The German Heating and Cooling Industry
Europe’s Leading Market for Green Building Technologies

Germany has introduced a raft of laws and incentives programs to promote renewable energy sources. The country’s progressive energy policy is a reaction to two of the most pressing challenges of our time: energy security and climate change.

Accordingly, there is a significant need for efficient technologies to reduce primary energy consumption. The government is actively promoting the swift development and integration of renewable and efficient heating and cooling technologies through new laws and attractive incentives.

This promotion has led to a significant market shift in Germany which has seen the heating and cooling industry grow partly as a result. The number of renewable efficient technologies — such as CHP, heat pumps, solar thermal, condensing heating boilers and pellet heating systems — has increased enormously.

Thanks to this market development, research and development in efficient and energy-saving heating technologies is highly concentrated in Germany.
The German Heating and Cooling Industry: Opportunities for Investors

The German government intends to reduce CO₂ emissions by 270 million metric tons by 2020, and further promote the consumption of energy produced from renewable sources.

Buildings account for over 40 percent of German energy consumption; 85 percent of which is used for heating purposes. In private households this figure is as high as 86 percent of total energy consumption.

Of the 17 million heating generators in Germany, only 12 percent could be considered state-of-the-art: 70 percent are between 10 and 24 years old, and 18 percent are older still. As such, significant market and, accordingly, investment potential can be expected in the decades to come.

Around 50 percent of total building stock will be retrofitted within the next 20 years (2.5 percent annually which is equivalent to 950,000 buildings from a total stock of 38 million buildings).

There is an obligation to integrate efficient heating technologies in order to decrease primary energy consumption per m² for new buildings. Potential savings are up to 93 percent of primary energy consumption of apartment houses in Germany. Demand for air conditioning is increasing due to lifestyle and climate change and adaption to modern standards. Air-conditioning and refrigeration engineering technologies use around 15 percent of the total electric energy produced in Germany.

The saving potentials, however, are as high as 60 percent, with an average saving of 35 percent. Accordingly, technology developments facilitating increased energy efficiency are becoming ever more important and will continue to be in the long term.

In 2008, 45 percent of all newly installed heating systems in Germany were linked to renewable energy sources. This is equivalent to a 13 percent growth level in less than two years.

Investment Conditions

- The German government has set out a High-Tech Strategy granting generous funding for R&D projects in different sectors, with specific emphasis on the renewable energy sector.
- Renowned R&D institutes and a number of developers of new technologies within the heating and cooling segment make Germany an optimal investment location.
- Domestic market size, a fully developed European logistical center infrastructure, and the availability of a highly skilled and well-educated workforce are further decisive factors for investing in Germany.
- Germany’s central location at the heart of Europe allows neighboring markets to be easily and swiftly accessed and serviced.
- Thanks to some of the highest efficiency standards in Europe, German manufacturing is a recognized guarantor for outstanding quality.
- A plethora of incentive and funding programs are in place to promote further energy efficiency progress and renewable technologies developments.

Age and Energy Conversion Efficiency of Heat Generators in Germany 2009 (as percent of total heat generators)

- 12% below 10 years, energy conversion efficiency < 98% state of the art
- 70% between 10 and 24 years old, energy conversion efficiency < 85%
- 18% older than 24 years, energy conversion efficiency < 65%

Source: BDH 2009

18 % older than 24 years, energy conversion efficiency < 65 %
12 % below 10 years, energy conversion efficiency < 98 % state of the art
70 % between 10 and 24 years old, energy conversion efficiency < 85 %
The German Heat Pump Market

Germany is the second largest producer of heat pumps in the European Union (EU). More than 80,000 heat pumps are produced annually in Germany. More than 62,000 heat pumps were sold in 2008, contributing to a total of 350,000 heat pumps installed in Germany by the end of 2008. The market for air/water heat pumps in particular has experienced rapid growth. The German heat pump market is expected to reach 121,300 installations by 2015, with revenues expected to rise to USD 1.43 billion – equivalent to a growth rate of 12.2 percent.

Growing European Market Opportunities

With total sales volume of 580,489 installed heat pumps in 2008, the European heat pump market grew by 50 percent compared to 2007 levels, with overall earnings of USD 4.35 billion. Potential revenues in the European heat pump market for the period up to 2015 are estimated to be in the region of USD 7.67 billion.

Market Drivers in Germany

There exists a significant demand for energy efficiency in Germany, with heat pumps providing an attractive alternative to oil central heating systems. A number of strict quality standards providing consumers and installers with heat pump usage and maintenance guidelines have been introduced. German energy suppliers actively promote commercialization and offer special heat pump rates/tariffs while different industry associations and manufacturer alliances actively support the heat pump market. Supportive legislation such as the Renewable Energies Heat Act provides a significant boost to the German heat pump market.

Incentives Programs

There are several incentive programs promoting efficient and renewable heating and cooling technologies. Available funding for the Marktanreizprogramm or “Incentive Program” will be increased to a maximum of EUR 500 million per year from 2009 through 2012. The availability of financial incentives that encourage the use of renewable energies for heating of new and existing residential and non-residential buildings has increased significantly. These incentives are offered at national and local levels.

The most important incentives at the national level for heat pumps are innovation promotions for air/water, water/water or brine/water heat, pumps subject to the coefficient of performance (COP) level. For example, within existing building stock it is possible to benefit from grants of up to EUR 30 per m² of floor space up to a maximum of EUR 4,500 per apartment or 22.5 percent of net investment costs respectively for a water/water or brine/water heat pump with a COP of 4.5. Newly built apartments have a slightly higher COP value of 4.7.
The German Pellet and Pellet Heating Systems Market

With annual consumption of 151 terawatt hours (TWh) in 2007, Germany is the largest consumer of bioenergies within the EU-27. Around 25 million m² of wood in the form of logs, wood chips, pellets, and briquettes are used for heating every year – providing heat to almost one in five German households. The total stock of wood heating in households stands at over nine million units with the trend increasing.

Fast Developing Market
Currently the majority of these units are individual fireplaces (e.g., fireplaces and stoves), but larger systems are on the increase: almost a fifth of households heating with wood are already using a central heating system (e.g., gasification boilers, pellet heating, wood-chip heating), which also serves domestic water heating purposes. In 2007, eighty-five percent of pellet heating systems were installed in the form of central heating systems while systems in the form of single-room fireplaces and individual fireplaces respectively contributed 15 percent. Approximately half of the plants installed in 2007 were used in combination with a solar-thermal installation. For the period 2000 to 2008, the number of installed pellet heating systems had a CAGR of 56 percent, leading to a total number of 105,000 installed systems by the end of 2008. For 2009, industry analysts forecast a total volume of 140,000 pellet heating systems in Germany. The general forecast predicts increasing growth rates for larger heating systems for heat supply in municipal and commercial buildings (15-100 kW installations).

Market Drivers in Germany
Germany owns 3,381 million m³ of wood stock – the largest stock in Europe. Around one million pellet heating systems could be fueled at current average wood harvest levels. Pellets are subject to the reduced value-added tax (VAT) rate of seven percent.

The rising prices of fossil fuels and widespread public support for the acquisition of environmentally friendly small combustion boilers have contributed to a major increase in the number of highly efficient and low-emission wood heating systems in use.

Incentives Programs
Different governmental incentive programs for pellet heating systems and pellet stoves are available subject to technology implemented. For example, a basic incentive of EUR 500 and an additional bonus from EUR 250-500 per plant is available for pellet stoves/fireplaces (5-100 kW). Gasification boilers within a capacity of 15-100 kW are subject to a basic incentive level of EUR 1,125 per plant and an additional variable bonus of between EUR 500 and EUR 1,000 per plant.
Approximately 21,000 fledgling micro-CHP systems have been installed across Europe. The total European market is expected to grow at a CAGR of 43 percent during the initial period 2005 to 2012. In 2008, the European micro-CHP market generated USD 37.8 million – the total potential is above five million units annually.

Germany is the leader in the European micro-CHP market: around 90 percent of 2008 European sales were generated in Germany. Fifty percent of the internationally leading technology developers in Europe are based in Germany.

Germany is also number one for global fuel cell R&D in Europe; one of the focuses being the development of fuel cell technology for micro-CHP applications.

Germany has an extensive natural gas infrastructure. The total length of gas pipelines is 380,000 km, making it the largest network in Europe.

**German Technology Leadership in Europe**

European micro-CHP markets are currently dominated by five kilowatt electric (kWe) products purchased in Germany. The market for 1 kWe to 3 kWe sized products designed for single-family homes is recording significant growth.

Internal combustion engine-based systems dominate the micro-CHP industry. New technologies including external combustion engines and fuel cells are starting to establish themselves in this emerging market.

**Market Drivers in Germany**

Many major customers - such as utility firms - are already involved in tests and early commercialization. Consumer interest has been greatly piqued by the potential cost savings to domestic electricity bills: 25 to 60 percent cost reductions subject to usage and property size.

Germany has one of the world’s most secure regulatory systems and is Europe’s leading nation in the promotion of cogeneration, with strong support from CHP associations and local authorities alike.

Micro-CHPs are an ideal replacement for the mature condensing boiler market, with Germany providing an excellent export platform in the fast-growing European market. Gas, oil, and electricity markets in Germany have also been comprehensively liberalized.

**Incentives Programs**

For micro-CHPs up to 4 kW, the basic incentive level is EUR 1,550 per kW (subject to capacity). The available environmental bonus is EUR 100 per kW for units with low pollutant emissions (less than 50 percent of NOx and CO emissions permitted by the clean air standards).
The German Solar Thermal Market

Germany is home to Europe’s largest and most dynamic solar thermal market. More than 40 percent of installed solar thermal system capacity in Europe is located in Germany. This is largely attributable to strong governmental support and favorable end-user acceptance of the industry.

European turnover in 2008 was EUR 1.4 billion. This is expected to reach EUR 2.2 billion by 2014 with an estimated CAGR of 15 percent. In terms of solar cooling area, there are more than 200 solar cooling systems with a total surface of approximately 18,000-25,000 m² in Europe - 40 projects are situated in Germany.

Significant Market Growth

The German solar thermal market is a fast-growing market: it increased by 60 percent for the period 2007 to 2008 alone. Some 210,000 solar collectors were installed in 2008. With 2.1 million m² in new collector area - a capacity increase of 1.4 GWth - the thermal capacity increased by 120 percent: 40 percent more than the previous record year of 2006.

There are 1.2 million plants - with a surface area of 11.3 million m² of flat plate plus tube collectors on household roofs – which provide domestic hot water and space heating via solar energy. Solar thermal collectors are not only installed on single-family houses, but increasingly used in multi-family houses and residential areas. One third of all heaters installed in 2008 have been combined with solar thermal - twice as high as 2005 levels. Solar thermal installations provide a share of 3.8 percent of overall heating from renewable resources.

The German solar thermal market is divided between collector producers and importers, and system service providers. Sixty-six percent of German collector demand is met domestically – the remaining 33 percent imported.

Close R&D partnerships with some of Germany’s most prestigious research institutes (e.g., ISFH, Fraunhofer ISE, ITW Stuttgart) ensure advances in production technologies and processes to facilitate further cost reductions.

Market Drivers in Germany

There is a strong level of environmental awareness among the German public, and the existence of generous subsidies and financial incentives further support the solar thermal market. The federal government’s market incentive program for renewable energies has an assigned budget which has been increased to EUR 500 million for 2009. A growing trend towards energy independence has been created by the volatility of energy prices. Moreover, widespread availability of ready know-how is boosting overall market growth. Strong support is also provided through solar thermal associations and local authorities.

Incentives Programs

For water heating/process, heat/cooling or heating backup up to 40m², an incentive of EUR 45 to 105 per m² is available with a guaranteed minimum payment of EUR 307.50 available. An additional boiler exchange bonus rate of up to EUR 750 per m² is also possible.
**Heating and Cooling Market Promotion Program**

The German Federal Government has announced ambitious goals within the framework of a sustainable energy supply for Germany. Given the limited supply of fossil fuel sources such as coal, oil, and natural gas, notwithstanding the harmful effect of fossil fuels on the environment and climate, the German government supports the deployment of renewable energy technologies in all buildings.

To this end, a market incentive program has been applied to promote investment grants, low interest loans, and liquidation allowances for equipment utilizing renewable energies. The focus of the program is aimed towards heat generating equipment such as solar thermal collectors, facilities for the liquidation of solid biomass, and efficient heat pumps for the treatment of drinking water and heating installations in buildings.

The overarching goal is to increase the share of renewable energies to at least 30 percent of German gross power consumption by the year 2020. Therefore, the program addresses all property holders of old and new buildings alike. The application, development, authorization, and disbursement of aid funds are administered by the Federal Office of Economics and Export Control (BAFA).

The German Federal Environmental Ministry has allocated considerable resources in 2009 to support energy restructuring projects.

This volume of support also gives potential investors the possibility to profit from the Climate Initiative of the German government.

**Energy and Climate Program in Germany**

Twenty-five percent of Germany’s total electricity needs will be generated by CHP; 30 percent of all electric energy will come from renewable sources; and renewable energies will provide 14 percent of heating requirements by 2020.

The heating market is expected to contribute a proportion of 14 percent of the overall thermal energy from renewable energies.

The German Climate Program promotes a reduction in CO₂ emissions and creates advantageous market conditions. The program consists of several legal acts. The most important of these are listed directly below.

- **Energy Conservation Regulation (EnEV)**
- **Cogeneration Act (KWKG)**
- **Renewable Energies Heat Act (EEWärmeG)**

**Program Details: Energy Conservation Regulation (EnEV)**

The Energy Conservation Regulation promotes energy-saving and efficiency measures in the building sector. Since 1984, the German government has implemented standards decreasing primary energy consumption1 for buildings from 200 kW/ m² to 50 kWh/ m² per year. In 2012, the primary consumption standard will be set at 35 kWh/ m² per year. EnEV makes the energy performance certificate compulsory for all new buildings and buildings which have been significantly refurbished in alignment with its stated primary energy consumption reduction goals.

- On July 1, 2007, the energy passport was introduced in Germany. This measure provides information on each building’s energy consumption. Obligation of notice in certain public buildings and recommendations for retrofits has to be attached.

- The energy passport is a four-page standardized energy performance certificate that must be presented when a home is sold or leased in order to assess and improve energy efficiency levels.

**Program Details: Cogeneration Act (KWKG)**

The Cogeneration Act stipulates that electricity production from cogeneration should be at least 25 percent by 2020. In summary:

- Electricity grid operators are obliged to connect cogeneration installations to the grid and purchase and transmit electricity from these installations.

- Distribution of cogeneration bonuses and subsidies of up to EUR 750 million per year starting in 2009 made available by the German government.

- Tax exemptions are available for fossil fuels (Ökosteuer or eco tax) used in CHP devices.

- Tax exemption and bonuses (5.11ct/ kWh) for electricity provided by Micro-CHP devices are available.

---

1 primary energy consumption for heating, hot water, ventilation, and cooling
The German government and the individual federal states, together with the European Union (EU), offer a number of different incentives programs to support the set up of production facilities.

**Cash Incentives**

There are two main programs directing the allocation of cash grants for production facility set-up support: the Joint Task for the Promotion of Industry and Trade (Joint Task); and a special cash incentives program to promote investment activities in Eastern Germany called the investment allowance.

**Public Loans and Guarantees**

Special loan programs make up a second component of Germany’s investment support. These programs are offered by publicly organized financial institutions submitting loans at attractive rates. The provision of such loans usually makes it easier for investors to access funding from private lending banks.

**Development of Primary Energy Consumption (kWh/m²a)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Primary energy consumption (kWh/m²a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
<td>300</td>
</tr>
<tr>
<td>1984</td>
<td>250</td>
</tr>
<tr>
<td>1985</td>
<td>200</td>
</tr>
<tr>
<td>1986</td>
<td>150</td>
</tr>
<tr>
<td>1995</td>
<td>100</td>
</tr>
<tr>
<td>2002</td>
<td>70</td>
</tr>
<tr>
<td>2009</td>
<td>50</td>
</tr>
<tr>
<td>2014</td>
<td>30</td>
</tr>
</tbody>
</table>

Source: EneV

**Incentives for Setting Up Production Facilities**

The Joint Task program regulates the distribution of non-repayable grants for investment costs through this program. Money available through this program is usually distributed in the form of cash payments.

In Eastern Germany, investment grants are complemented by the investment allowance program, which is usually provided in the form of a tax-free cash payment but can also be allotted in the form of a tax credit.

**Energy and Climate Program in the EU**

The European Union and its member states have introduced a raft of legislative initiatives to promote renewable energy sources.

The EU “20/20/20 Objectives”

- Reduction of EU greenhouse gas emissions by a minimum of 20 percent by 2020 (compared to 1990 levels).
- Reduction of EU global energy use by 20 percent by 2020 (compared to 1990 levels).
- Ensure 20 percent of renewable energy sources in the EU energy mix by 2020.

**Program Details: Renewable Energies Heat Act (EEWärmeG)**

Fourteen percent of building heating should be produced by renewable energies (current level of seven percent) by 2020. The obligation would be to use a share of renewable sources to produce the energy used in the heating of new residential and non-residential buildings. One of the following requirements needs to be met:

- 15 percent from solar thermal
- 30 percent from biomass (gas)
- 50 percent from biomass (liquid and solid)

**50 percent from geothermal**

Alternative solutions to the above mentioned requirements include, for example, the installation of CHP systems or heat recovery systems.

**The German government has provided subsidies for installations under 50KW since September 2008 within the framework of the Mini-CHP Program.**

Subsidies of up to 20 percent of the investment costs are paid for construction to build new or modernized heat networks fed mainly with heat from cogeneration.

**Standards for Buildings**

- 50 percent from geothermal
- Alternative solutions to the above mentioned requirements include, for example, the installation of CHP systems or heat recovery systems.
Germany Trade & Invest Helps You

Germany Trade & Invest’s teams of industry experts will assist you in setting up your operations in Germany. We support your project management activities from the earliest stages of your expansion strategy.

We provide you with all of the industry information you need – covering everything from key markets and related supply and application sectors to the R&D landscape. Foreign companies profit from our rich experience in identifying the business locations which best meet their specific investment criteria. We help turn your requirements into concrete investment site proposals; providing consulting services to ensure you make the right location decision. We coordinate site visits, meetings with potential partners, universities, and other institutes active in the industry. Our team of consultants is at hand to provide you with the relevant background information on Germany’s tax and legal system, industry regulations, and the domestic labor market. Germany Trade & Invest’s experts help you create the appropriate financial package for your investment and put you in contact with suitable financial partners. Incentives specialists provide you with detailed information about available incentives, support you with the application process, and arrange contacts with local economic development corporations.

All of our investor-related services are treated with the utmost confidentiality and provided free of charge.

---

### Project Management Assistance

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Evaluation</th>
<th>Decision &amp; Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business opportunity analysis and market research</td>
<td>Market entry strategy support</td>
<td>Project partner identification and contact</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Joint project management with regional development agency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coordination and support of negotiations with local authorities</td>
</tr>
</tbody>
</table>

### Location Consulting/Site Evaluation

<table>
<thead>
<tr>
<th>Identification of project-specific location factors</th>
<th>Cost factor analysis</th>
<th>Site preselection</th>
<th>Site visit organization</th>
<th>Final site decision support</th>
</tr>
</thead>
</table>

### Support Services

| Identification of relevant tax and legal issues | Project-related financing and incentives consultancy | Organization of meetings with legal advisors and financial partners | Administrative affairs support | Accompanying incentives application and establishment formalities |
Imprint

Publisher & Editor
Germany Trade and Invest
Gesellschaft für Außenwirtschaft
und Standortmarketing mbH

Friedrichstraße 60
10117 Berlin
Germany
T. +49 (0)30 200 099-0
F. +49 (0)30 200 099-111
office@gtai.com
www.gtai.com

Chief Executives: Dr. Jürgen Friedrich, Michael Pfeiffer
Contact Heating and Cooling Industry: renewables@gtai.com

Conception, Layout, Text, Translations
Germany Trade & Invest

Support
Promoted by the Federal Ministry of Economics and Technology and the
Federal Ministry of Transport, Building and Urban Affairs in accordance
with a German Parliament resolution.

Notes
©Germany Trade & Invest, October 2009
All information provided by Germany Trade & Invest has been put together
with the utmost care. However, we assume no liability for the accuracy of
the information provided.

Order Number
14606
About Us

Germany Trade & Invest is the foreign trade and inward investment agency of the Federal Republic of Germany. The organization advises and supports foreign companies seeking to expand into the German market, and assists companies established in Germany looking to enter foreign markets.

All inquiries relating to Germany as a business location are treated confidentially. All investment services and related publications are free of charge.

Germany Trade & Invest
Friedrichstraße 60
10117 Berlin
Germany

T. +49 (0)30 200 099-0
F. +49 (0)30 200 099-111
renewables@gtai.com

www.gtai.com