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Greco, A.

Publication date
2025

Document Version
Final published version

Published in
Adaptive Reuse for Housing

Citation (APA)
Greco, A. (2025). Energy Transitions: Reconciling Conflicting Demands with a Paradox Perspective. In H. Remøy, G. van Bortel, E. Heurkens, & R. van Venrooij (Eds.), *Adaptive Reuse for Housing* (pp. 217-228). BookRxiv.

Important note
To cite this publication, please use the final published version (if applicable).
Please check the document version above.

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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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