



ENERGY FROM WASTE WATER

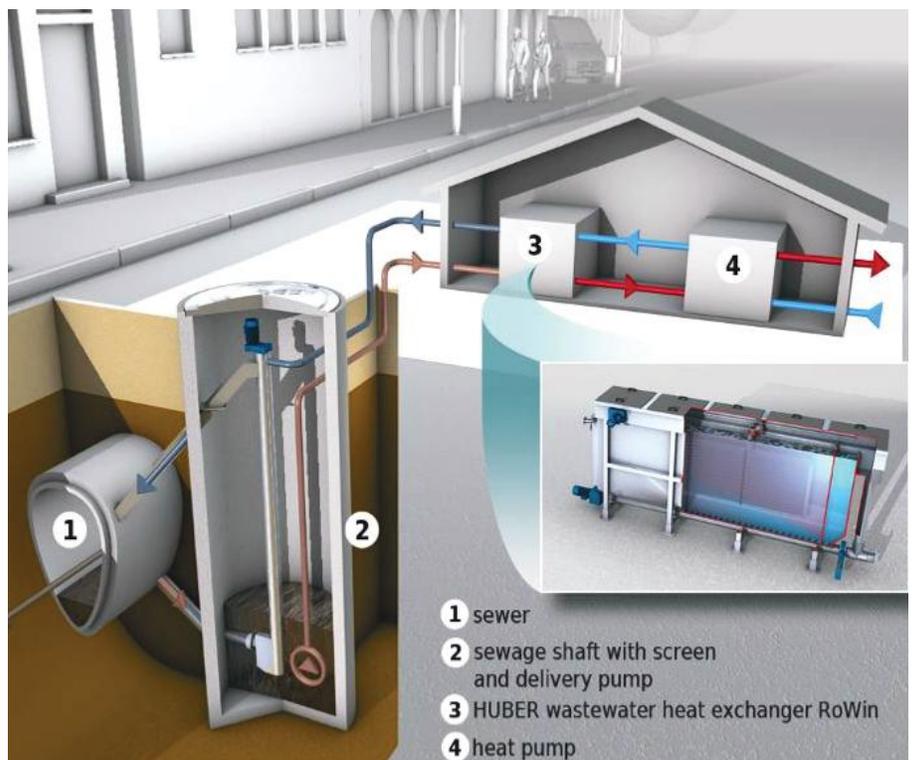
Wastewater contains thermal energy. Using our exclusively licensed HUBER *ThermWin*® system, in conjunction with *Trane*® heat pumps, we can extract this energy from the sewer to supply heating to buildings in the winter, or we can reject heat to the sewer to provide cooling to buildings in the summer.

HUBER Technology is a 100-year-old company with over 40,000 waste water installations around the world. Their experience in screening and handling sewage and industrial wastewater has enabled them to develop the *ThermWin*® system. *ThermWin*® includes the HUBER pumping stations screen *ROTAMAT*® *RoK4* assembly located in a wet well next to the sewer and the patented *RoWin*® heat exchanger located above ground or in the basement. The sewage is screened in the wet well to remove coarse solids while the remaining sludge is lifted up by the *RoK4*'s compact auger and put back into the sewer. The remaining brown water containing the energy is pumped up to the patented *RoWin*® heat exchanger wherein a well-defined and turbulent flow is generated to achieve efficient heat transfer. Once the energy transfer is completed, the brown water is returned to the wet well where it flows back to the sewer along with the sludge that has been lifted by the *RoK4*.

Noventa is proud to have an exclusive license for HUBER *ThermWin*® in North America. Through our close working relationship, our respective engineering teams are working together to develop customized engineering solutions to make wastewater heat recovery a viable option for numerous applications across Canada and the United States.

HOW IT WORKS

- A portion of the raw sewage flows via gravity through an intake structure from the sewer into the wet well and the HUBER pumping stations screen *ROTAMAT*® *RoK4* that retains the coarse solids.
- The solids retained by the screen are transported vertically upwards and returned to the sewer system.
- The screened wastewater is lifted by a pump installed in the inlet structure and flows by gravity through the *RoWin*® heat exchanger installed above ground. This creates continuously stable hydraulic conditions and ensures a controlled heat transfer. In the HUBER *RoWin*® heat exchanger, the heat energy is transferred to a cooling medium (normally water), which transports the energy to a heat pump.
- The cooled wastewater flows back to the sewer, taking along the screenings separated by the HUBER pumping stations screen *ROTAMAT*® *RoK4*.



DESCRIPTION OF SYSTEM COMPONENTS

1. Sewer: The HUBER *ThermWin*[®] system is independent of sewer shape and size. Even small flow rates are handled without problems due to the gravity system and intake near the sewer bottom.

2. Wet Well: The shaft is located directly at the sewer and has two functions. It serves as a sump for the pump feeding the heat exchanger and houses the HUBER pumping stations screen *ROTAMAT*[®] *RoK4*. This type of HUBER screen is well-proven worldwide and ensures pre-screening of the wastewater to protect the heat exchanger against coarse material. A vertical screw conveyor with brushes transports the separated solids upwards and, at its top, discharges them to the sewer.

3. Heat Exchanger: The HUBER heat exchanger *RoWin*[®] has been developed especially for wastewater applications. The tank is completely made of stainless steel and is odour-tight, and can therefore be installed even in residential areas. The patented self-cleaning mechanism and sediments removal screw inside the *RoWin*[®] guarantee continuous system operation with low maintenance requirements. Due to its modular design, the HUBER heat exchanger *RoWin*[®] can be tailored to suit project-specific requirements.

4. Heat Pump: Many buildings in North America are designed with heat pumps because they are able to provide both heating and cooling, thereby reducing capital and operating costs. Additionally, by reducing natural gas consumption, they contribute to lower carbon emissions. Noventa has partnered with one of the world's leading suppliers of heat pumps: *Trane*[®]. By combining HUBER technology and *Trane*[®] heat pumps, Noventa is able to significantly reduce carbon emissions, improve HVAC system reliability, and lower operating costs. ***For every 1 KW of electric energy put into a heat pump, Noventa's proprietary HUBER ThermWin*[®] *system can produce over 6 KW of eco-friendly energy to heat and cool buildings.***

