

# The current legal framework for the use of shallow geothermal energy in district heating and cooling grids: comparison between EU Countries

Jessica Maria Chicco<sup>1</sup>, Giuseppe Mandrone<sup>1</sup>, Rao Martand Singh<sup>2</sup>, Gregor Goetzl<sup>3</sup>, Martin Bloemendal<sup>4,5</sup>, Jakob Kulich<sup>3</sup>

<sup>1</sup> Interuniversity Department of Regional, Urban Studies, and Planning, University of Turin ([jessica.chicco@unito.it](mailto:jessica.chicco@unito.it); [giuseppe.mandrone@unito.it](mailto:giuseppe.mandrone@unito.it))

<sup>2</sup> Department of Civil & Environmental Norwegian University of Science & Technology ([rao.m.singh@ntnu.no](mailto:rao.m.singh@ntnu.no))

<sup>3</sup> Geological Survey of Austria ([gregor.goetzl@geologie.ac.at](mailto:gregor.goetzl@geologie.ac.at), [jakob.kulich@geologie.ac.at](mailto:jakob.kulich@geologie.ac.at))

<sup>4</sup> Department of water management, Delft university of Technology ([j.m.bloemendal@tudelft.nl](mailto:j.m.bloemendal@tudelft.nl))

<sup>5</sup> KWR Water Research Institute

## 1. Introduction

Europe is aiming the decarbonization of the energy sector through some specific policies such as the «Clean Energy for all European» and the «European Green Deal». Direct delivery of heating/cooling to consumers via district heating and cooling (DHC) grids, is seen as an important option to allow the decarbonization of heating/cooling systems (Chicco et al., 2022). It is expected to gain acceptance and market uptake as it will provide a solution to partially replace the use of fossil fuels and to reduce the costs of heating and cooling. As reported by IRENA (2022), the energy transition has become even more urgent in the last months, due to the continuous volatility of the energy prices. Recent events have testified that high fossil fuel prices, in the absence of alternatives, result in energy poverty. Thus, the important work of policy makers in this field plays an important role and can be also linked to funding R&D and demonstrations, in order to prove the system benefits as well as to promote media campaigns encouraging consumer uptakes. Currently, a huge diversity exists on the regulatory framework amongst European countries, and this acts as a big barrier for the development of the ground source heat pumps (GSHP) market in DHC networks; It needs of a common approach at European level (Tsagarakis et al., 2020). Therefore, the legal framework has to serve the following main purposes:

- protection of underground drinking water resources;
- regulating competing uses and securing sustainable use of geothermal energy;
- improving the administration and permitting procedures;
- overhauling the plans, policies, fiscal regimes and energy sector structures that impede progress.

## 2. The current legal framework across Europe: comparison between some European Countries

Most of the current European Laws regulating the use of geothermal energy, refer to two specific categories consisting on "water" (shallow geothermal), "mining" (deep). Here below, a focus on shallow geothermal resources is presented.

### Denmark

"2012 OECD Environmental Policy Stringency Index"

This Law rules also the geothermal plants, but permits are given by Municipality. For BHE more than 250 m depth, the Energy Agency should be consulted.

Law "BEK nr 1019 of 25/10/2009":

- It rules the closed loop geothermal systems, to prevent pollution of groundwater and underground soils and rocks

### Norway

Norway has a comprehensive legal framework related to renewable energy. The most important is the "Energy Act" concerns the production, conversion, transfer, trading, distribution and use of electrical and thermal energy, except in territorial waters. There is a substantial body of regulations and administrative guidelines that derive from this act.

### Belgium

«VLAREM I: Flemish Government Order» (February 6, 1991)

Inside this Law are also contained specific guidelines applied for the geothermal heat pumps, aquifers and all the systems working with groundwater, and closed loop systems for which:

- <50 m: only a declaration to the Municipality
- >50 m: application to the Province.

### Ireland

A Planning Permission is not required, and no building codes of practice or standards regulate the use of Geothermal heat pumps. **Open loop systems:** Discharge License from the Environmental Protection Agency.

### Netherlands

"Water Law"  
It rules the use of groundwaters both for traditional open loop systems and aquifer thermal energy storage (ATES) facilities.  
Heat capacity less than 70kW: simple declaration  
Heat capacity more than 70kW; license by Municipality  
For ATES: storage volume less than 500m depth and reinjection temperature more than 25°C

### France

Wells less than 200 m depths and 500 kW thermal power capacity: are exempt from the Laws ruling deeper wells with higher thermal capacity. They don't have specific regulations but standards guidelines such as "NF X 10-999: Water and geothermal drilling - Construction, monitoring and abandonment of collection or monitoring works for groundwater carried out by drilling"

### Spain

There is no specific form or protocol in order to obtain an exploitation license for shallow geothermal energy systems. Any thermal installation for space heating/cooling in Spain is considered to be part of the building process and is regulated by the Technical Building Code (CTE) and the Regulation for Thermal Installations in Buildings (RITE) documents. An Environmental Impact Assessment is only required by the Environmental Authority when drilling exceeds 500 m in depth

### Italy

D. Lgs. 22/10  
Description and classification of all the geothermal resources of national and local interest depending on the different total output: higher or lower 20MWt.  
Art. 15 of the Law 17/21  
It introduces simplified procedures for traditional GSHP systems  
Dl. 17/2022  
It allows the installation of geothermal pipes until 50kW and 80 m in depth (free building), and until 100kW and 170 m in depth (procedure simplified enabler)

### Switzerland

«(OEaux, annexe 2, chapitre 21)»: Federal Water Protection Act;  
it rules that the groundwater temperature has not to exceed more than 3°C than the original temperature, during geothermal plant operation (open loop systems)  
There aren't specific descriptions about deep wells or the use of groundwater with temperature exceeding 25°C

### Germany

"Water Household Act"  
Shallow geothermal energy is mainly governed by the water law. The use of groundwater requires a license from the water authorities.  
Guidelines: VDI 4640 of the Association of German Engineers (Verein Deutscher Ingenieure, VDI)  
Mainly suggested for GHSP systems

### Hungary

The Legislation on Environment and water: Act LVII of 1995 on water management → thermal waters with an outflow temperature at surface of 30°C or higher  
The 219/2004 Government Decree on protection of groundwaters: reinjection into the same aquifer, and that the reinjected should not impact groundwater quality

### Austria

In Austria no federal Laws for shallow geothermal energy has yet been defined, but there are temperature limits for heating and cooling of the groundwater (20°C for temperature difference). As well, there is "ONORM M 7753, O" NORM M 7755-2+3" valid only for heat pumps

## 3. Conclusions

Governmental policies to support geothermal development are focusing so far on power generation only, not on the thermal energy production. Serious efforts are needed to harmonize legislation and to simplify procedures as well as to establish and implement strong policies to boost geothermal heating and cooling.

## 4. References

Chicco, J.M., Antonijević, D., Bloemendal, M., Cecinato, F., Goetzl, G., Hajto, M., Hartog, N., Mandrone, G., Vacha, D. (2022). Improving the Efficiency of District Heating and Cooling Using a Geothermal Technology: Underground Thermal Energy Storage (UTES). In: Calabrò, F., Della Spina, L., Piñeira Mantiñán, M.J. (eds) New Metropolitan Perspectives. NMP 2022. Lecture Notes in Networks and Systems, vol 482. Springer, Cham. [https://doi.org/10.1007/978-3-031-06825-6\\_164](https://doi.org/10.1007/978-3-031-06825-6_164)  
Tsagarakis, K. P., Effthymiou, L., Michopoulos, A., Mavragani, A., Andelković, A.S., Antolini, F., Bacic, M., Bajare, D., Baralis, M., Bogusz, W., Burlon, S., Figueira, J., Genç, M. S., Javed, S., Jurelionis, A., Koca, K., Rzyżyński, G., Urchueguía, J. F., Žlender, B. (2020). A review of the legal framework in shallow geothermal energy in selected European countries: Need for guidelines, Renewable Energy, 147 (2), 2556-2571, <https://doi.org/10.1016/j.renene.2018.10.007>.

## Acknowledgements

This poster presentation is based upon work from COST Action CA18219 "Geothermal DHC", supported by COST (European Cooperation in Science and Technology), [www.cost.eu](http://www.cost.eu); <https://www.geothermal-dhc.eu/>