MAN Energy Solutions

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MAN Energy Solutions to Provide Climate-Neutral District-Heating to Aalborg

- Danish city set to cut 160,000 tons of CO_2 emissions annually using MAN heat pump technology
- Industrial-scale heat pump will use the energy of seawater and renewable electricity to generate heat
- MAN Energy Solutions will supply three 44 MW heat pump units – the world's largest ever used for a district-heating plant

Danish multi-utility company, Aalborg Forsyning, has commissioned MAN Energy Solutions to supply a turnkey heat-generation system with an overall heating capacity of 132 MW, featuring three MAN heat pumps. Each unit has a capacity of 44 MW, making them the largest heat pump units ever to be installed in a district-heating plant worldwide. Overall, the plant will supply around 550,000 MWh of heat annually and account for almost one-third of the heat production in Aalborg, Denmark's third-largest municipality.

The district-heating plant's location on the northern bank of the local Limfjord strait will enable the use of seawater as a heat source. The heat pumps will use electricity from Aalborg Forsyning renewable-energy sources to raise the water's temperature from a range of 1-15° Celsius up to 98°, which is the temperature used in the district heating network. The heat-pump plant will consequently reduce CO_2 emissions by 160,000 tons annually compared to the city's current, coal-fired power plant that is scheduled for closure in 2028.

Uwe Lauber, CEO of MAN Energy Solutions, said: "We are very proud to collaborate with Aalborg Forsyning on the city's transition from coal-based to climate-friendly district heating. In many regards, heat and cold generation has thus far been a blind spot for the energy transition. This major project demonstrates how renewable energy can be harnessed outside of the power grid to heat homes and factory facilities. Going forward, such sector-coupling will be essential to progress in global efforts to reduce carbon emissions. I am particularly pleased that MAN Energy Solutions is able to support Aalborg on its way to net-zero. Together, we are setting a powerful example for others to follow."

Jesper Høstgaard-Jensen, Technical Director at Aalborg Forsyning, stated: "We are very pleased to collaborate with MAN Energy Solutions in the decarbonisation of Aalborg's heat supply. These seawater heat pumps will play an important role in our transition from coal-based to climate-friendly district heating and we are getting a very flexible, efficient, and climate-friendly solution. We look forward to working closely with MAN Energy Solutions in executing this project."

The naturally cooled seawater heat-pump plant in Aalborg will be one of the largest of its kind ever used in the world. Project construction is scheduled to start in August 2024 with Aalborg Forsyning taking over the heat-pump system by 2027 after a period of testing and commissioning.

Amplifying and transferring thermal energy

The basic principle of heat-pump technology is the conversion of electrical energy into thermal energy. A key feature of MAN's solution is its use of toxicologically- and environmentally-safe CO_2 as a refrigerant for the entire system-cycle. Additionally, the solution enables fast electrical power-balancing and thus supports the integration of intermittent power generation.

The core element of Aalborg's future heat pump system is three oil-free, hermetically-sealed HOFIM® motor-compressor units, which will be produced and tested by MAN Energy Solutions in Zurich, Switzerland. The compression unit utilises a high-speed motor and active magnetic bearings, enabling it to operate without requiring a dry gas seal system and the complete oil system. The scope of contract also encompasses a Long-Term Service Agreement with MAN PrimeServ.

Høstgaard-Jensen added: "Overall, MAN Energy Solutions offered the best solution for Aalborg Forsyning. This system can deliver heat at a very high temperature – up to 98°C – which is quite unique. It is also a clear plus that MAN Energy Solutions uses a natural refrigerant, which is suitable for heat-pump operation at high district-heating temperatures. In addition, fast regulation on the electricity side helps to optimise our operating economy."

MAN Energy Solutions is currently installing a 60 MW heat-pump system in the Danish port of Esbjerg, which will be powered by offshore wind farms and use heat from the adjacent Wadden Sea as energy source. The new district-heating plant will replace the city's current, coal-fired power plant and supply around 25,000 households with approximately 280,000 MWh of climate-friendly heat annually.
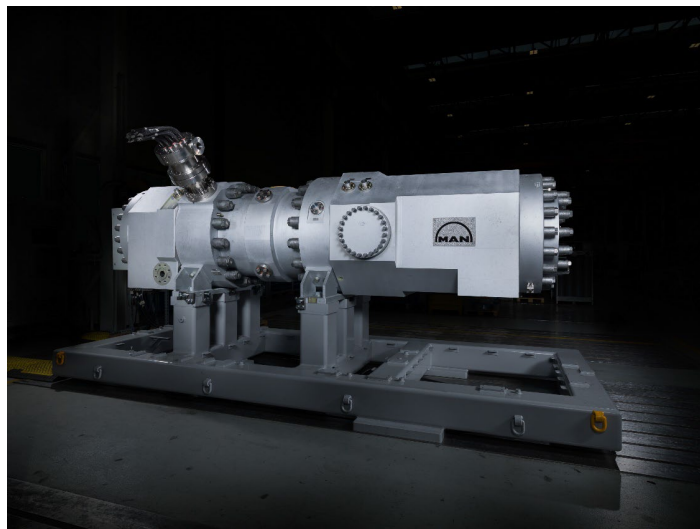
For more information about MAN's heat-pump technology, visit:
[Heat up Carbon down (man-es.com)](man-es.com)

Visualisation of the new district-heating plant in Aalborg, Denmark (illustration © Friis & Moltke)

The future district-heating site will house the world's largest seawater heat pump units by MAN Energy Solutions (illustration © Friis & Moltke)

At the heart of the new heat pump system are three hermetically-sealed HOFIM® compressors by MAN Energy Solutions (picture © Andrin Winteler / MAN Energy Solutions)

MAN Energy Solutions enables its customers to achieve sustainable value creation in the transition towards a carbon neutral future. Addressing tomorrow's challenges within the marine, energy and industrial sectors, we improve efficiency and performance at a systemic level. Leading the way in advanced engineering for more than 250 years, we provide a unique portfolio of technologies. Headquartered in Germany, MAN Energy Solutions employs some 14,000 people at over 120 sites globally. Our after-sales brand, MAN PrimeServ, offers a vast network of service centres to our customers all over the world.