

GEA supplies powerful heat pumps for district heating in Gateshead – the largest mine water project in the UK

Duesseldorf (Germany), June 20, 2023 – Heat energy from the coal mine: "Gateshead Mine Water Scheme" is currently the largest project in the UK for heat recovery from mine water. GEA as project partner supplied 2 x 3 MW high performance heat pumps. These heat pumps use the energy from naturally heated mine water to meet the heat demand of the buildings connected to the district heating network. The existing municipal heating network, which already supplies 18 public and private buildings and 350 households, will thus be expanded by an additional heat capacity of twelve GWh per year.

A pilot project that serves as a role model

Gateshead is located in the North East of England near Newcastle. Both Gateshead Council and its wholly owned business Gateshead Energy Company (GEC), as operator of the Gateshead District Energy Network (DEN), have committed to achieving zero carbon emission status by 2030. The mine water heat extraction system is part of Gateshead Council's zero carbon heat strategy. The first goal was to provide cheaper heat energy for all residents in the borough. The second goal was to identify a supplement to the combined heat and power (CHP) system initially installed, and with a lower carbon footprint.

Politicians, grid operators and authorities highly satisfied

Councillor Martin Gannon, leader of Gateshead Council, is thrilled with the success of the project. He says, "What is happening here is truly amazing. What we're seeing in Gateshead is a legacy from the days of coal mines. Where we were a leader in the industrial revolution 200 years ago, we are now a leader in the clean energy revolution of today. Working alongside our partners, we can make use of the naturally heated mine water and generate valuable, low carbon energy. We are proud to have successfully delivered the largest mine water project in the UK."

Richard Bond, director of innovation and engagement at the Coal Authority, added: "It's fantastic to see forward thinking local authorities like Gateshead Council using warm mine

water to provide low carbon heating for buildings. We have a low-carbon, secure, UK-owned heat source in the form of mine water in Gateshead, which is also an excellent option for many other coalfield communities. We are delighted that our support has helped make this project a reality."

Mine water: after "black gold" now "warm gold"

In the past, miners in Gateshead's coal mine extracted black gold from the earth to fire blast furnaces, but also to heat homes. In fact, Gateshead was once the largest supplier of coal in the world, shipping more than 400,000 tons in 1625 to provide heat for homes. However, the last coal mines in the area closed in the 1960s. The tunnels have since filled with water - now the source of energy for the heat pumps. So once again, Gateshead's underground provides vital energy for heating Gateshead's homes and industry. This time it is being done in an environmentally friendly way, helping to reduce CO₂ and NO_x emissions.

This is how heat is extracted from mine water

The water is pumped from a depth of 150 meters from the old mine to the ground level plantroom where the 2 x 3 MW ammonia heat pumps from GEA, extract the energy from the mine water (15 degrees Celsius). The heat pumps boost the temperature of the extracted energy and hot water (80 degrees Celsius) is then provided to homes and buildings in Gateshead. When the heat from the mine water has been extracted by the heat pumps, the water is returned to the mine at a temperature of eight degrees.

To optimize the performance of the heat pump system with the 2 x 3 MW heat pumps, a two-stage compression cycle with screw compressors is used. Groundwater is filtered and pumped through titanium plate and frame heat exchangers. Titanium was chosen for the evaporator plates to match the quality of the groundwater. On the heating side, several heat exchangers are connected in series to optimize the efficiency of the heat pump solution.

Solar parks are also part of the concept - which help to provide some of the power to run the heat pumps - these have been newly built on a field next to the minewater boreholes

and heat pump. For every 1 unit of power used by the heat pump, 3 units of renewable heat are generated. GEC will import power from the grid to run the heat pumps... which is decarbonising year on year and should be zero carbon by the middle of next decade. On sunny days, when GEC has surplus power from the solar parks, this will provide green power to run the heat pumps, meaning that for certain periods, GEC can produce 100% zero carbon heat now.

GEA ammonia heat pumps offer optimum performance

Ammonia was chosen as the natural refrigerant for this application. It offers the best efficiency and has no global warming potential. Under the given conditions in Gateshead, ammonia heat pumps are 10 to 20 percent more efficient than F-gas solutions (HFC/HFO).

GEA with extensive experience in heat pumps and district heating projects

GEA has been involved in other innovative heat pump projects for district heating in the UK in the past, including the installation of a heat pump that extracts heat from London Underground ventilation air and provides heat for a high-rise building in Islington.

John Burden, Director Project Sales Heating & Refrigeration Solutions at GEA UK, says: "GEA's highly innovative heat pump technology has been used in other district heating projects in the UK and around the world as we recognize the dire consequences of global warming. Given the UK government's ambitious targets to significantly increase the proportion of district heating in the UK, we expect to see many more new and ambitious projects in the coming years."

GEA supplies heat pump solutions to a wide range of industries

GEA supplies heat pumps to a wide range of industries including food, dairy, beverage and district heating. GEA supplies energy-efficient systems based on natural refrigerants that offer double-digit percentage points better performance compared to synthetic refrigerants, which also translates into significantly lower energy bills - one of the biggest cost drivers for industrial heat pumps.

Photos:



Photo 1, caption: GEA is at the forefront of technology solutions for tackling climate change and supplying district heating projects like this one in the Northeast of England. GEA heat pumps are at the center of the Gateshead Mine Water Scheme, the largest mine water heat recovery scheme of its kind in the country. (Photo: GEA)



Photo 2, caption: The use of ammonia heat pumps in the Gateshead project is a reflection of the advancement in the development of district heating. (Photo: GEA)



Photo 3, caption: The technical center with the control cabinets. (Photo: GEA)

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About GEA

GEA is one of the world's largest suppliers of systems and components to the food, beverage, and pharmaceutical industries. The international technology group, founded in 1881, focuses on machinery and plants, as well as advanced process technology, components, and comprehensive services. With more than 18,000 employees working across five divisions and 62 countries, the group generated revenues of more than EUR 5.1 billion in fiscal year 2022. GEA plants, processes, components, and services enhance the efficiency and sustainability of production processes across the globe. They contribute significantly to the reduction of CO₂ emissions, plastic usage, and food waste. In doing so, GEA makes a key contribution toward a sustainable future, in line with the company's purpose: "Engineering for a better world".

GEA is listed in the German MDAX and the STOXX® Europe 600 Index and is also among the companies comprising the DAX 50 ESG and MSCI Global Sustainability and the Dow Jones Sustainability Europe Indices.

More information can be found online at [gea.com](https://www.gea.com).

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