

# PROPOSAL FOR A HARMONIZED EUROPEAN GEOHERMAL LICENSING GUIDELINES

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**G E O E N V I**

## GEO GUIDELINES

### INTRODUCTION

Geothermal energy can significantly contribute to reach the European Commission's 55% emissions reduction target by 2030. However, the deployment of the new geothermal projects is not progressing as quickly as it would be needed due to some impediments related to:

- a) the complexity and slowness of the authorization procedures;
- b) the overestimation of some environmental impacts which, in some cases, create concerns in the local communities that must host the geothermal plants.

The GEOENVI project addresses ways to tackle the main concerns which hinder the geothermal energy development in Europe and to propose the adoption of straightforward and unambiguous procedures for licensing geothermal project deployment. This will contribute to increase of the trust of the citizens and geothermal developers.

The GEOENVI Deliverable 4.1, *Decision Making Process Mapping*, provided an extensive overview of the environmental regulatory framework at the European level and its national implementation for geothermal energy projects.

This document stands as the *Geothermal Guidelines* to harmonize the regulatory framework for more efficient licensing and environmental impact assessment procedures in Europe.

Coordination between the European Union regulators and the Member States is crucial to exchange best practices from industries and other key stakeholders, and to allow for a streamlined regulatory framework that is essential to accomplish new geothermal developments and achieve the European Green Deal goals.

## 1. DEFINITIONS, CLASSIFICATION AND OWNERSHIP OF THE GEOTHERMAL RESOURCES

The Renewable Energy Directive sets a harmonized definition of geothermal energy as an “energy stored in the form of heat beneath the surface of the earth” to be used in all implementation and delegated acts at the Member State level. This Directive is a particularly relevant underlying common framework. Classifications however vary among the countries as the definition has different objectives. It can be used to define a source and its environmental impact, but also to provide criteria for public support schemes and for collection of statistical data.

According to the document *Specifications for the application of the United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources 2009 (UNFC-2009) to Geothermal Energy Resources*<sup>1</sup>:

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<sup>1</sup> [https://unece.org/fileadmin/DAM/energy/se/pdfs/UNFC/UNFC\\_GEO/UNFC.Geothermal.Specs.pdf](https://unece.org/fileadmin/DAM/energy/se/pdfs/UNFC/UNFC_GEO/UNFC.Geothermal.Specs.pdf)

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### 1.1. Definitions

- **Geothermal Energy Source** is a renewable energy source; it is the thermal energy contained in a body of a rock, sediment and/or soil, including any contained fluids, which is available for extraction and conversion into energy products. This source is equivalent to the terms 'deposit' or 'accumulation' used for solid minerals and fossil fuels. The geothermal energy source results from any influx, outflux or internal generation of energy within the system over a specified period of time.
- **Geothermal Energy Product** is an energy commodity that is saleable in an established market. Examples of geothermal energy products are electricity and heat. Other products, such as inorganic materials (e.g. silica, lithium, manganese, zinc, sulphur), gases or water extracted from the geothermal energy source in the same extraction process do not qualify as geothermal energy products. However, where these other products are sold, the revenue streams should be included in any economic evaluation.
- **Geothermal Energy Resources** are the cumulative quantities of geothermal energy products that will be extracted (through primary fluids naturally stored in the rocks or through borehole heat exchangers) from the geothermal energy source, from the effective date of the evaluation forward (till the end of the project lifetime/limit), measured or evaluated at the reference point.

### 1.2. Classification

Geothermal Resources can be classified based on:

- Temperature
  - Low  $\leq 90^{\circ}\text{C}$
  - High  $>90^{\circ}\text{C}$
- Depth
  - Shallow  $\leq 500\text{ m}$
  - Deep  $> 500\text{ m}$
- Thermal power
  - Low  $\leq 2\text{ MWt}$
  - High  $> 2\text{ MWt}$

### 1.3. Ownership

The ownership of the geothermal resources belongs to:

- Region for resources at depth  $\leq 500\text{ m}$
- National State for resources at depth  $> 500\text{ m}$   
In some cases, the National State can delegate the regulation to the Region.

## 2. REGULATORY FRAMEWORK HARMONIZATION

In many Member States, the authorization procedures to deploy and operate a geothermal project require several licensing steps. Exploration and exploitation permits or concessions are typically needed to start an industrial project development. Various other licenses may be required, such as an environmental permit, and permits for power plant construction and operation.

In some countries, the management of the authorization procedures is not centralized and requires an interaction between different bureaucratic bodies, which in some cases slows down the process.

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Therefore, a harmonized and streamlined regulatory framework is required to enable geothermal energy development in Europe.

In the agenda of the European Energy Transition Plan, each Member State shall be in charge of the multi-year implementation plan for renewable energies, including the geothermal energy, at the national level. This will require the adoption of simplified regulatory processes and tools which will allow the national and regional authorities to rapidly accomplish major investments (economy, infrastructure, buildings, energy grids, transportation...) that will impact their policies (urban and spatial planning, environmental policies...).

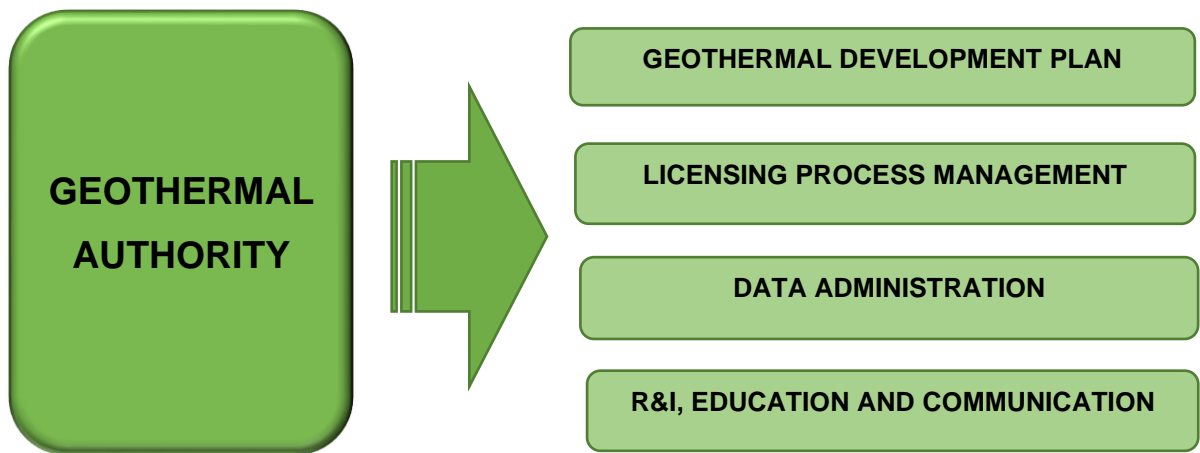
The Geothermal Energy Resources are classified as a strategic interest in majority of the European Member States due to enhancement of the electricity and heat generation, therefore their development shall be planned and managed by a national authority.

### ➤ **Geothermal Authority**

A qualified **Geothermal Authority** shall be established to superintend the geothermal energy sustainable development in each Member State.

The Authority will act as a multi-level governance body, working in a partnership with the different levels of a government (local, regional, national, and European) and involving a range of stakeholders including environmental and business associations (geothermal developers, industry, ...) to guarantee the sustainable development of the geothermal energy.

The main responsibilities of the Authority are schematized in the figure below.



In particular, the Geothermal Authority should be in charge of:

- a) The national geothermal development plan outline, including:
  - An inventory of the geothermal resources in the country
  - Setting up of the geothermal energy contribution to the EU decarbonization targets
  - Ensuring the ability of the energy grid to dispatch geothermal heat and power
  - Identification of the areas suitable for electric and/or thermal power generation

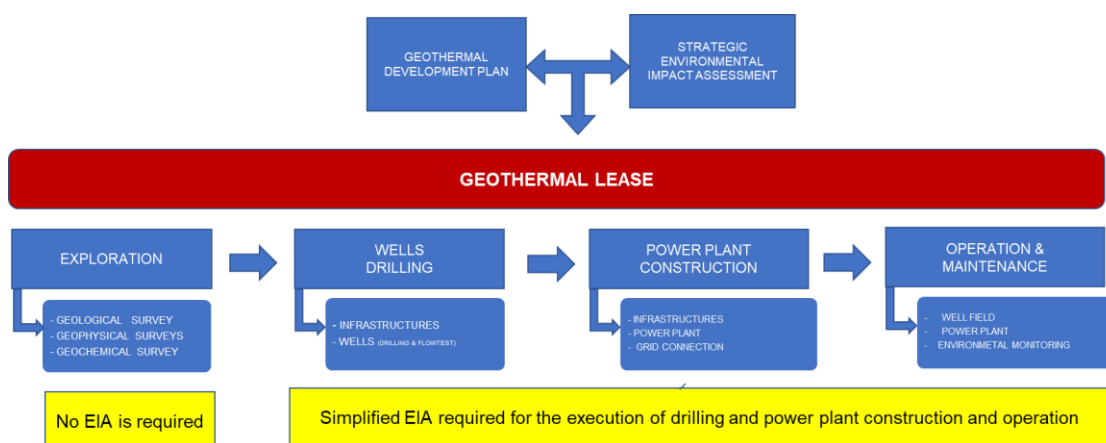
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- Defining a multiyear geothermal development master plan
- b) Management of the whole licensing process, including:
- Definition of simplified authorization procedures (*One-stop shop*)
  - Call for competitive bids for geothermal licenses
  - Evaluation of the applications and granting of the geothermal licenses (< 1 year)
  - Ensuring the compliance with the laws and overseeing the safety during the field activities
- c) Administration of the data and information relevant for geothermal sector, including:
- Data historically collected in expired geothermal leases (exploration lease and concessions)
  - Data collected in the framework of oil & gas, mining, and water exploration campaigns
- d) Promotion of the geothermal energy development in a country through a specific instrument able to finance:
- Research and innovation programs
  - Education and training programs
  - Communication and awareness towards public

### ➤ Geothermal Lease

The geothermal lease is a portion of a territory where the Geothermal Authority can grant the exclusive right to conduct geothermal operations (exploration, well drilling, plant construction) to produce and sell electric and/or thermal power as well as inorganic materials (e.g. lithium) by geothermal resources present in the subsurface at depth > 500 m.

The release of the **geothermal lease** is subject to the approval by the **Geothermal Authority** and explained in a “**Geothermal development plan**”, which shall describe all the activities (exploration, well drilling, plant construction, overall project operations) to be execute in the geothermal lease and the related **Strategic Environmental Impact Assessment**.



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The grant of the geothermal lease over all the work plans must be authorized with the declaration of public utility, undeferrable and urgent work with the predetermined constraint for the expropriation of the land and assets. At the same time, the variation of the urban planning instruments shall be authorized as well as the energy grid connection and dispatchability shall be guaranteed.

### ➤ **Supporting schemes**

European support instruments shall be established to promote the geothermal energy development and utilization for electricity and heating and to stimulate R&D in the geothermal sector.

#### ▪ **Electricity**

Geothermal energy shall benefit from the:

- Feed-in tariff, consisting of a premium paid to the producers of RES electricity to top up the revenues they receive from the sale of their electricity directly on the market;
- tax credit to reimburse (50-100%?) the costs for wells since the geothermal resources are state owned and once the geothermal lease will expire the wells and all related infrastructure will return to the proprietorship of the state;
- a fund established to cover the resource risk in the areas where there are no existing wells.

#### ▪ **Heating and cooling**

Geothermal heating and cooling are mostly financed by the Heat Fund through regional aids or specific calls for projects, while the SAF environment fund insures investors against the geological risks related to high-investments projects.

#### ▪ **Innovation**

Regarding the innovation and R&D, the Investments of the Future program is the main financial instrument for the geothermal sector, increasing the potential of exploitable geothermal resources for heat and electricity.

#### ▪ **Guarantee**

The SAF Environment Fund is a guarantee fund for geothermal district heating which covers geological risk and protects operators against the risk faced during the exploration and exploitation phases of geothermal projects. It has been completed with another Guarantee in 2019: Geodeep SAS (dedicated to “EGS” and “volcanic” projects). After the green light given by the European Commission, the fund, based on public/private financing, will aim at mitigating the geological risk of geothermal resource deployment in France. It will compensate the operator in case of exploration drillings failures. This fund lowers the financial risk for developers.

## 3. AUTHORIZATION PROCESS FOR A GEOTHERMAL LEASE

### 3.1. Application

The geothermal operator, who will apply based on the call for tender launched by the Geothermal Authority, shall provide:

#### a. **Development Plan**, including:

- a technical report assessing the expected geothermal potential to be deployed in the area of the geothermal lease on the basis of the existing data (e.g. geological, geochemical and geophysical data, well data);

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- an overall development scenario (decision tree) envisaging for each expected project: location, technical characteristics (e.g. number and depth of the wells, type and power capacity of the plant);
  - Economic valuation of the whole project, including decommissioning.
- b. **Strategic Environmental Impact Assessment**, including:
- Evaluation of any possible effect related to the execution of the activities included in the development plan on the atmosphere, water environment, soil and subsoil, vegetation, flora and fauna, ecosystems, public health, noise and vibrations, radiation, landscape, and material goods and related monitoring and mitigation measures;
  - a description of the measures envisaged to avoid, reduce and possibly compensate the negative impacts;
  - assessment of the development plan alternatives, including the so-called zero option, with indication of the main reasons for the choice, in terms of an environmental impact;
  - background of the information and data used to evaluate the main impacts on the environment and on cultural heritage that the development plant can produce, both in the construction phase and in the operation exercise phase;
  - a description of the measures envisaged for environmental monitoring.
- c. **Technical and financial capability**, including:
- Description of the experience in the geothermal sector;
  - skills and expertise of the project development team;
  - financial statements;
  - availability to submit a bank or insurance guarantee that covers the value of the submitted development plan.

### 3.2. Evaluation of the proposal(s)

- The Geothermal Authority shall complete the evaluation of the application(s) within 270 days. If an integration to the submitted documents would be requested to the applicant(s), the evaluation period could be extended by further 90 days. No more than one round of integration should be requested.
- The evaluation of the proposal(s) will be executed based on the criteria defined by the Authority.
- The results of the evaluation will be disclosed to the applicant(s).

### 3.3. Granting of the geothermal lease

- The Geothermal Authority will grant the geothermal lease to the applicant who reached the max. score above the pre-established threshold.
- The geothermal lease might be awarded with requirements which must be fulfilled before to receive the final authorization for starting the deployment of the project(s).
- The total duration of the geothermal lease shall be 50 years, including the 5-6 years for project deployment (exploration, drilling, plant construction and commissioning) and 1-2 year(s) for decommissioning.
- No royalties neither lease fees shall be due, since the geothermal energy source is a renewable source which contributes to achieving the Green Deal target of decarbonizing Europe.

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- Compensation measures can be agreed with local communities which host the plants on their territory.