

EGU24-15820, updated on 09 Dec 2024

<https://doi.org/10.5194/egusphere-egu24-15820>

EGU General Assembly 2024

© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



## Visualising low enthalpy geothermal favourability in Scotland: A map-based screening tool for community scale open-loop ground source heat pumps in superficial aquifers

**Tristan Alexander Roberts**, Adrian Hartley, and Clare Bond

University of Aberdeen, Geology and Geophysics, United Kingdom of Great Britain – England, Scotland, Wales

(t.roberts.21@abdn.ac.uk)

The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 demands a net zero economy in Scotland by 2045, yet in the same year over three quarters of domestic heating was met by natural gas. A novel method and dynamic map resource is developed to visualise low enthalpy geothermal potential for space heating on a community scale using Ground Source Heat Pumps (GSHPs) and District Heat Networks (DHNs). This resource is intended to provide a screening tool that enables communities and policy makers to effectively reduce carbon emissions by aiding early-stage decision making and understanding of geothermal potential within the context of their communities.

ArcGIS software is used to infer geothermal potential in 49,768km<sup>2</sup> of superficial deposits (64% of total land area), in Scotland, using a Favourability Index (FI) and a 1km<sup>2</sup> grid. Cells are assigned an FI value (0.0 - 5.0) using ten metrics based on key criteria: 1) deposit coverage, 2) thickness, 3) aquifer productivity, 4) temperature, 5) ground conditions, 6) heat demand, 7) protected land. Map resources developed show lowland areas generally exhibit more favourable conditions particularly within the Midland Valley, and settlements predominantly lie in high favourability areas. ~60% of the population is identified as living in areas where further investigations into community scale GSHPs is warranted, suggesting that the thermal resource held in unconsolidated sediments has significant potential to decarbonise the Scottish heating sector.