

Heat Pump Awards 2026

Application submission

The Mill That Powers and Heats Its Neighbours

EXTRAQT | Innovation Award

1. Application overview

Award category	Innovation
Title of the project	The Mill That Powers and Heats Its Neighbours: an aquathermal heat network for heritage homes powered by its own hydropower
Organisation Name	EXTRAQT
Exact address of the project	Molenstraat 2, 3110 Rotselaar
Funding	Private Public EU funds Autre
Organisations involved in the project	Ecopower cv: project owner and lead, citizen energy cooperative EXTRAQT bv: aquathermal source design and technical design Eco-Technix: heat exchanger supply Van Marcke Engineering: distribution network design and heat substations Bumaco: heat pump installer Terrendis: pre-insulated underground piping Province of Vlaams-Brabant: co-financing and support vzw De Molen van Rotselaar: site and residents
Project ending date	20/12/2025
Project website	https://ecopower.be/over-ecopower/productie-installaties/molen-van-rotselaar
Sector of application	Residential

2. Applicant & EHPA contact details

Full name	Jan Denayer
Email address	jan.denayer@extraqt.be

Phone number	32484671640 Membership
EHPA member involved	EXTRAQT
Role of EHPA member	Design of the aquathermal heat pump source Technical details

3. Project description and benefits

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

The goal of this project was to heat nine existing homes and apartments at the historic watermill of Rotselaar (Belgium), the site where energy cooperative Ecopower was founded, entirely without fossil fuels.

Existing and heritage buildings are among the hardest to decarbonise. Deep renovation is often impossible, outdoor units are unwelcome on heritage sites, and individual heat pumps for nine separate households would be costly and inefficient. Small collective heat networks for existing homes did not yet exist in Flanders.

EXTRAQT designed an innovative solution where a submerged heat exchanger placed in the river Dijle, directly behind the mill's water wheel, extracts heat from the flowing river (average flow $\sim 5 \text{ m}^3/\text{s}$). A cascade of water-to-water heat pumps upgrades it to 50–60 °C for space heating and domestic hot water, distributed through a 300 m insulated micro heat network. The heat pumps run on green electricity from the mill's own hydropower plant, and an additional heat pump recovers waste heat from the turbine's generator and gearbox.

The result is a fully local, 100% renewable heat supply on a now fossil-free site, owned by citizens through the cooperative, and the first aquathermal heat network for existing homes in Flanders.

Expected or achieved benefits

Climate: $\sim 29 \text{ t CO}_2$ avoided per year; the mill site is now 100% fossil-free.

Energy: designed for $\sim 200 \text{ MWh}$ of heat per year at an estimated SCOP of 3.6. Electricity comes from on-site hydropower, and turbine waste heat is recovered instead of lost.

Buildings: existing and heritage buildings switched to a heat pump without deep renovation, thanks to 50–60 °C supply temperatures. There are no outdoor units and no noise, and the heat exchanger is invisible under water.

Residents: stable, locally produced heat from a not-for-profit cooperative supplier, with an estimated €6,500 per year in operational savings versus fossil heating.

Community: the network is owned by citizens and residents joined voluntarily. It can expand to 15 households and businesses.

Replication: a blueprint for the many watermills, moated castles and riverside neighbourhoods across Europe.

Obstacles/barriers encountered during development

The main barrier was economic. At current energy prices and taxation, a small heat network cannot compete with gas, so public co-financing was essential to make the project viable. Nine separate households also had to agree voluntarily to join one shared heat network. Ecopower's role as a trusted local cooperative made that possible. Technically, the system had to work with the existing heat emitters of historic buildings at 50–60 °C, without invasive renovation. The heat exchanger also had to be placed in the flowing river behind the water wheel without disturbing the hydropower operation. Finally, there was no Flemish precedent or regulatory framework for this type of small heat network to build on.

Why should this project win an award?

In 1991, a few people founded the energy cooperative Ecopower around a kitchen table in this mill. Today Ecopower has more than 73,000 members, and the mill where it started heats itself entirely from the river that flows beneath it.

The same river turns the turbine that powers the heat pumps and provides the heat they upgrade. Even the waste heat of the turbine's generator and gearbox is recovered. River, mill and heat network work together as one closed local energy loop, with no fossil fuel, no grid dependency for the heat and nothing visible on a heritage site.

It proves that aquathermal heat pumps can decarbonise the existing buildings that are hardest to reach, collectively and owned by citizens. Europe has thousands of mills, moats and riverside communities that could follow.

Your information

4. Technical specifications

Capacity of unit(s)	75 kW in total: two 35 kW water-to-water heat pumps on the river source and one 5 kW heat pump on recovered turbine heat.
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Energy sources used	The heat pumps run on electricity, mainly green power from the mill's own hydropower plant on the Dijle. The heat comes from the river itself, and a small extra heat pump uses recycled waste heat from the turbine's generator and gearbox. No gas or other fossil fuel is used.
Coefficient of Performance (COP)	The expected seasonal COP of the system is about 3.6. That figure assumes Dijle river water as the source over a full heating season and a supply temperature of 50–60 °C to the homes.
Service provided	Space heating and domestic hot water for nine existing homes and apartments.
Refrigerant type	R290

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

Heat is taken from the Dijle by a stainless steel heat exchanger placed in the river, just behind the mill's water wheel. A closed water-glycol loop carries the heat to two 35 kW water-to-water heat pumps (Mastertherm). They work in cascade, so one unit covers low demand and the second switches on when it gets colder. A third 5 kW heat pump upgrades the waste heat from the hydropower turbine. All three feed into shared buffer tanks. From there, a 300 m pre-insulated network delivers the heat to individual substations in each home.

5. Renewable energy integration and grid response

Integration of renewable energy sources

River, hydropower and heat pumps are one local system. The water that drives the turbine also supplies the heat, and the turbine's electricity drives the heat pumps, so most of the energy is produced and used on the same site. Heat from the generator and gearbox used to be lost, now it is recovered as an extra heat source. This lowers the carbon footprint, increases local self-consumption of the hydropower and makes better use of every kWh produced on site.

Response to energy demand / smart grid integration

The two cascaded heat pumps modulate and switch on step by step as demand rises, so they rarely run inefficiently at part load. The buffer tanks decouple heat production from the moment residents use it. This lets the system smooth out peaks, such as morning hot water, and opens the door to running the heat pumps when the turbine produces most.

6. Innovation, monitoring and replicability

General (all awards)

Why the project is innovative (all awards)

It is the first aquathermal heat network for existing homes in Flanders. It combines three local sources: heat from a flowing river, electricity from the mill's own turbine and recovered waste heat from that turbine. Placing the heat exchanger in the river right behind a working water wheel, on a heritage site, without deep renovation of the buildings and owned by a citizen cooperative, makes it a model for watermills and riverside communities elsewhere in Europe.

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

The heat pumps are monitored remotely through the MasterTherm online dashboard, which logs operating data such as heat output, electricity use, source and supply temperatures and COP in real time. A hydraulic expert follows up on the installation and adjusts the control settings based on the measured performance, for example the heating curves, the cascade staging and the buffer temperatures. This keeps the system running as efficiently as possible as the river temperature and the heat demand change through the season.

Large Heat Pump & Building Solutions award categories

Evaluated criteria: replicability potential. Answer only if you are applying to the Large Heat Pump or Building Solutions award category.

For Innovation Award

Technology/technique developed solely for this project

No new components were developed. The innovation lies in the integration: a closed heat exchanger in a flowing river, right behind a working water wheel, combined with heat pumps powered by the mill's own turbine and a heat pump that recovers the turbine's waste heat.

Differentiation from state-of-the-art solutions & market maturity

Most aquathermal projects are either large open systems with water intake and filtration, or single buildings next to a pond. This is a closed system in a flowing river that heats a small collective network of existing homes and is fully integrated with local hydropower. The configuration is a first-of-its-kind pilot in Flanders. The underlying technology, closed aquathermal systems for existing buildings, is in early commercial deployment, with several EXTRAQT installations already running in Belgium.

Regional benefits (energy savings, emissions, jobs, infrastructure)

The project delivers around 200 MWh of local renewable heat per year and avoids about 29 tonnes of CO₂. It is owned by local citizens and was designed and built by regional companies, so the investment stays in the region. The mill also serves as a demonstration site for municipalities, heritage owners and installers, and the network can grow from 9 to 15 connections.

Commercial potential

The concept fits wherever buildings stand next to surface water: watermills, moated castles, estates and riverside neighbourhoods. In Flanders alone, about 8.7% of all buildings are within 250 metres of a suitable water body. Growth comes from replication across Belgium and the Netherlands, not from licensing.

Consent