

Mixed-ownership complex(ity)

The sale of social housing, energy affordability and investments within homeowners' associations

While the sale of social housing has been a key part of Dutch housing policies, energy affordability in mixed-ownership complexes has become a pressing issue. Owner-occupied and social housing now coexist, necessitating joint homeowners' associations to invest in reducing energy bills. This mixed-methods study in Groningen examines challenges in implementing sustainability measures within these complexes. Weak regulatory frameworks, limited influence of housing associations, and financial constraints on homeowners highlight the urgent need for targeted policies to support sustainability investments.

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INTRODUCTION

In the Netherlands, social housing sales have risen significantly due to privatization initiatives and the government's withdrawal from the sector over recent decades (Van Gent & Hochstenbach, 2020). Budget constraints have also driven housing associations to sell portions of their housing stock to fund sustainability and liveability investments (Damen, 2018). Often, they opted to sell parts of their apartment complexes while retaining ownership of the remaining units, leading to mixed-ownership complexes – comprising both owner-occupied and social housing units within a single building.

The energy crisis, characterized by soaring energy prices in 2021 and 2022, has left many people struggling to afford their energy bills. Investing in home energy efficiency is key to reducing costs long-term. However, buyers of former social housing units in mixed apartment complexes often lack the freedom to invest in sustainability measures on their own: they often depend on the approval of a homeowners' association (Vereniging van Eigenaren in Dutch, abbreviated as VvE). When a VvE consists of both private owners and a housing association, neither party can decide on its own to start major renovations or maintenance.

Research on the sale of social housing and its impact on housing management is limited, particularly in the European context (Gruis et al., 2009). Moreover, existing studies do not explicitly investigate the link between the sale of social housing and energy affordability. Although energy poverty cases in the Netherlands largely affects social housing residents (TNO, 2021), homeowners facing similar challenges are understudied. This study addresses this gap by examining the energy efficiency challenges of residents and owners in mixed-ownership complexes in the province of Groningen, the Netherlands, and the difficulties housing associations encounter with sustainability investments in mixed VvEs.

EXISTING LITERATURE ON CHALLENGES OF ENERGY AFFORDABILITY AND INVESTMENT IN MIXED-OWNERSHIP

Similar to other Western European countries, Dutch housing has undergone neoliberal reforms, including deregulation, reduced public spending, decentralization, and increased market orientation, which led to the sale of social housing to private individuals (Gruis et al., 2009). Rationales behind these sales include expanding homeownership opportunities and diversifying tenure in neighbourhoods (Kleinhans & Van Ham,

2013). Neoliberal policies have also pressured social landlords to focus on financial risks and market positioning and adopt strategic asset (Nieboer et al., 2012). Despite these changes, social housing associations still owned 2,321,421 units (66% of rental apartments) in 2024 (CBS, 2024a), many of them within mixed-ownership buildings, which presents complex legal and financial challenges in dividing responsibilities between owners (Lux, 2003).

In the Netherlands, apartment ownership typically follows a 'unitary ownership' model, where co-owners hold a percentage share of the property, granting them exclusive use of an apartment while shared areas are managed by homeowners' associations (Lujanen, 2010). A homeowners' association, or VvE, is a mandatory legal entity representing all owners, functioning as a private non-profit organization that upholds both individual and collective interests. However, this form of building governance does not come without challenges. For instance, low-income buyers often struggle with greater-than-expected maintenance expenses, while local authorities may face difficulties in dealing with individual owners who are unable or unwilling to contribute their share of maintenance or improvement costs (Kleinhans & van Ham, 2013). Additionally, misunderstandings between social landlords and homeowners regarding estate management and maintenance can lead to further complications (Gruis et al., 2009).

Investments in energy efficiency can lead to significant improvements in energy consumption (Abdellatif & Al-Shamma'a, 2015). However, large-scale sustainability measures—such as insulation, double or triple glazing, and heat pumps—can be costly, creating barriers for lower-income households. Additionally, homeowners, social housing tenants, and private sector tenants face different options for investing in sustainability due to varying laws and subsidies. Tenants in low-energy-quality homes often rely on their landlords for improvements, while homeowners may lack the financial resources to invest, leading

to 'choice poverty' in energy investments (TNO, 2021). Nonetheless, in a VvE, all owners—including the housing association in mixed complexes—must reach a collective agreement on sustainable energy measures (Tiellemans et al., 2022).

Energy poverty, though not universally defined, is generally understood as households' inability to meet their energy needs due to high prices, poor home energy performance, or high energy demands (CE Delft, 2021). It affects both low-income tenants and homeowners in energy-inefficient homes. The academic literature often discusses energy poverty from an affordability perspective, focusing on high energy bills relative to income. While energy costs can be assessed objectively or subjectively based on personal experiences, lower-income households face challenges not only in covering energy costs but also in investing in energy-efficient improvements that could lower bills (TNO, 2021).

METHODOLOGY

This study employed a mixed-methods case study approach to gain in-depth insights into the relationship between the sale of social housing, sustainability investments and energy affordability in the province of Groningen (Table 1). An informal joint discussion was held in June 2022 with two housing associations and other researchers to gain insights into the position of housing associations regarding the sale of social housing, drawing attention to governance challenges within VvEs. This was followed by a document analysis of publicly available policy documents and reports from authorities and private agencies to gain a thorough understanding of the trends in the sale of social housing and policy frameworks.

Next, four semi-structured interviews were conducted with housing association representatives and one VvE management company to explore challenges within mixed-ownership complexes in November 2022 (Table 2). The VvEs associated with the two housing associations differ in number and location:

TABLE 1 ► RESEARCH OPERATIONALIZATION

Concept	Dimension	Indicators	Methods
sale of social housing	sold units in residential complexes by housing association	regulations and strategies	expert interviews, policy documents and reports
sustainability investments	large-scale sustainability measures	regulations and strategies	expert interviews, policy documents and reports
energy affordability	physical aspects	type of dwelling, construction year, type of energy connection, energy label	experts interviews, survey
	individual circumstances	type of energy contract, preferences, and behaviour	experts interviews, survey
	ability to invest	implementation experiences	experts interviews, survey

housing association A is part of about a dozen VvEs, mainly outside the city of Groningen, while housing association B has around a hundred, many of which are located in the city. All interviewees signed confidentiality agreements and were ensured anonymity.

Lastly, from 25 November 2022 to 25 January 2023, a survey was conducted to assess homeowners' perceptions of energy affordability in mixed-ownership complexes, approved by the University of Groningen's research ethics committee. Housing association A provided a list of eleven VvEs across the province, where 1,000 flyers with QR codes linking to the survey were distributed. Due to insufficient responses, the survey was also shared online via the Vinkhuizen neighbourhood website and several Facebook groups for residents of the province of Groningen. Additionally, a VvE management company was

approached to assist in distributing the survey after obtaining permission from 13 out of 17 VvE boards. These efforts resulted in 180 total respondents, including 29 social housing tenants, 23 private tenants, 80 regular homeowners, and 48 VvE homeowners. The analysis ultimately focused on the 128 homeowners. The survey included 32 questions, primarily multiple-choice, based on established indicators of energy poverty, along with one open-ended question for respondents to describe their current energy situation and experiences. Data were collected in Qualtrics and analysed using SPSS.

INSTITUTIONAL BACKGROUND

The Northern Netherlands has the highest proportion of households in the country experiencing energy poverty relative to its population (TNO, 2021). In the province of Groningen, residents tend to have large, old

TABLE 2 ► LIST OF INTERVIEWEES

Interviewee	Position
P1	Senior policy advisor (housing association A)
P2	Manager Finance and Support (housing association A)
P3	Financial & Portfolio strategist (housing association B)
P4	Coordinator VvE (housing association B)
P5	VvE manager (VvE management company)

homes and low average income, spending up to 23.6% of their income on energy bills (Breukelman, 2022). Issues surrounding energy poverty are addressed through fragmented small projects rather than a unified national framework. Many municipalities are developing strategies to improve energy affordability but often struggle with limited resources and staff (TNO, 2020). The Province of Groningen (2021) has introduced a loan program for low-income households, offering up to €2,500 on favourable terms. However, with only 1,000 loans available, not all households in need can be supported.

From 2013 to 2020, housing associations sold 4,305 homes in the province of Groningen, representing a share of 3.5% of their total stock (ABF, 2022). Of these, 1,420 were sold to commercial institutions, while 2,885 were sold to legal entities, including owner-occupiers and private landlords (Ibid.). Interviewees indicated that housing associations aimed to enhance investment capacity and balance portfolios while addressing low-income tenant clustering to improve the social environment.

A 2022 national performance agreement asserts that sales and demolition are essential for sound management and balanced stock policy, outlining guidelines for selling homes to financially capable tenants to optimize social housing stock and promote mobility and homeownership, while requiring housing associations to first offer these homes to current tenants before selling them on the open market, with favourable conditions like conditional sales established (BZK, 2022a). However, local performance agreements are drawn up between municipalities and tenant organizations, which may lead to different implementations. Housing associations negotiate with municipalities based on these agreements, setting criteria for social housing unit sales. If criteria are met, housing associations can sell units without municipal permission.

Approximately 13% of greenhouse gas emissions in the Netherlands result from heating around

9 million existing buildings, partly due to inadequate insulation, with only 8.6% of energy consumed by heating buildings coming from renewable sources (Hoops, 2020). A key component of the 'accelerating sustainability in the built environment' program is the National Insulation Program (BZK, 2022b), which aims to insulate 2.5 million homes by 2030, focusing on the 1.5 million poorly insulated homes (labels E, F, and G) to reach a standard insulation level that eliminates natural gas use (BZK, 2022c). As part of this program, housing associations must phase out homes with energy labels E, F, and G by 2028, with exceptions for certain buildings and those designated for demolition, pending tenant and VvE consent (BZK, 2022a).

However, housing associations struggle with these objectives, especially in mixed-ownership complexes. Being aware of the challenges of energy investment, both interviewed housing associations in our study have a policy of not selling homes in their complexes anymore, where they currently have full ownership of all units. The current 'ban' on sales in complexes they currently fully own aims to prevent the efficiency problem of 'broken blocks', which makes maintenance and renovation more difficult. Both housing associations even occasionally buy back homes from homeowners in complexes with a few other owners, so they retain full ownership and can get out of some VvEs.

Mixed-ownership complexes are a widespread phenomenon in the Netherlands. Of the approximately 135,000 VvEs supervising 1.4 million homes as of January 1, 2022, nearly 70% are mixed, meaning they consist of both rental and owner-occupied homes (CBS, 2024b). Apartment buyers automatically become VvE members upon purchase. The laws and regulations of VvEs are governed by a deed of division (splitsingsakte) with a mandatory property division regulation (splitsingsreglement), outlining ground rules for building use, management, maintenance, and decision-making (Van der Vleuten, 2020). As of January 1, 2022, 37% of homes within a VvE had

an unknown or invalid energy label, and among those with a valid label, 49% were rated A or B, 34% were rated C or D, and 17% were rated E, F, or G (Ibid.). This is comparable to the general data on homes' energy labels in the Netherlands, which shows approximately 49% rated A or B, 36% rated C or D, and 14.9% rated E, F, or G (CLO, 2023).

According to our interviewees, larger VvEs are increasingly outsourcing some or all board duties to external management companies, leaving the board to consist of one or more VvE members while the external manager takes on various tasks. The General Meeting of the VvE decides on sustainability upgrades, which often require changes to common areas and a qualified majority vote (Hoops, 2020). To implement sustainability measures, VvEs often need to take out loans, and since the VvE takes out the loan as a legal entity, all owners need to participate. Currently, there is no opt-out option for owners who wish to avoid participating in the loan (Van der Vleuten, 2020). Furthermore, financing options for VvEs are limited. Since 2015, the National Heat Fund has provided financing, although further expansion is needed (BZK, 2022b).

THE INFLUENCE OF HOUSING ASSOCIATIONS ON THE ENERGY AFFORDABILITY OF HOMEOWNERS

Housing associations have a mixed impact on homeowners' energy affordability. Since 2020, the interviewed housing associations have enacted a new sales policy mandating sustainability investments for all single-family homes up for sale, typically ground-level, to ensure they achieve at least energy label C. According to interviewee 3, this incentive is driven by both internal policies and municipal requirements. The aim is to maintain these homes' market position and prevent poorly insulated houses from shifting into the low-cost owner-occupied sector. Interviewee 1 noted that nearly all housing associations in Groningen are now voluntarily adopting this strategy. While some may argue that it drains resources from the social housing sector, housing associations

view it as their responsibility to avoid passing the problem onto new homeowners. As Interviewee 2 puts it: *"It is anti-social to put your E-F-G properties on the sale list and say 'figure it out'"* (P2, 16-11-2022). Additionally, Interviewees 1 and 2 argued that the investments also raise the market price of the property, thus recouping some investments.

However, interviewees indicated that housing associations have minimal impact on the energy affordability of homeowners when selling multi-family homes in mixed-ownership complexes. While housing associations have mostly stopped this practice, they sometimes still sell homes in mixed-ownership complexes where they own only a few units, making it impossible to invest in sustainability measures beforehand: Like other owners, housing associations rely on the VvE for sustainability investments, limiting their influence on the energy affordability of future homeowners in mixed-ownership complexes.

This dependency on the VvE regarding sustainability investments presents several challenges. First, housing associations and other homeowners may have differing views on these investments, and residents who do not plan to stay long-term—such as those anticipating a move soon or elderly individuals—are often reluctant to invest in sustainability measures that involve significant costs and lengthy payback periods. Interviewee 2 explained, for instance: *"Homeowners with an average age of 80 are not going to invest 30,000 euros in sustainability measures now, which have an average payback period of 10 or 15 years. They think: in 10 years I won't be here anyway"* (P2, 16-11-2022). This short-term perspective regarding sustainability investments sharply contrasts with the longer-term perspective of housing associations.

Second, getting approval for sustainability measures within a VvE can be complex and time-consuming. A qualified majority—often at least two-thirds of the votes present at the General Meeting—must approve any significant decision. Housing associations also need the

approval of 70% of their tenants in the complex (Interviewee 4) making it challenging to agree on concrete sustainability plans (Interviewee 5). Although housing associations can theoretically push decisions through if they hold the majority, they prefer not to misuse this power. Instead, they seek to involve other owners in discussions, as substantial investments are required. Additionally, failure to consider minority interests may lead to court annulment of decisions (Interviewee 2).

Third, housing associations differ greatly from other property owners when it comes to the financial resources available to implement sustainability measures. According to Interviewee 5, monthly VvE contributions typically range from 128 to 180 euros, but improving energy affordability requires either one-off investments of 5,000 euros or more from owners or an increase in monthly contributions. Consequently, high financial costs for sustainability measures often lead owners to vote against them. Interviewee 1 explained: *“You get the investment back in a lower energy bill, a better-maintained building or added value of your home, of course. However, it has to suit your wallet”* (PI, 01-11-2022). Finally, a lack of expertise and knowledge about sustainability can hinder support for sustainability measures within a VvE. Interviewee 4 noted that a professional sustainability scan can cost around 36,000 euros, which many VvEs cannot afford.

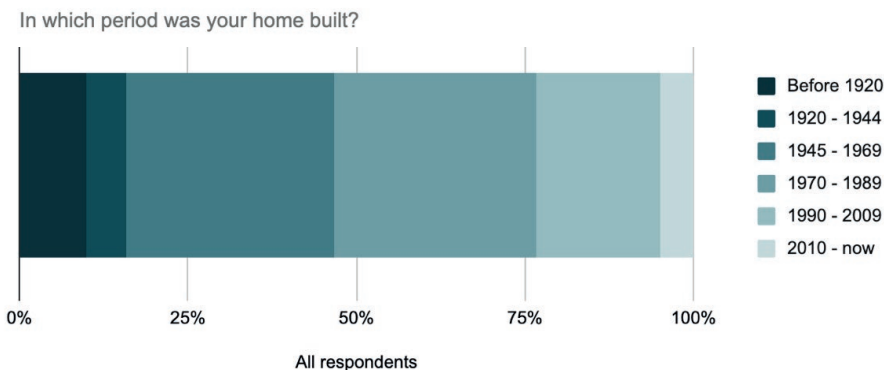
Consequently, Interviewees 2 and 4 often advise VvE boards in their mixed-ownership complexes on sustainability measures and help them with supplier and contractor networks.

THE EXPERIENCES OF ENERGY AFFORDABILITY OF HOMEOWNERS LIVING IN MIXED-OWNERSHIP COMPLEXES

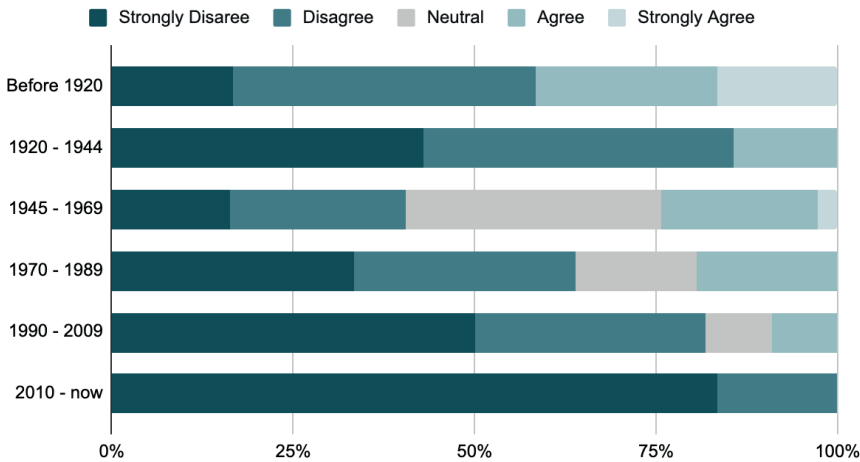
Our survey measured the experience of energy affordability by examining three dimensions: physical aspects of the home, individual circumstances, and the ability to improve the home's energy efficiency.

Interviewees emphasized the significance of physical aspects like dwelling type, construction year, and energy connection. For instance, they noted that single-family homes typically have higher energy use than apartments, where residents can benefit from shared heating or cooling. To test these assumptions, the survey examined six construction periods (Figure 1). Before 1920, rapid construction in the Netherlands due to housing shortages led to poorly insulated homes and high energy consumption (Hubbs, 2019). From 1920 to 1944, houses were built with better materials, including cavity walls (De Vries, 2016). The post-World War II era (1945-1969) prioritized quantity over quality, resulting in lower-quality housing. Starting in 1970, the use of low-maintenance materials improved insulation with standard features like double glazing (De

FIGURE 1 ▶ PERCENTAGE OF RESPONDENTS INDICATING WHETHER THEY HAVE DIFFICULTY PAYING THEIR MONTHLY ENERGY BILL, BY CONSTRUCTION PERIODS



I experience difficulty with paying my monthly energy bills currently



Vries, 2016). After 1990, the Building Code raised construction standards, leading to high-quality homes with low maintenance and heating costs. Homes built post-2010 generally have low heating costs (Hubbs, 2019). Indeed, our survey indicates that the construction period impacts respondents' experiences with paying their energy bills (Figure 1). Next, the type of owner and year of construction were compared. A total of 27% of individual homeowners live in poorly insulated homes built before 1920 or between 1945 and 1969, while the majority of VvE homeowners (63%) reside

in houses from 1945 to 1969. However, most homeowners in both single-family and multi-family homes can afford to keep their homes adequately warm, with similar results (80.6% for single-family vs. 80.9% for multi-family).

There are two types of energy connections: individual connections, involving personal heating boilers, and collective heating systems, like district or block heating. According to the interview with the VvE manager, the type of energy connection significantly affects energy affordability. Especially

FIGURE 2 ▶ PERCENTAGE OF RESPONDENTS INDICATING WHETHER THEY HAVE DIFFICULTY PAYING THEIR MONTHLY ENERGY BILLS, BY TYPE OF ENERGY CONNECTION

I experience difficulty with paying my monthly energy bills currently

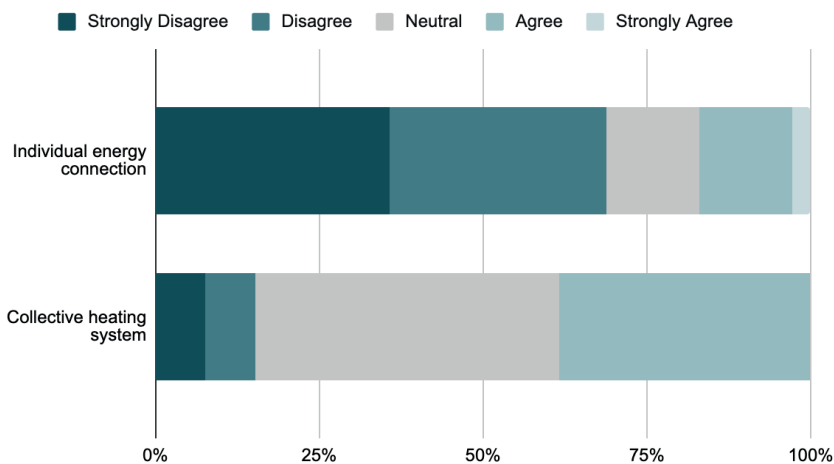
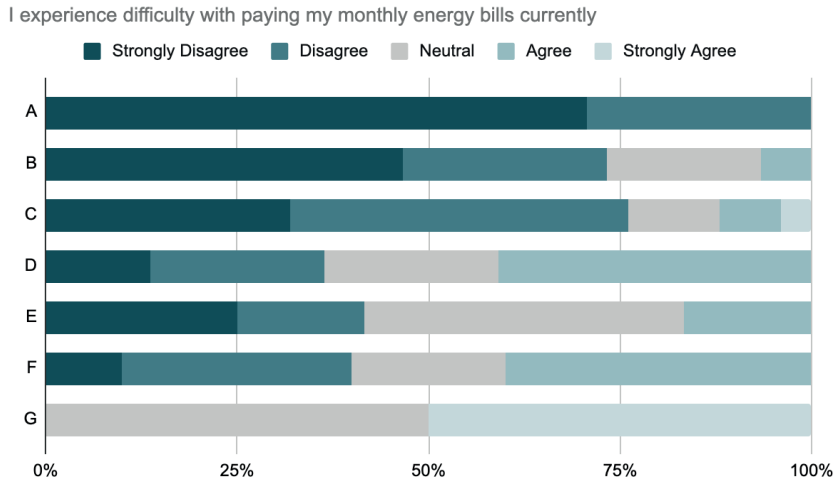


FIGURE 3 ▶ PERCENTAGE OF RESPONDENTS INDICATING WHETHER THEY HAVE DIFFICULTY PAYING THEIR MONTHLY ENERGY BILLS, BY TYPE OF ENERGY LABEL



residents of VvEs with block heating experience payment problems, as there is no allowance for this group yet (during data collection). Residents in VvE complexes with collective heating are also bound to the VvE's chosen energy contract, limiting their options too. This lack of choice can lead to dissatisfaction, as expressed by one homeowner in our survey: *"We have district heating, and we can't get rid of that either."* (VvE homeowner, 01-01-2023). Our survey data shows that homeowners with collective heating systems are less likely to afford adequate heating compared to those with individual connections (61.5% vs. 83%). While 68.8% of individual connection homeowners report no difficulties paying their energy bills, a significant portion of those with collective heating (38.5%) struggle with monthly expenses, despite 46.2% expressing neutrality about their ability to pay (Figure 2).

Most homeowners unable to afford adequate heating live in homes with energy labels D or lower, with 75% of those in properties with an energy label G reporting affordability issues. Additionally, the data shows that higher energy labels correlate with fewer problems in paying energy bills (Figure 3).

Individual circumstances certainly affect energy consumption and affordability, particularly concerning the type of energy contracts—whether fixed-term or indefinite. Thus, the affordability of energy bills was examined based on homeowners' contract types, focusing on those with individual energy connections that allow them to track and pay for their actual consumption instead of paying a fixed amount to the VvE. The findings reveal that 52.8% of homeowners have a fixed-term energy contract, 39.6% have an indefinite contract, and 7.5% are unsure of their contract type. While most homeowners can afford to keep their homes warm, a lower percentage of those with indefinite contracts (53.1%) report '(strongly) disagree' compared to those with fixed-term contracts (74.1%). This suggests that fixed-term contract homeowners experience fewer energy affordability issues, possibly due to not yet facing sharply rising energy prices.

Personal preferences and behaviour also influence energy consumption and affordability. While 47% of survey respondents are uncomfortable at temperatures below 18 degrees, 32.4% of homeowners feel comfortable at this level. What is notable is that many are actively trying to reduce energy use, as shown by one respondent: *"I filled in that we have no payment problems,*

TABLE 3 ► COMPARISON AVERAGE ROOM TEMPERATURE (WHEN AT HOME, DURING DAYTIME), BY AGE CATEGORY AND GENDER

Average temperature by age category (when at home, during daytime)	currently	last winter
18-24	18,33	20,33
25-34	16,69	18,00
35-44	18,09	19,00
45-54	17,22	19,45
55-64	17,93	19,23
65-74	18,90	20,28
75+	19,31	20,25

Average temperature by gender (when at home, during daytime)	currently	last winter
Male	17,70	18,89
Female	17,76	19,39

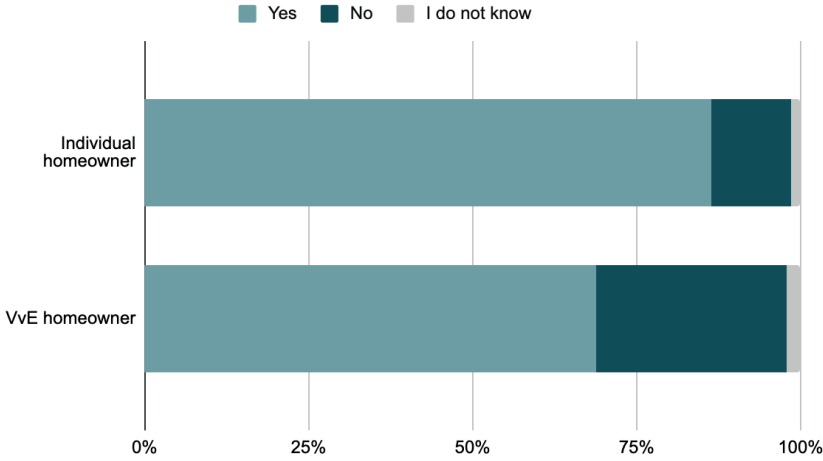
but that is because we have turned down the thermostat substantially. If we used our thermostat 'normally' we would probably be in trouble though" (Individual homeowner, 06-12-2022). In fact, most respondents reported a decrease in their average room temperature compared to a year prior (Table 3).

The ability of individual homeowners to invest is constrained by the VvE, as discussed earlier. Similar to housing associations, surveyed respondents pointed out difficulties. One homeowner noted, "In a VvE, it is very complicated to decide how and where we can put solar panels on our roof in such a way that every resident (owners and tenants) will benefit from them" (VvE homeowner, 16-01-2023). Another expressed frustration, stating, "Within a VvE, you have little to no say. No say in what happens, whether there will be solar panels or insulation. There is always someone against it, and the bureaucracy is obstructive" (VvE homeowner, 01-01-2023).

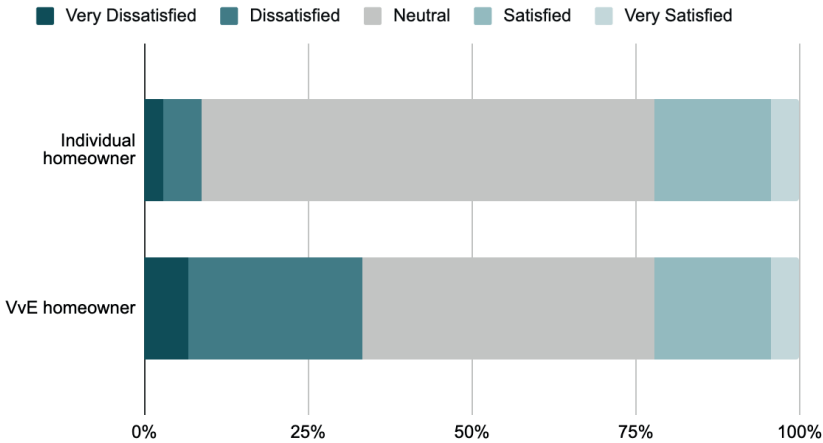
A third homeowner remarked, "Being part of a VvE makes it much more complex to improve the sustainability/energy situation of my apartment" (VvE homeowner, 19-12-2022). As shown in Figure 4, fewer sustainability measures were implemented in VvE homeowners' homes (68.9%) compared to individual homeowners (86.3%). Additionally, most VvE and individual homeowners reported not receiving any financial support for their sustainability efforts. Overall, VvE homeowners expressed lower satisfaction with the level of cooperation with others (such as landlords, other VvE members or neighbours) compared to individual homeowners (33.4% versus 8.8%, Figure 4).

FIGURE 4 ▶ LEVEL OF SATISFACTION WITH COOPERATION REGARDING THE IMPLEMENTATION OF SUSTAINABILITY MEASURES, BY TENURE TYPE

Have any sustainability measures been implemented in your home?



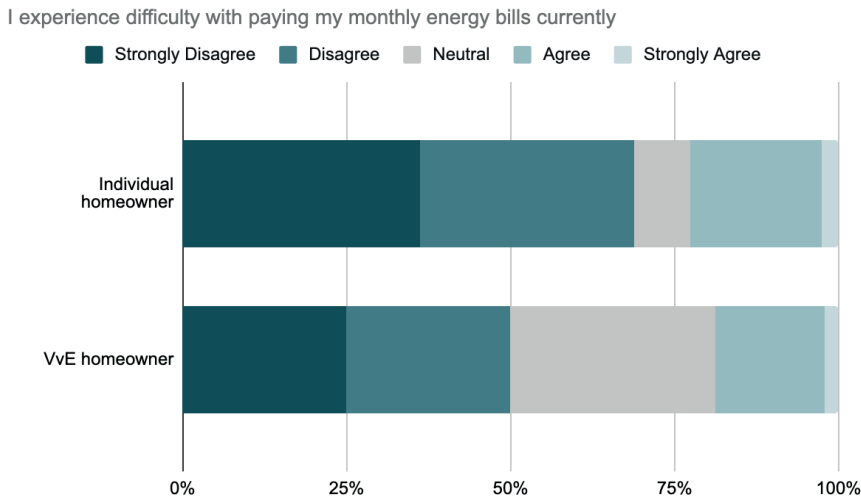
How satisfied are you with the cooperation with the people around you when it comes to making your home more sustainable?



Those who implemented sustainability measures reported improved living comfort (72.8%) and reduced energy bills (54.4%). Most individual and VvE homeowners can afford to keep their homes adequately warm, but a different picture emerges regarding difficulties in paying monthly energy bills. A higher percentage of individual owners disagree or strongly disagree about facing payment issues compared to VvE homeowners (68.8% versus 50%, Figure 5).

Due to rapidly rising energy prices during data collection, future affordability concerns were also assessed. The majority of both homeowner types express worry about future energy bills, with VvE owners slightly more concerned than individual owners (58.3% versus 54.4%).

FIGURE 5 ▶ PERCENTAGE OF RESPONDENTS INDICATING WHETHER THEY HAVE DIFFICULTY PAYING THEIR MONTHLY ENERGY BILLS, BY TENURE TYPE



DISCUSSION AND CONCLUSION

This mixed-methods study has shed light on the energy efficiency challenges faced by residents and owners, including housing associations, in mixed-ownership complexes in the province of Groningen. Housing associations in the province follow national performance agreements while refraining from selling properties in fully owned complexes to avoid creating more mixed-ownership complexes. Although a national policy aims to phase out low-energy-labelled homes by 2028, there is no specific policy for mixed-ownership complexes. Energy poverty is primarily addressed through small local projects, with limited regulations focused on improving home sustainability.

Housing associations have limited influence on homeowners' energy affordability when selling social housing in mixed-ownership complexes, as they depend on VvEs for sustainability investments. Challenges include differing perspectives, high voting quotas, limited investment capabilities among private owners, and a lack of sustainability knowledge within VvEs. Although Dutch housing associations must phase out homes with poor energy labels by 2028, there

is no mandatory policy for mixed-ownership complexes. The responsibility for organizing and financing sustainability investments lies with the VvE, leading to inaction on sustainability despite its importance for reducing energy costs and advancing the energy transition. With nearly 70% of all dwellings in VvEs being part of mixed-ownership complexes (CBS, 2024b), this issue requires urgent attention from the Dutch government.

The results emphasize the urgent need for targeted policies and support from municipalities and housing associations to accelerate sustainability within VvEs. We recommended that policies enhance knowledge about sustainability in VvEs and simplify decision-making structures. Following Groningen's example, housing associations across the Netherlands may consider ceasing the sale of houses in fully owned complexes to help prevent the formation of new VvEs. Additionally, many mixed-ownership complexes currently face challenges due to a lack of financial resources and expertise for implementing sustainability measures, underscoring the importance of government initiatives to bolster sustainability knowledge

within VvEs. Providing free sustainability scans and condition assessments could significantly address these issues.

VvE homeowners face greater challenges with energy affordability than individual homeowners. Although both groups can maintain warmth in their homes, VvE homeowners struggle more with monthly energy bills, and fewer sustainability measures are implemented in VvE homes. This suggests that the sale of social housing may adversely affect energy affordability

in mixed-ownership complexes. While this study did not explore individual or household characteristics influencing energy use, future research could investigate how socio-economic demographics impact energy affordability. Additionally, this study focused solely on the perspectives of owners in mixed-ownership complexes; examining the experiences of social housing tenants could provide valuable insights for developing tailored policies to improve the lives of those unable to invest in sustainability measures.

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