EM-Power Europe
Munich, June 19-21, 2024

RETHINKING HEAT: ELECTRIC HEATING – THE LATEST TREND

Munich/Pforzheim, May 2024 – Electricity and heat are becoming increasingly intertwined, and the use of self-generated solar power for heating is growing in popularity. Infrared heaters are on the rise alongside heat pumps. With rising oil and gas prices, falling costs for photovoltaics, product innovations and regulatory climate protection requirements such as the German heating law, the market is gaining momentum. As space and water are increasingly heated with electricity, the work of electricians is starting to merge with that of heating engineers. When it comes to heating and hot water production, pipes are increasingly being replaced by cables, especially in new buildings. Solar-electric buildings, which cover as much of their electricity and heating demand as possible with a suitably sized photovoltaic system, are all the rage now.

It's well worth using every available surface for solar power and installing solar panels on the roof, garage, carport, façade, balcony or on the ground. Vertically mounted solar panels on façades or balconies are particularly suitable for solar-electric buildings, because they generate more solar power during winter, when heating demand is highest, than roof-mounted systems.

But saving energy still has priority. If possible, this includes retrofitting the building envelope with insulation, from windows and façades to ceilings. After that, the right heating system is chosen.

Infrared heaters in vogue

Infrared heaters powered with PV electricity are in vogue: in well-insulated new buildings as the main heating system, and in existing buildings as a temporary solution to save fossil fuels in the short term.

As electric low-temperature heating systems, the advantages of infrared heaters are their low purchase price, compact design, short heat-up and cool-down times (fast response time), high efficiency and easy installation. They also provide a comfortable radiant heat, are virtually maintenance free and durable. However, they cannot heat domestic water – this requires a separate system.

Powerful electric continuous-flow water heaters, boilers and special heat pumps are available as an alternative to a central hot water production, and not just for infrared heaters. Their benefit: Hot water is only heated when you need it. However, there are significant losses associated with the long storage of hot water in tanks and pipes. Experts generally recommend separating the hot water system from the winter heating system to reduce energy costs. Hot water is needed year-round, but heating is only needed during the cold months between seasons and in winter.

Step by step to a solar-electric building

However, the standard in many existing buildings are fossil-fueled central heating systems that move water at high flow temperatures. It is often too expensive to convert an existing building into a solar-electric building all at once. But as practical examples and simulations show, it can also be done step by step. First, the domestic water heating and the heating circuit are separated. In hybrid systems, a modern domestic water heat pump supplies hot water to the bathroom or kitchen. It uses electricity to heat drinking water and stores it in an insulated water tank. The tank can be powered with solar power during the day and the hot water can be used at night or in the early morning. Air-to-water heat pumps are very efficient, so they require little electricity.

The existing heat distribution system with its heating surfaces is set to a low flow temperature (35 to 40° Celsius) to cover the basic heat capacity demand. To meet peak demand, fast-responding infrared heaters can be installed in multiple rooms and used when heat demand is high. This reduces fossil fuel consumption. The house maintains a comfortable temperature without the need for costly renovation measures such as modifying the water-based heat transfer system or carrying out a comprehensive retrofitting of the building envelope.

It is possible to replace the old heating system (e.g. oil and gas heating) with a small air-to-water heat pump and combine it with infrared heaters distributed around the house. A study conducted by TU Dresden demonstrated that this approach can reduce the heating energy by up to 62 percent. The simulation was based on an existing single-family home with a low-temperature gas boiler, a usable floor space of 160 square meters and a heating insulation standard according to the German Ordinance on Thermal Insulation (Wärmeschutzverordnung) from 1995.

Heat pumps for existing buildings

Field tests conducted by the Fraunhofer Institute for Solar Energy Systems ISE also prove that heat pumps – contrary to popular belief – can be a viable option for existing buildings, even if they haven't been fully retrofitted. In many cases, a few insulation measures – or simply installing larger heaters – can do the trick. The larger the heater, the less heat is necessary to heat the room. This allows many old houses to be heated with maximum heating flow temperatures below 55° Celsius, which heat pumps are capable of supplying.

The technology behind heat pumps has been around for more than 100 years – it's the same principle as refrigerators, only in reverse. Heat pumps use geothermal heat, ground water or ambient air as a heat source for heating and hot water – even at temperatures below zero degrees Celsius. In buildings with a normal energy standard, they can use one kilowatt hour of electricity to turn environmental heat into three to four kilowatts of heat.

Solar-powered heat pumps cut costs, save climate

A heat pump powered by self-generated solar power is a great benefit, and not only in terms of carbon footprint. This also reduces the cost of electricity required for the heat pump, and the higher self-consumption rate increases the economic viability of the PV system. For the entire system to work efficiently, all components – including the necessary buffer storage – must be well coordinated. Optimal supply also requires an energy management system and an electricity storage system.

Innovations for both heat pumps and infrared heaters are developing dynamically – from intelligent controls and the integration of energy management systems, to WIFI communication with inverters for optimal use of solar power, to improved efficiency. When purchasing infrared heaters, it is important to ensure that they are classified according to the IEC 60675-3 standard, which states that they need to have a radiation efficiency of at least 40 percent to be classified as infrared heaters.

EM-Power Europe in Munich: everything you need to know about electric heating

EM-Power Europe, the international exhibition for energy management and integrated energy solutions, will take place in Munich from June 19-21, 2024, and will offer visitors the opportunity to meet numerous suppliers and find out more about the most important improvements and innovations in heating. This year, the focus is on linking PV systems, residential storage, electric cars and heat pumps to create an effective combination of units that allow users to generate, store and consume electricity. On the second exhibition day in particular, visitors to The smarter E Forum (hall B5, booth B5.550) will get valuable insights into how excess solar power can be used efficiently for heating. EM-Power Europe will take place from June 19-21 in Munich as part of The smarter E Europe, Europe's largest alliance of exhibitions for the energy industry, with the parallel events Intersolar Europe, ees Europe and Power2Drive Europe.

For more information on electric heating, please visit:

The smarter E Forum
Decarbonising and Electrifying Heating: The European Pathway
Thursday, June 20, 2024, 04:15pm – 05:45 pm
Messe München, Hall B5, Booth B5.550

EM-Power Europe Exhibitors; Product category: Power-to-heat and conversion (e.g. heat pumps):
www.em-power.eu/exhibitorlist

www.em-power.eu
www.TheSmarterE.de

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