

Joint News Release

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BASF and MAN Energy Solutions enter into partnership for construction of one of the world's largest heat pumps in Ludwigshafen

- **Waste heat from cooling water system as a low-carbon energy source for steam production**
- **Expected reduction in CO₂ emissions of up to 390,000 metric tons annually**
- **Feasibility study to investigate project at Ludwigshafen site**

BASF and MAN Energy Solutions have entered into a strategic partnership to pursue the construction of an industrial-scale heat pump at the BASF site in Ludwigshafen. This project is intended to make an important contribution to reducing greenhouse gas emissions, establishing the use of low-CO₂ technologies in chemical production and reducing the site's natural gas consumption. As a first step, the project partners are conducting a feasibility study that is expected to be completed by the end of 2022.

The planned large-scale heat pump will enable production of steam using electricity from renewable energy, tapping waste heat from the cooling water system at BASF as a source of thermal energy. The residual heat in the water will be processed using compression to produce steam that will be fed into the site's steam network. By integrating the planned heat pump into the site's production infrastructure, up to 150 metric tons of steam can be produced per hour, equivalent to a thermal output of 120 megawatts. The project could reduce CO₂ emissions at the site by up to 390,000 metric tons per year. At the same time, it would make the cooling water system more efficient and less dependent on climate and weather conditions.

Steam is the most important source of energy in the chemical industry. In Ludwigshafen, BASF requires around 20 million metric tons of steam per year. The plants at the site use much of this as process steam in production, for example, to dry products, heat up reactors or for distilling. Around half of the steam required at the Ludwigshafen site is already produced by recovering heat from production facilities using a low-CO₂ process. The remaining steam demand, approximately 50 percent, is met by gas and steam power plants, which emit CO₂ during generation.

Dr. Martin Bruder Müller, Chairman of the Board of Executive Directors of BASF SE: “In the medium term, we want to reduce our CO₂ emissions by 25 percent by 2030. The use of technologies such as large heat pumps, which already exist and can be scaled up to industrial size, brings us a lot closer to this goal. In our cooperation with MAN Energy Solutions, we combine the expertise of a chemical Verbund site with the know-how required for the technological implementation of a project like this. This technology also has the potential to pave the way for projects at other BASF sites.”

Dr. Uwe Lauber, CEO of MAN Energy Solutions SE, commented: “We are really looking forward to the close collaboration with BASF. Space heating and process heat account for around one-third of German greenhouse gas emissions. Together with BASF, we want to address this significant lever with an innovative solution. We are convinced that our heat pump solution can make a decisive contribution to a climate-friendly supply of steam at the Ludwigshafen site. BASF is a global pioneer in the energy transformation in the chemical industry, a role model for the deployment of innovative technologies to protect the planet, and a great project partner. Industry and climate protection both rely on the innovations that arise from such strong partnerships.”

Dr. Uwe Liebelt, President European Verbund Sites, BASF SE: “The transformation that lies ahead of us requires, above all, openness to new technologies. In Ludwigshafen, we are testing and developing several technologies and alternative processes to replace fossil fuels – this includes the electrical production of steam. Protecting the climate means not only avoiding greenhouse gas emissions but also using energy sustainably – industrial heat pumps enable both. In the future, they will be an essential part of the sustainable energy infrastructure at the Ludwigshafen site.”

With this project, the two partners want to gain experience in the integration and operation of industrial-scale heat pumps and pave the way for the standardization and deployment of the technology at other sites. The feasibility study's findings with regard to the economic viability, efficiency and competitiveness of the technology will form the basis for the subsequent decision-making process for the construction of the heat pump.

BASF has set itself the goal of achieving net zero CO₂ emissions by 2050. In addition to the use of renewable energies and increasing energy efficiency in production, new technologies such as the electrification of steam production will contribute to meeting this target. Scaling up such climate-friendly processes to an industrial level will decisively influence the transformation to low-CO₂ chemical production.

MAN Energy Solutions has put technical solutions to lower greenhouse gas emissions from industry, energy production and shipping at the heart of its future strategy. In addition to technologies to avoid harmful emissions, the company focuses in particular on the reduction or compensation of unavoidable residual emissions from industry.

About BASF

At BASF, we create chemistry for a sustainable future. We combine economic success with environmental protection and social responsibility. Around 111,000 employees in the BASF Group contribute to the success of our customers in nearly all sectors and almost every country in the world. Our portfolio comprises six segments: Chemicals, Materials, Industrial Solutions, Surface Technologies, Nutrition & Care and Agricultural Solutions. BASF generated sales of €78.6 billion in 2021. BASF shares are traded on the stock exchange in Frankfurt (BAS) and as American Depositary Receipts (BASFY) in the U.S. Further information at www.basf.com.

About 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.

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