

# Construction and Green Building in Germany

ISSUE 2018/2019



**Germany is Europe's leading construction market and home to the continent's largest building stock. A number of drivers have created impressive growth in the construction and heating, ventilation, and air conditioning (HVAC) sectors that is expected to continue in the coming years. Germany offers a fantastic investment landscape and a buoyant sales market for international companies with innovative energy- and resource-efficient solutions.**

## Growing Construction Market

The German construction market has experienced substantial growth in recent years with investments expected to increase further still. Federal Statistical Office figures show the sector's revenues increased by 7.5 percent in 2016. Although the German construction market is highly consolidated, strong growth presents international companies with an opportunity to enter the market with innovative products and services. Residential buildings are responsible for the lion's share of market activity. The enduring attractiveness of the new-build sector is reflected in the high number of building permits being issued. Estimates suggest that between 350,000 and 400,000 new dwellings need to be built every year to meet demand, with Germany's seven largest cities (Berlin, Munich, Hamburg, Cologne, Frankfurt, Stuttgart, and Dusseldorf) under particular pressure to build. Despite the bright outlook for new construction, DIW Berlin (German Institute for Economic Research) expects new growth to shift gradually towards work on existing building stock, where growth of six percent and more than seven percent is expected in 2018 and 2019 respectively.

## Robust HVAC Market

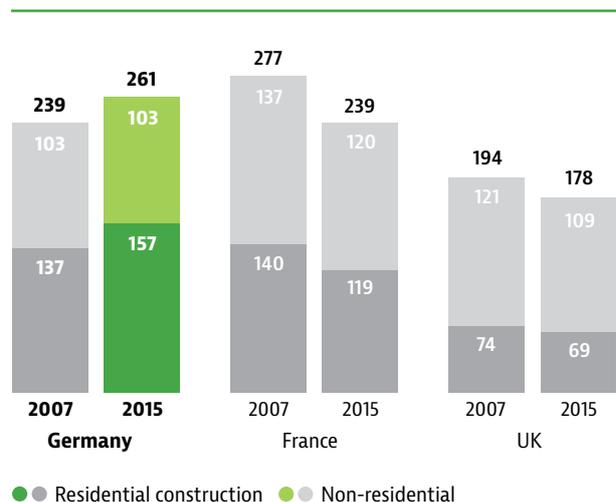
2017 was a strong year for Germany's HVAC sector. According to BDH German heating industry association figures, more than 700,000 heating systems were sold in the German market – a plus of three percent on 2016. Gas-fired condensing boilers remained the most commonly installed heating technology, with almost half a million units sold in 2017 (four percent year-

on-year increase). Some 78,000 heat pumps were sold during the same period (17 percent increase). More than 1,500 fuel cell units were installed in German basements in 2017, the majority co-funded under the government's market introduction program. Solar-thermal installations were down in 2017, with 625,500 square meters installed over the year.

## Market Growth Drivers

Demographic change, economic confidence, and attractive government incentives are just some of the local factors driving construction market activity in Germany. Global factors such as climate change, increasing urbanization, and digitalization (e.g. BIM and BEMS) are also moving the German building industry. Furthermore, the circular economy and resource efficiency are playing an increasingly important role in Germany's construction sector.

**Investment in Construction 2007 and 2015**  
in EUR billion (rounded values)



Source: BBSR/Eurostat 2017

## Developing Market Segments

**Demographic change, economic confidence, and attractive government incentives are just some of the local factors driving construction market activity in Germany. Global factors such as climate change, increasing urbanization, and digitization are also moving the German building industry, spurring innovation and creating opportunities for new market entrants.**

### Heat Recovery in Ventilation Systems

As buildings become more airtight, the need for active ventilation systems to deliver fresh air to homes and workplaces is growing. Ventilation systems can improve air quality, comfort levels, and health by expelling moisture, odors, volatile organic compounds, and carbon dioxide. Systems that include heat recovery are particularly efficient. Up to 90 percent of the heat lost through airing rooms by opening windows or doors is instead recovered and reused – reducing both energy use and heating costs. Regulated air flows enable heating systems to be optimized. Funding for ventilation systems with heat recovery from the country's KfW development bank was introduced in 2016 for projects that include building envelope insulation or efficient windows.

### Drain Water Heat Recovery

Drain water heat recovery (DWHR) systems – whether built into showers, main drain pipes, or gray water systems – can often be credited as compensatory measures under renewable energy requirement regulations and efficiency funding programs. At the time of writing, small-series funding was being launched to support the market entry of decentral DWHR units.

### Building Energy Management Systems

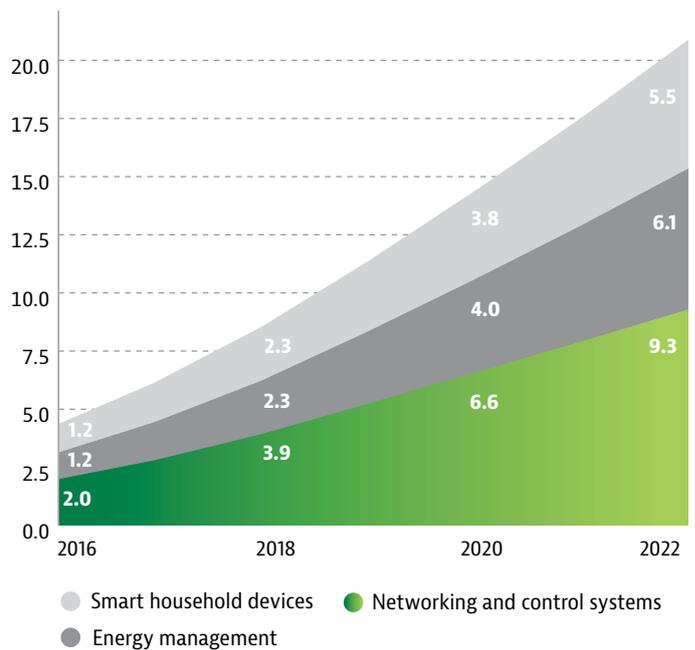
Building Energy Management Systems (BEMS) reduce energy consumption and increase comfort levels in larger buildings by monitoring and controlling energy use – be it for heating, ventilation, air conditioning, lighting, vehicle charging stations or any other power system – and adapting to internal and external environmental conditions such as air quality, temperature, noise and light levels in real time. BEMS can also trigger alarms, predict problems, and highlight necessary maintenance work in advance. Certain systems can provide demand-side response, thus contributing to Germany's transition to renewable energy. With strong growth both in new construction and energy efficient retrofitting, an increasing share of renewable energy, and demand for more comfortable buildings, the potential market for BEMS is set to expand in Germany in the coming years.

### Smart Home Systems

Through consumer-friendly interfaces, smart home systems control heating, ventilation, cooling, lighting, and smart-home-enabled appliances in order to optimize energy consumption,

increase comfort levels, and improve security. Certain systems can enhance the utilization of local generation assets such as PV and battery systems, heat pumps, heat storage, micro CHP, EV charging, and more. With its 41.7 million dwellings, more than one million of which have rooftop PV, Germany is set to become the largest smart home market in Europe.

**Smart Home Technology Installations Forecast**  
in million households



Source: Statista 2017

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## Building Information Modeling

Whether it is tracking systems for construction machinery, digital construction files, or drones flying above a building site to check the construction status - digitization has arrived in the German construction industry. Of the many trends changing the way buildings are planned, built, and managed, building information modeling (BIM) is expected to have the most disruptive impact.

Architects, engineers, construction companies and scientists are collaborating in numerous clusters across Germany to further develop the new method for integrated digital planning and construction. International companies are invited to join the process of turning BIM from a vision of the future into a construction standard. While BIM adoption is still at an early stage in Germany, companies can benefit from first mover advantages and establish themselves in the market before their competitors. In addition to the private sector, the Federal Ministry of Transport and Digital Infrastructure (BMVI) has developed a "Road Map for Digital Design and Construction," which promotes the development and utilization of BIM as a standard planning tool for all federal infrastructure projects by 2020. A study by the Fraunhofer Institute for Industrial Engineering found that one third of companies surveyed with projects worth more than EUR 25 million already utilize BIM. However, high software costs are discouraging many smaller planners in Germany from using the digital planning method. As a result, business opportunities arise for international companies offering BIM software with an attractive cost-benefit relationship.

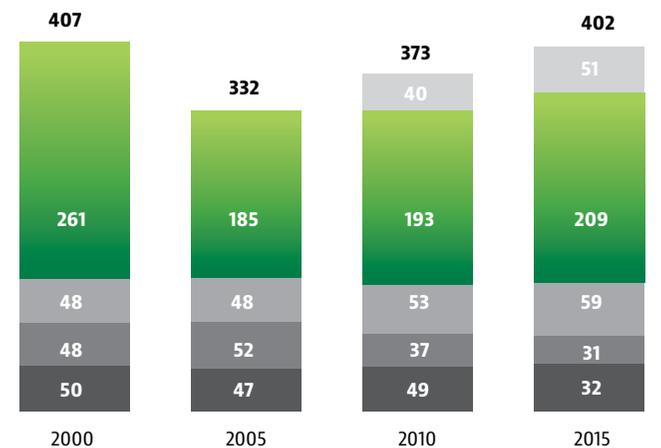
## Resource Efficiency in Buildings

Federal Environment Agency data shows that Germany's construction industry as a whole created 209 million metric tons of waste in 2015, making it by far the country's largest source of refuse. A large proportion of mineral construction waste is used in lower-order operations such as backfilling of excavation sites. However, more than 14 million tons of waste were generated at building sites in 2014, and just 1.4 percent of it was recycled, according to German industry association Kreislaufwirtschaft BAU.

There is a strong need for a more efficient use of resources in buildings, and a clearly defined legal framework is a prerequisite for companies to thrive in this segment. The provisions of the German Waste Management Act (KrWG) are the backbone of Germany's leading circular economy market. The five-step waste hierarchy identifies waste prevention as being preferable to recycling, energy recovery, and disposal. Moreover, the KrWG calls for a mineral waste recycling rate of at least 70 percent by 2020 which has stimulated demand for new recycling technologies and methods.

## Total Waste Volume in Germany

in million metric tons



- Waste from waste treatment facilities
- Construction and demolition waste (incl. road demolition debris)
- Other waste (incl. waste from production and manufacturing activities)
- Waste from extraction and treatment of natural resources
- Municipal waste

Source: UBA 2017

In addition to the legal framework, a number of federal programs – especially in research and development – promote resource-efficiency in buildings. The Technical University of Berlin, RWTH Aachen, and the University of Kassel are three academic institutions with a notable focus on resource efficiency in buildings. The Fraunhofer Building Innovation Alliance carries out R&D on construction material reclamation and categorization for recycling, water reuse, and the treatment of polymers and composite materials. The main research program in the field of future buildings, *Zukunft Bau*, also emphasizes improving building material recycling and maximizing the efficient use of mineral resources. One *Zukunft Bau* project is developing technologies to reuse the raw materials contained in mixed construction waste and includes the installation of pilot plants.



[https://twitter.com/GTAI\\_Greentech](https://twitter.com/GTAI_Greentech)

# Supporting Business Success

**Germany is one of the most attractive business locations in the world. Located at the center of Europe, the country offers ideal conditions for foreign companies to expand their business. The German legal system protects property and individual rights. Competitive tax regulations and a wide range of funding options offer a strong framework for investment. Germany's excellent infrastructure and its highly qualified workforce contribute to sustainable business success.**

## Attractive Business Expansion Support

Germany offers numerous incentives for foreign companies interested in expanding into the German market. There are a variety of programs available, ranging from cash incentives to labor-related and R&D incentives. Incentives in Germany are designed to meet the immediate capital needs of investors. Early stage investment financing provides funding at the beginning of the new investment project. These incentives, mostly provided as cash grants, are important as they guarantee liquidity at a stage in the investment process when investor capital requirements are typically high. Later stage investment incentives are made available in the form of a raft of programs created to support putting together a workforce in Germany (e.g. through wage subsidies) and provide generous R&D project assistance. Incentives in Germany are available to all investors – regardless of country of provenance. Funding to the tune of more than EUR 19 billion has been freed up by the EU (co-financed using means obtained from German federal and federal state budgets) for the period 2014 to 2020. As well as this, Germany and its individual federal states also make their own incentives funds available to prospective investors.

## World Class R&D

Germany enjoys an excellent reputation regarding its dynamic and innovative R&D environment. With its high innovation output, Germany is a first-rate location for R&D projects. Its unique innovation potential as a research location is widely acknowledged, and according to Ernst & Young, a quarter of decision-makers surveyed believe Germany is the most attractive R&D location in the world. Germany's R&D expenditures are continually rising, reaching almost EUR 89 billion in 2015. Generous public funding programs contribute to the excellent conditions allowing companies from all over the world to carry out their R&D in Germany: setting the stage for international high-tech products "made in Germany." The German federal government promotes research through the High-Tech Strategy. This initiative defines areas of particular significance in terms of their contribution to solving global challenges. Support is also granted to key technologies that act as innovation drivers.

## Excellent Logistics and Infrastructure

Germany is Europe's prime logistics hub, offering a central geographic location paired with reliable and high-quality infrastructure. Companies benefit from easy access to domestic and international markets, with state-of-the-art transportation networks (road, rail, sea, and inland waterways) as well as a dense network of national and international airports. Germany's role as a major player in Europe is reflected in its approximately one quarter share of the European logistics market (EU-28, Norway and Switzerland). Germany has ranked number one in the World Bank's Logistics Performance Index – which especially values the country's outstanding infrastructure, logistics competence and timeliness of shipments – for several years in succession.

## Highly Skilled Workforce

More than 80 percent of the German workforce is in possession of an academic degree or has received formal vocational training. The country's dual education system – unique in combining the benefits of classroom-based and on-the-job training over a period of two to three years – is specifically geared to meet business needs. Recruitment services are actively supported by government agencies. Germany's major metropolitan regions – Berlin, Hamburg, Munich, Cologne, Frankfurt (Main), and the Ruhr region – attract young and highly educated people from across Europe. The resulting multilingual labor pool makes Germany an attractive base for rolling out business to other European countries.

## Quality of Infrastructure 2016

Rank	Country
1	Germany
2	Luxembourg
3	Sweden
4	Netherlands
5	Singapore
6	Belgium
7	Austria
8	UK
9	Hong Kong
10	United States

Source: World Bank Logistics Performance Index 2016

# Energy Efficiency in Buildings

**The combination of progress being made towards energy efficient buildings and the vast stock of older buildings and heating systems mean that international companies with efficient products and services will find vast untapped potential in Germany. The German transposition of the European Energy Performance of Buildings Directive, in the form of a new Buildings Energy Act (GEG), will see numerous building efficiency regulations combined, including requirements for renewables-based HVAC systems.**

## Ambitious Climate Goals

Germany, home of the *Passivhaus* standard, has a proud tradition of innovation in energy-efficient building structures and HVAC systems thanks to an integrated approach of pioneering research, generous incentives, and efficiency regulations. Nevertheless, buildings still account for around 35 percent of Germany's final energy consumption and indirectly for up to 30 percent of its greenhouse gas emissions. The government aims to have a nearly climate-neutral building stock by 2050 which will entail reducing primary energy demand in buildings by 80 percent on 2008 levels. To achieve this, a twofold strategy is being followed: (i) reduce the need for heating through building efficiency measures and (ii) meet any unavoidable demand to an ever greater extent with renewable energy. New building envelopes are subject to tight efficiency requirements, as are the HVAC systems installed to heat them. However, around 63 percent of Germany's building stock was constructed before 1979 (when the first building efficiency codes were introduced) and are, as such, a long way from modern standards. Furthermore, more than 13 million heating systems currently installed in German buildings are considered inefficient.

## Government Incentives

The federal government, states, and municipalities have introduced a wide range of measures to help change this situation and reach the government goals. Germany's KfW development bank has a multi-billion euro program of low-interest loans coupled with repayment grants for efficient construction and renovation. The Market Incentive Program (MAP) supports the installation of solar-thermal, biomass, and heat-pump-based systems. Geothermal and district heating solutions are also supported, for example in municipality-wide projects. There is even a separate program for fuel-cell-based CHP systems in households. Many federal states offer their own additional energy efficiency funding programs for buildings and HVAC systems.

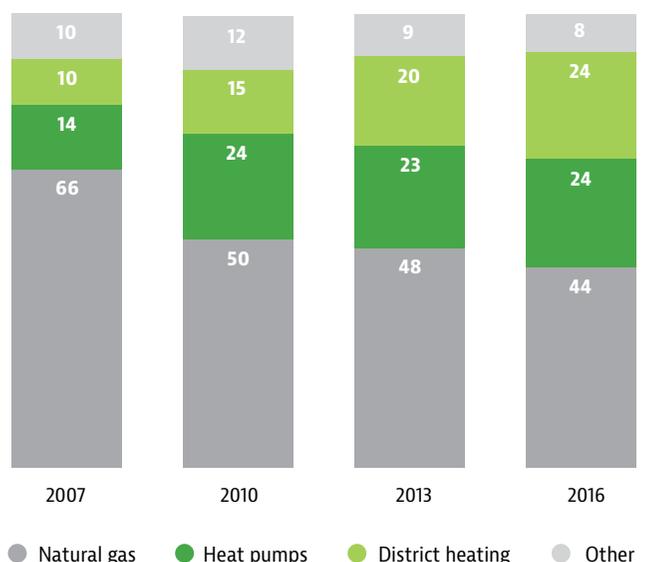
## Changing Market

The integrated approach of funding, research, and regulation has borne fruit. In the past 15 years, German households have reduced the energy needed for heating by around 20

percent, reports DIW Berlin. According to the Federal Statistical Office, sixty percent of the nearly 110,000 residential buildings completed in 2016 were equipped with a renewables-based heating system. In 38 percent of the buildings, this was also the primary source of heating energy. Gas remained the most common primary source (53 percent), with all other sources (e.g. district heating, oil, electricity) accounting for almost ten percent. Where new residential buildings were heated primarily by renewables, this was usually achieved with air-, water-, or ground-source heat pumps. In half of all new residential buildings, heat pumps or gas were the primary and sole heating energy source. Where they were not the sole source, they were most often supplemented with renewable sources. Wood was primarily installed to support air- or water-source heat pumps (23 percent) and geothermal systems (16 percent). Gas was most often combined with solar-thermal technologies (27 percent).

The Federal Ministry for Economic Affairs and Energy supports renewable energy in the heating market through its MAP program with EUR 300 million annually. [www.erneuerbare-energien.de](http://www.erneuerbare-energien.de)

**Primary Heating Energy Source in New Residential Buildings**  
in percent (rounded values)



Source: BDEW 2017

## OUR SERVICES

# About Us

Germany Trade & Invest (GTAI) is the foreign trade and inward investment agency of the Federal Republic of Germany. The organization advises and supports foreign companies planning to expand into the German market and assists German companies seeking to enter foreign markets.

### Investment Location Germany

GTAI provides close-to-market information to international companies looking to enter German markets. Our specialist industry teams prepare all of the relevant information essential to business success in Germany. GTAI's comprehensive range of information services includes:

- Market and industry reports
- Market entry analyses
- Business and tax law information
- Business and labor law information
- Funding and financing information

### Business Location Services

GTAI supports international companies from market entry to business start-up in Germany. Expert project teams advise and assist in the business establishment phase. GTAI's range of free services includes:

- Legal and tax-related project support
- Funding and financing advisory services
- Site visit organization
- Local partner and network matchmaking
- Public and private partner coordination

All investment-related services are provided entirely free of charge. Our specialist industry teams have hands-on experience in their respective industries and treat all investor enquiries with the utmost confidentiality.

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