Mine-water Energy Toolkit

Gateshead Mine Water Project – Case Study
Summary
The Gateshead Mine Water Project is the largest mine-water heat network in Great Britain and one of the largest in Europe. It has been developed by the council-owned Gateshead Energy Company with the support of contractors and the Coal Authority. The Heat Network Investment Project (HNIP) and Gateshead Council provided the funding for the scheme that started operations in March 2023.
Key Points
Project Background The Gateshead Mine Water Project is an innovative energy project harnessing the Earth's natural heat reservoir to provide sustainable heating and potentially cooling solutions for the local community. The project leverages the consistent mine water temperature of 15.5°C, extracted from a depth of 150 meters underground to provide 6.1MW of heat. **Project Overview** • **Location**: Gateshead • **Customers**: The network supplies heat to Gateshead College, the Baltic Arts Centre, several offices and 350 council owned homes. Anticipated future connections include 270 privately owned homes, a conference centre and a hotel. • **Mine Water Abstraction Depth**: 150 meters • **Mine Water Temperature**: 15.5°C

- **Consistency of Mine Water Temperature**: Unchanged, but yet to experience a full winter
- **Extraction Rate**: from 70 litres per second to 140 litres per second - currently operating mostly at 50%
- **Heat Exchanger Operating Parameters**: Hot side: 80°C / Cold side: 65°C (Aiming to improve to 80°C / 60°C)
- **Peak Output**: 6.1MW
- **Potential Capacity**: 6.1MW, constrained by mine water flow; operating 2500 hours per year at 50% capacity, significant spare capacity
- **Heat Load Supplied**: Equivalent to 5000 homes at peak demand; aiming to deliver 10GWh in 3 years (approximately 35% of network demand)
- **Future Expansion**: Potential to increase to 20GWh/year with additional loads (development, Queen Elizabeth hospital). There are plans to increase the percentage of output to reduce reliance on gas CHP, but these are contingent on lower electricity prices from renewable Power Purchase Agreements or installing renewables
- **Cooling**: Space provided for cooling pumps if required for future developments
- **Carbon Saving**: estimated saving of 72,000 tonnes of CO_2 over 40 years which equates to annual savings of about 1,800 tonnes CO_2 per annum.

Benefits and Impact

- **Renewable Energy**: The project harnesses geothermal energy from the mine water, contributing to the reduction of greenhouse gas emissions and reliance on fossil fuels.
- **Local Heating Solutions**: By providing heating to thousands of homes, the project enhances the quality of life for the local community while reducing energy costs and environmental impact.
- **Sustainable Expansion**: With plans to accommodate future loads and potentially supply cooling, the project is well-positioned to support the area's growth and changing energy needs sustainably.
- **Transition to Green Energy**: The project's ambitious goal of reducing reliance on gas CHP in favour of mine-water energy aligns with broader efforts to decarbonise the energy sector and combat climate change.

The Gateshead Mine Water Project demonstrates that energy can be successfully harvested from warm water in former mine workings to provide sustainable heating solutions and meet the evolving energy needs of communities.