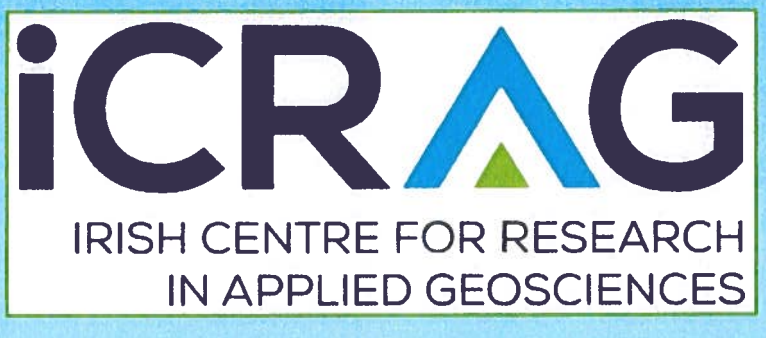

iCRAG, The SFI Research Centre for Applied Geosciences Response to 'District Heating: Consultation to inform a policy framework for the development of district heating in Ireland'

Submitted to: Department of Communications, Climate Action and Environment.

Submitted by: iCRAG, the SFI Research Centre for Applied Geosciences

Date: 27/02/2020

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About iCRAG

iCRAG is the SFI Research Centre for Applied Geosciences. We are a team of researchers creating solutions for a sustainable society.

We develop innovative science and technologies to better understand the Earth's past, present, and future and how people are connected to it.

We drive research in areas that are critical to society and the economy, including:

- Sustainable discovery of energy resources and raw materials required for decarbonisation.
- Securing and protecting groundwater and marine resources.
- Protecting society from Earth's hazards such as floods and landslides.

iCRAG, the world leading SFI Research Centre in applied geosciences hosted by UCD, comprises 150 researchers across eight universities and institutions. iCRAG is supported by Science Foundation Ireland, the European Regional Development Fund, Geological Survey Ireland and industry partners.

www.icrag-centre.org

Introduction

iCRAG, the SFI Centre for Research in Applied Geosciences, funded by Science Foundation Ireland, the European Regional Development Fund, Geological Survey Ireland and industry partners welcomes this opportunity to contribute to the development of policies for district heating in Ireland. District heating, with geothermal energy as one of its sources of heat, can reduce Ireland's reliance on imported fossil fuels and lower our greenhouse gas emissions. As Ireland's applied geoscience research centre, comprising more than 150 researchers across eight Irish universities and institutions, iCRAG is actively contributing to Ireland's commitments on lowering carbon emissions.

Hosted by University College Dublin, iCRAG's broad research community focuses on three interrelated Challenges–Earth System Change, Earth Resources, and Earth Science in Society. Established in 2015 iCRAG has established a network of over a hundred industry partners and has strong relationships with several government bodies and agencies.

Understanding the Earth system is an essential component in addressing the climate challenge. iCRAG's research findings on how and why the Earth system changes through time, the distribution and characteristics of Earth resources needed for clean energy technologies, and the interactions between people and the Earth system all support evidence-based policy options and decision making. Many of the UN Sustainable

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Development Goals, such as SDG6 (clean water), SDG7 (affordable and clean energy) and SDG13 (climate action), are reliant on the geosciences to understand, monitor and manage the actions needed to reach these goals.

iCRAG hopes that the final district heating policy framework will enable Government departments, State agencies, regulatory authorities and policy makers to make informed decisions on geothermal and district heating. Furthermore, iCRAG wants to share its expertise particularly in the areas of geothermal energy and climate action.

Comments and Observations

Geothermal energy for district heating

Action: Geothermal energy has significant potential to contribute to district heating. District heating policies should deliberately include geothermal energy as a potential heat source and should not create any barriers to its inclusion in district heating schemes.

Geothermal energy is defined as "energy stored in the form of heat beneath the surface of solid earth" (Statutory Instrument No. 147 of 2011). Geothermal energy is classed as a renewable energy source under the EU Renewable Energy Directive and a recent study showed that direct use geothermal energy has 7% of the emissions of a gas-fired boiler[1]. Geothermal energy is widely used in district heating schemes in Europe, including in France, Denmark, and the Netherlands.

Many people are familiar with ground source heat pumps (GSHP) which use geothermal heat stored just below the surface of the earth. Most GSHP installations in Ireland are linked to individual homes but larger installations provide heating and cooling services to commercial buildings such as the IKEA store in Ballymun, Co. Dublin. These systems are growing in popularity but they barely tap into the vast resource of heat that underlies Ireland.

The temperature of the Earth increases at a rate of about 25°–30°C per kilometre under Ireland[2]. We can therefore expect to encounter temperatures of about 60°–75°C at depths around 2.5 km, which is a typical depth for geothermal wells for heating in the Netherlands (Dutch master plan, p. 9). Two geothermal wells near Newcastle, Co. Dublin, encountered water at a temperature of 46.2°C at 1,337m, confirming predictions[3]. As

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Figure 1 shows, these temperatures are suitable for heating and cooling buildings and indicate that geothermal energy could be used for district heating in Ireland.

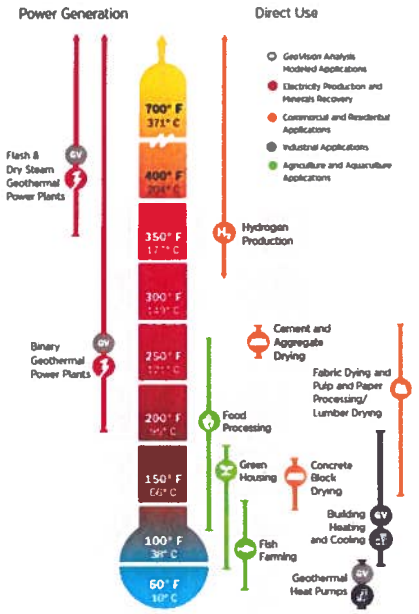

Fig. 1. The continuum of geothermal energy technology applications and uses.[4]

Geothermal energy can provide baseload energy on a 24/7 basis and serve as a reliable backup system in district heating schemes because it does not depend on the weather or on a source of waste heat, such as an incinerator or data centre, being in continuous operational mode. Geothermal systems can provide cooling as well as heating services, which will become increasingly important as global temperatures rise. Including geothermal energy as a heat source makes district heating systems more reliable and resilient.

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Coordinate district heating and geothermal policy development

Action: Set up a working group to coordinate policy development across the supply and demand side of the district heating sector.

The basic concepts for geothermal district heating have been proven elsewhere in Europe. Both the district heating and geothermal energy sectors are at a similar early stage of development in Ireland. Just as policies for district heating should accommodate geothermal energy, policies for geothermal energy should accommodate its use in district heating. Both sectors would benefit from coordinated, streamlined policies to facilitate appropriate development.

Research to overcome barriers to development

Action: Create a grant programme to support research on the technical and human science challenges faced by the district heating sector and its energy sources.

Financial and technical challenges associated with district heating are not the only barriers to development. Public awareness of district heating and, perhaps more crucially, public acceptance of district heating can be a major obstacle. Social science research can help policy makers and stakeholders to identify and address societal concerns about district heating.

Geothermal energy is probably the least understood Irish energy resource and this hinders its development for district heating. Action 70 in the 2019 Climate Action Plan, which tasks Geological Survey Ireland with examining the potential of geothermal to contribute to district heating and to develop a roadmap, is a first step. However, more geological and hydrological research is needed especially near urban areas where district heating is most likely to be installed if we are to make strategic and timely use of this resource and to develop the skilled workforce needed to mesh renewable energy sources with district heating systems.

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Summary and Recommendations

We urge you to consider these points as you develop district heating policies:

- Ensure that all policies relating to district heating in Ireland accommodate the inclusion of geothermal energy as a renewable, near-zero-carbon, indigenous source of energy for heating and cooling.
- Coordinate the development of policies for district heating with the development of policies for geothermal energy to ensure the optimum use of the nation's geothermal resources.
- Support essential research to de-risk investment in district heating, including research on public acceptance of district heating and on developing geothermal energy for district heat.

Further information on the above points can be sought from [redacted] iCRAG Director, [redacted] or [redacted] iCRAG Communications Manager, [redacted]

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[1] McCay, A.T., Feliks, M.E.J., and Roberts, J. (2019). Life cycle assessment of the carbon intensity of deep geothermal heat systems: A case study from Scotland. Science of the Total Environment, v. 685, p. 208-219. https://pureportal.strath.ac.uk/en/publications/life-cycle-assessment-of-the-carbon-intensity-of-deep-geothermal-

[2] Blake, S. (2018). The IRETHERM Project 2011-2016, *in* Geological Survey Ireland (2018). Deep geothermal in Ireland – past, present and future.: A review of recent developments and potential growth for the deep geothermal sector in Ireland. https://www.gsi.ie/en-ie/publications/Pages/Deep-Geothermal-Energy-in-Ireland-GSI-Workshop-September-2018.aspx

[3] Pasquali, R. and Hanly, P. (2018). Deep geothermal investigations in the Dublin Basin, , *in* Geological Survey Ireland (2018). Deep geothermal in Ireland – past, present and future.: A review of recent developments and potential growth for the deep geothermal sector in Ireland. https://www.gsi.ie/en-ie/publications/Pages/Deep-Geothermal-Energy-in-Ireland-GSI-Workshop-September-2018.aspx

[4] U.S. Department of Energy (2019). *Geovision: Harnessing the heat beneath our feet.* https://www.energy.gov/eere/geothermal/geovision.

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