



# Geothermal Association of Ireland

Geothermal Association of Ireland response to public  
consultation

On

*Geothermal Energy for a Circular Economy Draft Policy  
Statement*

**25 February 2022**

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## 1. Executive Summary

In response to the newly drafted Policy Statement ‘Geothermal Energy for a Circular Economy’ (hereafter referred to as the “Draft Statement”) consultation. The Geothermal Association of Ireland (GAI) proposes the following response. Notwithstanding the considerable progress that is presented in the Draft Statement, there exist some minor and major opportunities: Clarity in policy objectives, Licence archetypes, Planning and regulation and Incentivisation.

The GAI fully supports the formation of the Geothermal Energy Advisory Group (GEAG). We consider this approach which has been taken in Northern Ireland as a best-in-class approach to policy development ensuring that all key stakeholders are around the table to support policy development.

As stated there are elements of the draft policy that need further consideration and here we lay out a roadmap as to how the GEAG could approach the next draft of policy, using the current draft as a good base with the objective of “to have the greatest impact on our climate goals, how does the policy best regulate, permit/license, incentivise, and staff the targeted deployment of geothermal?” The GAI recognises that there are multiple potential approaches that could be taken to achieve these goals, and we suggest some alternatives within this document. With that understanding, however, we consider that it is useful to have outline a roadmap on how the GEAG may approach these issues.

### Step 1: **Archetypes**

What is the appropriate classification (Archetypes) for geothermal energy that considers:

- 1) Which Archetypes are most likely to impact the short, medium and long term in Ireland?;
- 2) “Currently ready to deploy” technologies versus approaches that can impact when further technology is developed;
- 3) The different potential requirements from current regulatory regimes for different types;
- 4) The risk profile of the operations;

- 5) The risk profile of investment.

### Step 2: **Regulation/Permitting**

Given the different Archetypes, what characteristics are important to regulate more closely?

And what is the appropriate approach to doing so?

For example: What is appropriate for shallow proven low risk technology, and how does permitting/licensing compare to deep unproven riskier technology?

### Step 3: **Targets**

For technologies that are proven and deployed widely outside Ireland in countries with similar subsurface conditions (e.g. Shallow geothermal in Sweden), use these analogue countries to set Targets for deployment and decarbonisation.

For technologies that are less proven, or where we have more uncertainty on the resource, consider what targets drive the appropriate understanding (e.g. demonstrators, data collection etc.)

### Step 4: **Incentives and Capabilities**

With the basis in clear Archetypes that focus on impact, readiness, investment level and risks; a clear differentiation in the Regulatory/Permitting environment to facilitate ease of geothermal development.

## 2. Consultation Response

The GAI is pleased to see the progress made by the Department for the Environment, Climate and Communications in this crucial renewable sector. Whilst significant work has been presented in the Draft Statement, the GAI is of the opinion that there are several, non-trivial concerns that should be addressed in order to achieve informative and accessible legislation and policy for geothermal energy in Ireland. The concerns are presented as follows:

## 2.1. Policy Statement Objective

Under the heading “Purpose and Scope of this Paper”, the aim of the Draft Statement is given, however, in its current form, the Draft Statement has been unable to fully articulate the vision proposed for the development of geothermal resources in Ireland and the associated broader opportunities with respect to meeting decarbonisation targets.

### 2.1.1. Metrics

The Draft Statement would significantly benefit from the inclusion of metrics, numerically highlighting the potential of geothermal heating and cooling in reducing carbon emissions. The use of geothermal energy has the potential to provide 100% of all fabric low to medium heating and cooling across Ireland. This target, whilst ambitious in the short term, is accurate and reflects the true potential of geothermal energy in Ireland and should be stated as such. With a clear goal defined, the Draft Statement should further identify how this usage will be achieved and the current barriers in place.

### 2.1.2. Energy Use & Storage

In its current form, the Draft Statement could benefit from further emphasis of geothermal cooling as an important and necessary aspect of geothermal systems. The Draft Statement does not mention nor consider the impact of putting heat into the ground. Furthermore, the term “net energy/yield by area” or its equivalents are absent. Sustainable and long-term use of geothermal resources is dependent on extraction, re-injection and storage of heat within the subsurface. The lack of acknowledgment of the potential of geothermal resources to impact cooling and thermal storage, combined with only an “extraction approach”, as described in the Draft Statement, actively discourages the material use of geothermal energy for decarbonisation and potentially encourages excess harvesting of heat. Furthermore, the energy saved and the carbon impact through the implementation and regulation of geothermal cooling, as well as heat storage within geothermal reservoirs should be considered in the evaluation of geothermal deployments.

## 2.2. Licensing

### 2.2.1. Proposed System of Licensing

Appropriate licensing is essential for the development of geothermal resources. This gives the developer of the resource security of tenure and enables investment. Today in Ireland over 99.9% of geothermal deployments are shallow (less than 500m) and are progressing with no licensing approach. The current proposed policy would shut down that industry for any scale today. The policy needs to support the local development of heat for the local buildings where they are using the heat close to surface (shallow systems), rather than use a model that is based in exploration for scarce resources (hydrocarbons, minerals). There is a fundamental need to define “shallow” and “deep” as these classifications are generally linked to vastly differing levels of investment requirements. Countries with high enthalpy ranges at shallow depth, such as Italy, would require additional parameters in these definitions, however, Ireland is a low-mid enthalpy environment, with a largely homogenous shallow environment. As such, it is envisioned that Ireland’s geothermal resources be subject to an ‘Irish geological approach’. Therefore, defining a broad classification for shallow (at <400 metres) and deep (>400 metres) resources, as already cited in the [2020 Geothermal Energy Roadmap](#), would be suitable in this context. The following is proposed (and summarised in Table 1):

**Shallow systems** (using the German definition of less than 500m).

- All systems must be registered.
- Residential systems are only subject to planning regulation under part [L of the Building regulations](#).
- Systems larger than small residential, but not exceeding 0.1kW/m<sup>2</sup>, require registration and energy use reporting. In the case of open systems, the appropriate planning regulations and water usage regulations apply.
- Energy use of >0.1 kw/m<sup>2</sup> requires the project to be licensed by the new Geothermal Authority.

### **Deep Systems**

For depths of over 400 metres the licensing of acreage per an Exploration/Production approach may be more appropriate, as a greater footprint would encourage more activity for

the development of the resource. Given the fully recognised importance of de-carbonising Ireland's economy, GAI believes that DECC should give serious consideration to a fair and equitable tribunal system which would adjudicate on land access for deep exploration. Any deep geothermal data gathered will be extremely valuable, considering the immature nature of Ireland's deep geothermal sector.

### 2.2.2. Threshold and Archetypes

As stated in 2.1.2. the approach that ensures that the resource is managed appropriately is a "net energy/yield by area". This is particularly important in high yield closed-loop systems where energy is extracted through conduction and heat replenishment is crucial for long term sustainability. A simple capacity threshold (70kW or otherwise) is therefore inappropriate as it neglects (and may actively discourage) cooling and heat storage. Similarly, the lack of regulation for heat input, also potentially enables excessive storage of heat in the subsurface. Without recognition of heat-input for the purpose of storage/cooling, coupled with a lack of consideration for the size of the affected area (100 hectares treated the same as 1 hectare), the Draft Statement does not appropriately reflect how geothermal, particularly shallow geothermal is currently being utilised in Ireland.

The GAI therefore recommends two potential approaches to archetype implementation: 1) a system based on net yield per area, and 2) a system based on net energy usage.

#### Proposed System 1: Net Yield Per Area (Table 1)

In system 1, it is suggested that  $0.1 \text{ kW}_{\text{NY}}/\text{m}^2$ , i.e. (kiloWatts net yield per area) be used as a standard measure of regulatory threshold (see Table 1). This would consider the impact of a 10 kW single shallow borehole (e.g. 15 metres deep) and scaled appropriately for the footprint of the installation. Under such classifications, shallow, closed loop systems would only be subject to planning permission and not licensing. Similarly, open-loop systems would be subject to local water regulations as well as planning permission.

Using the given IKEA geothermal installation as an example. Based on a total of 158 drilled boreholes of ~120 metres each over an area of approximately  $0.126 \text{ km}^2$ , this system would be subject only to planning permission, without the added burden of licensing. If,

theoretically, the IKEA system was installed in a smaller area and/or had to drill deeper with the same requirements, the installed system may extend beyond the scope of planning permission and therefore be subject to additional licensing under the proposed Geothermal Energy Exploration Licence (GEEL).

In light of the proposed archetypes, the classification of “mine waters” as given in the Draft Statement, should be removed. This group should simply be considered as a body of ground water, not unlike ground water used in open-loop systems. As such energy from mine waters could be regulated with ease under the proposed archetypes.

#### Proposed System 2: Energy Usage (Table 2)

Under this proposed system 2, area of land usage is not considered a primary factor in licensing, but rather the overall energy usage that a residence/facility intends on using. In this system, three categories are proposed:

- **Residential.** In addition, as an alternative where energy usage for residential and commercial building fabric heating and cooling is considered, this could be subdivided into two subcategories that require a process of online registration and automatic permitting respectively. Both of these categories could be implemented when Part L of the relevant building regulations are being complied.

- **Fabric Heating** (i.e. direct to building or facility space heating and cooling).

- **Industrial Heat** (i.e. all other non direct building/space heating and cooling – non-exhaustive list). This category is focussed on industrial heating and cooling, as well as any large capacity energy systems, e.g. DHNs, energy storage, etc. This category could follow a 6 permit process but critically the GEEL should transition at the end (year 6) into a production license for the operator.



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Table 1. Proposed system 1 archetypes for geothermal classification.

Closed-loop	Type	Definition	System type	Use	Regulation Authority
Closed-loop	Residential – single or low density.	low-yield energy for residential heating and cooling to be exempt from licensing	Small ground-sourced heat pumps	Heating and cooling (heat pumps)	Local planning regulator
	Low-mid tier	<0.1 kW <sub>NY</sub> /m <sup>2</sup> net yield	- Large ground-sourced heat pumps.	Heating & Cooling in Agriculture, Commercial, Districts, Public Service and Industry	Local planning regulator
	High-tier	>0.1 kW <sub>NY</sub> /m <sup>2</sup>	Advanced Geothermal System	Heat and/or electricity power generation	GEEL
Open-loop	Residential – single or low density.	low-yield energy for residential heating and cooling to be exempt from licensing	Small ground-sourced heat pumps; Standing-column well	Heating and cooling (heat pumps)	Local planning regulator, geoscience regulation office EPA authority
	Low-mid tier	<0.1 kW <sub>NY</sub> /m <sup>2</sup>	-Ground-sourced heat pumps; Standing-column well -Hydrothermal - Direct Use; Large ground-source heat pump	Heating & Cooling in Agriculture, Commercial, Districts, Public Service and Industry	Local planning regulator, geoscience regulation office EPA authority
	High-tier	>0.1 kW <sub>NY</sub> /m <sup>2</sup>	Hydrothermal electricity generation; Enhanced geothermal systems	Heat and/or electricity power generation	GEEL

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Table 2. Proposed system 2 archetypes for geothermal classification

	Residential	Fabric Heating	Industrial Heat
Energy Usage	Heating and cooling; Heat pump operation (in line with Part L	Heating and Cooling; System demand in line with Part L	1) Agriculture 3) District heat network 5) Tourism/Leisure/Balneology 2) Industrial of any kind 4) Energy Storage 6) Gower generation
Threshold Proposal	Installed capacity not exceeding 25kW Depth not exceeding 200 metres  Energy usage to be verified against Part L - compliance (DEAP Dwelling Report)	Energy usage: - Balanced heating and cooling favoured - Annual energy use up to 1100 MWh net pa or - Max plant operation not exceeding 3600 hours pa  Design Verification Submission - Energy load profiles - Proposed borehole design specification	Energy usage: - Annual energy use exceeding 1100 MWh net pa or - Temperature exceeding 45C or - Max plant operating more than 3600 hours pa
	Online registration only - BER assessment - Heat pump and installer - Borehole records	Automatic permit - Site specific - Open loop: existing water abstraction route - Closed loop: licence for energy use threshold (above)	GEEL Staged - licensing submission Year 1-3 : Borehole design specification Exploration programme of work and testing Year 4-5: Energy and end user analysis (business case) Planning and EIA Long term operational model Decommissioning strategy etc  GECL Licence - project specific Licence: Min term 30 years with renewal option Awarded at 6 years: For open loop - Impacted hydraulic area For closed loop - Thermal influence area based
Monitoring and data	None	Quarterly data submission	Quarterly data submission

### 2.2.3. Resource Boundaries

The Draft Statement accurately identifies the potential of “deep” closed-loop systems, but does not identify any proposed policy surrounding the regulation, licensing or allocation of boundaries in such systems. Without addressing instances where systems traverse beyond the prospect surface footprint and into neighbouring prospects at depth, deep-closed systems, such as the identified Evor loop Greenfire example, would be unable to operate without purchasing the corresponding surface footprint.

### 2.2.4. Residential Prospects.

The GAI is of the opinion that, under no circumstances should residential prospects require licensing. This would be a deterrent to small-scale residential projects and would significantly undermine ground-source heat-pump installations in favour of less efficient air-source heat pumps.

### 2.2.5. Data Reporting

Based on the concept of energy ‘net-yield’ rather than ‘output’ per metre squared, it is proposed that data reporting be required quarterly per annum for all systems, bar small residential systems. This frequency of data reporting will account for seasonal changes in heat requirements, particularly in systems used for space heating and cooling.

## 2.3. [Geothermal Energy Advisory Group](#)

The GAI fully supports the establishment of a ‘Geothermal Energy Advisory Group’ as outlined in the Draft Statement and would like to emphasise the importance of such a group for the holistic and inclusive development of geothermal energy policy. However, in addition to group members with scientific and technical backgrounds, the GAI would also like to stress the need for representation from individuals with different perspectives, including social and economic.

## 2.4. [Planning and Regulation](#)

Advanced planning is necessary to ensure optimal geothermal adoption across new developments. All planning should demonstrate that prior satisfactory consideration has

been given to the implementation of geothermal systems in large scale residential, commercial, and industrial developments. This would ensure that optimal, long-term energy solutions are implemented wherever feasible. These systems should be further subject to quarterly data reporting as per the recommendation indicated in 2.2.7.

## 2.5. Training and Industry Standardisation

The GAI recognises the need for specialised training and standards for geothermal energy development. Guidelines for best practice already exist and can be found in the following documents:

- NSAI Standard Recommendation (S.R.) 50-4:2021 - Building Services – Part 4: Heat pump systems for dwellings;
- prEN 17522 Design and construction of borehole heat exchangers;
- GAI - Guidance Document Completion, Installation & Testing Of Closed & Open Loop Heat Exchangers. April, 2020 Rev B
- CIBSE - CP3 Open-loop groundwater source heat pumps: Code of Practice for the UK (2019)
- (EPA) Drinking water advice note - Advice Note No. 1
- Institute of Geologists of Ireland – Water Well Drilling Guidelines
- ASHRAE - Best Practices for Designing Geothermal Systems

Programmes implemented should be done so with the intention of homogenising geothermal practice and training through the conformation of Irish geothermal energy policy to EU-wide standards. This will stimulate trans-border cooperation in training and facilitate the easy transferable of key modules. In recognition of the, and as a member of Geotrained network ([www.geotrained.eu](http://www.geotrained.eu)), the GAI has developed a manuals and training material for drillers and installers of ground-source heat pumps that would require recognition from professional organisations. Certification under such policies would promote the dissemination of standards in the developing the shallow geothermal sector in Ireland.

## 2.6. Incentivisation

The policy is silent on incentivisation to support deployment, adoption and capability development for geothermal. In general, geothermal may be full-cycle economically competitive with fossil fuel-based systems but the capital intensive nature of the investment is a barrier for many adopters of the solution and, where exploration risk exist, the investment of the developers. We would recommend that the policy is explicit in how it intends to:

- 1) Reduce the electricity/gas price disparity for ground source heat pump systems
- 2) Support capital spend on low carbon solutions at scale
- 3) Reduce commercial exploration risk



1<sup>st</sup> March 2022

**Re. Geothermal Energy for a Circular Economy - Draft Policy Statement**

Dear Sir or Madam,

eHeat Ireland (EHI) is a recently formed trade association promoting the use of electric heat (eHeat) as a clean energy source in the industrial and commercial sectors across Ireland.

The association is an all-Ireland body led by industry experts who are committed to accelerating the decarbonisation of heat using renewable electricity in support of the 2030 Climate Action targets.

EHI support the summary response from **Geothermal Association of Ireland** on the *Geothermal Energy for a Circular Economy – Draft Policy Statement*. We believe that the principles and approaches proposed would strengthen the policy and hasten the development of Ireland's geothermal resources in a sustainable and safe manner that would accelerate the decarbonisation of heating and cooling.

Best regards,

[Redacted signature block]