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MAN Energy Solutions to deliver first cross-sectoral ETES Heat-Pump system

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Danish multi-utility company, DIN Forsyning, has commissioned MAN Energy Solutions to supply a turnkey technology solution for heat generation, featuring two ETES heat-pump systems. These will be installed in a new district heating plant based on the operating principle of a heat pump – but on a large, industrial scale. With an overall heating capacity of 50 MW, the plant will supply around 100,000 local inhabitants with approximately 235,000 MWh of heat annually.

The location at the Port of Esbjerg will enable the use of renewable power from nearby wind farms and seawater as a heat source for the generation of heating energy. The new district-heating plant will thus guarantee an emission-free alternative to the city's current, coal-fired power plant, which at present provides approximately half of Esbjerg's district heating and is scheduled for closure by April 2023.

"Esbjerg has very ambitious goals to become carbon neutral by 2030, and the new heat pump will be an important element in achieving this. Esbjerg City is undergoing a huge change these years and transforming a carbon industry towards a world leading position as a green city," explains Jesper Frost Rasmussen, Mayor of Esbjerg.

"The deployment of the ETES heat pump systems from MAN Energy Solutions will help us to ensure an environmentally friendly and economically efficient heat-supply for the inhabitants of the city of Esbjerg. By decarbonising the heat supply, we are taking into account Denmark's goal of phasing out coal while ensuring the environmental preservation of Denmark's Wadden Sea, which is a UNESCO World Heritage Site," explained Anders Linde, chairman of the Board of DIN Forsyning.

"The transition to a carbon-neutral world is at the core of all the actions we take today. This is why we are very proud to play a major role in the pioneering Esbjerg project as the provider of an innovative technology solution. The ETES heat-pump system is a climate-neutral alternative to traditional, large-scale heat supplies and will significantly drive the decarbonisation of the heating sector," stated Uwe Lauber, CEO of MAN Energy Solutions.

ETES technology enables the exploitation of excess power from renewable energy sources, which will have a beneficial effect on the efficiency of power production from wind and solar energy, and will further reduce the need for fossil power plants. In addition, the operational flexibility of the heat-pump solution makes it possible to generate electrical balancing power in the short term, and therefore to maintain balance on the grid.

Patrik Meli, Senior Vice President, Managing Director of MAN Energy Solutions Switzerland Ltd. added: "Sector coupling is an essential key to a climate-neutral energy future. The growing share of renewable energy must also be harnessed outside of power grids in order to break through the extreme dependency on fossil fuels for heat and cold generation. Our technological solution for the city of Esbjerg makes this sector coupling possible; our ETES heat pump system will generate climate-neutral heat energy from renewable energy sources and supply this to around 25,000 households."

The key, innovative feature of ETES technology is the use of toxicologically and environmentally safe CO_2 as a refrigerant for the entire system cycle. The CO_2-based heat-pump plant in Esbjerg will be the largest of its kind ever used in the world.

The scope of supply for the project in Esbjerg covers the entire heat-pump system, including the heat exchangers, the piping for the CO_2 and seawater cycles, the water pumps as well as the electrical infrastructure provided by ABB Switzerland and ABB Denmark. The core element is represented by two oil-free hermetically-sealed HOFIM® motor-compressor units with integrated expander, which are developed, produced and tested by MAN Energy Solutions in Zurich (Switzerland). The absence of the dry gas seal system and the complete oil system as well as the use of a high-speed motor and active magnetic bearings results in an emission-free compression system with a small footprint.

The ETES heat-pump system is a version of the electrothermal energy-storage system, called *MAN ETES*, which was developed by MAN Energy Solutions in cooperation with ABB Switzerland. The basic principle of the technology is the conversion of electrical energy into thermal energy, which is stored in the form of hot water and ice in insulated reservoirs. The electrothermal process not only allows the distribution of the generated heat and cold to users according to demand and margins, but also offers the option of converting it back into electricity as an additional usage variant.

The energy-storage solution is suitable for a wide range of applications. MAN Energy Solutions is currently examining the possible implementation of the technology in the German state of North Rhine-Westphalia (NRW) as part of a funding program with project partners Rheinisch-Westfälische Technische Hochschule (RWTH), Aachen University and Stadtwerke Aachen Aktiengesellschaft (STAWAG). The study will examine the necessary requirements for the construction of an electrothermal energy storage facility with a capacity of up to 7 MW in the Aachen area.

About DIN Forsyning:

DIN Forsyning is a multi-utility company within the markets of water supply, waste water purification, district heating, house hold waste and recycling. The company has 230 employees, is owned by the municipality of Esbjerg and Varde and the head office is based in the town of Esbjerg in Denmark. Every year DIN Forsyning produce and distribute about 8.6 million liters of drinking water, transport and treat 26 million M3 waste water, handle 45,000 tons of waste and transport approximately 1 million MWh district heating to our customers in the municipalities of Varde and Esbjerg.

Documents

MAN_ES_PR_Esbjerg_ETES-Heat-Pump-System_ENG
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Images

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