Country brief: Unlocking private capital for Germany's heating transition

A stakeholder- and technology-specific approach to overcoming investment barriers

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Executive Summary

Mobilising private capital for Germany's heating transition is essential to achieving national and EU climate targets – while also strengthening energy security and economic resilience. Yet, current investment flows remain misaligned with these goals, slowing the replacement of fossil fuel-based heating systems with renewable alternatives. A range of persistent barriers continues to hinder private investment, particularly in heat pump deployment within the residential sector.

These barriers go far beyond access to capital. They vary by technology and differ significantly across stakeholder groups. Private homeowners, housing companies, energy service providers, and municipal utilities each face a unique set of challenges that shape investment decisions. One-size-fits-all approaches are therefore insufficient.

Overcoming these challenges requires targeted public policy responses based on (a) a technology- and stakeholder-specific strategy and (b) a systemic approach that addresses financial profitability concerns, real-economy implementation constraints, and deeper-rooted behavioural barriers.

To facilitate such targeted responses, ZOE Institute's Private Finance Toolbox offers a systemic framework that links investment barriers to corresponding policy tools.

This country brief analyses stakeholder-specific investment barriers to heat pump deployment in the residential building sector and applies the aforementioned approach to private homeowners – the group with the highest investment needs and largest emission reduction potential.

By adopting this differentiated and systemic approach, decision-makers can unlock the full potential of private capital – and accelerate Germany's heating transition in line with its climate, socioeconomic and energy security goals.

1. Introduction

Decarbonising the building sector is pivotal to achieving Germany's climate targets. The sector accounts for almost 35% of final energy consumption and nearly a third of national CO_2 emissions, primarily due to its continued reliance on fossil fuel-based heating systems (UBA, 2024). In residential buildings, space heating and hot water alone represent more than 70% of final energy use (UBA, 2025). Therefore, replacing fossil fuel-based heating systems with renewable alternatives is a key lever for decarbonising the built environment (Altermatt et al., 2023; Gaur et al., 2021).

Heating decarbonisation is also essential to secure long-term energy security and economic resilience. Germany's historic dependence on Russian fossil fuels left the building sector particularly exposed during the 2022 energy crisis. The subsequent shift to liquefied natural gas (LNG) mitigated immediate supply shortages but introduced new dependencies (Holz et al., 2023; von Hirschhausen et al., 2024). This exemplifies the strategic importance and the vulnerability of the building sector, and it illustrates the broader costs of fossil fuel reliance: volatile energy prices, inflationary pressures, and diminished industrial competitiveness (IEA, 2024; Dieckelmann et al., 2024; Hoffart er al., 2024).

Private investment for the heating transition remains insufficient in scale and speed. Reaching the sector's climate targets will require significant investments, with a substantial share of this gap needing to be filled by private capital (EIC, 2024; Andersson et al., 2025). Despite policy reforms such as the 'Buildings Energy Act (GEG)' in Germany, renovation rates and the uptake of renewable-based heating systems remain well below target levels (dena, 2024; Kaestner et al., 2025).

Mobilising private investment requires both technology- and stakeholder-specific approaches. The deployment of heat pumps is a clear example of this dynamic: they are a cornerstone technology in the heating transition – efficient and commercially available – yet their adoption in Germany has not accelerated at the speed and scale to match policy targets (Gaur et al. 2021; dena, 2024; BMWK, 2023). This cannot be addressed through improved access to capital alone. Heat pump specific investment barriers include high upfront costs, uncertainty over long-term operating expenses, regulatory complexity, short-term planning horizons, and skilled labour shortages (chapter 3.1). And even for the same technology, barriers vary significantly across stakeholder groups. In the building sector, the landscape is highly fragmented — private homeowners, housing companies, municipal utilities, and energy service providers all face distinct challenges (chapter 3.2). Public policy must therefore respond not only to the technology-specific barriers, but also to the stakeholder-specific contexts in which solutions are implemented.

To support effective policy design, this country brief applies ZOE Institute's Private Finance Toolbox to the heating transition in Germany's residential building sector. The Toolbox assembles a wide range of policy tools to overcome investment barriers at three levels: explicit, semi-explicit, and implicit. It reveals that no single measure can address the full spectrum of investment barriers. Instead, a differentiated mix of policy intervention is needed.

Some illustrative policy options include *(non-exhaustive list):*

- Public investment grants and low-interest loans to reduce upfront capital costs
- Service based models, e.g. 'Heat-as-a-Service'
- Information and coordination platforms such as 'One-Stop-Shops'
- Training and skills development programmes
- Showcasing climate-friendly peer behaviour in investment decisions

In sum, enabling the heating transition in Germany demands more than access to finance. It requires (a) a technology- and stakeholder-specific strategy and (b) a systemic approach that addresses financial profitability concerns, real-economy implementation constraints, and deeper-rooted barriers (chapter 4).

2. A technology- and stakeholder-specific approach

Private investment is essential to decarbonising Germany's heating sector, but current levels remain insufficient. Swift decarbonisation of the built environment requires rapidly scaling private investments into building renovation and renewable-based heating systems, especially heat pumps (Gaur et al., 2021; EIC, 2024; Agora Energiewende, 2025). Germany's heating sector remains heavily reliant on fossil fuels, with nearly 80% of residential buildings still using oil or gas-based systems (dena, 2024). Given the long lifecycles of heating systems, continued investment in fossil-based technologies risks locking in emissions for decades and severely undermining national and European climate targets (Pathak et al., 2022).

Investment barriers differ by technology and require tailored solutions to accelerate the heating transition. Different technologies encounter distinct levels of resistance: for example, while nearly 60% of German households say they could imagine installing photovoltaic systems, only 37% would consider a heat pump (KfW, 2024). Because of this heterogeneity, a one-size-fits-all approach is unlikely to succeed. Instead, a technology-specific approach is needed. The rapid deployment of heat pumps is among the fastest technical pathways to significantly reduce fossil gas in the building sector and achieve climate targets (Altermatt et al., 2023). For these reasons, this country brief focuses specifically on heat pumps as a key lever in the heating transition.

Deployment of heat pumps remains well below policy targets. The German government set a target of installing 6 million heat pumps by 2030, at a rate of 500,000 units per year (BMWK, 2023). As of 2024, only around 1.7 million are in operation (BWP, 2024a). Annual installations between 2022 and 2024 fluctuated between around 200,000 and 350,000 units (BWP, 2024a). Most heat pumps are still installed in new buildings: in 2023, approximately two thirds of newly completed residential buildings used a heat pump as their primary heating system (dena, 2024). While this reflects clear progress in decarbonising the new-build sector, the existing building stock remains overwhelmingly reliant on fossil fuels. Achieving climate neutrality across the entire building sector by 2045 therefore remains a major challenge (Altermatt et al., 2023; dena, 2024).

Decarbonising the heating sector requires engaging a diverse group of stakeholders. The residential building stock in Germany is highly heterogeneous. Key stakeholder groups include private homeowners, housing companies, municipal utilities, and energy service providers (see Figure 1). They vary significantly in terms of ownership structures, investment needs, and potential for natural gas savings (see Boxes 1-4). Understanding these differences is essential to tailor effective policy responses for heat pump adoption.

The misalignment between policy goals and market behaviour underscores the need to understand how different actors make investment decisions. While many stakeholders face shared challenges for rapid deployment of heat pumps – such as high upfront costs, volatile energy prices, policy uncertainty, and shortages in skilled labour (see Table 1 in chapter 3.1) – these barriers play out differently in practice. For example, capital constraints may be a liquidity issue for private homeowners but a balance sheet constraint for municipal utilities. Likewise, some barriers are unique to specific groups. For example, municipal utilities must navigate legacy gas infrastructure, whereas private households may lack access to information and advice (see chapter 3.2).

To unlock the necessary private capital, policy approaches must therefore be both technology- and stakeholder-specific. This is further illustrated in the next chapter, which examines investment barriers across different stakeholders for the deployment of heat pumps in the residential building sector.[1]

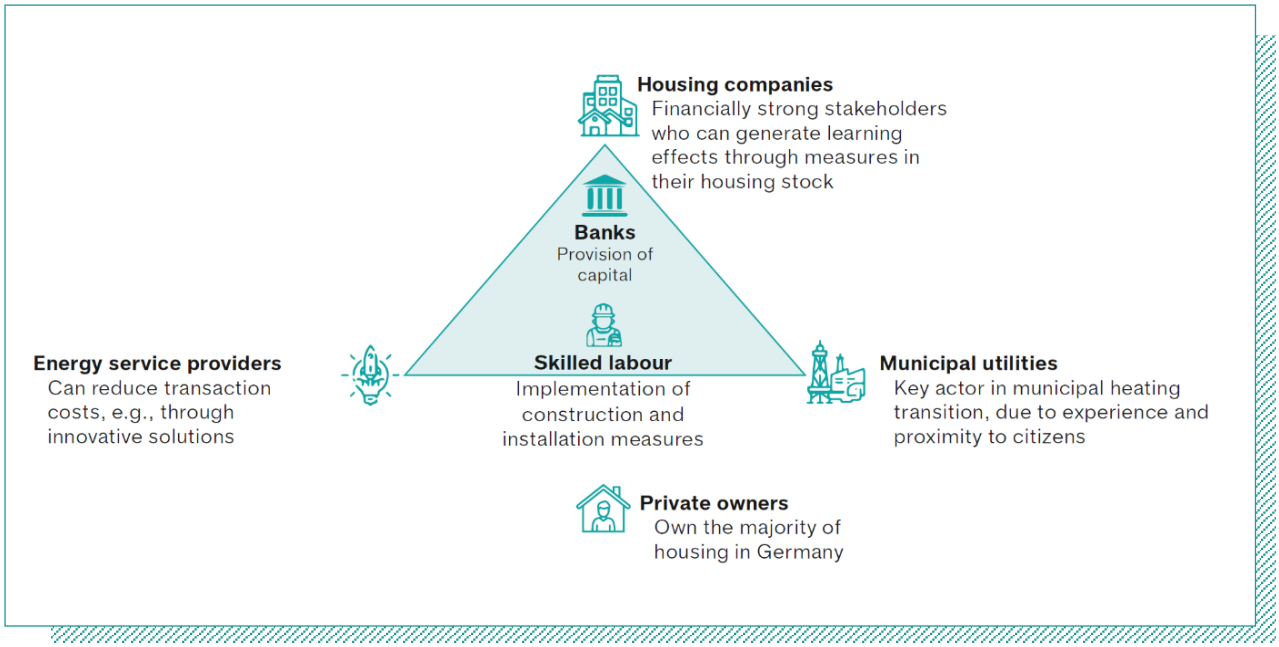


Figure 1: Key stakeholder groups in Germany's residential building sector decarbonisation (based on EIC, 2024)

Note: In the buildings sector, housing companies, municipal utilities, private homeowners and energy service providers are key stakeholders to accelerate the deployment of renewable heat solutions. Skilled labour and financial actors such as banks are conceptualised as enablers with cross-cutting relevance across all other groups.

[1] For simplicity, this country briefs' analysis focuses on residential buildings. However, the findings also offer valuable insights for non-residential buildings, as many of the required policy tools and challenges are comparable. Consequently, the methods and Private Finance Toolbox outlined in Chapter 4 can be adapted and used as a foundation to mobilise investment in non-residential buildings as well.

Boxes 1-4: Profiles of key stakeholder groups in Germany's residential building sector

Private homeowners

Housing stock share: Approximately 79% of all dwellings in Germany (dena, 2024)
Typical ownership: Self-occupiers, small-scale landlords, co-ownership associations (WEGs)
Property types:

- Own 98% of single-family homes
- Their share drops to 52% in buildings with 13 or more units (dena, 2024)
- Average ownership is 1.7 dwellings per person (IW Köln, 2017)

Relevance: Private homeowners hold the greatest potential for natural gas savings, but they also face the highest investment needs for decarbonisation (EIC, 2024).

Housing companies

Housing stock share: Account for 21% of dwellings (BMWSB 2022; dena, 2024)
Ownership composition:

- Private housing companies (~36%)
- Municipal providers (~29%)
- Housing cooperatives (~27%)

Property types:

- Predominantly own larger multi-family buildings – over half of flats in ≥13-unit blocks are institutionally owned (dena, 2024)
- Portfolio size: average of 114 units per owner (BMWSB, 2022)

Relevance: By bundling a large number of dwellings, they create a strong investment and scaling dynamic. This leverage is further enhanced by a high market concentration among private housing companies (EIC, 2024).

Municipal utilities

Market role:

- Operate local energy infrastructure and maintain close proximity to end customers
- High shares of the heating business (~88%) and gas business in the end customer sector (~60%) (EIC, 2024)

Revenue structure:

- Approximately 25% of revenues come from the gas business, which is structurally declining due to decarbonisation and the growth of decentralised renewable heating systems (Agora Energiewende 2023; EIC, 2024)

Relevance:

- Though the smallest in number, energy suppliers account for a disproportionately high natural gas consumption of 67 GWh for heat generation in heating networks (EIC, 2024).
- Municipal utilities are expected to finance most of the more than 100 billion euro required for district heating expansion (EIC, 2024).

Energy service providers

Actor types: Predominantly cleantech start-ups and scale-ups (Singh et al, 2022; EIC, 2024)
Business models include:

- **Heat/Energy as a Service (HaaS/EaaS):** Customers pay for heating services, not system ownership; providers finance and operate systems
- **Heat pump subscription models:** Monthly fee covers installation, maintenance, and energy use of heat pumps
- **Heat supply contracting and leasing:** Long-term agreements recover system costs through energy savings or fixed instalments (EHPA, 2024; EIC, 2024)

Relevance:

- Act as innovation drivers in the heating transition by unlocking new financing and ownership models
- Lower adoption barriers for clean heating technologies (Singh et al. 2022; EIC, 2024)

3. Investment barriers to heat pump deployment across stakeholder groups

This chapter provides an overview of the key investment barriers hindering the widespread deployment of heat pumps in the German residential building sector. The analysis draws on qualitative desk research, previous studies, and expert interviews. Based on this work, a comprehensive set of investment barriers was identified (see Annex). These barriers were then synthesised into broader categories based on shared characteristics (Table 1). In a second step, they were disaggregated by stakeholder group – private homeowners, housing companies, energy service providers, and municipal utilities – to reflect the distinct challenges faced by each group (Table 2). This differentiation underscores the need for policy responses that are tailored to the specific constraints and roles of diverse actors involved in the heating transition.

3.1. Selection and categorisation of investment barriers

The identified investment barriers, as shown in Table 1, reveal that financing building decarbonisation in Germany is not merely a matter of improving access to capital. Financial barriers include, for example, high upfront investment costs, uncertain operational expenditure, and policy uncertainty that undermines investor confidence in long-term returns (Lowes et al. 2024; Kaestner et al., 2025; IEA, 2022). Yet even when capital is available, real-economy constraints frequently impede implementation. These include, for example, shortages of skilled labour and qualified energy advisors, access to information, and bureaucratic obstacles (Öko-Institut and Fraunhofer ISE, 2022; Gaur et al. 2021; Mjekic et al. 2022). Finally, deeper-rooted issues further inhibit the uptake of heat pumps. These include limited public awareness and acceptance of the technology, the perceived complexity of funding schemes, and widespread risk aversion among property owners (EIC, 2024; Stieß et al. 2010; Schleich et al., 2021).

Table 1: Key investment barriers to heat pump deployment in residential buildings

Investment barriers
Ubiquity of gas distribution networks
Lack of coordination
Unfavourable regulatory environment for new technologies and services
Bureaucratic obstacles
Lack of long-term policy certainty
Uncertain return on investment
Uncertain operational expenditures
High upfront investment costs
Lack of access to capital
Shortage of skilled installers and advisory professionals
Information asymmetries
Short-term return expectations
Split incentives dilemma
Lack of information and advisory services
Information diffusion and disinformation in the public debate
Limited product and technology awareness and acceptance
Perceived complexity of funding applications and bureaucracy of energy renovation projects
Perceived lack of information and advisory services
Risk aversion among property owners
Complex retrofitting
Short-term planning horizons

3.2. Investment barriers by stakeholder group

In the building sector, private homeowners, municipal utilities, energy service providers, and housing companies all need to be mobilised to accelerate investments in heat pump deployment (see Figure 1, Boxes 1-4). While these actors share some common challenges, they also face unique barriers that shape their investment decisions. Understanding these specific constraints is therefore crucial. Table 2 assigns key investment barriers[2] to different stakeholder groups, drawing on a synthesis of existing literature, previous research and expert interviews. The table indicates where each challenge is particularly relevant.

Table 2: Stakeholder-specific investment barriers to heat pump deployment

Barrier	Stakeholder			
Investment barrier	**Private homeowners**	**Housing companies**	**Municipal utilities**	**Energy service providers**
High upfront investment costs	x	x	x	x
Lack of access to capital	x	x	x	x
Uncertain return on investment	x	x	x	x
Uncertain operational expenditures	x	x	x	x
Ubiquity of gas distribution networks			x	
Lack of long-term policy certainty	x	x	x	x
Bureaucratic obstacles	x	x	x	x
Unfavourable regulatory environment for new technologies and services			x	x
Lack of coordination			x	x
Complex retrofitting	x	x		
Shortage of skilled installers and advisory professionals	x	x	x	x
Lack of information and advisory services	x			
Information asymmetries	x	x	x	x
Information diffusion and disinformation in the public debate	x			
Split incentives dilemma	x	x		
Limited product and technology awareness and acceptance	x	x	x	
Perceived complexity of funding applications and bureaucracy of energy renovation projects	x	x	x	
Perceived lack of information and advisory services	x			
Risk aversion among property owners	x	x		
Short-term planning horizons	x	x	x	
Short-term return expectations		x	x	x

[2] Some of the barriers in Table 1 go beyond the direct mobilisation of private capital for heat pumps and address upstream investment challenges, such as infrastructure investments by municipal utilities. As these are central to creating the necessary framework conditions for the large-scale, decentralised deployment of heat pumps, they are included in this analysis.

Private homeowners

Private homeowners hold the greatest potential for natural gas savings, but they also face the highest investment needs for decarbonisation (EIC, 2024; Luderer et al., 2025). Many still face significant barriers that impede investment, spanning financial profitability concerns, real-world implementation challenges, and deeper-rooted issues (see Table 2).

Financial profitability concerns remain a central barrier. High upfront costs and uncertain long-term expenditure remain a key barrier to heat pump adoption. Initial costs are high, and fluctuating energy prices and unclear CO_2 pricing make it hard for homeowners to estimate lifetime costs (EHPA, 2024; IEA, 2022). In addition, homeowners tend to exhibit strong risk and debt aversion: many are reluctant to take on loans for capital-intensive technologies, even when long-term savings are likely. Investment decisions are often driven by short payback expectations – even though heating systems typically decades (Schleich et al., 2021; Pathak et al., 2022).

Market volatility and political uncertainty have compounded the challenges in the heat pump market. Data from 2020 to 2024 shows demand fluctuating sharply due to external factors. In 2024, unclear and shifting policy signals contributed to a 45% drop in heat pump sales in Germany (BWP, 2024a). Political debates, such as the CDU/CSU's threat to "abolish the GEG" (CDU, 2025), triggered a temporary surge in demand as homeowners rushed to secure subsidies. Thermondo, a leading installer, reported sales rising by up to three-fold in a matter of weeks, while Enpal constantly adjusted capacity to keep pace (Financial Times, 2024). However, such politicisation also increases policy uncertainty, undermining long-term planning and investment decisions in the market (BWP, 2024b). These developments highlight the urgent need for long-term, stable policy frameworks that provide planning security for the market.

Lower-income homeowners face even higher financial barriers to upgrading heating systems. Low-income households often live in older, poorly insulated homes with higher heating costs (Galvin, 2024). Renovation is especially important for these groups, as older buildings incur heating expenses per square metre about 40% higher than modern ones (Kaestner et al., 2025). Even with subsidies, many low-income households lack upfront capital for financing shares and loan repayments, risking further delay or avoidance of heating upgrades and exacerbating energy poverty (KfW, 2024; BBSR, 2024).

Real-world implementation constraints pose persistent challenges for heat pump adoption. Navigating Germany's fragmented subsidy and information landscape spanning federal, state, and municipal levels can be overwhelming. Programmes differ widely in eligibility criteria, application procedures, and funding conditions, complicating homeowners' ability to determine which support scheme applies to them (Engelmann et al., 2021). In addition, it is difficult for many homeowners to access reliable information about the benefits, costs, and technical performance of heat pumps. Common concerns include system reliability, suitability for older buildings and uncertain energy savings (Wilson et al., 2015; Stieß, Dunkelberg, 2013). A major factor underlying these barriers is that investment decisions tend to be reactive: most homeowners replace heating systems only after failure or in response to regulatory pressure (Albrecht et al., 2010, Stieß et al. 2010). Under such time pressure, they rarely consult advisory services or compare technology options (EIC, 2024). Additionally, the perception of excessive complexity can be as discouraging as the actual administrative burden, often deterring action before it begins (Wilson et al., 2015; EIC, 2024).

In summary, private homeowners face a web of challenges that make their participation in the heating transition difficult. Targeted, clear policies are urgently needed to lower these barriers and support all homeowners, especially lower income groups.

Housing companies

Housing companies are crucial institutional actors in the heating transition, with high potential to mobilise capital efficiently and deliver impact at scale. Their role is especially relevant given their predominance in multi-family housing (see Boxes 1-4 in chapter 2). This enables powerful scaling dynamics, making housing companies key levers for accelerating heat pump deployment (EIC, 2024).

A range of financial constraints is limiting investment capacity. Elevated interest rates and construction costs in recent years have significantly reduced financial headroom among housing companies (EIC, 2024). Construction material prices and costs have surged since early 2021, driven by unstable global supply chains and material shortages, further exacerbated by the Russian war of aggression. Between 2020 and 2023 overall building and manufacturing costs rose by around 48% (ARGE, 2025). While prices for construction materials are coming under control, mainly due to stabilised supply chains, costs for construction services continue to rise, putting sustained financial pressure on housing companies (BBSR, 2025; ARGE, 2025).

At the same time, credit conditions have worsened, and several major housing firms have faced credit rating downgrades, further limiting access to affordable capital and slowing investment momentum (EIC, 2024). This slowdown is also reflected in new construction activity: the number of building permits for residential buildings has dropped by more than 50% in many parts of Germany, with application volumes falling by as much as 80% in some regions – leaving the country far from its target of 400,000 new homes annually (ARGE, 2024; Bundesregierung, 2022).

Return expectations and investment capacity vary widely across the sector. Housing companies are highly heterogeneous, with different ownership models associated with distinct economic logics. Private, for-profit companies generally operate with higher return expectations and shorter payback horizons than municipal or cooperative providers (BBSR, 2024). Listed housing companies typically benefit from access to capital markets but face strong shareholder pressure and short-term profitability targets (EIC, 2024). Despite the potential to increase property values and improve long-term rentability, heating system replacements have historically not been prioritised, resulting in a high prevalence of fossil-based heating systems (EIC, 2024; dena, 2024). By contrast, smaller cooperatives and municipal providers often operate under tighter budget constraints and with lower return expectations. While they may be more inclined toward long-term sustainable investment decisions, they face steeper barriers when it comes to absorbing high upfront costs and securing financing (BBSR, 2024).

Regulatory complexity continues to challenge implementation. Housing companies regularly encounter long waiting times for building permits (GdW, 2023). Fire protection, noise control and land-use regulations often conflict or overlap across municipal, state and federal levels, adding planning burdens and driving up costs (ARGE, 2023). While legal reforms such as the Buildings Energy Act (GEG) and the Heat Planning Act have begun to establish a more coherent framework, many uncertainties persist at the level of local implementation (EIC, 2024). For example, tenancy law limits refinancing options for landlords**.** Under §§ 555b and 559 of the German Civil Code (BGB), landlords are permitted to pass on part of the costs of energy-related modernisations to tenants through a modernisation levy. A new regulation (§ 559e BGB) now allows for a higher surcharge of 10% per year – compared to the previous 8% – if public funding is used and appropriately deducted. This is designed to create stronger incentives for landlords to make use of funding schemes and install higher-efficiency heating systems than required by the minimum standards set out in the Buildings Energy Act (GEG). An additional cap of 0.50 euro per square metre per month applies specifically to heating system upgrades that comply with the GEG (Keimeyer et al., 2024). Despite ongoing efforts, the split incentive dilemma remains a persistent challenge. For an in-depth discussion, see Henger et al. (2021, 2023).

In conclusion, housing companies are crucial stakeholders to drive the heating transition at scale, particularly due to their professionalised operations and portfolio-level planning capacities. Unlike individual homeowners, they are not held back as much by information gaps, but rather by a combination of tightened financial conditions, regulatory uncertainty, and ownership-specific value orientations.

Municipal utilities

Municipal utilities are pivotal to the success of the heating transition due to their role as operators of local energy infrastructure and their proximity to citizens. Currently, they hold an 88% share of the heating business and 60% of the gas business in the end customer sector (EIC, 2024). However, their investment capacity is under strain due to several intersecting challenges (Table 2).

Investment needs are high, while financing capacity is under pressure. Municipal utilities are expected to take on a large share of the investment needed for district heating expansion and infrastructure (EIC, 2024). Three quarters of utilities cite major financing challenges, pointing to severe strains on internal investment capacity (EY & BDEW, 2025). A significant share of municipal utility revenues still relies on the gas business, which is structurally declining. Approximately a quarter of municipal utilities' income derives from gas sales, a sector facing gradual erosion as decentralised renewable heating systems and district heating networks expand (Agora Energiewende, 2023; EIC, 2024). This decline not only threatens a key income stream but increases the risk of stranded assets: gas infrastructure amortisation schedules cannot keep pace with falling demand, tying up capital needed for future-oriented investments (Agora Energiewende, 2023; EY & BDEW, 2025).

The situation is further aggravated by fiscal stress at the municipal level. Local governments are not only key co-actors in municipal heat planning but also essential allies in the implementation of infrastructure projects, collaborating closely with utilities. Yet they face mounting budget pressures: Germany's municipalities recorded a core budget deficit of over 24 billion euro in 2024. Forecasts suggest that over 90% of municipalities expect their financial outlook to deteriorate further over the next five years (KfW, 2025). This severely limits their ability to support utilities through instruments such as subordinated loans or equity-style capital. As a result, utilities are often forced to rely on internal resources to fund transition-related investments, placing an even greater burden on their balance sheets (KfW, 2025; EY & BDEW, 2025). But municipal utilities are not only constrained by limited access to capital and financial profitability concerns.

Real-world implementation barriers such as regulatory complexity and bureaucratic burden also pose considerable challenges. Bureaucratic hurdles significantly delay and distort implementation. Slow approval processes, complex subsidy procedures, and frequent short-term legal amendments drain valuable planning capacity and introduce serious uncertainty (EY & BDEW, 2025). These rising demands reduce operational flexibility and tie up both financial and human resources needed for the heating transition. A lack of long-term regulatory consistency and policy uncertainty further complicates planning: many utilities report difficulty navigating shifting requirements, and over 90% feel that increasing legal complexity hampers their ability to implement the energy transition (EIC, 2024; EY & BDEW, 2025). Most strikingly, two thirds of municipal utilities report having postponed or cancelled projects in the last three years due to complex or time-consuming legal requirements or approval procedures (EY & BDEW, 2025).

Beyond financial and procedural obstacles, deeper-rooted barriers persist. Short planning horizons and internal lock-ins continue to undermine strategic, long-term action. These challenges range from incentive structures within utilities to mental models shaped by decades of fossil-based operations (EIC, 2024; Agora Energiewende, 2023).

A transformative business model shift is imperative for municipal utilities to remain competitive and decarbonise with speed and scale. This includes moving away from fossil fuel sales toward decentralised, service-oriented solutions, such as leasing or contracting models for heat pumps (EIC, 2024). As Sebastian Jurczyk, Managing Director of Stadtwerke Münster, noted: "In ten to twenty years, the sale of kilowatt-hours will be dead." (Energate messenger, 2025). Reflecting this outlook, the utility is shifting from a traditional supplier role toward becoming a distributor, with leasing models for technologies like heat pumps playing an increasingly important role (Energate messenger, 2025). Enabling this transition requires clear, consistent long-term policy frameworks and a variety of policy tools that mitigate early investment risks.

Energy service providers

Energy service providers are key innovation drivers in the heating transition, introducing novel business models that can overcome traditional financial and operational barriers. Start-ups and scale-ups are pioneering approaches such as 'Heat-as-a-Service' and leasing services, which allow households without sufficient upfront capital to adopt heat pumps and other efficient heating solutions. By shifting the upfront cost away from end users, these models have the potential to accelerate market penetration and broaden access to low-carbon heating technologies (EHPA, 2024; Singh et al. 2022).

Despite their innovative potential, energy service providers face significant financial and investment challenges rooted in the capital-intensive nature of their business models and limitations within the broader financing ecosystem. These companies often incur large upfront costs to procure and install heat pumps, which they subsequently lease to customers. This arrangement increases liabilities on their balance sheets, gradually eroding creditworthiness (EIC, 2024; EHPA, 2024). Additionally, existing subsidy structures, such as Germany's Federal Funding for Efficient Buildings (BEG) programme, require full pre-financing of investments, with reimbursement provided only after the investment has been completed and relevant supporting documents have been provided. This can lead to significant reimbursement delays which can generate liquidity bottlenecks and therefore disproportionately affect start-ups (Laskowski et al., 2024; EIC, 2024). Moreover, the current imbalance in energy prices – where electricity costs remain comparatively high against subsidised fossil gas – results in unfavourable operational expenditure for electric heating systems such as heat pumps (IEA, 2022). Without a level playing field in energy costs, the viability of electrified heating business models is further undermined (Rosenow et al. 2022).

Financial challenges are compounded by a regulatory framework that favours incumbents and imposes significant barriers to new entrants and innovative business models. For example, Germany's Energy Industry Act (EnWG) and Heat Supply Ordinance (WärmeLV) are designed primarily with established, centralised suppliers in mind. This regulatory environment privileges traditional supply models, making it difficult for decentralised or service-based providers to compete (EIC, 2024).

Politically induced market distortions significantly increase risk exposure, particularly for smaller or newer market entrants. Uncertain policy frameworks – characterised by frequent shifts in political priorities and repeated adjustments to subsidy schemes – create planning insecurity that undermines long-term investment and strategic business development. These unstable conditions lead to boom-and-bust cycles in demand, making market dynamics highly volatile (EIC, 2024; Financial Times, 2025). Larger scale-ups may be able to absorb such fluctuations to a certain degree, but early-stage start-ups often lack the resilience to navigate these cycles. This highlights the urgent need for long-term policy and regulatory stability.

While financial constraints remain a key concern, many persistent barriers lie in real-world implementation, particularly in regulatory frameworks that favour incumbent actors. Addressing these challenges calls for targeted policy interventions that create a level playing field and support innovation. The next chapter presents a practical approach to help decision-makers identify effective policy tools.

4. A Policy Toolbox to address investment barriers

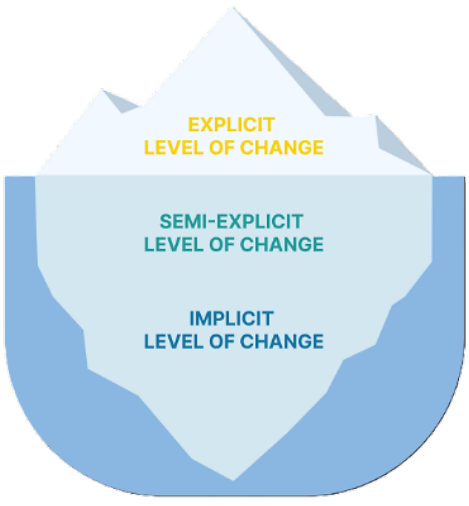
This chapter takes private homeowners as a focal group to explore targeted policy solutions. The choice is based on several factors: private homeowners represent the largest decarbonisation potential within the residential building sector and account for the largest share of the total investment needs required to meet climate targets (EIC, 2024). They form a highly heterogeneous group with wide variation, for example, in income levels and decision-making preferences (Stieß et al., 2010; BBSR, 2024). As such, they encounter the full spectrum of investment barriers – from limited access to capital and concerns over financial profitability, to real-world implementation constraints and deeper-rooted challenges. Addressing these challenges requires tailored policy responses. ZOE's Private Finance Toolbox provides a structured method for identifying such targeted interventions, matching specific policy tools to each investment barrier.

4.1. Introducing the Private Finance Toolbox

The Private Finance Toolbox enables users to identify tailored policy responses by linking specific investment barriers to appropriate public policy tools. It is based on the principle that a systemic and holistic understanding of investment barriers is essential to designing effective and targeted interventions. The Toolbox defines three levels of systemic change (see Figure 2). For a full overview of the comprehensive set of investment barriers associated with each level, please refer to the Toolbox methodology.

The Toolbox covers a wide range of instruments across key policy areas such as public (co-)funding, financial and non-financial regulation, monetary policy, information and coordination measures, labour market, and education. Many policy tools are designed to (simultaneously) incentivise green investment and disincentivise harmful or fossil-based activities.

For each policy, the Toolbox specifies key details such as its policy status, the entities affected, and its immediate fiscal impact. In the context of decarbonising buildings, users can also apply a sector-specific filter to identify relevant tools.



1. **Explicit level of change**
Tangible investment barriers, such as capital expenditure, operational costs, human resources and technology.

2. **Semi-explicit level of change**
Power dynamics and institutional challenges such as imbalances in decision-making authority, stakeholder representation and access to information.

3. **Implicit level of change**
Deeply ingrained mental models and beliefs that shape decision-making, including fundamental preferences, openness to change and risk preferences.

Figure 2: Toolbox methodology: three levels of systemic change

4.2. Toolbox application: Private homeowners

The preceding chapters identified technology-specific investment barriers that are hindering progress in the heating transition within the building sector, particularly with regard to the widespread deployment of heat pumps (see Table 1). These barriers were subsequently mapped to the relevant stakeholder groups to determine which challenges are most pressing for each actor (Table 2). This analysis forms the foundation to applying the Private Finance Toolbox.

In the next step, the identified technology- and stakeholder-specific barriers are matched with the conceptual barrier categories defined in the Toolbox (see Table 3). This alignment enables the identification of targeted policy instruments capable of addressing the specific barriers. Table 3 illustrates how this methodology has been applied to the case of private homeowners: each investment barrier was linked to its corresponding conceptual category in the Toolbox and provides a selection of suitable policy tools.

Table 3: Addressing stakeholder-specific barriers: Toolbox policy tools for private homeowners

Investment barrier	Toolbox barrier equivalent	Potential tools (for full list refer to Toolbox)
High upfront investment costs	*CapEx cost*	• CapEx tax benefit • Consumer subsidies for investment • Service based models, e.g. 'Heat-as-a-Service' • Investment grant • Capital and equity injections
Lack of access to capital		
Uncertain return on investment	*Demand*	• Consumer subsidies for investment • Phase-out of fossil fuel subsidies • Fossil fuel early retirement mechanism • Subsidised interest rates • Energy efficiency standards
Uncertain operational expenditures (e.g. high electricity-to-gas price ratio)	*OpEx cost*	• Energy policy coordination • Emissions cap & trading system • OpEx tax benefit • Phase-out of environmentally harmful subsidies (EHS)
Uncertain return on investment	*Business case certainty*	• Emission standards • Energy efficiency standards • Mandatory product standards • Feed-in tariffs for green energy
Lack of long-term policy certainty		
Bureaucratic obstacles	*Administrative efficiency*	• Fast-track approval processes • Priority rules for renewable energies • Grid access regulation • One-stop-shops • Public investments for infrastructure
Complex retrofitting	*Technology*	• Information sharing platforms & databases • Public investments for R&D
Shortage of skilled installers and advisory professionals	*Human resources*	• National green skills and workforce planning strategy • Training and skills development programmes • Curricula for green education

Lack of information and counselling services	*Information*	• Information sharing platforms & databases • Showcasing climate-friendly peer Behaviour in investment decisions • Product information campaigns
Information diffusion and disinformation in the public debate		
Lack of information and counselling services	*Imbalanced access of decision-makers to information*	• Information sharing platforms & databases • Tailored decision support • Financial planning and loan advisory services
Information asymmetries		
Split incentives dilemma	*Imbalanced voting rights in decision-making processes*	• Legal framework for collective ownership
Limited product and technology awareness and acceptance	*Openness for change*	• Coordinating platforms • Information sharing platforms & databases • Showcasing climate-friendly peer behaviour in investment decisions
Perceived complexity of funding applications and bureaucracy of energy renovation projects		
Perceived lack of information and counselling services		
Perceived complexity of funding applications and bureaucracy of energy renovation projects	*Notion of value and purpose*	• Showcasing climate-friendly peer behaviour in investment decisions
Perceived lack of information and counselling services		
Risk aversion among property owners	*Risk preferences in decision-making*	• Coordinating platforms • Information sharing platforms • Showcasing climate-friendly peer behaviour in investment decisions
Short-term planning horizons	*Time horizon of decision-making*	• Systems thinking training

In the following section, some examples from the Toolbox are presented to illustrate how public policy is addressing investment barriers in Germany's heating transition (Table 3).

Public subsidy schemes and innovative financing models play a crucial role in lowering upfront costs and promoting equitable heat pump adoption. Germany's Federal Subsidy for Efficient Buildings (*Bundesförderung für effiziente Gebäude*, BEG) demonstrates how grants and low-interest loans can ease financial burdens for private homeowners. Its tiered structure allows public support to cover up to 70% of eligible costs through various bonuses. Notably, the 'climate speed bonus' adds up to 20 percentage points for replacing fossil heating systems, while an income bonus increases support by 30 percentage points for households earning under €40,000 annually. These incentives accelerate market uptake and promote social fairness (BMWE, n.d.). However, the BEG also faces practical limitations. Funding is typically disbursed only after project completion, requiring households to pre-finance large expenses (Laskowski et al., 2024). This remains a substantial barrier for many owner-occupiers, particularly pensioners, single-parent households, or others with limited liquidity (Schumacher et al., 2025). Beyond subsidies, energy service models like Heat-as-a-Service (HaaS) provide an alternative to overcome high initial investment barriers. Piloted by energy providers and municipal utilities, HaaS allows homeowners to adopt heat pumps without substantial

upfront payments. Instead, users pay a regular fee covering installation, maintenance, and sometimes energy consumption. This model helps overcome liquidity constraints and mitigates technology risks for households, while simultaneously fostering new, service-oriented business models (EIC, 2024; EHPA, 2024).

Targeted fiscal and regulatory tools are essential to realign cost structures in favour of clean heating technologies. Current regulatory frameworks disproportionately favour incumbent fossil fuel systems, placing electrification at a disadvantage. For example, the tax and levy system benefits gas relative to electricity (IEA, 2022; Lowes et al., 2024). Fiscal reforms that reduce charges on electricity while increasing those on fossil fuels can enhance the operational expenditure of heat pumps. Phasing out environmentally harmful subsidies further helps establish a level playing field and generates revenue to support the energy transition (Rosenow et al., 2022).

Beyond financial profitability concerns, real-world implementation barriers must be addressed, including the complexity of the funding landscape, limited access to information, and shortages of skilled labour. One-stop shops, mandated by the EU Energy Performance of Buildings Directive, offer a promising solution by simplifying processes for private homeowners. These platforms provide technical assistance and facilitate coordination among homeowners, administrative bodies, financial stakeholders, SMEs and microenterprises (European Union, 2024). Establishing a nationwide network to support homeowners from consultation to implementation and connect them with qualified service providers is critical (Thomas et al., 2024). Meeting the growing demand for heat pumps requires expanding installer capacity. Labour shortages, particularly for installation and deep retrofitting, present a significant bottleneck. Industry estimates indicate a need for around 60,000 additional installers by 2030 (ZDH, 2023). Programmes like the Federal Heat Pump Support Programme (BAW) fund specialist training to support consultation, planning, installation, and commissioning (BAFA, n.d.). Equally important is simplifying and standardising curricula to ensure consistent skills across the sector (BMWK, 2023; Öko-Institut, Fraunhofer ISE, 2022).

Finally, deeper-rooted barriers such as risk aversion among property owners, limited awareness and acceptance of products and technologies, and short-term planning horizons persist. Households often reference peer behaviour (Stieß et al., 2010; Mjekic et al. 2022; Schleich et al., 2021). Policy tools like information-sharing platforms, showcasing climate-friendly peer behaviour in investment decisions through campaigns help build trust and motivate action (Öko-Institut, Fraunhofer ISE, 2022; Mjekic et al. 2022, Stieß, Dunkelberg, 2013). Addressing risk aversion requires stable, long-term policy frameworks. As politicised debates around the GEG have demonstrated, shifting political signals cause uncertainty and market distortions (Financial Times, 2025). Robust regulatory frameworks such as the GEG and municipal heat planning enable long-term certainty, and participation in local coordination platforms is key for aligning stakeholders, improving technology acceptance (EIC, 2024; Luderer et al., 2025).

5. Conclusion

As this country brief has shown, the challenge of mobilising private finance for Germany's heating transition goes far beyond improving access to capital. Specific barriers to investments in heat pumps include high upfront costs, uncertainty over long-term operating expenses, regulatory complexity, skilled labour shortages, short-term planning horizons, and risk aversion among others.

Moreover, stakeholders across the heating value chain – private homeowners, housing companies, energy service providers and municipal utilities – each face a unique set of investment barriers to heat pump uptake in the residential sector. As such, no single approach will suffice for the task.

For private homeowners, financial profitability concerns remain a key barrier. Beyond costs, implementation challenges persist, such as a fragmented funding landscape, a lack of information, and skilled labour shortages. Deeper-rooted barriers – including risk aversion, limited awareness, and short planning horizons – further discourage heat pump adoption among this stakeholder group.

Housing companies are less affected by information deficits, but face tightened financing conditions, regulatory uncertainty, and ownership-specific value orientations. Municipal utilities must develop new business models to compensate for sharp revenue declines in the gas business. Energy service providers, meanwhile, operate within regulatory frameworks that favour incumbent fossil systems — for example through tax and levy structures.

Overcoming these challenges requires targeted public policy responses based on a technology- and stakeholder-specific strategy and a systemic approach, addressing financial profitability concerns, real-economy implementation constraints, and deeper-rooted barriers.

To facilitate such targeted responses, **ZOE Institute's Private Finance Toolbox offers a systemic framework that links investment barriers to corresponding policy tools.**

This country brief illustrates how this approach can be applied to private homeowners – the group with the highest investment needs and largest emission reduction potential. But the methodology holds broader relevance. It lays the foundation for designing policy mixes that are context-sensitive, impact-oriented, and capable of accelerating deployment at scale.

Importantly, this is not a one-size-fits-all roadmap but a starting point. Policymakers, financial actors, and implementation partners are encouraged to use it as the basis for co-creating policy responses with stakeholders on the ground. Such a participatory process is essential to ensuring that interventions are not only technically sound, but also practically feasible and socially accepted.

In practice, this means:

- Diagnosing investment barriers through a technology- and stakeholder-specific lens
- Applying the Private Finance Toolbox framework to identify suitable policy tools
- Collaborating with stakeholders from all groups relevant to the heating transition to co-create effective and just solutions.

By adopting this differentiated and systemic approach, decision-makers can unlock the full potential of private capital – and accelerate Germany's heating transition in line with its climate, socioeconomic and energy security goals.

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Annex

Investment barriers	
High upfront investment costs	High upfront investment costs when switching to green technologies
	High upfront investment costs for energy-efficient building renovations and heating system conversions
Lack of access to capital	No access to large volumes of capital
	Weakened financing access due to debt-heavy balance sheets
	Inequitable access to funding between high- and low-income households; Insufficient access to affordable financing
	Economic burden on vulnerable or low-income households
	Deteriorating credit conditions
	Insufficient access to loans due to low credit rating
	Homes in less attractive locations have lower market value, requiring higher equity contributions for renovations or energy upgrades
	Financial situation of municipalities in general, negatively affecting utilities
	Cross-financing of other public tasks of the municipality
Uncertain return on investment	Profitability concerns
	Initially unprofitable investment in heating networks
	Insufficient investment profitability due to current energy price ratios
	Uncertain returns on investment for renovations or electrification
	Uncertainty about cost-saving effects through energy efficiency measures
	Volatile demand
Uncertain operational expenditures	Uncertainty around future energy prices
	Misaligned or inadequate energy price signals
	Uncertainty from volatile energy prices
	Uncertain electricity price trends
Lack of long-term policy certainty	Unclear or shifting eligibility for funding programs
	Lack of long-term regulatory certainty on carbon pricing or fossil fuel phase-out
Lack of coordination	Coherent and coordinated approach across different levels of government and across policy areas including energy, climate, housing and finance
	Limited integration with urban planning and social housing strategies
Unfavourable regulatory environment for new technologies and services	Existing regulation protects incumbent utility business models, discouraging innovation or green investment
	Regulation tailored to established players creates market entry disadvantages (kept distinct for emphasis)
	Complexity of funding applications
	Bureaucratic obstacles (e.g. sound insulation and fire protection requirements)

Bureaucratic obstacles	Bureaucratic obstacles (e.g. limited transfer of subsidies to end customers; regulation tailored to established companies, e.g. EnWG)
	Complexity or bureaucracy of energy renovation projects
	Slow permitting processes
	Slow or uncertain permitting and approval processes
	Absence of performance standards or enforcement
	Fragmented or overly complex subsidy landscape
Short-term return expectations	Pressure from shareholders or investors prioritizing short-term financial performance over sustainability
	Rapid return expectations of investors
	High and short-term return expectations (in the case of listed companies)
	Short-term view on the investment
Complex retrofitting	Mismatch between building stock and technology requirements
	Complexity associated with multi-occupancy buildings
	Limited availability of heat pump technology in multifamily buildings due to underinvestment in R&D
Shortage of skilled installers and advisory professionals	Shortage of skilled installers and advisory professionals
Lack of information and advisory services	Insufficient information and counselling services
	Lack of information among homeowners about technologies and funding opportunities
Information diffusion and disinformation in the public debate	Information diffusion and disinformation in the public debate
Lack of information and advisory services	Insufficient information and counselling services
	Lack of information among homeowners about technologies and funding opportunities
Information asymmetries	Information asymmetries
Split incentives dilemma	Landlord-tenant dilemma
	Split incentives in multi-family buildings & owners associations
	Lack of coordination and conflicting interest among property management, tenants and investors
Limited product and technology awareness and acceptance	Reluctance to adopt new technologies
	Cultural bias toward proven (fossil) technologies
	Lack of market confidence in new technologies
	Low public consumer acceptance, awareness and confidence
Perceived complexity of funding applications and bureaucracy of energy renovation projects	Perceived complexity of funding applications
	Perceived complexity or bureaucracy of energy renovation projects
Perceived lack of information and advisory services	Perceived lack of information and counselling services
	Perceived lack of information among homeowners about technologies and funding opportunities
Risk aversion among property owners	Risk aversion among property owners
Short-term planning horizons	Short-termism in planning horizons
	Aversion to loans with long time horizons

ZOE Institute for Future-Fit Economies is a non-profit and independent think & do tank. We are dedicated to research for a future-fit economy. At the interface of politics, science and civil society, we develop trend-setting impulses for the fundamental questions of

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