Renewable Energy:
Heat Pump Technology in Europe

Factsheet 12

Facts and Figures

Heat Pump Technology

A heat pump is a system that takes heat from a reservoir (air, water, soil) to bring it to a higher temperature and use it for heating buildings and producing hot water. The heat pump uses a cycle process: The evaporator extracts heat energy from the reservoir and evaporates a refrigerant in the process. The compressor compresses the refrigerant, causing it to heat up. In the condenser, the refrigerant releases the absorbed heat energy to the heating system and is liquefied again in the process. The expansion valve ensures that the refrigerant expands again and can absorb heat again in the evaporator.

Saving potential

Heat pump technology can save energy and thus costs compared to conventional heating systems such as gas or oil heating. However, how much is saved depends on various factors, such as the size of the building, the heat demand, the heat source, the insulation standard and the efficiency of the heat pump itself.

A study by the Fraunhofer Institute for Solar Energy Systems (ISE, 2000) shows that average savings in the range of 30-50% in heating costs and 50-70% in CO_2 emissions can be achieved by using heat pumps compared to conventional heating systems.

The use of the heat pump is **particularly climate-friendly if the required energy is obtained from renewable sources such as solar or wind energy.** A heat pump powered by green electricity is therefore almost emission-free and contributes to the reduction of CO_2

Heat pumps are a boost for climate protection. However, most heat pumps use persistent chemicals (PFAS) as cooling medium. Alternatives must be used, e.g. natural refrigerants such as propane, in order to take climate protection and environmental protection to heart. The good news is: In the mass market, the switch to natural coolants will not cause

Professions & Competence Profiles

Heat pump technology is relevant for many professions in the field of building services engineering, plant engineering and crafts, e.g.:

- Heating engineers, electricians, refrigeration engineers for heat pump installation
- Architects for sustainable building concepts

Required skills include, in particular, knowledge of electrical engineering, refrigeration plant construction, control engineering and renewable energies.

3 Good Reasons for the Use of Heat Pumps in Europe

1. **lower operating costs:** In many countries in Europe, heat pumps can be operated efficiently due to the mild climate, which can lead to lower operating costs.
2. **renewable energies:** In Europe, there are many opportunities to use renewable energy sources such as solar and geothermal energy to power heat pumps. These renewable energy sources are often more abundant in more southern countries.
3. **environmental friendliness:** heat pumps use electricity in operation, but they produce much lower greenhouse gas emissions compared to conventional heating and cooling systems. The use of heat pumps can help reduce the environmental footprint.

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The 3-Country Check

Spain

According to the European Heat Pump Association (EHPA), there were a total of 25,000 installed heat pumps in 2020. This corresponds to an annual increase of 17%.

Potential for increased use:
High temperatures and sunny climates in many regions of Spain increase the demand for cooling. Air-to-air heat pumps can be an energy-efficient alternative to air conditioning. The use of heat pumps can also contribute to cooling in agriculture. In addition, there are many regions in Spain where there is no gas supply, so heat pumps are an alternative to fossil fuels.

Greece

According to EHPA data, there were a total of 5,000 installed heat pumps in 2020. This corresponds to an annual increase of 10%.

Potentials for increased use:
Many islands are not connected to the electricity grid and rely on diesel generators. Heat pumps powered by renewable electricity could help reduce greenhouse gas emissions. In addition, there are many areas in Greece with geothermal resources that could be used to run ground source heat pumps.

Slovakia

In Slovakia, the use of heat pumps has increased significantly in recent years. According to EHPA data, there were a total of 33,000 installed heat pumps in Slovakia in 2020. This corresponds to an annual increase of 10%.

Potentials for increased use:
Slovakia has a high dependence on fossil fuels, especially natural gas, which is largely imported. The use of heat pumps powered by renewable electricity can help reduce dependence on imports and diversify the country's energy supply. Furthermore, there are many buildings in Slovakia with outdated and inefficient heating systems, where the use of heat pumps is an opportunity for modernization in the case of complete building refurbishment.

Sources:
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