

Heat Pump Awards 2026

Application submission

EFFLUENT WATER SOURCE MEGA SCALE

Hamburg Wasser, Dradenau | Large Heat Pump Award

1. Application overview

Award category	Large Heat Pump
Title of the project	EFFLUENT WATER SOURCE MEGA SCALE
Organisation Name	Hamburg Wasser, Dradenau
Exact address of the project	Dradenastr. 8, 21129 Hamburg-Waltershof, Germany
Funding	Public
Organisations involved in the project	Customer and Contractor Johnson Controls DE
Project ending date	30/09/2026
Project website	https://hgv.hamburg.de/en/aktuelles/milestone-in-the-energy-park-port-germanys-largest-wastewater-heat-pump-is-taking-shape
Sector of application	Industrial

2. Applicant & EHPA contact details

Full name	morten deding
Email address	morten.deding@jci.com
Phone number	4529497361
EHPA member involved	Johnson Controls
Role of EHPA member	Supplier of heat pump equipment, installation and commissioning

3. Project description and benefits

Project description (goal, problem addressed, and solution provided by the heat pump)

Hamburg Dradenau Wastewater Heat Pump

Goal: Hamburg wants its district heating to be coal-free by 2030 and climate-neutral by 2040. The Dradenau project, part of the Energiepark Hafen, contributes by tapping a local renewable heat source to replace the coal-fired plant in Wedel.

Problem: Much of Hamburg's district heat still comes from fossil fuels, which causes high CO₂ emissions. At the same time, usable heat is wasted. About 450,000 cubic metres of wastewater flow through the city's sewage plant every day, and the treated water is discharged into the Elbe at a stable temperature of at least 12 °C, even in winter.

Solution: Hamburg Wasser and Hamburger Energiewerke are building Germany's largest wastewater heat pump at the Dradenau sewage plant. Four 15 MW compression heat pumps (60 MW thermal in total) extract heat from the treated wastewater and raise it to about 95 °C. The hot water goes to the neighbouring gas-and-steam plant, can be buffered in a heat store, and is then fed into the city's district heating network.

Impact: The plant can supply heat for up to 39,000 households and save up to 90,000 tonnes of CO₂ per year compared with fossil heat generation.

Expected or achieved benefits

CO₂

The heat pump saves up to 90,000 tonnes of CO₂ per year compared with fossil energy sources.

The whole Energiepark Hafen, including the gas-and-steam plant and the waste-heat sources, is quoted at about 360,000 t of CO₂ per year.

The heat pump replaces heat that was previously generated from fossil fuels and feeds district heating instead. It delivers 60 MW of thermal output, enough for 39,000 housing units in calculation. The energy park is meant to replace the coal-fired plant in Wedel.

Obstacles/barriers encountered during development

Large wastewater heat pumps at sewage plants had barely paid off because subsidy rules disadvantaged them being non renewable. Hamburg's environment authority lobbied for years for a change in the law. The Bundesrat backed it in November 2018, and it then took the federal ministry roughly another year to be convinced.

Why should this project win an award?

Hamburg Wasser and Hamburger Energiewerke have built Germany's largest wastewater heat pump at the Dradenau sewage plant. Four 15 MW turbo-compressor units deliver 60 MW of thermal output, withdrawing heat from treated wastewater that stays at 18-12 °C or more less all year. The water is heated to about 95 °C and fed straight into Hamburg's district heating grid.

The plant can supply up to 39,000 households and save up to 90,000 tonnes of CO₂ per year by replacing fossil-generated heat. It is a key module of the Energiepark Hafen to make Hamburg's heating coal-free by 2030.

The project also created a showcase for others. Hamburg's years of advocacy changed the German CHP Act so that wastewater heat is treated as an environmental heat source, opening funding for similar plants across Germany.

4. Technical specifications

Capacity of unit(s)	4x 15.000kW = 60MW
Energy sources used	Source is effluent water average at 15°C. Heat pumps are electrical driven
Coefficient of Performance (COP)	Total line COP including sub systems is 2,86
Service provided	District heating
Refrigerant type	R1234Ze(e)

Heat pump details (compressor technology, heat exchanger, system configuration)

4x Centrifugal compressors technology. Each compressor is a 4-stage intermediate injection system. Source and sink side is shell and tube heat exchangers in materials resistant to respective fluids

4X heat pumps in parallel operation

5. Renewable energy integration and grid response

Integration of renewable energy sources

This system utilizes waste water from a sewage cleaning station. A lot of our household energy is released through our waste water and by recovering it before released back to the recipient river/sea/lake we can obtain a circular

process. Recovering heat before it is released back to the recipient also significantly reduces the thermal effect on the recipient, meaning the waste water is closer to the natural occurring temperature of the recipient, effectively having a positive influence on the environment

Response to energy demand / smart grid integration

The heat pumps is a part of many heat sources feeding independently into the same district heating network. Cut in/out seamless adopting full flexibility towards the grid of heating and electrical

6. Innovation, monitoring and replicability

General (all awards)

Why the project is innovative *(all awards)*

Innovation is evident. This is not something new from a technology perspective, but in large facilities the scale of this plant is impressive. To think this into a city overall decarbonization plan is a 100% first mover project.

Monitoring approach (performance, cost, and carbon targets) *(all awards)*

Data is captured in the machine local control system as well as the overarching control system

For Large Heat Pump or Building Solutions Award

Why the project serves as a model for others *(Large Heat Pump or Building Solutions Award)*

All big cities in Europe need to utilize waste heat to meet the goals of de-carbonization

Why Dradenau works as a model

It changed the rules for everyone: Hamburg pushed for years to have wastewater heat treated like other environmental heat sources in the German CHP Act. Any German city with a sewage plant can now use that funding route.

Built for a big city, as 450,000 m³ of wastewater flow through the sewage plant daily at 12 °C or more, even in winter. Any metropolis has a similar resource.

The heat pump is one module of the 4th generation heat system, next to waste and industrial heat, heat storage and a gas-and-steam plant. Perfect location to add a heat pump to combine sectors and minimize investments in infrastructure

Scalable technology, in this case four 15 MW units, 60 MW in total, raise the heat to about 95 °C. It shows that wastewater heat pumps work at any scale of a city's district heating.

Potential for expansion to other locations/industries *(Large Heat Pump or Building Solutions Award)*

The concept can be copied to other cities and used with other heat sources in other locations

Other cities, both inside and outside Germany. The change to the German CHP Act, which Hamburg pushed for, puts wastewater heat on a par with other environmental heat sources, and that opens the funding route for similar plants at other sewage plants, something other countries could adapt... spreading to the rest of Europe

Barriers to replication elsewhere *(Large Heat Pump or Building Solutions Award)*

Large heat pumps run on refrigerants that are either flammable or toxic. There is no danger no matter if it is CO₂, Ammonia or Low GWP synthetic refrigerants, the industry is ready to enforce mitigations and technical installation to protect human and environments.... but the building codes are not there yet. This is the largest barrier, as if we want fast decarbonization with heat pumps we should also allow risk assessments where the refrigerant is allowed and the projects benefit from State of the art protection of the refrigerant with a vessel for safety, extracting refrigerant in case of a leakage etc.

Business opportunities for expansion, licensing, or commercial production *(Large Heat Pump or Building Solutions Award)*

This can be replicated in ALL large cities across the world across size and technology of the heat pump. Effluent water stations are situated where people live and need heat.

For Innovation Award

Technology/technique developed solely for this project *(Innovation Award only)*

No answer provided. (Innovation Award section — not applicable to this application.)

Differentiation from state-of-the-art solutions & market maturity *(Innovation Award only)*

No answer provided. (Innovation Award section — not applicable to this application.)

Regional benefits (energy savings, emissions, jobs, infrastructure) *(Innovation Award only)*

No answer provided. (Innovation Award section — not applicable to this application.)

Commercial potential *(Innovation Award only)*

No answer provided. (Innovation Award section — not applicable to this application.)

Consent and submission notes

People's Choice Award opt-out: No answer provided (not opted out).

Consent to publish project information: Yes.

Consent to publish exact project location: Yes.

Consent to future Awards contact: Yes.

Consent to publish project pictures: Yes.

Supporting materials: No answer provided.