

## **Greening our future space-heating with groundwater!**

In moderate to cold (excluding polar) climates, space heating is associated with approximately 30% to 50% of the overall carbon footprint. It is, hence, clear that a green transition in such places, will not be achieved without serious consideration given to such large contributors.

With an "all hands-on-deck" approach, COWI have pulled together a team of academics from Strathclyde University and DTU, entrepreneurs from SCALGO, The Coal Authority (TCA) and the Scottish Environmental Agency (SEPA), together with several internal experts from COWI in the UK, Energy International, and Utility department to address some of the most substantial barriers to using low-temperature geothermal sources for space heating.

This unique innovation ecosystem will be utilising decades of minewater data (from TCA) to produce a digital tool which can accurately predict the behaviour of both, the natural and built system components. The importance of such a development lies in the lack of clear understanding of heat behaviour in underground environments, and consequently the lack of clear policy in regulating heat in a sustainable manner. A model that can be used for systematic prediction of performance under changing circumstances is key to making sustainable decisions while allowing for a future energy solution to flourish with public and private investment.

The data will be meticulously analysed using artificial intelligence and machine learning techniques to identify complex patterns of correlation. The model will also benefit from the latest updates to numerical analysis methods in groundwater flow and transport.

The United Kingdom offers an exceptionally suitable set of conditions for this project. This is due to the availability of the resource within the flooded, abandoned mine tunnels and shafts. Moreover, these flooded cavities are in large cities and as such, very close to the end-users.

This work will make it possible to build and regulate several local systems without undermining the natural process of re-rising to ambient temperatures. In addition, outlining the governing factors in heat transfer behaviour will help assess usability of groundwater as a long-term heat storage solution. More resilient heat sources are an integrated part of the future energy landscape.

There is little doubt that the findings of this work will be advantageous to design consultants, policymakers, and investors but evermore importantly, this will act as an enabler in our collective strive to save our blue-green planet!