

Warming Dutch Homes With Industrial Process Heat



Challenge

Gasunie, a European energy grid owner, is seeking new ways to meet its customers' ever-growing energy needs while also supporting efforts to reduce emissions of carbon dioxide (CO₂). The European Union has committed to becoming carbon-neutral by 2050; reaching that goal will require the development of alternative energy sources that minimize or eliminate the release of greenhouse gases that cause climate change.

Solution

Gasunie plans to construct the first large-scale system in the Netherlands to capture waste heat from industrial plants near the port of Rotterdam. The heat will be transferred through water in a pipeline network to warm 120,000 homes. Highly reliable and efficient pumps from Flowserve — Worthington® LNN axially split, single-case pumps and HPX overhung OH2 process pumps — were selected for a pumping station and a heat exchange facility in the project's first phase.

Reduce fossil fuel use by transporting heat that's already available

The Netherlands, and much of Europe, depends heavily on fossil fuels, the burning of which releases significant amounts of carbon dioxide (CO₂), which contributes to the greenhouse gases that cause climate change. The countries of the European Union, however, intend to become carbon-neutral by 2050.

Since about 40% of energy-related CO₂ emissions come from heating, there's an opportunity to significantly reduce emissions by burning less natural gas.

Gasunie is investing in large-scale heat infrastructure to distribute heat that otherwise would be wasted as a by-product of industrial processes. Repurposing the heat for homes will effectively reduce the amount of natural gas combusted as well as the amount of CO₂ released into the atmosphere.

First large-scale heat grid in the Netherlands

To contribute to efforts to reduce the heavy reliance on fossil fuels, Gasunie is investing in the construction of the first large-scale heat grid project in the Netherlands.

Called WarmtelinQ, this project consists of a pipeline that will carry residual heat from existing industrial plants near the port of Rotterdam to nearby cities where it will be distributed by local third-party pipeline operators. Approximately 120,000 homes can be warmed affordably, reliably and sustainably with heat that otherwise would be released into the atmosphere.

Utilizing residual heat reaching 130°C (266°F) from industries is a cost-effective alternative to burning fossil fuels to individually warm residential units.



Dutch home might soon be warmed by lower-cost heat from Gasunie’s WarmtelinQ heat grid project. By repurposing waste heat from industrial plants near the port of Rotterdam, WarmtelinQ will support a cost-effective alternative to burning fossil fuels and reduce CO₂ emissions.

Cross-county closed loop to keep people warm in their homes

Heat in process water, gases and exhaust from industrial plants in Rotterdam will be transferred in a heat exchanger to a distribution pipeline to be built by Gasunie. It’s the first closed-loop system of its kind in the Netherlands and will deliver heat to local heat grids operated by third parties in Delft and The Hague.

Gasunie is partnering with Flowserve to engineer, commission and support pumping and heat transfer stations needed to transport the hot water about 16 km (10 miles) to the first pump station near Delft and another 16 km (10 miles) to a pump stations near The Hague.



Redesigning the heat grid concept

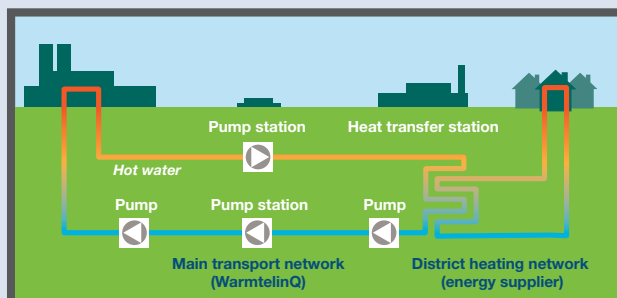
Gasunie is scaling up the idea of heat grid to transfer energy cross-country.

A heat grid or district heating has long been used in individual buildings or facilities; heat is generated in a central location and transported to grids or districts within an industrial plant and residential or office buildings.

This approach often is found on campuses with multiple buildings operated by companies, schools and governmental organizations.

Gasunie is building upon this traditional local approach to create a network of heat exchangers, pumps and pipelines that stretches across the Netherlands:

- The waste heat from multiple sources around the port of Rotterdam will be collected at a new heat exchange facility that transfers the energy to water in a new Gasunie pipeline.
- Heated water will then be pumped from Rotterdam to additional heat exchange stations in cities across the Dutch countryside.
- From there, heat carried in the Gasunie system will be transferred to local networks owned by third-party companies.
- Their smaller pipelines will connect to neighborhoods and deliver the warm water to keep people comfortable in their homes.



Highly reliable Flowserve pumps help redistribute heat

For the first phase of the project, Gasunie selected Worthington LNN axially split, single-case pumps for a pumping station near the city of Delft. The superior design of the LNN pump series offers broad hydraulic coverage, quiet operation, low NPSH and high operating efficiency.

Gasunie also selected HPX overhung OH2 process pumps from Flowserve for a heat exchange station in the first phase of WarmtelinQ.

All pumps will be fitted with Flowserve QBQ cartridge-style, single pusher seals and a flush plan.

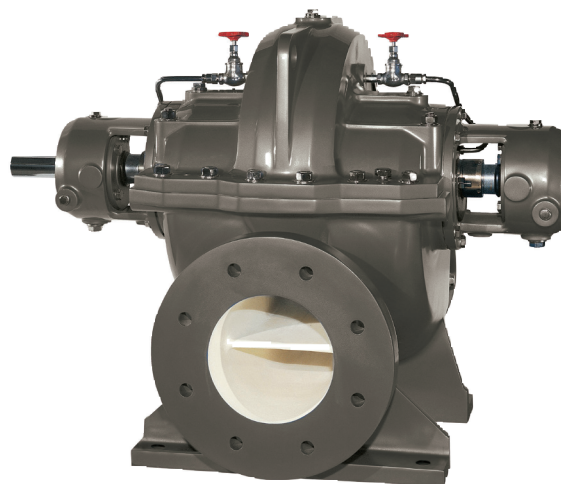
Driving first pumping station with LNN pumps

The LNN pump is an ideal match for an energy recovery project because it's designed to lower the total cost of ownership (TCO) and provide years of reliable service.

Its double volute design minimizes hydraulic radial forces in any condition down to the minimum flow, thereby reducing shaft deflection and increasing the service life of bearings, seals and wear rings. In addition, separate 360° bearing housings provide superior bearing stability and shaft support while easing maintenance.

Maintenance costs will be minimized because the upper casing does not need to be removed to access bearings, packing, mechanical seals, sleeves or sleeve nuts.

Each LNN pump also comes ready to connect to the operator's existing process monitoring and predictive analytics systems.



Manufactured in Amage, France, among other locations, the Worthington LNN axially split pump from Flowserve offers high-efficiency operation and years of reliable service, contributing to low total cost of ownership.



HPX pumps crucial for heat exchanger

The HPX pumps help lower operating costs with comprehensive hydraulic coverage and specialty configurations that permit the best operating efficiency. They are designed for high temperatures and a long service life.

That makes them ideal for use in the first heat exchange station, where energy from the main Gasunie pipeline will be transferred to smaller local pipelines for delivery by another energy company to residential users.

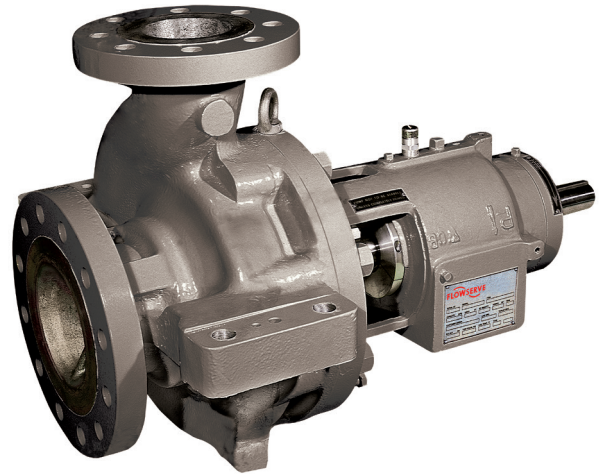
Carrying heat from port to multiple cities

The initial pump station and heat exchanger station are part of a pilot project. The complete WarmtelinQ heating district will require multiple pumping stations and heat exchanger units.

Phase 2 plans by Gasunie call for additional LNN and HPX pumps from Flowserve for the large pumping stations along the route from Rotterdam to nearby cities, including Leiden and Rijswijk, and the regions of Oostland and Ypenburg.

Partnership can ensure energy transition success

Gasunie partnered with Flowserve because our engineers located nearby in the Netherlands and France quickly can provide technical information to meet changing requirements. We bring a proven process to successfully execute projects, and Flowserve is present where many of our customers operate. In the Netherlands and France, our engineers and technicians are working alongside the Gasunie team to design the first leg of the WarmtelinQ project. It's scheduled for construction in late 2022.



The Flowserve HPX overhung process pump complies with API 610 (OH2) requirements, making it ideal for use in heat exchanger applications.

Gasunie leaders also said they chose Flowserve so they can leverage our 225 years of flow control expertise and the unique capabilities available from our global network of Quick Response Centers (QRCs) staffed by pump, valve and seal specialists. We approach first-of-a-kind projects such as WarmtelinQ with an enterprise mindset that enables us to focus the worldwide resources of Flowserve to support such an innovative energy transition initiative.

And Flowserve can be counted on to provide comprehensive technical support, spare parts and repair services when needed throughout the expected 30-year lifespan of the WarmtelinQ project.

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