclusively positive. The negative externalities became so significant, due to issues such as exploitation, diseases, and pollution, that various changes rapidly followed. Socialism, which emerged as a major political movement, and the development of spatial and urban planning are examples of responses to these negative externalities. In other words, spatial planning was the twentieth-century answer to the problems of the nineteenth century. The spatial separation of functions such as industry and housing were proposed to ensure that the city and the Industrial Revolution could continue to reinforce each other positively, rather than negatively affecting one another. Until around the 1970s, this reciprocity between city and industry remained strong, and diverse types and processes of urban planning were developed in cities around the world (e.g., CIAM).

However, from that time onwards, everything began to change rapidly, especially in the West. Following the collapse of the Bretton Woods system in 1971 (Williamson, 1985), the international agreement from 1944 that established fixed exchange rates against the US dollar and organised the world by country, cross-border networks began to emerge. Many national airlines, postal services, and car companies ceased to exist or became multinationals, often retaining names that reflect their national origins. The period that followed is characterised as the era of globalisation, which can be interpreted in several ways. Here, globalisation is explained by the relative value (percentage of the total absolute value) derived from trade activities (Van Bergeijk, 2022). Figure 18.1 shows that for decades, this relative value hovered around 20%. There was a first peak just before World War I, but due to the world wars, protectionism during the interwar period, and the difficult reconstruction after World War II, it was only from the 1970s, when the Bretton Woods system fell apart, that an increase began. This increase became exponential from the 1990s and 2000s, peaking between 60% and 70%. Today, we refer to this period as hyperglobalisation (Brakman & van Marrewijk, 2022). Several factors contributed to this, including the fall of the Iron Curtain, the establishment of the European single market, China’s entry into the global market, container standardisation, and digitisation, all of which led to a tremendous increase in international trade and the relative value derived from it.

Openness of the World Economy (global trade in goods, 1880–2023, as a percentage of GDP)

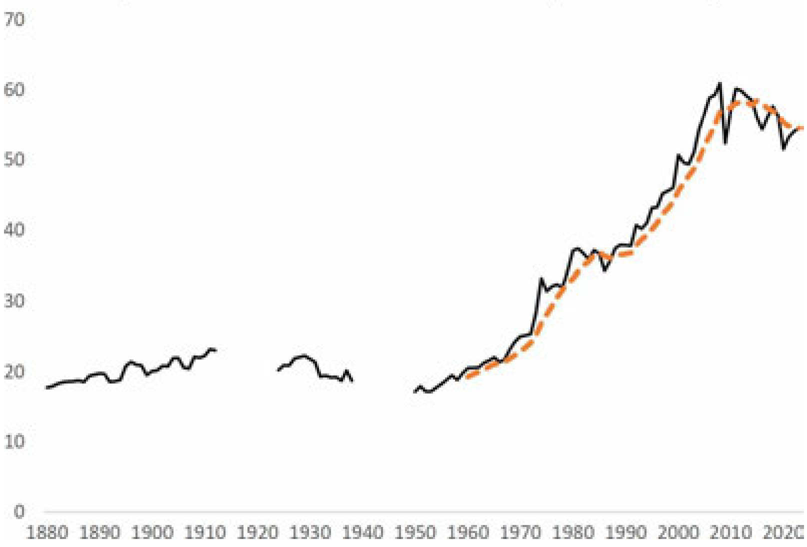

FIG. 18.1

FIG. 18.2

FIG. 18.1 **Globalisation over time, explained by the relative value derived from trade activities**
Source: Van Bergeijk, 2022

FIG. 18.2 ***Time Magazine* A Tale of Three Cities, January 2008**
Source: Elliott, 2008

Due to the optimisation of production networks across borders, so-called global production networks (GPNs) emerged (Coe et al., 2004; Henderson et al., 2002). The automobile sector is illustrative, as are the clothing sector and, more recently, the computer chip sector. Before final products are made, components travel countless times across borders. These global production networks became so complex that there was a great demand for services to set up, manage, and maintain these networks. Firstly, there is a material demand for services, such as ed coordination. Examples include rapidly scaled-up container ships or the expansion of huge canals, railways, highways, and distribution centres. Secondly, there is an immaterial demand for services, such as insurance, specialised banks with available capital, research centres, or legal support. These services are referred to as advanced producer services (APS).

Here, a link can be made to the potential added value of the city. To benefit from globalisation, a specific built environment was needed. On one hand, large air and seaports were necessary; on the other hand, cities became important again. It is notable that between the need for cities during the industrial revolution and the need for cities in globalisation, cities in many parts of the world, including the Netherlands, became less popular (van Meeteren, 2020).

In the early days of globalisation, heavy industry soon began to lose out to heavy industries from other parts of the world. Shipbuilding, mining, and basic chemicals are examples of sectors that faced difficulties, closed, or reorganised to other parts of the world (Van den Berghe, 2018). Unemployment rates peaked during this time in cities like Amsterdam and Rotterdam. The higher unemployment in cities led to a vicious cycle of reduced income, less maintenance, and a faster departure of more anticipated residents from the city.

Since the 1980s, but especially during the 1990s and 2000s, there has been a gradual shift. The enormous demand for specialised services led to a significant spatial effect, an effect first described by John Friedmann (1986) and later by Saskia Sassen (1991) as world cities or global cities, respectively. These geographers observed a worldwide concentration of APS (Advanced Producer Services) in a limited number of cities (Hanssens et al., 2012). Unlike during the industrial revolution, these services, which cater to demand as the term suggests, did not spatially cluster around the factory for which the service was provided. The competitive advantage of sharing knowledge became more important, so much so that it became more crucial for these APS to be close to each other and to develop knowledge and expertise (cf. competitive colleagues) than to be near their clients (Florida et al., 2017).

The key input variable for these APS to remain competitive is knowledge—knowledge held by highly specifically trained individuals, who from the 1980s onwards were referred to as yuppies (cf. Young Urban Professionals) (Beaverstock & Hall, 2012). Yuppies, besides their salary, could be attracted by companies that could offer specific work and living environments. At that time, central business districts emerged worldwide, often characterised by gleaming high-rise buildings. But the living environment of cities, at least those that successfully capitalised on their potential added value in this global era, also improved rapidly—something that is still ongoing today. The increased importance of airports for quick travel between these global cities, the greater importance of culture, top hotels and conference centres, specific associations, extensive public transportation, green spaces, sports, etc., all influenced how cities began to transform. Gradually, just as in the coordination world, rankings began to emerge (Beaverstock et al., 2000). The top global cities, which increasingly began to steer global production networks, included cities such as Tokyo, New York, London, and Hong Kong (see, for example, the cover of Times magazine, figure 18.2), followed by cities like Paris, Frankfurt, and Amsterdam. The yuppie (r)evolution had a remarkable side effect: these global cities progressively had more in common with each other than with the places surrounding them.

The Netherlands can be seen as a champion of globalisation, though there is always debate over who, what, and were benefited from it. The Netherlands, which emerged from a complicated economic period in the 1980s (CPB, 2023), a tougher period than its neighbouring countries (for more information, see Jongsma & de Lange, 2023), actively focused on facilitating globalisation through its built environment. Examples of active policies include the Mainport policy, which focused investments on the Port of Rotterdam and Schiphol Airport (RLI, 2016), as well as policies for developing Central Business Districts (CBD) on one hand and creating beautiful and attractive urban environments, particularly in the Randstad, on the other. The Netherlands distinguished itself from other countries by deliberately profiling itself as a service economy, both materially and immaterially. Illustrative of this is the fact that many Dutch architecture and urban planning firms, such as OMA, Mecanoo, and MVRDV, which began designing and shaping the often large-scale (transformative) development of CBDs and residential environments in the Netherlands and neighbouring countries, became an export product during globalisation, developing such ideas worldwide. In short, a successful city became one that could combine a high-quality commercial area with a high-quality living and experience environment.

In this era, urban living has become important. The causality behind this lies in the need for high-quality jobs, which are concentrated in cities. Conversely, if a city, or even a country, wanted to be successful during this (hyper) globalisation era, it could achieve this by actively focusing on attracting highly educated, internationally, and culturally oriented workers who are essential for APS companies that need these individuals. Therefore, attention to providing high-quality living environments in cities for these workers is crucial. It's a kind of chicken-and-egg situation. There is certainly an economic and even societal reason for the need for more housing in cities. In some cases, spatial policies may choose to transform certain buildings or areas into residential spaces. In other words, in this era, it is logical for other land uses in the city that do not sufficiently contribute to attracting yuppies, such as urban industrial areas, to be transformed into residential or commercial functions.

18.4

From Central Business District to Central (Re-)Manufacturing District?

There are, however, signs that this era is ending or at least changing. As shown in figure 18.1, since the 2008 crisis, there has been a decline in the relative value derived from trade in services, a period now known as "slowbalisation" (EPRC, 2020). More recently, although it remains a major topic of debate in the literature, we have seen a levelling off or, in some cases, even a decline (Van Bergeijk, 2022) in the relative value derived from trade and services. This does not necessarily mean, though in many cases it does, that the absolute demand for material and immaterial services is decreasing, but rather that their relative value is declining. In other words, the relative value of other activities, particularly specialised industries (e.g., ASML, see Hijink, 2023), is increasing.

In this 'new' era, the added value of cities could be fundamentally different. If the relative value of specialised innovative manufacturing industries is indeed increasing, it would mean that these business activities need to be facilitated. The same will be required as with APS during the post-industrial era, namely that these innovative industries need specific workers who want and need to live in a specific spatially nearby environment. As illustrated by developments in the circular economy, this trend not only requires the attraction of highly educated and specialised workers but also a growing need for skilled labour (Burger et al., 2019). The question arises whether these workers will have a similar demand for housing, both in quantity and quality, as the yuppies of the post-industrial era.

The other effect of this new era on cities, however, is likely to be even more significant. If there is increasing demand for high-quality, innovative, circular, and socially diversified activities, this will also lead to a change in the demand for urban functions that these new workers require. Where high-rise office buildings once provided the supporting urban environment for APS, this new era may require a different form (Ferm & Jones, 2017). If the new added value of the city is to be derived from socially driven, innovative, high-quality industries, it is likely that a central business district (CBD) will no longer be necessary, but rather a central (re)manufacturing district (CMR). A CMR would be situated close to, or even at the heart of, its key input variables: specifically diversified workers. A parallel can be drawn here with the early days of the Industrial Revolution when factories were similarly established in the middle of cities because they could only innovate and operate there.

However, it is hoped that, unlike in the past, these developments will not be accompanied by the same negative externalities. The book Industrious City (Hosoya & Schaefer, 2021) demonstrates that there are already examples today of centrally located manufacturing industries in cities that, on the one hand, house, in some cases, even heavy industrial and logistical activities, while on the other hand, being close to residential areas. Note, this is a fundamental difference from the "win-win" living/working adaptive reuse currently underway in the Netherlands. The causality is different. In the Netherlands, the combination of living and working is primarily based on enabling residential functions in business areas (van Bueren et al., 2022), whereas the causality described by Hosoya and Schaefer (2021) is focused on enabling high-quality work first, with living potentially following later.

The Netherlands can be seen as a champion of globalisation, though there is always ongoing debate about who, what, and were benefited from it.

FIG. 18.3 **Conceptual representation over time and hypothetically towards the future of the causal relationship in which the demand for urban living is a consequence of the industrial and/or service sector**

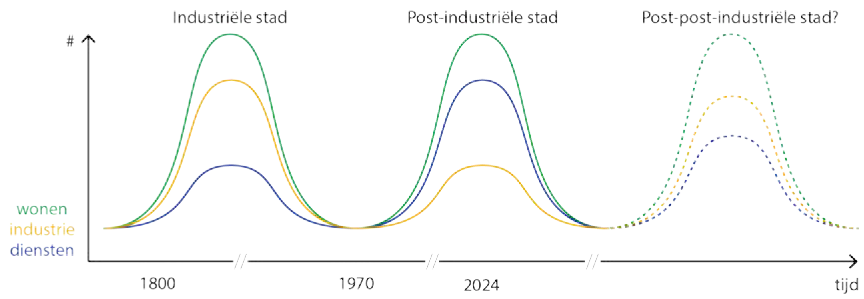

FIG. 18.3

18.5

How to Reach the Next Peak?

The central message of this chapter is that housing is a derivative of the societal needs of cities, and that this changes over time. Figure 18.3 illustrates this causal relationship during the most recent "peaks" of urban prosperity: the industrial city and the post-industrial city. The demand for housing during the first peak arose from the industrial functions that emerged in cities, driven by key input variables such as proximity to workers, infrastructure, and capital. The demand for housing during the second peak came from the service sector (cf. APS), which sought specific workers concentrated in cities. Between these two peaks, there was a decline in the popularity of the city, which occurred in the Western world around the 1970s and 1980s. This hypothesis also partly explains why certain cities were successful during the first peak but less so during the second (e.g., Charleroi), and vice versa (e.g., Singapore).

The proposition of this chapter is that the post-industrial peak has likely passed, and we are moving toward a new societal role for cities. This new role will be much more focused on facilitating the manufacturing industry, particularly high-quality manufacturing. Cities will certainly still be needed, as will urban living, but the underlying cause for this will likely shift partly towards industry. This industry, like Central Business Districts (CBDs) during the post-industrial city, will want to establish itself in or near the city centre, referred to in this chapter as Central (Re-)Manufacturing Districts (CMDs).

The answer to the central research question is that the adaptive reuse of buildings and areas in cities into housing, particularly urban industrial buildings and areas, has been a relatively logical practice during the post-industrial era. However, this could become a problem as we shift towards the next peak, referred to in Figure 18.3 as the post-post-industrial city. This serves as a partial warning for the current dominant urban planning practices. For cities, and more broadly for any space and infrastructure, it is often a clever idea to preserve activities and added value for the longer term.

FIG. 18.4 **Two interdependent perspectives for urban policy**
The perspective of a building or area where different individuals or companies come together or are located, and whether or not they collaborate (left), and the perspective of a relational network, such as a community or a production process of a company or a group of companies that emerges through the collaboration between different buildings and areas (right).
Source: Van den Berghe, 2023

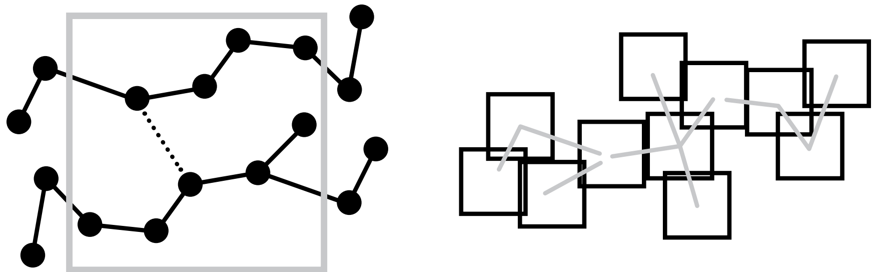

FIG. 18.4

In the future, these developments could serve as a catalyst for the creation of dependent functions. If not, previous investments, often public investments, may significantly decrease in societal value. If a shift in spatial-economic policy is once again needed, it will often require a disproportionately large investment. In other words, looking beyond the peaks and ensuring that the troughs are not too deep is likely a wise long-term strategy to effectively allocate public resources.

In addition to the critical note about an overly narrow focus on the transformation of buildings and areas into housing, this chapter also proposes a new approach to urban planning and area transformation practices. It is likely that understanding and guiding the derivative demand for urban living will become more complex than in recent decades. During the polycrisis we are currently facing, transitions such as climate change, the circular economy, biodiversity, geopolitics, (in)equality, and more will interact with each other and often move in unexpected directions. The Netherlands, and especially its cities, may directly experience the consequences of these transitions. Figure 18.4 illustrates that, in response to the transitions of our time, it may be useful to formulate and implement urban policies for specific spaces—such as a building, area, city, or even region—from two interdependent perspectives. On the one hand, there is the perspective of a building or area with interdependent and collaborative actors within it (left side of Figure 18.4). On the other hand, there is the perspective of a relational network of actors collaborating across spatial boundaries for their business activities (right side of Figure 18.4). Urban spatial policies and area transformation practices that integrate horizontal perspectives (across spatial boundaries) with vertical perspectives (through spatial scales) can help to guide spatial interventions more effectively, ensuring that the development of societal value continues to be supported.

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19

The Role of Citizen Participation

Gerard van Bortel

Citizen assemblies (Dutch: 'Burgerberaden'), also known as citizen forums, are increasingly seen as tools to involve residents in discussions and decision-making on complex societal issues such as sustainability, housing, and climate change. This chapter explores the potential of using citizen assemblies as instruments to promote the adaptive reuse of buildings into housing. The hypothesis is that the pace of many new construction, renovation, and adaptive reuse processes is not so much determined by technical or financial challenges, but by the time needed in the Netherlands for participation and decision-making processes.

19.1

Introduction

This chapter focuses on citizen participation in the initial stages of decision-making regarding the adaptive reuse of buildings into housing, rather than on the role of residents in specific adaptive reuse projects. More information on that latter role can be found in other contributions within this book. For example, the role of collective private commissioning (CPO) in housing adaptive reuse (see 'Create the House of Your Dreams,' p. 00); the support provided to residents by professional organisations such as Steenvlinder in realising affordable self-build homes (Project Post Apeldoorn, p. 00); examples of collaborative approaches to transforming buildings into housing (see '10. Collective Housing Models'), and the role of housing corporations in creating affordable rental homes through housing adaptive reuse (see '23. The Role of Housing Corporations in Housing Adaptive reuse').

This chapter begins with an introductory exploration of recent thinking on the role of citizen forums. We then present the findings from recent citizen assemblies on housing, which reveal that citizens, unexpectedly for many policymakers, place great importance on the careful and efficient use of both existing built and open spaces, while also advocating for collective housing models. The chapter concludes with a reflection on the potential for stronger resident involvement in the adaptive reuse of buildings into housing.

'Public spaces' belong primarily to the citizens, not to the government and not to the market.

19.2

The Participation Society and Citizen Assemblies

Citizen assemblies fit within the concept of the "participation society," introduced by the Dutch Rutte II administration (2012-2017) during the 2013 King's speech:

It is undeniable that people in our current network and information society are more vocal and independent than in the past. Combined with the necessity to reduce government deficits, this leads to the classical welfare state slowly but surely evolving into a participation society. Everyone who is able is asked to take responsibility for their own life and surroundings. (Het Koninklijk Huis, 2013).

This formulation of the "participation society" emphasises the self-reliance and personal responsibility of citizens. However, the outcome was also that citizens began organising themselves, seeking more influence, and not necessarily wanting to operate within the existing legal and policy boundaries set by the government. In short, the government must provide space, support, and trust to make the participation society possible.

In the report 'Trust in Citizens' by the Scientific Council for Government Policy (Dutch acronym: WRR), the Council advocates for more citizen involvement but also notes, based on its research, that there is no single ideal solution. Additionally, the WRR highlights several disadvantages of increased citizen involvement, particularly that both policymakers and citizens often share a short-term perspective: policymakers want to achieve something in the short term, while citizens often aim to block something in the short term.

Despite the WRR's advocacy, citizen participation in the Netherlands has been slow to take off and is often inadequately facilitated by the government. Kim Putters, former director of the Social and Cultural Planning Office (Dutch acronym: SCP), argues in his book 'Het einde van de BV Nederland' ('The end of The Netherlands Inc.') (2022) that current citizen participation is too heavily shaped by the government's policy goals. Citizen participation is framed primarily to contribute to governmental objectives, such as reducing costs and promoting self-reliance. However, as Putters points out, it is not primarily the government's role to dictate how citizens and civil society should organise themselves. "The strength of a civil society lies in its own definition of participation, where voluntary associations are dominant," says Putters (p. 82).

Like Putters, Minister of State Herman Tjeenk Willink concludes in his publication 'Kan de overheid crises aan?' ('Can the government deal with crises?') (2021) that the "public space" (both literally and figuratively) belongs primarily to the citizens, not the government and not the market. According to Tjeenk Willink, the government does not hold all the wisdom, and economic prosperity does not automatically lead to societal well-being. He argues that citizens are essential in providing sufficient intellectual input and counterbalance to government actions.

Tjeenk Willink and Putters both emphasise the need to enhance citizenship and civic initiative, and to more clearly embed these in how we shape our society. Citizen participation has become an indispensable part of the Dutch political system, alongside representative democracy. However, it remains an uneasy relationship.

19.3

Citizen Assemblies: Current Status

Decision-making on spatial plans, including the adaptive reuse of buildings, can be prolonged or even fail due to the complexity of bureaucratic systems and resistance from citizens. Citizen assemblies may contribute to better plans, greater public support, and shorter procedures. Citizen assemblies are structured, short-term participation processes that largely consist of randomly selected citizens.

Particularly in decision-making around climate and environmental policies, there is a growing interest in the potential of citizen assemblies. This was highlighted by the recommendation of the Brenninkmeijer Commission (2021) in its report "Involved in Climate: Citizen Forums Recommended," which suggested strengthening democracy through innovative forms of citizen participation, such as citizen forums.

The idea of citizen participation predates the publications of Putters, Tjeenk Willink, and the Brenninkmeijer Commission's advice, emerging even before politics embraced the concept. Writer David Van Reybrouck (known for his books on Congo and Indonesia) argued in his manifesto ‘Against Elections’ (2016) that the limits of representative democracy and elected policymakers had been reached. Van Reybrouck advocates for participation by citizens selected through lotteries in citizen forums. He followed through on his ideas by helping to establish the Flemish non-profit organisation G1000, which supports citizen forums in practice. G1000 has a counterpart in the Netherlands with the same name.

Publicist Eva Rovers argued in her pamphlet Now It’s Up to Us (2022) that citizens are crucial for solving the biggest challenges of our time, particularly focusing on climate change. In addition to being a writer, Rovers is also a co-founder of Bureau Burgerberaad, an organisation like the G1000 foundation.

19.4

The outcomes of citizen assemblies on housing

In this section, we discuss two examples of recent citizen assemblies that focused on housing as their central theme. The first example involves a citizen assembly organised by a broad coalition of municipalities, housing corporations, and other parties in the Zaanstreek-Waterland region of North Holland. The second example is a citizen assembly organised by the province of South Holland. Both assemblies were supported by the G1000 foundation. In addition to citizens, employers, professionals, and civil servants also participated in these assemblies.

Citizen Assembly on Housing in the Zaanstreek-Waterland Region

IIn 2023, three municipalities, six housing corporations, and several market parties (including construction companies, developers, and architecture firms) organised a citizen assembly on housing policy in the Zaanstreek-Waterland region. Over several rounds, 300 citizens developed an agreement with key principles for housing in their region. The participants ranged in age from 17 to 85 years and met for three full Saturdays, three evenings, and three online sessions (Woonbond, 2023).

The involved parties had promised in advance to take the outcomes of the citizen assembly seriously. However, there was no guarantee that the results would lead to policy changes. Still, it is notable in the Netherlands that citizens themselves are the main authors of the proposed housing policy, rather than merely reacting to proposals from policymakers. The Citizen Agreement is the final result of the citizen assembly in Zaanstreek-Waterland. This agreement contains many recommendations focused on utilising existing resources—both existing locations and buildings. The theme of preserving what you have runs through the citizens' recommendations. Additionally, the importance of collaboration and the pooling of citizens' strengths was highlighted in the advice.

For many involved, this was a surprising outcome. Cees Tip, director of Intermaris, a housing association with offices in Hoorn and Purmerend, mentioned in the Woonbond magazine Huurpeil:

Among housing associations and developers, there was a prevailing idea that collectivity is something for very specific groups of people, but it has become a major theme. Housing cooperatives, housing collectives, and shared living communities—many proposals were made for these because a lot of people feel that they can't manage on their own" (Woonbond 2023, p. 18).

The Citizen Agreement on the Future of Housing in Zaanstreek-Waterland contains several concrete recommendations regarding the adaptive reuse of buildings into housing. For example, municipalities are urged to inventory vacant properties and designate them (at least partially) for affordable senior housing. A similar recommendation is made for transforming large, long-vacant buildings into residential spaces.

The Citizen Agreement also advocates that ownership of land and property not being used according to its intended purpose should be returned to the community.

The Citizen Agreement on the Future of Housing in Zaanstreek-Waterland also reflects a strong awareness of the need to use land sparingly. Municipalities are called upon not to release additional building land but instead to actively revise zoning plans allowing for the adaptive reuse of existing monumental buildings and factories, so that rural areas are not lost, and characteristic buildings are preserved.

Housing associations, according to the agreement, should manage existing housing stock wisely. Municipalities are encouraged to provide subsidies for transforming existing homes. Examples include converting single-family homes into multi-family units or adding an extra residential floor to existing buildings. The agreement also emphasises that existing building structures and materials should be reused to prevent waste.

The Citizen Agreement on the Future of Housing in Zaanstreek-Waterland was, after its approval, presented to the 29 partners that together form the Housing Coalition of Zaanstreek-Waterland. These partners include the involved municipalities, housing associations, as well as a significant number of tenant associations, architects, builders, developers, and real estate agents. All these partners had pledged before the assembly began to respect the independence of the process and to seriously consider the outcomes (the Citizen Agreement) by incorporating it into policy and implementing it, or to publicly explain why certain parts of the agreement could not be implemented.

To ensure that the parties uphold their commitments, a monitoring group was appointed from the participants of the citizen assembly. This group acts as a discussion partner and can be consulted by the government or partner organisations regarding the Citizen Agreement.

Citizen Assembly on Housing of the Province of South-Holland

In 2023, the province of South Holland also organised a citizen assembly, with 360 citizens participating. This assembly was divided into three sub-assemblies, each held in a different location in the province and focused on a distinct theme. In Rotterdam, the theme was "housing"; in Bodegraven, it was "the future of rural areas"; and in Oud-Beijerland, the focus was on "liveability, traffic, and transportation." The citizen assembly on housing produced many recommendations related to transforming buildings into housing.

According to the Citizen Agreement reached in the province of South Holland, municipalities should grant special status to housing projects that renovate characteristic buildings in an appealing manner, allowing these projects to be completed through accelerated procedures. The agreement advocates for restraint in developing new land for construction.

The Citizen Agreement also states that municipalities should not grant permits for new housing developments if similar housing can be created through the adaptive reuse of vacant office buildings. To facilitate this, municipalities must develop a "conversion opportunities map" and create regulations that incentivise such adaptive reuse projects. Residents and developers can propose potential locations to be added to the list, provided they meet criteria set by the province and municipality.

Resident involvement in adaptive reuse projects is a key component of the Citizen Agreement in South Holland. The citizen assembly advises that municipalities should effectively organise the participation of neighbourhood residents in such projects, giving priority in the planning permission process to projects that have broad community support or contribute to social cohesion.

Like the Zaanstreek-Waterland citizen assembly, representatives from the South Holland assembly regularly meet with the province to discuss progress. However, unlike the Zaanstreek-Waterland citizen assembly, the municipalities in South Holland were not formal participants and have not made any commitments to implement the outcomes to the best of their ability.

19.5

Conclusion

This chapter explored the added value of citizen assemblies in the adaptive reuse of buildings into housing. Both benefits and challenges emerged from the practical examples and literature. A key challenge for citizen assemblies is the representativeness of the participants. While citizen assemblies tend to enjoy broad support among the public, in practice, the participants are often those with higher education (HBO or university levels). Young people and citizens with a non-Western background are underrepresented (Den Ridder et al., 2021). Therefore, the question of who participates is just as important as how many people participate (SCP, 2024).

A lot is expected from participants in citizen assemblies. In Zaanstreek-Waterland, participants were tasked with writing texts for the Citizen Agreement and creating PowerPoint presentations. This required a considerable time investment, which not everyone could manage, leading to a noticeable drop in participation by the end of the process compared to the beginning (Woonbond, 2023).

Citizen assemblies are clearly still in the initial stages of their development. The connection with representative democracy and elected politicians is far from seamless. Additionally, the step from formulating a Citizen Agreement to implementing its recommendations is by no means guaranteed.

Citizen assemblies show clear support to use existing buildings for residential purposes. This public backing could help facilitate the creation of more housing at a faster pace through building adaptive reuse. How this can be practically implemented can be found in many other contributions within this book.

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Circularity and the adaptive reuse of Heritage

Dylan Besten

The construction sector poses significant pressure on the environment, as it is one of the largest consumers of natural resources and a producer of substantial amounts of waste (Ellen MacArthur Foundation, n.d.). Even though the Dutch construction sector uses the highest proportion of recycled materials compared to other sectors, only 38% of all building materials come from reused sources (CBS, 2019). In the current system, we extract raw materials from the earth, turn them into products, and eventually discard those products as waste—a linear process. Due to the large CO_2 footprint of the construction industry, the transition to a circular economy is crucial. The circular economy addresses issues such as pollution, waste production, biodiversity loss, and climate change (Ellen MacArthur Foundation, n.d.). Increasingly, governments and organisations are taking steps toward a circular economy, including the Dutch government, whose goal is to achieve a fully circular Netherlands by 2050 (Ministry of Infrastructure and Water Management, 2022). The construction sector will play a significant role in this transition.

One way the construction sector can contribute to the circular economy is by repurposing existing buildings, particularly heritage buildings. Repurposing or adaptive reuse refers to a ‘change in use’ of a structure—adapting it for a new purpose other than what it was originally designed for (Woodcock et al., 1987). In the case of heritage buildings, repurposing involves finding a balance between preserving the quality of historical structures while adapting them for current and future uses. This chapter will explore the extent to which circular economy strategies are currently applied in the repurposing of heritage and the steps that can still be taken moving forward.

20.1

Why heritage?

Heritage is an incredibly interesting type of real estate. On the one hand, heritage buildings have proven to be extremely robust and have stood the test of time. On the other hand, they are very vulnerable in the sense that when a part of the structure is removed, a piece of history is taken away that cannot simply be brought back. This vulnerability has led professionals working with heritage buildings to be cautious, reusing as much of the original structure as possible. This reuse is directly in line with the principles of the circular economy. However, since heritage buildings are protected, they are also in a privileged position, where they do not always have to comply with certain rules when it comes to improving sustainability, for example. This ambiguity places the heritage sector in an interesting position where we can learn a lot from it, but where the sector itself can also make a lot of progress.

20.2

Research Objective and Previous Studies

The research discussed in this chapter will address several objectives. The first goal is to identify which circular economy strategies have already been implemented in adaptive reuse projects. Through case studies, an overview will be created, showing which strategies are implemented and which are not. Additionally, an overview will be provided of the obstacles and barriers professionals encounter when trying to incorporate circularity into their projects. This analysis of current implementation and obstacles will form the foundation of a methodological tool for the potential application of circular economy strategies in a project.

Previous research has already established the connection between circularity, heritage, and the adaptive reuse of heritage buildings. However, much of this research is limited to literature reviews (Plevoets & Van Cleempoel, 2011), systematic reviews (Foster & Saleh, 2021), and theoretical models (Pomponi & Moncaster, 2017). In practice, circularity and the adaptive reuse of heritage are increasingly being implemented, with more contractors and developers incorporating circular economy strategies into their designs, projects, operations, and business philosophies.

The circular economy is pursued both in theory and in practice. While both aim for the same goal, the translation from theory to practice is something that is not often studied. This chapter specifically addresses that translation.

20.3

Case Study Research

Five different case studies have been selected to assess the extent to which circular economy strategies are applied in adaptive reuse projects. These case studies all involve the adaptive reuse of heritage buildings, meaning they are either municipal or national monuments. Additionally, these projects were initiated in the last eight years, following the introduction of the circular economy goals by the Dutch government (Ministry of Infrastructure and Water Management, 2022). Ideally, the projects are either currently under construction or recently completed. This ensures that the interviewees involved in the case studies are still engaged with the project, making it easier for them to recall project details. The selected projects for the case studies are shown in Table 20.1.

TABLE 20.1 Overzicht casestudies

PROJECT	LOCATION	ADAPTIVE REUSE
Vincentius	Udenhout	From monastery to apartments
Groot Tuighuis	’s-Hertogenbosch	From church to cultural heritage centre
Zuiderziekenhuis	Rotterdam	From hospital to apartments
Veerhuis	Rotterdam	From ferry house to writers' house
Oudezijds Voorburgwal	Amsterdam	From warehouse to apartments and offices

For each project, three different parties were interviewed. The first interview was conducted with the plan developer or project leader representing the contractor. This person was involved in the project's early stages and has extensive knowledge of the final plan's development. Also, they have insight into the design and execution phases of the project, allowing them to provide a full overview of how circularity was integrated throughout the project.

The second party interviewed was the project client. This interview's goal was to determine to what extent circularity was prioritised by the client at the project's outset.

Finally, the architect responsible for the design was interviewed. The purpose of this interview was to uncover the specific circular economy strategies that were integrated into the project’s design. These three parties were interviewed because they were key stakeholders in the project.

FIG. 20.1

FIG. 20.1 **Vincentius, Udenhout**
Source: Nico de Bont

Vincentius, Udenhout

The Vincentius building in Udenhout was originally constructed as a monastery by the Sisters of the Choorstraat. They chose architect J.J.M. van Halteren for the design, continuing the tradition of religious congregations in North Brabant to collaborate with a designated "house architect." The building, characterised by the Amsterdam School style, featured an innovative repurposing concept where spaces could be flexibly adapted for distinct functions, such as dormitories, classrooms, or playrooms. A notable feature of the building is its 35.5-meter-high tower, originally designed to supply drinking water to Udenhout, making this historic structure a prominent landmark in the village.

Currently, the water tower is being restored and transformed into a "fauna tower," which will serve as a habitat for barn owls, swallows, and bats, and a research site. The fauna tower is part of a larger adaptive reuse project that includes 92 homes, consisting of apartments in the monumental main building, townhouses in the wings, sustainable owner-occupied apartments, and rental apartments.

FIG. 20.2

FIG. 20.3

FIGS. 20.2 and 20.3 **Groot Tuighuis, ’s-Hertogenbosch**
Source: Nico de Bont

Groot Tuighuis, ’s-Hertogenbosch

The Groot Tuighuis, also known as the Old Saint Jacob's Church, is a historic building in ’s-Hertogenbosch with a rich history and multiple functions over time. Originally constructed around 1430 as a chapel and guesthouse for pilgrims en route to Santiago de Compostela, it eventually expanded into a church with several aisles and a choir. In 1569, it became a parish church (Gemeente ’s-Hertogenbosch, n.d.). After the city's capture in 1629, the building was confiscated and repurposed as a Protestant church, carriage house, and horse stable. In 1752, it became an arsenal with storage rooms for weaponry and other military supplies, gaining the name "Groot Tuighuis" in the 19th century. After its military function ended in 1924, it was converted into the “Noordbrabants Museum”. In 1988, it became home to the municipal Department of Building History, Archaeology, and Heritage Preservation. Since 2015, the Groot Tuighuis has served as the office and depot for the Heritage Department of ’s-Hertogenbosch.

The Groot Tuighuis is currently being renovated into a modern heritage centre as part of a sustainable renovation project led by the municipality. Starting in December 2023, residents and visitors can experience the rich history of ’s-Hertogenbosch and contribute to the city's story.

FIG. 20.4

FIG. 20.5

FIGS. 20.4 and 20.5 **Groot Tuighuis, ’s-Hertogenbosch**
Source: Nico de Bont

Zuiderziekenhuis, Rotterdam

From the late 19th century, Rotterdam-South rapidly expanded. In response to this urban development, the municipality of Rotterdam commissioned the construction of a new hospital on Groene Hilledijk in 1929. The design was entrusted to W.G. Witteveen, later assisted by municipal architects B. Cramer, W. de Groot, and city architect Ad van der Steur. The project faced slow progress, with plans continuously being modified and sections of the building being dismantled and rebuilt due to changing requirements or insufficient funding for certain design elements. Other parts of the building were also adjusted during construction in response to evolving medical insights (Molenaar, n.d.). The project was finally completed in 1939, with the official inauguration on August 1, 1939, shortly before the outbreak of World War II (BOEi, 2022).

The war brought significant challenges, not only for the hospital’s operations but also for the structural integrity of the building itself. In 1941, the Zuiderziekenhuis suffered severe damage from an incendiary bomb attack, reflecting the turbulent times and forging a unique connection with the residents of Rotterdam-South. After the fires at the nearby Shell facility in Pernis, the hospital shifted its focus toward treating burn injuries, starting in 1974. This specialisation led to the establishment of a dedicated facility in 1986. Due to a merger, the hospital moved to a new location in 2011 (BOEi, 2022).

The Zuiderziekenhuis is currently undergoing an adaptive reuse. The pavilions on the site will be converted into approximately 30 ground-floor family homes, while the Carré, which was formerly the main hospital building, will house around 70 apartments. Additionally, the surrounding area will be transformed into a new residential neighbourhood called Zuiderhof (BOEi, 2022).

Veerhuis, Rotterdam

The Veerhuis on the northern bank of the Maas River in Rotterdam is an architectural gem with a history dating back to 1917. Designed by architect H.A.J. Baanders and inspired by a Swiss chalet, it played a crucial role in the daily transport of hundreds of workers by ferry to the RDM shipyard on the southern bank. At its peak, the ferry service had a capacity of 1,300 passengers, along with the transport of small equipment. However, after the bankruptcy of RDM in 1983, the ferry service was forced to cease operations (Het Cuypersgenootschap, 2021).

The Veerhuis holds significant cultural value as one of the last tangible reminders of the maritime history of the area. Although the building has been vacant and deteriorating since 1983, plans are underway to preserve and repurpose it, primarily as a welcoming haven for writers along the banks of the Maas. The goal is to restore the building to its original design while incorporating contemporary and future needs, allowing the Veerhuis to serve as a place for people to come together to write, listen, and learn (Veerhuis, n.d.). Additionally, part of the building will be transformed into a restaurant to enhance the overall experience of the area (Stichting Droom en Daad, n.d.).

Oudezijds Voorburgwal, Amsterdam

The building at Oudezijds Voorburgwal 136 has a rich history. The previous structure on this site was home to beer merchant Hendrick Lenertsz Pot starting in 1585. The "bierkaai" was the quay in Amsterdam where workers loaded and unloaded heavy beer barrels, a central location to facilitate excise tax collection. The quay was part of the Oudezijds Voorburgwal, near the Oude Kerk (De Bierkaai, 2018). In 1733, the current canal house was built in the stately Louis XIV style. Over the years, it has served various purposes and is now a national monument.

The building has been fully transformed with a strong emphasis on sustainability. Solar panels have been installed, and the windows and walls have been insulated using natural and biobased materials to optimise energy efficiency. Notably, the building has been disconnected from the natural gas supply and now uses a heat pump and underfloor heating. To take it even further, a "green pile" was implemented, drawing energy directly from the ground (Nico de Bont, 2022). Additionally, the transport of construction materials was strategically conducted via waterways, using electric transport. This approach served multiple purposes: reducing strain on the fragile quay walls, minimising disruption to the local community due to limited construction space, and lowering CO_2 emissions.

20.4

Case Study Results

Definition of Circular Economy

During the case study interviews, the various parties were asked to provide their definition of the circular economy. Overall, developers, project leaders, and architects had a similar understanding, emphasising reuse, circular material usage, and waste reduction. Reuse and circular material usage were highlighted, particularly focusing on reusing building materials, and incorporating circular, biobased, and recyclable materials. Waste reduction was also a key theme, with the circular economy being viewed as one where waste is minimised.

The project clients added social aspects to their definition of the circular economy, emphasising that it also involves a society where everyone has a place. They also stressed the cultural significance of the circular economy, especially when dealing with heritage buildings.

Implementation of Circular Economy Strategies

The second part of the interviews aimed to uncover which circular economy strategies were implemented within the projects. The interviews revealed that the definition of the circular economy provided by a participant significantly influenced the implementation strategies they mentioned. Specifically, developers, project leaders, and architects primarily discussed sustainable circular economy strategies, often focusing on sustainability and material reuse. This emphasis stems from their definition of the circular economy, which is often centred on sustainability. Conversely, project clients also highlighted social circular economy strategies during the interviews, aligning with their broader definition of the circular economy, which placed greater emphasis on the social aspects. This reflects their consideration of the social benefits and inclusivity alongside the environmental factors when implementing circular strategies.

The fact that most interviewees mentioned circular economy strategies that aligned with their own definitions may be due to their limited knowledge of the full range of strategies that fall under the circular economy. A lack of knowledge often emerged during the interviews, as the case studies revealed strategies that are indeed circular economy strategies but were not recognised as such. For example, the creation of the fauna tower in the Vincentius project, aimed at enhancing and promoting biodiversity, is a circular economy strategy but was not mentioned in the interviews. While it is encouraging to see that strategies are being implemented, even without full awareness, this lack of knowledge could hinder implementation in future projects. Since the initial implementation was accidental, it suggests that further education and understanding of circular economy strategies are needed to ensure more deliberate and effective use in future developments.

20.5

CESAR-model

The case studies revealed that the circular economy strategies proposed by interviewees were significantly influenced by their personal definition of the concept, often focusing on material reuse and the use of circular building materials. This material-focused definition was frequently reflected in the strategies they identified as implemented in the projects. However, literature shows that the concept of the circular economy is much broader than just material usage.

The case studies further showed that projects do not consistently apply circular economy principles. In certain projects, themed sessions were held to explore various possibilities for the application of circular economy techniques. There were also cases where certain strategies were applied without the implementer being aware of their contribution to the circular economy. These strategies were implemented in the projects, but the interviewees would not directly categorise these interventions under the term circular economy. This shows a gap between the strategies that stakeholders implement and what they perceive as part of the circular economy. All of this led to a broad adoption of the circular economy in all scenarios.

Using input from the case studies, the Circular Economy Strategies for Adaptive Reuse model (fig. 20.4) was developed, also known as the CESAR model. Its goal is to raise awareness of the possibilities for integrating circular economy strategies into a project.

Heritage buildings have proven to be extremely robust and have stood the test of time, on the other hand they are very vulnerable. When part of the structure is removed, a piece of history is lost.

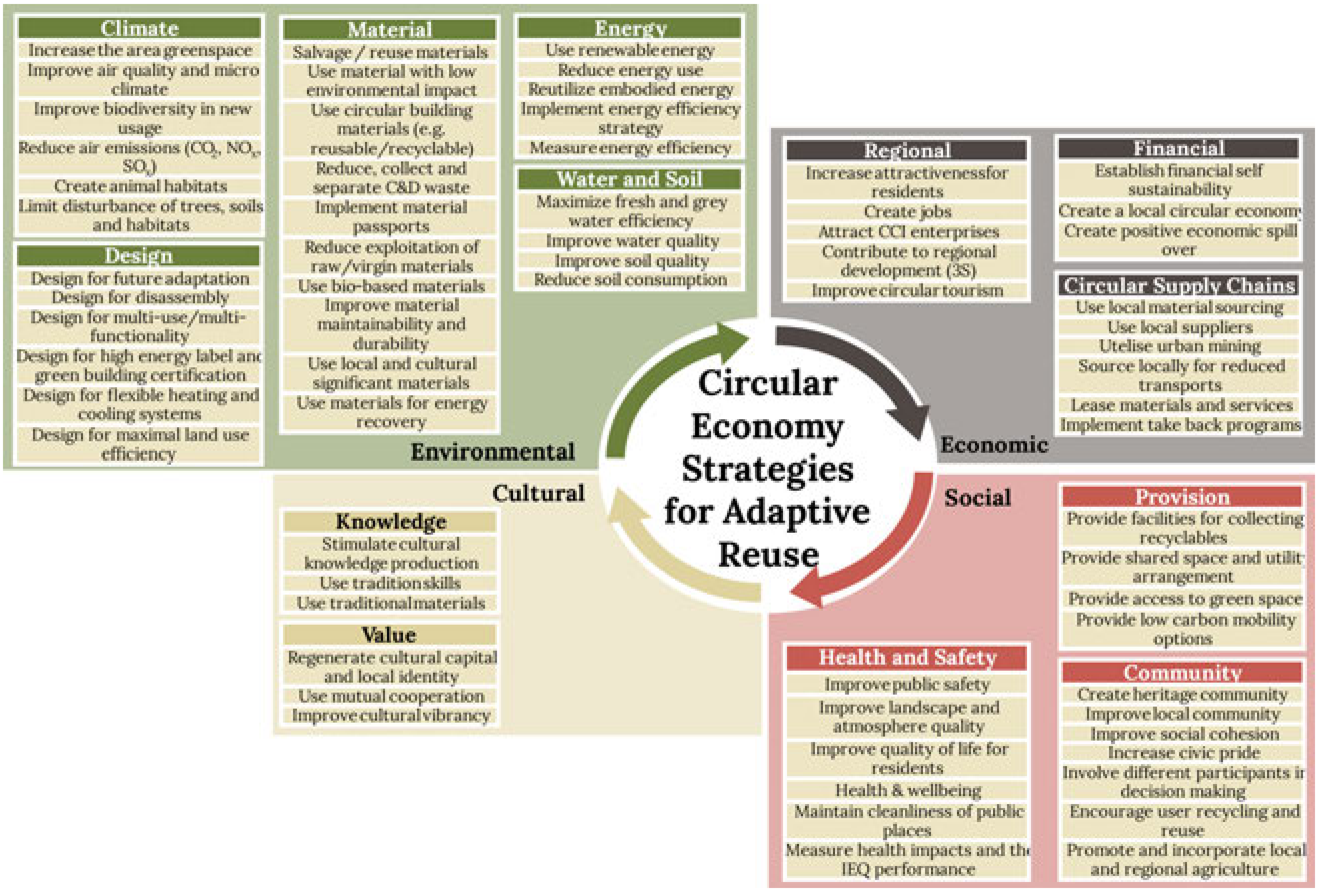

FIG. 20.6

FIG. 20.6 **The CESAR model**

Development of the Model

The CESAR model is a combination of various theoretical models discussed in scientific literature by Foster (2020), Bosone et al. (2021), and Foster & Kreirin (2020). The model consists of a series of strategies and indicators that have been compiled into an extensive spreadsheet, where similar strategies have been grouped together. In cases where strategies were too broad to implement, they were broken down into individual components.

The initial version of the model, consisting of approximately seventy strategies, was reviewed by sustainability experts and staff at Nico de Bont B.V., as well as by the interviewees from the case studies. Based on their feedback, the strategies were clarified and operationalised, and an accompanying explanation was added for better understanding. Additionally, the strategies were categorised into the four main dimensions of sustainability (environmental, economic, social, and cultural), as is commonly done (Najjar 2022), with the aim of making it more comprehensible, even for those less familiar with the concept of the circular economy. A checklist was then added to the model to assess what has and has not been implemented in a project.

The definitive version of the model contains categorised strategies within each dimension, presented in an Excel checklist format. Each dimension has its own sheet, with every strategy accompanied by an explanation and a checkbox to indicate implementation. The score summary shows the selected strategies in each dimension, displaying the number of checked strategies in proportion to the total number, and provides a "circularity score" as an indication of the overall strategy implementation. It is important to note that while all strategies are treated equally in the evaluation, their levels of circularity may vary. The score tab is primarily designed to provide insight into the relative priority given to each dimension and to identify areas for potential improvement.

The CESAR model was then tested and discussed during focus group discussions. One key piece of feedback was that some strategies are project-specific and therefore not applicable to every project. It was recommended to include an option to exclude strategies that are irrelevant to the project. However, a drawback of this approach is that excluding strategies could artificially inflate the overall score, potentially misrepresenting the project's circularity. Addressing this issue relies on the integrity of the person completing the model, who must honestly assess which strategies are not applicable versus those not implemented.

The option to exclude strategies was incorporated into the model. If a strategy is marked as not applicable, it is removed from the final score and highlighted in red on the sheet. If many strategies are marked as not applicable, the sheet will display red, indicating that the user may not be fully committed to implementing circularity in the project. One recommendation for using the model is to have the checklist completed by multiple stakeholders and an independent assessor to ensure objectivity.

20.6

Conclusion

This chapter is based on my graduation research (Besten 2023). The repurposing of heritage buildings is a way to preserve historical structures and their values, but there are still challenges in consistently implementing circular economy strategies throughout the process. This research demonstrates that when circular economy implementation is discussed within a project, architects, developers, and project leaders tend to focus more on practical and material aspects, while clients emphasise the social dimension. The CESAR model was developed to aid in the systematic implementation of circularity and is intended as a tool to raise awareness of circular economy strategies within projects. The model can serve as a planning and assessment tool, an exploratory exercise, and a resource for evaluating circularity after project completion.

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Perspectives

Every adaptive reuse project begins with the vision of an initiator. The initiator could be a user searching for suitable living or working space, but more often, it is a real estate developer, a housing association, or an investor. For government parties, adaptive reuse is complex. Different rules apply, and both national and municipal policies are still evolving. Each actor involved in a project has their own principles, ambitions, and strategies. In adaptive reuse projects, it is noticeable that the most successful projects arise from collaboration between various parties. This section explores the perspectives of the different actors involved.

Architectural Adaptive reuse

Joost Ector

Remarkable about the renewed interest in architectural adaptive reuse is that we were hardly interested in them for so long, and now we categorise them as a specific type of project. For centuries, it was perfectly normal to use hard-earned and expensive building volume as long and as efficiently as possible. Many historical buildings testify to this practice, which, when you look at them closely, often reveal multiple layers of time and have a surprisingly varied history.

This standard practice ended under the influence of the modern myth of boundless possibilities, which also took a hold of construction and architecture. As a result, existing architecture was increasingly viewed as outdated, and new buildings became more monofunctional and temporary. The adaptive reuse of existing architecture was reserved only for evident gems or—in a low-quality form — to meet a space requirement quickly and cheaply. Many function-specific buildings, however, faced vacancy or even demolition after just a few decades.

In our time, we see a well-deserved correction to those past ideas, and—under the influence of modern insights into the necessity of circularity—reuse is once again becoming the norm. This is a logical and positive development, as it allows us to perhaps recover some of the damage caused by two hundred years of wastefulness. Some even advocate for a ban on demolition. It might not be a bad idea, especially considering the increasing space needs of a growing population. Since World War II, more building volume has been created in the Netherlands than in all the centuries before. Perhaps we should first do everything we can to use this volume effectively. This isn't necessarily a disadvantage, as adaptive reuse allows us to combine a sustainable future with unique architectural qualities.

21.1

Beyond the Throwaway Mentality

In *Architecture: From Prehistory to Climate Emergency* (2021)), architectural historian Barnabas Calder describes architectural history from the perspective of changing energy sources. For centuries, energy scarcity made building materials extremely expensive—so costly, in fact, that reusing existing buildings was the logical choice. Discarding a structure was considered irresponsible destruction of capital. When demolition did occur, materials were incorporated into new buildings or used for modifications to existing structures.

That changed during the Industrial Revolution. An apparently endless supply of fossil fuels suddenly provided substantial amounts of relatively cheap energy, making the large-scale extraction of raw materials and the production and global transportation of (new types of) building materials easily possible. This resulted in a significant increase in construction in the rapidly growing Western and colonial economies. A changing perception of the (future) value of real estate led to a shorter average lifespan for buildings. Cities and landscapes began to change more rapidly and on a larger scale. Gradually, buildings were no longer designed for eternity, making it logical and appealing to tailor them to a single specific function without considering future uses. This monofunctional approach led to a growing variety of highly specialised building types, which in the 19th century were routinely provided with facades in an appropriate architectural style.

In the modernism of the 20th century, short-term thinking in architecture reached its peak. At the urban planning level, there emerged a desire to organise space by function. Each function had its own typology, and functionalist thinking demanded that each type be given a distinctive architectural expression. By the end of the 20th century, the lifespan of an average building had decreased to just three or four decades, which was the maximum lifespan extended for its initial use. By the turn of the century, property owners, developers, urban planners, and architects commonly accepted the idea that disused or "worn-out" buildings would simply be demolished and replaced with new ones. New construction became the prevailing norm, driven by the illusion of endless space, materials, and energy.

21.2

Circularity as a Decisive Argument

Only about two decades ago, there were typically two common reasons for repurposing existing buildings. Either the structures possessed an undeniable charm or a culturally and historically valuable character protected by monument status, or a provisional transformation was considered a cheap and quick alternative—though, in hindsight, this latter conclusion was surprisingly rarely drawn. That we have, in just a few years, shifted from a 'new-build unless' mindset to a 'reuse unless' principle could be seen as revolutionary. Yet, as stated, it is in fact a return to an older, more logical order.

We are now acutely aware of the harmful consequences of our short-sighted throwaway culture. The real estate sector is by no means the sole culprit, but it contributes significantly to environmental and climate issues. An estimated 35% of global greenhouse gas emissions stem from the construction and operation of buildings (Buildings and Construction, n.d.). This is in addition to the damage inflicted on landscapes and ecosystems, caused both by the extraction of raw materials and the massive amounts of waste generated by the sector. As the global population continues to grow, we must adopt a consumption pattern that operates within the planet's ecological boundaries. Waste is simply no longer an option. We must begin to think in cycles—of circularity—powered by renewable energy and with respect for vulnerable ecosystems.

The construction sector must prioritize the development of highly energy-efficient or even energy-generating buildings with maximum lifespans. These buildings should be constructed using reusable materials or, preferably, from already used or renewable biobased resources. The latter could even be cultivated as new agricultural crops, simultaneously converting CO_2 into oxygen and sustainably storing carbon within our building stock. Achieving maximum lifespan means constructing in climate-resilient locations and designing structures that are optimally flexible in use and durable in the traditional sense. No more monofunctional structures, but architecture capable of accommodating a wide range of uses with minimal adjustments.

Even more effective, of course, is the efficient use of the existing building stock. The less material and energy we consume to equip existing buildings with new, sustainable functionalities, the greater our contribution to circularity and sustainability. Viewed in this light, transformation is not merely a logical choice—it becomes a societal imperative.

21.3

The Technical-Functional Challenge

Designing an adaptive reuse project is fundamentally different from designing a completely new building. An adaptive reuse project challenges imagination in a different way than starting from a blank slate. The task of fitting a new programme into an existing spatial context—often combined with the addition of new building volume—is inherently complex. There are almost always technical challenges: roofs and facades rarely meet the desired acoustic and thermal insulation standards, existing systems and installation concepts are almost never usable for function changes, and more stringent fire safety requirements will most likely apply (see Chapter ‘8. Fire Risks in Building Adaptive reuse and Energy Transition’).

Almost every adaptive reuse project is unique, making standard solutions often ineffective. This demands a profound, conceptual understanding of their craft from designers and a high level of creativity in finding unconventional but realistic solutions. At the same time, this need for customisation often presents excellent opportunities to escape the uniformity that unfortunately characterises so many new construction projects today.

A careful approach requires an intensive dialogue with the existing structure. This can only happen when an adaptive reuse project is thoroughly understood on all levels. This involves a comprehensive inventory of various aspects of the building or building ensemble and a deep analysis of the underlying design. Original design or construction drawings can often be used for this, although in practice there are often essential discrepancies between these documents and reality. Analysing the design can distil the logic of the building design and trace how different underlying systems such as construction, installation technology, escape routes, and flexible layout principle's function or have functioned. To effectively work with or adapt these systems, it is crucial to understand them.

Additionally, the building in its current state must be thoroughly analysed through visual inspections, measurements, and so-called destructive testing. This allows for the determination of the composition of floor, roof, and facade constructions, as well as existing installations and finishes. The expected remaining lifespan of all building components can be estimated. The actual strength of the structure can also be mapped as additional evidence of possibilities for, for example, vertical expansion.

Subsequently, it can be assessed which parts can be preserved as they are, which need to be repaired or replaced, and which are no longer suitable for reuse. From a circularity perspective, it is useful not to dismiss components that are not reused too quickly. The term demolition is no longer used in the construction lexicon; we now speak of urban mining. ‘Material scouts’ display admirable creativity in finding reuse opportunities for discarded construction products and materials.

It is advisable to finalise the Programme of Requirements for the adaptive reuse only after this preliminary research. Initially, it is better to work with a guiding quantitative and qualitative description of the intended ambitions, which can be easily adjusted if necessary. In any case, it is not useful to work with a highly detailed or rigid programme for adaptive reuse. It is better to allow for an ongoing interaction between the building and the ambitions throughout the design process. This approach helps prevent conflicts between the object and the adaptive reuse requirements from leading to cost-increasing solutions. The energy spent on futile attempts to reconcile incompatible principles is better directed towards reformulating the challenge into a starting point that naturally results in a coherent and synergistic project.

21.4

The Cultural-Contextual Challenge

Naturally, it is essential to understand how the object was conceived in an architectural sense, from urban integration and compositional design to the precise development of floor plans, sections, facades, and details. In this area, many fundamental questions arise. How do mass and space relate to each other, how does the spatial structure and routing function, how do they connect to the urban context, and how is the interaction between inside and outside conceived, for example, in terms of daylight and views? From which technical and aesthetic perspectives were colour and material choices made, and how were the details shaped?

This cannot be viewed separately from the cultural-historical context in which the design was created. Cultural-historical research, as is standard in restoration architecture, is also valuable for adaptive reuse, even when it concerns relatively recent buildings. Knowledge of the general cultural-historical context, the specific origin history of the object, and the ultimate meaning of the building leads designers to greater understanding and – just as importantly – more inspiration. This certainly does not mean that a new future must always follow the trajectory of the past or that the two must seamlessly blend. It simply means that design choices can only be truly well-founded when the existing is properly valued.

In the adaptive reuse of monumental buildings, thorough research is obvious, and in many cases, it will become clear that a high monumental value leads to further limitations in flexibility. Unfortunately, this often discourages many clients. Usually, this is unjustified because there is a significant added value in return, and only monuments of the utmost cultural-historical importance truly need to be preserved. In the vast majority of cases, such a "freezing" is not necessary, and preference is given to a respectful and carefully integrated new use. In fact, buildings of cultural-historical significance benefit from a living future.

But even with buildings, both old and relatively new, that lack monument status, cultural-historical research can be enlightening. Those who take the time to understand the choices of the original client and architect can truly grasp a building's essence. Surprisingly often, qualities are not immediately apparent, and what initially seems "unremarkable" turns out to be far more interesting or full of potential than first assumed. For designers, this offers an appealing starting point: a fascinating foundation that serves as inspiration for new interventions, allowing them to relate to the existing structure in an equally meaningful way.

However, circularity as a driving force will also mean that we should want to give buildings without special architectural or cultural-historical value a second life. This category may pose the greatest challenge for a designer. How can you create added value while retaining as many parts as possible of an uninteresting or perhaps even poorly designed building? It’s a difficult task, and sometimes maximising usable floor space and sustainability is the best outcome. Still, it is always worthwhile to search for solutions, and not to rule out radical interventions. Sometimes, the most restrictive conditions lead to the ultimate discovery, as spectacular examples have shown.

21.5

Contrast or ‘aemulatio’?

At the core of designing an adaptive reuse project lies a fundamental choice about the intended relationship between the existing structure and the new additions. This choice is fairly binary, as hybrid variants usually prove unsatisfactory. A frequently chosen strategy is to create a clear or even sharp contrast between the old and the new.

In many stimulating examples of adaptive reuse, contrast naturally becomes the essence of the project. Sometimes, the original and the new functions of the building are worlds apart, such as housing in a former factory or church. There may even be a paradox, such as a hotel in a former prison. Sometimes, the materials or artisanal construction methods that characterise the original are no longer available, unaffordable, or their reuse would be considered ‘kitsch.’ Designers often choose to extend such functional, spatial, or technical contrasts into a contrasting design language between the old and the new. Since the twentieth century, adding or expanding with glass and steel has become part of the standard repertoire for adaptive reuse and restorations, along with intentionally keeping new elements visually and structurally distinct from the existing.

Of course, there are more ways to explore contrast. Contrast can also be achieved with other, strikingly different materials, as we increasingly see when wood is used on a large scale in the adaptive reuse of industrial heritage. A pronounced difference in the use of colour can also be effective. The extreme form of contrast in some designs is achieved by allowing the new to intrude on the existing in an almost aggressive manner, where the old is, in a sense, overgrown or overwritten by the new.

In more recent adaptive reuse projects, however, a development can be observed where architects aim for greater continuity in material choices and design language, seeking alignment with the architectural essence of the existing structure. This approach can be compared to the concept of *aemulatio*, which has been present in rhetoric since the Renaissance and represents a third option alongside *imitatio* (imitation) and *translatio* (translation). In *aemulatio*, the goal is not to literally continue or transform the existing, but rather to surpass an admired example in an informed and creative manner.

This is no easy task for architects. This ambition requires them to possess a deep stylistic knowledge and sensitivity, along with the skill to design a tasteful, contemporary continuation based on that foundation. There are no standard formulas for this approach; in fact, a designer must constantly learn a new language or a specific dialect. It takes considerable talent, study, and patience to be ready for a public presentation of such work.

It is no coincidence that successful examples of this design approach are particularly appealing. They are tasteful, subtle, and harmonious. Moreover, they provide abundant intellectual inspiration, as the old and new begin to reflect on each other, creating a dialogue where architecture celebrates architecture. A stronger form of synergy is almost unimaginable.

21.6

Quality in Adaptive reuse

As with all construction projects, quality in adaptive reuse can take many different forms. Ultimately, two simple questions are relevant when assessing adaptive reuse projects. First: have the opportunities presented by the combination of the existing and new elements been optimally realised? This involves various aspects such as construction quality, circularity (including energy consumption), functionality, and economic feasibility or return on investment. The following focuses on architectural quality. Here, the subsequent question is equally important: does the result manage to surprise and convince?

In the most striking examples of adaptive reuse, the change in function is clearly recognisable, and unique forms of architectural added value emerge, which are exclusive to adaptive reuse. Consider, for example, the specific spatiality of the original building, such as the extra ceiling height often found when transforming industrial buildings into residential spaces. Added value can also arise from a highly specific atmosphere created by juxtaposing a new use in an originally different context, like a sacristy in a former church or an old warehouse.

This added value might also stem from the presence of materials and details that are not immediately associated with the new function, as is often the case in the repurposing of industrial heritage. A special value is further enhanced by the presence of ornamentation—an architectural element that is almost entirely absent in new construction projects.

As mentioned, a conversion of a building must ultimately be convincing. The persuasiveness of the result is primarily derived from a sense of inevitability, which requires creativity, craftsmanship, and talent from all involved parties. For the architect's role, this naturally involves design quality and taste. But it also concerns whether the architect, together with the design team, has addressed all design challenges—both spatial and technical—with great ingenuity or skilfully circumvented them.

Lazy, thoughtless, or forced interventions are quickly exposed and will be intuitively noticed even by less experienced users. Persuasiveness also relates to execution; the designed quality only truly comes to fruition when the builders realise the design with the necessary craftsmanship and attention, which can be especially crucial in the case of less conventional design solutions.

Surprise, whether through contrast or the unexpected absence of it, is a common thread in architectural adaptive reuse.

21.7

History, Identity, and Story

The hardest yet most interesting and unique quality to define is the added value of history. Whether that history spans centuries or just decades, it gives an existing building an implicit sense of place. Existing buildings have earned a place for themselves, not only in physical space but also in time and in the collective memory.

Every building is a product of its time. Even architecture that aims for timelessness does so in a way that unmistakably dates it. Buildings tell us something about their creators, about the people for whom they were built, and about the ideas of the time when they were conceived. They speak to how people lived, worked, produced, and spent their leisure. Indirectly, they also reflect political and social dynamics, the state of craftsmanship and technology, fashion influences, beauty ideals, and much more. Buildings with a long history have often been revived more than once, allowing them to tell stories from different eras.

In short, buildings are physical reflections of the time and culture in which they were created and later revived. They serve as living memories of a shared past, fulfilling an important societal function. The value of this becomes evident in young cities with a limited history or in cities where layers of time have been erased due to unfortunate circumstances. Communities are deeply attached to their familiar surroundings, which play a significant role in shaping their identity. This is a key reason why adaptive reuse is so appreciated by the public.

Choosing adaptive reuse, therefore, also means taking responsibility and showing commitment. Investing in a new phase of life for existing architecture, whether by enhancing positive values or turning negative aspects into positives, always garners enthusiastic responses and goodwill.

And finally, there are the stories: it is both tempting and enjoyable to imagine what took place before your arrival in your new apartment or workspace, or in the place where you shop or attend a performance. This stimulates our imagination and gives us a sense of continuity—a realisation that our own existence is part of something larger, an ongoing story that sometimes takes surprising turns. A place with patina and a soul offers comfort, grounding our existence and, along with that environment, perhaps providing, against all logic, a small glimpse of immortality.

FIG. 21.1

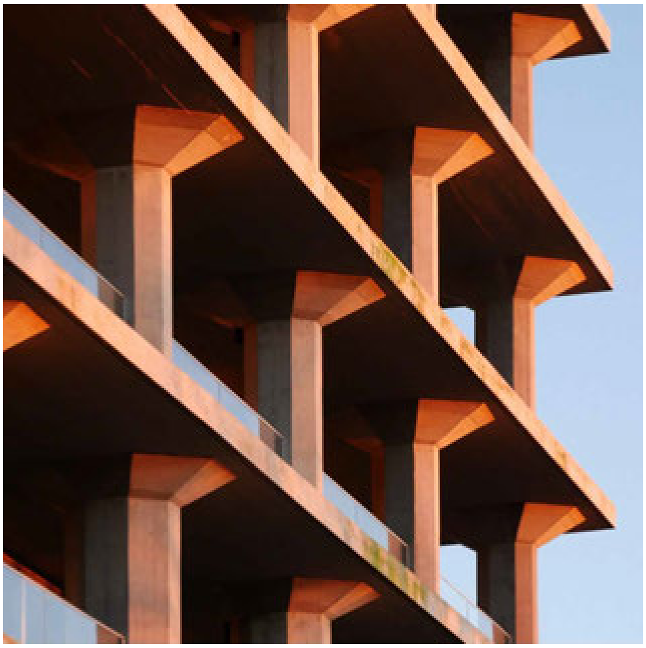

FIG. 21.2

FIG. 21.3

FIG. 21.4

FIG. 21.5

FIG. 21.6

FIG. 21.1 **Westerlaantoren, Rotterdam. Architect: Ector Hoogstad Architecten**
The structure of this former office building was optimally reused by adding five lightly constructed high floors and transforming the upper half of the building into residential apartments.
Source: Ector Hoogstad Architecten, z.d.

FIG. 21.2 **De Meelfabriek, Leiden. Architect: Studio Akkerhuis**
Instead of an enclosing facade, this 1896 flour factory in Leiden has been given recessed glass facades, making the beautiful concrete structure a defining visual feature.
Source: Ubo van Dijk, 2024

FIG. 21.3 **Frøsilo, Copenhagen. Architect: MVRDV**
When it proved impossible to create enough window openings in the concrete silos, it was decided to place the residences not inside the silos but to hang them on the exterior.
Source: MVDRV, z.d.

FIG. 21.4 **Student Housing, Paris. Architect: TVK**
Through the intelligent addition of galleries, which also function as balconies, an otherwise unremarkable office building in Paris was transformed into a beautifully transparent residential complex for students.
Source: Julien Hourcade, z.d.

FIG. 21.5 **Suikerunie, Breda. Architect: EVA Architecten**
This office building designed by Wim Quist for Cosun (formerly Suikerunie) seems to have always anticipated a future as a residential building.
Source: Sebastiaan van Damme, z.d.

FIG. 21.6 **Pillows Hotel, Amsterdam. Architect: Office Winhov**
A former laboratory building was transformed into a hotel and expanded with a new section that serves as a homage to the existing 19th-century facades.
Source: van Rossum, z.d.

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Adaptive Reuse from the Developer's Perspective

Experiences from Practice

Roderik Mackay

In adaptive reuse projects, the developer plays a key role as the initiator of the project, and for a developer, an (inner-city) adaptive reuse project is one of the most challenging. This chapter provides an overview from the developer's perspective on the most relevant aspects of real estate development, continuously linking it to adaptive reuse projects and the author’s experiences. The aim is to give readers a deeper understanding of both the versatility of the development profession and the additional challenges posed by adaptive reuse projects.

Topics covered include the real estate cycle, acquiring a project, valuation, financing, the role of the government, the role of the architect and consultants, the product-market combination, risks, and profit models. Specific conclusions are drawn, and recommendations are provided for parties interested in initiating an adaptive reuse project.

22.1

Introduction

The developer plays a central role in the realisation of projects and is involved with all factors and actors in the real estate development process. A developer must be a jack-of-all-trades, capable of overseeing and understanding the legal, planning, political, fiscal, technical, architectural, environmental, financial, and commercial aspects of a project, along with their mutual impacts. An (inner-city) adaptive reuse project is often more challenging than a new construction project.

The role of the developer in an adaptive reuse project often differs from that in a new construction project. New construction typically begins with a tender process or competition, where a project is roughly conceived in advance, and the developer is bound by the promises made during submission. In contrast, an adaptive reuse project usually begins when a developer or investor takes the initiative to purchase an old building at their own expense and risk. In many cases, a plan and business case for various development scenarios must be created in a very short time to justify a bid. Additionally, other elements and risks play a crucial role, such as the condition of the building, the presence of asbestos, the existing structure, ongoing lease agreements, existing arrangements with the municipality, changes to the zoning plan, and neighbours who are attached to the current situation.

22.2

Position in the Cycle

The real estate market has a cyclical nature: approximately every seven to ten years, the market moves from a low point to a high point, and then back again. The full cycle, from peak to peak or trough to trough, can take a long time. Various events can trigger the start of a downturn in the market cycle. The most recent (financial) crises that had a significant impact on the Dutch real estate market were the dot-com bubble (1997–2001) and the credit crisis (2007–2011).

The timing within the cycle of acquisition, tendering, and sale is crucial for the (financial) success of a project. Currently, we are also during a (real estate) crisis, triggered by rising costs due to inflation, housing rent regulations, significant interest rate increases, and financial uncertainty for investors. Since initial yields (the return on a real estate investment at purchase, expressed as a percentage of the purchase price) are directly tied to interest rates, the rise in interest rates has led to higher initial yields and a sharp decline in property values.

This situation puts property owners under pressure but simultaneously creates opportunities for opportunistic investors who are willing to invest risk capital in real estate.

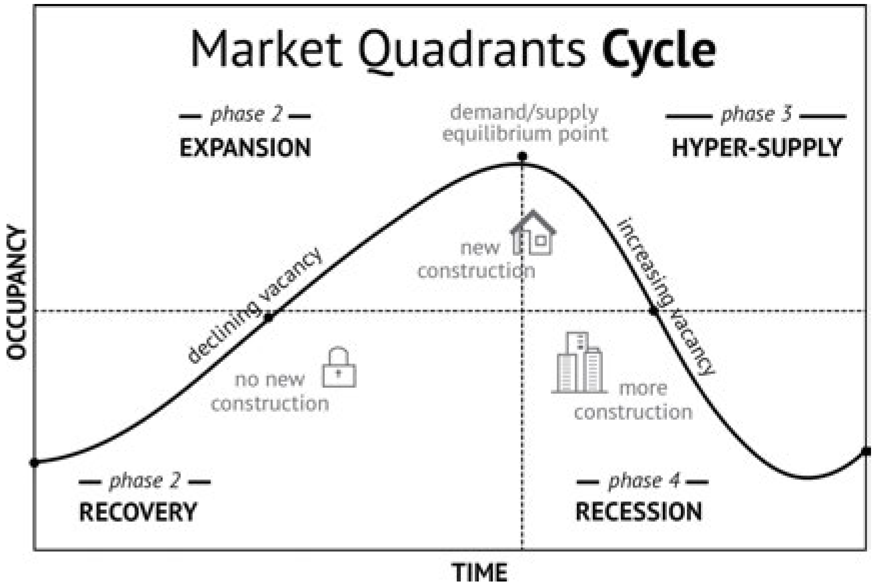

FIG. 22.1 **Real Estate Cycle**
Source: Mueller, Real Estate Finance 1995

FIG. 22.1

It generally takes some time before asking and bid prices align, during which transactions nearly come to a halt. The position in the cycle can be gauged primarily by the number of transactions, but also by transaction prices and the speed of sales.

Other cycles are also recognisable as direct consequences of the real estate cycle. For example, the number of building permits issued, and construction orders tends to be lower in a declining market. However, these cycles respond with a delay. When transactions come to a standstill, many builders are still working on ongoing construction projects. The number of new orders will drop significantly, but the impact on the order portfolio is only noticeable a few years later. The same pattern applies to orders for consultants and architects, as well as land prices and leasehold grants from municipalities.

For adaptive reuse projects, the position in the cycle is more critical than for other projects. This is because the developer of an adaptive reuse project is always dealing with the cycles of different submarkets. The maximum financial result is achieved when an office building slated for adaptive reuse is purchased at a favourable point in the office market cycle and the residential units are sold at the most advantageous moment in the housing market cycle. Therefore, a developer involved in adaptive reuse projects is expected to have insight across various submarkets. Unfortunately, these cycles are not easy to predict.

22.3

Acquisition of a Project

The property owner or developer is the initiator of a project. The timing of initiation depends on how the developer acquires the project. For developers, there are three ways to acquire a project: through the purchase of an existing property, participation in a tender or competition, or by forming a partnership or joint venture with other parties, such as investors or municipalities:

- Taking a risk by purchasing an existing building or land.
- Winning a competition or tender, where the building or land may or may not be purchased at risk.
- Being approached by the owner of a building or land to work on commission for a fee.

Competitions and tenders are often organised by municipalities and usually involve new development projects. Some developers specialise in winning tenders and employ tender teams for this purpose, such as large (area) developers. It is rare for adaptive reuse projects to be tendered, although municipalities sometimes offer an old school building or similar property for sale.

An adaptive reuse project often begins when a developer or investor takes the initiative to purchase an old building at their own expense and risk.

Adaptive reuse projects typically arise after a private transaction, meaning a private party buys a building from another private party. If the purchasing private party is also a developer, they will undertake the development themselves and assume the full risk. This is called fully risk-bearing development, as the developer bears all the risks related to both the purchase of the land or building and the development process itself. In some cases, a private party may be able to purchase a building for adaptive reuse at their own risk but lacks an in-house development company. In such cases, they will hire a developer to carry out the development on their behalf. These developers execute the project for a fee and possibly a performance-based bonus. The fee is calculated as a percentage of the construction or total project costs or as an estimate of the hours worked multiplied by an hourly rate. This method of collaboration is also known as delegated development or fee development.

22.4

Valuation

The method and timing of valuation are crucial for redevelopment. Earlier, we discussed the relationship between the initial yield, and thus the value, and interest rates. This provides insight into the current value if a transaction were to occur now. However, a development project often has a lead time of around five years before construction begins. When a developer is working on a project, they must make a prediction about the value of the project at the time of sale. That is the moment when the value is critical to the business case, while in the meantime, the value is influenced by both the market cycle and the indexing of costs and revenues.

In addition, the book value of the property plays a role, particularly in a fiscal sense. The method of valuation can vary significantly depending on whether the historical cost is used as the valuation basis or if the property is valued at market value. In the case of the latter, the valuation will be based on appraisals, which for a project are primarily determined by the projected sales value and the estimated construction costs.

The difference ("residual") between the sales value on the one hand and the construction costs and additional expenses (such as fees for permits, consultants, financing, etc.) on the other is referred to as the residual land value. This is the most important guiding factor for the developer. Since the developer aims for profit maximisation, they will always seek the highest residual land value with the lowest risks and shortest lead time.

Because an adaptive reuse project has a long lead time and involves not only planning costs but also ownership and financing costs, it is beneficial for the business case if additional income can be generated. This can be achieved by keeping the current tenant as long as possible or by temporarily renting out the building. This (temporary) rent also represents a value.

The value of a (to be transformed) building can be divided into three elements:

- The (net present) value of the remaining rental income stream.
- The (reconstruction) value of the building itself.
- The (residual) value of the land.

The value of the remaining rent refers to the total remaining contracted net rental income until the end of the lease agreements. However, the owner still faces ownership costs (such as taxes) and costs to maintain the building for rental purposes (maintenance, management). The remaining net contract value is calculated by multiplying the number of years by the rent, minus the total ownership and rental costs. These cash flows then need to be "net present value," meaning the future cash flow is discounted to reflect its value today. Over time, the value of the euro decreases, so for each future year, the cash flow must be discounted using the developer's discount rate. This discount rate is typically equated to the Weighted Average Cost of Capital (WACC), which represents the average cost of equity and debt. The total net present value of the rental income stream is the value assigned to the remaining rental income.

The second value element is the value of the building itself, or the "bricks." There are several ways to determine this value. One approach is to assess the value based on the reusable components of the building. In the case of redevelopment, this is often the value of the building's structural core (foundation, columns, walls, floors, and beams). If we were to rebuild it from scratch (including the foundation), those costs can be attributed to the building as its "residual value." Another method is to consider the reconstruction value, which is the total cost of rebuilding the total building in a similar state. The safest approach is to evaluate the building's value from all these different perspectives and arrive at a weighted value that can be justified from each angle.

Finally, we assess the value of the land, which generally represents the highest value of the three elements. This is done through an analysis of the residual value, ideally across various development scenarios. For example, when purchasing an office building, the costs and revenues of a renovation scenario, an adaptive reuse scenario, and a demolition-new build scenario are calculated. Each scenario accounts for different values, costs, risks, and timelines. The developer will always aim for the "highest and best use"—the most valuable use of the land. Another approach to land valuation is to look at the market value, meaning the price that would be paid on the open market for a similar building in a comparable condition and location (adjusted for the net present value of the remaining rental income and the value of the building). The advantage of this method is that it incorporates the current market situation and the position in the cycle at the time of valuation. Lastly, one can consider the land prices set by the municipality when releasing new land. As with the building valuation, the best method for determining land value is to examine it from all different perspectives and arrive at a weighted value that can be justified from each angle.

22.5

Financing

The way a project is financed has a significant impact, not only affecting the (financial) feasibility but also the time pressure on the project. Financing is used for two main reasons: to create the effect of leverage (using loans to increase returns on an investment) and/or to reduce the capital commitment of the owner/developer. In recent years, with low interest rates, the leverage effect was highly beneficial for both investors and developers.

As of 2023, however, due to rising interest rates, the leverage effect is negligible. The variable interest rate (around 4.0%) plus the margin (3.5%) for development financing is roughly equal to the return requirement on equity (about 8.0%). Therefore, the only reason to finance projects is to reduce the capital commitment, although the owner/developer must pay substantial costs for this. In addition to interest, financing costs include various fees for closing, releasing, and making the financing available.

Different parts of a project can be financed: the acquisition of the land, development costs, construction costs, and/or the total costs. The more components a developer finances, the higher the total leverage on the project, and consequently, the higher the financing risk. The acquisition is typically moderately financed, with around 50% loan to cost (LTC), which is the ratio of the loan to the total costs. Acquisition financing is easier if the building to be transformed is still leased for a few more years, as the lender has more certainty that interest and repayments can be covered by rental income. If the building is vacant, the owner/developer will need to provide other forms of security to assure the lender that the financing costs can and will be paid. Often, the acquisition is financed together with part of the development costs through a development loan. For example, 50% of all costs up to the start of construction might be financed this way.

Construction can be financed if certain conditions are met. For instance, there must, of course, be an irrevocable building permit and a construction contract for an all-in and fixed-price construction sum. Additionally, it is important to have certainty about the lease of the project. In the case of a retail or office project, it is often required that the building is partially pre-leased. For a residential project, this is usually not required, as it is assumed (in the current market) that the homes will always be leased out. Lastly, it is important to have certainty, or at least a plan, for the investment phase after completion: who will buy the project or take it as an investment, so that the construction financing can be repaid?

It is therefore logical to arrange the investment financing for a period of two to three years at the same time as securing the construction financing. This ensures that both the developer and the financier have sufficient funds ("funding") available after completion.

In the past ten to fifteen years, many projects have been structured in a so-called purchase-construction contract model, where it is assumed that the end investor (the one who operates the building after completion) finances the construction. This method of funding is known as "forward funding." In the case of an adaptive reuse project, the end investor buys the old building from the developer, along with all plans and a building permit for the new project to be realised. This has a tax advantage, as only transfer tax (10.4%) is payable on the purchase of the land and existing building, and not VAT (21%). Additionally, many investors prefer to have a contract solely with the main contractor during the construction phase, without involving the developer.

The effect of this separate purchase-construction contract structure is that it essentially acts as leverage for the developer. If the developer also financed the acquisition, this creates double leverage in the project, which significantly impacts the risk to the equity invested in the project. This structure is often chosen in adaptive reuse projects converting offices to residences, with moderate leverage of around 50% on the acquisition, as the risk profile suits the private parties that typically initiate such projects.

This method of financing a project is quite different from the financing of new construction projects on (municipal) land. In those projects, usually, only an option fee is payable on the purchase price of the land, and the land is only transferred (and thus paid for) once the building permit is irrevocable. In such cases, only the planning costs required to obtain the permit are fully invested at risk. This type of structure is well-suited to large developers and development-oriented contractors, as it allows for the development of many projects simultaneously with relatively low capital commitmen.

22.6

Role of the Government

The government plays a crucial role in projects. Firstly, it controls the spatial planning process, from structural vision to zoning plans and the necessary building permits (see chapter "3. Legal Framework"). Secondly, part of the (housing) market is regulated by the government, with a range of rules concerning rent, rent increases, and sales of properties. Thirdly, municipalities have specific regulations for the development of housing, offices, and retail spaces, which vary by location. For example, housing regulations may dictate housing segmentation and the minimum floor area per type of dwelling. Additionally, parking regulations, which have a significant impact on building developments, are also governed by such rules.

Additionally, the municipality has interests at different levels. At the highest level of abstraction, city development (economically, demographically, etc.) is a key ambition. For economic development, for example, there must be sufficient employment opportunities, which in turn requires adequate business spaces and offices. At the same time, the residential and living environment must be attractive enough, necessitating the construction of suitable housing. One abstraction level down, at the neighbourhood and district level, there must be adequate facilities such as schools, sports facilities, and shops, all of good quality. Furthermore, the quality of public spaces and infrastructure needs to be appealing. Finally, the municipality needs to balance its own budget, partly relying on revenue from real estate projects. This includes not only land sales but also 'air rights' (rights to build upwards), leasehold, and fees and taxes, all of which contribute to the municipal finances.

Politics also influences the ambitions of the municipality, not just in terms of content but also procedurally and practically. It is well understood that the composition and political alignment of a council affect the agenda. However, what not everyone realises is that, during each four-year administrative term, there are effectively only two years during which projects can make significant progress. In the first year, officials are settling in, and election programs and coalition agreements need to be established. In the last year, there is little to gain for a new project since any benefits will be reaped by a successor. Political activities already start gearing up for the next election period. Only the two years in between are truly productive.

Finally, experience shows that the greater the importance of a project for the municipality, the better the cooperation from the municipality. This cooperation can manifest in several ways. Firstly, it is crucial for the developer that the municipality shares the same vision for the development of a building. This includes not only the functions but also the rules, volume, access, green space, urban planning integration, parking, and transportation, etc. Secondly, it is important that the municipality is willing to collaborate in the project's realisation. If there is no willingness, the process will be arduous. As mentioned, there are numerous elements over which the municipality has influence. Thirdly, it is important that the municipality can collaborate in the project's realisation. During prosperous periods in the real estate market, many civil servants move to commercial sectors, leaving the civil service understaffed, while at the same time the number of initiated projects, and thus the pressure on the administrative apparatus, is high.

22.7

Role of the Architect, Advisors, and Contractor

In every project, a crucial role is played by the architect and all other advisors (such as the structural engineer, installation consultant, landscape architect, urban planner, as well as legal and tax advisors). The success of a project is largely determined by how this design team is assembled, collaborates, and is managed.

The selection of the design team can occur in two ways: either through a competitive selection process (request for proposals) or by the developer directly selecting parties without competition. The most creative disciplines, such as architecture, urban planning, and landscape architecture, are often chosen through a selection process, while other advisors are more frequently selected based on relationships and/or availability.

For adaptive reuse projects, it is crucial that all advisors have the necessary experience with adaptive reuse. Adaptive reuse is fundamentally different from new construction for all disciplines, and a lack of experience will negatively impact both the process and the final result.

The starting point for an adaptive reuse project is an existing building. The design team must understand the (im)possibilities of reusing and adapting the existing building, not only from a structural perspective but also concerning installations, access, apartment layouts, and facades. Proper decisions can only be made if there is also immediate and effective advice on spatial planning aspects: what impact does a particular choice have on the (modification of the) zoning plan, permits, and parking standards? The same applies to fiscal and legal aspects; every choice affects the fiscal structure, given the different regimes for old and new buildings. If a project is structured as a separate purchase-contract arrangement, where all (design) risks are transferred to the contractor, each design choice directly impacts the contractor's risk profile and must be considered in advance in terms of how this can be legally mitigated.

The role of the contractor in adaptive reuse projects is different from that in new construction projects, depending on the task and the choice of the owner/developer as the client. Firstly, in an adaptive reuse project, construction does not start from a blank site but involves renovating an existing building. This means that some dimensions may need to be determined on-site because the building was not constructed exactly according to the drawings. Or adjustments might need to be made in different places because the structure differs from what could be derived from the old construction drawings. Taking on the design responsibility from the developer can be risky for the contractor. Secondly, the contractor does not fully construct the building themselves but modifies an existing one. The contractor will want to guarantee their own work but will not easily take responsibility for the pre-existing structure. Complete ‘turnkey’ guarantees are often more challenging to provide in such cases.

Complete 'turnkey' guarantees are therefore less common in adaptive reuse projects. To manage risks and limit the risk margin, it makes sense to involve contractors in the construction team (a continuation of the design team) for adaptive reuse projects and to involve them from stages like preliminary design (VO) or developed design (DO). The major challenge in such a collaboration is to make good agreements on pricing, contract formation, and exclusivity

22.8

Product Market Combination

The temptation exists to start the adaptive reuse of a location by focusing on the opportunities, limitations, and constraints offered by the existing building or site. For instance, an office building with a long, rectangular floor plan, featuring a single corridor and stairwells on either side, is physically ideal for transforming into student housing or studios, resulting in an efficient design. However, if the building is located in an area where there is no demand for or need for student housing, this development scenario is not feasible. Finding the right match between the type of housing (the product) and the market demand is the most crucial task for a developer when determining the development strategy.

Start by determining the specific product-market combination for the specific location; what type of housing (or other real estate) should we develop for which target groups?

Market Analysis: Where is the demand? Which target groups? How large are these target groups? Is there a need for purchase or rental? What can these target groups afford? How is the purchase or rental financed? Then translate this into a commercial Programme of Requirements.

Product Analysis: How large should the housing units be? How many rooms, and what kind of outdoor space? What amenities should be included in the building? What are the requirements for parking cars, (cargo) bikes, and scooters? Translate this into a functional Programme of Requirements.

Recently, there has been a growing trend towards mixed-use functions within buildings. For example, the ground floor of a residential building is often occupied by non-residential functions, such as facilities, commercial or community functions. Additionally, entire mixed-use projects are being developed, which may include a portion of office space, residential units, and facilities. In such cases, different product-market combinations can complement and enhance each other.

If the product-market combination is not fully clear and detailed (in, among other things, a commercial and functional Programme of Requirements), all subsequent decisions and choices will be much more difficult to make. Therefore, the start of the adaptive reuse process is essentially no different from how any other project developer would approach a development site; only the tendency to approach it differently is much greater.

There are tools available that can help determine a development strategy, such as the Transformation Meter developed by Rob Geraedts, Theo van der Voordt, and Lizanne Espinal (see Chapter 11: Transformation Meter for Offices).

22.9

Risks

Project development largely revolves around risk management. Much has been written about this (e.g., the risk checklist in the Transformation Meter). This chapter will only provide an overview and highlight the differences between adaptive reuse and new construction.

Risk management becomes clearer when using a "framework," a model that serves as a tool. One such model is the "pizza pie model," which originated from the former TCN (formerly Trammel Crow Nederland). This model divides risks into five key areas: Land & Building, Permits, Concept & Product, Feasibility, and Financing. These are the "pizza slices" in a circular diagram. The various phases of a project development are then distinguished: Acquisition, Due Diligence (research related to the purchase), Contract Formation, Preparation, Realisation, and Management. These phases can be represented as rings in the circular diagram. This creates an overview of the main risk areas in the distinct phases of a project. For an adaptive reuse project, the management phase during development should also be included. Additionally, sales should ideally be added as either another "pizza slice" or another ring.

22.10

Revenue Models

The way a developer acquires projects (as discussed above: purchasing independently, winning a tender, or being invited) largely determines the developer's revenue model. If the developer assumes full risk for the purchase, they will also be entitled to the largest portion of the project profit, possibly shared with an investor participating in the project. Winning a tender generally involves the same principle, though the risk and thus the profit margin for such projects are often constrained by the tender conditions. In such cases, these projects generally require less capital commitment (for instance, by using option fees for the land), and therefore a lower profit margin can be acceptable. If the developer is asked to develop a project on behalf of an owner, various revenue models are possible. The most commonly used model is a fixed fee for the work, plus a performance-based component. This latter part could take the form of a stake in the project company or a bonus.

22.11

Conclusion and Recommendations

In several key aspects of project development, an adaptive reuse project is even more challenging than a new construction project. The developer deals with different sub-markets and their associated real estate cycles for acquisition and sale. Projects cannot be won through tenders but must be acquired through commercial, often private transactions. If the development is entirely risk-bearing, the projects are capital-intensive. If both acquisition and construction are financed, there is double leverage and a high risk to equity. Additionally, the developer takes on extra risks by taking over the ongoing operation of an existing building. Otherwise, adaptive reuse projects are not necessarily riskier than new construction projects. The value of an adaptive reuse project must be considered from various elements to achieve a sound valuation. The success of the development largely depends on clearly defining the product-market combination in advance and on the specific experience of the design team and other advisors. Finally, we must be aware that transforming an old building will involve various unforeseen issues.

Here are five recommendations:

1. Be aware of the positions the project will take in the various cycles, including those of asset classes (offices, retail, residential, etc.) for buying and selling, as well as those related to financing, procurement, and leasehold.

2. Do not underestimate an adaptive reuse project; there are at least as many examples of failed adaptive reuse projects as there are of successful ones. Both the investor and the developer, as well as all advisors, must have sufficient specific experience to successfully complete an adaptive reuse project.

3. The capital structure and financing are a crucial part of an adaptive reuse project. Develop a comprehensive financing plan that provides enough flexibility in terms of time and resources.

4. The role of the government has a significant impact on the project and the process. Ensure there is interest from the municipality to cooperate on the project and do not underestimate the complexities of regulation and segmentation.

5. Ensure sufficient contingency provisions, both in terms of time and money. One thing you can be certain of in an adaptive reuse project is that you won’t know everything in advance!

The Role of Housing Associations in Adaptive Reuse to Housing

Gerard van Bortel

The adaptive reuse of buildings is not a real estate activity that just any party can undertake. It requires knowledge of the market, technical and financial expertise, understanding of housing operations and renovation, insight into the local housing market, and neighbourhood liveability. Additionally, funding is necessary for acquisition, adaptive reuse, and management. Housing associations are organisations that, due to their objectives, market role, and competencies, are well-suited to undertake these adaptive reuses. However, housing associations are special organisations. Over the past decade, their role has shifted from being an actor with a broad mandate and a wide range of real estate activities to a position with a greater focus on housing low-income tenants and households in vulnerable positions in the housing market. Adaptive reuse of real estate into residential units is still possible for housing associations, provided it aligns with their legal possibilities and their own objectives.

23.1

Housing Associations: what kind of organisations are they?

Housing associations are private, not-for-profit entities that carry out (semi-)public tasks in social housing. Their primary role is to contribute to good and affordable housing for households that cannot adequately provide for themselves on the regular housing market. Housing associations operate within the framework of the 2015 Housing Act as so-called Approved Provider ('Toegelaten Instelling'). The activities of housing associations are further elaborated in the Regulation on Admitted Institutions for Social Housing 2015 (Dutch Acronym: BTIV). A housing association can generate profit, provided that it is used in the interest of social housing. The legal forms are exclusively a foundation or an association. Housing associations collectively own approximately 2.3 million homes. A large portion of these were built after World War II, are generally well-maintained, and are also reasonably up to date in terms of housing specifications. However, some of the housing stock requires significant investments in quality improvement and sustainability. In some cases, the necessary investments for housing improvements are so high that new construction becomes more attractive. Demolition and replacement with new construction often offer the opportunity to increase density by adding more homes. However, demolition is increasingly controversial as it leads to fewer affordable homes in the short term and the reuse of demolition waste is still limited. This is precisely why the adaptive reuse of existing buildings is so appealing.

Since the revision of the Housing Act in 2015, the activities of housing associations have been divided into Services of General Economic Interest (SGEI) and other (non-SGEI) activities. The commercial activities of housing associations are now limited and must be separated from their core task of housing vulnerable groups. This change was necessary to comply with European state aid rules and affects the ability of housing associations to transform real estate into housing. For example, the realisation of owner-occupied homes or commercial real estate is now only partially possible. This applies to both adaptive reuse and new construction.

Housing associations are eligible to engage in adaptive reuse due to their objectives, market role, and competencies.

The Housing Act 2015 stipulates in Article 45 that housing associations may only be active in the field of social housing. This task description remains quite extensive, as summarised below.

Summary of Permitted Activities for Housing Associations According to Article 45 of the Housing Act 2015

Construction, Purchase, Allocation, Rental, Maintenance, Renovation, Sale, and Demolition of residential properties and buildings with social or commercial functions.
Performing Necessary Tasks related to the aforementioned activities.
Providing Services to housing cooperatives to whom the social landlord has sold properties, and supporting individuals who wish to start a housing cooperative.
Contributing to the Liveability in the immediate vicinity of the housing association's properties or for the benefit of the tenants of those properties.

Housing Cooperatives

A new element in the Housing Act 2015 (see point in the summary above) is the support for housing cooperatives (not to be confused with housing associations). Residents who want to start a housing cooperative, for example by jointly purchasing and/or managing rental properties, can seek support from their housing association. This support is still relatively rare. Most realised examples involve management cooperatives, where the properties remain owned by the housing associations.

The BTIV 2015 outlines (in Article 47) additional conditions for the activities mentioned above but also specifies which activities are not within the scope of housing associations' tasks (see Table 23.1). It is quite unusual to prescribe what an organisation is not allowed to do, but this is explained by the history of housing associations. Especially during the period from 2000 to 2010, housing associations engaged in many commercial (real estate) activities with the aim of creating social value. These activities sometimes led to significant financial setbacks and competitive advantages over market players, and occasionally even to conflicts of interest, abuse of power, and fraud. In 2014, the Parliamentary Inquiry Committee on Housing Associations published a report on this.

TABLE 23.1 Summary of activities not part of the tasks of housing associations (Article 47, BTIV 2015)*

Contributing to liveability outside their own housing	Mortgage advising and brokerage services
Services that can be provided by utility companies	Providing financial resources
Care services, meal services, and medical services	Offering or mediating insurance
Operating a radio or television broadcaster	Providing pre-school, after-school, and holiday care
Providing training	Offering assistance in preventing school dropout
Cleaning housing units	Providing support for child-rearing
Interior design	Offering services for homeowners

** Exceptions may apply to some provisions.*

Characteristics of Housing Associations

The housing sector in the Netherlands owns approximately 28% of all homes. This share has decreased in recent years as housing associations sold and demolished more properties than they constructed. Additionally, the number of owner-occupied and rental homes in the commercial sector has increased more significantly, leading to a decline in the share of homes owned by housing associations. The organisational size of housing associations can vary widely (see Table 23.2).

TABLE 23.2 Characteristics of Housing Associations; Reference Date December 31, 2022

NUMBER OF HOUSING ASSOCIATIONS	**280**	
Housing Associations by Size		
< 2.500 vhe's	75	27%
2.501-5.000 vhe's	56	20%
5.001-10.000 vhe's	75	27%
10.001-25.000 vhe's	56	20%
> 25.000 vhe's	18	6%
Total Number of Social Rental Homes (DAEB) (2021)	**2.091.000**	
Average Net Monthly Rent (2021	578 euro	
Total Balance (2021)	130 bilion euro	
Average Solvency (2021)	56,6%	

Source Aedes Datacentrum and Ministry of BZK, 2022, State of the Housing Sector

Housing Market Regions

Housing associations are only allowed to operate within the housing market region for which they have received authorisation from the national government. The Netherlands is divided into nineteen housing market regions. Some housing associations are permitted to operate in multiple regions, typically because they owned properties in several regions before the introduction of this regulation. However, housing associations are allowed to invest in only their core region.

The delineation of housing market regions aims to ensure that housing associations can focus on local housing needs, which can vary significantly. The housing challenges in Amsterdam are different from those in the northern part of North Holland. Managing a large or fragmented area would complicate this local focus. Housing associations must make performance agreements with the municipalities within their operational area. Tenant organisations, as defined in the Tenant and Landlord Consultation Act, are also involved in these performance agreements.

Income and Rent Limits

Housing associations are real estate organisations that focus on specific target groups. Household income is the primary criterion for defining these target groups. With the introduction of the revised Housing Act in 2015, these income limits were clearly defined. Previously, the limits were more informally set and could vary locally.

Income assessment is primarily carried out when allocating a home but can also influence the annual rent adjustment. While average rent adjustments and bandwidths are legally regulated, housing associations still have some flexibility to determine individual rent adjustments. Household assets play only an indirect role in housing allocation or rent adjustments, as they are reflected through annual income from those assets (such as income from interest or dividends).

Income limits for social rental housing are adjusted annually by the national government. Additionally, the maximum rent limit for the social rental sector is set yearly by the minister. This limit also determines the maximum rent for which low-income households are eligible for housing benefits.

TABLE 23.3 Rent and Income Limits for Social Housing 2024

Rent Limit 2024
The maximum rent limit for social rental homes in 2024 is €879.66.
Income Limits 2024
Housing associations are required to allocated at least 85% of their vacant homes to households with an income up to €47,699 for single-person households and €52,671 for multi-person households.

Source: Rijksoverheid.nl

Above the social rent limit, individuals are expected to either purchase a home or rent in the more expensive commercial rental sector, also known as the free rental sector. However, in the current housing market, this is often unfeasible: purchase prices are (too) high, especially for middle-income households, and more expensive rental homes are scarce. Consequently, there has been increased attention to middle rental housing—a category with rent prices that are more regulated than the free rental sector.

A crucial component of rent regulation is the Housing Valuation System (Dutch Acronym: WWS), which expresses the quality of a property in terms of points (WWS points). Up until 2024, only the rent of properties with fewer than 141 WWS points was regulated. Starting in 2024, this threshold will increase to 187 points), bringing middle-rent homes under the rent regulation regime as well. The hope is that this change will increase the availability of affordable rental homes in this categor.

23.2

How Do Housing Associations Finance Their Activities?

Guarantee Fund for Social Housing

Since the 1980s, the Dutch housing sector has employed an internationally unique system to finance investments. Two key sector institutions are central to this system: the Guarantee Fund for Social Housing (Dutch acronym: WSW), which guarantees the loans that housing associations need for their activities, and the Authority Housing Associations (Dutch acronym: Aw), which oversees social landlords on behalf of the national government. The WSW is a private organisation, while the Aw is a governmental organisation, part of the Environmental and Transport Inspection of the Ministry of Infrastructure and Water Management.

Since the Bruteringswet of 1995, housing associations have been financially independent from the national government and no longer receive 'object subsidies' (subsidies for enabling social housing construction). The housing allowance ('subject subsidy,' intended for individual households) is now the primary tool for keeping rental housing affordable, in addition to statutory rent price regulations and adjustments.

The WSW guarantees loans that housing associations use for constructing and improving their social rental properties. The WSW holds a so-called financial triple-A status, the highest level of security (almost zero risk). This enables housing associations to obtain loans relatively easily and at lower interest rates. National and local governments also provide guarantees for these loans, although this government guarantee has never been actively used. These guaranteed loans are not available for non-social housing activities, to comply with European competition and state aid rules.

However, housing associations must meet strict conditions set by the WSW to qualify for guaranteed coverage. These conditions can be summarised in three indicators:

- **Interest Coverage Ratio (ICR) must not be lower than 1.4.** This indicator shows how much interest the housing association must pay relative to its operational cash flows.
- **Loan to Value (LTV) must not exceed 85%.** This indicator reflects the proportion of loans in the total balance value of the housing association.
- **Solvency must not be lower than 15%.** This indicator presents the ratio of liabilities to total equity.

Impact of the Landlord Levy on Housing Associations' Investments

The national government has long believed that housing associations were not sufficiently utilising their financial assets. Against this backdrop, and following the aforementioned parliamentary inquiry, the landlord levy was introduced in 2013 to improve state finances after the financial crisis. This levy was designed in such a way that housing associations were primarily responsible for paying it. The annual burden of this levy had a significant impact on the investment capacity of housing associations. Between 2013 and 2023, the housing sector paid a total of over €16.7 billion in landlord levies. The impact was evident in the number of new homes built by these social landlords, which dropped from 29,840 homes in 2013 to 12,900 homes in 2018 (Companen & Thésor, 2020). Since then, new construction activity has increased slightly, reaching 16,015 homes in 2022 (Aedes 2022). Additionally, housing associations have become less active in transforming buildings into homes due to the landlord levy.

The housing crisis and the call for more affordable homes contributed to the abolition of the landlord levy as of January 1, 2023. This reduces the annual burden on housing associations by approximately €1.7 billion and provides them with more investment capacity (Rijksoverheid 2022).

In exchange for the abolition of the landlord levy, National Performance Agreements have been made for the period 2022–2030 (BZK 2022). These agreements include a doubling of the production of social rental homes by 2030 (250,000 social rental and 50,000 mid-rental homes), extensive sustainability measures [without increasing rents] for more than 675,000 homes, rent moderation, and mandatory rent reductions for the lowest incomes. Investment will also be made in housing improvements, such as addressing moisture and mold issues. No agreements have been made regarding adaptive reuse.

23.3

Adaptive reuse to Housing: The Role of Housing Associations

The majority of recently completed adaptive reuse homes (in the period 2012–2021) are new rental homes, with most being rented out by commercial landlords. Housing associations have transformed into fewer homes. This represents a break from the years before the housing market crisis (2008–2013), when housing associations led the way in adaptive reuse nationwide. Housing associations that previously acted counter-cyclically during crises did not do so this time. Social landlords were also affected by the economic malaise, especially if they developed mixed rental/ownership projects or had land positions intended for such mixed projects. As a result, the number of newly completed homes during those years dropped significantly. The limitations imposed by the Housing Act 2015 and the introduction of the landlord levy in 2013 also made housing associations less active in realising adaptive reuse homes (Expert Team (Office) Transformation 2022).

Regulation and the Adaptive reuse to Housing

Housing associations are subject to strict regulations, including when it comes to purchasing and transforming buildings. The social landlords can acquire buildings to transform them into residential spaces (or social real estate). Sometimes these buildings are still rented out, and for a responsible adaptive reuse, it may be necessary to lease the buildings (e.g., a school or an office) to the current tenant for a while before the tenant vacates. In such cases, the housing association is allowed to lease the acquired buildings for a maximum of five years to the current tenant. However, the Authority Housing Associations must give prior permission for this.

Adaptive reuse to Housing: For Which Target Groups?

Housing associations must, according to their mission, provide affordable and adequate housing for their primary target groups. In the current housing market, the discussion focuses on providing more housing for lower-income groups, starters, and older households. The demand for (social) rental housing is high, as evidenced by the long waiting lists. Therefore, housing associations are seeking ways to increase the supply of rental housing to meet current and future demand. New construction, acquisition of (private) rental housing, and adaptive reuse of non-residential buildings into living spaces are some of the options. New construction and the acquisition of other properties are limited. Hence, housing associations are also looking for opportunities to increase and possibly diversify their supply through the adaptive reuse of buildings into residential spaces. Location plays an important role in this, especially in areas undergoing urban renewal and restructuring. Other important factors include the local objectives of the housing association (e.g. improving sustainability versus adding new homes) and the (financial) resources available for renewal and expansion of their housing portfolio. Some housing associations focus on specific target groups, such as Habion and Woonzorg Nederland, which concentrate on the elderly, and Lieven de Key, which primarily aims to house young people and starters.

Adaptive reuse and Housing Associations: Support from the National Government

In 2022, the Expertteam Transformation published the guide 'Transformation and Housing Associations’ (Expertteam (office) transformation 2022). The guide provides various examples of adaptive reuse and offers several recommendations to housing associations:

- Act as a directing client and leave the execution to the market.
- Collaborate closely with the municipality during acquisition, planning, and permitting processes.
- Involve future residents as much as possible in the design and management of the building.

Some sections of the guide are outdated as it was published before the introduction of the revised Housing Act in 2015, which introduced stricter rules for housing associations. Additionally, the guide contained information on the landlord levy, which was abolished in 2023.

FIG. 23.1

FIG. 23.1 **Stek Noord, Housing Association Stadgenoot**
Source: Stadgenoot

EXAMPLE
Adaptive reuse of Stek Noord in Amsterdam-Noord

Stek Noord in Amsterdam-Noord was completed in 2019 and consists of two former school buildings totalling 34 studios. The buildings were transformed by the housing association Stadgenoot. The studios are rented out with temporary contracts to young status holders (refugees with a residence permit) and starters (aged 18–27). It is a mixed living arrangement where community building is central. The buildings retain many unique and original details, such as stained glass and old tiles. Each building has a shared kitchen and space where residents can cook together, study, or organise a language café.

Stek Noord is one of the locations from a real estate agreement concluded in December 2017 between the municipality and the Amsterdam housing associations. Six municipal properties were taken over by the housing associations to be transformed into over 200 social rental homes, primarily intended for accommodating young seekers and status holders.

23.4

Housing Associations as natural collaborators

Housing associations are among the few entities capable of supporting, financing, and managing adaptive reuse organisationally. They are true experts in their areas, having deep knowledge of the dynamics in various neighbourhoods and town centres. This expertise helps them understand the needs, such as the type of housing or facilities required, and address liveability issues effectively.

Housing associations are often involved not just in the adaptive reuse of individual buildings, but also in the redevelopment of entire areas. They frequently collaborate with market parties in these endeavours. Unlike market players, housing associations have extensive networks with organisations such as welfare services, healthcare providers, and municipalities.

Housing associations are professional, reliable, and financially sound partners. They can purchase social rental housing from developers in adaptive reuse projects, thus significantly contributing to the viability of business cases. As landlords, these social landlords maintain a long-term presence in their neighbourhoods, ensuring that they have a vested interest in well-functioning areas. Their stability and commitment make them dependable partners. They adopt a strategic approach to their housing stock, often referred to as portfolio management.

Municipalities often aim for 'mixed areas' in their housing vision, featuring a broad mix of ownership and rental housing, including affordable, mid-range, and high-end options, different types of housing, and diverse populations. Ideally, these areas also include various functions such as shops, schools, recreation, and dining.

Housing associations, with their mandate to actively enhance the liveability of their neighbourhoods, are key partners for municipalities in urban renewal areas. They typically own substantial property in these areas, giving them a vested interest in creating value through renovation, new construction, and improving liveability.

Since the introduction of the new Housing Act in 2015, housing associations have had fewer opportunities to contribute to liveability beyond their own housing estates. In the past, these social landlords had a strong position in the land and building market and more opportunities to develop owner-occupied homes and rental properties in the free rental sector. Currently, housing associations have fewer opportunities to invest in land and buildings in anticipation of redevelopment. Moreover, their ability to invest in mid-range rental properties was restricted by the 2015 Housing Act, but these opportunities have recently been expanded due to market players' limited investment in this affordable rental segment (Inspection of Environment and Transport [ILT], November 17, 2023)

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23.5

Conclusions

Housing associations, due to their special status, are exceptionally well-suited to handling adaptive reuse processes. Transformable buildings offer them a new way to expand their housing stock and develop new housing products. This is particularly important in today's context, where construction sites are scarce and there is increasing emphasis on sustainable and circular use of materials. Housing associations often target specific groups such as young people, students, refugees with residence permits, urgent seekers, and older households. In a limited number of cases, transformed buildings may also be suitable for families.

Housing associations, due to their mission, are also focused on enhancing the liveability of the neighbourhoods where they own property and are willing to invest there, including in the adaptive reuse of buildings. They often have a robust financial position, providing the necessary long-term commitment required for adaptive reuse processes. This combination of capabilities means that housing associations are expected to play an active role in adaptive reuse processes, provided it aligns with their objectives. Moreover, housing associations can invest in social and healthcare real estate within certain conditions. Thus, they are a logical partner in many adaptive reuse projects.

Housing associations are professional, reliable, and financially sound partners.

Acknowledgement
This chapter is an entirely updated contribution with the same title previously written by ir. Henk Westra for the publication *Transformation of Offices* from 2007. Henk Westra (1943–2011) was a prominent figure in the housing sector. His legacy continues through the Ir. Henk Westra Fund for Social Housing. For more information about Henk Westra and his contributions to housing, visit: www.tudelft.nl/universiteitsfonds/help-mee/uw-fonds-op-naam/ir-henk-westra-fonds-voor-volkshuisvesting.

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The Investor Perspective

Conditions for the Adaptive reuse of a Building

Barbara-Sophie Greeven

The trend of recent years to transform office buildings into residential properties continues to offer opportunities for (institutional) investors in the future. However, not all adaptive reuse projects are attractive for investors looking for long-term investments. When is an adaptive reuse worth the investment for an (institutional) investor?

Adaptive reuse of an office building into a residential property is attractive to an investor if the office building is structurally vacant and the location is suitable for residential development. The vacancy often leads to a lower book value, making the adaptive reuse financially more appealing. If the office building requires sustainability upgrades, these can also be incorporated into the adaptive reuse process. Reusing an office is inherently sustainable. Additionally, societal impact will increasingly be considered when deciding whether to transform or acquire an adaptive reuse project if there is an appropriate financial return.

This chapter will examine the considerations and conditions that determine whether an investor should transform an office building from 1) an existing ownership situation or 2) the purchase of a building yet to be transformed. This will be done using examples of completed adaptive reuse projects. It's important to remember that many initiatives do not reach realisation because decisions are made during the development process to halt the project. Numerous factors can influence this, including financial feasibility and the duration of the development process (RO-procedure), as well as changing local and national policies.

24.1

The Adaptive reuse Process

This chapter focuses on the adaptive reuse process from an investor's perspective. It generally involves the following steps:

1. QuickScan
2. Plan (concept design)
3. Market research/valuation
4. Technical due diligence
5. Decision-making (funding)
6. Contracting (turnkey)
7. Implementation
8. Operation

Throughout the entire process, investors evaluate an adaptive reuse based on several criteria. The primary investment criteria an investor considers are location, type of building (structure/construction), investment product (rental yield), municipal conditions and requirements, and willingness to invest (funding). Each phase of the process focuses on these criteria differently. We will now discuss the various considerations for each phase of the adaptive reuse process.

Quickscan

All investment criteria are initially assessed at a high level, and if the preliminary outlook is positive, they are further elaborated upon in the subsequent steps of the planning process.

Part of the investment criteria includes the strategic investment framework. This framework is reviewed annually for the investment portfolio (current and desired portfolio), determining where the focus will be. The ESG (Environmental, Social, Governance) objectives and return targets are established within this framework.

In the QuickScan phase, determining the financial perspective is crucial. Based on the initial parameters, a construction cost estimate (STIKO) and a return calculation with a long-term perspective (15-20 years) are made. An investor examines the following returns.

Short-Term

- Gross Initial Yield (BAR) = Rental income for year 1 / Investment = x%
- Net Initial Yield (NAR) = (Rental income – Costs for year 1) / Investment = x%

Long-Term

- Internal Rate of Return (IRR): The IRR is the interest rate (or return) at which the net present value of all expected revenues equals the net present value of expenditures.

The final yield levels are, of course, dependent on the location and the type of product. They are calculated based on the expected market rent and value development of the transformed building. This market value must be substantiated with a valuation in the subsequent phase, Plan (schematic design). When transforming from owned property, the investor must also consider the book value of the office building. A significant devaluation relative to the book value is a crucial factor in the willingness to invest.

If the various yields do not meet the desired performance targets, the plan will not proceed. In the case of a purchase, it will not result in a transaction, and for an ownership situation, the scenarios of (re)leasing or selling the office building will need to be further explored.

Plan (Schematic Design)

The intended investment product determines the (future) value of the residential building. The plan is a design for the investment product to be realised (rental apartments). This design is developed within the constraints of the existing building, municipal conditions, and the investor's objectives.

Since institutional investors are primarily focused on rental housing for the middle segment, not all types of housing are suitable as investment products. Rental income is crucial for the valuation of the residential building. Therefore, additional conditions and restrictions such as initial rent, annual rent indexing, limits on the sale of units, and extra space/sustainability requirements are carefully considered. It is desirable for the apartments to be neither too small nor too large. Small apartments tend to fall into the social sector, while large apartments result in higher rents, which may not fit within the investment strategy due to the increased risk of rental vacancies.

An investor uses principles outlined in a Programme of Requirements (Dutch acronym: PvE), which specifies spatial and quality demands. Implementing a PvE is easier in a new construction project than in adaptive reuse because one has to work within the existing spatial structure, frameworks, and building construction. Implementing a PvE can increase costs and requires customised solutions. On the other hand, requirements for finishing and quality levels contribute to good rental potential and longevity of the property and help minimise surprises during the operational period.

Sustainability ambitions set by institutional investors and municipalities lead to high requirements for the thermal envelope and installations, which significantly impact costs.

The safety of a building, especially fire safety, is crucial for institutional investors. It may not always be possible to ensure the entire adaptive reuse meets the Building Decree standards, and some components may be accepted at legally obtained levels. Plans must pay extra attention to these aspects, and additional investments may be needed to ensure safety.

Additionally, a building with a good appearance and a distinct identity that aligns with the intended residential function positively influences the decision to proceed with adaptive reuse. Table 24.1 provides four examples of how an adaptive reuse project is evaluated. The Westerhoek and Groot Hertogin projects are examples of adaptive reuse projects that already had a stately and strong appearance in their office function.

TABLE 24.1 VExample of Evaluation of Adaptive reuse Projects

	ADAPTIVE REUSE FROM OWNERSHIP POSITION		TURNKEY ADAPTIVE REUSE PURCHASE	
	AMSTERDAM WESTERHOEK	DEN HAAG GROOT HERTOGIN	UTRECHT NEUDEFLAT	ROTTERDAM FORUM
Investment Product	185 appartments area: 33 to 113 m² GO	85 appartments area: 54 to 119 m² GO	88 appartments area: 48 to 57 m² GO	103 appartments area: 85 m², 111 m² to 120 m² GO
Parking Spaces	**+++** 308 parking places	**++** 85 parking places	**-** gebruiksrecht 5 parkeerp-laatsen	**+** parking subscription in nearby parking garage
Sustainability Ambitions / Technical Quality of instal-lations and environmental quality	**+/-** Average. energy label C	**+** 72x energy label A and 13x energy label B	**+/-** 88x energylabel C	**+** 66x energylabel A and 37x energylabel B
Fire Safety/Security	**++**	**++**	**++**	**++**

- Negative | +/- Neutral | + Good | ++ Very Good | +++ Excellent

In the preliminary design made based on this assessment, a balance must ultimately be found between quality (according to the Programme of Requirements), affordability, and marketability of the apartments.

Market Research/Valuation

The market research and valuation focus mainly on the criteria of location, investment product, and municipal conditions, with the aim of substantiating the intended return so that a final decision can be made based on independent advice.

In the market research, attention is given to the rental market developments, the demographic trends, the transaction references, the new construction planning capacity of the municipality, location, liveability, safety and the specific target audience and marketability based on the project (e.g., living area, outdoor space, communal space, parking, level of amenities, and accessibility). In both ownership and purchase situations, it is necessary to assess the marketability and rental speed of the apartments, which refers to how quickly the apartments are expected to be rented out after completion.

The value of the investment product (end product) must be substantiated through an independent appraisal. The appraisal will also determine the marketability to ensure that the rental apartments can be leased at the proposed rental prices.

The Location

The location is crucial for an investor. What is the current status of the location, and what are the (spatial) developments in the short, medium, and long term? Since an investor buys real estate to hold for the long term, it is important to consider possible future developments that may affect the intended use and target group, in this case, tenants, as well as the surrounding residents/users in the immediate vicinity.

For users, the location's position, accessibility, and reach are important: is the location accessible by car, bicycle, on foot, and public transport (bus, tram, train)? The further expansion of accessibility through Mobility as a Service (MAAS) concepts or other innovative mobility solutions is increasingly being considered in the planning and operational phases.

The spatial and visual quality of the surroundings also contributes to the success of adaptive reuse. If the environment looks good and attractive and fits the future function, the project being transformed "sells itself." If this is not the case, it will be necessary to gain insight into future public and private investment plans for spatial developments that contribute to an improvement of the surroundings, as well as their phasing and planning. Impressions and phasing drawings of the development area can contribute to this.

A monofunctional location is usually not attractive to investors. The level of amenities in the surrounding area and accessibility need to be made clear, such as the distance to stores (supermarkets, drugstores, pharmacies), schools, childcare, restaurants, sports facilities, and healthcare providers. A good mix of functions, amenities, and users contributes to a better and more socially safe living environment; this translates into better future value development of the property. A monofunctional location might be interesting to invest in if there are plans (from the municipality's vision) to develop it into a multifunctional area. The plans, ambitions, and timing of financial criteria (return) determine when and whether an investor is willing to invest. Higher value development can be achieved if the investor takes more risk by entering earlier. Such area development often takes years and will have a lower purchase price at the start of the transition. However, there is a risk that the transition may not be completed (quickly), which can lead to lower quality of living, occupancy rates, and thus valuation.

Municipal Conditions

Municipal (political) policy is crucial in the adaptive reuse of an office building. Under what conditions is it possible to change the function of an office to a residential and/or flexible (mixed) use? The designation, function, and programming of the building are decisive. A flexible designation is most advantageous for an investor because it allows for changes in function (use) in response to changing (market) demand (alternative applicability). Policy and political positions can shift, and in some cases, this leads to projects not proceeding because the lead time to realisation of the adaptive reuse is extended. In many cases, the lead time for the realisation of the adaptive reuse is longer than the term of office of the aldermen/city council. If there is no longer political support at crucial moments, this can lead to delays or even cancellation of the adaptive reuse, despite the project meeting all the requirements, laws, and regulations.

The municipality determines the parking standards. The (adjustment or implementation of the) parking standard (the number of parking spaces) can significantly impact the potential of an adaptive reuse project because the costs of creating new parking spaces are high and the construction time is extended. Many office buildings have a parking garage that meets the requirements for residential use, so no additional investment is needed.

Renting parking spaces on a subscription basis in a nearby parking garage can also be a solution for some urban transformations. The expectation is that the demand for parking will further decrease; owning vacant parking garages indicates inefficient space use and is therefore not sustainable. Table 24.2 provides an overview of location-specific characteristics and municipal conditions.

TABLE 24.2 Example of Evaluating Location Factors for Adaptive reuse Projects

	TRANSFORMATIE VANUIT EIGENDOMSPOSITIE		TRANSFORMATIE AANKOOP	
	AMSTERDAM WESTERHOEK	DEN HAAG GROOT HERTOGIN	UTRECHT NEUDEFLAT	ROTTERDAM FORUM
1. Location	++	++	+++ (Utrecht Centre)	+++ (Rotterdam Centre)
2. Spatial and visual quality	++	++	+++	+++
3. Monofunctional location	Location next to existing residential area Bos en Lommer / village Sloten*	Sweelinckpleinbuurt*	N/A Utrecht Centrum	N/A Rotterdam Centrum
4. Distance to amenities	++	++	+++	+++
5. Accessibility by car and publiic transport	+++ Near A10 Amsterdam entrance. Public transport: new tram stop in front of the door. Sloterdijk 4 minutes bike	+++ 10 minutes drive from N44/ A12. Public transport: tram/ bus stop right in front. The Hague HS 10 minutes by bike	++/- Bus stop around the corner. Utrecht CS 5 minutes by bike	++/- Accessibility by car is not optimal and parking is limited. Public transport: bus/tram/ metro
6. Municipal conditions, policy, and timelines	+++ Involved Offices: Municipality of Amsterdam. No additional conditions or restrictions	+++ No additional conditions or restrictions	+++ No additional conditions or restrictions	+++ No additional conditions or restrictions. Long timeline due to objections causing significant delays. Construction costs came under pressure, leading to further delays.

- Negative | +/- Neutral | + Good | ++ Very Good | +++ Excellent

Westerhoek Amsterdam (2003) and Groot Hertogin Den Haag (1955) are located in good parts of the city, but are not in the city centre. Both buildings, as office buildings, already had the appearance/potential of a residential building. For all locations (Westerhoek Amsterdam, Groot Hertogin Den Haag, Neude Flat Utrecht, and Forum Rotterdam), full ownership is in place (no leasehold). This positively influenced the investment decision, as there were no additional costs or obligations such as a buyout upon changing the function from office to residential building. Additionally, there were no extra requirements regarding initial rent, rent indexation, or restrictions on rent control (regulation of middle rent).

Technical Due Diligence

In technical due diligence (TDD), the condition of the existing building is assessed. Since TDD is relatively costly, it is conducted only after market research. The assessment determines if the building can be transformed and what elements can be retained or need replacement. The goal is to ensure that upon completion, the building meets new construction quality standards, so that maintenance for the investment will not be required earlier than for new construction.

The construction and condition of the existing office building largely determine the spatial parameters for the new residential units. The structural framework must enable the change from office to residential use. Ceiling height, floor load capacity, installations, and overall structural layout (grid size) will serve as the basis for designing floor plans, determining the number of apartments, and the possibility of adding parking spaces, storage areas, and outdoor space. An asbestos and/or soil survey will also need to be conducted.

It is also possible that the quality is better than anticipated, resulting in less demolition and thus cost savings. In some cases, previously made choices can be reconsidered, potentially achieving a higher sustainability rating. A higher sustainability rating adds value for an investor due to financial and socio-economic returns. Actively contributing to reducing the impact of climate change on the built environment (CO_2 reduction) is an important goal for many investors.

TABLE 24.3 Example of assessment of building characteristics

	ADAPTIVE REUSE FROM OWNERSHIP POSITION		**ADAPTIVE REUSE PURCHASE TURNKEY**	
	AMSTERDAM WESTERHOEK	DEN HAAG GROOT HERTOGIN	UTRECHT NEUDEFLAT	ROTTERDAM FORUM
Technical quality of structure and fit-out	+- Load-bearing facade resulted in project-specific solutions such as outdoor space /possibility of adding extra	+- Concrete frame. Adding extra levels is possible; outdoor spaces are attached to the existing building:	+- Building is fully stripped to the structure (floors and columns)	+- (stripped down to load-bearing structure)
Spatial visual quality	+++ Brick facade	+++ Concrete facade	++ Panel material / monument	n/a (stripped down to load-bearing)
Year of construction	2003	1955	1963	1976
Technical quality of facade and roof	++ Facade retained	++ Concrete facade	++ Panel material / monument	++ New facade
Sustainability and technical quality of installations and environmental quality	+/- Avg. energy label C	+ 72x energy label A and 13x energylabel B	+/- 88x Energylabel C	+ 66x energylabel A and 37x energylabel B

- Negative | +/- Neutral | + Good | ++ Very Good | +++ Excellent

It was not chosen to have all the adaptive reuse projects achieve an A label, as at that time the added value of a higher energy label did not outweigh the additional investment. It remained a search for a balance between quality requirements/sustainability ambitions and returns, or yield. To realise the project, choices had to be made to do as much justice as possible to the balance between price and quality versus yield. Note: according to the current ESG policy of investors, the homes would need to meet an A label.

In the adaptive reuse projects from ownership position, it was decided to add an additional floor to create more square meters. This worked out well for both buildings. In the purchased adaptive reuse projects, it was not possible to add an additional floor.

Decision-making (funding)

Without investment willingness, there is no project. To initiate or purchase adaptive reuse, funding must be available. Investors will assess annually how much they want (and can) invest in real estate. The expansion capacity of (institutional) investors depends on market developments. For example, the value of many investors' bond portfolios has decreased significantly due to rising interest rates, leading to an increase in the share of real estate in their portfolios. As a result, there will be less willingness to invest in new real estate objects (expansion) and possibly more investment in existing assets, such as sustainability upgrades, adding floors, or adaptive reuse.

For investors who also pursue social returns, adaptive reuse projects are an opportunity to contribute to reducing the housing shortage, increasing sustainability, better utilisation of scarce urban space, and improving neighbourhoods/cities. Compared to demolition/new construction (with traditional materials), the CO_2 footprint is also lower.

When is a return objective considered appropriate? The return on an office building is higher than on a residential building. This higher return is explained by a higher risk. An office building with a single tenant has a higher return objective because the effect of a tenant's departure immediately leads to 100% vacancy. In many cases, it is financially more attractive to keep the building as office space rather than transforming it into a residential building with a lower return expectation.

The advantage of a residential building is twofold: reduced risk of vacancy (risk diversification) and higher (quicker) marketability. When a tenant terminates their lease, it has less impact on the building's total rental income because there are multiple smaller tenants, and a new tenant can often be found quickly.

Figure 24.1 provides insight into the yield difference between office buildings and residential buildings. It shows that the yield for office buildings is structurally higher than for residential buildings.

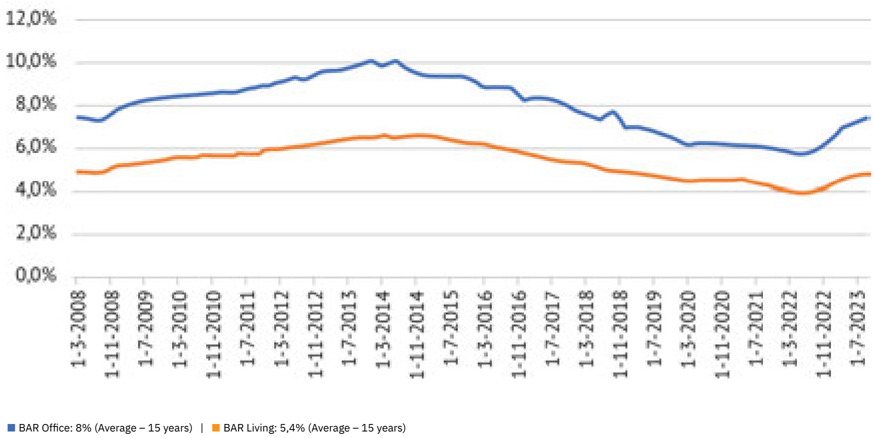

FIG. 24.1

FIG. 24.1 **Development of Gross Initial Yield Offices vs. Residential 2008-2023**
Source: MSCI

Adaptive reuse from an ownership position results in different considerations compared to purchasing adaptive reuse: 1) leaving it vacant, 2) transforming it, or 3) selling it. Adaptive reuse from an ownership position depends on an owner who is willing to depreciate the existing asset, invest additionally and long-term, and accept a different initial yield. An additional advantage of this adaptive reuse is that it allows for some control over the timing, so the adaptive reuse can occur under favourable market conditions.

The purchase of a building for adaptive reuse is based on the presented financial and spatial parameters. Trust in the location, the product, the return, and the long-term perspective is crucial.

The investment decision is made based on the gathered parameters from the previous three phases: the planning phase, market research phase, and technical due diligence (TDD) phase. Is there willingness to invest under the outlined conditions? Purchasing an adaptive reuse project offers the opportunity to enter a project with an attractive (consistent) financial and social return. In the decision-making phase, these conditions are usually formalised in a letter of intent signed by the investor with the developer or developing contractor.

Implementing a Programme of Requirements is easier in a new construction project than in adaptive reuse.

Contracting (turnkey)

Based on an investment decision, agreements are contractually formalised. The contract form preferred by an (institutional) investor for adaptive reuse is a turnkey approach (delivered ready for use: key-ready). The contracting party is therefore a developing contractor, as they can also provide assurance regarding the realisation fee and can market any residential units in the project at their own risk. The turnkey concept is reflected in a split purchase and realisation agreement. With this type of agreement, all risks related to development, construction, permits, environmental issues, soil conditions, and asbestos lie with the developer. By choosing this contract form, the investor bears the financial risk (value/return), but not the development risk. For the adaptive reuse of existing property, a purchase agreement is obviously not required since the building is already owned.

After contracting, the design must be further developed into a final design (DO) and specifications or technical description (TO). If the adaptive reuse involves a building that is yet to be purchased, the preliminary design (VO) and final design (DO) are usually already prepared by the selling/developing party.

Additionally, all necessary investigations must be carried out to navigate the municipal Spatial Planning (RO) procedure. This is typically the responsibility of the developer of the project.

Realisation

Once the contract formation and permit issuance are complete, the adaptive reuse project can commence. The start of construction or demolition depends on the delivery conditions applied. A crucial condition is that an irrevocable environmental permit is granted, and all required securities are provided, as investors often pay in instalments based on the progress of the realisation. Leasing will begin at least six months before completion with the goal of having the building 100% rented by the time of completion.

During the realisation phase, parties may encounter unexpected issues, such as discrepancies between construction drawings and the actual situation. For an investor, it is crucial to carefully consider short-term and long-term solutions. Given that an investor will hold the property long-term, a well-considered decision or solution must be found.

Operation

The operational phase begins after the building is handed over to the tenants. During this phase, the investor will work with a property manager on leasing and re-leasing, as well as managing and maintaining the residential building. A maintenance- and sustainability plan are developed based on the technical specifications (existing and new construction). In the operational phase, the investor can influence management and maintenance costs as well as rental income.

24.2

Differences Between Transforming Owned Property vs. Purchasing Property

As discussed, there are differences in considerations at every stage between transforming an owned property and purchasing a property to be transformed. The main characteristics of each situation are as follows:

Adaptive reuse of an Owned Property

Ownership allows the final investor to be involved from the outset of the adaptive reuse, providing the opportunity to influence product, quality, technology, sustainability goals (ESG objectives), and affordability. Achieving a higher sustainability label and/or social impact has a positive effect on value development.

If an investor already owns the office building, they possess in-depth knowledge and history of the property, market dynamics, and tenant profiles. This can aid in making informed decisions during the adaptive reuse process.

On the downside, transitioning from an office to a residential building changes the investment/risk profile. Often, in addition to the investment required for the adaptive reuse, a write-down may be necessary if it has not already occurred.

Purchase of a building to be transformed

The purchase of a building that is yet to be transformed typically occurs only if a turnkey realisation agreement (TKRO) is simultaneously signed. The adaptive reuse is not purchased on risk. In the case of buying a building for adaptive reuse, control over the final product depends on the timing of the investment or acquisition.

A comprehensive technical due diligence must be conducted on both the existing condition (the part to be reused) and the new situation.

24.3

Conclusion

Transforming a building in ownership or purchasing a building for adaptive reuse remains attractive for investors. Under current market conditions (interest rate increases/construction cost rises) combined with strict regulation of the rental housing market, it is challenging to make real estate projects feasible. Reaching agreements is difficult because revenues are constrained by predetermined initial rents, rent indexation, and exit terms, leaving little to no room for increasing returns.

These constraints have a significant impact on property valuation. Investors are focused on investing in housing for the middle segment, but regulation of this segment is more likely to reduce the realisation of new and transformed rental homes rather than increase it. This is due to rising costs and fixed revenues. Adaptive reuse projects may be even more challenging, but if the project is located in a good or interesting area, it is always worth investigating. An additional effect is that this decline is expected to result in an increase in rents for the private rental sector.

From a societal perspective, it is important to continue exploring adaptive reuse projects and other densification challenges within the existing urban structure (facilities) to address the significant demand for (rental) housing. Transforming buildings into residential properties with an additional mix of functions is crucial for growth and improving neighbourhoods/cities. Investors can and want to play a key role in this, provided it leads to an appropriate financial return.

24.4

Project overview

AMSTERDAM, MOLENWERF – WESTERHOEK	
Original Construction Year	2003
Completion After Adaptive reuse	2014
Area After Adaptive reuse	14,166 m² GBO
Layout	185 apartments with living areas ranging from 33 to 113 m² GBO and 308 parking spaces in an underground parking garage
Client	Achmea Real Estate B.V. on behalf of pension fund
Design Adaptive reuse	KOW Concepts Design Development B.V.
Contractor	Koopmans Bouwgroep B.V.
Cost Data Reference Date	2011
Acquisition Costs	Not applicable (office building was already owned)
Land	Full ownership
Sustainability	Average energy label C – GPR 7.5

DEN HAAG, LAAN VAN MEERDERVOORT – GROOT HERTOGIN	
Original Construction Year	1955
Completion After Adaptive reuse	2018
Area After Adaptive reuse	6,600 m² GBO
Layout	85 apartments with living areas ranging from 54 to 119 m² GBO and 85 parking spaces on parking lot
Client	Achmea Real Estate B.V. on behalf of pension fund
Design	J.W. Janzen
Design Adaptive reuse	KOW Concepts Design Development, Den Haag
Contractor	Koopmans Bouwgroep B.V.
Cost Data Reference Date	2016
Acquisition Costs	Not applicable (office building was already owned by Rabobank Pensioenfonds)
Land	Full ownership
Sustainability	72x energy label A (85%) and 13x energy label B (15%)

UTRECHT – NEUDE	
Original Construction Year	1963
Completion After Adaptive reuse	2017
Area After Adaptive reuse	4,514 m² GBO
Layout	88 apartments with living areas ranging from 48 to 57 m² GBO and 5 parking spaces on parking lot
Client	Achmea Real Estate B.V. on behalf of pension fund
Design	H.A. Maaskant
Design Adaptive reuse	A3 Architecten
Selling Party/Contractor	De Nieuwe Norm B.V., part of Aan de Stegge Verenigde Bedrijven
Cost Data Reference Date	2015
Land	Full ownership
Sustainability	88x energy label C (100%)

ROTTERDAM – FORUM	
Original Construction Year	1976
Completion After Adaptive reuse	2020
Area After Adaptive reuse	10,100 m² GBO
Layout	103 apartments with living areas ranging from 85 m² to 120 m² GBO and parking subscription in nearby parking garage
Client	Achmea Real Estate B.V. on behalf of pension fund
Design	Herman Kraaijvanger
Design Adaptive reuse	OMA (Reinier de Graaf)
Contractor	Sprangers en Van Mierlo
Kostendata prijspeildatum	2015
Grond	Vol eigendom
Duurzaamheid	66x energielabel A (64%) en 37x energielabel B (36%)

User Perspective

Create the Home of Your Dreams – A Unique Opportunity!

Yolanda Majewski-Steijns

This chapter tells the personal story of Yolanda Majewski and her husband Raoul. In 2005, they, along with their future neighbours, 'purchased' a dilapidated building block and collectively transformed it into homes. This chapter provides an insight into their process of turning a decaying building into a home where they still live happily today. It describes their experiences, what went well, what did not, and explores whether collective private commissioning (Dutch acronym: CPO) is a viable alternative to traditional project development. Additionally, it examines the added value of transformation compared to new construction.

FIG. 25.1

FIG. 25.1 **The boarded-up facades of the Wallis block**
Source: Hester Blankestijn 2005

25.1

De Dichterlijke Vrijheid (The Poetic Freedom)

We met our future neighbours on a drizzly Tuesday in January at the Spiekman neighbourhood centre in Spangen, Rotterdam, about a year and a half before we would receive the keys to one of the homes in the building block. A month earlier, we had signed up for the 'free' homes, an initiative by Ineke Hulshof of Hulshof Architects, Steunpunt Wonen, and the municipality of Rotterdam. Most of the homes in the Wallis block were in very poor condition, and the building block was scheduled for demolition. No party could be found to renovate the homes; the investment required to upgrade the Wallis block to modern homes would be greater than the value of the homes after renovation. There was no profitable business model. The only way to make the renovation happen was to let the (future) residents do it themselves. They were willing to invest as much as the house was worth, but they could not afford the additional costs of purchasing the existing building. Therefore, the houses had to be free.

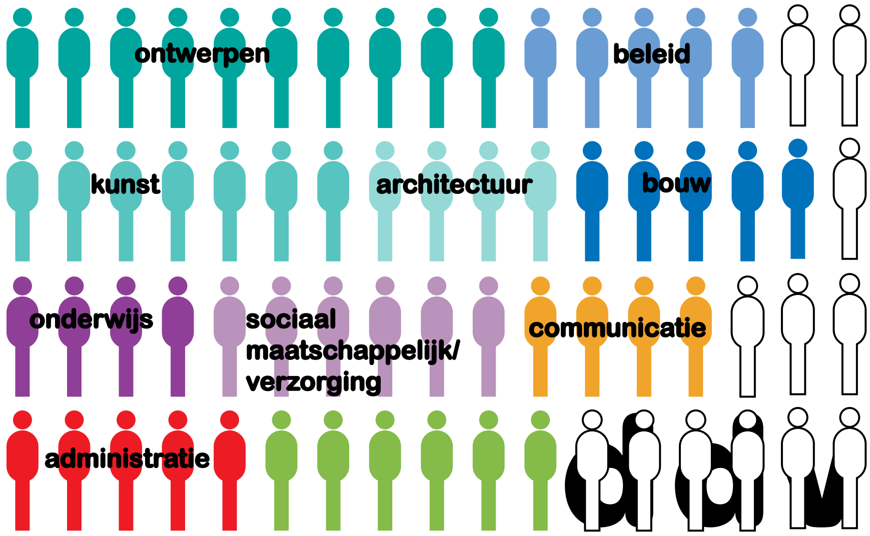

FIG. 25.2

FIG. 25.2 **Occupation of the participants: Designers, policy makers, artists, architects, building sector, education, social workers, communication, administrative**

A newspaper article had created a genuine hype, and at the information session in the Sparta Stadion, hundreds of interested people attended. We still signed up with the hope of being awarded a house. But as it turned out, only just enough people had registered out of the five hundred interested, so everyone who signed up could participate. The mandatory renovation obligations, the estimated budget, and the requirement to live in the property for two years made it clear that this was not suitable for developers, slumlords, or bargain hunters. Due to these participation requirements, only those genuinely willing to invest time and money in the block remained. This concept ensured that the block would not be demolished but would instead create new value in a neighbourhood with both problems and potential.

The interested parties saw opportunities in this unique concept. It offered people the chance to personalise a (large) home according to their own preferences, where they could carry out renovations themselves and have more control over the budget. All of this in a vibrant neighbourhood with private outdoor space. Despite recent investments and measures by the municipality, Spangen had a poor reputation. So, we decided to take a bike tour around the neighbourhood in the evening. To our surprise, it was exactly the lively, multicultural Rotterdam neighbourhood we were looking for. We were also greatly attracted to the idea that we wouldn't have to do it alone and that we would be living with a relatively large group of likeminded people.

It was a bit nerve-wracking to go to the first meeting. Who would we be going through this intensive process with? Who would our neighbours be? Would we get along? Would we make the same choices? What would be involved in the process? But our concerns were unfounded. The evening was led by Frans van Hulten from Steunpunt Wonen, and his clear explanation of the process, the schedule, and the cost estimates quickly reassured us that we had made the right decision. Moreover, it turned out that the other participants shared similar sentiments, and there was a positive atmosphere from the start. Only one couple decided after the first meeting that it wasn't for them and withdrew immediately. The remaining participants all stayed. Naturally, there were some designers, architects, and planners in the group, as you might expect for such a project. To understand the potential of a demolition site, you need to look at boarded-up facades, leaking roofs, and uneven floors with a critical eye and some knowledge. In addition to new residents, there were also people who already lived in the Wallisblok or the neighbourhood. Barbara, one of our future neighbours, had even lived her whole life on Balkenstraat! It was a nice mix of people who all shared at least one trait: we all liked to get things done.

FIG. 25.3

Fig. 25.3 **Origin of Participants**

25.2

The Association

We initially formed an association of clients (Dutch: Vereniging van Opdrachtgevers, VvO) with all 33 families. This association acted as the client for all the consultants needed during the definition and design phases to develop the plans. The VvO was registered with the Chamber of Commerce and could be dissolved once all contractual obligations were met.

The VvO hired a process facilitator, an architect, and a structural engineer, and involved a notary to draft agreements. From the VvO members, a chairman, treasurer, secretary, and general board members were elected. Additionally, we formed committees necessary for the process: I was part of the construction group working closely with the architect, while there were also committees for the garden plans and events around milestones.

Each participant paid a monthly contribution to the VvO. This 'pre-investment' is something to consider in any CPO development. It needed to be paid before a mortgage could be secured. At the time, we did not yet have a purchase agreement or a construction agreement to secure a mortgage. When the mortgage deed was executed at the notary (about six months later), we could reimburse ourselves. The rest of the mortgage was placed in a construction deposit, which allowed us to pay the contractor in instalments during the collective renovation and finance additional expenses incurred during the work.

With the funds from the pre-investment, the VvO could not only pay the advisors for their work but also cover expenses such as room rentals and refreshments for the general member meetings. We had to hold meetings regularly! All collective decisions had to be made during a general member meeting and were prepared by the board or various committees (sometimes in consultation with the involved advisors). Each participant (member of the VvO) had one vote, and decisions were made by a simple majority.

Decisions like whether to demolish or restore the back facade, which contractor to select, whether to have a communal garden or individual gardens, what should be arranged collectively and individually, and how to access the upper apartments were all discussed. The general member meetings sometimes featured intense debates and long evenings. What I found particularly remarkable was how the collective interest was always a major factor in many choices. The goal was to meet the initial cost estimates so that no one would have to drop out for financial reasons. And in the end, we succeeded in that. It was truly special to be part of such a process, and during that time, we got to know our neighbours very well!

25.3

Construction Costs

The foundation repairs that were necessary for some buildings were financed by the municipality of Rotterdam to make the project financially feasible. The calculated investment required for the restoration of the homes was equivalent to the value of the renovated homes after completion. Thus, no purchase price could be charged, making the project unfeasible otherwise. That's why the homes were given away with the condition that they would be renovated and meet the Building decree requirements.

All major structural interventions had to be carried out by a single collective contractor. This allowed costs to be distributed among all the homes/participants, regardless of the specific repair needs of each individual home. Some homes were in better condition than others. By addressing the project collectively, the overall feasibility was ensured, and a consistent baseline quality was achieved.

However, securing a mortgage was not straightforward with all lenders. The collateral was essentially a dilapidated building, and the risk was considered high. Ultimately, Rabobank took the risk, and all participants were able to secure their (individual) mortgages.

In addition to the collective costs for renovating the structure, each participant had to decide how much work would be done by the collective contractor, by an individually hired contractor, or by themselves. We chose to have the collective contractor handle the installation of heating, water pipes, and electrical systems, as well as all interior walls and ceilings. After completion, we personally installed the floor-to-ceiling interior doors, sliding doors, and all the stairs. We did as much of the finishing work ourselves as possible. For instance, we assembled the kitchen with a group of friends, piece by piece. My parents were always involved. It was a rewarding time, working on the house and seeing it gradually take shape. I never thought I would be able to install a toilet myself, but I managed it! The great thing about making all the decisions and doing the work ourselves is that everything in the house is our own achievement. All the good things (a loft, a large bathroom, plenty of light and air in the house, and light fixtures exactly where we wanted them), as well as the things that aren't as neat or comfortable. We accepted these imperfections for years, precisely because we had done it ourselves. After fifteen years, we renovated again, this time hiring a professional contractor to fix some of those DIY mishaps.

No party could be found to renovate the homes.

25.4

The Homes

The sizable building blocks in the Spangen were constructed in the 1930s as the first planned large-scale housing development in Rotterdam. The neighbourhood was intended for (reasonably educated) workers. The homes are quite modest but were carefully designed. The layout of the neighbourhood was designed by J.J.P. Oud, while the Wallisblok itself was designed by architect A. Krijgsman.

FIG. 25.4

FIG. 25.4 **Wallisblok in the Spangen Neighbourhood, Rotterdam**

The residential block was originally designed with three apartments per building: a ground-floor apartment with a garden and two upper-floor apartments with balconies. The two upper apartments shared a common staircase and covered one and a half floors each (one apartment on the first floor and half on the third, and the other apartment on the second floor and the remaining half on the third floor). During the process of surveying the housing preferences of all VvO members, it was decided to divide each building into four 'modules'. Through a form, we could indicate how many 'modules' we wanted to combine into a new apartment. You could also specify a preferred location in the block, with the block's end and the first homes from the end having a wider span, which were particularly suitable for apartments. Finally, you could indicate whether the modules should be placed above or next to each other. This resulted in a Tetris-like puzzle where we tried to realise as many first choices as possible for everyone. Where there were no more adjacent or stacked modules available, a lottery was held, or second choices were used. We chose four floors stacked on top of each other so that we could have both a garden and a rooftop terrace and avoid having neighbours above or below. We also chose the charming Balkenstraat, a street with old trees, opposite neighbours, and a garden/terrace with evening sun. In the end, everyone got their specific place in the building block. By that time, the major collective decisions had already been made, and we could focus on the design of our own home. The architect assisted us in this, but we also brainstormed a lot together and involved all our friends and acquaintances in the process.

FIG. 25.6

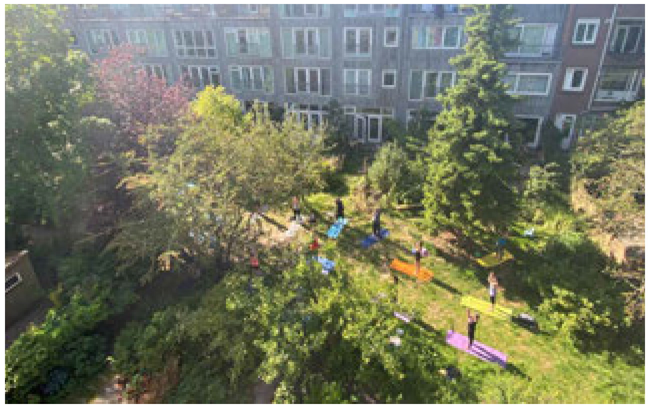

FIG. 25.7

FIG. 25.8

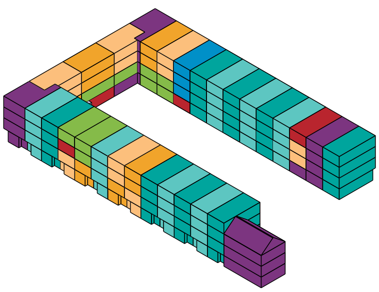

FIG. 25.7

FIG. 25.5 **Gateway to the Community Garden "De Dichterlijke Vrijheid"**

FIG. 25.6 **The Community Garden Is used by everyone**

FIG. 25.7 **Breakfast with the Contractor; The Festive Start of Construction**

FIG. 25.8 **Housing Typology of the Wallisblok**

Initially, it was planned that everyone would have access to an outdoor space. All upper-floor apartments received a fixed staircase leading to the roof, complete with a roof extension and terrace. The apartments and homes on the interior sides were allocated gardens. During one of the general member meetings, we decided to not only allocate individual gardens but also make part of the garden communal. The entire central area along the length of the block was designated for the collective group of owners, including for the residents of the upper-floor apartments. To provide them access to the garden, we decided to create a new entrance from the end of the block with a lockable gate. All residents received a key to this beautiful gate, which bears the name of our project.

The name "De Dichterlijke Vrijheid" (The Poetic Freedom) is inspired by the street names on two sides of the block. On the west side is the Nicolaas Beetsstraat. Beets was known under his pseudonym Hildebrand, a poet, preacher, and professor from the early nineteenth century. On the north side is the Wallisweg. Wallis was the pseudonym of Adèle Sophia Cordelia Opzoomer, a Dutch writer and poet from the late nineteenth century. We began our general member meetings by reading a (relevant) poem, a tradition that continues with the meetings of our current Homeowners Association.

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25.5

The Construction

After designing both the collective and individual renovations, selecting a contractor was no easy task. In addition to the renovation of the building shell, which was uniform for all homes, each home had its own design and choices for varying degrees of finishing. Moreover, it had to be affordable for everyone, which posed a significant challenge for the contractor. Eventually, a suitable contractor was found, and on September 1, 2005, we celebrated the start of construction with a breakfast in Nicolaas Beetsstraat together with the selected contractor. The entire preparation phase lasted about six months. It was an intensive period with many meetings, decisions, and arrangements. But now, the real work could begin!

The first building was completed in June 2006, and the last one followed just under a year later. We were at the front of the queue and were given access to our home as early as August to start working on it ourselves..

25.6

Enjoyment of Living

The Wallisblok was on the demolition list. Had that happened, neither we nor most of our neighbours would have lived here. It was precisely the transformation from small, dark apartments to large, light homes with a 1930s look that drew us to this option. The requirement for collective development was an added benefit for us, especially given the scale of the renovation. In my view, the appeal of such a project lies mainly in taking control of both the size and layout as well as the quality of the home. This is a significant advantage over individually renovating an existing home or buying a new home from a developer.

You can design a home without a living room but with one very large kitchen, connect each bedroom to an en-suite bathroom, create a studio for all your hobbies, include an indoor bike storage, easily combine working from home, keep a wall free for a large painting from your inheritance, fit all your books in a two-story bookshelf, or add a French balcony to your bedroom or connect it to a patio with an outdoor shower. The possibilities are endless! And by creating collective amenities, additional costs can be saved.

In a CPO project, you are directly the client for advisors and contractors, so there is no developer making choices that might be less favourable for you as the final buyer and resident, and who also needs to be paid for their work. Every euro is invested directly into your own home. This allows for sustainable choices that might be more costly upfront but improve living comfort or reduce monthly expenses. The decisions we made here would not have been possible elsewhere. I wish more people could have this opportunity—to develop a home that fits them perfectly without paying a premium.

Our collective was made up of active participants who enjoyed taking initiative and often had a background in construction or creative fields. We enjoyed figuring things out ourselves and investing time in the project. This will not be the case for every group, and it does not have to be. Nowadays, there are excellent process facilitators who can support the collective. They ensure that decisions are made on time and select other advisors based on quality and price. They prepare meetings, take minutes, and chair them. They ensure that decision-making is smooth and democratic, and that a cohesive resident group forms. With good help from a process facilitator, participants can take a more relaxed approach compared to what we experienced at De Dichterlijke Vrijheid and focus on the aspects of the project that matter most to them. This makes CPO accessible even for those without a construction background or with less time. Whether it's a vacant church, an old factory, a dilapidated post office, or a 1930s apartment block, working together leads to new, unique, sustainable, and community-focused neighbourhoods.

Government Policy on Adaptive Reuse for Housing

Hilde Remøy and Erwin Heurkens

Since 2005, the Dutch government has prioritised the adaptive reuse of existing buildings due to the rising problem of office space vacancy and a lag in housing production compared to policy targets. The production of housing through adaptive reuse was first endorsed in various policy notes to address both the need for more housing and to combat urban decay and vacancy. Sustainable adaptive reuse is also seen as a strategy to manage socio-demographic changes, support the economic base of cities, and improve urban quality. In 2022, the Ministry of the Interior and Kingdom Relations (Dutch abbreviation: BZK) set a goal to achieve 15,000 residential units annually through adaptive reuse. To meet this target, a reform of real estate markets is necessary, encouraging institutions and organisations to favour adaptive reuse over demolition and new construction. This requires the use of public policy instruments that align with the changing demands of the real estate market and the needs of market actors.

This chapter illustrates that adapting existing real estate into housing requires an effective mix of policy instruments and activities tailored to market needs at both urban and local levels. It outlines and categorises the government's policies regarding adaptive reuse to housing, providing an overview of the range and potential effectiveness of these policies.

26.1

National Policy Context for Adaptive Reuse

At the national level, the Dutch government promotes adaptive reuse of vacant real estate and the redevelopment of cultural heritage through policies and regulations. Municipalities have the autonomy to make their own spatial planning decisions within this framework. Until 2023, the Spatial Planning Act (Dutch: Wet ruimtelijke ordening, Wro) focused on achieving "good spatial planning." The Wro mandates that municipalities consider qualitative aspects such as cultural heritage, parking, needs and demands, and sustainable land use. Additionally, national regulations delineate the separation of sensitive and nuisance functions, including noise pollution, external safety, air quality, and biodiversity. Spatial developments must be assessed against these factors, which can sometimes limit the possibilities for adaptive reuse.

In January 2024, the new Environmental Planning Act (Dutch: Omgevingswet) came into effect, replacing the Spatial Planning Act (Wro) and several other laws that govern decision-making for spatial projects. The Environmental Planning Act provides municipalities with greater flexibility in evaluating environmental aspects. Adaptive reuse is addressed within the environmental vision, which includes the programmatic approach and the environmental plan.

Since 2005, the Dutch government has developed specific policy instruments to promote the adaptive reuse of buildings and areas. Under the Ministry of Housing, Spatial Planning, and the Environment (Dutch abbreviation: VROM), various policy tools were introduced. For instance, fiscal instruments were designed to financially support adaptive reuse projects, such as reducing the VAT on renovation and adaptive reuse work from 19% to 6% and offering environmental investment deductions for investments meeting high environmental quality standards. Regulatory instruments were also adjusted to facilitate adaptive reuse.

The government encourages adaptive reuse of vacant real estate and reuse of cultural heritage with policy and regulations.

In 2007, the Dutch Building Decree was adjusted to better align the legislation for residential and utility buildings. Procedures for temporary rental and adaptive reuse up to a maximum of five years were significantly shortened. By the 2012 Building Decree, adaptive reuse was introduced as a distinct category with less stringent requirements for comfort. Around 2013, the book and market values of many office buildings had decreased sufficiently to attract developers interested in converting these properties into housing. Since then, approximately 10,000 homes have been created annually through the adaptive reuse of existing buildings.

On behalf of the Ministry of VROM and later the Ministry of BZK, expert teams for adaptive reuse were established and guidelines were created to encourage initiatives for adaptive reuse and inform parties about the opportunities, possibilities, and challenges. In 2022, it became clear that housing production was lagging and that new initiatives were needed to accelerate it. The Ministry of BZK identified adaptive reuse of offices, retail, and social real estate as a strategy to achieve national goals. A National Transformation Plan was developed, and a Taskforce for Accelerating Temporary Housing was established. Additional funding for subsidies was allocated (De Jonge, 2022).

Excerpt from Minister De Jonge's letter to the House of Representatives

Newly built homes make the largest contribution to reducing the housing shortage, followed by adaptive reuse for housing. Over the past ten years, 690,000 new homes have been built, of which more than 100,000 through adaptive reuse. Adaptive reuse contributes to the growth of the housing stock and to the vitality of areas in cities and villages. Quantitatively, a significant portion of the future building stock is already available for use. However, from the perspective of adaptive reuse in relation to circularity, sustainability, and futureproofing, there is a major challenge. This also applies to linking the locations of these buildings with the required functions.

To organise more implementation power so that the targeted 15,000 adaptive reuse homes per year are achieved and the vitality of villages and cities is strengthened, the National Transformation Plan has been drawn up. This plan is an elaboration of the Housing Construction programme. The approach essentially involves making performance agreements with regions and municipalities about the adaptive reuse of areas and real estate into housing, work, and facilities. Additionally, already successful instruments are being continued and, where possible, strengthened.

For example, the adaptive reuse facility of €22 million has been increased to a total of €80 million, so that even more adaptive reuse projects can be supported with a loan, and the growth to 15,000 homes per year can be realised faster. Furthermore, knowledge and expertise have been made more accessible through a National Transformation Desk. In addition, the national government is exploring other possibilities to accelerate real estate and area transformations. The National Transformation Plan (NTP) that we have developed with involved parties, including the Urban Transformation Programme Working Group and the Delft University of Technology, is included in the appendix to this letter.

26.2

Policy Instruments in Theory

Policy instruments play a crucial role in realising adaptive reuse of buildings and urban areas. However, choosing policy instruments is not an easy task for policymakers and legislators. This section conceptualises policy instruments by delving into some of the difficulties associated with selecting the 'right' set or combination of spatial policy instruments.

Classifications of Policy Instruments

Classifications of policy instruments are intended to illustrate the variety of instruments that can be applied to shape market behaviour aimed at achieving urban redevelopment through real estate adaptive reuse. In policy terms, the housing shortage in large parts of the Netherlands is a societal problem that has been designated as a policy issue by politicians. To achieve its policy goals, the government chooses policy instruments. There are many different classifications of policy instruments. A comprehensive overview of classifications is provided by Fobé et al. (2014) and Schram (2005). Such classifications can be used for policy analysis. They provide insight into the instruments that are chosen in practice to guide the actions of actors within a policy area, such as vacancy and reuse of offices. They also shed light on which instruments have not been chosen (cf. Fobé et al., 2014, 63).

Heurkens et al. (2015) classify four planning instruments specifically for the policy area of spatial planning. This classification is particularly useful because it specifies the impact of each of the four instruments on markets. As explained above, markets play a crucial role in pursuing urban development, and to enhance its effectiveness, planners need to act as market actors who strategically deploy planning instruments to influence market behaviour (Heurkens et al., 2015). Table 26.1 provides an overview of different categories of spatial policy instruments, their impact on the real estate market, subtypes of these instruments, and examples of instruments. According to Heurkens et al. (2015), spatial policy instruments can be categorised into shaping, regulating, stimulating and capacity building instruments. This chapter uses the classification of policy instruments below to categorise and evaluate government policy regarding adaptive reuse.

TABLE 26.1 Policy instruments, classification of instruments

POLICY INSTRUMENT	MARKET EFFECT	SUBTYPES	EXAMPLES
Shaping	Guiding the decision-making environment of market parties by shaping a policy context for market actions and transactions	Policy and vision Investment plan	Housing policy/vision Public infrastructure plan
		Indicatie plan	Spatial strategy, master plan
Regulating	Defining the decision-making environment of market parties by regulating and conditioning market actions and transactions	Public law regulation (including laws)	Building decree, Environmental Plan
		Private law regulation (contract)	Environmental permit, development rights
		Direct public action/investment	Land reclamation, land purchase
		Price-adjusting instruments	Infrastructure development
		Risk-reducing instruments	Subsidies, bonuses, tax benefits
Stimulating	Expanding the decision-making environment of market parties by providing financial and fiscal incentives for market actions	Capital-raising instruments	Loan guarantees, fund, public-privat cooperation
Capacity building	Understanding and facilitating the decision-making environment of market parties through organising capacity, to make other policy instruments work more effectively	Market-oriented culture, way of thinking	New perspectives and ways of thinking
		Market knowledge	Understanding/logic of development process
		Market networks	Participation in/in formal and informal
		Market-relevant skills	Human/individual professional capability

Source: Heurkens et al., 2015, p. 631

Complications in Choosing a Policy Instrument

It is likely that the choice of one or more policy instruments is determined by the effectiveness of that instrument. However, there are complicating factors. The choice of a policy instrument is not entirely free. Some instruments come with higher costs than others or may have more side effects than others. It may be necessary to select and shape the policy instrument in consultation with actors in the policy area. If the government is heavily dependent on private actors for implementing its policy, it is conceivable that these actors influence the choice of instrument(s). For example, if the government wants to establish a fund for adaptive reuse of existing buildings into housing, and this fund needs to be largely filled with contributions from market parties, it is necessary to gain support from these market parties. In short, the choice of one or more policy instruments may depend on more factors than just the perceived effectiveness of the instrument. To effectively manage policy objectives, in this case adaptive reuse to housing, public organisations need to be aware of both the market effects of a particular policy instrument and the interdependencies of policy instruments. In practice, this means combining different policy instruments to change the real estate markets in favour of adaptive reuse.

26.3

National Adaptive Reuse Policy 2005–2024

Since 2005, national legislative changes and new regulations have been implemented to guide adaptive reuse. These have affected the way other planning instruments could be used by municipalities to support adaptive reuse. In 2006, responding to shortages in the housing market and high vacancy rates in offices, the ministry of VROM proposed a series of policy instruments to encourage adaptive reuse. Positioned in the policy instrument classification of Heurkens et al. (2015), these were:

1 Fiscal instruments (stimulating);
1 Subsidies (stimulating);
1 Simplification of building regulations (regulating);
1 Simplification of zoning changes and (temporary) repurposing and leasing (regulating);
1 Use of municipalities, the government real estate agency (RVB), and housing associations (capacity building).

Policy 2005–2010

1 **Fiscal instruments (stimulating):**

- Transfer tax (Dutch Acronym: OVB): Recognised neighbourhood development companies (WOM) were exempt from double transfer tax. The adaptive reuse had to be part of a restructuring plan approved by the municipal council.
- Value-added tax (VAT): A proper combination and phasing of OVB and VAT were established. For certain work (e.g., plastering and painting) in buildings older than fifteen years, the VAT rate was reduced from 19% to 6%.
- Investment in sustainable business assets, including buildings, could qualify for an environmental investment deduction. This applied if the investments achieved above-average environmental quality. For the investment, the entrepreneur could receive a deduction on their income and/or corporate tax.
- Low-interest loans could be obtained by builders for sustainable investments in housing projects.

2 **Subsidies (stimulating):**

- Under the Location-Based Subsidies Decree 2005 (BLS), municipalities could receive subsidies for housing created through adaptive reuse.

3 **Simplification of building regulations (regulating):**

- From 2006, experiments were conducted with exemptions up to the level of 'existing construction,' or to the level obtained from a previous building permit for the building in question.
- For monuments, the Monuments Act applies, prioritising the preservation of the monumental character over compliance with the Building decree 2003. The municipality had the option to grant exemptions from new construction requirements, up to the exemption level indicated in the Building decree 2003.
- To increase transparency in building regulations, the Building decree was adjusted in 2007 so that the requirements for residential and non-residential buildings maintained a similar system where possible. An exception to this is safety requirements, such as fire safety, which are stricter for residential buildings than for non-residential buildings.

4 **Simplification of zoning changes and (temporary) repurposing and leasing (regulating):**

- As of January 1, 2008, the new Spatial Planning Act came into effect. This significantly shortened the procedure for plan preparation and approval. This is important for adaptive reuse, as objections from residents are generally rare.
- Temporary repurposing and temporary leasing were formalised and allowed for up to five years. The assessment against the Building decree was relatively less stringent. The Vacancy Act was introduced. A permit was required for temporary rentals under the Vacancy Act. For housing associations and commercial landlords, this permit could be extended for an additional five years.

5 **Use of Municipalities, the Central Government Real Estate Agency (Dutch acronym: RvB), and Housing Associations (stimulating):**

- Municipalities were encouraged to support adaptive reuse with various means. By incorporating flexibility into zoning plans, office locations can be easily converted from ‘commercial’ to ‘residential’. Such ‘dual’ zoning was made possible by the Spatial Planning Act.
- Municipalities could support adaptive reuse projects through BLS contributions or from their Urban Renewal Investment Budget (Dutch acronym: ISV).
- The RVB began a repurposing policy for surplus government buildings by initiating pilot adaptive reuse projects.

Policy After the Financial Crisis (2010 and Beyond)

Specifically, after the financial crisis of 2008, various legislative changes and additions have had an impact on adaptive reuse.

1 **Crisis and Recovery Act (regulating):**

— In 2010, the Crisis and Recovery Act was adopted. This legislation was initially intended to accelerate (construction) projects so that construction companies still had sufficient work during the economic crisis following the 2008 financial crisis. Subsequently, this legislation was used to allow for greater flexibility in dealing with the Building decree and zoning plans.

2 **Fiscal instruments (stimulating):**

— In 2011, the transfer tax for residential properties was reduced from 6% to 2%. This made it easier for first-time buyers to enter the housing market (Ministry of Finance 2012). It also made adaptive reuse to housing more attractive.

3 **Office Covenant (capacity building):**

— In 2012, a national office covenant was established for adaptive reuse or new use of vacant offices. The covenant primarily influenced local implementations by municipalities. In response to the national covenant, larger municipalities developed their own covenants and goals, either independently or in collaboration with market parties.

— Subsequently, the government worked on new legislation to address practical issues related to adaptive reuse, redevelopment, or demolition arising from the office covenant. The Transformation Expert Team was established. Initially convened for one to two years, the management of the Expert Team was later transferred from the Ministry of the Interior and Kingdom Relations (Dutch abbreviation: BZK) to the Netherlands Enterprise Agency (Dutch abbreviation: RVO). The Expert Team still exists in 2024.

4 **Urban Transformation Programme (capacity building):**

— The Urban Transformation Programme, initiated by BZK, implements the Manifesto for Inner-City Area Transformations, which was signed by various parties in March 2017. Government bodies, market parties, and knowledge institutions collaborate in this programme to accelerate adaptive reuse projects, understand and resolve common issues, and embed the acquired knowledge. The programme is funded by the Ministry of BZK, with large branch organisations. Platform31 is responsible for the programme's implementation, and Delft University of Technology (TU Delft) conducts research and ensures integration into education.

5 **National Transformation Plan (guiding/connecting/stimulating):**

— The Ministry of BZK informed the House of Representatives by letter that it aims to achieve 15,000 homes annually through adaptive reuse (see excerpt). To organise more implementation power to reach the targeted 15,000 homes per year and enhance the vitality of villages and cities, a National Transformation Plan has been established.

The approach fundamentally involves making performance agreements with regions and municipalities regarding the transformation of areas and properties into residential, commercial, and service uses. Knowledge and expertise will also be made more accessible through a National Transformation Portal.

— Additionally, already successful instruments will be continued and, where possible, strengthened. For example, the Transformation Facility will be increased from €22 million to a total of €80 million. The Transformation Expert Team also aims to encourage adaptive reuse. The team operates demand-driven, with its involvement always going through or in collaboration with the municipality. Other stakeholders in adaptive reuse can also engage the Expert Team. The government funds half of the Expert Team's involvement, while the municipality and/or joint stakeholders fund the other half

6 **Simplification of Building Regulations (regulating):**

— The 2012 Building decree was the first to differentiate between building requirements for new residential constructions and those for renovations or adaptive reuse. It mainly focused on establishing lower quality requirements from the perspective of usability.

— The Crisis and Recovery Act was applied and made permanent in 2014. The decision aimed to improve and remove bottlenecks within the environmental law system, make it easier to temporarily repurpose vacant office buildings, simplify regulation for family care homes, and simplify environmental permit-free construction. With the introduction of the decision, it became possible to obtain an environmental permit for plan-related activities to temporarily deviate from the zoning plan for up to ten years. Previously, this was five years.

— According to the Environmental Law 2014, it became easier to deviate from the conditions of the zoning plan. Additionally, the required duration of municipal procedures was shortened, giving municipalities more freedom to promote adaptive reuse. After a modification of the Environmental Decree (November 2014), the zoning plan also lost part of its effect. Although the municipality still had to approve all zoning changes, a zoning change request for adaptive reuse did not need to be accompanied by a spatial quality motivation, as was required before. This means that while the municipality could reject an adaptive reuse plan, it could not do so based on the (low) quality of the development.

7 **Environmental Law/Policy/Plan (shaping)**

— Under the Environmental Law, all levels of government, including municipalities, are required to establish an environmental vision. This is a strategic and long-term vision for the physical living environment. In the vision, the municipality can outline the adaptive reuse opportunities, which locations can be fully or partially transformed, and how. Once these (political) choices are made, they provide clarity and space for initiators and property owners. The environmental plan can then incorporate the vision on adaptive reuse.

26.4

Classification of Policy Instruments for Adaptive Reuse

The discussion of policy instruments for guiding adaptive reuse is classified in the table below (Table 26.2) according to the classification of spatial policy instruments by Heurkens et al. (2015).

TABLE 26.2 Classification of Government Policy Regarding Adaptive reuse to Housing

POLICY INSTRUMENT	
CATEGORY	ADAPTIVE REUSE TO HOUSING
Shaping	National Transformation Plan
Regulating	*Monument act:* experiment exemptions up to the level of existing construction (exemption from Building decree)
	Spatial Planning Act (WRO): simplification of zoning changes and (temporary) repurposing and letting
	Vacancy Law: temporary repurposing and letting for five years
	WRO: flexibility in environmental plans (dual zoning)
	Crisis and Recovery Act (Chw): flexibility with Building decree and temporary deviations from environmental plans regarding adaptive reuse, easier temporary repurposing of offices, and environmental permit-free construction
	Building decree: differentiation in building requirements for new homes and adaptive reuse homes
	Environmental Law Decree: zoning change request for adaptive reuse no longer needs to be accompanied by spatial quality motivation
	Environmental Law (Ow): environmental visions and plans with allocation of space for adaptive reuse
Stimulating	Transfer Tax (OVB) exemption for adaptive reuse
	VAT reduction for adaptive reuse
	Environmental Investment Deduction for sustainable business assets
	Low-interest loans for sustainable housing construction
	Location-based Subsidies Decree (BLS) for adaptive reuse homes
	Urban Renewal Investment Budget (ISV) for adaptive reuse projects
	Government real estate agency (Rvb): pilot adaptive reuse projects
	Reduction in Transfer Tax (OVB)
	Transformation Facility
Capacity Building	National (and local) Office Covenant
	Transformation Expert Team
	Urban Transformation Programme
	National Transformation Portal
	Housing Expert Team

It is notable that regulating, stimulating, and capacity building instruments form the core, with relatively little focus on shaping policy. Shaping policy is intended to provide consistent direction to market parties' decisions, in this case, to invest in adaptive reuse of buildings and areas for residential functions. A National Transformation Plan in its current form cannot (yet) be considered a cohesive spatial policy that can serve as a framework to align all existing policy instruments concerning adaptive reuse.

The diversity of expired and/or current policy instruments reflects an organic growth of the policy framework that responds to developments and demands from the market and society. A positive aspect of the numerous capacity building policy instruments is that the government demonstrates its recognition of these developments and demands. According to Heurkens et al. (2015), capacity building policy instruments are necessary to enhance the effectiveness of the other three types of policy instruments. Only when the national government understands what the market sector can, wants, and needs regarding investments in adaptive reuse can regulations be designed to positively influence their decision-making environment. Thanks to these 'connecting insights,' numerous regulating and stimulating policy rules and instruments have been devised to help market parties realise capacity building projects more quickly and cost-effectively. However, the current lack of a cohesive shaping government policy for adaptive reuse can lead to market parties being uncertain about the possibilities and opportunities of adaptive reuse projects, causing them to delay or waive decisions. This could jeopardise the continuity policy instruments for adaptive reuse, while a stable policy environment is essential for market parties to undertake long-term investments.

Given the many stimulating measures and specific legislative changes, it can be stated that the national government does indeed pay considerable attention to the market impact or market effects of shaping, regulating, and stimulating policy instruments. Therefore, it is too far-reaching to conclude that the government policy is ineffective simply because adaptive reuse does not deliver 15,000 homes annually. This depends on many more factors, such as local municipal policies regarding adaptive reuse and market conditions, including developments on both the demand and supply sides. However, it is advisable to continue evaluating government policy by assessing at lower (regional/urban) administrative and spatial levels to determine how provinces, municipalities, and market parties can translate government policy into feasible adaptive reuse plans and projects.

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27

Adaptive Reuse and Spatial Policy for Municipalities

Paul Kersten and Sander Gelinck

This chapter focuses on municipal policy regarding adaptive reuse, addressing the potential role of municipalities and the decisions that need to be made in adaptive reuse issues. Municipalities can stimulate adaptive reuse in various ways, depending on local political situations, market conditions, and their own role perceptions. It is always beneficial for municipalities to engage with the theme of adaptive reuse for housing, addressing vacancy, and maintaining the vitality of the built environment. The housing demand is significant, and speed is essential. Many people are looking for homes, and scarcity is increasing. New construction alone is insufficient. Adaptive reuse of existing buildings is crucial. Adaptive reuse provides immediate benefits, as it can proceed quickly due to the lack of complex land positions and land exploitation issues. Moreover, adaptive reuse offers long-term benefits for the housing market. The real estate market is dynamic, continually presenting new adaptive reuse opportunities. By responding to market dynamics through adaptive programming, municipalities can timely seize future opportunities

27.1

Opportunities for adaptive reuse in a nutshell

Adaptive reuse offers both quantitative and qualitative opportunities from a municipal perspective. Quantitative opportunities include adding several new homes, while qualitative opportunities involve increasing support for shops and combating urban decay.

Adaptive reuse responds to societal changes in the demand for space. Over the past decades, office vacancy rates have increased. While a significant portion of these offices has already been adapted, many office buildings remain empty, and new square metres continue to come on the market daily. Offices in business parks and office districts are increasingly being converted into housing. This requires adjustments to environmental features, such as adding amenities and bike paths.

In recent years, retail vacancy has increased, putting pressure on the central functions of many towns. Unlike vacant office space, many municipalities take the initiative to plan for the adaptive reuse of vacant retail space in central areas. This includes encouraging residential use of the floors above shops or replacing commercial buildings to create space for housing. Market conditions and innovative construction developments now offer more opportunities than in the past. Innovations, such as more efficient prefabricated building packages, reduce costs and construction disruptions for shopping areas. Adding more housing in the city centre is both a goal and a means to make the desired area transformation financially feasible. The creation of more housing in city centres helps maintain the economic health and liveability and promotes urban infill development.

Municipal adaptive reuse policy is most effective when it aligns with the local (market) situation. Therefore, policy can vary across different areas.

Unlike in the past, the impetus for adaptive reuse is no longer just an issue of vacant properties but the increasing housing shortage. This shortage is partly due to the high demand for housing for social support, sheltered living, care groups, asylum seekers, Ukrainian refugees, and other people urgently in need of housing. As new construction stagnates, the accommodation and housing of these groups are also stalled. Adaptive reuse can provide a solution for both. Permitting can often be expedited through short procedures and because there are usually few objections to addressing vacancy. Many adaptive reuse projects are small-scale and improve the immediate environment.

27.2

Knowledge of the local real estate market is more important than policy

To seize adaptive reuse opportunities, knowledge of the local real estate market is crucial. Therefore, it is essential for municipalities not only to have a good understanding of which buildings are currently vacant but also which ones are expected to become vacant soon. An analysis of vacancy and future space requirement can be the starting point for engaging in discussions with owners of vacant properties. What future do they envision for their buildings?

To acquire good local knowledge, municipalities can periodically conduct analysis for both specific areas and the municipality, either through their own monitoring or by utilising external sources. Real estate reports, brokers' portals such as Funda in Business, and real estate data are available for this purpose. Additionally, municipalities can actively contact real estate agents or choose to periodically visit and assess the area themselves. An important source of information can also be the Property Tax (Dutch abbreviation: OZB) register of the municipality, from which it is often possible to extract a list of properties not paying user-based OZB, as these properties are typically (partially) vacant.

Municipal adaptive reuse policy is most effective when it aligns with the local (market) situation and can therefore vary by area. Adaptive reuse is often custom-tailored as it depends on area and property characteristics. Therefore, a municipality must carefully consider which specific adaptive reuse policies to formulate and implement. However, it is often also a matter of practice.

27.3

Municipal Roles and Processes

Based on an analysis of the demand for and supply of space, a municipality can make a policy choice. The municipality has various tools to achieve spatial and sectoral policy goals.

The municipality always has a public-law steering role but can also choose a more active, stimulating role. This depends not only on the municipality's urgency regarding the realisation of adaptive reuse policy but also on available resources and implementation capacity. Due to the current housing shortage, more and more municipalities are opting for an active role, as a passive approach is insufficient for realising housing and accelerating adaptive reuse. The main steering roles are summarised in Table 27.1 and are explained below.

TABLE 27.1 Municipal steering and examples

STEERING ROLE	EXAMPLES
Steering by utilising own public real estate, setting a good example	Pilot small-scale commissioning with adaptive reuse of own social real estate
Steering from a public-law role and setting frameworks	Rights in spatial plans, spatial vision, regional housing agreements, performance agreements with housing associations
Steering through pre-investments in area transformation	Investments in prerequisites such as lighting, bike paths, public transport, and environmental impact mitigation measures, like the construction of (shared) parking garages
Steering through research	Conducting quick scans, environmental impact studies, and parking balance assessments
Facilitating by connecting parties and streamlining processes	Holding discussions with municipal managers, housing promoters, or office space coordinators; offering adaptive reuse portals and platforms, or initiating teams or control rooms
Steering through acquisition and leasing of real estate	Active land policy in area transformation, purchasing properties to address urgent housing needs
Steering from a public-law role with temporary possibilities	Anti-squatting arrangements, rental under the Vacancy Law, temporary permits

FIG. 27.1

FIG. 27.1 **Rotterdam school building transformed into housing**

Steering through the use of own public real estate – Setting a good example

Many municipalities take on a leading role by offering their own properties—those no longer used efficiently—to a housing association or commercial party for adaptive reuse. According to national vacancy statistics (Expertteam Vastgoedtransformatie, 2022), there is minimal vacancy in public real estate. However, in practice, schools, town halls, churches, community centres, and other buildings are often empty across the Netherlands. These are sometimes not entirely vacant but are used only a few hours per week for social functions. Upon closer examination, users can often find (sometimes even better) alternatives elsewhere, allowing these properties to eventually be vacated. Additionally, by creating new facilities that are more multifunctional and can be used by various social groups, other buildings can be transformed into housing.

Properties owned by municipalities offer interesting opportunities to achieve specific policy goals that are harder to negotiate with market parties. For example, Rotterdam has implemented DIY - do-it-yourself homes (Dutch: Kluswoningen) and assisted living arrangements in former school buildings in Leiden. According to research (Expertteam Vastgoedtransformatie, 2022), there are significant opportunities for housing development in public real estate in the coming years, particularly in school buildings in areas where households are "thinning out," such as in Vinex neighbourhoods and shrinking regions. The city of Rotterdam inventoried surplus public real estate for potential adaptive reuse and offered several school buildings as so-called "DIY homes". The base buildings are delivered by the municipality, allowing the buyer to arrange and/or carry out the interior work themselves.

Regulating through the public law role: providing clarity now and in the future

Municipalities have a public law role, which includes establishing policies that can be used to assess applications for environmental permits. In addition to the environmental plan, sectoral policy documents can also be important. Within this public law role, municipalities can proactively assign mixed-use designations to buildings, making adaptive reuse easier. For example, policies can reduce the requirements for parking and noise nuisance.

Part of the public law role also involves guiding with (spatial) visions. Municipalities can use these to anticipate for adaptive reuse. Establishing a spatial vision can be sufficient to initiate an adaptive reuse process. In addition to the environmental vision, relevant sectoral visions may include: a retail policy document, office vision, business park strategy, housing vision, and a housing care vision (mentioned in the Housing Act). Additionally, area-specific visions are important, such as a vision for the city centre. For example, in a business park strategy, a municipality can indicate which work locations could potentially develop into mixed-use residential and commercial areas.

It is desirable to include adaptive reuse as a fixed component in all these policy visions. The National Spatial Vision clearly emphasises the preference for urban development. However, it is not advisable to create extensive visions with additional policy requirements for each individual building. This can lead to unnecessary delays. It is beneficial for the municipality to have a vision for transitional challenges like shared cars, and for green or grey roofs on buildings, but not everything can or should be enforced through policy stacking. Developers, investors, and housing associations also impose their own requirements on a building. Municipal adaptive reuse policies and visions can provide direction for potential investments from owners and market participants.

Adaptive Programming, Every Change an Opportunity

Many municipalities and regions do not meet their housing construction planning. Hard plans are often less solid than hoped. Adaptive programming can then contribute to reducing the dropout of housing realisation, especially for people urgently seeking a home.

The term adaptive programming is relatively new and is used for new construction, but the instrument seems at least as applicable for adaptive reuse. It comes down to responding to market dynamics, which are greater for existing buildings than for unbuilt land. Municipal visions and programmes should therefore not only address current vacancy but also potential vacancy. Remarkably, almost all studies on adaptive reuse potential focus on current vacancy or buildings that have been vacant for more than two years, while a building that is rented today can be vacant tomorrow. Companies merge, shrink, move, and reopen continuously. At the same time, it is forgotten that new buildings will become vacant again tomorrow. In Leiden, the approach to urgent target groups addresses this issue. From the urgent target groups programme, office buildings that became vacant due to relocation were immediately designated for adaptive reuse.

Many legal changes regarding offices and homes are announced that can be anticipated before they come into effect. Think of the decision that from 2023 offices must have at least energy label C to be rented out, and even stricter legislation is on the way. For example, offices that will be adapted or demolished have a two-year postponement to comply with the energy label obligation.

This means that vacancy can already be partly estimated. Adaptive reuse policy is about future vision. By estimating the need for offices, business space, and social real estate, it can be predicted where opportunities will arise. The report "Transformation in Figures: Present, Past, and Perspective" (Expert Team Real Estate Transformation, 2022) provides insights for this. It shows that there is much more potential for adaptive reuse into housing.

Municipalities formulating policy on where adaptive reuse is and is not allowed, can anticipate future adaptive reuse opportunities, and stimulate market dynamics. In the middle of a shopping centre, adaptive reuse on street level is often not desirable. By including, in policy, that retail properties on the edges of shopping centres and solitary retail properties may be transformed, adaptive reuse can be acted upon. In The Hague, for example, the Retail Note distinguishes between the main shopping structure, where adaptive reuse on the ground floor is not allowed, and stretch-and-shrink areas outside the main structure, where it is allowed.

Guiding Through Pre-Investments in Area Transformation

It can be sufficient to plan for allowing residential use in specific areas to kickstart an adaptive reuse process. Municipalities can further encourage adaptive reuse by making pre-investments in the living environment and accessibility of the area. If an industrial area is gradually transforming into a mixed-use residential area, it is desirable and even necessary to develop a pleasant and safe environment for current and future residents. Property owners and developers rely on municipalities for this. Consider investments in bike and pedestrian paths, playgrounds, public transport, meeting places, and other amenities. For adaptive reuse in city centres parking often presents a challenge. Here too, municipalities can anticipate future adaptive reuse by supporting a collective parking solution. At the level of individual objects, it is often not feasible to resolve parking issues effectively. In practice, municipalities can usually pass these above-plan costs on to developers once they propose their initiatives.

FIG. 27.2

FIG. 27.2 **Bruishuis Arnhem**

Facilitating by Connecting Parties and Streamlining Processes

Municipalities can also stimulate adaptive reuse through personnel capacity and persuasion. Ten years ago, so-called office liaisons and activation teams demonstrated how empty office buildings could be successfully converted into housing. Today, facilitating or stimulating often involves bringing together parties around local market knowledge. A good example of this is the role of city centre managers who work to fill vacant retail spaces. They actively combat vacancy by matching the local demand for small or less affluent tenants with empty properties. This approach results in rental income, satisfied users, and more vibrant city centres. This is also the case with residential projects above shops and initiatives like the Bruishuis in Arnhem. Such projects illustrate that adaptive reuse is highly suitable for addressing needs or groups that might otherwise be overlooked, such as supported housing and emergency housing. The Volkshuisvesting Arnhem project highlights the significant hidden demand for space, both from commercial and non-commercial users, even in neighbourhoods far from the city centre.

Additionally, streamlining internal municipal processes is seen as a crucial step by market parties. It is essential for the municipality to organise its internal structure so that all departments with spatial responsibilities can facilitate market parties as effectively as possible and within the set deadlines.

Experience shows that it is important to provide clarity about the policy before applying for an environmental permit. Clear guidelines are essential for developers to make decisions about adaptive reuse projects. Developers appreciate it even more when the municipality provides clarity on key points through quick scans and checklists prior to an environmental permit. These quick scans offer a preliminary assessment of whether the proposed plan or design meets municipal requirements (see Table 27.2). In such quick scans, the municipality provides an initial evaluation of whether adaptive reuse or demolition-rebuild initiative can be aligned with existing laws and regulations. This includes urban planning requirements, the possibility of adding floors, balconies, and cantilevered elements, and compatibility with considerations such as air quality, noise, external safety, sustainability, and parking/mobility.

TABLE 27.2 Example of a section of advice from a steering committee (municipal planning assessment desk) for evaluating a general adaptive reuse plan

2.1	**Does the initiative align with the relevant housing visions?**	(green)	Yes, there is a need for apartments; there is a shortage in this location.
2.2	**Does the initiative meet traffic engineering requirements? If not yet assessed, is responsible traffic engineering integration possible?** ((entry and exit points, parking spaces on site and in the area, crosswalks, adequate bicycle parking, loading and unloading areas, car-sharing, accessibility, fire brigade).	(green)	Yes, it complies with parking standards. The traffic situation remains unchanged.
2.3	**Is the initiative feasible and desirable within the 'green' frameworks?** (tree removal, Flora and Fauna Act, Nature Conservation Act, preservation of green, etc.)	(orange)	Green space should be added in line with the housing along the street, and the sidewalk should be extended.
2.4	**Does the initiative impact public space, and is this acceptable?**	(orange)	Yes, it is approved, provided it aligns with the structure.
2.5	**Is the initiative appropriate within the historical framework and/or are there any monuments involved?**	(green)	Yes.

Such quick scans allow municipalities to contribute to solutions and empathise with market parties in adaptive reuse projects. They also enable municipalities to engage with owners of vacant properties and properties with illogical uses in advance.

Steering by Acquiring Real Estate

The most extensive form of intervention occurs when a municipality acquires real estate to realise adaptive reuse projects. This is particularly relevant when political and social ambitions are not quickly enforceable. Given the housing shortage and the associated urgent challenges, this is often the case. Nowadays, municipalities are increasingly adopting this approach, often through so-called breakthrough teams. These teams purchase or rent properties to achieve specific objectives within a very short timeframe. An example is the Hoefkwartier in Amersfoort, where the municipality acquired two office buildings to house Ukrainian refugees. In 2023, the municipalities of Almere, Haarlemmermeer, and The Hague also purchased properties for these urgency groups.

Another reason for a municipality to opt for acquisition is if the risks and costs are lower when the municipality itself undertakes the adaptive reuse. Municipalities can more easily apply for and receive subsidies, benefit from lower interest rates on loans, and mitigate political risks. This is often the case with complex area transformations where the market is hesitant, and development time is long.

Municipalities can also enforce adaptive reuse through the Municipal Preferential Rights Act (Wvg) and the Vacancy Act. The Vacancy Act allows for requisitioning properties that have been vacant for more than twelve months through a Vacancy Ordinance and a vacancy register. Few municipalities have a vacancy register, and the requisition tool is rarely or never used, as the Vacancy Act has only been in place since 2009, and requisition has not been found necessary in many places. This is due to the significant impact of requisition and the relatively low vacancy rates in many areas. The municipality of Amsterdam is currently ahead of the rest, having included the option to requisite vacant properties with a residential designation in its Vacancy Ordinance. Given the housing shortage, discussions about using vacancy ordinances are increasingly taking place. Key municipal conditions for actively purchasing property for adaptive reuses are listed in Table 27.3.

TABLE 27.3 Municipal Conditions for Property Acquisition for Adaptive reuses

Financial Resources	The municipality must have sufficient financial resources to finance the purchase, adaptive reuse, and associated costs. The "bathtub" (i.e., the initial investments) needed to start complex area adaptive reuses is too deep for many municipalities. With rising municipal care costs (homeless sheltering in hotels, implementation of social laws, etc.), purchase is cheaper than letting the housing shortage continue, which requires smart budgeting.
Knowledge	Expertise in several crucial areas is necessary. There should not be a significant dependency on external parties. Regional cooperation can provide a solution. At the same time, provincial and national support teams are available to assist with the process. The process involves market consultation, valuation, tenders (Didam ruling), calculations and designs, participation, and restrictions from the Market and Government Act.
Vision	A clear vision regarding when properties are acquired is important. The market will become much less active if the municipality intervenes unexpectedly multiple times.

Municipal Choices for Temporary Adaptive reuse

In addition to using the above-mentioned steering tools, municipalities also have choices to allow market parties room for temporary adaptive reuse. Instead of a permanent environmental permit (an out-of-plan environmental activity), it is possible to use the following three options for temporary adaptive reuse or conversion. The difference with temporary adaptive reuse is not only the duration, but also the speed with which execution can be achieved, and the lower requirements for the building and its surroundings. Table 27.4 provides an overview of municipal steering options for temporary adaptive reuse.

TABLE 27.4 Municipal Steering Options for Temporary Adaptive reuse

Anti-squatting Regulation	The anti-squatting regulation pertains to vacant buildings that are temporarily used (partially) for habitation or other functions. With anti-squatting, a loan agreement/anti-squatting agreement is made between the users of the building and the owner or manager. Under this agreement, various rental rights that a tenant would have under a regular lease (such as rental protection) do not apply. A lower fee is owed for a loan than for a lease.
Use for Temporary Habitation under the Vacancy Act	Renting under the Vacancy Act involves entering into a temporary lease agreement for up to ten years. Here, rental protection rules (regarding residential space) do not apply. Instead, the mandatory provisions of the Vacancy Act regarding rental protection are in force. To rent under the Vacancy Act, a permit is required, the building must have the correct zoning, and it must meet certain criteria. The landlord applies for this permit with the municipality.
Environmental Permit for Temporary Use	Under the Environmental Law, a permit for temporary use can be requested for up to fifteen years, deviating from the zoning plan, while adhering to existing building requirements. Noise regulations for residential use do not need to be met, but an acceptable living environment must be ensured. An alternative is an environmental permit with a lodging destination, which has stringent requirements for escape routes but does not require compliance with noise regulations from the Noise Abatement Act. This can be used for various groups such as refugees, seasonal workers, and international students.

The steering options listed in Table 27.2 are often used to quickly realise housing projects. When transforming an area into a mixed-use residential-commercial environment, it is common to gradually change the area's character with temporary uses. Buildings can be temporarily utilised with a mix of functions before demolition. Homes for pioneers can also contribute to placemaking, putting the area on the map. Pioneers accept that an environment may not yet meet (spatial-functional) standard levels. However, attention must be paid to the quality of the housing. There are missed opportunities in this regard. Few municipalities stimulate the adaptive reuse of buildings or collaborate with market initiatives. Knowledge of the possibilities is often lacking, and there are poor precedents. Many more opportunities could be seized by setting the right conditions for an acceptable living environment and desired function mix. This can be done by using legal possibilities without compromising the business climate.

27.4

Conclusion: Prioritisation and Subsidies

Municipalities have a range of tools available for adaptive reuse. It is important to make choices about how to use these tools. If needed, the Expertteam Woningbouw (RVO) and provincial flex-pools assist with this. Adaptive reuse also requires municipal personnel capacity. Since it is not always possible to predict when buildings will become vacant and because buildings may be spread across the municipality, capacity planning often does not account for this. It is essential to consider adaptive programming and allocate capacity, accordingly, especially given the current high housing demand and stagnation in new construction. Finally, subsidies and financial arrangements are available for adaptive reuse, including subsidies for monuments, focus groups, and sustainability.

Accountability

In 2021, Members of Parliament submitted a motion calling for a more active approach to adaptive reuse of vacant buildings. In response, the national government developed a National Transformation Plan (see chapter 26) to accelerate housing construction. To support this plan and encourage municipalities to implement it, the Expertteam Woningbouw (part of RVO) produced the report 'Transformatie in cijfers: heden, verleden en perspectief' and the guide 'Transformatie en ruimtelijk beleid'. This chapter relies on both publications and is also based on personal experiences and knowledge, including insights gained from working with the Expertteam Woningbouw.

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Projects

Hilde Remøy, Roeli van Venrooij & Thomas Snoek

To address the housing shortage, approximately 90,000 new homes need to be added to the housing stock annually. Transforming vacant buildings and repurposing them into housing contributes to solving this issue. Society now imposes higher sustainability standards than before, including requirements for lower energy consumption, better management of construction materials, and reduced waste production. Adaptive reuse aligns with these sustainability requirements. The transition to a circular economy, requires increased attention to reusing construction components and materials. While this is happening more frequently, it is still not widespread. Before the 2008 financial crisis, adaptive reuse was less common. Vacant buildings were often demolished rather than transformed. Nowadays, completely new construction projects are more the exception than the rule, and the shift toward repurposing reflects the changing societal demands.

Project Selection

Selecton criteria

Between 2015 and 2022, the number of homes added annually through the adaptive reuse of existing buildings ranged from about 10,000 to over 12,000. This project documentation aims to showcase the variety of projects that have been realised. The following criteria were used for selecting these projects:

- Realised or under construction
- Spread across provinces, from cities to villages and rural areas
- Various original building year
- Including both cultural and industrial heritage as well as newer buildings
- Various sizes
- Adaptive reuse started no more than ten years ago
- New function: housing for various target groups and housing as part of a multifunctional development
- Different former functions
- Different organisational forms
- Available information (documents, willingness of involved parties for an interview)

Data collection

For the detailed project documentation, the client and/or the architect were interviewed, and available documents were analysed. An interview protocol was used as a guideline for the discussions. In each conversation, all phases of the construction process were reviewed with the interviewee, from initiation and programme to design, execution, use, and management. Prior to the interviews, we gathered as much information as possible about the project through articles in professional magazines and via the internet. The NRP database (www.nrp.nl), our own networks, and the networks of the authors and editorial board members were key sources of information about the projects. Parties involved in the projects were very willing to share information. An exception was data on costs. It proved difficult to obtain information about acquisition and adaptive reuse costs. We were also unable to access financial feasibility studies and the methods of calculation (such as key figures, budget basis, cash flow calculations). While this is understandable, it is also unfortunate as financial feasibility is frequently cited as an obstacle to starting an adaptive reuse project. For the cost data that was collected, it was not always clear which cost items were included in the figures. Even direct stakeholders often could not trace this information.

Project Documentation Setup

For each project, a standard format was used. Broadly, the aim was to achieve a good balance between"

- describing (factual data), analysing (noting observations and raising questions), and evaluating (reflecting on project-specific and general lessons).
- documentation and analysis of both the product (location, building) and the process (all phases undertaken, information about relevant actors).
- hard and soft factors, including functional, technical, cultural, financial, legal, organisational, and sustainability aspects.

Lessons from the Projects

The selected projects provide insight into various aspects of adaptive reuse. Below, we outline several lessons learned from these projects, discussing them by aspect..

Feasibility

The lessons learned from the projects highlight various feasibility considerations. Project examples, such as the VB building, demonstrate that successful adaptive reuse often involves strategic collaborations between private parties and between private parties and government entities (typically the municipality and sometimes the RCE).

Successful adaptive reuse relies on balancing historical respect, sustainable innovation, programme flexibility, strategic collaborations, and stakeholder engagement. Successful adaptive reuse requires a holistic approach to harness the potential of each building, thereby providing a valuable addition to the urban environment

Project analyses reveal that local parking standards often pose a barrier, despite the potential for residential adaptive reuse. To address this issue, flexibility and differentiation in planning are essential.

Another challenge is the delay of projects due to objections from the surrounding community. It is crucial to proactively and early involve the municipality and stakeholders in the process. This can help prevent objections and generate valuable insights and support for the project. Often, public buildings or buildings with collective functions (offices, schools, etc.) are transformed into residential units. While residential properties inherently have a more individualistic character compared to public buildings, public buildings are still well-suited for conversion into housing. This is, of course, due to technical reasons; typically, public buildings often have larger structural dimensions and high ceilings, which makes them suitable for adaptive reuse. Additionally, such buildings are often valued by society for their historical and cultural significance. Buildings like churches, factories, and schools have developed a certain experiential value over their existence.

In some cases, adaptive reuse is only feasible as part of a larger project. For example, incorporating new construction as part of the project can help meet parking requirements. Conversely, an adaptive reuse project can sometimes enable another project, either by generating profit from housing sales (as seen in the Museum EICAS project in Deventer) or by creating parking facilities within the building being transformed (such as in the Veemgebouw project in Eindhoven).

Sustainability

The analysed adaptive reuse projects reveal various approaches to sustainability, with several common themes. Many projects aim for sustainability by incorporating reusable materials. Several projects have considered the adaptive possibilities of the building, allowing it to be adjusted to future changes and potentially accommodate various functions. For example, the Heilig Hartkerk in Breda was developed with the possibility of reversing 90% of the modifications, while in Enter Amsterdam, the apartment layout can be adapted to potential changes in residents' housing needs.

Ecological conservation is highlighted through the creation of bat habitats and the implementation of green roofs. Various sustainable installations, including solar panels, underfloor heating, and gas-free constructions, are used. Insulating (monumental) facades presents a challenge, with many projects employing a common solution: interior wall insulation. In practice, transformed buildings often lack a sustainability certification.

There is relatively little use of the exceptions for adaptive reuse projects in the Building Code (from 2024, BBL, Environment and Planning Act). In most respects, transformed buildings meet the new construction requirements of the Building Code.

Collaboration is crucial for sustainability, especially for reusable materials and sustainable installations (ranging from contractor expertise to feasibility, through communication with architects, developers, and residents). However, the involvement of sustainability experts varies between projects, depending on the amount of knowledge the project parties have in-house.

The tension between preserving historical elements, innovation, reuse, efficiency, and lifespan highlights the complexity and importance of custom solutions in the example projects. Preserving historical features is often desired, while there is also a push to generate sustainable energy through modern additions like solar panels. The pursuit of reuse conflicts with the need for new sustainable installations. Reusing materials contributes to sustainability but introduces challenges in the design and construction process.

Perspectives

Looking at the design phase of various adaptive reuse projects, parties prefer to work with the delivery model over early-contractor involvement through an integrated contract. Early technical evaluations can be conducted, such as having the building fully measured before the architect begins designing. By bringing this evaluation forward, the architect has knowledge of the existing building from the start, allowing technical complications, such as dimensional discrepancies or the presence of asbestos, to be identified early on. This minimises unexpected obstacles and delays during the adaptive reuse process. Additionally, the communication is more effective when parties collaborate from the beginning, as the lines of communication are shorter.

The involvement of the municipality plays a crucial role in aligning the adaptive reuse programme with the context. Good communication with the municipality is essential, especially given the lengthy permit procedures and potential objections from the local community. Active collaboration and open dialogue with the municipality can facilitate and potentially expedite the permit process.

Additionally, involving residents is important, particularly in the development of culturally and historically significant buildings with substantial experiential value. Engaging residents is necessary to understand their needs and increase support for the project.

Early involvement of future residents in the process can help prevent challenges in the use of the space. In self-build projects, the shell (facades, walls, floors, and/or installations) is shared. After the shell is completed, residents continue to build out their own homes. Promoting constructive collaboration among all stakeholders, including the municipality, residents, and future occupants, contributes to the success of the adaptive reuse project and strengthens community ties.

Concluding

For this book, fifteen adaptive reuse projects were analysed. These projects serve as examples of the vast variety of projects realised over the past decade. Based on this, the findings cannot be generalised. However, the examples and lessons should serve as inspiration and evidence that adaptive reuse can be successful in many different contexts and with many different starting points.

Heilig Hartkerk

Adaptive reuse of Former Church into Housing

The Heilig Hartkerk, decommissioned in 1985 and recognised as a national monument in 2002, has undergone a remarkable transformation. The project exemplifies a careful balance between heritage preservation, urban planning, and sustainability (H. Hart van Jezus Breda n.d.). This complex redevelopment journey has spanned decades, addressing historical, architectural, and community challenges while incorporating modern residential functionality.

CHARACTERISTICS	
Location	Baronielaan, Breda
Completion of Original Building	1901
Completion of Transept, Choir, and Side Chapels	1931
Original Function	church
New Function	residential
Owner	private ownership by residents
Architect	Architecten HMV
Developer	VolkerWessels in collaboration with MeMo Projectontwikkeling
Contractor	De Bonth van Hulten
Completion of Adaptive reuse	2023
Duration of Process	1985–2023
Original Size	1.497 m^2
Number of New Residences	20
Type of Residences	appartmens, 50-230 m^2
Added New Construction	balcony on the church and a new building next to the church
Potential Future Value	(semi)public function. 90% of modifications are reversible

FIG. P.1.1

FIG. P.1.1 **The Heilig Hartkerk after adaptive reuse to residential, Breda (2023)**

FIG. P.1.2 **Ground Floor Plan – Total Plan**

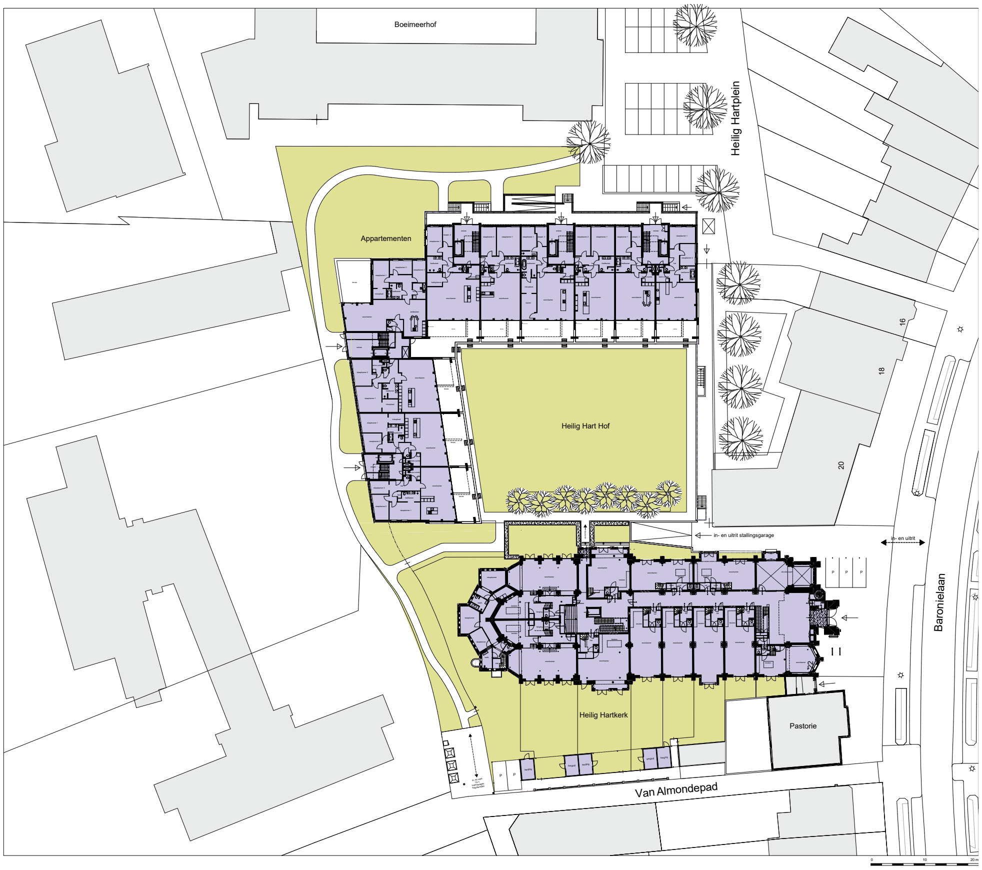

FIG. P.1.2

Initiative and Project Principles

At the beginning of the 20th century, the Bredasche Bouwgrond-Maatschappij, the owner of a large plot of land along Baronielaan, believed that constructing a church would stimulate the sale of adjacent plots for residential development. As a result, land on the western side of Baronielaan was sold to the diocese at a favourable rate, leading to the establishment of the Heilig Hartkerk. Designed in an elegant neo-Gothic style by architect P.J. van Genk, the church was built in phases between 1900 and 1930. It is now part of a designated protected cityscape. According to Rijksmonumenten.nl, "The church plays a significant role in the city's silhouette, especially in the appearance of Baronielaan. It serves as a neighbourhood landmark, with the alignment of streets and the overall view of Baronielaan deriving a distinct character from the towering church spire."

A chronological exploration of the church's history reveals periods of active use and neglect. Decommissioned in 1985, the church was subsequently purchased by Woonzorg Nederland. After its religious function ended, the building was occupied by squatters for several years. In 1995, an application for monument status was denied. Shortly after, Woonzorg Nederland applied for a demolition permit, which was granted the same year. However, the local community filed an appeal with the Council of State, which ruled in their favour. In 2002, the Heilig Hartkerk was finally granted national monument status.

In the early 1990s, local architecture firm Architecten HMV took the initiative to explore plans for repurposing the church. The firm faced numerous challenges, including securing funding, finding interested parties, and generating community support for a proposal.

Over the following years, several proposals were made. A major obstacle for all plans was the lack of a parking solution. Given the high parking demand in Baronielaan, these proposals frequently met resistance from residents. A new opportunity arose in 2012 when it became clear that the adjacent school, Heilig Harthof, would be vacated. The school building was purchased by the development company VolkerWessels. By demolishing the former school, space was created for the construction of an apartment complex and a parking garage, which the church could also utilise. This allowed the adaptive reuse of the church and the new construction to be approached as a single project, resolving the parking issue.

Between 2013 and 2016, a plan was developed to give the church a multifunctional purpose, including offices, a health centre, a restaurant, and a daycare centre in the adjacent rectory. While an environmental permit was issued for this plan, it faced objections from residents concerning reduced sunlight and obstructed views due to the new construction. A lengthy appeal process, which reached the Council of State (where the objections were ultimately dismissed), and the ongoing financial crisis caused potential tenants to withdraw. As a result, the financial foundation of the entire project collapsed.

FIG. P.1.3 **Heilig Hartkerk, Section AA**

FIG. P.1.4 **Heilig Hartkerk, Section BB**

FIG. P.1.5 **Heilig Hartkerk, Ground Floor Plan**

FIG. P.1.6 **Heilig Hartkerk, First Floor Plan**

FIG. P.1.7 **Heilig Hartkerk, Second Floor Plan**

FIG. P.1.8 **Heilig Hartkerk, Third Floor Plan**

Prolonged vacancy led to significant maintenance issues in the church, and the risk of losing the building increased daily. Pressure mounted among all stakeholders—Gemeente Breda, Woonzorg Nederland, VolkerWessels, and HMV Architecten—to find a viable solution. In consultation with the municipality, a decision was made in 2018 to convert the church into residential units. In a relatively short period, an adaptive reuse plan was developed in collaboration with the municipality and the Cultural Heritage Agency of the Netherlands (Rijksdienst voor het Cultureel Erfgoed, RCE).

The entire adaptive reuse process, from initiation to completion, ultimately spanned approximately three decades..

Programme, Target Group, and Feasibility Study

Both architectural and functional modifications were implemented to achieve the project goals. By integrating the adaptive reuse of the church with the new construction on the site of the demolished school and the newly built parking garage, parking facilities were developed collectively, more than meeting the municipal parking standards.

The programme was developed through an iterative design process and feasibility studies. Key steps included conceptual designs, financial evaluations by the contractor, and defining the sales programme in collaboration with the real estate agent. Based on these outcomes, adjustments and optimisations were made. For example, the initial concept preserved the baptistery on the south side, but financial feasibility required its demolition to create space for a new apartment. In contrast, the Mary Chapel on the north side was preserved and repurposed as a devotional chapel accessible to visitors from outside.

No specific target group was defined for the project. Instead, the design and repurposing were guided by the characteristics of the existing building and its monumental value. In the early stages, social housing was considered but ultimately dismissed following the feasibility study. To align the apartments with the historic building and ensure financial viability, larger apartments targeting the high-end market were chosen.

The final programme included 20 unique and luxurious residences, ranging from studios to spacious apartments, catering to a diverse group of residents. Each unit was allocated at least one dedicated parking space in the adjacent new underground garage.

During the programme phase, early contact was established with the municipality. The Cultural Heritage Agency of the Netherlands (Rijksdienst voor het Cultureel Erfgoed, RCE), the municipality, and the Heritage Commission were directly involved. Collaboration was intensive, and any challenges were addressed collectively whenever uncertainties arose.

FIG. P.1.3

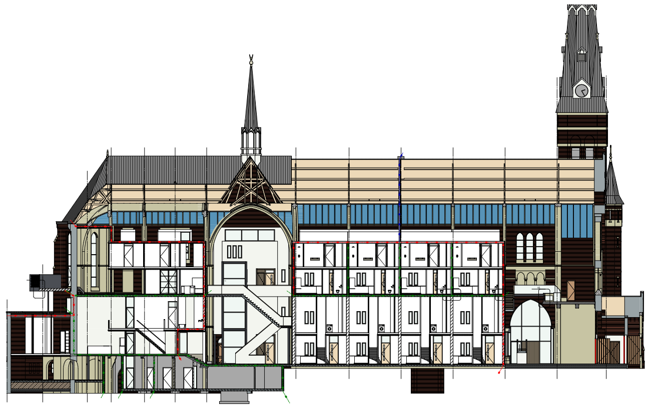

FIG. P.1.4

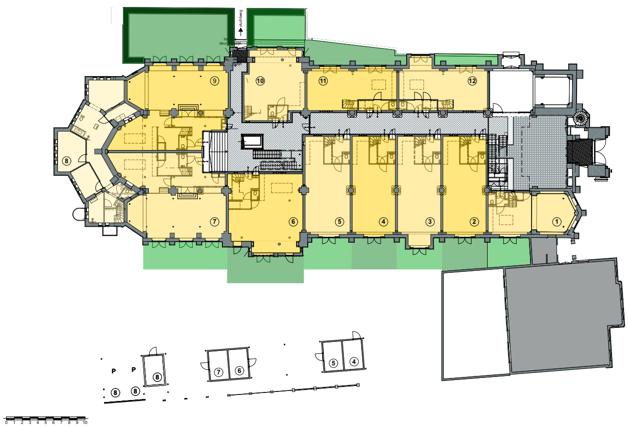

FIG. P.1.5

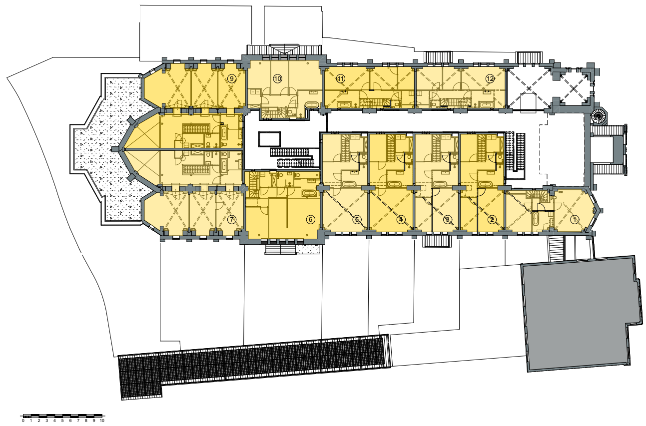

FIG. P.1.6

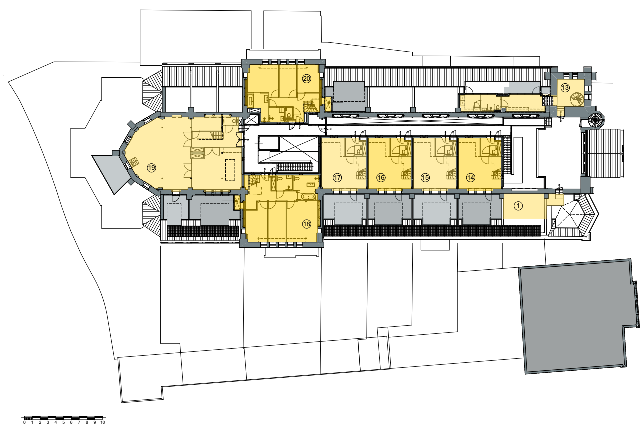

FIG. P.1.7

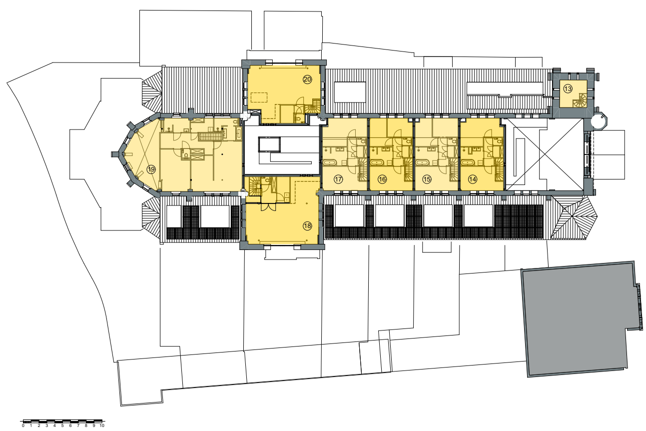

FIG. P.1.8

Design phase

Architects HMV embarked on the ambitious adaptive reuse of the Heilig Hartkerk, reimagining it as a unique and contemporary residential community. The redevelopment design process presented creative challenges, as the architects sought to balance preserving historical features with introducing modern elements. The neo-Gothic style and original monumental details were carefully conserved and restored. Stained glass windows, vaulted ceilings, and other distinctive features were thoughtfully integrated into the new design. To adapt the church for modern living, contemporary elements were added. The spatial layout, insulation, and individual residential units were meticulously planned and incorporated into the design. Insulating a monumental church presented constraints; therefore, insulation was applied only where feasible and justifiable, and primarily out of sight. Because the church is a national monument, the design was made reversible, allowing the building to be restored to its original state in the future if desired.

The municipality played an active role in the construction team, maintaining close involvement throughout the process. A pivotal milestone was the rezoning of the church's function, executed under the framework of the Crisis- en herstelwet (Crisis and Recovery Act). This allowed for procedural acceleration of the environmental permit application (see chapter '4. Temporary Transformations by SHS Delft') through the coordination provision of the Spatial Planning Act (Wet ruimtelijke ordening). The mutual understanding among all parties, including the municipality—participating in a construction team for the first time—proved crucial. The municipality served as both an advisory and supervisory body, granting exemptions for deviations from the Building Code, such as the non-level access to the terrace.

Procurement and Construction

The adaptive reuse of the Heilig Hartkerk involved various components, ranging from structural modifications to heritage preservation. The construction team, comprising the architect, main contractor De Bonth van Hulten, several subcontractors, and the municipality, collaborated closely to share expertise. From the design phase, the installer was actively involved, contributing to the seamless integration of all systems. During the construction phase, the municipality provided support through the building inspector and the Heritage Department.

The spatial structure underwent significant changes to convert the original open space into individual residences. This included the installation of floors, partition walls, and the repositioning of entrances. The restoration of historical elements—such as the elevated platform where the tabernacle and altar once stood, as well as the organ balcony—required meticulous attention to detail to preserve the building's historical value.
Several challenges arose during construction. For instance, the plan for a residence in the church tower was developed using a 3D scan. The church facade was found to be 15 centimetres off vertical alignment. Combined with structural adjustments, there was insufficient height for the planned spaces. This issue was resolved by adding an extension to the roof. The project's complexity underscored the importance of accurately documenting information to prevent data loss.

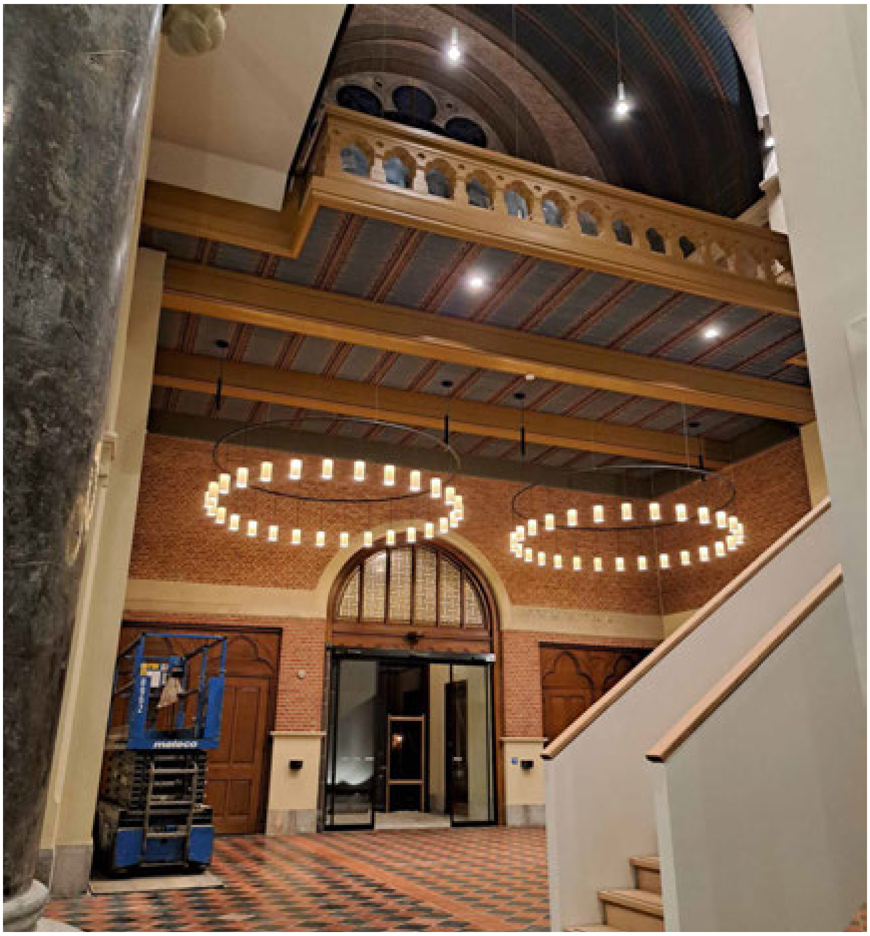

FIG. P.1.9

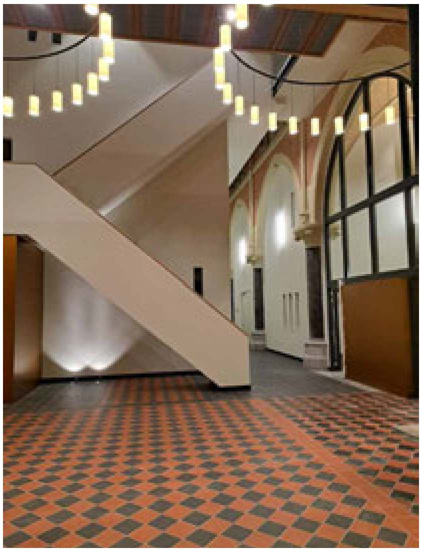

FIG. P.1.10

FIG. P.1.11

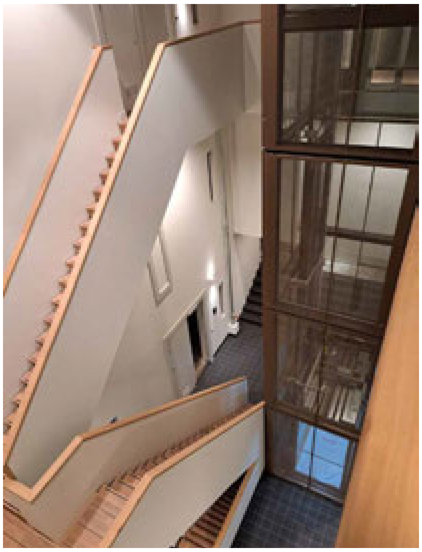

FIG. P.1.12

FIGS. P.1.9 and P.1.10 **Entrance**

FIGS. P.1.11 and P.1.12 **Stairwell and Landing**

FIG. P.1.13

FIG. P.1.14

FIG. P.1.13 and P.1.14 **Eastern facade long side: Restoration and renewal of windows and solar panels**

Compared to a new construction project, the demand for additional work was higher, largely due to specific buyer requests. The architect's design covered all work on the structural shell as well as the complete new interior build-out, including provisions for radiator placement, plumbing, and kitchens. During the final year of construction (2023), a new challenge arose due to significant price increases for building materials.

Both the developer and the contractor had prior experience repurposing churches into residential spaces, which proved invaluable. Their expertise, combined with the involvement of all parties from the outset and close collaboration within the construction team, was essential to the project's success. This approach would likely have been less feasible with a traditional procurement process based on highly competitive pricing.

Completion, Use, and Management

A Homeowners' Association (Vereniging van Eigenaren, VvE) was established in parallel with the sales process. Throughout the project, future homeowners were regularly welcomed to the Heilig Hartkerk, where they could observe the progress of their new residences up close every eight weeks. These gatherings were attended with great enthusiasm, highlighting the buyers' engagement and connection to the project.

Regarding the adjacent school, this property was acquired by VolkerWessels. The new-build apartments on this site were developed by its subsidiary, Van Agtmaal. Woonzorg Nederland transferred ownership of the church to the buyers, marking the final stage of the redevelopment process. The success of the adaptive reuse project garnered recognition and appreciation, including a nomination for the BLASt Prize of Breda. This award underscores the architectural quality and innovative approach of the repurposing process.

Sustainability

Where possible, sustainability ambitions were pursued. The second-floor separation floors were constructed from concrete, while the underlying load-bearing structure and partition walls were made of calcium silicate blocks. From the second-floor level upward, a steel structure was used in combination with timber frame construction (HSB). Efforts were made to source sustainable materials, though no specific sustainability experts were involved. Most of the expertise came from within the architect and contractor teams.

The renovation concept was designed for a permanent adaptive reuse, with the flexibility to remove the interior fittings if needed. Approximately 90% of the interventions could be reversed, as the load-bearing elements were detached from the church structure, with only a few anchoring points for stability. This approach ensures the church could potentially be restored to its original state and remains adaptable for future functional changes. As part of ecological preservation efforts, a bat cellar was constructed beneath the church. Solar panels were installed with the municipality's approval. However, it was not possible to fully insulate the building due to its massive masonry and the need to preserve the church’s interior ambiance. Despite these limitations, sustainability standards were met, with most residences achieving an energy label of A. Traditional central heating systems were used, as heat pumps at the time (2018) were not considered efficient enough.

Reflection and Future Value

Although all the residences have been sold and the project is considered a success, questions arise regarding whether the building is equally suited for residential use as it was for its original public function. In this context, it is noted that residential use may not be the most ideal purpose for a church building. A more community-oriented function is often regarded as more appropriate, as residential use can diminish the building’s monumental character. Preserving the original features, architectural value, and historical characteristics is therefore essential to maintaining the integrity of the church. The adaptive reuse was guided by the principle that approximately 90% of the alterations can be reversed, thanks to a detached load-bearing structure and a few anchoring points for stability.

Churches in the Netherlands are rapidly losing their original functions. While a societal purpose may not be feasible for all church buildings, transforming them into residential properties can address the growing demand for housing, particularly in a niche segment. Despite the three decades required to complete this project, there is an overwhelming sense of satisfaction with the final results and the complex yet rewarding journey of the adaptive reuse process.

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Conversation with Gerhard Vermeulen van Architecten HMV, november 2023.

Photography: Architecten HMV

Veemgebouw

Adaptive Reuse of a former Philips warehouse to parking and housing.

The Veemgebouw, a striking 'striped' building from 1942 located in the Eindhoven Strijp-S area, was acquired by the housing association Trudo in 2009. Between 2013 and 2015, the building underwent a renovation to accommodate a new mix of functions (Trudo 2023). In 2021 and 2022, Trudo added 39 apartments on top of the ten floors of the Veemgebouw: 19 studios, 19 maisonettes, and a three-story house, all surrounding a green courtyard on top of the existing warehouse. After the adaptation, the building now consists of thirteen floors.

CHARACTERISTICS	
Location	Torenallee, Strijp-S, Eindhoven
Completion of Original Building	1942
Original Function	Philips warehuis
New Function	Commercial facilities, cultural activities, parking, and residential
Owner	Trudo
Architect	Caruso St John Architects; Executive architect V/architecten
Contractor	Stam + De Koning Bouw
Completion of Adaptive reuse	2021
Duration of Process	2008–2023
Number of New Residences	39
Type of Residences	appartments, studios and maisonnettes 50-120 m^2
Newly added construction	Addition of floors
Investment costs	€36m excl. VAT
Potential Future Value	Combining or reducing residences, further transforming parking levels if resident parking needs decrease.

FIG. P.2.1

FIG. P.2.2

FIG. P.2.3

FIG. P.2.1 **Veemgebouw**

FIG. P.2.2 **Veemgebouw, Aerial view**

FIG. P.2.3 **Veemgebouw Philips before Adaptive Reuse**

History and Location

The Veemgebouw, together with the adjacent buildings Anton and Gerard and the Apparatenfabriek, forms an impressive ensemble of monumental structures. These buildings were once integral to Philips' production process and tell a significant part of Eindhoven's history. The buildings Anton and Gerard and the Apparatenfabriek served as Philips' manufacturing facilities and are characterised by their expansive floor areas and ceiling heights of 4.5 meters. The Veemgebouw, which functioned as a storage facility for Philips products, was internally connected to the production halls via covered walkways and a bridge, enabling the efficient movement of goods.

The monumental value of these buildings is primarily reflected in their facades, constructed entirely from masonry. The Veemgebouw is one of the few buildings in Eindhoven that was constructed during World War II, a historical detail that may hold particular significance for the city's heritage committee. The architectural features are visible in the facades, including distinctive doors and an overhead crane beam on the opposite side, further emphasising the industrial heritage of the building.

Area Development

Strijp-S, once a former factory site for Philips, has undergone a remarkable transformation in recent years. What was once known as a closed-off area accessible only to Philips employees has evolved into an international hotspot. The district is renowned for its events, including Dutch Design Week, Speedfest, and The Flying Dutch. The Blue Collar Hotel, located in the Klokgebouw, attracts both musicians and business travellers. Strijp-S is home to creative entrepreneurs working in studios and movable containers, collectively known as Plug-in City (Kooistra 2023). The synergy between living and working is a core focus of Strijp-S. Stakeholders have agreed to make annual financial contributions to ensure that ground-floor spaces are filled with functions that enhance the vibrancy of the area. The revaluation of industrial heritage, such as the Apparatenfabriek, the Klokgebouw, and the Veemgebouw, plays a crucial role in the transformation of Strijp-S(Kooistra 2023).

The development of the Veemgebouw is closely linked to other developments within Strijp-S. The vision for Strijp-Sincludes accommodating a mixed target group through a diverse programme offering, not only in housing types but also in amenities. Ground-floor spaces are primarily designated for non-residential functions. The vision emphasises combining living, working, and recreation in various types of buildings, such as mixed-use residential and workspaces, and venues like the Klokgebouw, where visitors can attend concerts or enjoy the skate hall.

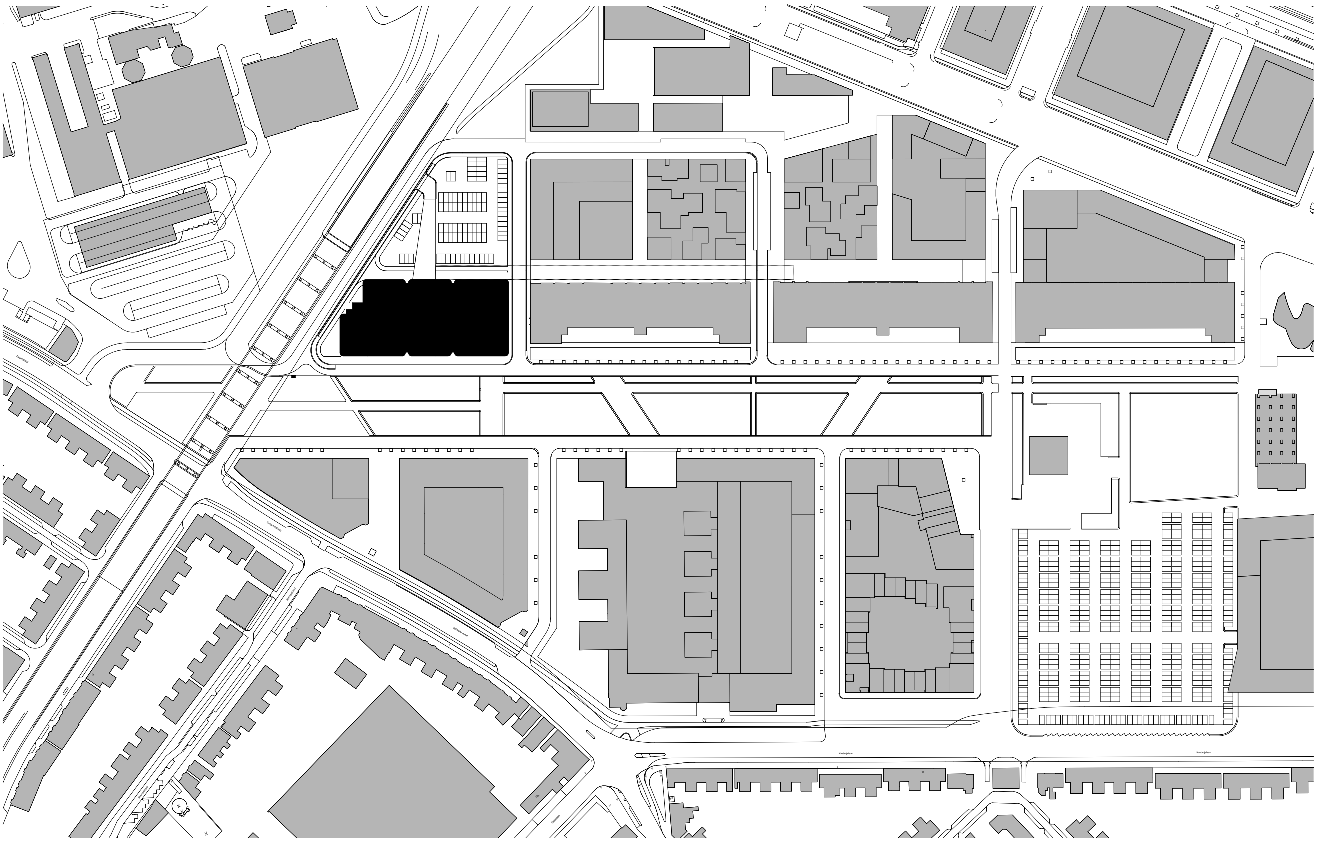

FIG. P.2.4

FIG. P.2.4 **Location Veemgebouw StrijpS**

Initiative and Objectives

In 2005, Trudo signed a collaboration agreement for the development of part of Strijp-S. VolkerWessels and the municipality of Eindhoven, the primary stakeholders, acquired the land at Strijp-S as part of the area's redevelopment. They subsequently sold individual plots or buildings to various developers, including Trudo. In addition to the Veemgebouw, Trudo also acquired other monumental buildings for redevelopment.

The design for the Veemgebouw was completed and permitted as early as 2012. However, the project stalled due to the financial crisis and delays in other developments by commercial parties at Strijp-S. It wasn't until 2018–2019 that the project was resumed and moved into the implementation phase. The original design remained unchanged, except for modifications to the energy systems (removal of gas boilers) and updates to comply with the Bouwbesluit 2015 (Building Code 2015), including adjustments for dimensions, storage spaces, and acoustics.

In addition to the Veemgebouw, Trudo also developed the Anton and Gerard buildings on the Hoge Rug at Strijp-S. Unlike the production halls, which featured high ceilings to accommodate manufacturing needs, the floors of the Veemgebouw were relatively low, as such height was unnecessary for goods storage.

Design Phase

In 2007, Trudo organised an architectural competition for the redevelopment of the Veemgebouw. Three architectural firms submitted proposals for the project. In collaboration with the municipal heritage committee and the Cultural Heritage Agency of the Netherlands (Rijksdienst voor het Cultureel Erfgoed), Trudo selected the London-based architectural firm Caruso St John as the winner. The extension atop the Veemgebouw was designed to align stylistically with the existing structure. Rather than the typical industrial extension, the design harmonised with the building's original architecture, respecting its historic character. Architect Caruso St John aimed for aesthetic continuity with the existing structure.

By 2012, the design and technical details were complete, and the necessary permits were submitted. However, Trudo faced challenges with programming, partly due to the financial crisis. The original adaptive reuse plan featured a vibrant ground floor, parking facilities spanning the first to the tenth floor, and a three-story residential extension. To bridge the gap in local knowledge of the Dutch Building Code (Bouwbesluit), Piet Vrencken of V/Architecten was appointed as the executing architect alongside the London firm.

Unlike many other adaptive reuse projects, the building's design process was relatively straightforward in terms of construction; the main challenges lay in the programming. For the residential units, the enclosed courtyard evokes the feeling of a small village square, while the height of 50 meters above ground level provides the homes with a unique view. The duplex apartments feature a studio on the entry level, with a maisonette-style unit above, accessible by an internal staircase.

The building incorporates several lifts, including a historic freight elevator from Philips' operational days, an office elevator, two elevators for the parking garage, and one for the residential units. This abundance of elevators reflects the building's former function, where lifts transported goods between floors using platforms. For fire safety and evacuation routes, the same stairwells are shared by all building functions. The parking garage is equipped with a sprinkler system, which was required because the open design, including a ramp, prevents compartmentalisation.

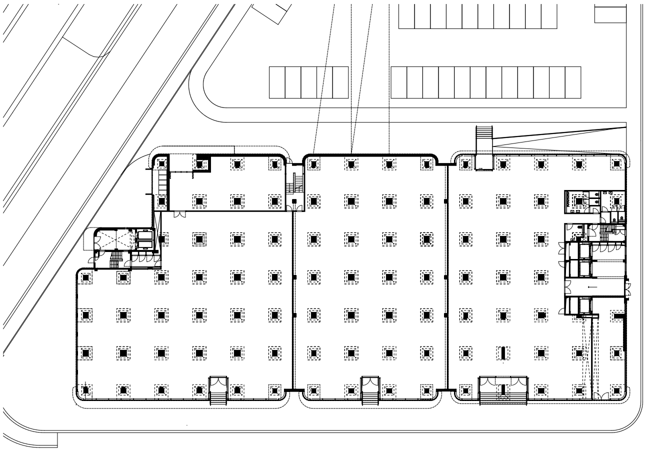

FIG. P.2.5

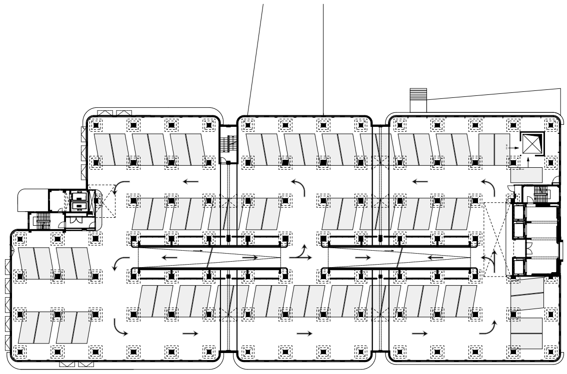

FIG. P.2.6

FIG. P.2.5 **Grid Dimensions of Columns in the Veemgebouw**

FIG. P.2.6 **Floor Plan of Parking Garage**

Parked

Due to changes in the Housing Act (Woningwet) in 2014, housing corporation Trudo could no longer develop high-end owner-occupied homes at Strijp-S and was limited to constructing social rental housing. This was deemed undesirable, as 270 social rental units already existed in the nearby Anton and Gerard buildings. Furthermore, during the financial crisis, commercial developers at Strijp-S contributed little to the area's development, resulting in an overabundance of social housing, which was considered excessive for the district. The original extension atop the Veemgebouw had been demolished due to its poor condition, but floors one through nine remained intact. However, the low ceiling heights and limited natural light made the building less suitable for residential use compared to Anton and Gerard. Seeking an alternative, Trudo opted for a mix of parking, retail, and hospitality functions. The redevelopment of the building began in 2012, preparing it for interim use. The ground floor and the first three levels of parking were developed at that time, while plans to add residential units were postponed due to the aforementioned challenges.In 2015, Vershal Het Veem opened on the ground floor, offering space for small hospitality businesses. Floors one, two, and three continued to serve as parking, while Trudo designated floors four through ten for temporary use by startups and entrepreneurs. These floors house attractions such as a VR experience and host annual events like the Dutch Design Week. Additionally, performances and exhibitions are regularly organised in the space (Trudo 2023).

Start development 2019

In 2019 and 2020, the Veemgebouw underwent a much-needed renovation of its structural shell to address concrete rot. The entire facade and steel window frames were restored, with an impressive 11,500 panes of glass replaced. This renovation provided Trudo with the opportunity to respond to the renewed interest among housing corporations in the mid-market rental segment. The design by architect Caruso St John was revived and executed at an accelerated pace. The originally planned gas boilers had to be replaced, and updates to comply with the new Bouwbesluit (Building Code) required several changes, including the implementation of a new heating system and the installation of photovoltaic panels on the roof.

FIG. P.2.7

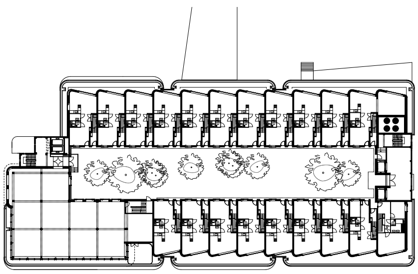

FIG. P.2.8

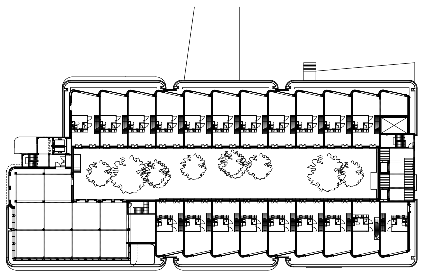

FIG. P.2.9

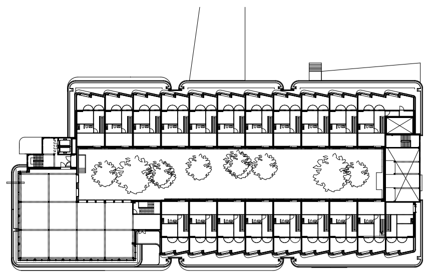

FIG. P.2.10

FIG. P.2.7 Side View of the *Veemgebouw* Including New Extensio

FIG. P.2.8 **Residential Floor Plan of Extension (Eleventh Floor)**

FIG. P.2.9 **Residential Floor Plan of Extension (Twelfth Floor)**

FIG. P.2.10 **Residential Floor Plan of Extension (Twelfth Floor)**

The building now includes a total of thirteen floors, with the fourth and fifth floors also converted for parking. Floors six through ten were left flexible in terms of layout and programming. On the roof corner, adjacent to the new extension (floors eleven, twelve, and thirteen), the existing rooftop structure was repurposed for business use. The predominantly high-placed windows in this wide building allowed little daylight, making these sections unsuitable for residential purposes. Trudo opted to use the lower-light floors for parking, despite the lower financial return on parking spaces. However, this decision alleviated pressure on other projects in the area, where the construction of underground parking had become unaffordable during the financial crisis. The new extension provided space for mid-market rental housing, introducing a different type of product to the area and enhancing its diversity.

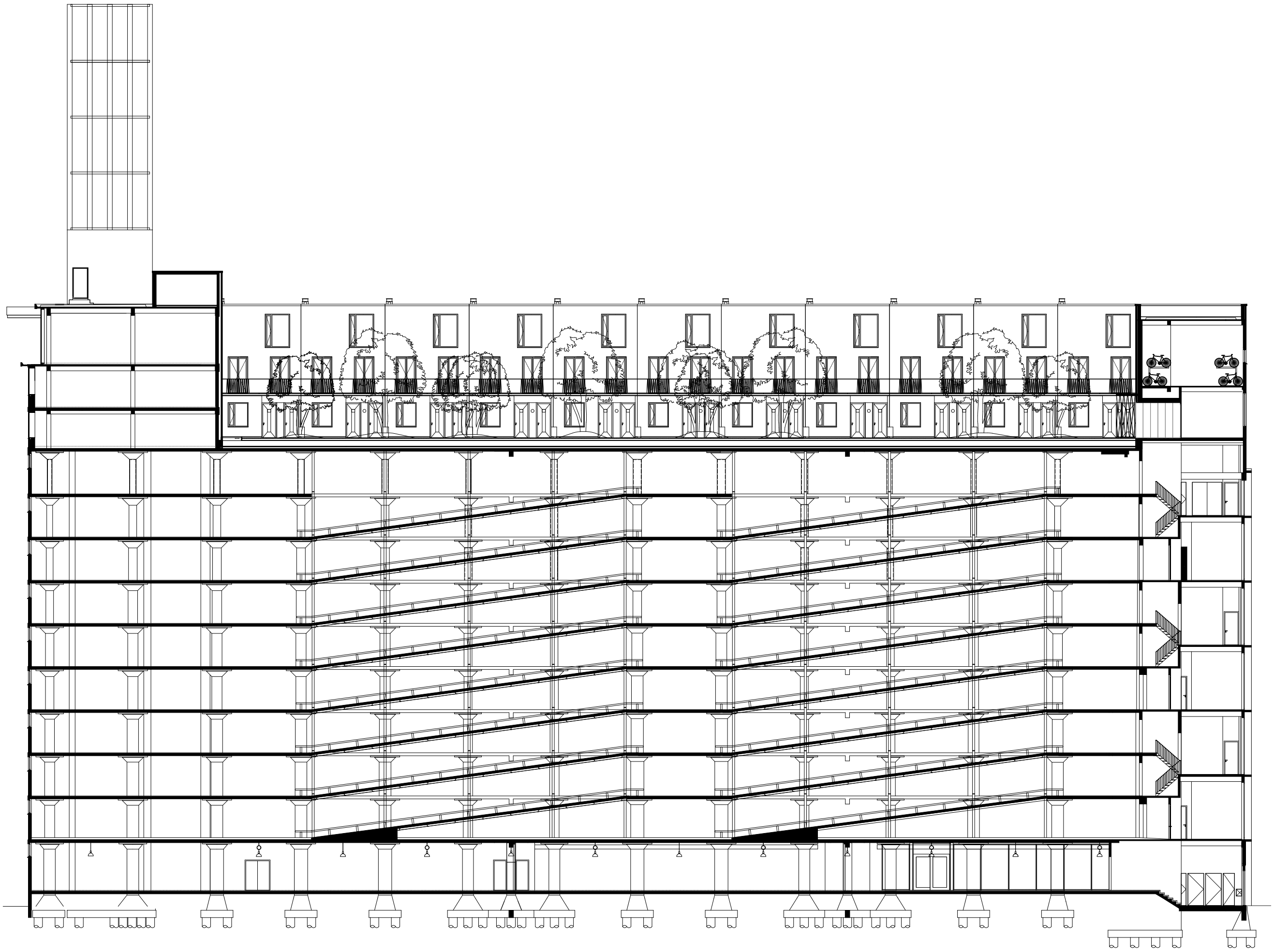

FIG. P.2.11

FIG. P.2.11 **Cross-Section of the Longitudinal Facade: Parking Garage with Residential Extension on Top**

Tendering and Construction

No contractor selection process took place, as VolkerWessels, being a stakeholder in the project, required that a contractor from their partner network execute the work. Consequently, the local contractor Stam + De Koning was chosen. During construction, the ninth floor served as a temporary site office for the contractor.

Key stakeholders emphasised that close collaboration between the contractor and designer in both the design and execution phases is crucial to achieving results. The adaptive reuse of the Veemgebouw involved frequent joint meetings to discuss design and construction activities, ensuring alignment between the two. This approach enabled all parties to communicate effectively, make prompt decisions, and streamline the process.

FIG. P.2.12

FIG. P.2.12 **Inner Courtyard at Veemgebouw**
Source: Norbert van Onna

Traditional construction methods were employed, including foundation beams, followed by floors and calcium silicate walls. While traditional, this approach was well-suited to the 2012 new-build context.

For parking, ramps were required. To accommodate this, sections of floors were removed, and adjustments were made to integrate the ramps into the structure. The building's overall construction underwent relatively few changes, although some columns were reinforced to support the new extension. Remarkably, the construction work was carried out without requiring the shops and businesses on the lower floors to close, allowing them to continue operating throughout the project.

Reflection and Future Value

In the adaptive reuse of an existing building, contractors inevitably encounter unexpected challenges. Fortunately, the contractor for this project had prior experience with other (monumental) buildings at Strijp-S, such as the Klokgebouw. While some obstacles arose during construction, these were effectively resolved by the contractor, who had included various contingency allowances for unforeseen work. According to the parties involved, no significant complications occurred. Fieke van den Beuken emphasised: "When you transform existing buildings, you always come across things you didn't anticipate beforehand. So, we don't talk about complications, but rather about matters that need to be carefully coordinated between the contractor, designers, structural engineer, and client."

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Photography: Igor Vermeer

VB gebouw

Adaptive reuse of the former Philips headquarters into residential units

The VB Building, located in Eindhoven, is a prominent high-rise complex that originally served as the headquarters for Philips on its former office campus. Built in 1964, it was considered an architectural marvel, featuring innovative technical elements for its time. With its concrete core and robust steel structure, the building is renowned for its flexible floor layouts and the ample natural light provided by its large windows. Currently, part of the building has been temporarily converted into student housing, while plans are underway for the permanent adaptive reuse of the entire structure and its surroundings into a vibrant new residential community.

CHARACTERISTICS	
Original Construction Year:	1964
Original Area	42.500 m²
Current Area	ca. 33.000 m²
Area After Adaptive reuse	ca. 40.000 m²
Client for Adaptive reuse	VB Gebouw Grond BV
Adaptive reuse Design	FAAM architects
Contractor	Ten Brinke
Completion of Temporary Adaptive reuse	2023
Number of New Residences	456
Type of Residences	student housnig
Future Value	to be transformed into permanet residences
Acquisition Costs	n/a
Renovation Costs	n/a
Sales Prices	n/a

FIG. P.3.1

FIG. P.3.1 **VB Building Before Adaptive reuse**

Initiative and Project Objectives

The VB Building in Eindhoven was once one of Philips' main offices, located on the former Philips office campus, Vredeoord. This high-rise tower is supported by a long, slender low-rise section beneath it. From the upper floors, there is a clear view of the city of Eindhoven. Built in 1964, the building incorporated many technological advancements of its time. Philips invested significant effort into its construction, resulting in an innovative design. The structure features a concrete core housing the elevators and a robust steel framework for the roof and facade, both suspended from the core. Only two towers in Europe were constructed using this method: one in Eindhoven and the other in Antwerp, the BP Building on Jan Van Rijswijcklaan. This construction technique provides unobstructed floor space, maximising functionality, while the large windows ensure ample natural light.

The building's design makes it adaptable for various uses. In recognition of its architectural and historical significance, it was granted national heritage status in 2021. Unfortunately, before this designation, the top floor and part of the low-rise section were demolished. The demolition aimed to 'free' the tower from its base, making the structure appear taller. However, the original low-rise design would have given the building a more substantial and balanced appearance.

After remaining vacant for some time, the building and its surrounding land were purchased by the developer VB Gebouw Grond BV. The final use of the building has yet to be determined, and, as is often the case with large-scale projects, this process may take several years. In the meantime, part of the building has been temporarily converted into student housing to ensure its continued use. This article focuses on that recent adaptive reuse. A more permanent redevelopment is planned for the future, with the rest of the building and the surrounding area still under consideration.

Programme, Target Group, and Feasibility

Eindhoven University of Technology (TU Eindhoven) is constantly seeking effective solutions for student housing. When it became known that the VB Building had a new owner with plans to transform the tower, TU Eindhoven reached out to the developer to explore the possibility of incorporating student housing. An agreement was finalised within approximately six months.

The student housing is in the high-rise section of the building. With its flexible floor layouts and ample natural light, this portion of the building was relatively easy to convert into temporary housing. In contrast, the low-rise section presents a greater challenge due to its deeper floor layouts. The lack of sufficient daylight in the centre of these floors makes it more difficult to create suitable residential units in that part of the building. The long-term vision is to transform the entire tower, the low-rise section, and the surrounding area into a vibrant residential community characterised by high-quality living spaces and abundant green areas. The spacious grounds around the building offer numerous opportunities to connect with nearby parks and green corridors, further enhancing the liveability and ecological value of the area.

FIG. P.3.2

FIG. P.3.2 **Site Plan (figure in Dutch)**

In the future, the student housing units can be converted into other types of residences, ensuring the building remains in continuous use. The initial temporary adaptive reuse prioritises flexibility, allowing the building to adapt easily to future needs.

Design

The VB-gebouw was originally designed as a stately headquarters, with its large, geometric forms intended to showcase the status of the prominent company that owned and occupied it.

When the building was designated a national monument in 2021, it was noted as unfortunate that a significant portion of the low-rise section had previously been demolished. Efforts will now focus on renovating the remaining structure to restore the ensemble and re-establish the balance between the high-rise and low-rise sections. To make the project financially viable, new construction will be added to ensure the realisation of sufficient housing units. A key added value of the project for the surrounding area is the inclusion of a green infrastructure, much of which will be publicly accessible. FAAM Architects conducted extensive studies to integrate the building with its new surroundings and, in consultation with the client, decided to make this green quality a central focus of the project.

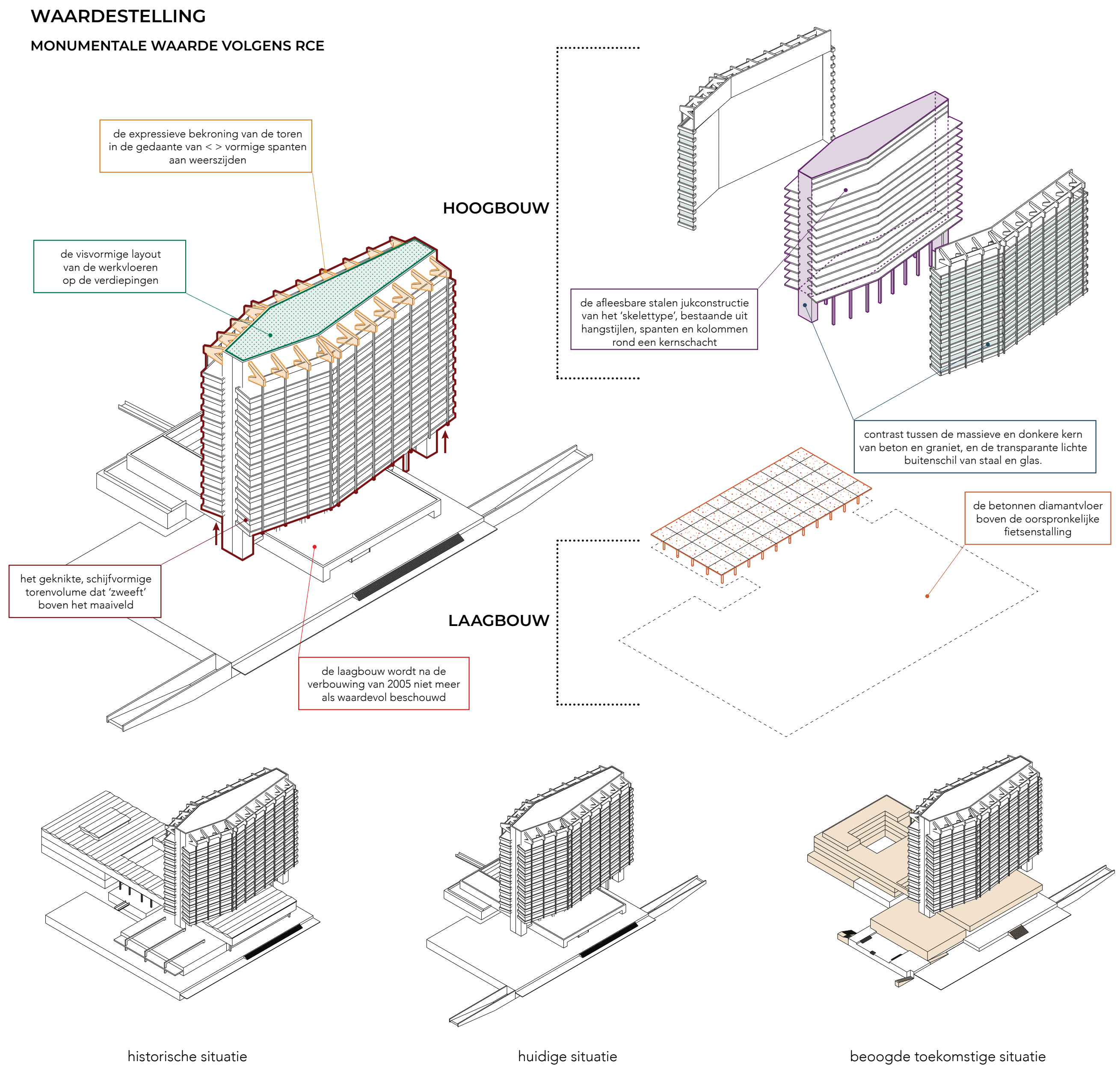


FIG. P.3.3

FIG. P.3.3 **Concept Design for the Adaptive reuse of the VB-gebouw (figure in Dutch)**

Given the tower's monumental value, alterations to its exterior are limited. The goal is to preserve the tower's historic character as much as possible, with internal upgrades to meet contemporary standards.

The temporary adaptive reuse of the building into student housing was a logical solution for the client. Due to the building's spatial layout, only minimal adjustments were required for this interim use.

FIG. P.3.4

FIG. P.3.5

FIGS. P.3.4 and P.3.5 **Temporary student housing in the VB Building**

Tendering and Construction

FAAM Architects is involved in numerous projects in Eindhoven and its surroundings, making them a familiar partner for the developer and owner of the building. The landscape design and urban plan were developed in collaboration with Diederendirrix and Buro Lubbers. The architects were selected without a competitive process and were also involved in the redevelopment of the surrounding Vredeoord site near the VB-gebouw. Working closely with the developer, they conducted multiple studies and explored various scenarios for the transformation of the site. VB Gebouw Grond BV is a partnership between Ten Brinke Vastgoedontwikkeling BV and Bekke & Partners. As Ten Brinke is both a major construction company and developer, the contractor was already in place from the start. The contractor was brought in early in the process, allowing them to contribute their expertise. This collaboration proved highly valuable, particularly in ensuring a swift construction timeline to complete the temporary student housing on schedule.

FIG. P.3.6

FIG. P.3.6 **The VB Building after the temporary adaptive reuse**

Completion, Use, and Management

Currently, the 456 student residences are occupied by students from TU Eindhoven. They are temporarily living in the tower until a permanent purpose for the building is determined. This temporary adaptive reuse is open-ended, with a maximum duration of ten years. The students are regularly updated on new developments regarding the building's future.

The current use of the tower offers valuable insights into how the VB-gebouw functions as residential housing. For instance, if certain areas of the building are perceived as unsafe or other challenges arise during its temporary use, these lessons will inform the future development of the site. The residents of this temporary adaptive reuse are also pioneers, being the first to inhabit this final piece of the former office complex.

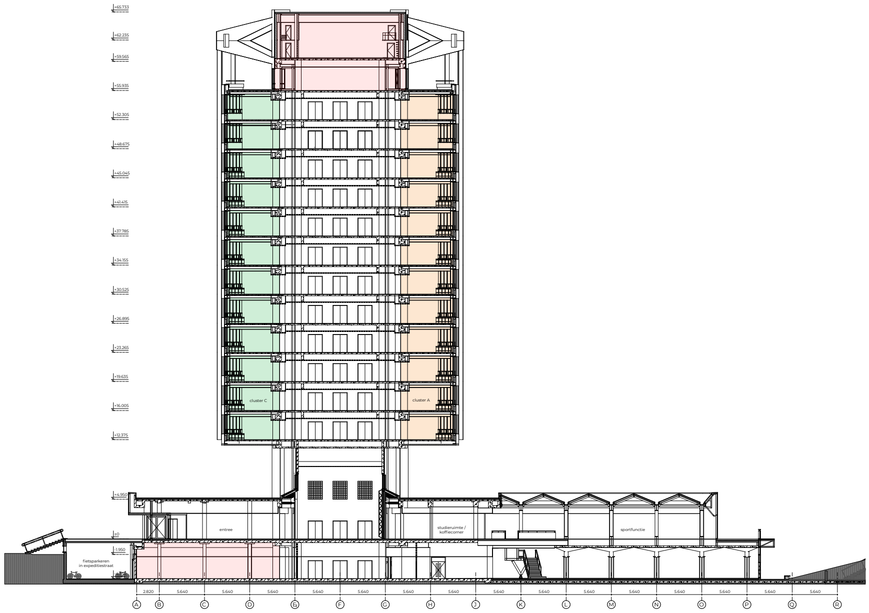


FIG. P.3.7

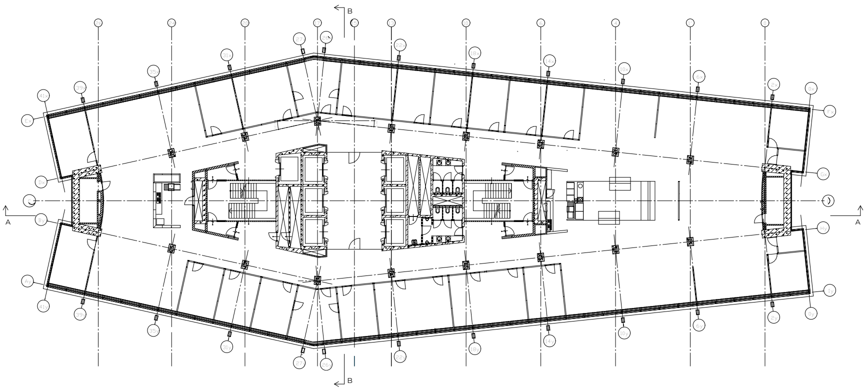


FIG. P.3.8

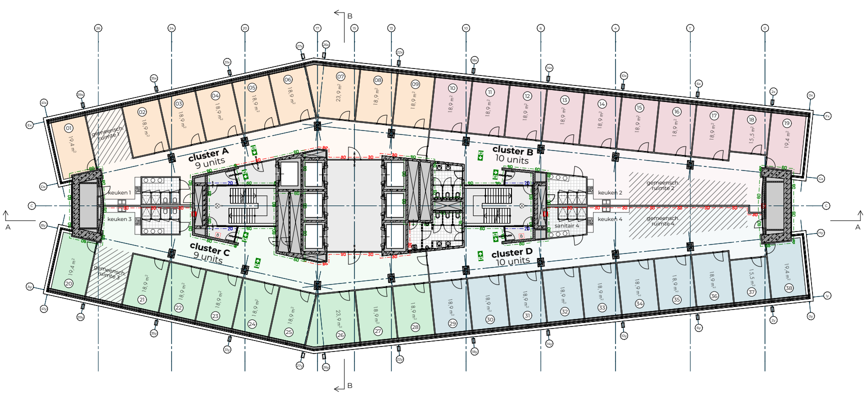


FIG. P.3.9

FIG. P.3.6 **Cross-section**

FIG. P.3.6 **Floor plan before adaptive reuse**

FIG. P.3.6 **Floor plan after adaptive reuse**

Sustainability Principles

The temporary adaptive reuse required no major structural changes. Utilising an otherwise vacant building for temporary housing is more sustainable than leaving it empty.

Sustainability principles will play a larger role in the permanent adaptive reuse, with plans for a nature-inclusive design. Existing installations, such as the WKO system (a heat and cold storage system with heat pumps), were reused with minor adjustments for kitchens and bathrooms. While speed was prioritised to meet the academic year deadline, other sustainable features, such as PV panels, will be implemented during the adaptive reuse of the low-rise buildings.

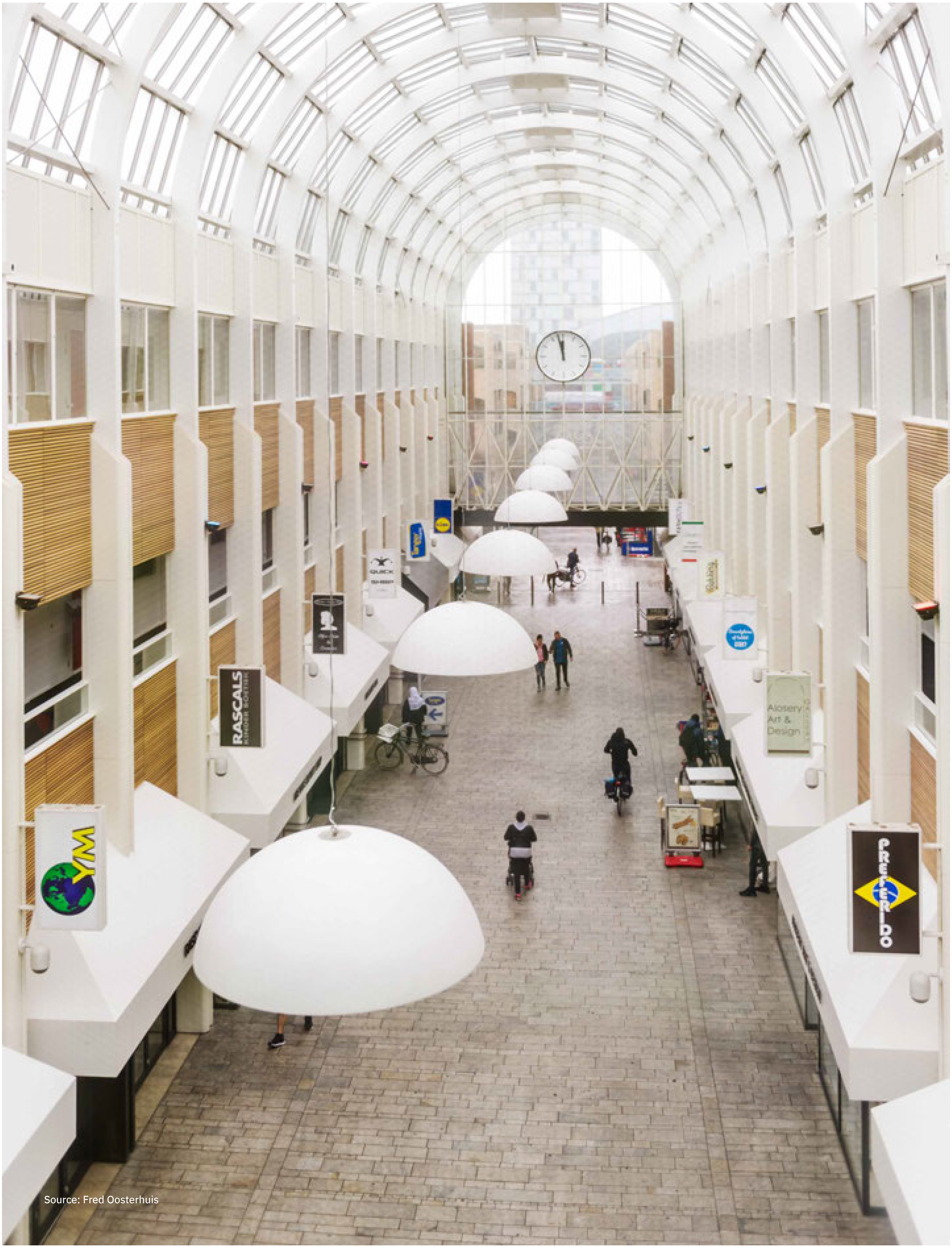
Reflection and Future Value

FAAM Architects reflect positively on the collaborative process of transforming the VB Building. Despite time constraints, the temporary student apartments were completed successfully while planning for the next phase of adaptive reuse was already underway.

This project serves as a model of adaptable adaptive reuse (see '16. Circular and Adaptable Building Transformation) and illustrates the unique challenges of repurposing a young national monument. Constructed in 1964, the VB Building was designated a national monument in 2021, making it just 58 years old.

Sources

Conversation with FAAM architects december 2023.
Photography: FAAM architecten



Source: Fred Oosterhuis

Zoetelaarpassage

Adaptive reuse of former office building into housing

The Zoetelaarpassage is a distinctive building block dating from 1980. Designed by former Rijksbouwmeester Kees Rijnboutt, the complex originally included shops, offices, residences, and a parking garage. After a prolonged period of vacancy, the adaptive reuse from office space to contemporary housing commenced in 2016. The project was divided into two phases.

In Phase 1, which began in 2017, 10,000 m² of office space was converted into 94 apartments for the housing corporation De Alliantie. These apartments, located on the first and second floors, are in the social rental sector, with sizes ranging from 60 m² to 80 m². As of 2024, rents range between €452 and €724.

Phase 2 will involve the addition of 34 timber-framed apartments, with construction starting in 2024. These mid-market apartments will have a monthly rent of approximately €1,030. Tenants of the social rental apartments from Phase 1 will be given priority to move into these three-room apartments.

CHARACTERISTICS	
Location	Zoetelaarspassage, Almere
Completion of Original Building	1980
Original Function	Shops and offices
New Function	Housing
Owner	De Alliantie
Developer	Alta SV
Architect	De Jong + Lafeber Architecten
Contractor	Zegers Bouw
Completion of Adaptive reuse	2018
Duration of Process	2017-2018
Number of New Residences	94 appartments
Type of Residences	2 to 3 bedroom appartments between 60 and 80 m²
Rental price	€425 - €724
Added New Construction	start development 2024 with 34 added appartments

FIG. P.4.1

FIG. P.4.2

FIG. P.4.3

FIG. P.4.4

FIG. P.4.1 **Front View of Zoetelaarpassage After Adaptive reuse**

FIG. P.4.2 **Facade Work in the New Design**

FIG. P.4.3 **Facade Work in the New Design**

FIG. P.4.4 **Aerial View**

Initiative and Project Objectives

Over the years, the building has served various functions. In the 1980s, its office floors housed the municipal offices of Almere, followed by several other offices and a university of applied sciences. Starting in 2010, office occupancy declined due to economic challenges. The strategy of its owner, Unibail-Rodamco, to limit leasing activities resulted in the office portion of the Zoetelaarpassage being almost completely vacant. This prompted the decision to sell and transform the property (Alta SV 2023).

Located on the edge of Almere's city centre, the complex had long provided space for startups that sought refuge here due to the high costs of city-centre locations. Over time, however, the retail offering in the passage became outdated, leading to a renewal of the shopping area in 2015.

The adaptive reuse of the office buildings posed challenges due to the surrounding environment. Near the passage, there is a hostel for the homeless, as well as a Salvation Army shelter. Creating a sustainable and liveable environment was therefore essential, with de Alliantie focusing on how the neighbourhood could absorb this adaptive reuse.

In 2016, the developer Alta SV acquired the 10,000 m² building through a tender bid from Unibail-Rodamco. Before submitting the bid, Alta SV consulted with de Alliantie regarding a plan for 94 apartments. De Alliantie outlined specific criteria, including the price per square meter and development conditions (PvE). Based on this input, the developer calculated the costs and submitted their tender bid. De Alliantie played a dual role as both investor and buyer in the project. As an investor, they provided funding to enable the project, and as a buyer, they purchased the completed apartments. This meant that de Alliantie not only supported the project's financial viability but also served as the end-user of the developed housing units.

Prior to the bid, the municipality had already rezoned the plot, ensuring residential use was permitted under the zoning plan, thus removing a significant risk as required by de Alliantie. To prepare for the adaptive reuse into apartments, Alta SV reached agreements with existing tenants to terminate their leases and relocate. Under the law, de Alliantie could rent out the property to existing tenants for a maximum of five years, provided they received approval from the Housing Corporations Authority (Autoriteit woningcorporaties, Aw) (see '23. The Role of Housing Corporations in the Adaptive reuse to Housing').

Programme, Target Group, and Feasibility

Housing corporations are required to establish performance agreements with the municipalities in their operational area (see '23. The Role of Housing Corporations in the Adaptive reuse to Housing'). For the development of the Zoetelaarpassage, extensive discussions were held with the municipality of Almere, primarily to determine the target group. It was ultimately decided to adopt a mixed target group, focusing on status holders, individuals transitioning out of social shelters, seniors, first-time renters, and students under a five-year campus contract. Particular attention was given to achieving a balanced mix of target groups, situating "carriers" (resilient households) alongside "seekers" (vulnerable households). Housing corporations are obligated to advertise properties, which are then allocated to the household with the longest waiting time. Specific conditions must therefore be set at the start of the rental process to effectively reach the intended target group.

Despite the lack of a monumental designation, the municipal Aesthetics Committee closely monitored the respectful treatment of the existing building.

De Alliantie adheres to a fixed Programme of Requirements that all housing and developments must meet. While each location and area have unique characteristics, it remains crucial to assess the specific needs of each project. Given the complexity of the Zoetelaarpassage's surroundings, safety was a central focus in its PvE. Camera surveillance was implemented to protect residents. While the retail passage remains publicly accessible, access to residential areas is restricted to prevent unauthorised entry. Liveability was a top priority. No communal spaces were added to the complex—an amenity becoming more common in developments from 2024 onward.

FIG. P.4.5 **Situation Diagram of Housing Typologies**

FIG. P.4.6 **Floor Plan of Housing Type A-K**

FIG. P.4.5

FIG. P.4.6

Few exceptions to the Bouwbesluit (Building Code) were applied during this adaptive reuse. De Alliantie's PvE stipulates that new construction standards in the Bouwbesluit must largely be met. However, a few deviations occurred, such as wall insulation values, where adaptive reuse-specific Bouwbesluit requirements were followed. The ceiling heights are higher, and the apartment sizes exceed the standard requirements outlined in De Alliantie's PvE.

Design Phase

The architect was appointed by the developer and was closely involved in the project from the start. After a preliminary design was created, the contractor was able to calculate the construction costs. The design was developed within a construction team that included developer Alta SV, De Jong + Lafeber Architecten, contractor Zegers Bouw, and end-user de Alliantie. To realise the design, only the floor slabs and load-bearing elements were retained, while all internal partitions were removed. Coordination also took place with architect Kees Rijnboutt.

By stripping the building, a flexible and open floor plan was created. The finalised programme allowed for the creation of a large number of apartments of similar size, leading to frequent repetition in the floor plan layouts. The building originally featured five entrances, which were preserved. This facilitated the enclosure, escape routes, and compartmentalisation requirements. Additionally, the existing entrances contributed to a human scale, with only a limited number of apartments per entrance.

Tendering and Construction

During the developer's participation in the tender, a price was already obtained from the contractor, allowing the developer to submit a bid with a known construction budget. The repetition of the apartment layouts proved advantageous for the contractor, as it enabled standardisation during construction.

The construction phase presented complex logistical and phasing requirements due to the continued operation of retail activities in the ground floor of the building. Additionally, the location on the edge of Almere's city centre posed challenges for the delivery and removal of construction materials. The new design necessitated significant demolition work, resulting in the production of a large amount of demolition waste.

FIG. P.4.7

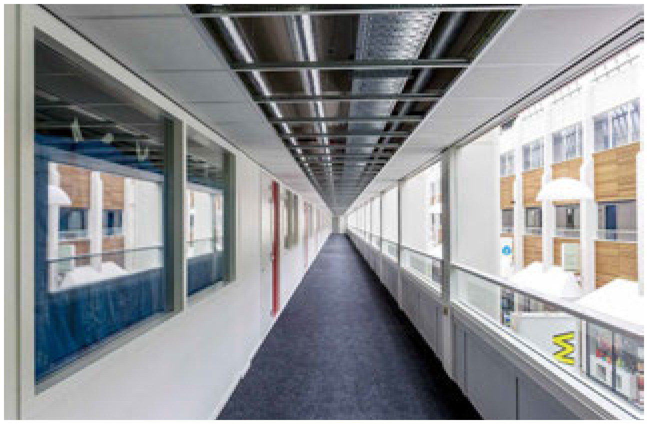


FIG. P.4.8

FIG. P.4.7 **Side View of the Facade**

FIG. P.4.8 **Gallery**

Sustainability Principles

De Alliantie follows sustainability guidelines, which are standard considerations during investment decision-making. In Almere, many buildings, including the Zoetelaarpassage, are connected to the city's district heating network.

The existing building was made more sustainable by greening the roof with sedum and replacing outdated installations with modern systems. The apartments were equipped with underfloor heating, heat recovery ventilation systems (warmteterugwinning, WTW), and solar panels were installed on the roo.

Reflection and Future Value

In collaboration with its subsidiary de Alliantie Ontwikkeling BV and Alta SV, 34 new homes are being developed as part of Phase 2 of the project. These homes are being constructed as an extension on the roof of the existing building. Phase 2 includes mid-market rental apartments, contributing to a more diverse housing supply. Residents from Phase 1 can move from social rental housing to mid-market rentals, promoting movement within the housing market. This project also expands the existing housing stock. The apartments meet modern building standards, including BENG (Nearly Energy-Neutral Building) and TOjuli (thermal comfort requirements). The three-room apartments, each approximately 70 m², feature private outdoor spaces (Alta SV 2023).

De Alliantie has adapted to shifting market demands. To support diversification, it established the BV Woonfonds, enabling the development of mid-market rental homes. This strategic initiative enhances the feasibility of diverse projects. Within de Alliantie, various subsidiaries operate, including de Alliantie Ontwikkeling BV, which develops independent projects, and Stichting de Alliantie, which acts as the buyer and landlord.

The retail units in the passage remain owned by Unibail-Rodamco. Due to the connection between the facades of the transformed homes and the retail units, de Alliantie is required to participate in the Homeowners' Association (Vereniging van Eigenaren, VvE) of the Zoetelaarpassage. Significant discussions arose regarding potential adjustments to the stickered facades of the shops, with conversations sometimes proving difficult due to the differing interests of the parties involved.

Initially, plans were made to refurbish the original elevators, but after a feasibility analysis, the costs were deemed too high. As a result, the decision was made not to renovate the elevators.

The target group programme, developed in collaboration with the municipality, is considered successful by de Alliantie. The Handreiking Transformatie en Corporaties (Expertteam (kantoor)transformatie, 2022) includes several recommendations for housing corporations (see 23. The Role of Housing Corporations in the Adaptive reuse to Housing'):

- Act as a coordinating client and delegate detailed execution to the market.
- Collaborate closely with the municipality during acquisition, planning, and permitting.
- Involve future residents as much as possible in the design and management of the building.

For the adaptive reuse of the Zoetelaarpassage, it can be concluded that de Alliantie embraced the first two recommendations. However, involving future residents in the building's design was not feasible, as these residents were not yet identified. The management of the building is handled internally within de Alliantie, with ongoing discussions held with current residents.

Sources

Expertteam (kantoor)Transformatie (2022). *Transformatie en corporaties*. Den Haag: Rijksdienst voor Ondernemend Nederland (RvO).
www.alta-sv.nl/projecten/optopping-zoetelaarpassage-almere/.
Conversation with developer Rob de Vries van Alta SV and Jolanda Niessen van De Alliantie, november 2023.
Photography: Fred Oosterhuis

Source: Otto Kalkhoven

Farm Barn Koldyk

Adaptive reuse of Former Farm Barn and Front House into a Residence

Farm Barn Koldyk is a kop-hals-romp farmhouse from 1631, located in Friesland. The farmhouse had been unused for a long time and was in poor condition before being taken over by Madelon and Roeland, the initiators of its adaptive reuse.
The building, originally an agricultural enterprise, now serves as a largely self-sufficient residence for a family and guests.

CHARACTERISTICS	
Completion of Original	Barn 1631, Front House approx. 1830
Area	Barn 450 m², Front House 170 m² on a plot of 4,95 ha
Completion of Adaptive reuse	2023
Clients	Madelon Oostwoud and ir Roeland Houtman mre
Design	Client
Contractor	Jelle's Boubedriuw, Greonterp
Acquisition costs	Unknown/private
Renovation costs	Unknown/private
Sale price	N/A

FIG. P.5.1

FIG. P.5.1 **Before the Adaptive reuse**

Initiative and Project Objectives

In Friesland, many unused farms that are no longer used for agriculture are being repurposed into homes or other functions. Madelon Oostwoud and Roeland Houtman transformed Koldyk, a kop-hals-romp farmhouse dating from 1631, into a largely self-sufficient home. The property, with five hectares of land, is situated in the rural area north of the watersport village of Grou, 12 kilometres south of Leeuwarden. Marked as 'Coldyck' on 17th-century maps (Bernardus Schotanus, 1670–1690, Rijksmuseum, Amsterdam), the Koldyk farm lies along a private canal connecting Grou to Leeuwarden.

In the past, farms that lost their agricultural function often fell into disrepair. Others were repurposed into (light) industry, homes, apartments, group accommodations, restaurants, galleries, or museums. Many new owners come from outside Friesland, as did the owners of Koldyk. Coming from the Dutch Randstad, they sought a rural location with space for planting fruit and nut trees.

The farmhouse did not have a monumental status and had deteriorated significantly after years on the market. Old architectural elements had been lost; roof tiles had been replaced with corrugated roof sheets, facades had subsided and were damaged, gutters and shutters were missing, and former repairs were rough. The house was nearly uninhabitable, but Oostwoud and Houtman saved the building from ruin.

Programme, Target Group, and Feasibility

Initially, the municipality saw the farmhouse fit for demolition. However, the initiators succeeded in having it designated as a characteristic or iconic structure, granting it a protected status.

After a thorough study of Frisian farmhouse architecture, a historically accurate restoration plan and land use plan were developed. An ecological study was also required for the permit application. The goal was to restore the farmhouse while preserving its historical materials and maintaining the character of a Frisian kop-hals-romp building. The municipality became enthusiastic and issued the necessary permits.

The adaptive reuse also aimed to minimise the ecological footprint and ensure the building was sustainable and self-sufficient. This included eliminating gas use, generating electricity on-site, and producing drinking water. The motto "Walk the Talk" guided their sustainable approach.

Following the adaptive reuse, Koldyk has been partially opened to the public. Part of the land is used by a local organic farmer for vegetable cultivation. Groups of volunteers help with soil preparation, planting, and harvesting. The farm has guest rooms that accommodate nature lovers, cyclists, and water sports enthusiasts. The private canal has a number of docking places for boats. The barn is used to host events and workshops for the local community.

Design

The initiators, experienced in repurposing monumental projects, conducted preparatory research after completing the programme of requirements. The wooden beams in the barn and front house were dated using dendrochronological analysis, confirming the construction year. The contractor was instructed to reuse as many materials as possible.

The goal was a contemporary, sustainable home with a multifunctional open space, fit to house a family. The barn is designed to serve as a workshop, exhibition space, and venue for educational events. This flexibility ensures long-term functionality and appeal for future generations.

The design adheres to the Building Code. The project plan meets all standards for safety, health, usability, energy efficiency, and environmental impact. Fire safety provisions, including smoke detectors and lightning rods, were incorporated, while the air handling system was equipped with CO and CO_2 sensors.


FIG. P.5.2


FIG. P.5.3

FIGS. P5.2 and P5.3 **Renovation of the Old Roof**

Tendering and Construction

In complex projects such as this one, many factors remain unknown despite thorough research and preparation. Good communication and a flexible construction organisation are therefore crucial. When selecting and appointing the contractor, particular emphasis was placed on experience with farmhouse restoration and the adaptive reuse of large-scale monumental projects. In a collaboration between the client and the contractor, the design and details were developed, material choices were finalised, and the budget was prepared. A key success factor was that the contractor employed an in-house architectural draftsman.

To ensure smooth collaboration with the contractor, the project initiators lived on-site in a caravan and in a nearby rental property during the construction phase. This made them easily accessible to builders and subcontractors, allowing them to oversee and guide the execution. Their close involvement enabled quality improvements to be implemented seamlessly during construction, enhancing the final result.

Historical elements were either restored or recreated. Lost features such as uleborden (decorative boards), wooden gutters, stable doors, shutters, chimney caps, and other architectural details were reintroduced. Old beams from the cow stables and bricks from demolished walls were cleaned and reused. The barn roof was repaired, and the corrugated roof sheets were replaced by reclaimed roof tiles. The foundation of the main house was repaired, and the masonry of the facades was restored using existing old bricks. In consultation with the mason, recessed mortar joints were chosen. New windows and doors were crafted with classic frame divisions and detailing.

FIG. P.5.4

FIG. P.5.5

FIG. P.5.4 **After the Adaptive reuse**

FIG. P.5.5 **Floor Plans and Sections**
Source: JBB Wagenaar

The residential section was entirely modernised for energy efficiency. The roofs and facades were insulated with high-quality wood fiber insulation. The living spaces are heated using a low-temperature underfloor heating system powered by an air source heat pump. There is no gas connection. The home is equipped with a balanced ventilation system with heat recovery and zone control, ensuring comfortable living conditions and low energy consumption.

The farmhouse is almost entirely circular in operation. Solar and wind energy are stored for later use. Rainwater collected from the roof is stored in a 15,000-liter underground tank, purified using a safe water system, and converted into drinking water. Thus, all tap water in the home is purified rainwater.

Completion, Use, and Management

The project was completed in phases. The guest rooms, built in the barn, were the first spaces that were ready for use. Gradually, the rest of the house was made habitable. The property now consists of a home with three bedrooms, a barn, and two guest rooms, each with its own kitchen and entrance. The farmhouse grounds have been planted with rows of fruit and nut trees, perennial vegetables, herbs, and berry bushes. The harvest is used for workshops and consumed during barn-hosted dinners. The former vegetable garden serves as a "nursery" for edible perennial plants. The pasture next to the farmhouse is used as a production garden for annual vegetables, supplying 250 subscribers. The land south of the farmhouse has been transformed into a wetland for meadow birds. Along the embankments of the canal, a pilot project for "flower-rich dikes," led by the water board, will continue until the end of 2025.

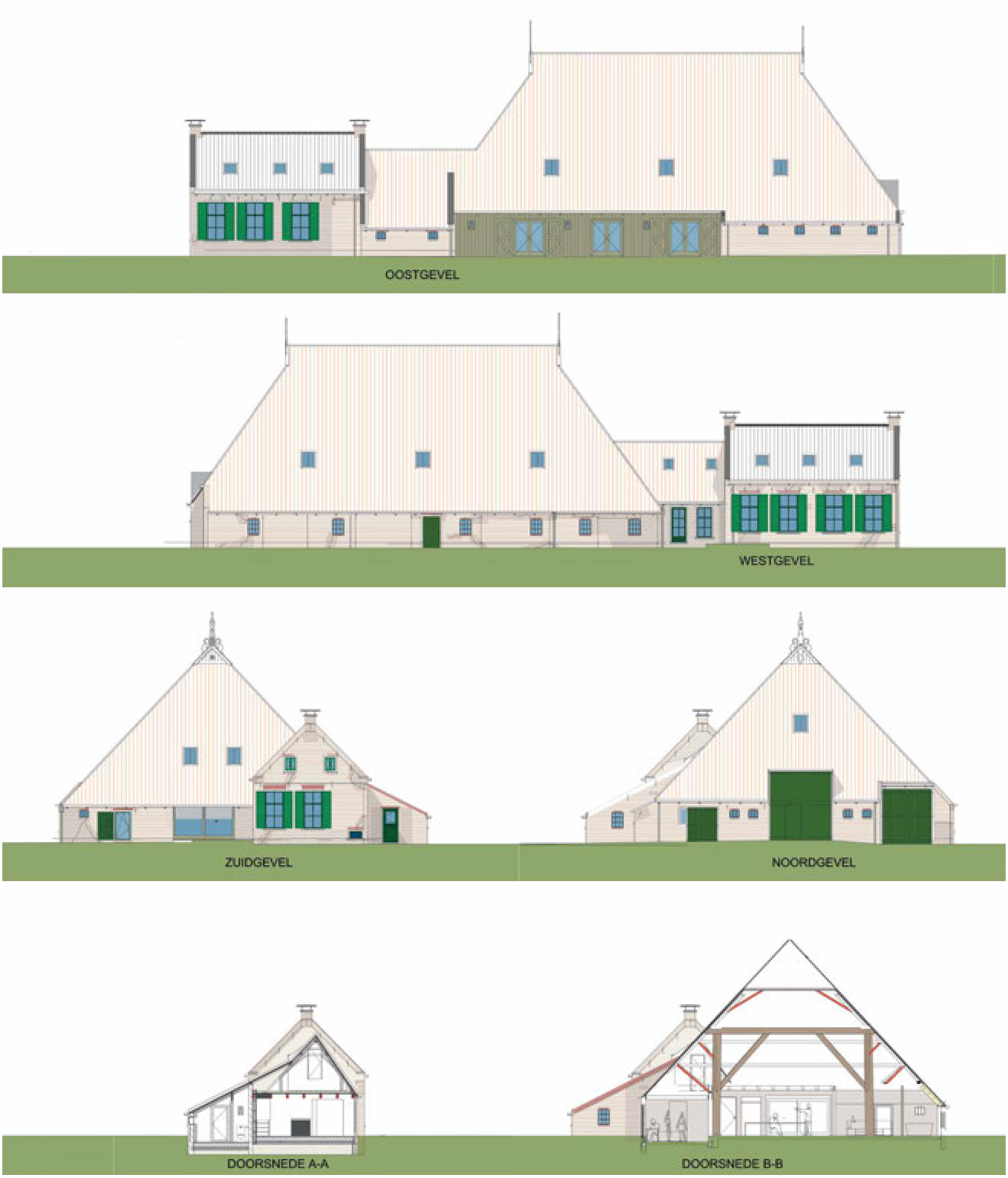

OOSTGEVEL
WESTGEVEL
ZUIDGEVEL
NOORDGEVEL
DOORSNEDE A-A
DOORSNEDE B-B

FIG. P.5.6

FIG. P.5.6 **Cross-section**
Source: JBB Wagenaar

Sustainability Principles

The principles for the adaptive reuse were established in the Programme of Requirements. The home is largely self-sufficient and minimally dependent on public utilities and grids. In collaboration with the contractor and installers, the insulation and systems were designed to create a sustainable, energy-efficient project with minimal reliance on general infrastructure. Old building materials were reused, and demolition wood was retained. Wood that could not be repurposed for construction is used as fuel for the wood stove.

Through the operation of the vegetable garden and guest rooms, Koldyk is financially sustainable. The revenue ensures the long-term maintenance of the building and the management of the land, ditches, dikes and fences.

Reflection and Future Value

The clients reflect on a successful adaptive reuse process and the realisation of a dream. They find Koldyk a wonderful place to live. The multifunctional barn offers numerous opportunities for activities, and the income from the guest rooms contributes to the viability of operating and maintaining the farm. The vegetable garden creates a connection with the local community. In the future, the vegetable garden, orchard, and food forest edge will yield increasingly larger harvests.

The initiators hope this project will inspire others in the area to preserve heritage sustainably. The challenges of the project primarily involved the permitting process and execution. The clients are convinced that the strong collaboration with the contractors and other parties during preparation and construction added significant value to the project.

In a region where many farmhouses have been lost, Koldyk has been restored to its full potential. As a result, one of the oldest "cathedrals" in the Frisian landscape has been preserved for future generations.

Sources

Conversation with Roeland Houtman, initiatiefnemer, november 2023.
Photography: Roeland Houtman


Source: Steenvlinder

Post Office

Adaptive reuse of Former Post Office to Housing

The former post office in Apeldoorn, designed by city architect C.H. Peters, dates back to 1908. The building is being converted into 28 self-build homes, allowing buyers the freedom to customise their homes according to their preferences and budget.

Located in a unique setting in the centre of Apeldoorn, the building features distinctive characteristics, including its brick facade and two intersecting gabled roofs. Listed as a municipal monument, the post office holds significant cultural and historical value for local residents and the people of Apeldoorn.

CHARACTERISTICS	
Original Year of Construction	1908
Completion of Adaptive reuse	2024
Client	Steenvlinder
Design	Steenvlinder
Contractor	n/a
Former function	Post office
New function	Residential
Programme	17 dwellings
Size of dwelling	41 m² to 115 m²
Renovation costs	n/a
Sale prices	n/a

FIG. P.6.1

FIG. P.6.1 **De Post in Apeldoorn**

Initiative and Project Objectives

Steenvlinder supports self-builders. They do this with new constructions, but also by transforming existing buildings with architectural value into self-build homes. The post office of former Chief Government Architect C.H. Peters in Apeldoorn is such a building. It dates back to 1908 and had already been repurposed as office space and shops after the post office moved to a new location in 1991. After a period of changing owners, the building came on the market in 2020 and was then purchased by Steenvlinder.

Steenvlinder is transforming the office spaces on the first and second floors into self-build homes; to be completed by the new residents. This offers buyers the opportunity to finish the home according to their own wishes and budget.

Central to Steenvlinder's approach is the intensive participation of end-users and local residents. Steenvlinder (Dutch for butterfly) derives its name from its vision of transformation: a building begins its life as a caterpillar that eats a lot. Then, like a caterpillar emerging from its cocoon, the building can transform into a radiant butterfly.

Initiative and Project Goals

Steenvlinder supports self-builders, both for new construction and by transforming old buildings with architectural value into self-build homes. The former post office designed by former Rijksbouwmeester C.H. Peters in Apeldoorn is one such building. Dating back to 1908, it had already been repurposed for office space and retail after the post office moved to a new location in 1991. Following a period of various owners, the building was placed on the market in 2020 and subsequently purchased by Steenvlinder.

Steenvlinder has been transforming the office spaces on the first and second floors into self-build homes—apartments that are delivered as a shell to their new owners. This allows buyers to finish the homes according to their own preferences and budgets.

Central to Steenvlinder's approach is intensive participation by end-users and local residents. The company derives its name from its vision of adaptive reuse: a building begins its life like a caterpillar that consumes a lot. Then, just as a caterpillar emerges from its cocoon, a building can transform into a radiant butterfly.

Programme, Target Group, and Feasibility

Due to the unique location and characteristics of the old post office, the initial plan was to create larger apartments in the building. However, during the planning phase, the high interest rates for both the developer and homebuyers prompted them to reassess the project's feasibility. The outcome of this reconsideration was a revised programme featuring 28 self-build homes. These homes are smaller than originally planned but offer a diverse and highly affordable range, making them well-suited for first-time buyers and better aligned with the self-building target group.

Buyers had the flexibility to decide how much space they wanted and how much they are able to invest in finishing their homes. For example, a skilled resident might choose to handle much of the construction themselves, thereby saving costs and potentially securing greater profit in the event of a future sale.

FIG. P.6.2

FIG. P.6.3

FIG. P.6.2 **Cross-section side view**

FIG. P.6.3 **Cross-section top view**

FIG. P.6.4

FIG. P.6.4 **Large windows in the roof of the post office**

Tendering and Construction

A local contractor was selected for the construction due to their extensive experience in renovating historic buildings and their familiarity with the property, the municipality, and local businesses. For a contractor, it can be challenging to estimate revenue loss when delivering only the shell, as very little of the finishing work is completed.

In many cases, new residents choose to have the same contractor who managed the adaptive reuse complete the interior work. The contractor's knowledge of the building and the availability of skilled professionals already on-site make this a convenient option.

Changes in market conditions led to a shift in the plan from 17 larger apartments to 28 smaller starter homes. This required a redesign, as well as a renewed permit application and tendering process. Additionally, the marketing and sales processes had to be restarted. Increasing the number of homes in the plan also impacted utility connections, requiring further adjustments. As a result, the construction timeline was delayed by several months.

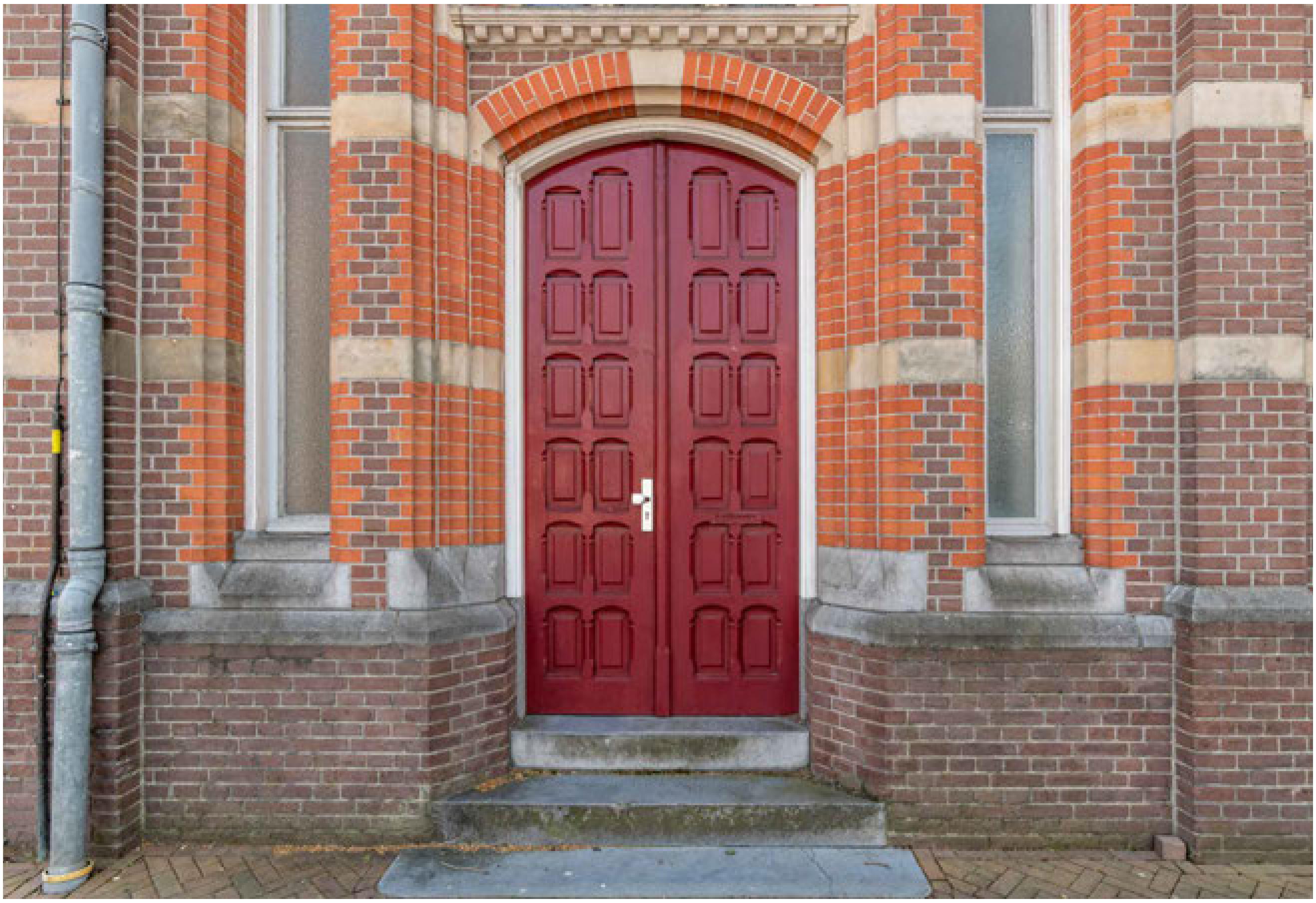


FIG. P.6.5

FIG. P.6.5 **Authentic Door of the Post Office**

A delay of several months is relatively long for a small-scale adaptive reuse project like Post Apeldoorn. Normally, a project of this scale, from purchase to the start of construction, takes about six months. The construction phase itself is relatively short because buyers complete the finishing of their homes after receiving the shell. However, within this development model, delays can sometimes result in up to a year between the purchase of the building and the start of construction for the self-build homes. Once construction begins, the maximum timeframe for building these self-build homes is one year.

Completion, Use, and Management

Post Apeldoorn is expected to be completed in the winter of 2024. Steenvlinder will establish a Homeowners' Association (VvE) for the residents, which will collectively manage and maintain the building. Setting up a VvE is mandatory in this situation, partly because the owners of the commercial spaces on the ground floor are also represented in it.

Sustainability Principles

Reusing the existing building is inherently sustainable. The adaptive reuse focuses on preserving and reusing original materials wherever possible. Materials removed during demolition are separated and recycled, with an emphasis on deconstruction rather than demolition. Residents receive a guide with rules, advice, and tips for sustainable construction, proper insulation, and energy-efficient installations. A comprehensive manual is provided, similar to an Ikea guide, to assist residents with their finishing work.

Reflection and Potential Future Value

Though not yet complete, the developer reflects positively on the Post Apeldoorn project, despite challenges with time and cost. The prolonged period between purchasing the building and selling the homes, along with fluctuating market conditions and rising construction costs, led to delays.

Nevertheless, the project aligns with the goals of the stakeholders: transforming a historically significant post office into self-build homes while preserving its architectural value.

Post Apeldoorn exemplifies a growing trend in self-build adaptive reuse, which has gained popularity since 2005. Some shell projects are initiated by collective private commissioning (CPO), where future residents collaborate to develop the building. This concept is explored further in Chapter 25: User Perspective – Build the House of Your Dreams. A Unique Opportunity!

Sources

Conversation with Marnix Norder, Directeur Steenvlinder, november 2023.

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Photography: Steenvlinder

Black Box

Adaptive Reuse Former Office Building to Housing

The former office building of the Social Service in Groningen, colloquially known as The Black Box, underwent an extensive adaptive reuse into a modern residential building. Spearheaded by developer DubbeLL on behalf of Xior Student Housing, and designed by Team 4 Architecten, the 12-storey, 15,000 m² structure building was converted the into 300 apartments. The adaptive reuse has revitalised this prominent urban area near the historic city centre.

CHARACTERISTICS	
Location	Eendrachtskade, Groningen
Original Building Completion	1976
Original function	Office
New function	Residential
Owner	Xior Student Housing
Developer	DubbeLL
Architect	Team 4 Architecten
Contractor	Geveke Bouw
Adaptive Reuse completion	2021
Process duration	2018–2021
Number of nen residences	ca. 300
Type of residence	studio’s (ca. 20 m²) and maisonnettes (ca. 40 m²)
New construction	no
Investment costs	€ 130 mio (Cobouw)

FIG. P.7.1

FIG. P.7.1 **Black Box, Groningen**

Initiative and Project Objectives

The adaptive reuse of this large office complex near the historic city centre required a meticulous process with special attention to the characteristics of its surroundings. Modifications to both the northern and southern sides of Black Box ensured that the building aligns with the architectural profile of the buildings along the Eendrachtskade. The character of the original architecture was preserved throughout. With its striking height of twelve stories, the building is visible from many parts of the city, making it a recognisable landmark in Groningen. Located near the city centre, the Eendrachtskade is a highly desirable residential area. As early as 2004, the adjacent building, a former KPN office, was transformed into student housing (Van der Voordt et al., 2007).

FIG. P.7.2

FIG. P.7.3

FIGS. P.7.2 and P.7.3 **Building in its Surroundings**

The adaptive reuse of De Zwarte Doos into the modern residential building Black Box was carried out by the developer DubbeLL. Commissioned by the Belgian investor Xior, an investment of €130 million was made to breathe new life into this vacant office building (Cobouw 2022). Initially, the property belonged to another investor, but as their plans for luxury apartments proved unfeasible, they were forced to sell it. Notably, the municipality of Groningen had already rezoned the plot from office to residential use during this early phase.

Programme, Target Group, and Feasibility

The municipality of Groningen supported the conversion of the office building into housing but stipulated that it should not consist solely of student accommodations. A cap of 225 units for students was set. Overall, the permit process with the municipality proceeded smoothly.

The mixed Programme of Requirements (PvE) for Black Box included 225 student units and 75 mid-market rental homes. The student units are typical studios of approximately 20 m². Sustainability requirements were also incorporated into the PvE. One key requirement was that the building be gas-free, even though this was not yet legally mandated at the time of the project's initiation. The developer noted, "Green investments are becoming increasingly appealing to investors because their shareholders (banks, pension funds, etc.) are increasingly requesting them, tenants consider them an important aspect, and development loans are lower for sustainable projects." The building had to be fully insulated, with the original exterior facade retained in its entirety.

The office building originally featured an internal parking garage with two levels. As the building was largely adapted to student housing, the parking standard for this project was lower than for other housing types. This allowed for the removal of one parking level and the addition of a row of low-rise housing adjacent to the parking garage.

A key aspect of the PvE was the focus on social sustainability and connection. Creating communal spaces within the building was seen as essential to foster a sense of community and enhance value at the site. Although the local community was not actively involved in the adaptive reuse process, discussions were held with nearby residents. Feedback from neighbours is often sought to better integrate the building into its context. For the municipality of Groningen, these discussions were important to prevent complaints, although the municipality itself did not participate in the conversations.

In practice, the adaptive reuse of vacant buildings often garners positive reactions from neighbours, although the specific focus on students as a target group sometimes sparks debate.

Design

In the search for an architect for the adaptive reuse, developer DubbeLL initially launched a traditional tendering process, inviting several architectural firms to submit proposals. During this process, Team 4 Architecten, the successor to the original designers of the 1976 building, Van Linge & Kleinjan, reached out. The developer was persuaded of the added value of involving Team 4 Architecten, not only because of their connection to the original building but also due to their in-depth knowledge of its structure and documentation. Although many adaptive reuse projects adopt a construction team approach, this was not the case for Black Box. Instead, various consultants were engaged—including sustainability, structural, mechanical, and traffic experts—to ensure a smooth adaptive reuse process. These consultants maintained direct contact with the client, DubbeLL. The execution of the work was subsequently put out to tender.

A striking feature of the design is the decision to retain the original black gravel concrete facade elements, with modifications in certain areas to create space for the new apartments. All window frames and facade panels were replaced with champagne-coloured aluminium frames and mullions. This gives the facade a more fine-grained rhythm, complementing the new residential programme.

The original 3.60-meter structural grid was preserved, providing a framework for the design. The existing structure facilitated the repetition of housing units, contributing to an efficient construction process. The building's structure allowed for the creation of diverse housing types, ranging from studios to two- and three-bedroom apartments, including maisonettes. To foster social interaction within the building, communal spaces were integrated on each floor, along with shared amenities such as a fitness area, office and study spaces, and communal living areas on the ground and first floors.

A unique aspect of the design process was the decision to preserve the building's existing envelope while applying interior insulation to improve its energy efficiency.

FIG. P.7.4

FIG. P.7.4 **Communal Ground Floor**

Tendering and Construction

The construction phase of Black Box began following a tendering process, with Geveke Bouw from Groningen selected as the main contractor. The choice of a local contractor was influenced by practical considerations, such as lower travel costs, as well as the valuable local network and insight into the regional market.

Geveke Bouw utilised a Building Information Model (BIM), which allowed the building to be engineered in great detail. By scanning the structure and creating a point cloud—a digital representation of the actual situation—the construction process was made more efficient and faster (Obimex 2023).

The regular concrete column structure and the standardised layout of the rooms provided a solid foundation for the detailed design. However, several challenges arose during the construction phase. Replacing the gas boilers with heat pumps and insulating the building involved significant technical modifications. Nevertheless, the structural changes required were relatively minimal.

The involvement of a local independent inspector during the construction phase, combined with the use of modern technologies such as the BIM system and point clouds, ensured an efficient and focused approach to the adaptive reuse of De Zwarte Doos into Black Box.

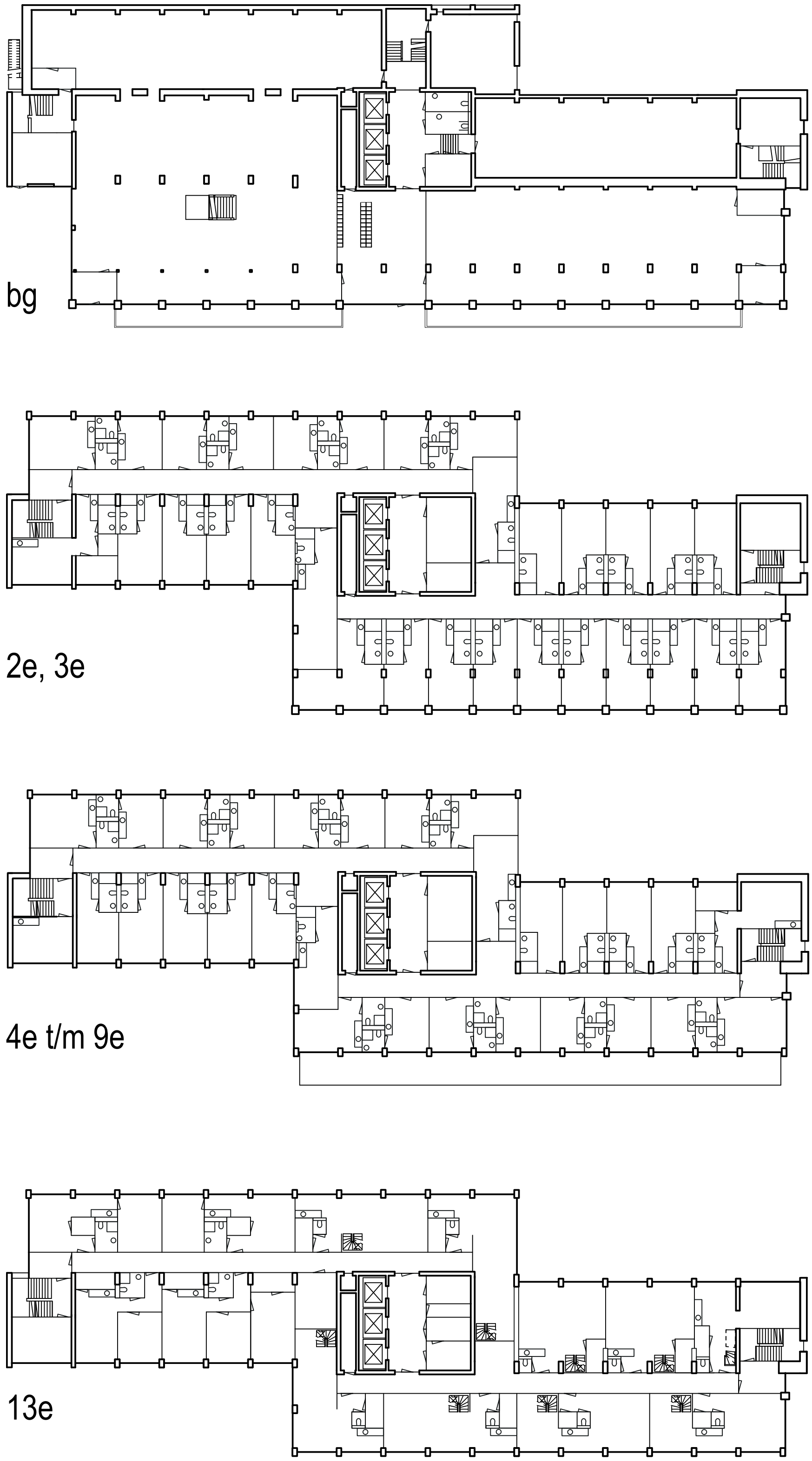

FIG. P.7.5

FIG. P.7.5 **Floor plans**

Sustainability Principles

The building was made gas-free, which was progressive for its time. While the original exterior facade was retained, internal modifications—such as the installation of modern heat pumps—create an energy-efficient environment. Social sustainability is reflected in the promotion of community-building through communal spaces on each floor and shared facilities on the ground and first floors. This combined approach resulted in a sustainable and socially engaging residential project.

Reflection and Future Value

The current programme focuses on residential use and was not designed with adaptability in mind. In the future, the programme could be modified, but this would require the replacement of internal walls. Given the ongoing shortage of student housing, Black Box remains relevant and can be adjusted to meet changing housing needs.

Black Box in Groningen represents a successful adaptive reuse of De Zwarte Doos. With a mix of student housing and mid-market rental apartments, Black Box is a distinctive addition to Groningen's housing stock. At the heart of urban renewal, Black Box serves as an inspiration for the reuse of vacant buildings, with a focus on social connection and sustainability.

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www.obimex.nlblackbox-groningen/.
Converstation with Leon Teunissen van DubbeL-L, november 2023.


10

The Eiffel building

Adaptive reuse former factory to housing

The Eiffelgebouw in Maastricht is an impressive monumental building, originally constructed in 1928, with expansions in 1931 and 1941. The building formerly served as the factory for Koninklijke Sphinx but was repurposed after a period of vacancy and a real estate crisis. It is located in the Belvedère area in the northwest of Maastricht, which underwent a major area transformation. The Eiffelgebouw is one of the largest building transformations in this area and plays a significant role in the area redevelopment. The Eiffelgebouw has been transformed into a vertical city with a mix of functions including hospitality, retail, and residential spaces.

CHARACTERISTICS	
Original Construction Year	1928 – 1931 – 1941
Original Area	33.000 m^2
Completion After Adaptive reuse	2018
Client	WOM Belvédère
Design	Braaksma & Roos Architectenbureau
Contractor	BAM
Acquisition costs	Approximately 45 milion euro for the entire Sphinx site
Renovation costs	22 million euro (exclusief TSH and other fittinngs)
Sale prices	Lease/rental


FIG. P.8.1

FIG. P.8.1 **The Eiffel building**

Initiative and Project Objectives

The Eiffel Building in Maastricht is a structure of enourmous proportions. It was originally built in 1928 and subsequently expanded in 1931 and 1941 to its current size. Previously, the building was used as a factory for the Royal Sphinx, initially as a factory for tableware and pottery and later for sanitary ware. It was unique in its time because there were factory halls on the upper floors. Even on the (top) fifth floor, the building resembled a factory hall. Factory space in most factories is on the ground floor, partly because the machinery could not be placed on the upper floors due to the weight. The Eiffel Building has a strong construction and so-called mushroom columns, which allow the weight of the floors to be better supported. In 1996, it was designated as a national monument.

The Sphinx site, including the Eiffel Building, is part of the urban redevelopment project Belvédère. Due to the credit and real estate crisis, from 2007 to 2011 various parts of this mega-project had to be temporarily paused, and private parties also withdrew from the project. This was a difficult period, but it also offered new opportunities. A new dynamic emerged, with the primary choice being to first restore and transform the heritage and monumental buildings and later consider what new constructions could be added.

FIG. P.8.2

FIG. P.8.2 **The Transformed Eiffel Building with Ground-Floor Hospitality Facilities**

Programme, Target Group, and Feasibility

The initial plan for the Eiffelgebouw was to proceed without a designated function or programme, signalling to the market that the building would undergo a shell restoration. This approach posed challenges due to the building's vast size, making it difficult to accommodate many small functions. Thus, the strategy was to attract larger entities to occupy significant portions of the space.

The Student Hotel (now known as The Social Hub) in Maastricht had been searching for a location and quickly became part of the project team. It was decided early in the collaboration that The Student Hotel would occupy a central part of the building and a substantial portion of the floor area. With this anchor tenant secured, the remaining spaces in the Eiffelgebouw were designed to support a multifunctional programme, including space for entrepreneurs, hospitality, and retail. The top two floors, with their unique quality and views, were reserved for residential units and a rooftop bar. Ultimately, the building evolved into a "vertical city."

A deviation decision was required in the zoning plan (referred to as the "environmental plan" from January 1, 2024) to accommodate The Student Hotel. Like many municipalities in the Netherlands, Maastricht required a market study to justify the need for such a hotel, given its hotel policy.



FIG. P.8.3

FIG. P.8.3 **The Shell of the Eiffel Building with Mushroom Columns**

Design

Because the building is a national monument, much attention has been given to its history and use. It is essentially a building 'without architecture,' which has always been used very functionally and adapted to the latest developments. Since it is now a national monument, little could be changed about its appearance, including the facades. Insulating the building was one of the challenges. Therefore, possibilities for insulating it from the inside were investigated. This could be done, for example, by wrapping all the columns on the outer wall or applying a separate curtain wall, but this would result in a loss of quality and usable space inside. Ultimately, a plan was made to insulate the building from the outside, also considering the poor condition of the exterior. This meant that all window frames were moved slightly outward to avoid changing the building's appearance. Since the facade needed significant restoration, this was the best solution. Many discussions were held with the municipal aesthetics and monuments committee and the Cultural Heritage Agency (RCE), which initially opposed the idea. They felt the adapted reuse posed a risk to the building's monumental value.

The choices made in consultation have preserved the atmosphere of the original building. This is evident in the visible columns, ceilings, and walls. At the same time, the exterior insulation has made it a national monument with very high energy efficiency and modern climate and comfort.

The apartments, ranging from 80 to 160 m², are located on the top floor and were delivered as shells. They offer a unique view. The residents bought a shell space that they could completely design themselves with interior fittings according to their wishes. All apartments are unique and thus contribute to the extraordinary character of the Eiffel Building. There is even a resident who bought two adjacent apartments and created a home of about 300 m².

Fire safety was not a particular issue in this project. The building has many exits, and only a few steel columns needed to be wrapped.

FIG. P.8.4

FIG. P.8.4 **Floor Plans of the Loft Apartments**

Tendering and Construction

Architecture firm Braaksma & Roos was selected through a tendering process. A large number of architectural firms passed the preselection phase, and after a lottery, three firms remained and submitted proposals. The tender process took place early in the project, allowing the architect to be closely involved throughout the development phase.

The contractor selection was approached innovatively in collaboration with The Student Hotel. What made this joint tendering process unique was the partnership between a public and a private entity, requiring the private party to publicly issue the tender as well. The tender specified several key components related to the adaptive reuse, including a fixed ceiling price for structural repairs.

BAM was selected as the contractor to carry out both the structural restoration and the interior construction. The tender process was designed to provide The Student Hotel with flexibility to negotiate the interior fit-out later (as no detailed specifications were provided for the hotel, but rather a design-and-build assignment). This arrangement enabled the selection of a single contractor, making the ambitious timeline achievable.

Toward the end of the project, a decision was made to artistically tell the story of the Eiffel Building. The former Sphinx factory is a well-known and significant building in the history of both the Netherlands and Maastricht. Its rich heritage was depicted in 26 chapters on 30,000 tiles along a 120-meter-long wall between the Eiffel Building and the newly constructed Pathé cinema, now known as the Sphinx Passage.

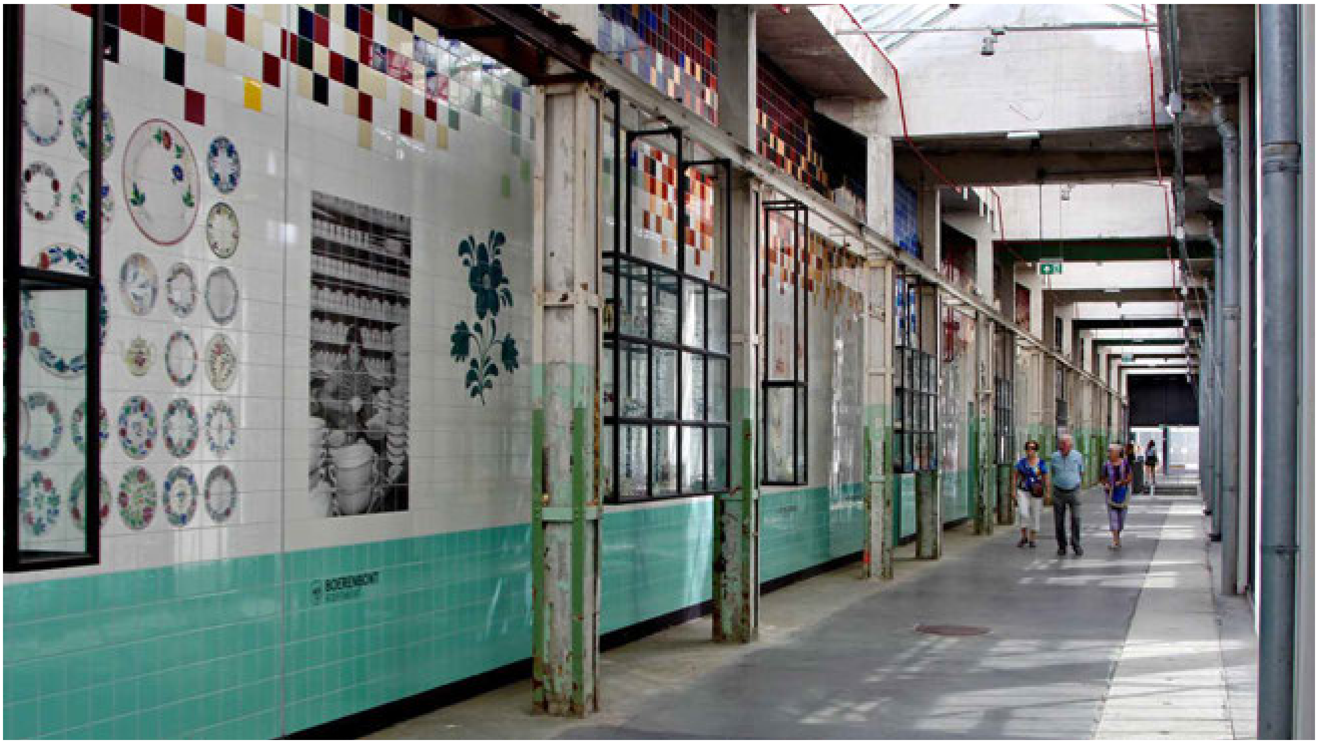

FIG. P.8.5

FIG. P.8.5 **Tile Wall with 30,000 Tiles**

Completion, Use, and Management

In September 2017, the hotel was completed, meeting the deadline set for the start of the new academic year. Beginning in early 2018, the loft apartments were sold in phases, and residents were able to start fitting out their new homes. The regulations for the apartments stipulated that owners were required to live in the units themselves and complete construction within one year. This ensured that no unfinished construction projects would linger within the building.

Sustainability Principles

The building's primary sustainability principle is reuse. It utilises residual heat from the Sappi paper factory and is gas-free. The greatest challenge in terms of sustainability was insulating the building. This was successfully achieved by insulating the facade externally, using HR++ glass, and adding secondary glazing to the historic window frames.

A limited number of solar panels were installed on the roof due to the lack of available space. These solar panels were already in place prior to the restoration and were partially reinstalled wherever space permitted.

Reflection and Future Value

With its spacious layout, high ceilings, and abundant natural light, the building's apartments are highly comfortable. These same conditions also enhance the usability of the office spaces for creative and innovative businesses, as well as the hospitality and retail spaces within the building. Visitors are drawn to the experience of using the structure in a completely different way than it was originally intended.

Although no direct provisions were made for future redevelopment, the flexible shell of the Eiffel Building ensures it is adaptable to a variety of purposes. Now that the building's envelope has been insulated, virtually all options are possible for its future use.

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Gemeente Maastricht. (2013). Descriptive document. *De Eiffel*.
Photography: Jonathan Vos

Enter

Adaptive reuse Former Office Buildings to Housing

The Enter Amsterdam project transformed four former office buildings along the Joan Muyskenweg in Amsterdam into a residential complex overlooking the Amstel River. Instead of opting for demolition, the original owner, Delta Lloyd, chose a sustainable adaptive reuse. A Design & Build team, comprising Ector Hoogstad Architecten, Heddes Bouw & Ontwikkeling, DWA (installations and building physics), and Imd (structural engineering), executed the project. During construction, the complex was sold to its new owner and investor, Vesteda.

CHARACTERISTICS	
Location	Joan Muyskenweg, Amsterdam
Original building completion	1991
Original function	office
New function	residential
Owner	Vesteda
Architect	Ector Hoogstad Architecten Ontwikkelaar
Developer	Heddes Bouw & Ontwikkeling
Completion of Adaptive reuse	2019
Duration of process	2016–2019
Original size	9.360 m^2 BVO, excl. 2.888 m^2 parking
Number of new residences	191
Type of residences	appartments, 50-120 m^2
New construction	Roof extension and expansion

FIG. P.9.1

FIG. P.9.1 **Enter, Amsterdam**

Initiative and Project Objectives

The offices on Joan Muyskenweg in Amsterdam were built in 1991 as four nearly identical five-story structures on a parking plinth. They are located on the edge of the Amstelkwartier business park, near the A10 and A2 highways, along the Duivendrecht canal.

The original buildings were constructed with prefabricated concrete facade elements, concrete floors, and interior concrete columns. The facades were clad in ceramic tiles and metal panels, and the window frames were aluminium. Inside, the office spaces featured outdated finishes, including carpeting and suspended ceilings.

The location on the fringe of the city made this an attractive site for area redevelopment, with a functional shift to residential use. Ector Hoogstad Architecten, experienced in adaptive reuse and repurposing projects, was well-suited for this endeavour. For the architects, every project begins by balancing the client's requirements and desires with a thorough investigation of the existing context. The initiative for Enter came from the property owner, Delta Lloyd. The company recognised that securing new tenants for these offices would require substantial investment. Meanwhile, the Amstelkwartier was gradually being transformed into an area with a mix of residential and commercial functions. With an eye on their social responsibility, Delta Lloyd decided to transform the buildings rather than opt for demolition and new construction. Designers and contractors were invited to submit proposals as a Design & Build team for an integrated approach combining design and execution. During the tendering process, the contractor in the initial team withdrew. At the last moment, Heddes Bouw was willing to join the project, resulting in a winning submission.

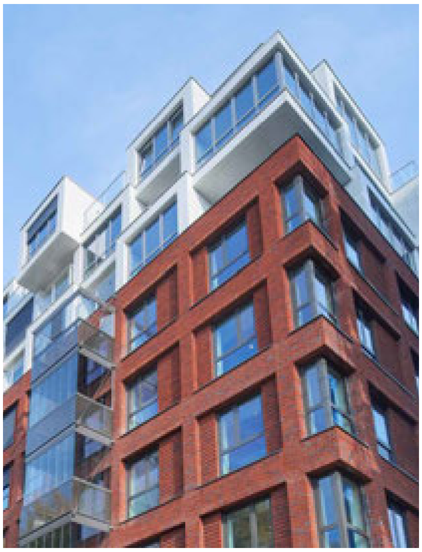


FIG. P.9.2

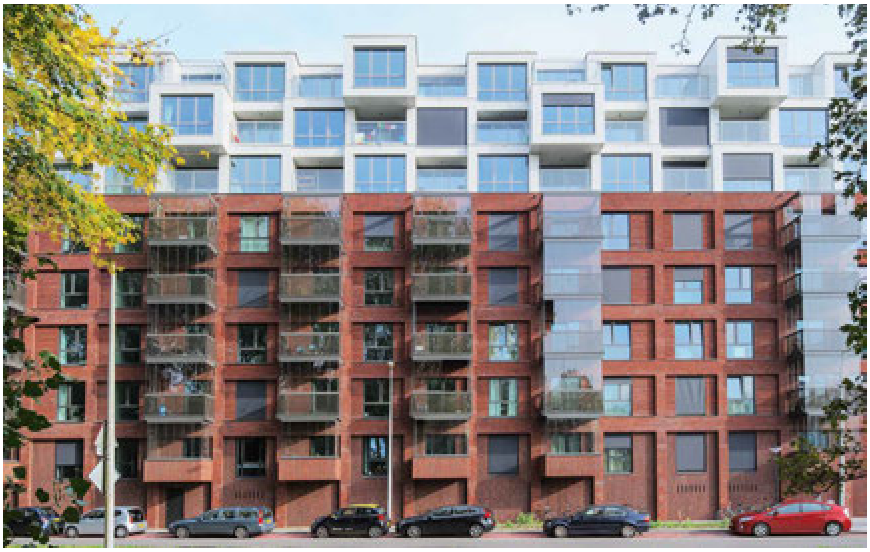


FIG. P.9.3

FIG. P.9.2 **Front View of Enter, Amsterdam**

FIG. P.9.3 **Front View of Enter, Amsterdam**

Programme, Target Group, and Feasibility

At the start of the design process for Enter, the target resident demographic had not yet been definitively determined. However, a preference for a mix of different housing types, including starter homes and larger apartments, was clear. During the design phase, based on external advice and the possibilities of the existing structure, a final decision was made on the proportions of unit types. Ultimately, the focus shifted to rental apartments in the private sector. The choice to offer higher-end apartments, ranging in size from 50 m^2 to 110 m^2, reflected both the changing environmental factors and the demands of the new context. This adjustment resulted in a range of high-quality, spacious homes in the private rental market.

In addition to compact, efficiently designed two-room apartments, friends apartments were introduced, specifically designed for co-living by two individual residents (see Chapter 10: Collaborative Housing). On the three new floors, spacious three- and four-room apartments were developed.

The Programme of Requirements was partially drafted by the client, Delta Lloyd, and based on standard choices from their new construction projects. However, the client acknowledged that an existing building presents unique constraints and allowed the Design & Build team to define the spatial programme. One of the questions in the tender was to specify the number and size of apartments planned for the building. A bold decision was made to include more apartments than the available parking capacity would typically allow. The client made this choice knowing that no permits for street parking would be issued. Sustainability principles were embedded in the design, covering energy efficiency, material use, and biodiversity. The stripping of the building incorporated principles of Urban Mining, enabling the dismantling and potential reuse of materials.

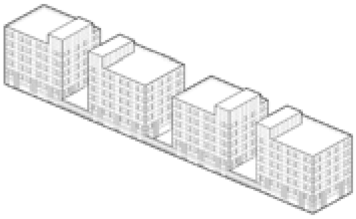
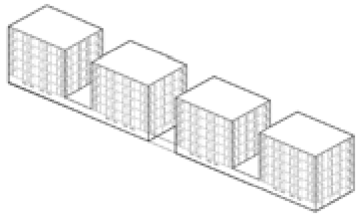


FIG. P.9.4



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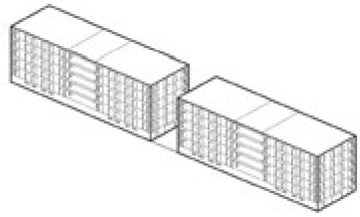

FIG. P.9.6

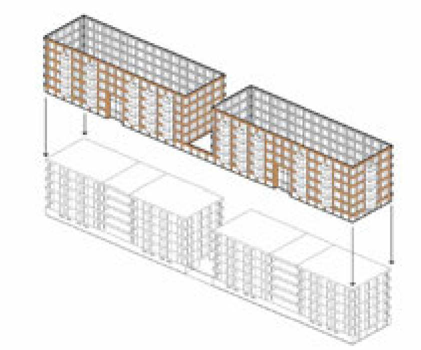

FIG. P.9.7

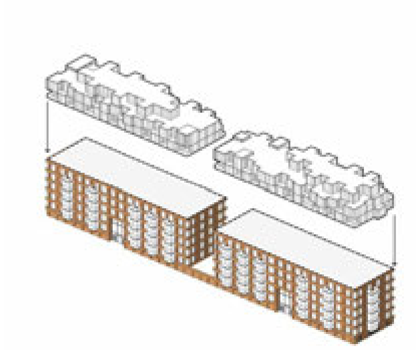

FIG. P.9.8

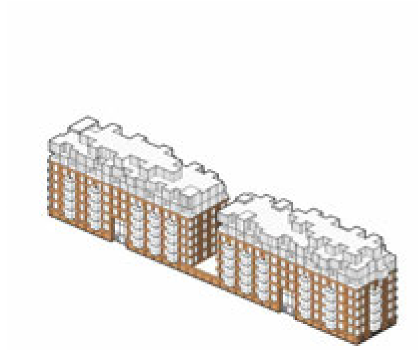

FIG. P.9.9

FIG. P.9.4 **Original Situation**

FIG. P.9.5 **Structural Framework**

FIG. P.9.6 **Connecting Two Building Sections**

FIG. P.9.7 **New Facade and Balconies**

FIG. P.9.8 **New Rooftop Floors**

FIG. P.9.9 **New Silhouette**

The municipality was involved early in the process. Before the architect began designing, the client contacted the municipality to request a zoning change from office use to residential. A feasibility study focused primarily on construction costs. The increase in the building's height, from six to nine floors, was possible within the existing zoning height limit and was positively received by the municipality.

Design

The architect selection for Enter was based on both a design and an estimate of construction costs. A key design concept that became central to the project was the idea of connecting the four original buildings in pairs. This approach allowed for the installation of new stability measures, enabling the enlargement of existing windows. Additionally, it provided extra floor space and allowed for a more efficient circulation system, with only two elevator cores and four emergency stairwells serving the entire project. Throughout the design process, the architecture firm worked closely with the contractor to ensure quality and overcome technical challenges. From a construction perspective, the design was influenced by factors such as the waterfront location, the need for sound-insulated outdoor spaces, and the constraints of the column grid. Utilising the existing structural grid, load-bearing framework, and facade characteristics was critical to the successful repurposing of the buildings. By adhering to the logic of the original structure, it was possible to add three lightweight floors without modifying the foundation, resulting in cost savings and efficient space utilisation.

Prevailing laws and regulations, including the Bouwbesluit (Building Code) and its fire safety requirements, played a crucial role in shaping the design. The Bouwbesluit mandate for dual escape routes led to the decision to use a central corridor layout with emergency stairwells at both ends. All units feature private or shared outdoor spaces, acoustically shielded where necessary by glass screens to mitigate traffic noise. Challenges during the design phase included an objection to the project filed by a nearby resident due to additional shadowing caused by the rooftop extension. Consultation with the complainant resulted in a minimal design adjustment, leading to the withdrawal of the objection. The design also faced criticism from the aesthetics committee, which expressed disappointment at the retention of the low ground-floor parking plinth. The committee had hoped for a more vibrant function at street level. However, it was eventually understood that this was a direct consequence of the adaptive reuse strategy, and approval for the blank plinth was granted. The objection came from a houseboat resident on the north side of the buildings, who raised concerns about shadowing from the extension.

Construction

The contractor for Enter was brought into the project by the architectural firm. As a member of the Design & Build team, the contractor was involved early in the design process, allowing potential issues to be addressed at an early stage. "The collaboration between the contractor and architect is incredibly valuable for adaptive reuse projects, where customised solutions are often necessary."

During construction, several challenges arose, including the lightweight structure of the rooftop extension and unforeseen issues that required foundation analysis. No exemptions from the Bouwbesluit (Building Code) were requested from the municipality. Specific circumstances, such as the proximity of a houseboat, required consultation to prevent potential disputes. Beyond these, no significant challenges emerged during the execution phase.

Completion, Use, and Management

The buildings are managed and rented out by their owner, Vesteda. Public support for projects like Enter continues to grow. Local residents and other Amsterdam inhabitants appreciate the boost the project has given to the Amstelkwartier area.A fire in Enter during the summer of 2023 initially sparked negative reactions. However, the building and its design met the fire safety requirements outlined in the Bouwbesluit (Building Code; see Chapter 8: Fire Risks in Building Adaptive Reuse and Energy Transition). All safety standards and regulations, including those for fire spread and evacuation, were adhered to. Following the investigation conducted after the fire, the fire brigade confirmed the integrity of the buildings. With their approval, the owner decided to rebuild using the same construction system and installations.

The incident, however, led to broader discussions about rooftop extensions and light-weight, "fire-sensitive" constructions in general. To increase public support for rooftop extensions, which contribute to urban densification, further research and knowledge sharing are necessary. Rooftop extensions are being used more frequently, not only in adaptive reuse projects but also in the renovation of social housing. They can be employed to create additional housing or to enable the inclusion of features such as elevators or renewable energy systems.

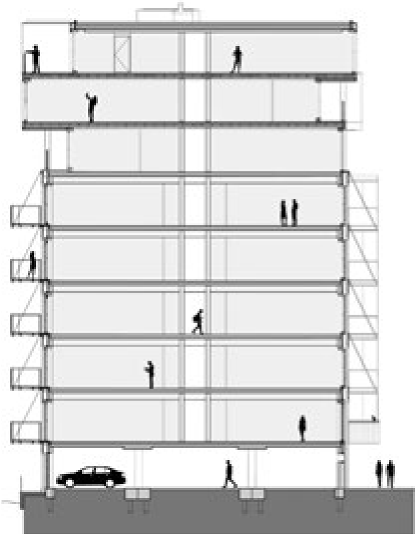

FIG. P.9.10

FIG. P.9.11

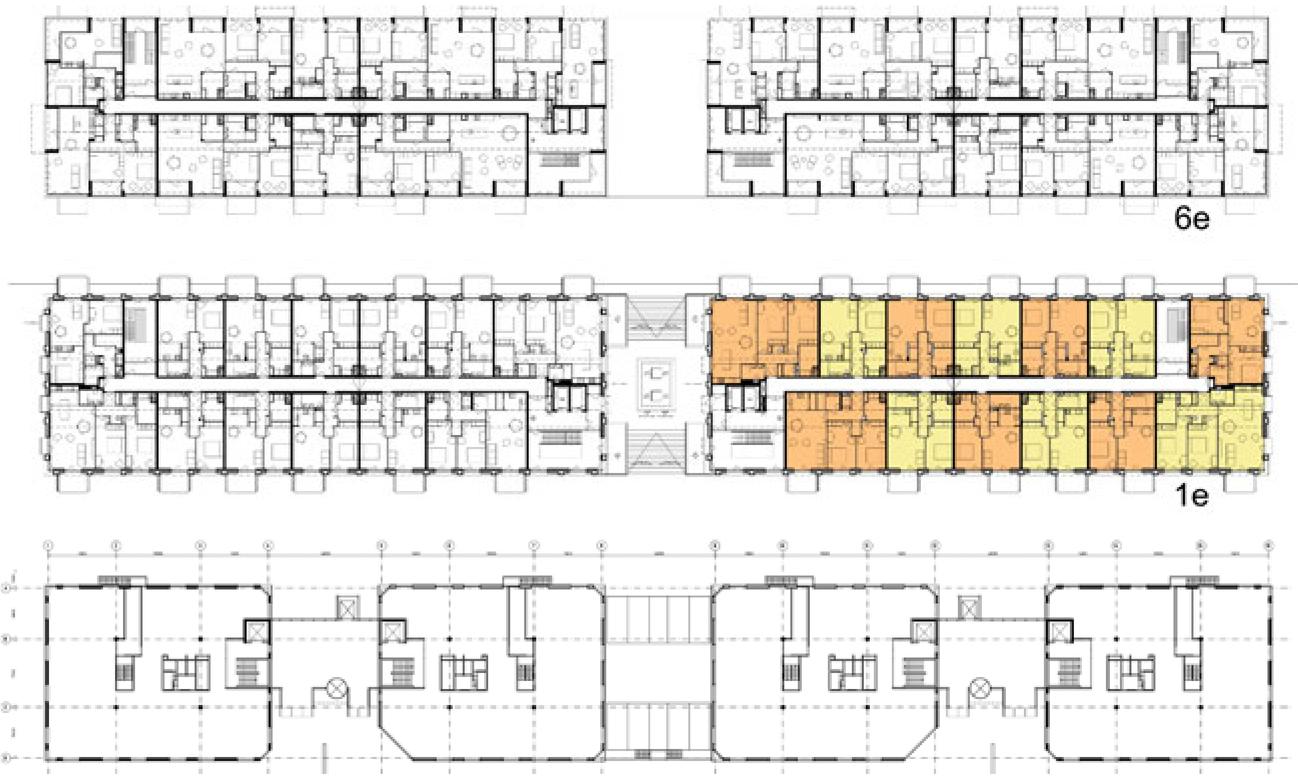

FIG. P.9.12

FIG. P.9.10 **Cross-Section of Apartments with Additional Stories**

FIG. P.9.11 **Both Entrances**

FIG. P.9.12 **Design of Apartments within Existing Floor Plan**

FIG. P.9.13

FIG. P.9.14

FIG. P.9.13 **Previous State of the Office Complex**

FIG. P.9.14 **New State: Transformed Offices into Residential Unit**

Sustainability Principles

Sustainability is becoming increasingly important in adaptive reuse projects, including in the design process. This was also evident in Enter. In the past, adaptive reuse projects were often driven solely by financial considerations, but according to architect Sander Visscher, Enter marked a turning point for Ector Hoogstad Architecten. Both the investor Vesteda and the former tendering owner, Delta Lloyd, aimed not only to make an architectural statement but also to emphasise sustainability.

The project team opted for the pragmatic preservation of the building's concrete foundation. This involved retaining the concrete structural shell while demolishing the rest of the building. Today, they would approach this with greater awareness, focusing more on preserving or reusing a larger number of components and materials from the building.

A tangible aspect of sustainability in the project is the integration of solar panels on the roof. These panels not only provide a source of renewable energy but also offer financial benefits to the residents. Furthermore, Enter incorporates biodiversity by including artificial nesting sites for swifts.

An interesting nuance in sustainability arose during discussions about reusing the building's installations. An initial assessment indicated that reusing the outdated installations, originally designed for office use, would have little value in the new residential context. The debate over retaining existing systems, along with reusing other components and materials from the original structure, highlights the tension between preservation and renewal in the pursuit of sustainability. This initiative underscores the importance of engaging in dialogue with the existing structure during adaptive reuse projects, a process where standardisation often falls short.

FIG. P.9.15

FIG. P.9.15 **Entrance and detail of facade**

Reflection and Future Value

Sustainability ambitions often involve the engagement of advisors during implementation. Aligning with these ambitions, particularly in adaptive reuse projects, requires incorporating future adaptability and flexibility into the design. This demands innovative solutions.

In Enter, adaptability was considered by including friends apartments that could later be converted into family homes and by using non-load-bearing, lightweight partition walls. These walls can be moved in the future to create smaller or larger apartments as needed. However, the requirements for utilities and installations, as seen in Enter and in many new construction and adaptive reuse projects, remain a limiting factor. The placement of installations is often inflexible, restricting the future adaptability of buildings.

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Photography: Fotografie Petra Appelhof, Fred Tigelaar

W99

Adaptive reuse of Former Factory to Housing

W99, located in Amsterdam, underwent a remarkable adaptive reuse from a former warehouse and factory into a modern residential destination. This project highlights the vision that the most sustainable buildings are not demolished but instead given a second, third, or even fourth life. The building was converted into 24 residences with a parking garage and a communal garden. Under the leadership of developer Lingotto, and with designs by Hund Falk Architects in collaboration with Fact Architects, the monumental character of the structure was both preserved and enhanced. This case study explores the various phases of this complex adaptive reuse project, realised successfully despite the challenges posed by the building's monumental status and the involvement of residents in the design.

CHARACTERISTICS	
Location	Weesperzijde 99, Amsterdam
Original building completion	1896
Original function	Utermöhlen binding material factory
New function	Residential and office
Owner	private ownership by residents
Architect	Hund Falk Architecten
Developer	Lingotto
Contractor	Van Moonen
Adaptive reuse completion	june 2017
Process duration	2014-2017
Programme	22 residences and 1 commercial space
Area	4.400 m^2 residential, 288 m^2 commercial, 26 parking place, 3.342 m^2 GFA,
Total surface area	5.600 m^2 GFA

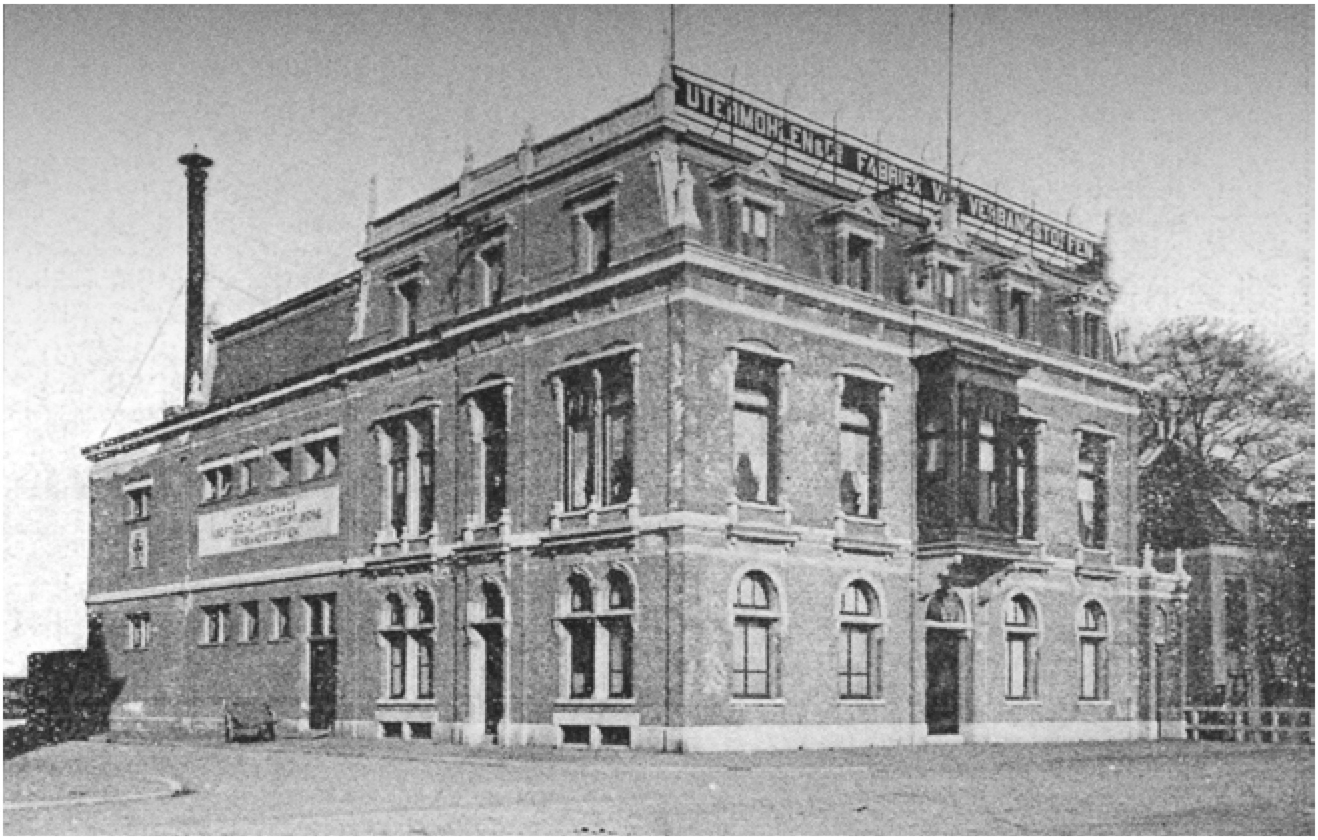

FIG. P.10.1

FIG. P.10.1 **Factory on Weesperzijde shortly after its opening in 1896**

Initiative and Project Objectives

The W99 project is located on the Weesperzijde, along the banks of the Amstel River in Amsterdam. Its location and historical characteristics have significantly shaped the identity of W99. The Weesperzijde is renowned for its architectural value, forming a distinctive part of the city with canal-side buildings overlooking the Amstel. In the 19th century, the Weesperzijde underwent adaptive reuse from an industrial to a residential area as part of urban development efforts.

Originally built in 1896 as the Utermöhlen bandage factory, the W99 complex has served various functions over the years, including as a fire station. The building's historical layers reflect Amsterdam's urban evolution.

The year the fire department vacated the Weesperzijde, the municipality of Amsterdam amended the zoning plan to allow for a mixed-use, community-oriented purpose. Following this, a tender was issued for the building's adaptive reuse. This early adjustment generated significant interest and high bids during the tender phase, with various potential uses being considered. Since then, the municipality has revised its policy, requiring a preliminary design plan alongside a bid during the tender process.

FIG. P.10.2

FIG. P.10.3

FIG. P.10.2 **Initial plans by the original tender winner to transform the factory into a hotel were not approved due to strong local opposition**

FIG. P.10.3 **The factory on Weesperzijde—after adaptive reuse in 2017**

The initial plans by the original winner of the tender to convert the building into a hotel were rejected by the municipality due to strong protests from local residents. In response, developer Lingotto, initially the second-highest bidder, took over the project. A condition of the tender was that a permit application had to be submitted within six months. Lingotto, eager to develop the project, approached their trusted partner Hund Falk Architecten to collaborate. Hund Falk Architecten, in partnership with Fact Architects, accepted the challenge and joined the project team.

The development was carried out under a co-clientship model (mede-opdrachtgeverschap), a unique form of collective private commissioning (CPO). Lingotto bore the project costs and subsequently sold the homes to the co-clients—future homeowners—for the cost price plus a margin. Fifteen of the twenty-two homes were sold under this model, allowing the co-clients to actively participate in the development process. Lingotto assumed the risk for the remaining seven homes and the commercial space.

Programme, Target Group, and Feasibility

At the start of the project, Lingotto aimed to develop residential units. Their collaboration with Hund Falk Architecten, already familiar with Lingotto's projects, proceeded smoothly. Unlike a strictly defined programme of requirements (Dutch acronym: PvE), in which all demands and wishes are established upfront, the plan evolved organically. Lingotto had already drafted a concept and estimated the number and size of the residences, which the architect then refined and enhanced.

The synergy between the architect and developer resulted in a plan for 24 residences, guided by an essential principle: the housing layout would adhere to the existing building structure. This approach significantly reduced the need for extensive demolition, especially in terms of structural work.

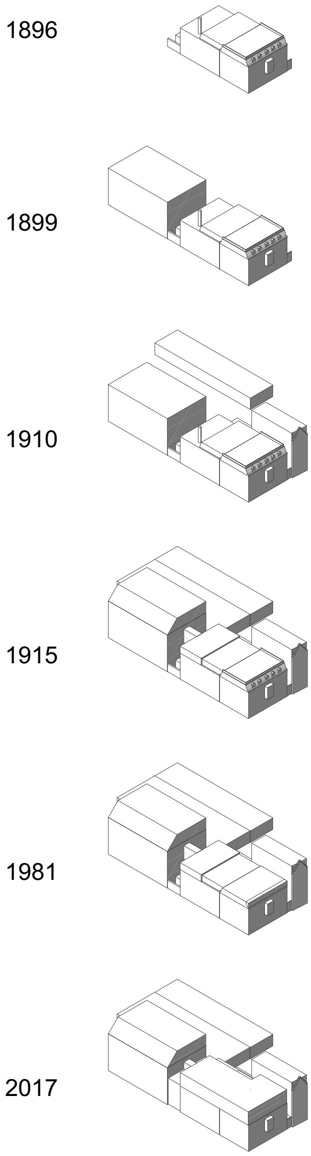

FIG. P.10.4 **Mass History Study by Hund Falk Architecten**

FIG. P.10.5 **Floor Plans, Elevations, and Sections**

From the outset, it was decided that the residences would be delivered as casco units, to be finished by the future owners. This decision was influenced by market conditions in 2014. While the market was unfavourable for expensive homes, there was a demand for alternatives. The solution lay in offering homes at a lower base cost, allowing buyers to finish and customise their residences according to their preferences, timelines, and budgets. Additionally, Lingotto established a guiding principle that, wherever possible, the project would meet the new construction requirements of the Building Code rather than the less stringent requirements for adaptive reuse projects. As a result, the building complies with modern comfort and energy performance standards.

The PvE not only reflects the functional requirements of the project but also embodies a flexible and pragmatic approach tailored to market conditions and the needs of prospective buyers.

Engagement with the Municipality

The Welstandscommissie in Amsterdam played a critical role in assessing the design for the adaptive reuse of W99. As a building classified with “Order Two” on the Waarderingskaart Beschermd Stadsgezicht Centrum (Heritage Value Map for the Protected Cityscape of the Centre), the project underwent thorough review by both the Welstandscommissie and the Monumenten en Archeologie (M&A) department of the municipality. While the city’s urban planning department quickly approved the design ideas, the Welstandscommissie required alignment regarding the extent of contemporary interventions. This body emphasised preserving the original style to a greater degree (see Figure 1).

To prevent the proposed plan from becoming a precedent, the architect conducted a detailed analysis that served as a spatial substantiation. This was particularly significant due to the flexibility in height adjustments permitted by the zoning plan along the Amstel. The analysis, prepared in collaboration with a cultural historian, documented the neighbourhood’s morphology. By mapping modern additions and carefully weighing how the proposed plan related to the area’s character, the design ensured it aligned with local features without setting an undesirable precedent.

Design

During the design phase of W99, the primary challenge was to preserve the monumental character of the building while integrating modern and contemporary elements. The collaboration between developer Lingotto, architectural firm Hund Falk, and the contractor resulted in a well-realised design. The project was executed using a construction team approach. The essence of the design lay in the seamless integration of new elements, particularly the addition of two floors, with the existing structure. This crowning addition adhered to the classical principle of the tripartite division: base, middle, and crown. It was crucial that the existing primary load-bearing structure guided the new framework.

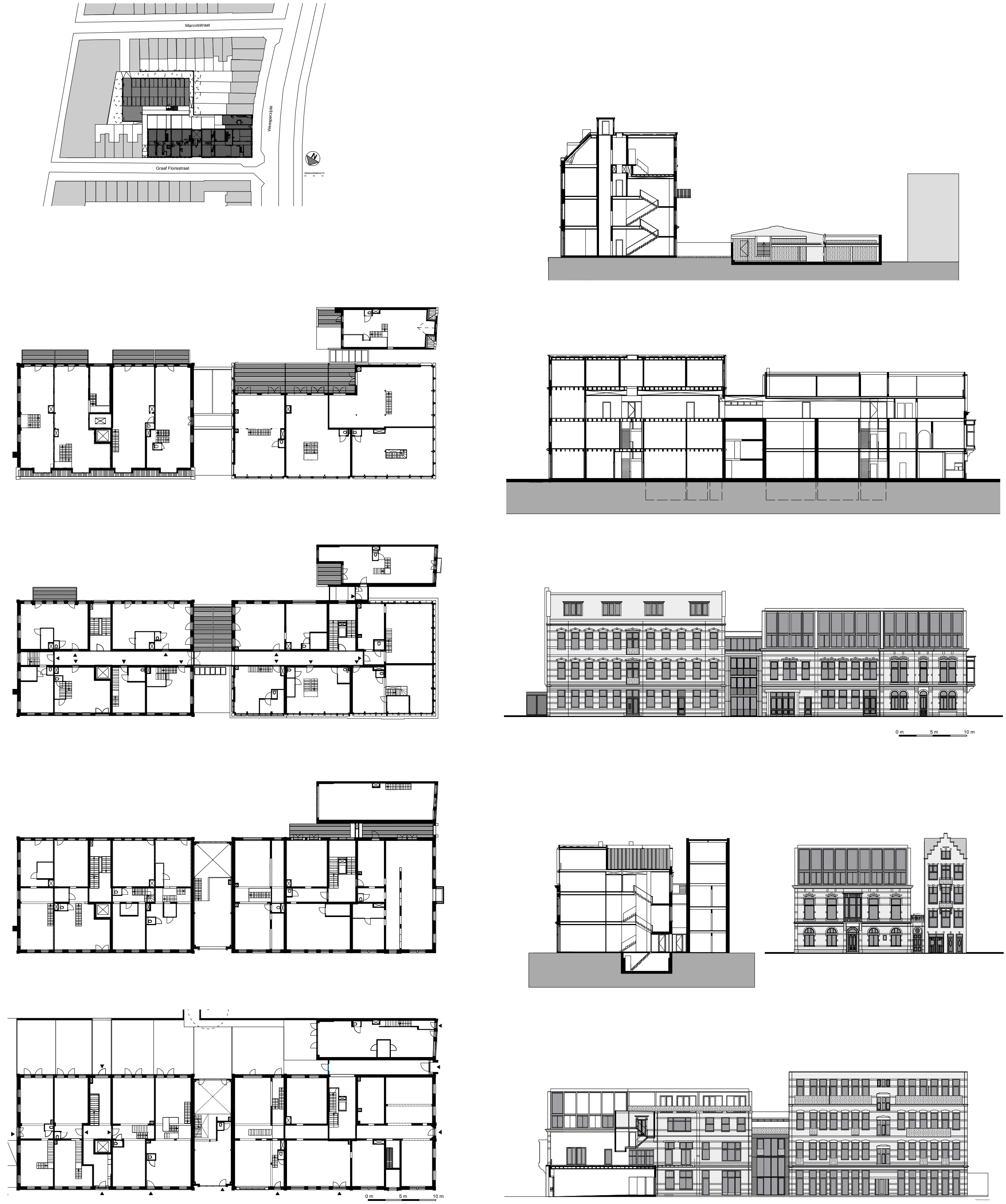

FIG. P.10.4

The facades, with their monumental character, were meticulously restored to their original condition. The additions subtly responded to the existing structure, respecting proportions, rhythms, and reliefs. The architects balanced contemporary and traditional elements, reinstating characteristic features such as bay windows, decorative mouldings, entrances, and monumental doorframes.

A notable feature was the elevated rooftop garden above the existing sheds, offering parking for cars and bicycles beneath the deck. This addition not only greened the inner area but also provided a new dimension to residential living within the complex. The various units within the structure ranged in size from 65 to 255 m², each with private entrances and outdoor spaces in the form of gardens, balconies, or rooftop terraces. Retaining the existing structure led to diverse layouts, allowing residents the freedom to design their own home. During the design process, the general layouts of the homes had to be established. Placing utility shafts that connected all installations was a significant design challenge. Aligning resident preferences for both lower and upper floors required substantial time and effort from the architect and the developer.

To aid in the technical development of the installations, the architect provided future residents with a zoning plan that outlined functional areas. Emphasising user-centric design, the architect underscored the philosophy: "You must create a building that serves its users." This approach facilitated efficient planning of shafts and installations for each residence. Although the possibility of centralised installations was considered, the developer opted to give residents individual responsibility for their systems. However, they were required to utilise the pre-established utility shafts.

Tendering and Construction

The process was structured as a construction team approach, with contractor Van Moonen involved from the initial design sketches. This approach not only saved time but also fostered close collaboration, open communication, and the sharing of expertise. It allowed the contractor to identify structural deficiencies in the existing building early on, minimising potential surprises during construction. Within the Homeowners' Association (VvE), it was agreed that the completion of the residential units would need to be finalised within three months after the delivery of the casings. This clear deadline was set to ensure that residents would not have to endure prolonged construction work. Since all units were quickly sold, the future residents were closely involved in the construction phase of their homes. At the time, the real estate market was experiencing favourable dynamics, giving buyers confidence in the value of their investment. These favourable conditions enabled them to finish their homes in a luxurious manner. Additional work often arises in the final stages of construction, and the contractor offered to manage the interior finishing of the homes. Several residents requested the original contractor to carry out this work. Various custom options, such as the addition of conservatories, extra windows, and rooftop terraces, were executed by the contractor, fulfilling the diverse preferences of the residents. Lingotto also employed a dedicated contact person to serve as the primary point of contact for the residents, ensuring smooth communication during this phase.

FIG. P.10.5

FIG. P.10.6

FIG. P.10.6 **W99 in the Streetscape**

FIG. P.10.7 **View of Rear Facade and Elevated Courtyard Parking**

Sustainability Principles

The project's programme of requirements emphasises sustainability and high-quality standards. The redevelopment of the building, which holds an Order 2 status in the city of Amsterdam, necessitates respect for the existing structure and the careful integration of new elements. Sustainable materials and modern installations contribute to creating an energy-efficient and comfortable living and working environment.

Reflection and Future Value

An intriguing aspect of W99 lies in the flexibility it retains for future functional changes, should the city's needs evolve. Non-load-bearing interior walls can be moved, and spaces can be expanded or reduced as needed. This adaptability is valuable not only from a functional perspective but also in terms of sustainability. Preserving the original structure and taking a thoughtful approach during the adaptive reuse phase establish a foundation for enduring relevance in Amsterdam's rapidly changing urban environment. As such, the project serves as both a reflection of the past and a cornerstone for the city's future. The W99 adaptive reuse project in Amsterdam demonstrates the successful adaptation of a historic building into a modern residential destination. The integration of self-built homes by residents resulted in a diverse housing complex but also brought complexities. Additionally, balancing preservation with contemporary additions posed significant challenges. These challenges were carefully addressed during the design phase. Despite these hurdles, W99 stands as an example of a successful adaptive reuse, with attention to sustainability and future-proof flexibility.

FIG. P.10.7

FIG. P.10.8 **Dwelling in rooftop extension**

The W99 adaptive reuse project in Amsterdam demonstrates the successful transformation of a listed building into a contemporary residential environment. The integration of resident-led self-build contributed to a diverse housing complex, while also introducing layers of complexity. A key challenge lay in reconciling heritage preservation with contemporary architectural additions — an issue that was carefully addressed during the design phase. Despite these challenges, W99 serves as a strong example of successful adaptive reuse, with a clear focus on sustainability and future flexibility.

Sources

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Photography: Luuk Kramer Photography

De Meester

Adaptive reuse Former School to Housing

In the 1920s, several vocational schools were built in the Netherlands, including one in Haarlem's Kleverpark neighbourhood. For decades, this school was a hub for training craftsmen, but after years of vacancy and neglect, the building underwent a significant adaptive reuse.
The project faced two major challenges: the removal of significant amounts of asbestos and the creation of sufficient parking facilities. These challenges were successfully addressed, resulting in the completion of 178 residential units.

CHARACTERISTICS	
Original construction year	1920
Original area	ca. 19.000 m^2 GFA
Completion after adaptive reuse	2023
Client	COD
Design	INBO
Contractor	VOF Bouwcombinatie Scholtens-Toekomst
Acquisition costs	€ 11.100.000
Renovation costs	€ 45.000.000 (ex. VAT)
Sale prices	€ 70.000.000 (ex. VAT)

FIG. P.11.1

FIG. P.11.2

FIG. P.11.1 **Entrance of De Meester**
Source: Charlotte Bogaert

FIG. P.11.2 **Aerial view De Meester**

Initiative and Project Objectives

Vocational schools constructed in the 1920s often embodied a modest yet modern style of Dutch brick classicism, characterised by large windows, high ceilings, and H-shaped layouts. The vocational school in Haarlem, located in Kleverpark, followed this architectural tradition and served as a training centre for craftsmen for decades. After being sold by the municipality of Haarlem to housing corporation Principaal de Key (now Lieven de Key), the school became vacant in 2010. During its final years, the building suffered from poor maintenance, and its condition further deteriorated after Sterren College vacated the premises. The vacant building was managed as anti-squatter property until its redevelopment potential for residential use spurred the decision to transform the site.

When the building was put up for sale in 2016, COD won the bid with a compelling plan to convert it into residential units.

Upon further inspection, it became clear that the building contained far more asbestos than anticipated, and the wooden roof and other components were in poor condition, requiring complete replacement.

Additionally, the urban location demanded a high parking standard, which presented a significant challenge in planning.

FIG. P.11.3

FIG. P.11.4

FIG. P.11.3 **Entrance of the parking garage**

FIG. P.11.4 **New dwellings**

Programme, Target Group, and Feasibility

The high parking standards in the area significantly influenced the adaptive reuse programme. In an earlier plan by housing corporation Principaal de Key, 300 homes were proposed. However, with a parking norm of 1.6, this would have required 480 parking spaces, making the plan unfeasible and leading to its failure. Ultimately, COD's design included 178 homes in the programme and constructed 157 parking spaces in a two-level underground parking garage. Due to space constraints and the desire to maintain the quality of outdoor spaces, it was deemed undesirable to place parking at ground level.

The delicate balance between parking requirements and the number of homes meant that fewer homes could be included in the programme than initially planned. As a result, some homes in the transformed building were made larger. The municipality had stipulated in the earlier purchase agreement that at least 25 homes should be in the social (now mid-priced) segment, and this condition was carried over into COD's plans.

Design

The building features five-meter-high ceilings, which posed challenges for integrating homes. These ceilings were too high for a single residential floor yet too low for two levels. Another focus point was acoustics, which had received less attention in the building's previous function. When the building served as a school, lowered ceilings were installed in the hallways to reduce noise and echoes. However, the architect saw it as a missed opportunity to conceal the beautiful vaulted ceilings and large portals behind lowered ceilings and partition walls. It was decided to remove the lowered ceilings and address noise in the hallways with acoustic measures.

FIG. P.11.5

FIG. P.11.5 **De Meester at night**

Although the building exhibits consistent rhythm in the dimensions of the classrooms and hallways, slight variations were found among the homes. The building deviated from its original blueprints, making it difficult to adhere to the module sizes (spacing between walls and columns). A 3D model was used to create accurate drawings of the building's actual dimensions.

FIG. P.11.6

FIG. P.11.7

FIG. P.11.8

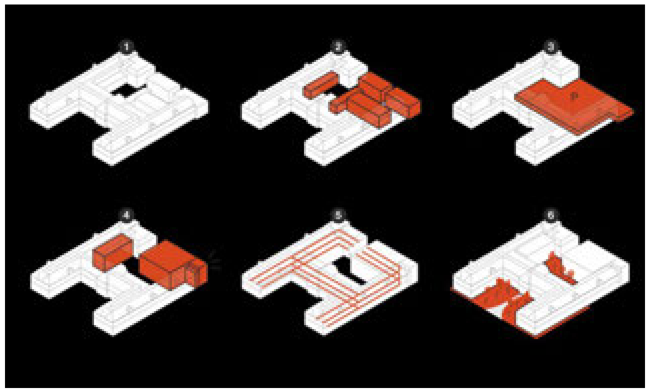

FIG. P.11.9

FIG. P.11.6 **Situation sketch**
Source: INBO

FIG. P.11.7 **Ground floor**
Source: INBO

FIG. P.11.8 **Housing types**
Source: INBO

FIG. P.11.9 **Construction phases**
Source: INBO

For the architect selection, COD organised a competition among a select group of architects, ultimately won by INBO for their innovative approach. In INBO's final design, bathrooms and kitchens were centrally located within the living space. This eliminated the need for hallways in the homes, instead creating connected spaces around the central bathroom and kitchen. By positioning the bathroom and kitchen away from the walls, variations in module sizes and dimensions did not have to be accounted for. This design was applied across all floors, aligning installations, water, and drainage vertically from top to bottom in a consistent layout.

Tendering and Construction

Scholtens Bouw became involved at an early stage and participated in the construction team from the Preliminary Design (VO) phase onward. Although they had also bid on the property, they were not awarded the project. However, having worked on the bid for the adaptive reuse previously, Scholtens Bouw had developed a thorough understanding of the building. The adaptive reuse of De Meester was extensive and demanded a broad range of skills from the contractor. On one hand, the project involved constructing an underground parking garage with new construction above it. On the other hand, it required meticulous restoration of window frames. Given the diverse expertise required, contractor Toekomst Groep was brought in to form a consortium with Scholtens Bouw. Toekomst Groep focused on the restoration, adaptive reuse, and detailed finishing work, while Scholtens Bouw handled the rougher construction aspects and the new-build elements.

Completion, Use, and Management

De Meester is now a vibrant residence, and the adaptive reuse has been well-received by the local community. After a long period of vacancy and neglect, the revitalisation of the building has contributed positively to the neighbourhood's liveliness. In the early period of occupancy, some residents reported complaints regarding noise disturbances within the building. Investigations and sound tests were conducted to identify the cause and determine potential solutions. However, the measurements taken in the apartments indicated normal levels of noise. One theory is that the complaints stem from the residents' adjustment to a new environment, as many moved from detached homes in quiet areas around Haarlem to shared housing near the city centre, where ambient noise is naturally higher. Additionally, the disturbances could have been linked to the noise from numerous ongoing move-ins. Over time, these complaints subsided.

The adaptive reuse of De Meester has been thoroughly documented. A local resident created a photo book capturing the building’s evolution over time, preserving its history and showcasing the progress of the project.

Sustainability Principles

The project utilised the GPR building score to ensure a sustainable adaptive reuse. The GPR building is a digital tool that measures and facilitates discussions about the sustainability of a structure. A life cycle analysis (LCA) serves as input for the GPR score, requiring detailed information about the materials' origins. The GPR score operates on a scale from 1 to 10, with 1 being the lowest and 10 the highest. A score of 6 is considered sufficient. For De Meester, the project set an ambitious goal of achieving a 7.5.

In addition to the GPR score, the EPC (Energy Performance Coefficient) score was also employed. The target of 0.4 was met, with an average result of 0.37. However, not all units achieved this level due to constraints in applying sufficient insulation in some of the monumental rooms, where features like historic wood panelling had to be preserved.

Reflection and Possible Future Adaptive reuse

During the early stages of the project, many aspects were uncertain, making the project a unique process for both the developer and the involved parties. For instance, a time capsule was discovered behind the building's original cornerstone. After it was opened, it was restored and returned to its place by the builders. Moreover, a "second cornerstone" was added, containing a new time capsule intended for the next hundred years. The contents of this capsule remain a secret, preserved for good fortune.

Sources

Conversation with Ferdi Koornneef van COD, november 2023.
Photography: Charlotte Bogaert and COD

Source: 1618 Vastgoed

The Hegius / Museum EICAS

Adaptive reuse of Former School into Residential Units

The Hegius, established in 1840 as a gymnasium, boasts a rich history. Over the years, it has undergone numerous transformations and faced significant challenges, including severe damage during the Second World War when it was nearly destroyed.

Recently, the building has been converted into Museum EICAS (European Institute for Contemporary Art and Science), with residential apartments added above. This mixed-use development was designed to offset the costs of the museum.

A standout feature of the adaptive reuse is the unique glass roof, which includes a CityDNA print by Chinese artist Lu Xinjian. The print features floor plans of cities such as London, New York, and Beijing.

CHARACTERISTICS	
Original construction year	1956
Original area	1.500 m^2 GFA
Completion after adaptive reuse	2023
Client	1618 Vastgoed BV
Design	Hans van Heeswijk architecten
Contractor	PHB
Acquisition costs	€ 1.600.000 excl. costs
Renovation costs	€ 6.000.000 excl. VAT
Sale prices	Ranging from € 375.000 to € 950.000

FIG. P.12.1

FIG. P.12.1 **Het Hegius before adaptive reuse**

Initiative and Project Objectives

The Hegius was founded as a gymnasium in 1840. At that time, there were only ten students, divided into six classes. The gymnasium and school building grew significantly over the years until it was damaged by an Allied bombing during World War II. The aim of the bombing was to hit the Wilhelmina Bridge, but everything around it was hit instead, leaving the bridge intact. The joke in Deventer is that if they come to bomb again, you should take shelter under the bridge because they won't hit it.

In 1956, the gymnasium was housed in a new, larger school building. The design is by engineer W. Knuttel and is a typical example of Dutch rationalism. The functional building housed not only the gymnasium but also a secondary girls' school. Over the years, the building has accommodated various forms of education, including an ROC. After a long period of vacancy, there was a plan in 2001 to demolish the building, but after a period of discussion, it was decided in 2003 to give it the status of a municipal monument. Since this decision, the building has mainly served as living space for anti-squatters.

FIG. P.12.2

FIG. P.12.2 **Het Hegius after adaptive reuse**

1618 Vastgoed, together with the initiator of EICAS, was looking for housing for a new museum. When the Hegius was put up for sale by the municipality, 1618 Vastgoed made a plan, and submitted a bid for the building. The plan was rated the best, and the building was awarded to 1618 Vastgoed.

The Hegius building is located on the 'cultural route' of the city, the strip from the station to the IJssel, a definition by former Chief Government Architect Jo Coenen and Fons Asselbergs in an advisory to the municipality. Developing anything other than a cultural function in this area would be detrimental to the cultural route, as understood by 1618.

The development plan of 1618 Vastgoed was the realisation of Museum EICAS (European Institute for Contemporary Art and Science) with condominiums on top. The idea was that the apartments would cover the costs of realising the museum. The intention of 1618 Vastgoed was thus to realise the museum pro Deo.

FIG. P.12.3

FIG. P.12.4

FIG. P.12.3 **Glass roof with a view over Deventer**

FIG. P.12.4 **Glass roof panels atop Het Hegius**

Programme, Target Group, and Feasibility

The Programme of Requirements included 16 high-end residential apartments above Museum EICAS. The location's mixed-use zoning (social and residential) required no changes to the environmental plan, facilitating the project's approval. The number of residences was limited by parking constraints, resulting in fewer but larger units. The museum provided a balance between cultural and residential functions, aligning with the area's purpose.

Design

For the building's adaptive reuse, three architects were shortlisted, including Hans van Heeswijk. However, his winning design was rejected by the Planadviesraad (the planning and heritage advisory board of Deventer), which found that it significantly compromised the building's monumental integrity.

The final approved design for the large L-shaped school building retained the high ceilings and large windows, respecting the structure's heritage value. The attic floor was fitted with a glass-panel roof. The ground floor of the school building was repurposed for a museum, while the upper floors and the attic with its glass roof were converted into apartments.

The discussions with the Planadviesraad were considered the most challenging part of the project. Reviewing and negotiating the design required significant time and effort. The council demanded extensive information, even requesting production drawings from suppliers. Additionally, custom-made mock-ups were assessed by the council before approval was granted - a highly unusual step in the permitting process. The coordination of these additional materials, coupled with the infrequent opportunities for evaluations, incurred significant costs and delays, with no certainty that the design would ultimately be approved. While the meticulousness required for evaluating designs in a historic city centre is understandable, the accompanying uncertainties proved extremely demanding.

Ultimately, the removal of the original roof and the installation of a glass structure were approved. The new design follows the contours of the former roof, with the glass addition providing ample natural light to the attic living spaces. The panels, made of enamelled glass, feature a stylised map of Deventer—a work of art by Chinese artist Lu Xinjian. For his City DNA series, Xinjian utilised maps of cities such as London, New York, and Beijing. The apartments are located on the upper floors of the building, while the former classrooms on the ground floor have been converted into museum galleries, now home to EICAS exhibitions. The building's structure was well-suited for its adaptive reuse into exhibition spaces due to the relatively large rooms and high ceilings.

A key design challenge was ensuring a programmatic separation between the museum and the apartments in terms of soundproofing and fire safety. The existing concrete floors were relatively lightweight and required reinforcement to achieve adequate sound insulation. The fire safety plan focused heavily on escape routes and staircases, taking into account the public nature of the museum function.

Tendering and Construction

Three contractors were invited to prepare a budget based on the final design. For the final design phase, the contractors were asked to create a base budget and provide input regarding the financial and technical feasibility of the project. The contractor selection was evaluated using a matrix with predefined selection criteria and weighting factors.

The client, 1618 Vastgoed, has extensive experience in selecting execution partners. Their preference is to select a contractor after the final design (DO) has been established. This allows the contractor's input to be incorporated during the period leading up to the permit documentation phase. If selection occurs during the preliminary design (VO), the level of detail is insufficient for a quantity-based bid. Conversely, if selection is delayed until after the permitting phase, opportunities to propose alternatives are too limited. For the Hegius project, involving a construction team partner was crucial to successfully obtaining the necessary permits.

The glass dormer windows are self-supporting glass structures manufactured in a factory. These dormers were mounted within a steel frame, which was then installed into the roof openings. The challenge with glass dormers lies in the fact that glass is structurally rigid and will crack if subjected to movement. Building roofs, however, are flexible, allowing for slight shifts and expansions that could cause the glass to break. The steel frame surrounding the glass acts as a connection between the two structural components, ensuring they remain intact. This system was thoroughly tested at a separate location before being incorporated into the dormer windows.

FIG. P.12.5

FIG. P.12.5 **One of the residences with secondary glazing and window frames for enhanced insulation**

Completion, Use, and Management

The museum was completed first, followed by the residences. The museum has been well received by both local residents and visitors to Deventer. Museum EICAS fits seamlessly into the city's cultural pathway plan.

The residences are being enjoyed by their occupants. In the initial phase, concerns were raised about noise disturbance and finishing options for the apartments. However, sound measurements confirmed that the noise resistance met the required standards, and no restrictions were found in the finishing possibilities for the apartments.

Sustainability Principles

Deerns consultants were involved in the project, providing expertise on building physics, technical installations, and specifications. Their work included calculations related to noise, safety, and energy performance. To achieve effective energy efficiency, interior insulation walls were installed for the single-layer brick walls, and secondary glazing was applied on the inside of single-glass windows to improve insulation.

Heat generation is managed sustainably. The building is connected to the city's district heating network. Although the network currently operates on gas, there are future plans to switch to more sustainable heating methods, a transition that will depend on municipal initiatives. Additionally, free areas on the roof of the glass dome were fitted with solar panels, allowing individual apartments to generate their own energy.

Deerns also advised on the light transmission (LTA) and solar heat gain (ZTA) values of the glass dome. The dome, which is fully bonded, uses specialised glass with a load-bearing function. This ensures that the apartments remain cool in summer and warm in winter.

Reflection and Future Value

The goal of creating a fully functional museum alongside high-quality apartments has been achieved. The glass-roof artwork is now a prominent feature of Deventer and has become the city's largest artwork. This adaptive reuse exemplifies the successful balance of preserving heritage while creating modern, functional spaces that contribute to the city's cultural identity.

Sources

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Photography: 1618 Vastgoed

Gym halls Middelburg

Adaptive reuse of Former Gym Halls into Residential Units

The two gym halls in Middelburg stand on a historic site once occupied by a VOC (Dutch East India Company) warehouse. Transforming the buildings was a more logical choice than demolition and new construction, which would have required extensive archaeological research.
Woongoed, the owner of the gym halls, aimed to develop social rental housing. The gym halls are large, square buildings measuring 20 by 10 metres, with smaller attached changing rooms. In collaboration with Hulshof Architects, the gym halls were transformed into 14 zero-energy social rental homes.

CHARACTERISTICS	
Original construction year	1966
Original area	Aprox. 500 m^2
New area	Aprox. 500 m^2
Completion after adaptive reuse	2022
Client	Woongoed Middelburg
Design	Hulshof Architecten
Contractor	Bouwgroep Pieters

FIG. P.13.1

FIG. P.13.1 **Aerial View of the Gym Halls**

Initiative and Project Objectives

In the provincial capital of Zeeland, two gymnasiums that had not been used for some time were transformed into social housing units. In the seventeenth century, a VOC warehouse for storing goods stood on this site. During World War II, this East India House was destroyed, and in 1966, the gymnasiums were built here.

The gymnasiums are 20 by 10 meters with a height of 6 meters, forming the shell for the transformation into an apartment complex. Both gymnasiums have changing rooms in a lower section, which receive less light. The two gymnasiums are located in a roughly square inner courtyard, surrounded by houses three to four stories high. A path runs through the inner courtyard between the two gymnasiums. It is a quiet place with a lot of potential for the neighbourhood. The vacancy of the gymnasiums created a sad situation.

When Woongoed took over the buildings in 2017, they had been vacant for some time but were still in reasonable condition. A major advantage was that the original wooden floors with crawl spaces had been replaced by higher quality system floors in the 1980s.

FIG. P.13.2

FIG. P.13.3

FIG. P.13.2 and P.13.3 **Gym halls before adaptive reuse**

Woongoed, together with Hulshof Architects, sought to fill the site with social housing. In the initial scenarios, the plan was to demolish the gymnasiums and build new homes. Ultimately, during a site visit, it was suggested and decided to keep the gymnasiums and transform them into homes. Choosing transformation would save time and costs, as no archaeological research would be required. There was a high chance that remains of the destroyed VOC building with warehouse would be found in the ground, and archaeological research can take a long time. Additionally, the neighbourhood wanted the buildings, which had been vacant for some time, to have a function.

Programme, Target Group, and Feasibility

It is Woongoed's mission to create sustainable and affordable housing for low-income tenants. For this location, it was an early goal to create a lot of greenery for both new and existing residents. This would tap into the potential of the courtyard, the backyard of the existing residents. Additionally, the architect aimed to build zero-energy homes.

The feasibility of various scenarios for redeveloping the location was tested, which ultimately led to the decision to convert the gymnasiums for a new function. This stemmed from the relatively simple goal: the most sustainable option is not to demolish. Ultimately, it was decided that 14 zero-energy social rental homes would be realised in the old gymnasiums.

For the realisation of this project, the environmental plan had to be amended, using the so-called "kruimelregeling," a relatively quick method for changing an environmental plan. With this regulation, a change in an environmental plan can be made in eight weeks. Important for the kruimelregeling is that there is a lot of participation and unanimous agreement from local residents for the plan change. Additionally, the building must meet several conditions, mainly that it should not be demolished but adaptively reused. Small expansions up to about 50 m² are also possible; otherwise, longer procedures apply.

FIG. P.13.4

FIG. P.13.2 **Floor plan**
Source: Hulshof Architecten

With the arrival of the Environmental Act on January 1, 2024, the kruimelregeling will be abolished. The new Environmental Act should accelerate the process of changing an environmental plan so effectively that the kruimelregeling becomes unnecessary.

Design Phase

After the research showed that the transformation into social rental housing was possible, the plan was discussed with the local residents. As early as 2017, a list of wishes and points of attention was made based on conversations with residents. It turned out that the plan for social rental housing was actually the most appreciated. During a meeting in August 2018, the final plan for the homes was presented to the residents and interested parties, and the starting signal was given for the establishment of a residents' working group for the design of the outdoor space of Hof van Oost-Indië. This working group developed the final design plan. The residents were also regularly informed about the progress during the further development process, and their wishes were worked out.

The use of the characteristics of the gymnasiums in the design results in unique living spaces. With a mezzanine at the front, the height of the space is used to get as much daylight as possible into the back of the homes. The space on the upper floor can be used as a living room or bedroom. The preservation of the gymnasium shells turned out to produce a desirable type of housing that is not standard. All in all, this also led to a quick permit procedure without objections.

FIG. P.13.5

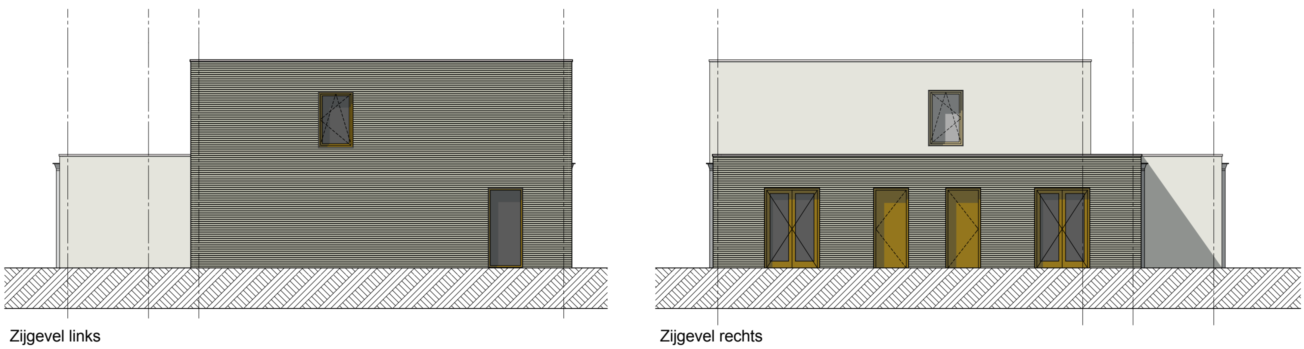

FIG. P.13.6

FIG. P.13.4 **Final Design – Front and Rear Facades (figure in Dutch)**
Source: Hulshof Architecten

FIG. P.13.4 **Final Design – Side Facades**
Source: Hulshof Architecten

Agreements were made with various neighbours about facilities and accessibility via the newly designed public area. At the insistence of the residents, it was also possible to reach an agreement with the municipality that no parking requirements needed to be set; the entire area was made car-free. Recounts of parking spaces in the area showed that there is some overcapacity when it comes to parking for residents.

Double wood was used as fire-separating walls between the homes. Because the buildings do not have monumental status, they could be insulated from the outside, which is easier than from the inside. As a result, the window frames could be replaced with insulating windows, which was necessary. The interiors of the homes were finished fire-resistant according to the Building Decree.

FIG. P.13.7

FIG. P.13.8

FIG. P.13.5 **Facade View**

FIG. P.13.6 **Front Doors of the New Residences**

Tendering and Construction

Hulshof Architects was chosen early on by Woongoed to lead the research into residential functions at the gymnasium location. The choice of architect stemmed from previous collaborations, which had built trust between the two parties. The contractor joined the construction team after the design development phase. Like the architect, the contractor was selected based on a previous collaboration.

For the construction of the project, a lot of asbestos had to be removed first, unfortunately much more than expected. Especially in the extensions with the former changing room, there was a lot of asbestos. At the start of construction, the asbestos was removed, and the gymnasiums were cleared and cleaned. The structure, facade, and roof of the halls were still in excellent condition, providing a dry and pleasant workspace for the contractor. A new facade was built for the existing facade, which serves as new insulation for the homes. The homes in the gymnasiums were then built with timber frames, a lightweight and easily workable construction method, ideal for interior fittings.

Completion, Use, and Management

Upon completion, the residences were immediately rented out and have been well received. The project delivered unique, high-quality homes within the social housing sector. Local residents also expressed satisfaction with their new neighbours and the enhanced courtyard featuring high-quality green spaces

Sustainability Principles

A key objective of the project was to create 14 zero-energy homes. Initially, this seemed like a challenging task in old gymnasiums. Woongoed consulted Atriënsis for advice on an installer. The contractor then brought in an installer and a sustainability advisor. Ultimately, a good technical installation design was created that was feasible for the contractor.

In addition to the requirement that the homes had to be zero-energy, other restrictions were important for the choices made. The restriction on the installations was that they should not make any noise. As a result, an air heat pump could not be used, but a smart pump that works on ventilation air had to be installed. For challenges like these, it was fortunate that there was a lot of expertise in installation technology within the construction team. This allowed the challenging zero-energy goal to be achieved.

Reflection and Future Value

After the completion of the project, the architect visited the location to cycle through the neighbourhood together with former social housing developers. During the visit, everyone enthusiastically spoke of a successful project. Everyone was particularly pleased with the quality of the social rental homes, both in terms of the technical applications and the integration into the environment. The advantage of transformation is that the shell (the structure, the facades, and the roof) is preserved, making it cost-effective to create high-quality social rental homes due to lower construction costs.

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Aan ’t Verlaat

Temporary Adaptive reuse of Former Nurses' Residence into Housing

The student housing complex Aan ’t Verlaat marks the first successful project of the Stichting Herontwikkeling tot Studentenhuisvesting Delft (SHS Delft). This former nurses’ and caretakers’ residence of GGZ Delfland had been vacant for ten years and was temporarily transformed into student housing. For a period of ten years, SHS is offering 150 student units within fifteen shared houses in the building, featuring communal facilities. Both international and Dutch students reside in the complex (SHS, n.d.).

CHARACTERISTICS	
Location	Aan ’t Verlaat 33, Delft
Owner	GGZ Delfland
Architect	SHS Delft & Adri Geerts
Developer	SHS Delft
Original function	housing for nurses
New function	temporary student housing
Adaptive reuse completion	2014
Duration of process	2011-2015
Number of residential units	150 non-self-contained rooms
Type of housing	communual living
Additional principles	no
Possiible future value	demolotion

FIG. P.14.1 **Student flat de Zusterflat Aan't Verlaat, Delft**

FIG. P.14.1

Initiative and Project Objectives

The Aan 't Verlaat student dormitory, formerly a nursing home, is owned by GGZ Delfland. After standing vacant for over a decade, the Foundation for Adaptive Reuse for Student Housing Delft (SHS Delft) initiated its temporary repurposing in 2015. Situated in a green area, the building is just a nine-minute bike ride from the TU Delft campus, in the Vrijenban neighbourhood.

The municipality of Delft initiated the idea of adapting the building into temporary student housing, drawing inspiration from Stichting Tijdelijk Wonen (STW)'s successful adaptive reuse of a former KPN building into student housing in Utrecht during the 1990s. After meeting with STW and learning from their experience, the municipality of Delft sought to implement a similar project.

The board of the SHS Delft took the initiative for temporary adaptive reuse, despite limited financial resources, starting the search for a suitable vacant building. The municipality presented a list of potential buildings, but many were found unsuitable due to location, construction, or the duration of the possible temporary use. Eventually, the Zusterflat was discovered, although it did not meet the initial expectations.

During discussions with GGZ Delfland, it was agreed that they would remain the owner of the building, and that SHS would pay rent to GGZ Delfland through an investor. GGZ Delfland saw the temporary adaptive reuse as a solution to make use of the vacant building. In the years before the adaptive reuse, they struggled with vandalism and break-ins in the building.

Role of the Municipality

The municipality of Delft played an important role in making the Studentenflat Aan ’t Verlaat project possible. The decision-making process was facilitated by the application of the Crisis and Recovery Act, which gave the municipality the authority to temporarily deviate from the zoning plan. This law provided an accelerated approval procedure without extensive consultation moments and objection procedures, significantly simplifying the realization of the project.

It is important to note that the municipality was aware of the temporary nature of the solution. Due to the limited occupancy period of ten years, the municipality could offer a quick and practical solution for the vacant building while leaving room for future plans and developments at the location. The usual requirements were reduced, although certain documents were still required, such as a spatial substantiation and reports on matters such as asbestos.

Programme, Target Group, and Feasibility

The Programme of Requirements for the Studentenflat Aan ’t Verlaat was carefully prepared by SHS Delft, with the aim of creating suitable student housing. The collaboration with GGZ Delfland required clear agreements to ensure a smooth rental agreement.

In drafting the programme, the goal was to adapt the vacant building into student housing. Specific requirements were set for the layout of the rooms and floors, considering the structure of the Zusterflat. Common facilities, such as living rooms, were added on each floor to create a communal living environment.

The rental agreement with GGZ Delfland included not only financial aspects but also provisions regarding the use of the premises. Clear agreements were made on issues such as parking facilities and the behaviour of the students on the premises. This ensured a harmonious collaboration, with SHS Delft and GGZ Delfland knowing what to expect from each other.

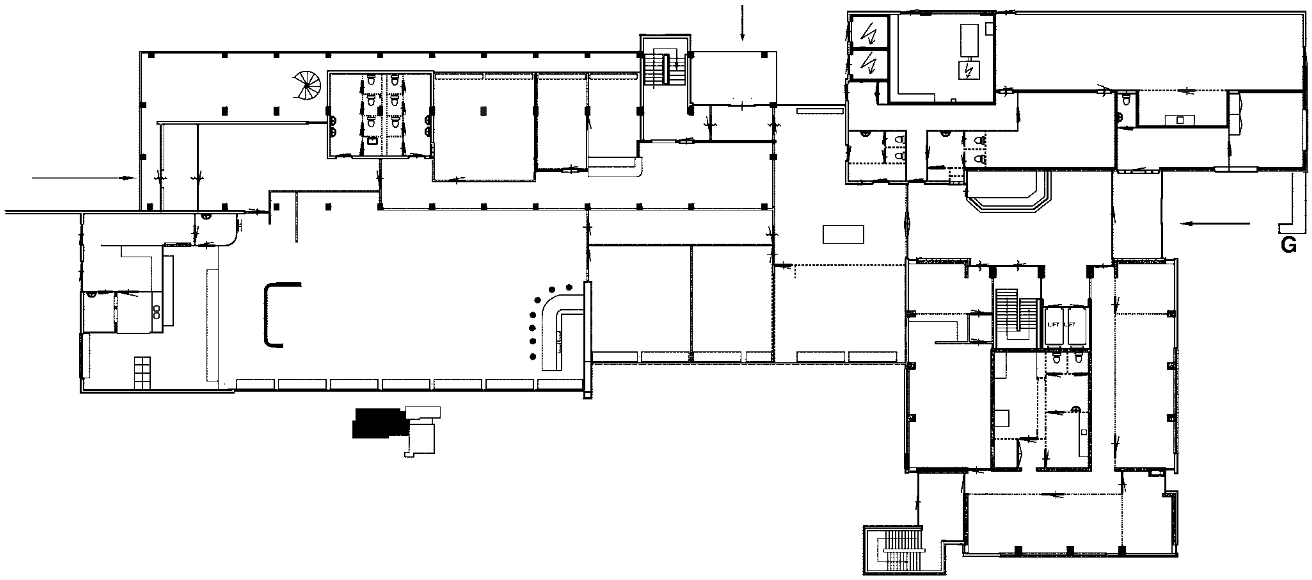

FIG. P.14.2

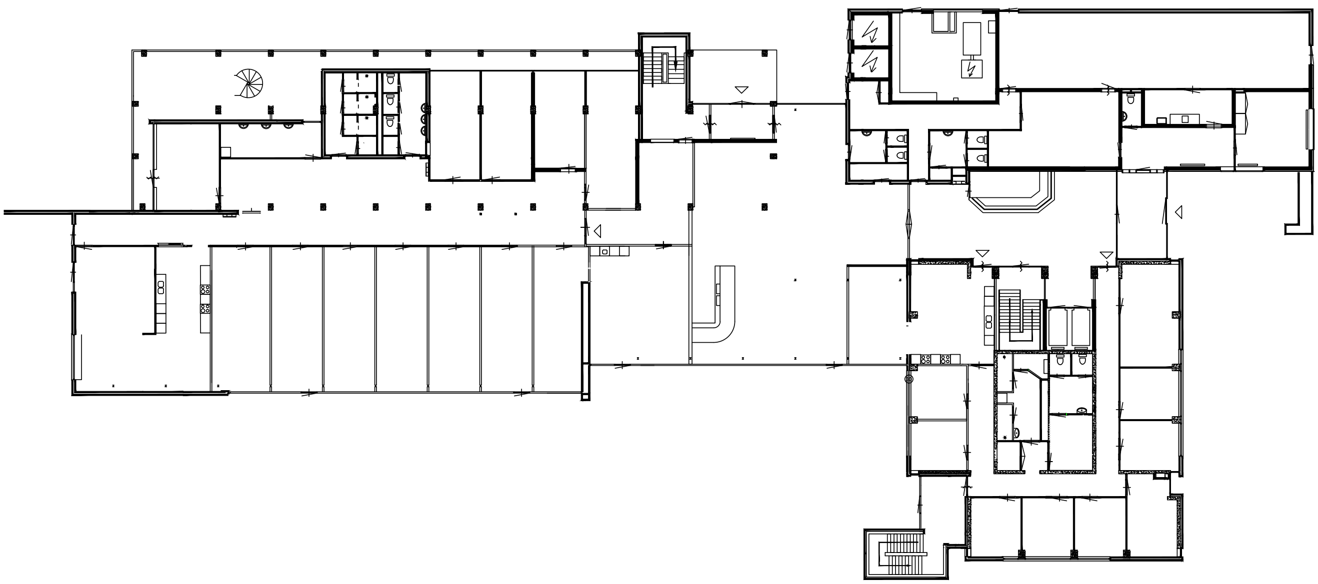

FIG. P.14.3

FIG. P.14.2 **Ground Floor Plan, Old Situation**

FIG. P.14.3 **Ground Floor Plan, New Situation**

While the temporary nature of the project limited large-scale sustainability initiatives, using the vacant building was considered inherently sustainable. Investments in renewable energy, such as solar panels, were not found realistic due to the short temporary use period. The programme of requirements prioritised functionality and practicality over extensive sustainability measures.

Design

In the design phase of the project, SHS Delft designed the floor plans for the housing. However, for the permit application, it was required that an official architect approved the plans. To meet this requirement, SHS Delft had the internal design reviewed by an external drafting firm before submitting the permit application. This was done to obtain formal approval without handing over the entire design process. The design retained as much of the original layout of the old Zusterflat as possible, with minimal changes such as the addition of door openings and the arrangement of common areas on each floor.

In the low-rise section, student rooms were drawn within the grid of existing windows, while on the floors of the Zusterflat, the existing layout of showers, toilet groups, and kitchens was largely preserved. The design choice was strongly influenced by considerations such as preserving the existing structure, daylight access, and living quality, taking into account the programme of requirements, the target group, and financial feasibility.

Financial assessment was carried out by the investor, with input from SHS Delft regarding rental levels. The building physics consultant Peutz was involved in the application for the environmental permit to comply with regulations (Peutz 2014).

The design was largely executed in accordance with existing laws and regulations, and obstacles such as asbestos removal and repair work after copper theft were addressed. During the design phase, no significant changes were made to the housing types or market segment. The costs did not deviate from the initial estimates.

Tendering and Construction

SHS Delft assumed the role of general contractor for the project, subcontracting specific tasks to selected specialists. Companies known to the Supervisory Board of SHS were approached, and contractors were chosen based on price and their willingness to collaborate with SHS Delft as the main contractor. The construction was carried out by various subcontractors, with SHS Delft also performing some tasks directly to minimise construction costs.

A unique aspect of the project was the participation of future residents in construction activities in exchange for rent reductions. This involvement included tasks such as installing walls and clearing debris. It was not individual self-construction but rather a collective effort in the building process.

During construction, some challenges arose, including the accidental demolition of a load-bearing wall, which required temporary support, permit re-approval, and repair work. Still, there was minimal need for additional work orders, and execution problems were kept to a minimum.

FIG. P.14.4

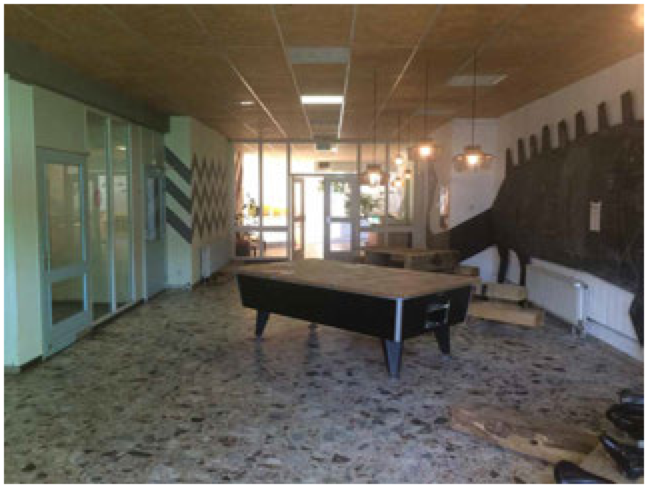

FIG. P.14.5

FIG. P.14.4 **Construction Work by Future Residents**

FIG. P.14.5 **Communal Facility (during construction phase)**

Completion, Use, and Management

Regarding the financial results of the project, SHS Delft experienced positive outcomes, as the foundation was able to reinvest profits into its mission. The interest in the project by prospective tenants was significant, with all rooms already rented out before the start of the leasing period. Overall, residents appear to be satisfied. Unlike new construction or long term adaptive reuse, there was no future added value assessment since it was known that the building would be demolished after the temporary reuse project to give room for a new building. The building was partially suitable for its new purpose as student housing due to its original function as a dormitory for nurses.

The project provided valuable lessons, especially concerning the uncertainties inherent in transforming an older building. It highlighted the importance of hands-on investigation during the repurposing and adaptive reuse process, as many adjustments cannot be anticipated in advance. SHS Delft remains involved in temporary adaptive reuse projects, now approaching them with the benefit of experience and gained insights.

Reflection and Future Value

The decision to temporarily adapt this building and then demolish it was partly driven by the opportunity for GGZ Delfland to develop a new plan and reach an agreement with the municipality for a completely new residential area.

Regarding the limited duration of the project, it is indicated that the legal opportunities for temporary adaptive reuse might be extended to fifteen years in the future. It seems that this extension would be interesting, but it should be noted that it may be challenging for owners to accept a rental agreement for such a long period. This suggests that the duration of the temporary adaptive reuse should be agreed when making such deals with property owners.

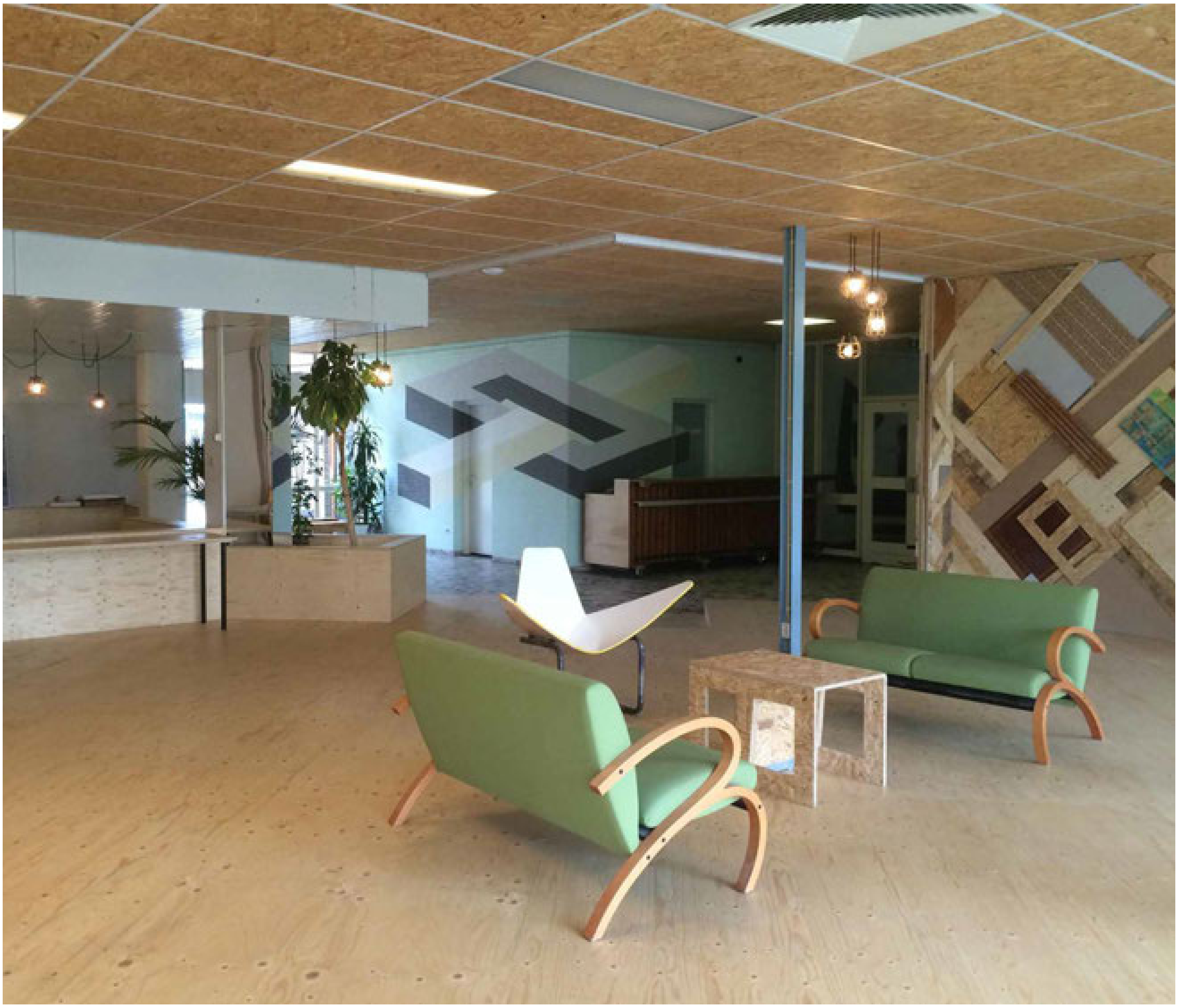

FIG. P.14.6

FIG. P.14.6 **Multifunctional space**

Sources

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Photography: SHS Delft


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SHOP

LUCIA

Adaptive reuse of Former Office Building into Housing

The building at Stadhuisplein in Rotterdam, designed by architect W.J. Fiolet in 1955, is part of the city's post-World War II reconstruction. With its elongated shape and austere appearance, the building is characteristic of its time. It was last used as a municipal office before the adaptive reuse into student housing for Erasmus University.

CHARACTERISTICS	
Original construction year	1955
Original area	6.945 m² GFA
Completion after adaptive reuse	2017
Client	Egeria Real Estate Development
Design	VANWILSUMVANLOON architectuur & stedenbouw
Interior	Standard Studio
Contractor	Du Prie bouw & ontwikkeling
Acquisition costs	n/a
Renovation costs	n/a
Selling prices	n/a

FIG. P.15.1

FIG. P.15.1 **Stadhuisplein with LUCIA**

Initiative and Project Objectives

The former Hermes retail-office complex, designed by architect W.J. Fiolet and completed in 1955, forms the southern wall of Rotterdam's Stadhuisplein. It is recognisable by its elongated shape and sober appearance and is a typical example of post-war reconstruction architecture. The rear of the building, De Sint-Luciastraat, was originally an expedition street. The street is a somewhat enclosed and quieter environment than Stadhuisplein. The building was last used as a city office by the municipality of Rotterdam and was then purchased by Egeria.

The real estate developer Egeria focuses mainly on adaptive reuse projects and came across the retail-office building at Stadhuisplein while searching for promising properties. During the design phase, Egeria encountered Erasmus University College, which needed housing for international students who would soon begin their first year of study. Adapting the building into student housing meant that there was time pressure on the development and delivery of the building.

FIG. P.15.2

FIG. P.15.3

FIG. P.15.2 **The Enclosed Sint-Luciastraat with a New Transparent Base**

FIG. P.15.3 **Front View of Sint-Luciastraat with a Transparent Base**

Programme, Target Group, and Feasibility

Initially, feasibility studies were conducted of the adaptive reuse project comparing various configurations, ranging from larger to smaller housing units. Several scenarios were developed, with the adaptive reuse into mid-priced rental housing, conversion into student housing, and demolition-new construction being the most likely options. The conversion into student housing proved to be the best option, as the office floors allowed for an efficient design and the building could also meet the parking requirements and other location restrictions.

Erasmus University did not formulate a clear program for student housing; there was no programme of requirements, only a minimum number of required housing units. The building has monumental value (municipal monument), which means that the facade could not be significantly altered.

Design

The adaptive reuse was aimed at renovating and restoring the building. The rooftop extension was designed as a separate object with different materials, colours, and forms to clearly indicate that it is not part of the original building. The more secluded Sint-Luciastraat at the rear has become part of the lively neighbourhood through a transparent plinth and the addition of hospitality venues. This connects the street to the more vibrant Stadhuisplein.

The challenge with this project was that the facade, as a protected cityscape, could not be altered. This meant that the building had to be insulated from the inside. Additionally, there were challenges in designing optimal sound insulation for the building. This was an important point because it is located at Stadhuisplein, a busy spot in the middle of the city with many terraces and entertainment venues. The new residences in the rooftop extension did not suffer from this due to good insulation.

FIG. P.15.4

FIG. P.15.4 **Site plan**

In the layout of the residences, the architect had a lot of freedom due to the high ceilings and large windows of the building. The main challenge was to fit in the many small student rooms. The height of the building was well utilised for this purpose. Creative solutions included the incorporation of mezzanines with stairs that also serve as storage space.

The building also has communal living rooms on different floors, allowing students to meet each other and spend time in a larger space than their small student rooms. The ground floor has a large entrance hall. The rest of the ground floor is set up as a daytime café. In the basement, there is a bicycle storage area and a common room where students can eat, study, and relax.

FIG. P.15.5

FIG. P.15.5 **Examples of Student Housing Interiors**

FIG. P.15.6

FIG. P.15.6 **Lucia at Stadhuisplein**

Construction

Given the time pressure to complete the project before the start of the academic year, the involved parties were quickly selected. Therefore, trusted parties with whom the developer had already completed multiple projects were chosen. The trust and knowledge of the individuals are important for executing an adaptive reuse project like this, with a short construction time. At the time of selection, the building layout was not yet definitively known, nor how it should be adapted, or which installations would be used. The parties were selected based on an open budget and a 'fixed tail.' The tail of a budget includes general costs and the contractor's profit and risk, which are often fixed percentages of the total construction costs. The open budget was filled in during construction team meetings with the developer, architect, and contractor. These meetings were held regularly to ensure that the design was monitored, and the construction pace remained high.

Such collaborations between parties require trust and can sometimes lead to disagreements and discussions. An open budget provides insight into the actual costs and ensures that each party has responsibility and thus engages constructively in the discussions.

Completion, Use, and Management

The building was completed a month after the start of the academic year. As a result, some of the students who were counting on a residence had to sleep on a nearby cruise ship for a few weeks. That was not an ideal situation, but after a month, they got their key to a new home with a high standard for student housing.

The preservation of the characteristic facade meant that it could not be sufficiently insulated to avoid noise nuisance for the students. The building is located on a busy square opposite several pubs with terraces that stay open late on weekends, and this is noticeable for the residents. However, the disturbance is not extreme, and the students are generally satisfied with their housing. It is also somewhat part of living in the city.

Sustainability Principles

The project had a very specific goal and a very short construction time. This meant that there was little time for research, for example, into sustainability. The building is connected to the district heating network, and the is well insulated. However, no special sustainability principles were set or achieved as objectives.

Reflection and Future Value

The project is considered successful. The university has effectively met the urgent need for more student housing in the city. Despite the late completion and noise issues, the needs of the users and the university have been met. Over time, there have been fewer complaints about the noise, as some students mentioned, 'it is also part of living in a city.'

The developer looks back on an educational and successful development. 'It is an advantage that the development took place in a time of economic growth; it would not have been possible now.' Other factors for success include good collaborations with the contractor and the architect. With the right knowledge and experience, these parties have been able to deliver what was required. This is a prerequisite for being chosen for a project like LUCIA.

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Source: Ossip

The orphanage

Adaptive reuse Former Orphanage to Housing

The Orphanage in Gouda, dating from the first half of the seventeenth century, was originally established as an institution for the care of the poor. Later, it housed orphans who could not be accommodated in the existing Holy Spirit Orphanage. It remained an orphanage until World War II. In 1939, it provided refuge for Jewish children fleeing the war, and during the occupation, it was used by several schools in Gouda. The orphanage function ended in 1948, with remaining funds allocated to youth and playground work in Gouda. Afterward, the building was repurposed as a library until its recent adaptive reuse.

CHARACTERISTICS	
Original construction year	the oldest part was completed in 1641, the newest part in 1875.
Original surface area	5.025 m^2
Year of completion	2021
Client	White House Development
Design	Mei architects and planners
Contractor	J.P. van Eesteren

FIG. P.16.1

FIG. P.16.1 **Het Weeshuis in Gouda**

Initiative and Project Objectives

The Weeshuis in Gouda dates back to the early seventeenth century. Originally intended as an institution for the poor, it was later also used to house orphans who could not be accommodated in the existing orphanage, the ‘Heilige Geest Weeshuis’. The building functioned as an orphanage until World War II. In 1939, it sheltered Jewish refugee children, and during the occupation, it was used by several schools in Gouda. The orphanage officially ceased operations in 1948, and the remaining funds were redirected toward youth and playground initiatives in Gouda. Afterward, the Weeshuis served as a library until its adaptive reuse.

The oldest part of the Weeshuis is a national monument, featuring Dutch Renaissance architecture. It is arranged in a square layout around a central courtyard, accessed through a gatehouse. The structure comprises two building sections separated by an alleyway. A newer section of the property is a municipal monument.

FIG. P.16.2 **The gate to the courtyatrd**

FIG. P.16.2

White House Development purchased the Weeshuis in 2018. Together with Mei Architects and Planners, with whom they had collaborated previously, they delved into the rich history of the Weeshuis. The close collaboration between the parties enabled a swift development of a plan for the adaptive reuse and new purpose of the historic building shortly after its acquisition.

Programme, Target Group, and Feasibility

The new programme for the building was established as a mix of hotel, apartments, and restaurant. Robert Winkel of Mei architects and planners explains that with a national monument, the building determines the functions. In this building, little could be changed in the layout, so a programme was sought that fits the building and required few interventions.

The former play and learning area of the Orphanage was well-suited for a hospitality function. The larger halls and the courtyard lent themselves for a terrace and a cozy dining room with a warm atmosphere. The alley was used as a buffer for noise from the street. Additionally, the alley also serves as a physical separation between the restaurant area, the hotel, and the residences.

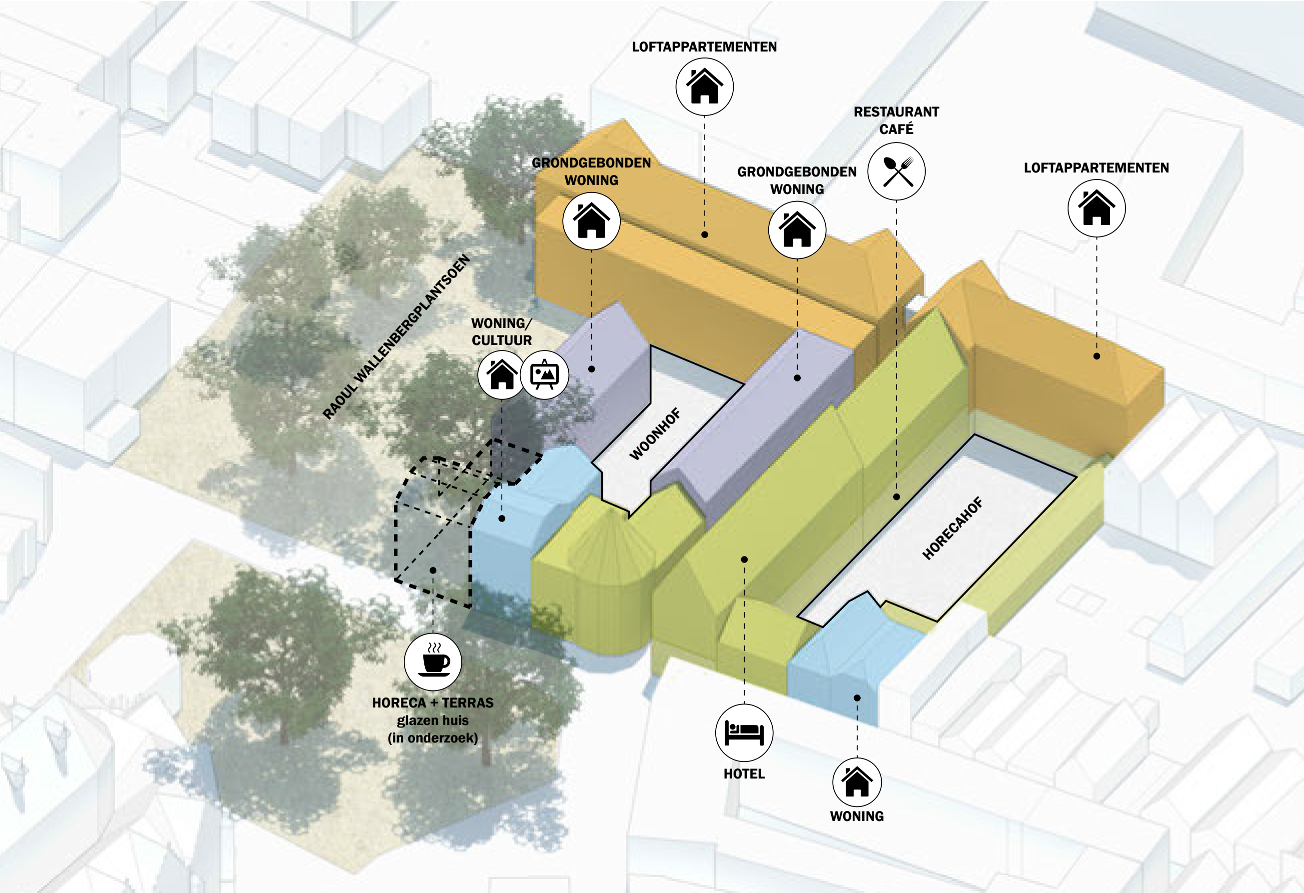

FIG. P.16.3

FIG. P.16.4

FIG. P.16.3 **Layout Concept**

FIG. P.16.4 **Floor plan**

Prior to the adaptive reuse, the plan was discussed with the local residents. A zoning plan change was required for the adaptive reuse because the new functions deviated from the environmental plan. The previous functions of the building were much quieter. The developer had a good relationship with the neighbours. They agreed to the adaptive reuse. Subsequently, the change in the environmental plan was approved, and the construction activities could begin.

Design

An important consideration for the adaptive reuse was to be very careful with the design and execution of adjustments to the historic building. Winkel describes the design process as almost surgical work, to preserve the monumental state of the building as much as possible. 'When you tackle and renovate one thing, a whole chain of interventions often follows, so the trick is to keep the intervention as small as possible. It often goes from small to large, so a small intervention can lead to major work such as replacing walls and roofs.'

To ensure that as few interventions as possible were needed, the entire building was first thoroughly studied to understand how it was constructed. Fortunately, the historical drawings were still quite accurate. According to Winkel, 'the funny thing is that the national monument, the Orphanage, was almost completely rebuilt in the 1970s. That was a way of restoring where every stone was chipped off and replaced. That is a very complicated way of building.'

Because the Orphanage is a national monument, exterior insulation was not allowed. Interior insulation is often used in such projects, although it leads to challenges. If the insulation is not done properly, moisture problems can arise. The challenge was also to integrate the insulation as seamlessly as possible into the existing building, but in some places, the insulation is visible on the inside.

The layout of the hotel and residences was handled smartly. Hotels have more lenient rules for sound insulation than residences. In the hotel section, the wooden floors were wrapped and insulated against vibrations where possible. The residences were placed in the former gymnasium. This part of the building has a robust structure. Here, the floors could be reinforced so that the sound insulation meets the requirements for new homes.

Tendering and Construction

Contractor J.P. van Eesteren was selected through a negotiated procedure after the planning of the adaptive reuse was completed. The selection was deliberately made after the design phase because decisions can change during the planning process. The contractor has extensive experience with adaptive reuse projects and the restoration of monuments. This was necessary to properly execute the design. For example, a large part of the roof of the Orphanage was completely decayed and had to be replaced. The contractor carried out the restoration so that the roof meets both technical requirements and the requirements of monument preservation.

FIG. P.16.5

FIG. P.16.5 **Courtyard with the restaurant**

During the project, the parties invested heavily in doing everything together. If problems arose, they were solved together. Design adjustments were discussed with the partners, and conversations with the aesthetics committee and monument preservation were conducted jointly. Much effort was made to make it a collaborative project

Completion, Use, and Management

The boutique hotel and restaurant were the first to be completed. They are managed by WSHS (WeeSHuiS). The apartments followed a month later. The apartments are aimed at first time buyers. The apartments are compact, but due to the high ceilings, mezzanine floors could be built in, providing sufficient space. The apartments are grouped around a residential courtyard with a communal garden. The garden has enough space for children to play, making the adaptive reuse of the Orphanage a lively addition to the city centre.

Sustainability Principles

There was no sustainability advisor involved in this project. If the adaptive reuse were to be carried out now, there would probably be a more critical evaluation of the use of materials, and there might have been more attention to biobased materials, admits architect Winkel. For this project, preserving and transforming the historic building was seen as the main priority.

The building was insulated according to the renovation standard in the Building Decree, and new installations with low energy consumption were applied. No major interventions were made for a sustainable energy supply. This would also be costly and complicated for a national monument.

Reflection and Future Value

The new use of the Orphanage breathes new life into this monument. The adaptive reuse clearly demonstrates how historical buildings can repeatedly take on new functions while being technically adapted to meet current requirements. The Orphanage is now well-equipped for the present and remains adaptable for the future.

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Photography: Ossip

About the authors

Editors

Remøy, Hilde
Hilde Remøy is Professor of Real Estate Management at the Faculty of Architecture and the Built Environment at TU Delft. Her research focuses on adaptive reuse as a sustainable real estate strategy. She is the editor of the books Transformatie van kantoorgebouwen (2007), Sustainable Building Adaptation (2014), and Building Urban Resilience through Change of Use (2018). She has authored several chapters and journal papers on transformation or adaptive reuse.

E: h.t.remoy@tudelft.nl
L: https://www.linkedin.com/in/hilderemoy/

Van Bortel, Gerard
Dr. ing G.A. (Gerard) van Bortel is Assistant Professor in Housing Management at the Faculty of Architecture, TU Delft. His research and teaching focus on promoting affordable and sustainable housing in resilient neighbourhoods, with particular attention to management, participation, and decision-making issues. He has published extensively on these topics. In addition to his academic work, he holds various administrative, advisory, and supervisory roles in the housing sector.

E: g.a.vanbortel@tudelft.nl
L: https://www.linkedin.com/in/gerardvanbortel

Heurkens, Erwin
Dr. ir. E.W.T.M. (Erwin) Heurkens is Associate Professor in Urban Development Management at the Faculty of Architecture, TU Delft. His research and teaching focus on innovations in public-private-community partnerships for sustainable urban area and real estate development. He has extensive experience in conducting and publishing internationally comparative research (especially in England and the United States) and practice-oriented research on Dutch urban development. Additionally, he is the co-programme leader of the post-initial Master City Developer programme for urban development professionals and project leader at TU Delft for the Urban Transformation programme.

E: e.w.t.m.heurkens@tudelft.nl
L: https://www.linkedin.com/in/erwinheurkens

Venrooij van, Roeli

Ir. R.G.A.M. (Roeli) van Venrooij graduated from the Faculty of Architecture at TU Delft with a Master's degree in Management in the Built Environment. Prior to her Master's, she completed a Bachelor's in Engineering and Policy Analysis at TU Delft and followed a pre-master at the Faculty of Architecture. During her studies, she focused on transformation and circularity, an interest that was further reinforced by her work on this book and the collaboration with co-authors.

E: roelivanvenrooij@hotmail.com
L: https://www.linkedin.com/in/roeli-venrooij-van-452163211

Authors

Balla – de Boer, Jessica

Ir. Jessica Balla – de Boer graduated from the Faculty of Architecture at TU Delft. She currently works as a technical developer at Bouwaccent. In her previous role as a project developer at Wonam, she contributed to the transformation of the former ING office AMP in Amsterdam Zuidoost, commonly known as the Zandkasteel. The transformation of this monumental building into high-quality rental apartments and flexible office spaces was a highly educational experience, particularly highlighting that existing buildings often differ from their original drawings. She has also encountered temporary transformations when vacant office buildings were repurposed for vacancy management and art exhibitions.

E: j.balla@bouwaccent.nl
L: https://www.linkedin.com/in/jessica-balla-de-boer-7a731333

Berghe van de, Karel

Karel Van den Berghe is Assistant Professor of spatial and urban development at the Faculty of Architecture, TU Delft. He has a background in geography, spatial planning, and urban design. His PhD focused on planning port cities and the role of maritime and urban area development. Currently, Karel is the lead researcher of the Horizon Europe project FABRIX, which focuses on the role of work in cities, and the "Circular Campus TU Delft" project. He is also involved in the NWO project SUBLIME, which focuses on circular sustainable mega infrastructures in the Netherlands. Karel regularly publishes his research in academic and professional journals.

L: https://www.linkedin.com/in/karelvandenberghe

Besten, Dylan

Ir. D.R. (Dylan) Besten is a former student at the Faculty of Architecture, TU Delft. After completing his Bachelor's in Architecture, he pursued a Master's in Management in the Built Environment. For his graduation research, he investigated the application of circular economy strategies in the repurposing of heritage sites, with the aim of addressing obstacles that still exist in the transition to a circular economy. This research was conducted under the supervision of Dr. H.T. (Hilde) Remoy MSc, Ing. P. (Peter) de Jong, and in collaboration with Nico de Bont.

E: dylanbest182@gmail.com
L: www.linkedin.com/in/dylanbesten

Boelhouwer, Peter

Peter Boelhouwer is Professor of Housing Systems at TU Delft. For over 40 years, Boelhouwer has studied the interaction between the housing market and public housing policy. He has served as an external advisor to the parliamentary inquiry committee on housing corporations and is a commissioner at the urban planning firm Kuipercompagnons. Boelhouwer is also the chairman of the European Network for Housing Research and Architectuurpunt Zoetermeer. Additionally, he is the editor-in-chief of the *International Journal of Housing and the Built Environment* and a board member of the Knowledge Centre for Foundation Problem Solving (KCAF). He coordinates the OTB/CBS expertise centre for housing value, which publishes the quarterly housing market monitor.

E: P.J.Boelhouwer@tudelft.nl
L: https://www.linkedin.com/in/peter-boelhouwer-75483824a/

Czischke, Darinka

Dr. Darinka Czischke is Associate Professor at the Faculty of Architecture, TU Delft. She is an internationally recognised expert in cooperative and collective housing forms and the founder of the Co-Lab Research Group at TU Delft. She leads the "Project Together!", an initiative focused on collective housing in the Netherlands. Her book, *Together: Ruimte voor Collectief Wonen*, co-authored with Marije Peute and Sara Brysch, compiles her recent research on collective and cooperative housing models in Europe and proposes four pathways to develop this sector to address urgent housing challenges.

E: d.k.czischke@tudelft.nl
L: https://www.linkedin.com/in/darinkaczischke/

Ector, Joost

Ir. Joost Ector graduated cum laude in architecture from TU Eindhoven in 1996. Since 2002, he has been an architect and partner at Ector Hoogstad Architecten in Rotterdam. Over the years, the firm has been responsible for several notable adaptive reuse projects, such as Metaforum for TU Eindhoven (which won the Gulden Feniks award) and more recently, MindLabs in Tilburg. In addition to his work as an architect, Joost writes about architecture, including a monthly column for *Architectenweb* since 2015. He is also currently the chairman of the Commission for Environmental Quality for the Municipality of Utrecht

E: j.ector@ectorhoogstad.com
L: https://www.linkedin.com/in/joostector/

Espinal, Lizanne

Lizanne Espinal recently graduated in Management in the Built Environment from TU Delft (2024). During her studies, she worked as a student researcher for the KaDer (Karakteristiek en Duurzaam Erfgoed) project, focusing on measuring the adaptive reuse potential of churches in the Gelderland province. She later wrote her master's thesis on the adaptive reuse potential of office buildings in The Hague, using the Transformatiemeter Kantoren, under the supervision of Hilde Remøy and Peter de Jong from TU Delft, and Sjoerd Pronk (Van Wijnen).

E: Lizanneespinal@outlook.com.
L: linkedin.com/in/lizanneespinal

Geldermans, Bob

Dr. Bob Geldermans is Head of Research & Innovation at WOOD.BE. Within the Interior Architecture department, his focus is on materials, construction, and sustainability, approached from a systems perspective. His interest in the relationship between Open Building and Circular Building began in 2008 and has since been a guiding theme in his research, teaching, and practice projects. From 2011 to 2015, Bob coordinated the Cradle to Cradle Inspired Lab at TU Delft and later helped establish the Circular Built Environment (CBE) Hub at the Faculty of Architecture.

E: bob.geldermans@uantwerpen.be
L: https://www.linkedin.com/in/bobgeldermans/

Gelinck, Sander
Drs. A.F. (Sander) Gelinck is the director and owner of id&dn, where he conducts research, provides consultancy, and teaches on adaptive reuse and repurposing. He is a member of the Expertteam Woningbouw and co-founder of the HerbestemmingAcademie, which has trained hundreds of heritage professionals for practical applications. His recent publications include *RekenenOpHerbestemming* (NAI010, 2015), *DIY Klarenstraat: zelfbouw en de herontdekking van de portiekflat* (JapSamBooks 2017, for which he wrote the financial evaluation of this innovative project), and *Transformatie in cijfers: heden, verleden en perspectief* (RVO, 2023).

E: sandergelinck@gmail.com
L: linkedin.com/in/sandergelinck

Greco, Angela
Angela Greco is Assistant Professor of Innovation Management at Delft University of Technology. She is also a Senior Scientist and Advisor for the Strategic Business Analysis department at TNO, the Netherlands Organisation for Applied Scientific Research. Prior to these roles, she was a postdoctoral researcher in Responsible Innovation at the Ivey Business School at Western University, Canada. She earned her PhD at the Centre for Sustainable Entrepreneurship at the University of Groningen. Her work is dedicated to accelerating innovation for a sustainable built environment by linking technological innovations with societal needs through multi-stakeholder participation and paradox management techniques. Her research has been published in various academic journals, including *Academy of Management Learning and Education* and *Journal of Cleaner Production*.

E: A.Greco@tudelft.nl
L: https://www.linkedin.com/in/angreco

Gruis, Vincent
Vincent Gruis is Professor of Housing Management at Delft University of Technology, specialising in organisational strategies in housing management. His research focuses on how property managers and developers can adapt their activities to societal challenges, particularly in making housing more sustainable. He has been with the Faculty of Architecture and the Built Environment since 1996 and completed his PhD in 2001. Gruis has published extensively on topics such as social enterprise in housing organisations, circular economy in building components, and strategic housing management. His work involves collaboration with innovators and practical applications in the field. He is also chair of the Dutch Transition Team for Circular Building Economy.

E: V.H.Gruis@tudelft.nl
L: https://www.linkedin.com/in/vincent-gruis-a3b13211

Greeven, Barbara-Sophie

Ir. Barbara-Sophie Greeven is regional manager for Central and Northern Netherlands at Achmea Real Estate (ARE). She is responsible for the acquisition and (re)development of (newly built) housing and healthcare real estate. In her role at ARE, she is committed to creating affordable housing for a highly diverse target group. Each project involves solving the puzzle of balancing quality, affordability, and sustainability to maximise financial, social, and societal returns. The goal is to create added value for (future) tenants, users, and clients, aligning with ARE's philosophy of "Investing with Purpose" and allowing Barbara-Sophie to contribute to her own mission of creating more beautiful and inclusive cities and neighbourhoods.

E: Barbara-Sophie.Greeven@Achmea.nl.
L: https://www.linkedin.com/in/barbara-sophie-greeven-ba420210

Hamida, Mohammad

Mohammad B. Hamida, a PhD candidate in Real Estate Management at TU Delft, is developing a knowledge-driven framework for circularity and adaptability in building adaptations under the supervision of Dr. Hilde Remøy and Prof. Dr. Ir. Vincent Gruis. He has analysed relevant literature and conducted case studies to form the conceptual framework. Participatory research with experts from the construction industry and real estate market in the Netherlands further refines this framework. Mohammad emphasises the importance of adaptive reuse, which depends on social dynamics and emerging phenomena. He introduces the concept of Circular Building Adaptability (CBA) and the CBA model, a framework that allows adaptive reuse interventions to add value to the built environment.

E: m.b.hamida@tudelft.nl
L: https://www.linkedin.com/in/mohammad-b-hamida-b28237116

Hek, Michel

Ir. M. (Michel) Hek is a partner and director at VPR Consultants. As a graduate in Architecture and Real Estate Management from the Faculty of Architecture at TU Delft, he developed the 'Herbestemmingswijzer' (Repurposing Guide) methodology as part of his graduation research. This was later published in the book *Herbestemmingswijzer* (2004). Over the past 20 years, he has further refined the methodology based on extensive practical experience and new applications. He has repurposed various buildings, including churches, industrial complexes, farms, schools, office buildings, and prisons, into vibrant new spaces both in the Netherlands and abroad.

E: michel.hek@vprc.nl
L: www.linkedin.com/in/michel-hek-5470b86

Herpen, Ruud

Ruud van Herpen has been a Fellow in Fire Safety Engineering at TU Eindhoven since 2012. He holds a civil engineering degree from TU Delft (1987) and the Fellow degree from the Institution of Fire Engineers (IFE, 2008). In addition to his role as lecturer and coordinator at SKB/NIPV Fire Academy for PHBO Fire Safety Engineering, he is also active as a fire engineer at Peutz and the Peutz fire lab. His expertise includes fire safety education, policy development, and advisory roles for various market stakeholders. Actively involved in NEN standards committees and working groups, he conducts research for market players as well as for the Ministry of the Interior (BZK) and NIPV, focusing on current fire safety issues, including fire resilience.Fire Engineers (IFE, 2008).

E: r.a.p.v.herpen@tue.nl
L: https://www.linkedin.com/in/ruud-van-herpen-94a9218

Hobma, Fred

Dr. Mr. F.A.M. (Fred) Hobma is Associate Professor of Environmental Law at Delft University of Technology. He is a member of the Management in the Built Environment department at the Faculty of Architecture. He teaches courses on Spatial Administrative Law, Construction Law, and Legal Aspects of Area Development. He frequently lectures in postgraduate programmes related to construction and infrastructure. Fred has extensively published and taught on topics including spatial administrative law, area development, public-private partnerships, and construction law. He conducts research for governments, advisory bodies, the business sector, and the Dutch House of Representatives.

E: f.a.m.hobma@tudelft.nl

Jong de, Peter

Peter de Jong is lecturer in the Management in the Built Environment department at the Faculty of Architecture, Delft University of Technology. His expertise lies in construction economics, focusing on cost-conscious design and the developer's perspective, particularly on the relationship between sustainability and feasibility. His main responsibility is coordinating the management game, a design course in the final year of the Bachelor's programme, which is a role-playing exercise in area (re)development. He is also involved in various projects, including the Solar Decathlon Europe, Total Cost of Ownership, and production forests.

E: p.dejong@tudelft.nl
L: linkedin.com/in/peterdjong

Kersten, Paul

Drs. Paul Kersten is a member of the Expertteam Woningbouw and one of the pioneers of its predecessor, the Expertteam Kantoortransformatie. Through the Expertteam and his consultancy Kansrijp, he supports governments with specific questions about adaptive reuse projects and area developments, with the aim of accelerating housing development. In this role, he co-authored the report *Transformatie in cijfers: heden, verleden en perspectief*.

Paul Kersten has been active at the Municipality of The Hague as an account holder for the office market and office lead, where he was administratively responsible for the office adaptive reuse policy. Currently, he is involved in area development at the Municipality of The Hague, focusing on the connection between the social and physical domains.

E: Kansrijp@hotmail.com.
L: https://www.linkedin.com/in/paul-kersten-9832616

Mackay, Roderik

Roderik Mackay has 15 years of practical experience in adaptive reuse, combined with the academic background of two graduation theses on adaptive reuse (TU Delft, 2008, and ASRE, 2013). He is currently a partner at ERED (Egeria Real Estate Development), where he is responsible for the acquisition, sale, and development of projects. In mid-2015, he partnered with Egeria and co-founded the real estate development company. Previously, he worked for investment company Pinnacle, where he was responsible for the acquisition and disposition of the development portfolio with adaptive reuse projects. He began his career at the central concept and project development department of Koninklijke BAM Groep, where, starting in 2008, he was responsible for redevelopment activities. Roderik earned his master's degree (ir.) from the Faculty of Architecture at TU Delft, specialising in Real Estate & Housing, and obtained his MSc. MRE title from the Amsterdam School of Real Estate. Since his studies, the redevelopment of existing real estate has been his professional passion. Besides its societal relevance, the creativity and complexity of redevelopment projects inspire him to find the right solution for each project.

E: rmackay@egeriagroup.com
T: +31 6 29 26 92 91

Meyer – van Hall, Marieke

Ir. Marieke Meyer graduated from the Faculty of Architecture at TU Delft. She was a board member of SHS from 2011 to 2013. In 2014, she graduated with a design for the adaptive reuse of a vacant office building in Rotterdam and is now a partner at the architecture firm Van Manen in Noordwijk. At Van Manen, they regularly work on designs to transform office buildings and even national monuments. Temporary transformations are also seen in these projects, primarily as a form of place-making. For example, they are working on the Pesthuis complex in Leiden, which will be repurposed with a mix of functions to make the complex accessible to everyone. While the building is currently vacant, it has been used in the past few summers by "De Buurt," a temporary hotspot featuring culture, hospitality, events, and more. This temporary use has shown the location's potential as a gathering place, promising a successful repurposing of the building.

E: mhameyer88@gmail.com
L: https://www.linkedin.com/in/marieke-meyer-van-hall-41b29529

Oudenaarden, Niels

Ir. Niels Oudenaarden graduated from the Faculty of Architecture at the Technical University of Eindhoven. Within the Building Design chair, he conducted research on the relationship between facades and functional changes in buildings. Based on this academic foundation, he gained extensive operational experience in the realisation of complex steel construction projects, with specific expertise in project and commercial management, navigating the dynamic nature of construction projects. Since 2021, he has been working at Liemar, where he supports companies in project-driven production and manufacturing industries

E: niels.oudenaarden@liemar.nl.
L: https://www.linkedin.com/in/nielsoudenaarden

Peeters, Michaël

Dr. ir. Michaël U.J. Peeters MRe is Assistant Professor in the field of ESG – sustainable finance at the Faculty of Architecture, Delft University of Technology. With an extensive publication record, he has conducted in-depth research on Product/Service Systems and the impact of technology on sustainability. His research interests lie at the intersection of technology and sustainability, with a particular focus on the underlying business models that connect these two fields.

Michaël has a passion for the digital economy, with a special interest in decentralised finance (DeFi), demonstrating his commitment to innovation within the financial landscape. His work and contributions to the field reflect a deep engagement in promoting sustainability through technological advancements.

M: m.u.j.peeters@tudelft.nl
L: https://www.linkedin.com/in/michaelpeeters

Snoek, Thomas

Ing. T.E. (Thomas) Snoek is a master's student in Management in the Built Environment at the Faculty of Architecture, TU Delft. Before starting this master's programme, he completed an HBO degree in Management in the Built Environment at the Hogeschool van Amsterdam. During his studies, he gained practical experience with various contractors, where he was involved in the execution and preparation of large projects. In addition to his studies and work, he is actively engaged in organising events for both students and companies, aimed at promoting career opportunities.

E: E: t.e.snoek@tudelft.nl
L: https://www.linkedin.com/in/thomas-snoek-7018b115b/.

Steijns, Yolanda
Ir. Yolanda Majewski-Steijns is a housing consultant at Brink in Rotterdam. She has worked as a researcher in the Real Estate & Housing department at the Faculty of Architecture at TU Delft. In addition to being an experienced participant and resident in Collective Private Commissioning (CPO), she has worked as a CPO advisor at Urbannerdam, where she supported groups of individuals through their CPO journeys. She worked with the collective of 16 families of CPO Hof van Damiate in Haarlem (new construction) and the 32 families of CPO De Nijverhoek in Rotterdam (renovation).

E: y.majewski-steijns@brink.nl
L: linkedin.com/in/yolanda-majewski-steijns-18b0b811

Voordt van der, Theo
Dr. D.J.M. (Theo) van der Voordt is Emeritus Associate Professor in Corporate Real Estate & Facilities Management at the Faculty of Architecture at TU Delft. He also worked at the Center for People and Buildings in Delft. He is the editor of the book *Transformatie van kantoorgebouwen* (2007), co-developed the *Transformatiemeter Kantoren* with Rob Geraedts, and published several journal papers on adaptive reuse with Hilde Remøy. His other research interests include concepts and tools for successful housing strategies, the added value of real estate and facilities, performance measurement, and the use and experience of work environments and healthcare facilities

E: theovandervoordt@gmail.com.
L: linkedin.com/in/djmvandervoordt

Zijlstra, Hielkje
Dr. H. (Hielkje) Zijlstra is Emeritus Associate Professor in Heritage & Design at the Faculty of Architecture at TU Delft. Before this, she worked for 12 years as an architect at the firms Atelier PRO and Inbo. In her PhD research, she developed a method to analyse post-war buildings before repurposing them, which was published as the *ABCD(in time) research method* (IOS Press 2009). She served on the Commission for Aesthetics and Monuments in Delft, was the secretary of Docomomo Netherlands, and a member of the European Science Foundation. Additionally, she served as chair of the Heritage & Architecture department for four years. Her expertise lies in building analysis, though her passion is teaching, helping young people excel. Outside of academia, she has interests in modern art museums, model-making, and photography.

E: hielkje@live.nl

Colophon

Editors
Hilde Remøy
Gerard van Bortel
Erwin Heurkens
Roeli van Venrooij

Copy editing
Els Brinkman

Design + Layout
Véro Crickx, Sirene Ontwerpers, Amsterdam

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