Consultation on the Draft Policy Statement on Geothermal Energy for a Circular Economy

Response by the Irish District Energy Association 01/03/22

Background

The Irish District Energy Association (IrDEA) is the trade organisation representing the district heating and cooling (DHC) sector in Ireland. We act on behalf of our members to support and promote the growth of the DHC industry, creating a new heating market for Ireland which offers greater opportunities to utilise indigenous low-carbon and renewable sources of heat.

Introduction

The Irish District Energy Association (IrDEA), founded in 2017 and its purpose is to promote the development of District Heating & Cooling (DHC) in Ireland. IrDEA currently represents 29 members from a variety of sectors from consultancy and technology providers, to the public sector and academia. Countries with similar climates, populations, and energy systems to Ireland have proven that district energy can deliver sustainable and cost-effective heating to urban areas with millions of people.

However, there is currently a shortage of knowledge, policy support, capacity, standards and regulations in Ireland to facilitate the implementation of large-scale district energy networks. IrDEA's objective is to overcome these barriers by informing key stakeholders in Ireland about all aspects of district energy.

IrDEA welcomes the opportunity to input into this consultation process and in this response we have outlined a number of key areas for the future development of geothermal district heating.

Data is Critical for the Development of Geothermal District Heating

Through earlier submissions the use or retention of data has been highlighted by IrDEA as a road block to developing a definitive view over fuel mix and usage across the state.

As per previous submission we would ask DECC to inform the relevant bodies that access to data on building heat demands or data to allow estimates of heat demand, is fundamental to developing DHC systems - it has become increasingly difficult to obtain data, even public data, on buildings in order for heat demand modelling and mapping to be carried out. Census data that was available at small area level is now unavailable for 2016 Census due to misinformed use of GDPR. GDPR has become an excuse for many public bodies not to release data, as their legal teams are overly cautious on releasing data. This is a problem for ALL energy research, not just DHC, but particularly relevant for DHC given its reliance on locational data attributes for spatial analysis.

We would therefore ask that DECC seriously consider and revise the policy on data control and advise relevant bodies such as the CSO & SEAI. Semi-state energy utility companies, while they hold commercially sensitive customer data, have data that can be anonymised easily to allow researchers to assess the most cost-effective and low-carbon solutions for heating in Ireland. Allowing these companies (particularly fossil-fuel companies) to retain this data only for their own use reinforces the status-quo and does not allow a level playing field for new technologies and solutions to gain the same market insights. This data needs to be made available to Local Authorities who are developing new DHC utilities for the public good and helping to meet national level emissions targets.

Section 7 of the Draft Document gives a new road map to develop and maintain Data into the future, which is welcome however, existing/historic data is required to develop systems across the state.

Reducing Project Risks Is Urgently Required

"The department can assist in reducing these costs and early risks to a potential project by seeking opportunities to undertake research drilling and geophysical data acquisition ... "

Geological survey Irelands inclusion is welcome and essential, any further supports available to the GSI should be welcomed and encouraged. A plan for test drilling and the proximity to existing DH systems

would be positive use of resources, where existing systems have to capacity and a need for Geothermal to add to their fuel mix. As potential Carbon Tax revenues are ring-fenced to provide for the" Just Transition", research and testing in this sphere should be prioritised.

The use of geothermal in the national energy mix provides a safe and secure energy source which will be unaffected by external economic or climate factors.

In addition, it is essential the department put in place adequate supports for Geothermal technology. As with support for Wind Energy production both here and in Europe, sufficient financial supports are required at both development stage and in cost of production, i.e. ensuring a fair market price for heat across Ireland.

Establishing a methodology to ensure the public are aware of the benefits of a near Zero energy source must run in tandem with the exploration process and development of geothermal heat sources. Our low level of renewable heat delivery has left us with a deficiency in this regard; however, a road map to delivery with the knowledge gained in this technology from our European Neighbours will assist in increasing the utilisation of low carbon heat.

As per the European Union's drive to achieve the UN Sustainable Development goals, the Special EU Programmes Body is calling for projects in the geothermal sphere.

While this is welcome and includes funding for one off project, the need for a sustained National programme is required and needs to be supported by DEEC to deliver these projects.

The establishment of central heating hubs based around Geothermal and District heating systems and complimented by other low to zero carbon sources of heat will drive awareness, uptake and investment in these locations.

IrDEA members already working in this area and with knowledge of European models (*France, Germany, Sweden and the Netherlands)* as well as relationships with European agencies crossing over the Geothermal and District heating spheres, are resources which DECC are encourage to utilise.

Increasing Awareness Will Accelerate Geothermal Development and IrDEA Would Welcome the Opportunity to Support this

4.1 ***Geothermal Advisory Group***

"The Department will establish a group to advise it on the development and finalisation of the policy statement on geothermal energy and on the subsequent regulatory framework and engagement with the public."

IrDEA requests, and volunteers, to nominate or appoint a suitably qualified person to assist with Geothermal Energy Advisory Group where it can … even if this is to serve on a panel to assist in the selection of members of the proposed Geothermal Energy Advisory Group.

4.2 Information Resources for the public

"Providing the public with easily understood and trusted information on the different technologies and aspects of different geothermal projects will be a priority."

IrDEA requests, and volunteers, to assist with the "easily understood and trusted information on the different technologies and aspects of different geothermal projects will be a priority"

5.1.1 Geothermal Systems

A geothermal system is the application of technology to a geological setting to extract geothermal energy for use. The geothermal potential of the subsurface is thus dependent not only on finding an appropriate temperature at an economically accessible depth, but also on establishing an economic means to transfer that heat to where it can be used. Geothermal systems can broadly be considered as either closed loop or open loop systems."

IrDEA asserts that significant resources need to be deployed into the exploration and mastering of appropriate geothermal systems for Ireland. IrDEA and other associations should be called upon to assist and give the public a sense of "ownership" of this quest for knowledge, data and skills.

The additional requirement of accessing and utilising drilling knowledge from the carbon energy industries is evident. The transfer of skills from this industry into the low carbon economy will benefit all sectors.

5.1.1.1 Closed loop system

Closed loop geothermal systems take heat directly from the soil and/or rocks in the subsurface. In this case, the geothermal potential is dependent on the ability of the soil/bedrock to conduct heat (thermal conductivity), and the efficiency of the system is usually maximised by the circulation of thermally efficient fluids inside a closed pipe.

Recent technological developments have seen the application of this principle to large, deep closed loop systems, drawing heat from hot rock into the fluids circulating within the closed loop. These are sometimes called Advanced Geothermal Systems (AGS) and are, as yet, commercially unproven in low-mid enthalpy geothermal settings like Ireland."

IrDEA asserts that significant resources need to be deployed into the exploration and mastering of appropriate Advanced Geothermal Systems (AGS) and commercial deployment in in low-mid enthalpy geothermal settings like Ireland. While closed loop has yet to be, commercially proven, the investment levels in this technology around the globe is very high.

5.1.1.2 Open loop systems

In an open loop geothermal system, heat is collected from groundwater, or water moving through the subsurface. Commonly, the heated groundwater is pumped out of a well, heat is harvested from it, and then the slightly cooler waters are reinjected into a second well (a pair of geothermal wells like this is called a doublet; For these systems, the geothermal potential is dependent not only on finding an appropriate temperature at an economically accessible depth, but also on the permeability of the rock (a measure of how easily fluid can move through the rock and therefore how easily heat can move in the subsurface). Reservoirs where there is sufficient natural permeability are called hydrothermal reservoirs (certain types of hydrothermal reservoirs can be called 'hot sedimentary aquifers'). These are currently the most common type of reservoir used for geothermal energy developments around the world.

IrDEA asserts that significant resources need to be deployed into the exploration and mapping (through/with GSI) of 'hot sedimentary aquifers' in Ireland and then investigate, through IrDEA and other NGO's, their commercial deployment in in low-mid enthalpy geothermal settings like Ireland.

Across Europe the wind power industry has been support by but government support and incentive. The need for a similar regime of support is required to establish a database of aquifer locations, in particular at locations in urban areas where this resource can be utilised to supply district heating systems. Incentivising the development of district heating and thereby providing a source of heat to supply the public, giving the option to transition from conventional heating sources to near zero District Heating.

Reservoirs where there is heat but insufficient permeability to naturally transfer the heat are called petrothermal reservoirs. In petrothermal reservoirs, permeability can be artificially created or enhanced through (hydraulic) stimulation or breaking of the rock by injecting water. This can lead to vibrations in the ground, referred to as induced seismicity. Engagement with local communities and information resources for the public will explain the likelihood and extent of these vibrations and if they might cause a disturbance and how any such risk will be mitigated. Once this permeability is created or enhanced, groundwater is then able to circulate in the subsurface. Geothermal systems that utilise artificial permeability are termed Enhanced Geothermal Systems (EGS) or are often referred to as Hot Dry Rock projects (e.g., Soultz-sous-Forêts, France; United Downs project, Cornwall, UK)."

IrDEA is alert to the potential danger of a public interpretation of these breakthrough technologies/methodologies and stress education and awareness and general "buy-in" in advance of all actions on this Enhanced Geothermal Systems (EGS) front. IrDea is here to assist, backed by other NGO's/Associations.

5.1.1.3 Irish geothermal resources

The size of the potential national geothermal resource has yet to defined. Very low enthalpy 'shallow' geothermal resources exist all over the country within a few hundred metres of the surface and can be used alongside a heat pump (ground source heat pump, or GSHP) to heat and/or cool buildings. The Department has prepared shallow geothermal suitability maps and an accompanying Ground Source

Heat and Shallow Geothermal Energy Homeowner Manual (Geological Survey Ireland, 2015) to assist members of the public with the selection of a GSHP system. Low (30 - 80°C) to mid (80 - 120°C) enthalpy resources exist beneath Ireland but require deep drilling (up to 5 km of drilling may be required for the higher end of the mid enthalpy temperature range). More data is required to fully assess both the amount of heat in the subsurface, and what proportion of that heat is recoverable. The acquisition of the required data is one focus of the Department's National Geothermal Database project."

IrDEA welcome any all increases in the dissemination of if this information. The utilisation and awareness in low within the country and information campaigns targeting home owners, local authorities, housing bodies, developers , etc .can only benefit the consumer and the country in its attempts to reduce carbon emissions .

The DECC's role in this is paramount and IrDEA is willing to assist in disseminating this information through its membership and in wider forums wherever possible.

5.2.1.2 District heating

Low enthalpy geothermal district heating (DH) is in operation in many locations worldwide. There were 350 geothermal DH systems in operation in Europe in 2020, with a further 232 in development. Existing schemes include Paris, France, where water between 57 and 85 °C is abstracted from depths of between 1.5 and 2 km depth, and Southampton, UK where brine with a temperature of 76 °C rises naturally from a depth of 1.8 km to where it is tapped at 100 m below the surface. Geothermal energy can also be used in a mix of energy sources in DH schemes. Progressive efficiency improvements in DH technology towards 4th and 5th Generation DH has meant that lower temperature inputs and even heat pumps are now acceptable in some networks. This is creating opportunities for geothermal DH in more regions with low enthalpy resources, such as Ireland. Studies in South County Dublin have shown that geothermal fluid temperatures in excess of 60 °C are likely to be achieved at minimum depths of approximately 2.5 km. Production temperatures in excess of 60 °C would enable geothermal DH to proceed without the use of a heat pump."

IrDEA is alert to the potential offered by *Low enthalpy geothermal district heating (DH)* there is a lack of awareness and interest in these breakthrough technologies/methodologies in Ireland and great education and awareness and general "buy-in" need in Ireland. *IrDEA is here to assist, backed by other NGO's/Associations.* Further studies and test holes are generating data which will increase the knowledge base regarding fluid temperatures at varying depths.

As previously mentioned an accelerated test-drilling program is required within the short term to identify the opportunities to utilise geothermal resources in existing and planned District heating systems. Extending the test drilling program will benefit the understanding subsurface conditions and assist in business case and financial planning.

The increased utilisation of District heating is reliant on a large number of heat sources; this multi-modal approach has assisted other states reach 4th and 5th generation networks. While there is a quantity of waste heat and solar to utlise in systems ,a base load which could be provide by geothermal

,would lead to greater utilisation and lower carbon in heating systems. The potential has been recognised, SEAI's recent report, states that up to 54 % of heating customers could connect to District heating systems.

5.2.2.2 Industrial cooling

"Geothermal energy can be used for cooling industrial premises. The average temperatures of Irish shallow groundwater are consistently between 9 and 11 °C, and GSHP technologies can also be used for cooling. In open loop cooling systems, cold groundwater is abstracted and passed through an electrical cooling system; the resulting warmed groundwaters are usually reinjected into the ground (either directly or once cooled). An open loop geothermal cooling system is used by Vistakon (J&J), Co. Limerick to control manufacturing plant operating temperatures. This system provides almost 900 kWth of cooling and annual savings of money and carbon".

Again here in industrial cooling, IrDEA is alert to the potential offered – resources are needed to open up a general awareness of the possibilities here in the context of the Zero Carbon mission that Ireland has embarked on in 2021. - there is a lack of awareness and interest in and great education and awareness and general "buy-in" need in Ireland. IrDEA is here to assist, backed by other NGO's/Associations.

5.2.3 Agriculture

"Very low enthalpy geothermal resources can be used for aquaculture (e.g., Huka Prawn Park, Taupo, New Zealand) and soil warming. Low enthalpy geothermal heating can be effectively used for traditionally energy-intensive horticultural operations such as heating greenhouses to grow fruit, vegetables, flowers (e.g., Slovenia; the Netherlands) and mushrooms (e.g., Oregon, USA). Geothermal heat is used to brew beer in Reykjavik, Iceland and Colorado, USA. Low and mid enthalpy geothermal resources can also be used to dry agricultural products, e.g., tomatoes, chillies, rice, cotton, timber, etc.

Dairy processing requires large amounts of energy. Milk cooling, water heating and vacuum pumps account for the biggest proportion of energy use on Irish dairy farms (Teagasc, 2020). Irish geothermal resources could be used to increase the share of renewable heat in this important economic sector. Geothermal energy has also been successfully used for processes such as milk pasteurization (e.g., Oregon, USA), and cheese maturation and storage (near Lardarello, Italy) and brewing (e.g., Iceland)."

Again here in Agriculture and food production, IrDEA is alert to the potential offered – resources are needed to open up a general awareness of the possibilities here in the context of the Zero Carbon mission that Ireland has embarked on in 2021. - there is a lack of awareness and interest in and great education and awareness and general "buy-in" need in Ireland. IrDEA is here to assist, backed by other NGO's/Associations

Need to Find a Better Balancing Between Regulation and Facilitating Project Development

Section 6 : Regulatory Framework

Ground-source heating and cooling of commercial buildings (examples including the IKEA store in Ballymun, the Western Gateway building in UCC, and the newly developed ESB Head Office building) is a well-established form of renewable energy, with considerable potential to be extended to sectors including greenhouses and retail. There is a danger that this existing industry could be undermined or brought to a complete halt by the introduction of an onerous licensing and regulatory regime.

The proposed threshold of 70 kW, if applied to very low enthalpy ground-source installations, would expose such projects to the full rigours of the licensing regime set out in 6.6.1 and 6.6.2 and the consents and permits shown in Figure 5.1.

Furthermore, a licence held by a third-party could prevent the development of commercial renewable energy projects within the licence area.

In these ways, the proposed policy framework could have the unintended consequence of impeding, rather than enabling, the use of renewable heat.

In order to avoid this consequence, IrDEA proposes that shallow, or very low enthalpy, closed-loop ground-source heating/cooling installations, regardless of size, should be excluded from the provisions set out in Section 6 regarding ownership of the resource, regulation, and licensing. A threshold expressed in metres depth (e.g. <400 metres) is suggested as an alternative to the kW thresholds proposed in 6.4.

For further enquiries regarding this submission, please contact:

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