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Sustainable Construction in Germany Opportunities for Dutch Companies

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SECTOR STUDY 2025

Sustainable Construction in Germany
Opportunities for Dutch Companies

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Rijksdienst voor Ondernemend Nederland

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Introduction

While the Netherlands stands as a global leader in sustainable and circular construction practices, Germany is currently accelerating its transition in this sector, driven by ambitious European climate goals, escalating energy prices, and rising construction costs. The interest in climate- and energy-neutral construction in Germany has noticeably increased, with themes such as renewable heating, life-cycle emissions or digitalisation being addressed in an increasingly integrated manner. This transformation is creating a fundamentally different market environment than just a few years ago, presenting significant opportunities for Dutch companies to leverage their expertise in sustainable construction solutions.

Since 2021, Germany has implemented comprehensive regulatory reforms that directly impact market opportunities. New legislation, such as the Heat Planning Act (*Wärmeplanungsgesetz, WPG*) and extensive amendments to the Building Energy Act (*Gebäudeenergiegesetz, GEG*), now mandates progressive transitions towards renewable heating to accelerate the decarbonisation of the nation's ageing building stock. This legislative push is backed by substantial financial commitment, with expanded Federal Funding for Efficient Buildings (*Bundesförderung für Effiziente Gebäude, BEG*) programmes and the introduction of new quality seals for sustainability. In addition, the new German government is setting new priorities on infrastructure investments, digitalisation and reducing administrative burden, to revitalise the German economy and address housing shortage. These developments are fundamentally reshaping investment decisions and creating new demands.

This study is designed to equip Dutch but also other foreign companies with the essential market intelligence needed to understand and act upon the opportunities within Germany's evolving sustainable construction landscape. The following chapter summarizes key actionable recommendations for market entry.

To elaborate these recommendations, the report first provides an overview of the status quo of the German building stock before analysing the regulatory frameworks its latest evolutions, highlighting new policy priorities and challenges to be addressed. The study then analyses the construction sector as a whole, mapping its structure, key players, and the technologies showcasing the fastest market growth. Finally, it identifies and examines key market trends which are likely to drive the future evolutions of the industry, including sustainable heating, digitalisation and circular construction.

The study is an update of a previous report published by RVO in 2021. It was carried out over the course of the Summer 2025, alongisde a Webinar and a Fact-Finding Mission organised by NBSO in Hamburg under the title "*Duurzaam Bouwen in Duitsland*". Questions from participating Dutch companies were collected to inform and adjust the scope of the study. In addition, three interviews were carried out with sustainable construction experts from the German Energy Agency *(Deutsche Energie-Agentur, dena)* and the German Federal Construction Business Association (*Hauptverband der Deutschen Bauindustrie, HDB*). These interviews were used to validate the identified challenges, policy priorities, market trends and opportunities from the point of view of public authorities and industry stakeholders.

With the new-formed Government under Chancelor Merz, new policy priorities were formulated yet not finally transposed into concrete policy measures. The study draws its findings from currently available strategy papers and policy drafts put forward by the new government. The situation however remains fluid and several of the proposed measures still have to undergo parliamentary debate and approval.

Recommendations for Dutch companies

This chapter summarizes the key findings from this report in the form of concrete recommendations for Dutch companies seeking to enter or expand in the German sustainable construction sector:

STRONG REGIONAL CONTRASTS

German federal states (*Länder*) differ strongly in economic size and dynamism in the construction sector. Federal policy objectives are applied through state laws with varying levels of ambition. **Baden-Württemberg**, among the largest and most dynamic states, has been a pioneer on climate policies and sustainable construction, offering a business-friendly environment for innovative. It often sets a reference for future federal policy measures. The city-states of **Hamburg** and **Berlin** are also frontrunners, with ambitious sustainability policies and a very dynamic construction sector supported by an innovative start-up scene. **Bavaria**, **Nord-Rhein Westfalen**, **Niedersachsen**, although less advanced in terms of sustainable construction practices, represent sizable construction markets with an urgent need for housing construction and renovation. → *See Sections 1 and 3.2.*

Figure 1: German regions with the fastest developing sustainable construction sectors

HOUSING CONSTRUCTION TURBO

The market for housing construction is expected to grow rapidly in the coming years. Germany is facing a **general housing shortage**, especially in urban areas, while construction and renovation activities have been slowing down for years. Up to 350 thousand new housing units are needed each year. To address the housing crisis, the Government has launched the **"Construction Turbo"**, a package of measures to reduce bureaucracy, speed up housing permits and increase flexibility of architects and builders. The BEG funding programme provides significant subsidies for highly energy-efficient homes with **extra funding for whole-life cycle approaches**. → *See Sections 1 and 2.2.*

RENOVATION OF MUNICIPAL BUILDINGS

The renovation of municipal buildings is expected to be an area of growth in the coming years. Municipal buildings, such as **schools, kindergarten, administrative buildings or sport and cultural infrastructures**, have generally not been maintained enough and require urgent attention. In addition, the EU sets ambitious energy-efficiency and renovation targets for public buildings, most of which are in the hands of municipalities in Germany. A **large public infrastructure investment package** (500 billion EUR) has been approved in March 2025, which will partly support municipalities in speeding up renovations. Depending on the state, public buildings can be subject to strict sustainability criteria, including on whole-life cycle approaches. → *See Sections 2.1 and 2.5.*

PUBLIC INFRASTRUCTURE UPGRADES

As part of the public infrastructure investment package approved in March 2025, the Government aims to **upgrade public infrastructure such as railways, highways, digital infrastructure and power distribution**, to improve German competitiveness. Another significant share of the investment package (100 billion EUR) is dedicated to the **upgrade of military capabilities, including military buildings and infrastructure**. Although, these sectors are subject to lower sustainability requirements, they could offer a **sizable market for alternative and recycled mineral construction materials**. In addition, federal construction projects must integrate digital Building Information Modelling in their processes, increasing the market for new digital planning tools. → *See Sections 2.1 and 2.5.*

COMPLEX PRODUCT CERTIFICATION

The access to the German market for innovative products and construction materials currently remains difficult. All products require a certification in accordance with EU and national standards to be able to distribute new products in Germany. **DIBt, the German Institute for Construction Technology**, oversees the entire certification process, delivering both national technical approvals (abZ) and European Technical Assessments (ETA). While other countries allow products based on technology readiness levels (TRL) and prototyping, individual approvals in Germany are only possible with additional bureaucratic effort. The approval **process takes on average 6 to 12 months**, while the costs vary strongly depending on the types of testing required. Although the new Government has pledged to reduce bureaucracy for companies, this process is not expected to change. → *See Sections 3.1 and 3.4.*

SLOW UPTAKE OF CIRCULAR MATERIALS

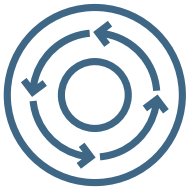
Germany is less advanced than the Netherlands in the transition to a circular economy. Whole-life cycle assessments, called **Ökobilanz**, are not the norm yet, while **whole-life carbon emission thresholds** only apply for certain sustainability subsidies (BEG NH) assessments. Therefore, the market demand for circular and innovative low-carbon building materials is only growing slowly, promoted by a few start-ups such as **CONCULAR** in Berlin. Germany has not yet rolled-out **Digital Product Passports** at scale and will likely only do so as per EU deadlines. In addition, life-cycle assessment methodologies and reference databases currently differ between EU countries. This means that foreign circular and low-carbon products might face difficulties proving their advantage on the German market, unless they integrate the German database **ÖKOBAUDAT**. The **EU plans to harmonise methodologies** among EU countries in the coming years, allowing for better market interoperability. → *See Sections 3.3 and 4.3.*

DIGITAL PRODUCTS AND SERVICES

In contrast, **innovative digital products and services for businesses are subject to less stringent requirements and certification processes** to access the German market. There is generally a market gap in Germany for innovative digital solutions, processes and services in the buildings and construction sector. Digitalisation has been lagging in Germany, especially among construction sector stakeholders, and it has now become one of the priorities of the new Government. **2025 marks an acceleration of the digitalisation**, with the BIM obligation for all federal buildings, the EMS obligation for large buildings and the mandatory roll-out of Smart Meters starting for all non-residential buildings. Yet, the integration of Building Information Modelling (BIM) and Energy Management Systems (EMS) are still often perceived as an additional burden in already complex construction and operation processes. The rise of **AI-based solutions may be an opportunity to simplify and mainstream the use of digital tools**, supporting data collection, data cleaning and analysis, as well as easing interface issues between different stakeholders. S**mart grid management is also** becoming a central topic, yet **simple "plug-and-play" digital solutions are missing to scale demand-side flexibility across buildings**. There is a **need for AI-based energy management tools** to use the potential of installed smart meters in order to optimise energy consumption, save cost and improve grid stability. → *See Sections 3.5.3 and 4.2.*

DEEP AND SERIAL RENOVATION

Existing building renovation is a priority in Germany to achieve its 2030 and 2045. Yet, **rising costs and labour shortage** are slowing down renovation rates. There is nevertheless a trend towards higher energy-efficiency levels in renovation projects, supported by extensive federal funding. To accelerate renovations and reduce costs, there is a growing market for serial renovation using prefabricated modular components, with **only a few German start-ups** (such as ECOWORKS and MODUCON) active in this sector, despite funding and technical support from the German Energy Agency (*dena*) under the **Energiesprong DE** initiative. Larger German construction companies are showing limited interest due to the scale issues, as they focus less on renovations and small-scale projects. **This is an opportunity for Dutch companies with a long track record to participate in the German expanding serial renovation market while competition is low and demand is high.** → *See Section 4.4.*



CIRCULAR ECONOMY SOLUTIONS

Despite market access challenges for construction materials and products, there is a **growing interest for circular approaches in the construction sector**, with **only few German start-ups** (such as CONCULAR) active and large construction companies and digital service providers still largely absent from this field. The German construction sector lacks the guidance, know-how and digital solutions to enable circular approaches at scale. This **is an opportunity for Dutch companies developing digital solutions for the circular economy.** → *See Section 4.3.*

NATURE-BASED RESILIENCE

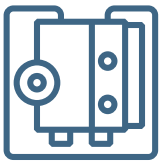
Climate resilience and adaptation, including **heat protection, flood protection and rainwater management**, are increasingly incorporated in all new construction and urban development projects. Beside Hamburg, which is a frontrunner in this field, many **German states lack experience** and could benefit from the know-how and services of foreign companies that have track record in nature-based solutions for urban flood protection and rain-water management. → *See Section 4.5.*

TIMBER CONSTRUCTION

Crosslaminated Timber (CLT) construction is increasingly considered as an important sustainable alternative to steel-reinforced concrete in larger buildings. This trend is supported by first "flagship" projects, such as the Roots Hamburg high-rise tower finalised in 2024. Sector-driven initiatives such as the **Holzbau Akademie** provide knowledge, technical support and training for practitioners to accelerate the uptake of these techniques in larger projects. This is an opportunity for foreign companies, as large German construction companies have not yet invested this field. → *See Section 4.3.*

LOW-CARBON CONSTRUCTION PROCESSES

As attention for whole-life cycle assessment is growing, the **impact of the construction process is increasingly scrutinised**. Although environmental standards and certification criteria for construction sites have existed for a long time, carbon emissions from that phase were rarely considered. **DGNB Baustelle** introduces a first rating system for construction sites and includes a focus on resource protection and emissions reduction. This is expected to encourage **demand for low-carbon construction tools and processes** in the coming years. → *See Sections 4.3 and 3.3.*



RENEWABLE HEATING

Since the update of the German Building Energy Act (*GEG*) in 2023, there has been a **dramatic increase in the market for small-scale on-site renewable** energy production, such as **heat-pumps and PV**. This also opens a market for supporting systems such as battery storage solutions or smart energy management systems for households. At the urban scale, municipalities are obligated to develop and implement a **Municipal Heat Plan until 2028**, which will lead to increased demand for renewable heating systems at individual home or neighbourhood in the coming years. → *See Sections 3.5.1 and 4.1.*

SUPPORT AND COMPETENCE CENTERS

The **German Energy Agency (*dena*)** is a central supporting actor in the sustainable construction sector in Germany. Through multiple knowledge hubs, competence centers and initiatives, dena monitors sector progress, disseminates knowledge through studies and best practices, provides capacity building and trainings for practitioners, promotes networking and provides funding for pilot projects. The **German Energy Efficiency Business Association (*DENEFF*)** also provides capacity building and support new sustainable market actors through networking and matchmaking. Other specific knowledge and networking platforms are provided by NGOs and business associations such as **BAUNETZ** or **HOLZBAU AKADEMIE**. → *See Sections 2.4.3 and 3.4.*

1 Status Quo of the building stock in Germany

The German building stock consists of 22.2 million buildings, out of which approx. 19.5 million[1] (88%) are residential and approximately 2.7 million (12%) are non-residential buildings (see Figure 1)[2]. Together, they account for approximately 5 billion m^2 of net floor area. Residential buildings make up the great majority of this total net floor area, about 73%, and are responsible for 64% of the overall building energy consumption[3]. One reason for the considerable role residential buildings play in this regard is that most of them are single-family or dual-family houses (83%). Only a minority of less than a fifth are multi-family houses (17%)[4]. In terms of floor space, single-family and dual-family houses account for approx. 60% while multi-family houses account for approx. 40%[5].

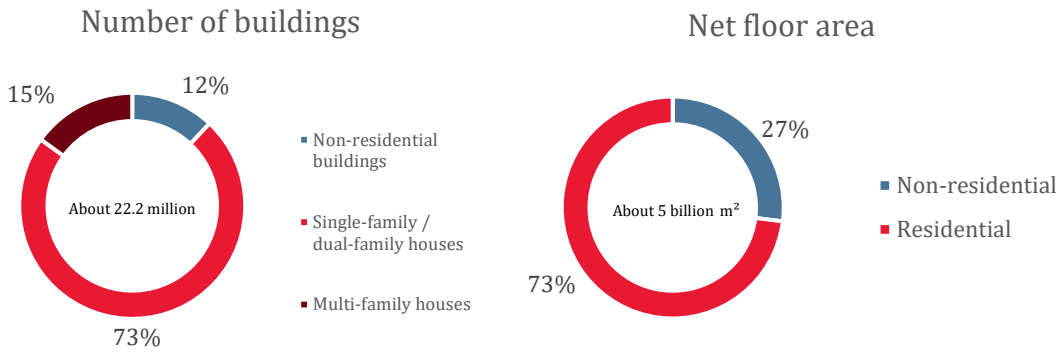


Figure 2: Number of buildings and total net floor area by building type. (Source: estimate based on multiple data sources)

Out of the total number of heated non-residential buildings (around 1,98 million[6]) production, workshop, storage or operational buildings make up the largest share (see Figure 2). Office, administrative and government buildings make up the second largest share, followed by accommodation or lodging, gastronomy or catering and then trade buildings.

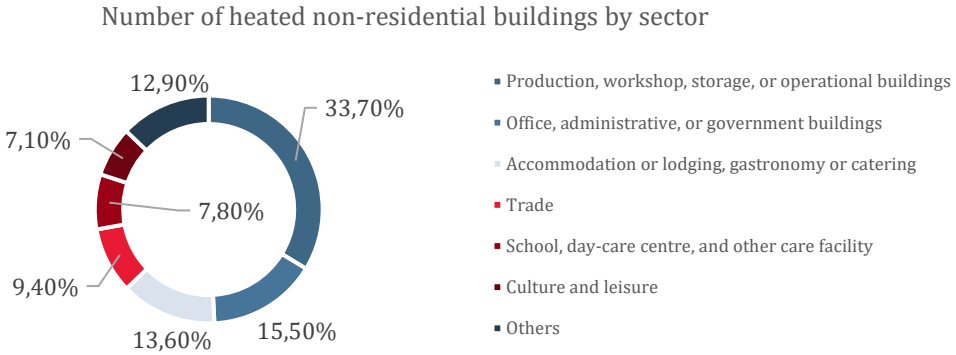


Figure 3: Number of heated non-residential buildings by sector (source: dena, 2023)

[1] dena-GEBÄUDEREPORT 2024
[2] For residential buildings, there is an official published figure while for non-residential buildings there is no such official statistic.
[3] dena-GEBÄUDEREPORT 2023
[4] Gebäudereport 2025 – Zahlen, Daten, Fakten zum Klimaschutz im Gebäudebestand
[5] dena-GEBÄUDEREPORT 2024
[6] dena-GEBÄUDEREPORT 2023

Heating and cooling account for approximately half of the total final energy consumption in Germany. The largest share consists of space heating and warm water supply (32.3%), whereas process heat and process cooling, which is mostly used in the industrial sector, account for 22.5% (see **Fehler! Verweisquelle konnte nicht gefunden werden.**). Air conditions or space cooling currently represents a negligeable part of the national energy consumption at about 0.6%. Therefore, transitioning to a decarbonised supply of heating and cooling is a policy priority.

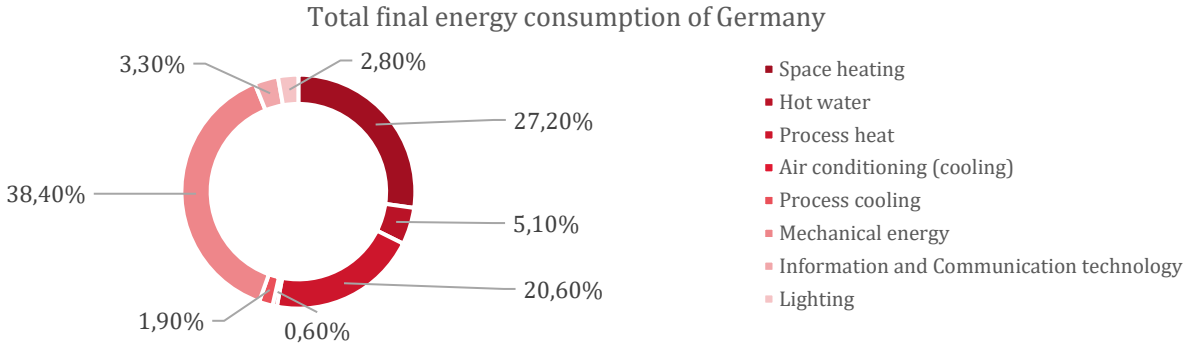


Figure 4: Total final energy consumption of Germany (2023)

Switching to renewable forms of space and water heating generally also requires large-scale renovation efforts, as existing buildings on average still have a high demand for heat. Approx. 4 Mio. buildings have the worst energy efficiency classes (F, G, H). The energy efficiency scale for residential homes in Germany ranges from A+ (very energy efficient) to H (not energy efficient). Moreover, 79% of residential buildings are still heated with oil and gas, while renewable energies currently only accounts for 10% of energy supply in the existing building stock (see Figure 3). New buildings, however, are increasingly climate-friendly – in 2023, 65% of new residential buildings were equipped with heat pumps.[7] (see Figure 3)

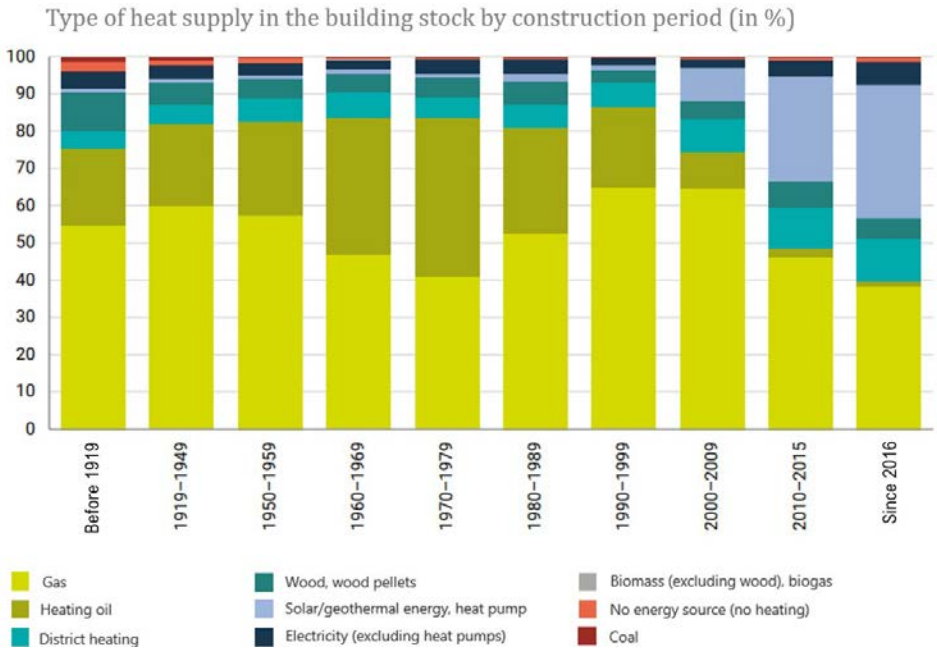


Figure 5: Typ of heat supply in the building stock by construction period (in %) (Source: dena, 2024)

One crucial issue, both in Germany as well as in other European countries, is the age of the residential building stock, as seen in Figure 3. Even though most buildings were built after the war, nearly 3/4 of the residential building stock were built before 1979 – before the first heat insulation ordinance came into force.[8] This substantial share

[7] Gebäudereport 2025 – Zahlen, Daten, Fakten zum Klimaschutz im Gebäudebestand
[8] UBA 2019: Wohnen und Sanieren (p. 54) Hintergrundbericht: Wohnen und Sanieren | Umweltbundesamt

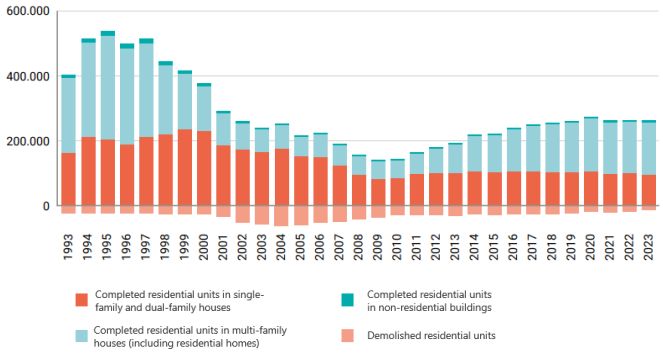
of the German residential building stock therefore still holds significant potential for energy savings and the implementation of energy-efficient and low-carbon technologies.

The German federal government is aware of this potential and has recognised the need for widespread energy renovations to achieve national 2030 and 2045 climate targets, in line with the EU's "´Fit for 55%" Policy Package, targeting a renovation rate of 2% per year (See Chapter 2). However, reality is lagging far behind: in 2024, the renovation rate was estimated at 0,69%, in slight decrease since a peak in 2022 at 0,88%.

Despite low renovation rates, there is a positive trend towards higher efficiency levels when constructing or renovating a building. KfW and BAFA (Germany's federal funding providers) have been reporting since 2021 a steady increase in the number of funding applications for the highest energy-efficiency standard *EffizienzHaus40* (EH40). EH40 describes a building that use 60% less energy than its reference building defined as per the European EPBD. For comparison, the EU's Nearly Zero Energy Building (NZEB) standard used to be an *EffizienzHaus70* (i.e. 30% less energy consumption than the reference building) and was lowered in 2024 to an *EffizienzHaus55* standard (i.e. 45% less energy consumption).

Nevertheless, Germany continues to experience a decline in new construction, both in the residential and the non-residential sectors (see Figure 4). In 2025, only 200,000 new residential units are expected to be completed.[9] Yet, to address the housing crisis, Germany needs approximately 320,000 new housing units per year until 2030.[10]

Evolution of residential new construction & demolition (1993-2023)



Evolution of non-residential new construction & demolition (1993-2023)

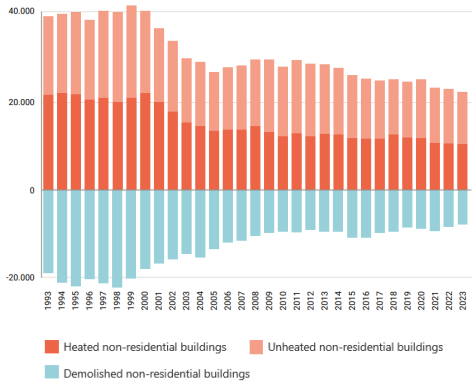


Figure 6: Evolution of residential and non-residential new construction and demolition (1993-2023)

This slow-down in construction and renovation activities at national level can be attributed to the interplay of multiple factors that currently throttle the Germany economy at large. In particular, they include the aftermath of the COVID19-pandemic, such as an inflation in construction material prices, the dramatic increase in energy prices induced by the war in Ukraine, Germany's structural labour shortage, as well as the inflating administrative burden induced by complex reporting and certification processes, and the general political uncertainty in Germany since the end of the Chancellor Merkel's last term, which may discourage building owners to invest as legal requirements are put to debate.

However, these constraints also allow for new opportunities for innovative technical solutions and business models. What is more, the newly formed government coalition under Chancelor Merz, intends to address several of these constraints through a series of measures to revive the economy at large[11], and specifically the construction sector, while reducing the administrative burden on households and companies induced by prior sustainability obligations perceived as overly ambitious. In fact, the Federal Government will submit a new "Construction Turbo" ("Bau-Turbo") housing bill to the Bundestag in October 2025. We explore this evolving policy framework and its effect on market trends and opportunities in the construction sector in the following chapters.

[9] Significantly Fewer New Dwellings in Germany by 2025 | Press release | ifo Institute
[10] Zentrale Ergebnisse der BBSR-Wohnungsbedarfsprognose: Neubaubedarfe in Deutschland bis 2030
[11] Koalitionsvertrag 2025 | Bundesregierung

2 Regulatory Framework

This chapter provides an overview of the most important policy objectives of the German government as well as its tools to achieve those goals: regulations and subsidies. Many of these measures are rooted in Germany's climate neutrality target by 2045, and the overarching EU climate objectives and specific obligations applying to all Member States.

2.1 Germany's climate objectives

Following a landmark ruling of the German Federal Constitutional Court in April 2021, the federal government increased its climate goals. The new goals foresee to reduce carbon emissions by **65% until 2030** (compared to 1990), **by 88% until 2040 and to decarbonise all sectors of the economy until 2045.** The Federal Climate Protection Act (KSG) of 2019 first established specific sectoral aims, which were adapted in May 2021 in accordance with the new climate goals. It is now mandated that the GHG emissions of the building sector be reduced from 118 million tons CO2-eq in 2020 to 67 million tons CO2-eq in 2030 – a **reduction of 43% within ten years.** Despite this target, emissions in the buildings sector have hardly decreased over recent years.[12]

In addition, across all sectors of the economy – including industry, transport, buildings, and others – Germany has set a target under the Energy Efficiency Act (EnEfG) to **reduce primary energy consumption by 39.3%** and **final energy consumption by at least 26.5% by 2030** compared to 2008 level. In recent years, primary energy consumption has fallen significantly, mainly due to the transformation of the electricity supply. However, final energy consumption in buildings, industry, and transport has hardly decreased, and the target is at risk of being missed.[13]

The **new federal government of Chancellor Merz**, which took office in April 2025, marks a notable evolution in policy priorities. The previous administration's strong focus on energy efficiency, renewables, and ambitious national targets, often overreaching EU requirements, has shifted. The new government has announced wanting to **reduce regulatory pressure** and seek strict alignment of climate goals and sustainability regulations with the **EU's minimum requirements**. Tere is also a strong push for **accelerated digitalization and decreased bureaucracy**, marked by the creation of a new Federal Ministry for Digital Transformation and Government. Fiscally, the new government aims to **lower electricity and corporate taxes** to provide incentives for investment and modernization, moving away from the high energy costs of the previous era.

In October 2025, the Federal Minister for Economic Affairs and Energy (BMWE) published its Monitoring Report on the Energy Transition[14] accompanied by **10 business- and competition-friendly key measures for climate neutrality**[15]. BMWE highlights the necessity to protect the **German competitiveness, supply security and ensure cost efficiency**, indicating that previous policy objectives where not realistic in regard to the payment capacity of industry, businesses and households. According to BMWE, the deployment of renewables along is not sufficient for a reliable and affordable energy supply, therefore significant investment in infrastructure such as storage capacities and new "hydrogen-ready" gas power plants will be needed. It allows recognizes that the large number of legal norms and lack of clarity hinder efficient and innovation-friendly energy policy, and emphasizes the importance of maintaining a **"technology-open" or "technology-neutral" approach**. Although the 10 key measures are framed broadly, they set the tone and indicate the direction of upcoming policies under the new coalition government. Prioritised approaches include the development of carbon capture technologies, advancing the flexibility and digitalisation of the electricity grid, as well as promoting the hydrogen ramp-up.

[12] Buildings Sector: How the Transformation can succeed
[13] Studie: Deutschland verfehlt 2030-Ziele für Energieeffizienz
[14] BMWE - Monitoring the Energy Transition
[15] BMWE - 10 Schlüsselmaßnahmen zum Monitoringbericht

2.2 Policy framework for the construction sector

Sustainability policies in the German construction sector encompass environmental, economic, and social dimensions. German guidelines place particular emphasis on minimizing energy consumption and greenhouse gas emissions during a building's operational phase, using resources efficiently, ensuring healthy and comfortable indoor environments, and promoting cost-effectiveness as well as resilience to climate change. These standards are closely aligned with, and often directly implement, EU directives – most notably the Energy Performance of Buildings Directive (EPBD) and the Energy Efficiency Directive (EED). Additionally, Germany is characterized by a longstanding focus on environmentally friendly materials, building components and appliances, with ambitious public procurement guidelines, and well-established environmental labelling systems such as Blauer Engel[16]. However, currently the focus on whole-life cycle carbon emissions and embodied emissions of building materials is lagging behind and will likely only be addressed at scale through gradually increasing EU-requirements.

While national legislation and EU directives provide a consistent baseline for sustainability across Germany, levels of ambition and implementation can vary strongly by region. Germany is a federal country, where each state-level government sets their own sustainability regulations in accordance with national and European frameworks. Some regions, such as Baden-Württemberg, and the city-states of Hamburg and Berlin are recognized as frontrunners, often exceeding the national status-quo and serving as "testing ground" for future national policies. For example, the national Heat Planning Act (*Wärmeplanungsgesetz, WPG*) was largely inspired by an earlier obligation developed by the State of Baden-Württemberg for its municipalities. Overall, federal states distinguish themselves through local funding initiatives adding to national funding programs, pilot projects, and stricter sustainability policies and building codes, higher rates of building certification, and of pioneering sustainable construction methods through local innovative start-ups.

In June 2021, Germany's "*Sofortprogramm 2022*"[17] proposed enhanced climate targets for buildings, including €2.5 billion additional BEG funding for 2022 and €2 billion for 2023, alongside tighter efficiency standards. The programme's key proposal made EH 55 (KfW-55) the minimum standard for new buildings from 2023—implemented early when KfW-55 funding ended in January 2022 due to high demand, becoming the legal baseline by January 2023. While long-term plans targeted EH 40 from 2025, construction sector challenges (high costs, interest rates) led to postponement, though EH 40 remains in the long-term strategy. For refurbishments, the programme proposed phasing out BEG subsidies for less ambitious KfW-100 and KfW-85 levels, focusing exclusively on deeper renovations (KfW-70 or better). These changes were gradually implemented through subsequent BEG reforms, eliminating subsidies for less ambitious refurbishments whilst reorienting funding towards high-efficiency measures, serial renovation, and "worst-performing building" bonuses.

Despite initial uncertainty around formal adoption before September 2021 elections, core elements were implemented in the following legislative period through BEG scheme updates, new building subsidy reforms (including the "*Klimafreundlicher Neubau*" programme), and GEG amendments mandating 65% renewable heating from 2024. Funding policy has undergone several short-term adjustments and temporary pauses due to high demand and evolving market conditions. Nevertheless, the *Sofortprogramm* remains a crucial guideline for German building-sector decarbonisation, supporting increased funding, ambitious building standards, and regulatory alignment with the 2045 climate neutrality target, albeit with adaptations to dynamic policy contexts.

To counteract the slowdown in construction activity and address the housing shortage, the federal government under Chancelor Merz introduced the "Construction Turbo" (*Baut Turbo*) Housing Bill in October 2025. This legislative package aims to accelerate residential construction by significantly streamlining planning and approval processes. A key proposal is a new temporary clause in the Building Code, expiring at the end of 2030, which would permit municipalities to approve new housing projects within just two months, thereby bypassing lengthy development plan procedures. This is complemented by measures to increase flexibility, making it easier to add new living space through extensions, attic conversions, and building on back-lots. This notably enables the conversion of existing buildings such as office buildings being turned into residential units, which is increasingly

[16] Blauer Engel | Das deutsche Umweltzeichen
[17] 220713-bmwk-bmwsb-sofortprogramm.pdf

being considered as part of the solution to meet Germany's housing targets. The bill would also make it easier to construct new residential buildings in unplanned inner-city areas and relax noise protection regulations to enable residential construction near commercial areas.

While the federal government argues this regulatory simplification is essential to quickly create much-needed living space, the proposal is drawing significant criticism during the ongoing legislative review. Construction sector staleholders contend that the bill does not address more fundamental obstacles like high construction costs and financing, while architects' associations and environmental groups warn it could incentivise urban sprawl and the construction of single-family homes rather than dense, sustainable housing. Opposition parties have voiced concerns that it may fuel land speculation and does not prioritise the renovation of existing vacant buildings over new construction.

2.3 Regulations

This chapter presents the most important pieces of legislation that influence currents trends in the German construction market.

2.3.1 Gebäudeenergiegesetz (Building Energy Act, GEG)

After long deliberation, Germany adopted the Building Energy Act (*Gebäudeenergiegesetz, GEG*) on 1st of November 2020, thereby transposing the European Energy Performance of Buildings Directive (EPBD) into German law. It unifies the previous Energy Conservation Act (*Energieeffizienzgesetz, EnEG*), the Energy Conservation Ordinance (*Energieeinsparverordnung, EnEV*) and the Renewable Energies Heat Act (*Erneuerbare-Energien-Wärmegesetz, EEWärmeG*) into one law. This important regulation is giving planning and investment security to both building developers and owners, defining a reliable framework to rate the efficiency of buildings. The GEG regulates requirements for newly constructed buildings and existing buildings regarding overall energy-efficiency, building envelope insulation, heat protection, heating and cooling systems, hot water supply, energy performance certificates and room ventilation. Further, it refers to national financial support schemes for the use of renewable energies.

The GEG underwent a comprehensive update which took effect on 1st of January 2024. Below are the most important provisions that affect new and existing buildings[18]:

- From 1 January 2025, all new buildings must comply with the Efficiency House standard 55 (EH55). This means that their primary energy demand must not exceed 55% of the value defined for a reference building in the legislation.

- Since 1 January 2024, only heating systems based on at least 65% renewable energy may be installed in new buildings located within newly developed areas. Various technological solutions are permitted, including connection to a district heating network, electric heat pumps, direct electric heating, hybrid systems (which primarily use renewable energy but may include a share of gas or oil), and solar thermal systems, provided they fully cover the building's heating needs. Under certain conditions, so-called "H2-ready" gas heating systems – capable of being converted to operate entirely on hydrogen – are also allowed.

- Longer transitional periods apply to existing buildings and new buildings constructed on infill sites, i. e. parcels of land within already developed urban or suburban areas that are vacant, underused or otherwise available for new construction. This approach enables better alignment of investment decisions with local heating infrastructure planning. Municipalities across Germany are required to determine, by mid-2028 at the latest (or by mid-2026 for large cities), where district heating or climate-neutral gas networks will be expanded in the coming years (see Chapter 3.2.2).

[18] https://www.gesetze-im-internet.de/geg/GEG.pdf

- For existing buildings, additional options are available, such as biomass heating systems and gas heating systems that can be proven to use at least 65% renewable gases – such as biomethane, biogenic liquefied petroleum gas or hydrogen.

2.3.2 Wärmeplanungsgesetz (Heat Planning Act, WPG)

On 1 January 2024, the Heat Planning Act (WPG) entered into force at the same time as the GEG. The primary aim of the WPG is to make a significant contribution to transforming both the generation and supply of space heating, hot water and process heat towards renewable energy sources, unavoidable waste heat, or a combination of both. The Act also seeks to ensure that heat supply in Germany becomes cost-efficient, sustainable, economical, affordable, resilient and GHG neutral by no later than 2045, while also achieving final energy savings.

Under the WPG, the federal states are required to develop heat plans for their territories according to the provisions of the Act and by the following deadlines:

- By 30 June 2026 for all existing municipal areas with more than 100,000 inhabitants
- By 30 June 2028 for all existing municipal areas with 100,000 inhabitants or fewer

While the creation of heat plans is mandatory, the heat planning process itself – and thus the resulting heat plan – is considered a legally non-binding, strategic plan. A key outcome of the heat planning process will be the division of the planned area into anticipated heat supply zones, such as:

- District heating network areas (local and district heating)
- Hydrogen network areas (H2)
- Areas for decentralised heat supply (primarily heat pumps)
- "Assessment areas"

Being assigned to a particular heat supply zone does not create any obligation to actually use or provide a specific type of heat supply.

The share of heat from renewable energies, unavoidable waste heat, or a combination thereof in district heating networks is to reach a nationwide average of 50% from 2030 onwards. Operators of existing district heating networks will be specifically required to achieve at least 30% renewable energy or unavoidable waste heat by 2030, and at least 80% by 2040. The deadlines for municipal heat planning are linked to the GEG disposition regarding the 65% renewable heating rule, as described above.

2.3.3 CO2 pricing system

Germany introduced a carbon pricing system for heating and transport in 2021, which has increased the cost of fossil-fuel-based energy and incentivised more energy-efficient behaviour. The carbon price was implemented in the form of an emission trading scheme with a fixed CO2 price applying to distributers of oil, gas and other fuels, in effect similar to an additional tax on these energy carriers.

The CO2 pricing system of Germany was officially launched in January 2021, covering the heating and mobility sectors, which are not part of the European Emission Trading System (ETS). It applies a fixed price per tonne of CO2 for the years 2021 to 2025. The price per emission permit started at 25 euros in 2021 and rose incrementally to reach 55 euros in 2025 (see Table 1). Starting in 2026, emission allowances will be auctioned, initially with a minimum price of 55 euros and a maximum price of 65 euros per allowance. From 2027 onwards, the price is formed freely on the market, unless a decision is made in 2025 to continue a cap for 2027 as well. The increased prices for heating started making energy efficiency measures more economically viable.

The revenue generated through the pricing system has been used to increase funding for energy-efficient refurbishment and energy-efficient construction. In addition, some of the income has helped to lower electricity prices and might be used to provide social compensation – such as through the planned "Climate Bonus"

(*Klimageld*) subsidy for households. The introduction of the cap-and-trade system has marked a significant development in the German heating sector. It is accelerating the shift away from oil heating systems and is expected to further reduce the reliance on natural gas in future years, as it signals rising costs for fossil fuels and strengthens the case for renewable heating solutions.

Table 1: Price increase due to CO2-price

	2021	2025	2026
CO2-price (tonne)	**25 €**	**55 €**	**55-65 €**
Natural gas (kWh)	0.5 ct	1 ct	1 – 1.2 ct
Petrol (litre)	6 ct	13 ct	13 – 15.5 ct
Diesel (litre)	7 ct	15 ct	15 – 18 ct
Heating oil (kWh)	0.66 ct	1.46 ct	1.46 – 1.73 ct
Heating oil (litre)	7 ct	15 ct	15 – 18 ct

While the effects of the CO2-price are only moderate in the beginning, a price of around 60€/tonne of CO2, as in 2026, can have considerable impacts on a household's finances. One example of these impacts could be the following: A household with two parents and two children has a daily commute of 20km (eligible for commute subsidies "*Pendlerpauschale*") and 15km drive for private reasons. If the family has an oil heater and a Diesel car, additional costs of about 530€ accrue per year. However, after adjusting for increased commute subsidies and decreased electricity cost, the net effect is about 360€ per year. If the family transitions to a gas heater and an electric vehicle, it will benefit from a total net savings of about 150€ per year. If the family decides to decarbonise their private life as much as possible and transitions to a renewable heating system and an electric vehicle, it will have total net savings of about 220€ per year.

Table 2: Additional monthly cost due to CO2-price of 60€/tonne

Household type	Additional cost (Gross)	Additional cost (Net)
Gas heater & Diesel car	22.21 €	8 €
Oil heater & Diesel car	44.14 €	29.94 €
Gas heater & EV	5.98 €	- 12.28 €
Heat pumps & EV	0 €	- 18.26 €

Roughly half of the final residential electricity price results from government-imposed components, such as the KWKG levy (0.277 ct/kWh in 2025) that promotes the generation of electricity and heat in efficient combined heat and power plants (CHP plants), the offshore grid levy (0.816 ct/kWh) and the new special grid usage surcharge (1.558 ct/kWh). Since 2023, the Renewable Energy Act (*Erneuerbare-Energien-Gesetz, EEG*) surcharge is no longer charged directly to consumers but is financed from the federal budget, and thus no longer increases the end-user electricity price. This shift was made possible in the context of rising CO2 pricing, making electricity-based technologies – such as heat pumps – more competitive with fossil-based alternatives going forward.

2.3.4 Amendment of the Energiewirtschaftsgesetz (*Energy Industry Law, EnWG*)

The government passed an amendment of the energy industry law (*Energiewirtschaftsgesetz, EnWG*) in February 2021. The amendment fulfils obligations of the Clean Energy Package of the EU: It makes it obligatory for electricity suppliers to offer dynamic tariffs, provided that consumers are equipped with a smart meter (see Chapter 3.2.5). Further, it foresees better information for customers about available dynamic tariffs as well as monitoring by the Federal Network Agency (*Bundesnetzagentur*) regarding the effects and market uptake of dynamic tariffs. While the legal framework is in place, the market diffusion of dynamic tariffs remains limited due to the still-ongoing rollout of smart metering systems. This system, once broadly implemented, is expected to support demand-side flexibility – enabling technologies such as heat pumps or electric vehicle charging to better align with real-time electricity prices.

2.3.5 Metering Point Operation Act (*Messstellenbetriebsgesetz, MsbG*)

Following the amendment of the Metering Point Operation Act (MsbG) as part of the Act on the Digitalisation of the Energy Transition (*Gesetz zur Digitalisierung der Energiewende, GDEW*) in 2023, smart metering systems have become legally mandatory for certain buildings since January 2025[19]. The obligation to install an iMSys applies to households with an annual electricity consumption of over 6,000 kWh, to plant operators with an installed capacity of more than 7 kW, as well as to buildings with a heat pump or a charging point for electric cars. These advanced metering devices, when combined with a smart meter gateway and an integrated energy management system, enable integrated smart grid management through demand-side flexibility. Equipped building appliances, on-site renewables, such as PV solar panels, and energy storage systems, such as batteries, can be controlled to automatically respond to requests from the grid operator, by adjusting their electricity consumption or generation in response to price signals or grid needs. These adjustments can be in the form of reducing, shifting, or increasing load over short time windows without affecting the buildings' function and user comfort.

The progressive rollout of smart meters in Germany is expected to be completed by 2032. This is a crucial for Germany's decarbonisation strategy, as it will allow to effectively use a greater share of renewable energy from wind and solar in the national electricity consumption.

2.3.6 Construction Material Act (Bauproduktgesetz, BauPG)

The legal framework for construction products in Germany is undergoing a significant transformation, driven by new European legislation. The new EU Construction Products Regulation (Regulation (EU) 2024/3110), published in December 2024, is set to modernise and strengthen the rules for products used in the construction sector. This upcoming regulation places a much stronger emphasis on sustainability, introducing mandatory obligations for environmental impact reporting and a digital product passport. The new EU regulation enters into force in January 2025 and will be applicable from January 2026, necessitating a comprehensive update of the German Building Product Act (*Bauproduktengesetz*, *BauPG*) to transpose these new European rules.

The existing Building Product Act, in its current form since 1 July 2013, serves as the national implementation of the preceding EU Construction Products Regulation (EU No. 305/2011). Its primary role has been to harmonise the marketing and use of construction products through the mandatory CE marking, which is linked to a declaration of performance covering essential characteristics like mechanical stability and fire safety. This established system, which also includes the national conformity mark (*Ü-Zeichen*) for non-harmonised products, provides the foundation that will be built upon and significantly expanded by the incoming sustainability and digitalisation requirements.

2.4 Funding & Support Measures

This chapter gives an overview of the most important supporting measures, especially funding schemes, in Germany for buildings construction and renovation.

2.4.1 Federal Funding Programme for Efficient Buildings (BEG)

The Federal Funding Programme for Efficient Buildings (*Bundesförderung effiziente Gebäude*, *BEG*), launched on January 1, 2021, combines previous funding schemes for energy efficiency and renewable energy and is the central federal support programme for both new construction and renovation of residential and non-residential buildings in Germany. The BEG consolidates former programmes, including energy-efficient refurbishment (*Energieeffizient Sanieren*) and energy-efficient construction (*Energieeffizient Bauen*), to streamline and widen support.

Administration is split between the state-owned promotional bank KfW (*Kreditanstalt für Wiederaufbau*) and the Federal Office for Economic Affairs and Export Control (*Bundesamt für Wirtschaft und Ausfuhrkontrolle, BAFA*). The structure is as follows and can also be seen in Figure 8:

[19] https://www.gesetze-im-internet.de/messbg/BJNR203410016.html

- BEG WG (*Wohngebäude*) for residential buildings
- BEG NWG (*Nichtwohngebäude*) for non-residential buildings
- BEG EM (*Einzelmaßnahmen*) for individual measures on both residential and non-residential buildings

Since 2023, new-build support for KfW Efficiency House has shifted partly to the "Climate-Friendly New Build" (*Klimafreundlicher Neubau, KFN*) and "Home Ownership for Families" (*Wohneigentum für Familien*) programmes. BEG remains responsible for renovation and individual measures (see Figure 7). With the KFN, for the first time, the entire life cycle of a building is considered – from construction and operation to potential future deconstruction. These buildings are characterised by low greenhouse gas emissions over their life cycle, high energy efficiency, low operating costs, and a significant share of renewable energy for heating and electricity generation. Funding is available for both new construction and the initial purchase (within 12 months of final acceptance in accordance with the German Civil Code) of newly built, climate-friendly, and energy-efficient residential and non-residential buildings. The KFN-Standard is an important step to promote circular construction and low-carbon materials in Germany, as embodied emissions of buildings and materials are rarely accounted and whole-life cycle assessments are not mandatory in private sector projects (regarding public procurement, see Chapter 2.5).

Figure 7: Structure of the Federal Funding for Efficient Buildings (BEG)[20]

Private individuals, companies, municipalities, housing associations, and non-profit organisations can apply. Funding is available as subsidies or low-interest loans and generally covers:

- Improvements to the building envelope (insulation, windows, doors);
- Plant technology (excluding fossil-based heating);
- Renewable energy systems for heat generation (e.g., heat pumps);
- Heating optimisation;
- Technical planning and construction supervision.

The BEG distinguishes between funding towards achieving an *EffizienzHaus*-standard (e.g. EH 55) and funding for individual measures (such as replacing old boilers, installing heat pumps, or upgrading insulation). Details on the funding scheme towards achieving efficiency targets for residential buildings as well as the maximum amount can be found in table 3 below.

Table 3: Funding for residential buildings by efficiency standard (BEG WG)[21]

Building efficiency	Renovation Maximum Amount	Calculation
EH 40	24,000 €	20 % of max. 120.000 € loan amount/subsidised costs

[20] BEG-Förderung 2025: BEG EM & WG Zuschüsse + Antrag
[21] Ibid.

EH 40 EE*/NH**	37,500 €	25 % of max. 150.000 € loan amount/subsidised costs
EH 55	18,000 €	15 % of max. 120.000 € loan amount/subsidised costs
EH 55 EE*/NH**	30,000 €	20 % of max. 150.000 € loan amount/subsidised costs
EH 70	12,000 €	10 % of max. 120.000 € loan amount/subsidised costs
EH 70 EE*/NH**	22,500 €	15 % of max. 150.000 € loan amount/subsidised costs
EH 85	6,000 €	5 % of max. 120.000 € loan amount/subsidised costs
EH 80 EE*/NH**	15,000 €	10 % of max. 150.000 € loan amount/subsidised costs
EH Denkmal***	6,000 €	5 % of max. 120.000 € loan amount/subsidised costs
EH Denkmal* EE*/NH****	-	10 % of max. 150.000 € loan amount/subsidised costs

*** EE** = Renewable energy class: A renewable energy class can be achieved for new construction or refurbishment if at least 65% of the heating and cooling supply comes from renewable energies

**** NH** = Sustainability class: An "EffizienzHaus NH" class can be achieved for new construction of a sustainability certificate is issued for an EH

***** Denkmal** = Listed Building: is a special energy efficiency standard in Germany designed specifically for buildings under historic preservation

For non-residential buildings the maximum limit of the subsidised costs is based on the net floor area of the building. Every m^2 of net floor area equals 2,000 euros (total of max. 30 million euros). The financial support is a percentage of that sum. The level depends on the final efficiency standard achieved, as laid out in table 4 below. An example could be the following: Renovating a 1,000 m^2 building to EH 55 level implies total subsidised cost of 2 million euro, of which 800,000 euros are given as financial support. Higher funding rates are possible if additional sustainability criteria are met, such as the use of renewable energy (EE class) or achieving the NH (Sustainability) class in new construction. Funding is capped at a maximum of 15 Mio. euro per project.

Table 4: Funding for non-residential buildings by efficiency standard (BEG NWG)[22]

Building efficiency	New construction	Renovation
EH 40	20 %	45 %
EH 40 EE*/NH**	0 %	50 %
EH 55	0 %	40 %
EH 55 EE*/NH**	0 %	45 %
EH 70	0 %	35 %
EH Denkmal***	0 %	25 %
EH 100	0 %	27.5 %

As mentioned above, the funding under the BEG can also apply to individual measures and technologies, independent of the energy efficiency target of the respective building. In this case, the funding consists of a given percentage of the renovation measure and generally varies between 15 % to 50 % of costs, as seen in table 5 below. A bonus systems for different social and environmental criteria can increase the funding with a cap at 70%.

Table 5: Funding of individual renovation measures (residential and non-residential) (Source: BAFA. 2025)[23]

Building efficiency	Maximum funding as share of total costs
Measures on the building envelope	15 %

[22] Merkblatt: BEG Nichtwohngebäude Zuschuss
[23] beg_em_foerderuebersicht (1).pdf

Systems engineering (except heating)	15 %
Systems for heat generation (heating technology)	30 %
Measure to improve systems efficiency	15 %
Measure to reduce emissions from biomass systems	50 %

In the first quarter of 2025, BAFA and KfW together processed a total of 241,606 applications (by BAFA) and approvals (by KfW) for individual measures aimed at renovating residential buildings. Of these, 76,596 were related to the funding of heating systems, while 58,794 supported specialist planning and construction supervision. In the non-residential building sector, specifically within the BEG individual measures programme, 3,217 applications or approvals were granted exclusively for specialist planning and construction supervision.[24]

2.4.2 State-level funding

In the residential building sector, federal-level funding is the most relevant and constitutes the lion's share of funding applications. Even though all states provide subsidies for the renovation of private homes, those subsidies are mostly small in comparison to BEG-funding and are therefore not "drivers of change".

However, a number of state-level funding programmes offer more substantial support in specific cases. The state of Baden-Württemberg, which is among the top three states by construction activity (see Figure 11), for instance offers funding for serial and energy-efficient refurbishment measures, similar to the Energiesprong initiative, of up to 500.000 € and funds a range of environmentally-friendly projects and refurbishments of non-residential buildings through the programme "Klimaschutz Plus".

Several states, such as Thuringia, Baden-Württemberg and Hesse, furthermore provide funding for the construction or refurbishment of social housing projects for low-income households or students. These programmes often include additional funding opportunities for energy saving measures or the installation of renewable energy. In addition, several programs exist in regions that are negatively impacted by structural change, for example in the former coal regions of Brandenburg or Saxony, and also include additional federal transition funds (e. g. STARK[25]) and EU funds, which include additional incentives for sustainable construction and refurbishment. The same is the case for funding programs in some states of the former East Germany, which are aimed at the improvement of living quality in inner cities and large housing estates.

Especially in the public and municipal sector, state-level funding is of crucial importance and diverse funding opportunities for public buildings, such as schools, sports facilities and administration buildings exist on state-level. Schleswig-Holstein and Baden-Württemberg for example offer grants of up to 90% of the total investment cost for school renovations.

Due to the multitude of different programmes offered by the German states, a comprehensive overview of the funding landscape is not feasible in the context of this short study. Information on all state- and federal-level funding programmes is however provided by the Federal Ministry for Economic Affairs and Energy (BMWE) through a dedicated online platform (foerderdatenbank.de[26]). The platform allows sorting funding programs by categories, such as state, beneficiary or type of grant, and searching for funding programmes by keyword. However, it is only available in German, which is also the case for most of the information provided by the states themselves, which the platform provides links to.

2.4.3 Support services & competence centers

The **German Energy Agency (*Deutscher Energieagentur, dena*)** has developed dedicated competence centres and comprehensive service offers to support sector stakeholders in transitioning toward more sustainable building

[24] Energie-Effizienz-Experten (EEE) Newsübersicht | News |
[25] BAFA - STARK
[26] Förderdatenbank - Startseite

practices. Two flagship initiatives hosted by dena specifically focus on sustainable building renovation and new construction:

The **Gebäudeforum klimaneutral**[27] serves as a central platform for climate-neutral construction and renovation across Germany. The platform provides professionals in the building sector, including architects, energy consultants, engineers, and property managers, with quality-assured information and practical support for the transition to a climate-neutral building stock by 2045. The platform consolidates expert knowledge on topics such as the German Buildings Energy Act (GEG) and individual renovation roadmaps (iSFP), whilst an integrated "Schaufenster" portal highlights best-practice projects. Dena operates a dedicated telephone and email service providing direct advice on technical and regulatory issues, supported by a network of partners including regional energy agencies, professional associations, and scientific institutions. Annual events gather experts to discuss current challenges, emerging regulations, and practical strategies for energy-efficient buildings. The annual **dena-Gebäudereport** provide regular analysis of the building stock, energy consumption, emissions, and technology deployment including heat pumps and photovoltaics, offering data for informed decision-making throughout the sector.

Energiesprong Deutschland[28], dena's centre of expertise for serial refurbishment functions as the German hub of the international Energiesprong network, promoting the Dutch-developed method for retrofitting buildings to Net Zero Energy standards using prefabricated, modular components. The centre focuses on market development by creating demand for serial refurbishment solutions and connecting stakeholders including housing companies, construction firms, and municipalities. Project support includes consulting services ranging from building identification and planning to subsidy navigation and pilot project implementation, including serial refurbishment of schools in Rhineland-Palatinate and advisory roles for non-residential public buildings. Knowledge transfer occurs through workshops, networking events, and site visits such as the "Energiesprong on tour" series. The centre operates accelerator programmes providing coaching by international experts and financial support to scale cost-effective renovation solutions. Through these activities, dena addresses initial market barriers and positions serial refurbishment as a component in achieving climate targets for the building sector.

The **Kompetenzzentrum Contracting**[29] is another key service hub operated by dena, established to promote Energy Performance Contracting (EPC) as an effective implementation and financing model for energy efficiency projects. It primarily targets social, health and public sector entities, such as municipalities, as well as private companies that may lack the financial resources or in-house technical expertise for complex energy modernisations. The centre acts as an independent information and advisory body, guiding interested parties through the entire contracting process—from initial potential analysis and tendering to contract negotiation and quality assurance. By providing standardised tools and best-practice examples, the Kompetenzstelle Contracting works to lower market barriers and increase the uptake of a model where an Energy Service Company (ESCO) finances, plans, and guarantees the savings of a renovation project, thus enabling efficiency upgrades without upfront capital expenditure from the building owner.

2.5 Sustainable Public Procurement

The legal foundation for the public procurement is the Public Procurement Act (*Vergabeverordnung, VgV*)**,** which imposes mandatory sustainability criteria for public tenders exceeding EU thresholds. Under this regulation, contracting authorities are required to integrate social and environmental factors into technical specifications and to use sustainability criteria in contractor selection and contract awards. The VgV permits the verification of these characteristics through recognised certificates and quality labels, and it extends environmental impact considerations beyond the product itself to include production processes and supply chains. This regulation provides a binding legal basis for embedding sustainability in public procurement decisions.

The new government of Chancelor Merz presented in August 2025 a new bill to make national public procurement law simpler, more flexible, faster and more digital in future. The proposed Public Procurement Acceleration Act

[27] gebäudeforum.de
[28] Startseite | Energiesprong DE
[29] Kompetenzzentrum Contracting

(*Vergabebeschleunigungsgesetz*)[30] will cut administrative processes, provide for fewer reporting obligations, strengthen self-declaration by companies, speed up review procedures and allows for more digital communication during processes. The bill has yet to be go through final approval.

Within the public construction sector, the **Assessment System for Sustainable Building (*Bewertungssystem Nachhaltiges Bauen, BNB*)** serves as a detailed set of green building guidelines for public authorities (See Section 3.3). The BNB system provides environmental, economic, and social performance indicators to assess and promote sustainable construction practices. Its application is mandatory for federal construction projects and recommended for other public buildings, supporting the implementation of best practices to achieve climate-friendly outcomes. BNB is closely aligned with the commercial and more broadly recognized DGNB System (Section3.3).

Higher requirements apply to federal buildings and construction projects (as opposed to buildings belonging to states or municipalities) as a result of the BNB criteria. Federal Buildings must achieve the highest operational efficiency level ***EffizienzHaus 40*** **(EH 40)**. What is more, **Life-Cycle Carbon Assessment (LCA)** is compulsory for all federal building projects under BNB. Consequently, **Environmental Product Declarations (EPDs)** are required for key building materials, to provide transparent, verified data on the environmental impacts of materials.

In addition, **Building Information Modelling (BIM)** is mandatory for all federal construction projects above 500 thousand EUR since 2025, and for all federal buildings by 2027. In 2023, the Federal Ministry of Housing, Urban Development and Building (BMWSB) presented the BIM Masterplan for s the German building market, but also on key players, networks, technologies and approaches to enter the market. Finally, innovative projects are presented that showcase current developments and opportunities available.

[30] Simpler processes with new public procurement law | Federal Government

3 Market Overview

3.1 Background

The German government has pledged to decarbonise Germany's building stock until 2045. This implies refurbishments of buildings to increase energy efficiency as well as switching to renewable sources of heat.

However, assessing the actual impact of these renovation measures on the overall energy performance of the building stock remains challenging. Comprehensive studies that analyse this issue in detail are rare and typically only available for specific years, due to the complexity involved. Research based on smaller sample sizes can provide only general trends in the progress of energy-efficient renovations over short periods, and these analyses are usually limited to the existing residential building stock. As an alternative, some approaches measure the scale of energy-efficient renovation by looking at the financial investments made, rather than relying solely on physical indicators.[31]What can be said is that, overall, the conditions for new efficient buildings and energy efficient refurbishment are more attractive than ever, with the unified and revised BEG at the centre.

The non-residential sector, including public buildings like schools and administrative offices, has seen substantial improvements in funding conditions over recent years – partly in response to the long-acknowledged renovation backlog and budget shortfalls at municipal level. These improvements are expected to unlock greater investment in this segment in the coming years.

The overall decision on the project goals (e.g. degree of sustainability, a specific certification) of a building lies with the client. In larger projects, this decision is made jointly with the architect, technical planners and the project management team. In the early phases of the planning process, this is usually done in technology-agnostic functional requirements, allowing for an open approach to product and system solutions. From the implementation planning phase onward, these requirements are further specified and usually put out to tender to ensure transparency, comparability, and best value for money. This is a mandatory step for public projects, but it is also the standard for larger privately financed developments. The selection of the offers is again the responsibility of the client. However, the architect and the project manager have some influence, as the client often relies on their expertise when obtaining quotes from different suppliers. Project controllers, for example, have internal supplier databases that they use to obtain quotations.

The decision for certain products is based on price, but also on reliability. As delays in the development of larger construction projects are always a major challenge, delivery time is also an important factor. In more advanced projects, digital tools such as Building Information Modelling (BIM) increasingly support decision-making for product selection, logistics, and lifecycle performance assessments. However the uptake of BIM remains slow, causing interface issues between stakeholders equipped with different planning tools, which reduces the overall effectiveness of the technology.[32]

3.2 Market structure

Over the past decade, Germany experienced a high level of building activity, particularly in the residential construction sector. However, since 2022, the sector has undergone a noticeable slowdown with a significant decline in building permits and project starts, especially in residential new construction. The non-residential sector has also been affected. Investment in commercial buildings (e.g. offices, retail) remains subdued, driven by uncertainty in the broader economy and changing work patterns. The development of public building projects depends heavily on the fiscal situation of municipalities, which often face budget constraints. This slow-down in construction and renovation activities at national level can be attributed to the interplay of multiple factors

[31] DIW Weekly Report 46
[32] Zentrum für die Digitalisierung des Bauwesens (BIM) | BIM Deutschland

previously mentioned (see Chapter 1). This includes the increase in construction material and energy prices, labour shortage, and complex administrative processes.

According to industry data, the total volume (in euros) of new construction and renovation measures grew in 2020 and 2021, despite COVID-19 impacts. However, growth rates have since stagnated or even reversed in certain segments of the market – most notably in multi-family housing and commercial real estate. The number of building permits for new residential and non-residential buildings grew until the year 2021 (Figure 8).

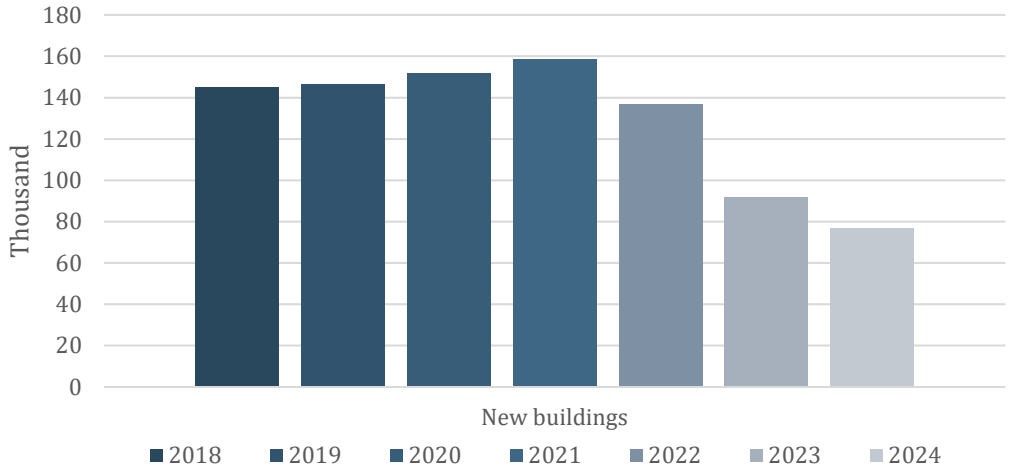


Figure 8: Building permits issued for residential and non-residential buildings, 2018-2024[33]

It is important to highlight the heterogeneity in demographics, economic activity, private wealth as well as public investment capacities between German states. The most construction projects are taking place in southern Germany (Bavaria and Baden-Württemberg being the most dynamic and capable of leveraging large investment projects), along with Germany's largest state North-Rhine Westphalia (NRW). Bavaria recorded the highest number of authorised projects for both new constructions and renovations of existing buildings. NRW, however, is marked by an older, denser and less renovated residential building stock, housing in parts poorer populations. This is also the case in the federal capital Berlin. While in most states, the number of newly authorised buildings in 2024 exceeded the number of projects involving existing buildings, in Berlin, North Rhine-Westphalia, and Baden-Württemberg, more construction projects were approved for existing buildings than for new ones. The eastern, former East German, states are less densely populated, less economically dynamic, except the main cities Leipzig and Dresden, and with a higher reliance on federal and European funding to renovate their infrastructure. Though less significant in size and demographics, states such as Hessen, hosting the Frankfurt urban area, and Hamburg are also highly dynamic. Hamburg especially, with the ambitious HafenCity project, has a track record in smart and climate resilient urban development and is developing to a national competence hub for sustainable and climate resilient construction, with institutions such as the HafenCity University. The German federal states (Bundesländer) show different levels of construction projects for works on new and existing buildings . Figure 11 below shows the number of construction projects by federal state in 2024.

[33] Number of building permits Germany 2024| Statista

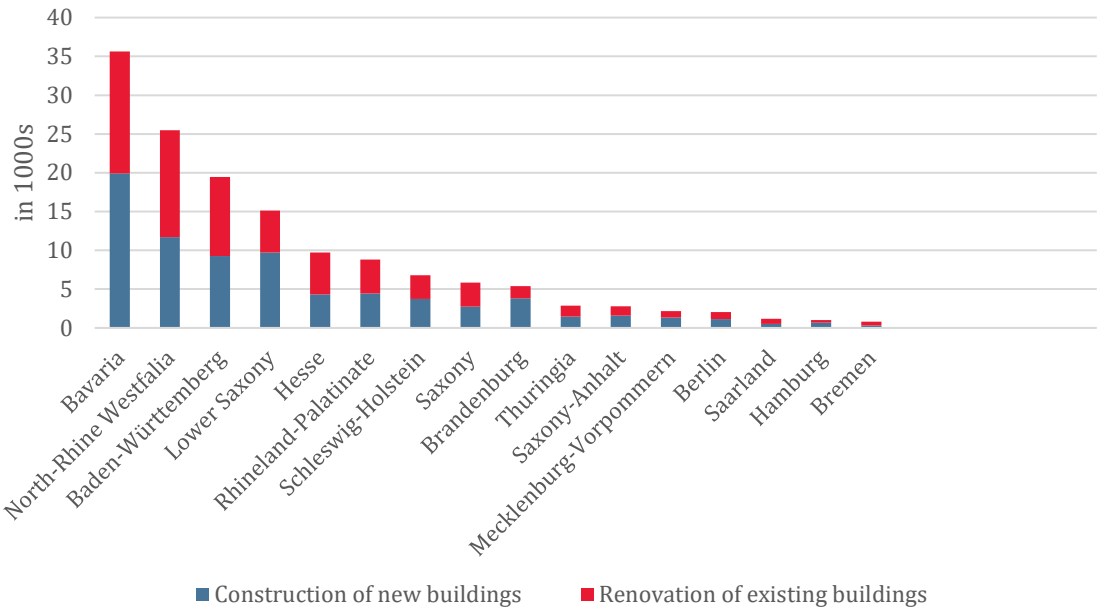


Figure 9: Number of construction projects with permits for works on new and existing buildings in Germany in 2024, by region[34]

3.3 Sustainable Building Rating Systems

In Germany, several rating systems guide and certify the sustainability of buildings. Beside the leading DGNB primarily addressing commercial and non-residential buildings, the German government has developed official rating systems to translate its policy objectives and funding guidelines into clear building criteria.

The **German Sustainable Building Council** (*Deutsche Gesellschaft für Nachhaltiges Bauen, DGNB*) system is the leading commercial certification in Germany, with over 10,000 projects certified globally. A major overhaul in 2023 streamlined the framework to 29 criteria while strengthening requirements for greenhouse gas (GHG) emissions, circularity, and biodiversity. Key features of the 2023 version include a resource passport to promote circular economy principles, advanced life-cycle carbon and biodiversity assessments, and a toolbox for designing carbon-neutral buildings. The system is also fully aligned with the federal Sustainable Building Quality Seal (QNG) and the EU Taxonomy.

In 2021, DGNB also introduced a **rating system for construction sites** (*DGNB System für Baustellen*)[35] focusing on sustainable planning, management, and execution of construction sites. Its main evaluation criteria are: site organisation, resource protection (including energy consumption and emissions reduction), health and social aspects, communication with the public, quality of the overall execution. Although the uptake is likely to be slow[36], it indicates an increase in interest for sustainable and low-carbon construction systems and processes. A market version of the DGNB Baustelle system, informed by user feedback and evaluation of the initial projects, is planned for launch in spring 2026.

For federal buildings, the **Assessment System for Sustainable Building** (BNB) is the mandatory standard. While not available for private sector projects, it is closely aligned with the DGNB system. The BNB is integrated with public procurement requirements and the 2024 update of the Building Energy Act (GEG). An update, BNB 2.0, is anticipated in 2025, which is expected to introduce enhanced lifecycle and energy standards and extend its application to a wider range of building types, including offices and educational facilities.

The **Sustainable Building Quality Seal** (*Qualitätssiegel Nachhaltiges Gebäude, QNG*) is a federal quality seal launched in 2021, offered at two levels: QNG-PLUS and QNG-PREMIUM. A key function of the QNG is its direct link

[34] Building permits in Germany 2024, by region and type| Statista
[35] Das DGNB System für Baustellen | DGNB
[36] No market data is available since 2021, DGNB plans a first evaluation of the initial system in 2026.

to the Federal Funding for Efficient Buildings (BEG) programme, where achieving QNG certification provides access to the enhanced Sustainability Class (*Nachhaltigkeitsklasse, NH*) subsidies, allowing for up to 10% additional funding. Certification must be obtained through compliance with other systems, such as DGNB (Silver or higher) and BNB. In addition, QNG sets additional, more ambitious, criteria regarding whole-life cycle emissions, sustainable material sourcing, avoidance of harmful substances, accessibility, natural risk management and green roofs.

Whole-Life Cycle Assessment (LCA) is taking a growing role in these German rating systems. All the main rating systems (DGNB, BNB and QNG) now incorporate requirements for to carry out an LCA, yet their methodologies differ significantly. The BNB and DGNB systems use a points-based approach based on reference values. Under this model, certification does not automatically guarantee that a building has a superior life-cycle performance, as the points achieved for the LCA are only one part of the total score. These reference values also change substantially between versions, largely in response to stricter legal energy requirements from the GEG. **In contrast, the QNG system sets fixed and ambitious maximum values for the LCA, which must be met as a mandatory requirement**. With QNG providing access to enhanced BEG NH funding, this creates a new and strong incentive for construction projects to focus more on embodied emissions and low-carbon, circular materials.

However, the practical consideration of embodied emissions still faces obstacles in Germany. Achieving a favourable LCA is often dominated by the building's operational energy performance, with a emphasis on technical systems such as photovoltaics or heat pumps, as these have the most significant and easily quantifiable impact on the energy balance. In contrast, the contribution of innovative and sustainable building materials, like renewable and circular resources, is often difficult to prove due to a lack of standardised data. In addition, new construction products most undergo the technical approval and certification by the DIBt (See Section 3.4) to ensure compliance with the German Building Code. This potentially complex and costly process can hamper the market introduction of a broad variety of innovative products. Therefore, optimisation through the selection of construction materials is less common in practice, even though it is on an upward trend.

3.4 Key players and contact points

This chapter provides an overview on how to enter the German market, key players and the most relevant contact points and trade fairs.

How to enter the German market

A foreign company that wants to become involved in larger development projects in Germany could approach prominent project controllers, architects or general contractors and pitch their solutions to them. To generate interest, the product must have a clear advantage over the market standard. To show reliability and build a brand, it can be helpful to have a strong reference in the German market. This can be achieved through very competitive offers and outstanding performance that might not be cost covering or through strategic partnerships with larger Dutch companies that already have a standing in the German market. Table 6 provides an overview of five of the largest construction companies in Germany. It involves non-residential and residential constructers.

Table 6: Construction companies[37]

Company	Business	HQ	Revenue in Euro (2023)	Employees
Hochtief AG	Infrastructure construction, commercial and residential buildings, energy infrastructure, digital infrastructure, transport infrastructure	Essen	27.8 billion (Germany: approx. 2.9 billion)	41 thousand
Strabag AG	Infrastructure and road construction, transportation infrastructure, civil engineering, building construction, bridge and tunnel construction, specialist foundation engineering, pipeline and sewer construction	Cologne	8.3 billion (Germany: approx. 8 billion)	25 thousand
Goldbeck GmbH	Planning, designing, and construction of modular and industrialized buildings, primarily commercial and industrial real estate	Bielefeld	6.7 billion (Germany: approx. 4.1 billion)	10 thousand (excluding trainees)

[37] 2024.07.22_Liste_der_50_groessten_deutschen_Bauunternehmen_in_2023.pdf

Ed. Züblin AG	Construction and civil engineering, infrastructure projects, urban development, industrial construction, large-scale modern building projects	Stuttgart	4.7 billion (Germany: approx. 3.95 billion)	15 thousand
Zech Group SE	Construction, infrastructure, civil engineering, real estate development, building refurbishment, energy-efficient construction	Bremen	4.5 billion (Germany: over 4 billion)	13.6 thousand (excluding trainees)

In smaller projects, like single family homes or refurbishment projects, the key expert is the architect or technical planner. Most products will be purchased through wholesale, making the larger wholesale companies the best point for a market entry. Again, a product needs to show a clear advantage over the market standard for a wholesaler to be interested. The supplier also needs to be able to deliver large quantities of the product, which often poses as a barrier for newcomer companies. Table 7 provides the most important wholesalers in the German construction market

Table 7: Wholesalers

Company	Business	HQ	Revenue (€)	Employees
Sonepar GmbH	- Craftsmen's supplies, - industrial supplies, - electrical wholesale	Paris (global), Düsseldorf (Germany)	32.5 billion (2024, worldwide)[38]	Over 48 thousand (worldwide)
BayWa AG	- Energy, - agriculture, - construction	Munich	23.9 billion (2023)[39]	Over 20 thousand
Würth Gruppe	- Craftsmen's supplies, - industrial supplies, - electrical wholesale, - energy	Künzelsau	20.4 billion (2023)[40]	Over 88 thousand (worldwide)

In some cases, especially for smaller companies or start-ups, that do not have a strong brand yet, it can be an interesting option to market the product via an established German manufacturer under his brand. The DENEFF is been offering support through by start-ups with established German manufacturers to help them to reach a market scale up. In the segment of industrial refurbishment, a dena initiative is offering support to companies that provide products or services that can be integrated into the Energiesprong approach. Apart from that, the more traditional route of exhibiting at trade fairs is also a viable option to gain attention. Some of the most interesting contact points for foreign companies can be found in table 8.

Table 8: Key contact points

Type	Name	Explanation	Link
Trade fair	Hannover Messe	Largest trade fair for industrial goods	https://www.hannovermesse.de/en/
	E-World energy & water	Trade fair for the energy and water sectors, relevant for infrastructure and construction projects	https://e-world-essen.com/en/
	Ifh intherm	Trade fair for sanitation, home and building technology	https://www.ifh-intherm.de/en/
	Expo real	Largest trade fair for real estate and investment in Europe, largest B2B trade fair in Europe	https://exporeal.net/en/
	digitalBAU	Trade fair for digital solutions in the construction industry, focusing on digital planning, building, and operation.	https://digital-bau.com/en/
Agency	German energy agency (dena)	Germany's centre of expertise for energy efficiency, renewable energy sources and intelligent energy systems	https://www.dena.de/en/
	NRW.Energy4Climate	State agency for energy transition and climate protection in the largest federal state of North Rhine-Westphalia; provides information, advice,	https://www.energy4climate.nrw/en/

[38] sonepar-panorama-2025-data.pdf
[39] BayWa Group
[40] Würth Group satisfied with first half of 2024

		networking, and support for companies, municipalities, administrations, and citizens	
	Bayern innovativ	Network that facilitates innovation by connecting companies, universities and knowledge networks in Bavaria	https://www.bayern-innovativ.de/en/
	Deutsche Institut für Bautechnik (DIBt)	Central authority for the approval, assessment and regulation of construction products and techniques in Germany	https://www.dibt.de/en/
Interest groups/industry associations	Deutsche Unternehmensinitiative Energieeffizienz e. V. (DENEFF)	Interest group for suppliers of energy-efficient products	https://deneff.org/ (only available in German)
	Hauptverband der Deutschen Bauindustrie (HDB)	Main association for large construction companies; provides market information, standards, and networking	https://www.bauindustrie.de/ (only available in German)
	Zentralverband Deutsches Baugewerbe (ZDB)	Central association for medium-sized and smaller construction firms	https://www.zdb.de/ (only available in German)
	Energieeffizienzverband für Wärme, Kälte und KWK e.V. (AGFW)	Association of companies operating combined heat and power plants and district heating networks in Germany	https://www.agfw.de/ (only available in German)
	Verband für Energiedienstleistungen, Effizienz und Contracting e.V. (vedec)	Interest group for energy service and contracting providers	https://vedec.org/ (only available in German)
Product databases	German Sustainable Building Council (DGNB)	Database of the German Sustainable Building Council	https://www.dgnb.de/en/
	Building Material Scout	Database for sustainable materials and building products	https://building-material-scout.com/en/
Certifications	Blauer Engel (Blue Angel)	German ecolabel for building products and technical equipment that meet high standards for environmental protection, health, energy efficiency, and low emissions. Widely used in sustainable construction and refurbishment.	https://www.blauer-engel.de/en
Networks for municipal utilities	Effizienz-Netzwerk für Stadtwerke (ASEW)	Network of municipal utilities	https://www.asew.de/
	THÜGA	Network of municipal utilities	https://www.thuega.de/ (only available in German)

Overall, it can be said that the German market is not particularly easy for foreign companies, as basically all products and services are offered by national brands and a strong, reliable brand is a key component for success. However, there are opportunities in new fields of products and services related to emerging sustainable market trends, as illustrated in Chapter 4. On topics such as climate resilience, flood and water management, circular construction and serial renovation, the German buildings and construction sector has been learning from other European countries and would further benefit from knowledge and innovative services, technologies and products from specialised foreign companies.

3.5 Market Technologies

This chapter provides a detailed assessment of different technologies that are grouped in the following three categories: energy and heating systems, air conditioning, and smart devices and software. For each cluster, barriers and opportunities are being discussed, followed by an in-depth analysis on the current state and future outlook of the respective technology on the German market.

3.5.1 Energy and Heating Systems

This chapter discusses technologies in the cluster of energy and heating systems. A presentation of the most important barriers and opportunities is followed by a detailed assessment for each technology.

3.5.1.1 Barriers and opportunities

Energy and heating systems in Germany continue to face notable barriers. Low renovation rates and long equipment life cycles persist, posing challenges for widespread modernization. Despite ambitious governmental goals, political uncertainty – heightened by the 2025 federal elections and debates over the BEG, (the law's provisions, first passed in 2023 and later amended, sparked widespread controversy and political disputes, with some parties advocating for stricter or more flexible approaches and others calling for the act to be repealed or eased in light of affordability and practicality concerns)[41] – has delayed investment decisions and contributed to market instability. The tenant-landlord dilemma remains significant in residential buildings due to Germany's high tenant ratio (around 52,8%, the highest in the EU[42]), while non-residential buildings grapple with long payback periods for energy-efficient upgrades. A shortage of trained installers and grid constraints in rural areas further hinder rapid adoption of new technologies.

However, there are strong opportunities supporting the market's transformation. As already described, from 2024, new heating systems installed in Germany must use at least 65% renewable energy, and by 2045, all buildings must be heated in a climate-neutral manner. The government has significantly expanded support: incentives under the BEG program now cover up to 70% of installation costs for residential heat pump systems, with special bonuses for replacing old oil or gas boilers and extra aid for low-income households. More than 500,000 new heat pumps are expected to be installed in 2025, and major manufacturers are ramping up domestic production to meet demand[43]. Financial and regulatory incentives, including accelerated permitting for large heat pumps, geothermal, and district heating, are being reinforced by new draft laws to boost renewable heating infrastructure and reduce licensing hurdles.[44]

The sector's transformation is also buoyed by a growing acceptance among the population[45], the emergence of smart grid solutions, and increasing operational savings as technology costs fall. Ongoing government efforts to clarify legal and funding frameworks, combined with the expansion of training programs for installers[46], are helping to address skill shortages and streamline project approval. As a result, Germany is solidifying its role as a key market and innovation leader for heat pump technologies within Europe, despite ongoing policy and technical challenges.

3.5.1.2 Technologies

The stock of heating systems in existing buildings remains relatively old, but the average age is decreasing due to accelerated replacement rates following regulatory changes and incentives. As of 2023, the average heating system in Germany is about 14 years old, with the share of systems older than 20 years now at approximately one third.[47]

Heat Pumps
The most significant change has been the rapid adoption of heat pumps in Germany. They have become the leading heating solution for new homes, with 64.6% of all newly approved residential buildings being equipped with heat pumps in 2024 .[48]

Though heat pumps have become standard in new residential construction, this trend does not extend to the replacement of heating systems in existing buildings. In 2024, homeowners installed more gas boilers than heat pumps when upgrading their systems, although the difference between the two is narrowing.

Despite the rising adoption of heat pumps in new buildings, domestic production in Germany fell sharply last year, reaching its lowest level in six years. In 2024, approximately 162,400 heat pumps were produced – a decline of nearly 60% compared to the previous year. The total value of all heat pumps manufactured in Germany dropped

[41] The future of Germany's heating industry: Charting a path forward | AlixPartners
[42] EU-Vergleich: Deutschland ist Mieterland Nummer 1 - Statistisches Bundesamt
[43] Germany's Push for Heat Pumps in 2025: Incentives, Laws & Market Outlook
[44] German government proposes boost for renewable heating infrastructure | Clean Energy Wire
[45] German heating industry calls for policy commitment as sales of climate-friendly systems halve | Clean Energy Wire
[46] Germany's Push for Heat Pumps in 2025: Incentives, Laws & Market Outlook
[47] Third of Germany's heating systems over 20 years old, three in four must be replaced by 2045 - industry | Clean Energy Wire
[48] Germany: new home heating sources 2024| Statista

to 587 million euros in 2024, down from 1.2 billion euros in 2023. A similar trend was observed in trade: imports of heat pumps fell by 28% to 755 million euros, while exports decreased by 40% to 480 million euros.[49]

Gas Heating Systems

Gas heating systems – including those fuelled by natural gas, biomethane, and liquefied petroleum gas (LPG) – now play only a minor role in newly approved residential buildings in 2024, accounting for just 4% of these new buildings and 5.2% of the dwellings within them.[50] Gas boilers has seen a dramatic decline and accounts for only around 15% of heating systems in newly completed residential buildings in 2024.[51] In non-residential buildings the share of gas heating has also significantly declined. There were around 5.74 million gas heating units in Germany as of 2023, while in 2019 it was still 7.04 million gas heating units.[52]

While the sale of conventional gas boilers has declined over the past decade, condensing gas boilers have grown steadily and maintained the largest market share of any central heating technology – driven predominantly by replacement in existing buildings rather than new construction.[53] There remains short- and medium-term growth potential for condensing gas boilers, mainly through replacement of older units in existing homes due to their lower upfront investment compared to heat pumps and other renewables.

Oil Systems

The market for both oil boilers and condensing oil boilers is rapidly declining. Oil heating in new residential buildings is now virtually non-existent: In 2024, the share of newly built residential buildings with installed oil heating is close to 0%.[54] Additionally, current figures for 2024 show that oil heating systems are practically no longer installed in new non-residential buildings. There were around 4.1 million oil heating units in Germany as of 2023, while in 2019 it was still 4.77 million oil heating units.[55]

Biomass Boilers (Using wood, wood chips and pellets)

Biomass heating systems are primarily installed in existing buildings, where they typically replace oil and gas heating systems. In contrast, newly constructed buildings are predominantly heated with heat pumps. Pellet boilers remain the most popular, followed by log wood and wood chip boilers which also saw moderate increases. Combination biomass boilers continue to have a smaller, but stable market share. Biomass boilers – especially high-efficiency pellet boilers – offer notable CO2 emission reductions of up to 90% compared to old oil or gas systems, making them one of the most climate-friendly heating technologies available in the short to medium term. While heat pumps are becoming increasingly carbon neutral as the German electricity grid gets greener, biomass systems benefit from relatively stable and low fuel costs per kWh.

In 2024, sales of biomass heating systems across Germany fell by 52%, according to statistics from the German Heating Industry Association (BDH).[56] Despite the positive impact of subsidies, the long-term popularity of biomass boilers remains uncertain post-subsidy. One advantage is that biomass as a CO2-neutral fuel is not subject to the carbon tax, but the need for physical fuel storage and logistics remains a challenge for many households.

Solar Thermal Panels

Since 2020, solar thermal heating systems have profited from the improved BAFA subsidy scheme.[57] In 2022, solar thermal accounted for approximately 5% of renewable heat supply in Germany.[58] Germany made modest progress in solar thermal energy for district heating in 2024, but major capacity growth is expected by 2026. A summarized update from March 2025 indicates that Germany is home to 61 solar heating networks. [59]

[49] Heat pumps become the norm in Germany's new homes | Clean Energy Wire
[50] Marktdaten - 81 % der neuen Wohngebäude soll eine Wärmepumpe beheizen
[51] Heat pumps become the norm in Germany's new homes | Clean Energy Wire
[52] Gas heating units in Germany 2023| Statista
[53] Europe Residential Boiler Market Size, Share, 2033; https://www.linkedin.com/pulse/germany-gas-condensing-boiler-market-trends-2026-share-egnbf/
[54] Germany: new home heating sources 2024| Statista
[55] Oil heating units in Germany 2023| Statista
[56] Marktdaten - Absatz von Wärmeerzeugern in Deutschland 2000 bis 2024
[57] Alles zur Förderung von Solarthermie | solarenergie.de
[58] Sonnenkollektoren, Solarthermie | Umweltbundesamt
[59] Progress in Solar Thermal Energy in District Heating: Only minor growth made in 2024

Electrical Heating Systems
Infrared heating systems continue to play a very minor role in the German market, with many consumers still largely unaware of this option. While upfront investment costs for infrared systems remain relatively low compared to other electric heating technologies, their efficiency is significantly lower than heat pumps, making them more costly over the lifecycle. The main market potential for infrared heaters lies in synergy with PV systems, which can substantially reduce operating costs by utilizing self-generated electricity. This advantage is further enhanced when PV systems are paired with battery storage. However, for households without PV generation, high electricity prices continue to be a major barrier to adoption. Additionally, infrared heating systems do not currently benefit from direct state subsidies, limiting their competitiveness against subsidized technologies like heat pumps or biomass boilers.

Electric Underfloor Heating (direct heating)
In 2019, electric underfloor heating hold a small market share, estimated at around 7.5%.[60] The global underfloor heating market is projected to grow at an average annual rate of 4.2% between 2020 and 2029.[61] The main disadvantage remains the relatively high cost of electricity leading to expensive operating costs compared to hydronic (water-based) underfloor heating. However, as more buildings incorporate PV systems, electric surface heating – including underfloor solutions – is becoming more attractive. Increased building energy efficiency reduces heating demand and operating hours, favouring direct electric heating solutions that are unaffected by carbon taxes if powered by self-generated electricity.

Micro Combined Heat and Power (Micro CHP)
Driven by policy incentives and the integration of green hydrogen into energy systems, Germany's micro CHP market is experiencing strong growth, with an annual rate of 9.1%. With more than 250,000 installed units, Germany ranks among the world's most advanced markets for micro combined heat and power systems.[62]Micro CHP systems, especially those integrated with hydrogen fuel cells and battery storage, are expected to play an increasing role in the decentralized energy grid of the future. Such units enable households to supply excess electric energy back to the grid and can participate in virtual power plants and demand aggregation schemes. Nevertheless, challenges remain due to high upfront investment costs and ongoing volatility in gas prices, amplified by the increasing carbon tax.

District Heating
The share of households connected to district heating grids in Germany has continued to rise: while around 12% were connected in 1995 and 14% in 2019, the figure reached approximately 15-16% by 2023.[63] In the area of new construction, growth is even more pronounced. Only 7% of new buildings used district heating in 2000, rising to nearly 24.6% in 2019. District heating remains far more popular in cities than in rural areas. In city states such as Berlin, Munich and Hamburg, over 33-37% of residential buildings are connected to district heating networks.[64] Currently, approximately 4,000 district heating networks, spanning around 35,000 kilometres of pipeline, supply heat to industry, businesses, and households.[65] With responsibility for 95 percent of Germany's district heating networks, the country's municipal utilities recognise considerable potential for future growth in this sector.[66]

Fossil fuels – primarily natural gas and coal – still account for more than two thirds of the energy sources used in Germany's district heating networks. Renewable energy sources currently make up around 20%, with the majority derived from biogenic fuels. When combined with waste heat, renewables and waste heat together contribute just under 30% of the energy mix for district heating. This demonstrates that the decarbonisation of district heating in Germany is still at a relatively early stage.[67]

Primary energy input in German district heating still relies mainly on natural gas, which together with coal will supply more than two-thirds of network heat in 2025. However, the share of renewables in district heating has

[60] Fußbodenheizungsmarkt profitiert vom Bauboom - Recknagel Online
[61] Marktgröße, Wachstum und Prognose für Fußbodenheizungen 2029
[62] https://www.linkedin.com/pulse/germany-micro-chp-combined-heat-power-kk90c/
[63] Studie: Wie heizt Deutschland? | BDEW
[64] Over a third of houses in Germany's largest cities supplied by district heating – report | Clean Energy Wire
[65] Benötigen wir eine neue Preisregulierung für die Fernwärme?
[66] Germany Eyes Big Expansion of District Heating | Energy Transition
[67] Benötigen wir eine neue Preisregulierung für die Fernwärme?

grown to about 20%, and another 10% is now covered by waste heat. In total, almost one third of district heat now comes at least in part from CO_2-free or "unavoidable" sources – but the transition is still impeded by the continued use of fossil-based legacy systems.

The sector faces rapid transformation due to the introduction of the Heat Planning Act (Wärmeplanungsgesetz) in 2024 and national carbon pricing. The law requires all existing district heating networks to provide at least 30% renewable heat and/or waste heat by 2030, rising to 80% by 2040. The federal government aims for at least 50% of district heat to be generated from renewables and waste heat by 2030.

Expansion remains tied to high investment costs: forecasts suggest €43.5billion in required spending by 2030. The goal is to almost triple the number of connected residential buildings from the current 1.3million to 3.6million by 2045, with at least 100,000 new buildings to be added annually.[68] The main challenges are the high costs, the pace of network expansion, and the need to fundamentally shift supply away from fossil sources to renewables and industrial waste heat.

PV System

The growth of small-scale private PV systems in Germany has remained strong since 2020, though with some recent market fluctuations. In 2020, small-scale PV installations under 10 kWp reached record new capacity exceeding 1 GW, corresponding to around 108,000 new installations and about €1.4 billion in revenue.[69] By 2024, Germany's total cumulative installed PV capacity surpassed 100 GWp, with small-scale rooftop PV systems continuing to constitute a large share.[70] In the first quarter of 2025 alone, 3.2 GW of new solar capacity were installed nationwide[71], with building-integrated PV systems accounting for nearly 60% of added capacity.[72]

The increasing electricity demand in homes due to electric heating systems and electric vehicle ownership is fueling renewed interest in small-scale PV and residential prosumership. Lower feed-in tariffs incentivize increased self-consumption, supported by the popularity of home battery storage, smart appliance integration, and behavioral adjustments to align electricity use with PV production peaks.

The traditional EEG feed-in tariffs remain in place; however, the new Federal Minister for Economic Affairs and Energy, who has been in office since May 2025, is considering abolishing the feed-in tariff for new private photovoltaic installations. She pointed to the reduced installation costs and argued that such systems are already economically viable on the market today.[73]

Home Batteries

By the first half of 2025, Germany had nearly 2 million battery storage systems in operation, a rapid increase from just under 300,000 in 2020. These account for about 11.5 GW of installed power and nearly 18.3 GWh of usable storage capacity. The total number of battery storage units has therefore increased more than sixfold since 2020, confirming the fast growth of this market. Home battery installations remain strongly linked to PV systems.[74]

Falling prices for home batteries combined with persistently high retail electricity prices strengthen the economic incentive for households to store self-generated solar power rather than feed it into the grid. This trend is expected to continue, with an increasing share of PV system owners opting to install home battery storage.[75]

[68] www.vku.de/fileadmin/user_upload/Verbandsseite/Presse/Pressemitteilungen/2024/Perspektive_der_Fernw%C3%A4rme_-_2024.pdf
[69] Photovoltaik: 1,1 Gigawatt Kleinanlagen in Deutschland - Solarserver
[70] https://www.ise.fraunhofer.de/content/dam/ise/de/documents/publications/studies/Photovoltaics-Report.pdf
[71] Germany solar additions 2025 Face Shocking Decline to 787 MW - PVknowhow.com
[72] Bundesnetzagentur - Press - Growth in renewable energy in 2024
[73] Nordrhein-Westfalen: Wirtschaftsministerin Reiche will Solarförderung kürzen | tagesschau.de
[74] German battery storage hits 22.1 GWh in H1 – pv magazine International
[75] European Residential Battery Storage Market: Strong Momentum Continues in 2025 – EUPD Research Highlights Strategic Growth Opportunities – EUPD Group

3.5.2 Air Conditioning

3.5.2.1 Barriers and opportunities

Historically, adoption remained low due to the country's moderate climate, established habits, and high electricity costs. However, climate change has brought more frequent and severe heatwaves, dramatically increasing demand for cooling solutions—particularly among vulnerable populations like the elderly who require air conditioning for health reasons. Despite growing acceptance, the sector faces considerable challenges including high upfront costs for advanced HVAC technologies, skilled labour shortages, intense competition, and concerns over energy price volatility[76] and supply chain disruptions.

The residential sector drives market growth as homeowners increasingly seek affordable, energy-efficient cooling solutions in response to intensifying heatwaves. Smart air conditioning systems, controllable via smartphones and other devices, are accelerating adoption by offering convenience alongside sustainability benefits that align with national environmental goals.

Commercial demand is expanding rapidly as new office complexes, shopping centres, hotels, and healthcare facilities require sophisticated air conditioning systems to maintain comfortable environments and ensure productivity. Energy efficiency regulations and long-term cost savings further boost commercial sector growth.

The industrial segment contributes through specialised cooling requirements for manufacturing processes and critical infrastructure like data centres, where reliable temperature control ensures operational continuity and product quality.[77]

3.5.2.2 Technologies

Cooling Systems (Split- and VRF-Systems)
Since 2019, both the production and import of air conditioning units in Germany have experienced significant growth. According to the Federal Statistical Office, the number of air conditioning units manufactured in Germany increased by an impressive 75.1% within five years, reaching around 317,000 units in 2024 (compared to 181,000 units in 2019). At the same time, the production value rose by 34.4% – the highest level in the past five years. Imports also showed a positive trend, representing an increase of 48.2%. The leading suppliers in 2024 were Italy, accounting for 25% (€237 million), followed by China (13.7%, €130 million) and Sweden (10.4%, €98 million). The highest import value was recorded in 2023 at €957 million. In contrast, exports declined slightly by 2.8%. It should be noted that air conditioning units for vehicles, as well as individual components, are excluded from these figures.[78]

Due to environmental concerns about refrigerants, Germany follows the EU Regulation (EU) 2024/573 on fluorinated greenhouse gases.[79] The regulation progressively restricts climate-harmful refrigerants and incentivizes the use of low-GWP (global warming potential) alternatives by increasing operating costs for high-impact substances. The market has also seen growing integration of heat pumps with cooling capabilities[80] and growing adoption of smart building automation systems, which optimize cooling efficiency and reduce electricity consumption.

Heat/Cold Storage
The momentum behind heat pumps and energy-efficient cooling systems has driven notable growth in the market for thermal energy storage solutions in Germany. In 2024, the thermal energy storage market size in Germany was

[76] Germany HVAC Market 2025-2033 Trends and Competitor Dynamics: Unlocking Growth Opportunities; Germany Air Conditioner Market Size & Share | Report 2034
[77] https://www.linkedin.com/pulse/germany-air-conditioning-systems-market-outlook-2025-2032-1ksuc/
[78] Klimageräteproduktion in Deutschland seit 2019 stark angestiegen | POPULÄRE PRESSE
[79] EU Regulation concerning fluorinated greenhouse gases | Umweltbundesamt
[80] Kühlen mit Wärmepumpe: Kosten & Förderungen | klimeo

approximately USD 291.6 million (around €250,28 million) and is forecasted to grow at a Compound Annual Growth Rate (CAGR) of around 11.6% from 2025 to 2035.[81]

Central Ventilation with Heat Recovery
Central ventilation systems with heat recovery (HRVs) have demonstrated steady growth in recent years. The global heat recovery ventilator market is projected to grow at a CAGR of about 5.2% from 2025 through 2030. This market growth is driven by increasing consumer awareness of indoor air quality, stricter building codes emphasizing energy efficiency, and the rising prevalence of respiratory health concerns. The market for these systems is also expected to benefit from the integration of smart-home technologies allowing remote control and real-time air quality monitoring.[82]

In 2024, Germany held the largest revenue share in the European HRV market, accounting for 32.4% of the total. As a frontrunner in green building initiatives and energy efficiency regulations, Germany has established itself as a key market for HRVs across Europe. One of the challenges for central ventilation systems remains their limitation mostly to new constructions or major renovations, as retrofitting older buildings is often costly or technically difficult.[83]

Decentral Ventilation with Heat Recovery
Germany stands out as the lead market for decentralized ventilation, boasting the highest number of installed systems worldwide.[84] Decentral ventilation plays a large role in renovations as they are a cheaper and more flexible option compared to central systems. Decentral ventilation systems are eligible for BAFA, KFW, and state level support schemes just like central ventilations systems, while SMEs are also encouraged to upgrade and implement ventilation systems with heat recovery to lower their energy consumption.

3.5.3 Smart Buildings & Digital Tools

3.5.3.1 Barriers and opportunities

Germany has faced difficulties in multiple sectors to advance digitalisation. Speeding up this process has become the one of the priorities of the new German government under Chancellor Merz. Especially in the buildings and construction sector, major wins in terms of automation, efficiency, comfort, grid stability and renewables integration can be achieved through an uptake in digital building technologies.

A major obstacle is the slow rollout of smart meters, which limits the interoperability and integration of smart solutions and restricts innovative use cases and the adoption of dynamic electricity tariffs. High retrofitting costs for existing buildings and a perceived lack of immediate practical benefits remain significant issues, although the growing availability of wireless and battery-powered retrofit solutions is beginning to reduce this barrier. Data security concerns are particularly strong in Germany, with consumers remaining wary of sharing personal information – especially when data is transferred externally or managed through cloud systems. The technological complexity of smart home solutions, along with the fast pace of development, often makes consumers hesitant to invest until systems mature further and standards become more widely adopted. Compatibility problems between different manufacturers' devices and fragmented data ecosystems also limit broad market penetration, while limited broadband and 5G coverage in some areas continues to hamper the deployment of cloud-based and remotely managed systems.

Despite these persistent challenges, the environment for smart devices and software is gradually improving. Increased digitalization across German society is encouraging more consumers to accept and experiment with smart technologies. The government's ongoing rollout of smart meters, the expansion of high-speed internet connectivity, and the growing introduction of flexible electricity tariffs are creating more attractive conditions for both consumers and businesses.[85]

[81] Germany Thermal Energy Storage Market Insights, Demand
[82] Heat Recovery Ventilator Market Size | Industry Report, 2030
[83] ibid.
[84] Ventilation market - standards, regulations, funding programs
[85] Germany Smart Home Market in North America: Market Dynamics and Forecasts 2025-2033

Furthermore, the electrification of sectors like transport and heating is putting new pressure on the national grid, thereby increasing demand for innovative management approaches such as demand-side response, energy management systems, and predictive maintenance solutions. Interoperability and standardization efforts – driven by industry alliances like EEBus and emerging universal protocols – are making it easier to integrate smart devices from different brands. The adoption of wireless retrofit solutions and cloud-based building management is also facilitating the modernization of older building stock.

In 2025, the German smart home market is valued at €8.65 billion and is set for dynamic expansion. Forecasts indicate a strong CAGR of 12.3% between 2025 and 2033, highlighting the sector's robust momentum and significant growth potential.[86]

New technologies such as IoT integration platforms, comprehensive energy management systems, predictive maintenance software, advanced smart security solutions, cloud-based building management, and artificial intelligence are all playing a growing role in enhancing energy efficiency, comfort, and operational reliability across residential and commercial sectors.

3.5.3.2 Technologies

Building Information Modelling (BIM)
Since 1 January 2021, the use of BIM has been mandatory in many public procurement processes in Germany. Public tenders now include dedicated "information requirement" sections, clearly outlining the data that contractors must incorporate into their BIM models. This is supported by the national initiative BIM Deutschland, which promotes BIM adoption through education and advisory services. However, despite these requirements and the long-standing availability of the technology, BIM is still far from being widely implemented. Adoption often only occurs when explicitly demanded by a client—for instance, when a bank makes it a condition for financing a taxonomically compliant building.

Germany was among the first EU Member States to establish a national BIM strategy: In 2015, the German Federal Government introduced a phased roadmap designed to guide the gradual adoption of BIM in public sector projects. Building on this foundation, four sector-specific implementation plans have since been published, covering the national railway network, trunk roads, waterways, and federal building construction.[87]

The German BIM software market is expected to grow at a compound annual growth rate (CAGR) of about 15.4% between 2025 and 2035[88], significant barriers are slowing this progress. A major obstacle is the high upfront investment in time, expertise, and funding required during "planning phase zero," a stage for which there is typically no dedicated budget. This is compounded by a severe shortage of professionals with the skills to plan, verify, and construct using these complex systems. The process demands extensive reporting and investment in extra software and service providers, yet the added value often remains unclear to stakeholders.

Barriers remain, primarily resistance to change notably among SMEs, high implementation costs and a shortage of qualified personnel.[89] However, as BIM technologies mature and training expands in universities and vocational schools[90], these challenges are expected to diminish. German companies are gradually catching up to more digitally advanced countries like the Netherlands, where firms such as Edge Technologies already offer digitized building lifecycle management solutions.

Furthermore, even when BIM is used, the digital workflow frequently breaks down. Initiatives like the BIM-Portal launched in 2022, and adherence to international standards (notably ISO 19650) aim to standardise data exchange, but the reality is often different[91]. For example, a sophisticated BIM model might be created for a project, but digitalisation comes to a halt when submitting information to authorities. Crucially, the client is often unable to use

[86] Germany Smart Home Market in North America: Market Dynamics and Forecasts 2025-2033
[87] https://build-up.ec.europa.eu/system/files/2025-03/q05EAijs3Y_31_03_2025_123222.pdf
[88] Germany Building Information Modeling (BIM) Software Market Size
[89] Germany Building Information Modeling (BIM) Software Market Size
[90] https://build-up.ec.europa.eu/system/files/2025-03/q05EAijs3Y_31_03_2025_123222.pdf
[91] Ibid.

the model for its intended long-term purposes, such as facility management, because the data points for maintenance are not active or properly integrated, rendering the model a static file rather than a dynamic tool.

Demand Side Management (DSM)

The short-term growth prospects for DSM in Germany remain moderate but promising. While the market for flexibility services has matured and the number of DSM service providers has increased, awareness and understanding of DSM among businesses that could benefit most remains relatively low. The current very low wholesale electricity prices reduce the financial incentives for DSM participation. Additionally, the required response times—15 minutes for tertiary control and 5 minutes for secondary control—pose operational challenges for some businesses. Market entry thresholds are also high, with a minimum capacity of 5 MW needed for secondary and tertiary balancing market participation, meaning that aggregation is essential for smaller entities to engage.

However, the growing implementation of energy management systems in commercial and industrial sectors is providing the necessary IT infrastructure for flexible load participation with minimal additional investment. The proliferation of automated production processes also opens new opportunities for DSM engagement. Aggregation of smaller consumers, including households, further broadens participation potential. With the rising adoption of electric mobility, heat pumps, and increasing renewable energy capacity, grid bottlenecks and supply-demand imbalances will intensify, likely resulting in higher flexibility prices and stronger incentives for DSM.

Although no direct subsidies exist specifically for joining DSM schemes, many enabling technologies—such as building automation, energy storage, and energy management systems—are subsidized, providing indirect support to DSM participation.

Germany's demand response management system market was valued at approximately USD 640.9 million in 2024 and is expected to grow at a compound annual growth rate (CAGR) of 13.4% through 2030. The commercial DSM market is likewise forecast to reach USD 25.2 billion in 2025 and expand at a CAGR of 13.3% until 2035. These trends underscore the growing importance of DSM in Germany's energy transition and grid stability strategies.

The global market for commercial demand side management is expected to expand at a CAGR of 13.3% through to 2035, driven by the broader adoption of energy management strategies within commercial buildings. In Germany, the market is experiencing particularly robust growth at 15.3%, underpinned by the rollout of grid-interactive technologies and mechanisms that enable price-responsive energy consumption.

Corporate campuses and shopping centres are now implementing distributed energy resource management systems (DERMS) to enable active load balancing. The integration of rooftop solar panels and battery storage with demand side management protocols is becoming more prevalent, particularly in regions with high energy consumption. Regulatory frameworks that promote flexible tariffs have encouraged facility managers to adopt demand control measures. Additionally, software-based automation tools are being incorporated into HVAC and lift systems to help reduce operational costs. Utility companies are also collaborating to establish networks that provide real-time visibility of electricity loads.[92] Favorable government initiatives for smart grid adoption and EV usage in Germany, is increasing the demand for DSM solution in the country. For instance, in 2024, Germany recorded more than 380,000 new battery-electric vehicles (BEVs), making it fourth largest EV geographic market globally.[93]

Building Automation/ Smart Building Technologies

Building automation and smart building technologies continue to see significant expansion worldwide in both residential and non-residential markets as of 2025.[94] Leading growth drivers include escalating energy-efficiency requirements, the widespread integration of IoT and AI, enhanced demand for occupant comfort, and regulatory policies.[95] The scope of building automation now spans not only HVAC, lighting, and shading but also security, predictive maintenance, advanced energy management, and seamless integration through cloud-based and IoT-

[92] Commercial Demand Side Management Market | Global Market Analysis Report - 2035
[93] Europe Demand Side Management Market Size, Statistics Report 2034
[94] Building Automation Systems Market Size, Share | Report [2032]
[95] Marktgröße und -anteil von Gebäudeautomationssystemen, Wachstumsbericht 2037

enabled platforms.[96] Cutting-edge technologies such as wireless controls, AI-optimized management, and real-time sensor data underpin the market's rapid evolution.[97] Building automation remains instrumental for optimizing energy consumption – modern systems can cut energy use by 30 %.[98]

Digital Analytics

Digital analytics and drone-based technologies are now widely used across Germany for building inspections, energy audits, and the identification of renovation and renewable energy potentials.[99] These digital methods have moved far beyond basic BIM environments, supporting both small-scale building assessments and large-scale infrastructure analysis through high-resolution imaging, thermal cameras, 3D modelling, and satellite data integration.[100]

The German State of Baden-Württemberg uses satellite images as well as laser scans, to create a digital map, which identifies the solar potential of every roof in the south-western state automatically. It thereby allows the citizens to see whether or not their home would be suited for a solar installation within just a few minutes. The digital solar potential map created by the Landesanstalt für Umwelt Baden-Württemberg (LUBW) is actively maintained.[101]

[96] IoT in Building Automation: HVAC, Lighting & Energy Use Stats | PatentPC
[97] Marktgröße, Nachfrage und Prognose für Gebäudeautomation und -steuerung bis 2032
[98] Smart Buildings: 30% Energieeinsparung durch KI-Technologie
[99] Branchen mit der größten Nutzung von Wärmebilddrohnentechnologie (2025) - Fly Eye
[100] Drone Roof Inspection Market Size, Share & Statistics 2035
[101] Karten - Energieatlas

4 Market trends

This chapter explores five key market trends currently shaping the German sustainable construction market. These trends are embedded in the broader evolution of the market structure and policy objectives presented in previous chapters. All together, these trends contribute to achieving Germany's current priorities and challenges in the construction sector: decarbonising the existing building stock quickly at scale and addressing the national housing crisis.

These trends focus on specific technical solutions, products and services, highlighting potential opportunities for companies looking to establish or strengthen their presence in the German market. The trends were identified based on an assessment of their relevance in regard to the previously analysed regulatory framework (Chapter 2) and market evolutions (Chapter 3) and backed by interviews with representatives from the **Deutsche Energie-Agentur (dena)**, Germany's national energy agency responsible for promoting energy efficiency and sustainable energy systems, and the German Federal Construction Business Association (**Hauptverband der Deutschen Bauindustrie – HDB)**, the leading business association representing the interests of the German construction industry. These interviews were used to validate the identified trends and provide additional insights from both the point of view of public authorities and relevant industry stakeholders. It should be noted that the selection and categorisation of key trends is inherently challenging, as boundaries may be drawn differently depending on individual perspectives. Nevertheless, all major topics relevant to the sector are addressed in this chapter. Each trend is illustrated by a recent case study from Germany.

4.1 Sustainable Heating & Renewable Energy Integration

One of the most dynamic trends in the German energy construction sector is the rapid shift towards sustainable heating solutions and the integration of renewable energy technologies.

The heat pump market is experiencing a significant boom, with a market size of almost €1.5 billion[102] and 64.6% of all newly approved residential buildings to be equipped with heat pumps[103] in 2024. This development is strongly driven by the GEG 2024, which mandates that at least 65% of the energy used in new heating systems must come from renewable sources. Significant subsidies – covering up to 70% of installation costs, with a maximum of €21,000 per project – are further accelerating this transition.

The integration of solar photovoltaic (PV) systems, particularly Building-Integrated Photovoltaics (BIPV), is also gaining momentum. The market has seen rapid growth, highlighted by the installation of 435,000 new balcony solar systems in 2024, accounting for 2.6% of new PV capacity. This trend is complemented by a growing demand for battery storage and smart energy management systems, enabling more efficient use and storage of renewable energy.[104]

Energy contracting is becoming an increasingly popular model, especially in the non-residential sector, including offices, commercial properties, and public buildings. This approach is frequently used to meet the GEG requirements – such as the 65% renewable energy rule – and to access higher subsidy rates.

Hybrid systems, combining heat pumps, PV, and thermal storage, are being adopted more widely, offering integrated solutions for both heating and electricity needs. Additionally, the expansion of renewable district heating networks, guided by Municipal Heat Plans, is further contributing to the decarbonisation of the built environment in Germany.

Case-Study 1: Contracting for the Koblenz University of Applied Sciences (2022)

[102] Marktgröße für Wärmepumpen in Deutschland, Wachstumsanalyse 2025-2034
[103] Germany: new home heating sources 2024| Statista
[104] Bundesnetzagentur - Press - Growth in renewable energy in 2024

In 2022, the Koblenz University of Applied Sciences initiated a comprehensive energy performance contracting (ESC) project across three campuses. The project was established through a ten-year agreement between the university, the State Enterprise for Property and Construction Management (LBB), and E1 Energiemanagement GmbH, an energy service provider.

The ESC framework enables the implementation of a wide range of measures aimed at improving energy efficiency, increasing on-site renewable energy generation, and reducing operating costs. Key actions include a large-scale upgrade to LED lighting systems, the installation of PV panels, and the deployment of combined heat and power (CHP) units capable of producing both electricity and heat.

E1 Energiemanagement is contractually obligated to meet defined energy and emissions reduction targets and is investing €6.5 million in new technical systems. The company's investment is refinanced through a share of the university's future energy cost savings, particularly in electricity procurement.

Upon completion of the planned measures, the university expects to achieve a 30% reduction in energy consumption and a 40% decrease in CO2 emissions – equivalent to 950 tonnes annually. The resulting lower energy costs will also release additional funds, supporting teaching and general university operations.[105]

Figure 10: Photovoltaic panels installed on the rooftops of the Koblenz University of Applied Sciences[106]

„Für uns ist ESC ein gutes Modell, um externes Know-how zu nutzen und Effizienzmaßnahmen direkt aus den Einsparungen zu refinanzieren."

"For us, energy performance contracting (ESC) is an effective model to leverage external expertise and to directly refinance efficiency measures through the resulting savings."

– Holger Basten, Managing Director, LBB

[105] Energetische Sanierungen: HS Koblenz installiert Photovoltaik-Anlage am Campus Höhr-Grenzhausen; Rheinland-Pfalz
[106] Source: dena/Thomas Frey

4.2 Digitalisation, smart buildings & AI-based energy management

Digitalisation is rapidly transforming the German energy and construction sector, with a strong focus on smart building technologies and intelligent energy management. One of the most significant developments is the accelerated rollout of smart metering systems. Supported by confirmed price caps and an enhanced legal framework, the MsbG mandates the installation of certified smart meters, with an ambitious rollout target of two million units per year. These smart meter gateways enable secure data communication and seamless grid integration, paving the way for new grid services such as demand response and intelligent load management.

Smart energy management is also gaining momentum, particularly through new regulatory requirements affecting non-residential buildings. From 2025, large companies with annual energy consumption above 7.5 GWh will be obliged to implement certified energy management systems in accordance with ISO 50001 or EMAS. The VALERI standard further encourages companies to either adopt efficiency measures or cover at least 30% of their energy needs with renewables. The integration of smart meters with advanced building automation systems is facilitating comprehensive energy management, enabling real-time data analytics for energy consumption optimisation and predictive maintenance. Additionally, these developments are giving rise to new compliance solutions, including ISO 50001 implementation and VALERI compliance services.

Moreover, artificial intelligence (AI)-based solutions are becoming increasingly important in the sector. AI-supported building control systems, particularly for the integration of sensor technology and monitoring, are enabling more precise and adaptive management of building operations. These systems can analyse large volumes of real-time data to optimise heating, cooling, lighting, and ventilation, significantly improving energy efficiency and occupant comfort. Furthermore, the concept of the digital twin is gaining traction: digital twins create a virtual representation of a building, allowing for advanced simulation, monitoring, and optimisation throughout the building's lifecycle. This not only enhances operational efficiency but also supports predictive maintenance and long-term sustainability goals.

Mentioned previously, Building Information Modelling (BIM) remains a key trend, becoming mandatory for public sector projects and increasingly required in private developments, but is hampered by concrete implementation challenges among project stakeholders. As BIM software tools embarking AI are emerging, a new generation of digital products may help overcome these roll-out issues by supporting data collection, data cleaning and interface issues between companies.

Another field of innovation, enabled by the development of digital solutions, Internet of Things and energy management software, is integrated neighbourhood energy management. By pooling several buildings owned by the same entity, for example a municipality, energy consumption can be managed across multiple buildings, allowing for economies of scale and load shifts between buildings. This innovative “building pooling” approach is promoted by the Germany Energy Agency (dena)[107] and appears particularly relevant in the context of energy-contracting agreements between a public or non-residential building owner and an Energy Service Company (ESCO).

Case Study 2: Hammerbrooklyn Digital-Campus (2021)[108]

Opened in 2021, the Hammerbrooklyn Digital Pavillon is a striking landmark on the Hammerbrooklyn Digital Campus in Hamburg. Originally constructed as the USA Pavilion for Expo Milan, the building was later relocated to Hamburg and now serves as an innovation hub offering state-of-the-art workspaces, teaching and event rooms, as well as areas for studios, retail, and gastronomy.

[107] Energiespar-Contracting
[108] https://hammerbrooklyn.hamburg/

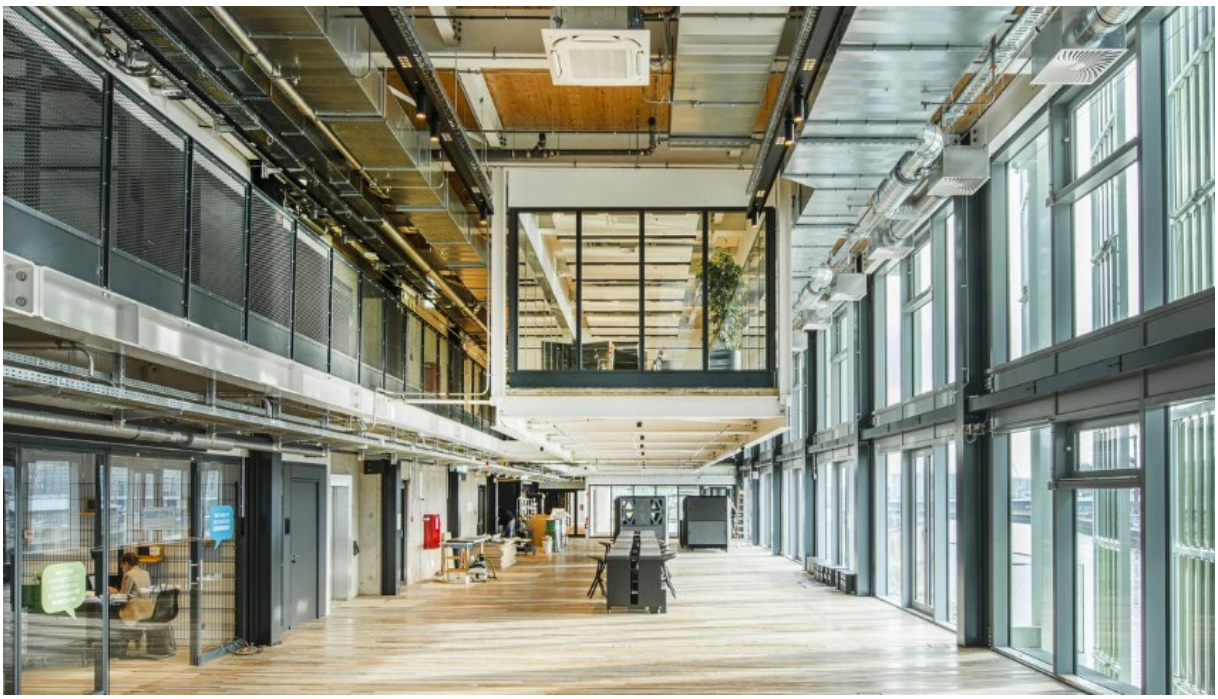


Figure 11: Hammerbrooklyn.DigitalPavillon[109]

The office building, developed by Art-Invest Real Estate, was the first in Germany to receive the new Smart Score smart building certification from Wired Score, that was developed in collaboration with over 100 property owners, users and consultants from some of the world's most advanced buildings. In 2021, the Hammerbrooklyn Digital Pavillon was awarded Platinum status and achieved the highest score ever recorded, making it the world's "smartest certified building" at the time – a status it still holds as a reference project in the field.

Designed as a customised smart building, the pavilion is tailored precisely to the needs of its users. Artificial intelligence optimises energy consumption, drawing on data from more than 10,000 data points and over 400 sensors installed throughout the building. All building functions can be managed via a dedicated app, allowing office users to book rooms, regulate temperatures, order food, and much more, creating an outstanding user experience and operational efficiency.[110]

„Wir sind sehr stolz, nicht nur das erste SmartScore-zertifizierte Smart Building in Deutschland entwickelt zu haben. Es zeigt uns, dass wir mit unserem Verständnis von Smart Buildings als wichtigem Baustein unserer Nachhaltigkeitsstrategie auf dem richtigen Weg sind, Immobilien zukunftsfähig zu denken."

"We are very proud not only to have developed the first SmartScore-certified smart building in Germany.. This demonstrates that our understanding of smart buildings as a key component of our sustainability strategy is the right approach to making real estate fit for the future."

– Arne Hilbert, Managing Director, Art-Invest Real Estate

4.3 Circularity, Sustainable Materials and Low-Carbon Construction

The transition towards a circular economy and the use of sustainable, low-carbon and renewable materials is becoming a defining trend in the German construction sector, although it is still far behind European neighbours such as the Netherlands.

[109] Source: Art-Invest Real Estate Real
[110] Das wahrscheinlich intelligenteste Gebäude der Welt steht in Hammerbrook - ganz-hamburg; Hammerbrooklyn Digital-Campus

Several regulatory drivers are accelerating this shift. Whole-Life Cycle Assessments (LCA) are increasingly required for federal buildings as well as to apply for BEG NH subsidies. The EU Taxonomy introduces sustainable finance requirements for construction projects, while the latest DGNB (German Sustainable Building Council) Version 2023 includes enhanced criteria for circular economy practices. Environmental Product Declarations (EPDs) are gradually being deployed for key building materials. These expanding requirements are encouraging demand for low-carbon materials, as the market is gradually looking for alternatives to traditional, emissions-intensive options.

In particular, wooden construction using cross-laminated timber (CLT) and other mass timber products is gaining traction as a sustainable alternative to steel-reinforced concrete structures. This trend is supported by several "flagship" projects across the country, such as the Roots Hamburg[111] high-rise tower, finalised in 2024, which is currently the highest timber construction in Germany with 18 storeys. Sector-driven initiatives such as the Holzbau Akademie[112] provide knowledge, technical support and training for practitioners to accelerate the uptake of this techniques in larger projects.

Circular approaches, trough material reuse and recycling, also showcase an upward trend. In road construction, the recycling rate of mineral building material can reach over 90%, according to a 2023 report of the Initiative Kreislaufwirtschaft Bau[113], which is a partnership between the leading German construction and demolition business associations. Menwahile, more advanced reuse of building components and materials remains marginal in Germany, though some pioneering companies such as the start-up CONCULAR (see Case Study 3) have emerged in the last years.

The Federal Ministry for the Environment and Costumer Protection (BMUV) issued in 2023 key measures for the integration of recycled mineral substitute materials in construction products and introduced the a Substitute Building Materials Ordinance (Ersatzbaustoffverordnung) alongside a revision of the Federal Soil Protection and Contaminated Sites Ordinance and of the Landfill and Commercial Waste Ordinance. However this package of measure is seen as insufficient to unlock a truly circular construction economy. Current waste laws on federal level create significant obstacles by often classifying removed components as "waste," which imposes complex handling requirements and legal risks. Furthermore, building regulations are tailored to new products with clear certifications, leaving architects and engineers to bear the full liability for the performance of reused materials, which lack such guarantees. According to KPMG[114], a new legal framework is needed to establish clear "end-of-waste" criteria, create standards for re-certifying used components, and reduce the legal uncertainties that currently hinder the widespread adoption of material reuse.

While legal frameworks are insufficient on federal level, the state of Baden-Württemberg appears to be the most advanced region, with the publication in April 2025 of a Guideline for the reuse of load-bearing steel components.[115] It is likely that other states, such as Hamburg and Berlin, will follow soon.

Case Study 3: Circularity in refurbishment: Allianz Headquarters (2025)

The Allianz Headquarters in central Munich is currently being refurbished, with a strong focus on material reuse. According to Concular – a German start-up specialising in circular economy solutions for the construction and real estate sectors – around 60% of global waste is generated by construction projects, underlining the urgent need for more circular practices in the industry.

As part of the refurbishment, Concular conducted a comprehensive re-use assessment to identify valuable materials and building components within the existing structure. This process revealed several hundred square metres of high-quality partition walls, extensive ceiling and wall panels, approximately 200 lighting fixtures, and numerous other elements suitable for reuse. These materials will be integrated into new construction projects

[111] ROOTS: ROOTS Hamburg
[112] HOLZBAU AKADEMIE | Kompetenz im Holzbau stärken | zukunftsfähige Bauweise fördern
[113] Kreislaufwirtschaft BAU
[114] Circular economy: the construction sector needs a new legal framework - KPMG-Law
[115] Leitfaden zur Wiederverwendung tragender Bauteile

across Germany, supporting both resource conservation and a sustainable building culture aligned with circular economy principles. [116]

> ***„Ohne Bauwende wird es keine Klimawende geben. Das zirkuläre Bauen und der Einsatz von vorhandenen Ressourcen aus bestehenden Objekten werden die Branche dorthin bringen."***
>
> *"Without a transformation in the construction sector, there will be no climate transformation. Circular construction and the use of existing resources from current buildings will lead the industry in that direction."*
>
> *– Annabelle von Reutern, Head of Business Development, Concular*

4.4 Serial renovation & simple construction

Germany's construction and energy sector is currently shaped by the tension between ambitious renovation and construction targets and a significant shortage of skilled labour. Around **27% of German construction businesses** reported disruptions due to a lack of skilled workers in early 2025, as documented in the KfW-ifo Skilled Labour Barometer[117]. Accelerated project delivery is essential to achieve the 2030 renovation targets and address the housing crisis.

One promising solution is the increased use of factory-based production, which can compensate for the lack of skilled workers on construction sites. This shift has driven rapid growth in the market for serial renovation and prefabrication, supported by numerous pilot projects and sector-wide initiatives such as Energiesprong DE[118], supported by the German Energy Agency (dena). dena sees a significant potential to further strengthen modular construction and serial renovation practices in Germany. An interviewed expert highlighted ongoing research projects aimed at scientifically validating the load-bearing capacity and other key aspects of modular components in laboratory settings. The emergence of the first German companies specialising in serial renovation, such as ECOWORKS[119] and MODUCON[120], further underscores this trend.

As a result, there is rising demand for standardised renovation components and serial renovation services, as well as for the technological integration of digital tools – such as BIM-to-manufacturing workflows – into the renovation process. Additionally, the development of robotic manufacturing capabilities is becoming increasingly important to support efficient, high-quality factory production and to help bridge the labour gap. The integration of modular approaches with circular business models, tapping into synergies to increase the climate impact of these solutions, is currently being explored through project-based collaborations (see Case Study 4) and should be expanded in the future.

Complementing the trend towards prefabrication, the German construction sector is increasingly recognising the value of simplicity in design and execution, as reflected in the growing interest in the "Simple Cnstruction" ("Einfaches Bazuen") approach and the "Building Type E" ("Gebäudetyp E") concept, championned by the Bundesarchitektenkammer e.V.[121] and Technical University Munich (TU München)[122]. This movement aims to address both resource constraints and regulatory complexity by promoting a construction culture that prioritises essential needs, straightforward construction methods, and reducing technical specifications to what is necessary and sensible for a given use, focusing on robust, durable, and easily repairable structures. By limiting complexity in both design and building services, this approach not only accelerates planning and construction processes but also lowers costs and minimises the risk of construction errors

[116] Über Concular – Concular – Zirkuläres Bauen; Zirkularität bei der Sanierung: Allianz Headquarter als Beispiel für die Kreislaufwirtschaft – Concular – Zirkuläres Bauen
[117] Economic Slowdown Eases Shortage of Skilled Workers in Germany | ifo Business Survey | ifo Institute
[118] Startseite | Energiesprong DE
[119] 360° serial renovation with ecoworks – Fast. Economical. Scalable.
[120] Moducon - Generalplanung für serielle Sanierung und modulares Bauen
[121] Einfach bauen: Gebäudetyp E – Bundesarchitektenkammer e.V.
[122] Einfach bauen | Technische Universität München

Since July 2024, the Federal Ministry of Housing, Urban Development and Construction (BMWSB) has adopted the concept and released Guidelines for Simple Construction[123]. Recommendations for example include allowing to reduce the thickness of concrete or wood floors, or to lower the amount of electric cables and plug points per housing through better design and planning. The Federal Government is also considering a Building Type E-Bil[124]l which would amend the current Construction Contract Law (Bauvertragsrecht) to support faster approval procedures and greater flexibility for architects and builders in complying with non-compulsory building standards. This proposal was put forward by the previous government and has therefore not yet been reconsidered, however it can be assumed that the new government would carry on with this proposal, as it is in line with broad bureaucracy simplification priorities and the announced "Construction Turbo".

Case Study 4: Energiesprong Daycare Centre in Frankfurt am Main

The "Kita am Wiesenrain" daycare centre in Frankfurt am Main exemplifies the challenges faced by many German cities: numerous public buildings, including many kindergartens, are housed in older structures – in this case, built in 1995/96 – with inadequate insulation, resulting in high heating and cooling demands. A common issue for cities like Frankfurt is the lack of alternative accommodation for building users during major energy retrofits. Consequently, there is a strong demand for renovation solutions that can be implemented rapidly and with minimal disruption to ongoing operations.

Figure 12: Serial refurbishment of a daycare centre in Frankfurt am Main[125]

In this daycare centre an innovative approach to modernisation has been piloted. Using a serial renovation solution developed by MODUCON, the Kita am Wiesenrain was brought up to contemporary climate standards in record time. The installation of 65 prefabricated façade modules was completed within just five working days, allowing the daycare to remain operational throughout the process. The measures included prefabricated timber façade elements with integrated windows and cellulose insulation, as well as the renovation and insulation of the roof. This project demonstrates how serial renovation can offer municipalities a practical, scalable pathway to achieving ambitious climate goals – without lengthy building closures or major disruptions to everyday life.[126]

In addition to accelerating the renovation process, MODUCON sought to advance circular practices in the building sector by maximising the reuse of materials from the existing structure. The former façade of the daycare centre

[123] BMWSB Aktuelle Meldungen - Der Gebäudetyp E - BMWSB
[124] Infopapier_Gebaeudetyp-E-Gesetz.pdf
[125] Source: Moducon, Dorian Schott
[126] Serielles Sanierungsprojekt: Kita in Frankfurt a. M. | Energiesprong DE

was carefully dismantled and, using the CONCULAR online platform (see Section 4.3), connected with a new owner who will integrate these reclaimed materials into a different construction project.

> ***„Uns ist es wichtig, nachhaltige Architektur zu gestalten, die Bestand hat. Deshalb wollen wir nicht nur mehr Tempo in die Sanierung, sondern gleich noch die Materiallager der Zukunft an die Wand bringen."***
>
> *"It is important to us to create sustainable architecture that stands the test of time. That's why we not only want to accelerate the pace of renovation, but also bring the material stores of the future directly onto the walls."*
>
> *– Marius Mersinger, CEO Moducon*

4.5 Climate Resilience & Adaptation

Germany is increasingly confronted with extreme weather events, which are having a significant impact on the construction sector and driving both policy and market responses. In 2023, weather-related insured losses reached €4.9 billion, underlining the urgent need for action. The severe flooding events in the federal states of North Rhine-Westphalia and Rhineland-Palatinate in 2021, in particular, have heightened political awareness and momentum for climate adaptation measures.

In response, the German government has introduced the updated Climate Adaptation Strategy 2024 (Deutsche Anpassungsstrategie an den Klimawandel 2024 – DAS 2024), which serves as the country's new comprehensive national framework for adaptation. This was accompanied by updates to the building codes, which now include enhanced requirements for climate resilience, raising the standards for both new construction and renovation projects. Planning regulations have also been tightened, making climate risk assessments mandatory for all new developments to ensure that potential climate hazards are systematically addressed from the outset. At the European level, the EU Taxonomy further reinforces these efforts by identifying climate adaptation as a key criterion for the classification of sustainable finance, thereby creating additional incentives for resilient construction practices.

To support implementation of the DAS, the Federal Ministry for the Environment, Climate Protection, Nature Conservation and Nuclear Safety (BMUKN) updated and expanded its funding programme for adaptation measures (DAS-Förderrichtlinie) for the 2021-2026 period. The funding aims to support local authorities, municipal institutions and other stakeholders in implementing the necessary adaptation processes to the consequences of climate change as early as possible, systematically and in an integrated manner.

These regulatory developments are accompanied by a growing demand for technical solutions and services within the sector. Smart water management services, such as integrated stormwater collection and management systems, are increasingly sought after to address the rising risk of urban flooding. At the same time, green infrastructure planning and delivery – incorporating features like living roofs, green walls and the integration of urban biodiversity – are becoming standard elements of climate-resilient urban design. Moreover, there is a notable increase in the adoption of climate-proofing solutions, particularly building technologies and materials that are resistant to flooding and extreme heat, including climate-resilient construction materials and protective coatings.

Numerous cities have developed dedicated initiatives, such as the "sponge city" (Schwammstadt) concept, which is promoted by the German Federal Environmental Agency (Umweltbundesamt – UBA)[127] and widely implemented across Germany. This approach seeks to transform urban environments by integrating permeable surfaces, green spaces, and water-retentive infrastructure, enabling cities to absorb, store, and gradually release rainwater – thereby reducing flood risks and mitigating the impacts of heatwaves. Financial institutions – particularly banks and insurance companies – are placing increasing pressure on the sector, as they must finance and insure assets exposed to climate risks. Their calls for greater transparency and resilience in construction projects are helping to drive the integration of climate adaptation measures across the industry. However, there is a prevailing tendency to prioritise new road construction and the development of car-centric infrastructure over the removal of

[127] Schwammstadt – Zukunftskonzept für klimaresiliente und lebenswerte Städte | Umweltbundesamt

impervious surfaces and the creation of additional green spaces, which limits the potential for urban areas to adapt effectively to climate-related risks.

Case Study 5: Pilot Project for Heavy Rainfall Prevention in Hamburg-Billstedt

The Hein-Klink Stadium in Billstedt, originally constructed in 1930, has been undergoing comprehensive modernisation since spring 2019. The redevelopment is not limited to upgrading the facility with modern, multifunctional sports spaces; it also introduces a pioneering solution below ground. An innovative emergency drainage system, utilising infiltration trenches, has been implemented to mitigate the risk of flooding in the neighbouring community during episodes of heavy rainfall. When the local stormwater sewers become overwhelmed, excess water is channelled to the stadium's lower-lying terrain, where it is absorbed through the subsurface infiltration system beneath the playing fields. A notable aspect of this project is its capacity to handle exceptionally intense, though infrequent, rainfall events. In such scenarios, the sports field itself functions as a temporary reservoir, with surplus water rising through the overflow and briefly transforming the stadium into a basin for water retention and evaporation. This integrated approach not only enhances local flood protection but also promotes the natural percolation of rainwater.[128]

Figure 13: Hein-Klink Stadium was designed to serve as emergency overflow for rainwater drainage[129]

[128] Hein-Klink-Stadion - RISA Hamburg
[129] Source: RISA Hamburg.

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