

# New recommendations from GeoSmart, for the role of geothermal in the European energy market.

*Geothermal plants can supply electricity and heat, guaranteeing both continuity and flexibility of production, as well as providing innovative forms of storage*

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During 2022, the expenditure for gas of a typical Italian family grew by 64.8% compared to the already critical 2021, while even more marked increases are expected for electricity at the end of the first quarter of 2023 (+67%).

The two trends are intertwined with each other.

To date, around 50% of the electricity (and 40% of all energy) that Italy needs is produced by burning gas, the price of which is formed through the Title Transfer Facility (TTF): the virtual trading point that is the reference for the price of gas throughout Europe.

To try to calm the price race, at the end of December the EU energy ministers agreed on a price ceiling set at €180/MWh, but it is already clear that the measure cannot be decisive.

The solution to high bills passes through a reform of the electricity market and above all through a rapid and robust installation of new renewable plants, both aspects on which the European institutions have been working for some time.

In this context, geothermal energy represents a renewable source of particular interest, as clearly emerges from the developments of GeoSmart, an international project financed by the EU Horizon 2020 program which brings together 19 entities at an international level, which also includes the Consortium for the Development of Geothermal Areas (CoSviG).

The project will end in 2024, but it is already able to outline some key elements, as emerges from the European Union science bulletin (CORDIS).

Firstly, geothermal plants have the highest capacity factor (about 90%) of any other plant for the production of electricity, as they operate practically continuously; a factor that makes geothermal energy very reliable for covering the so-called baseload demand - the minimum or basal level of electricity required by the market - without greenhouse gas emissions, allowing gas to be replaced in this role.

However, to date this precious contribution is not adequately valued: the release of mining concessions and plant authorizations, for example, do not take it into account at all.

To improve, GeoSmart indicates the opportunity to establish national geothermal authorities - already present in mature markets such as Iceland - as a single point of contact between institutions and proposing companies.

Secondly, geothermal energy is able to replace fossil gas in the electricity grid balancing service, thanks to its characteristics of production flexibility highlighted by GeoSmart: in Germany there are already geothermal power plants that have demonstrated the ability to increase or decrease production by 70% in seconds, based on the requests of the electricity grid operator. Even these balancing services should be adequately remunerated to encourage greater use of geothermal energy, while now in Italy the major proceeds from the capacity market managed by Terna still go to fossil gas.

Thirdly, the know-how gained in the geothermal sector today makes it possible to explore the opportunity of underground thermal energy storage (UTES), a frontier which to date is however held back by the lack of adequate mechanisms regulatory and supportive.

In the context of Geosmart, however, the construction of pilot plants is planned: a thermal storage of steam and a PCM storage (phase change materials) will be installed in Kizildere II, where there is one of the oldest geothermal plants installed in Turkey (a central unit with flash technology, powered by high enthalpy resources).

This is a particularly complex challenge, given the presence on site of geothermal brines (i.e. a mixture of hot water and steam together with mineral salts and incondensable gases) at great depths and with the presence of minerals at high risk of deposit on the pipelines of the plant.

However, the chemical elements naturally dissolved in geothermal brines represent not only critical issues to be addressed, but also important opportunities to be seized as demonstrated by another reality active in the context of GeoSmart. The company Natuerlich Insheim GmbH, founded in 2021 by Vulcan Energy is managing in Insheim (Germany) a binary cycle geothermal power plant which currently supplies electricity to 8,000 households.

However, the same geothermal fluids would also be suitable for simultaneously serving other purposes, i.e. powering a local district heating network and obtaining geothermal lithium, to create sustainable batteries useful for supporting the revolution in mobility towards the electric car: an opportunity which, at the outside the Geosmart project, Vulcan and Enel are already evaluating in Italy as well.

Finally, to implement a full development of the geothermal sector in Europe - which in Italy in particular would have extraordinary opportunities, counting that the heat theoretically accessible within 5 km of depth could satisfy five times the national energy needs - two general indications arrive from the GeoSmart project.

The first concerns the need to promote financial risk mitigation tools, given that Capex (i.e. capital expenditure) represents up to 90% of the total costs of a geothermal plant, characterized by very high start-up costs.

The second looks at the importance of defining an internal European market for heat, in order to pursue security of supplies and affordable prices for heating (or cooling) homes and industries. The advantages linked to the development of geothermal energy in this area are evident, not only from an environmental point of view (avoiding climate-altering and polluting emissions linked to fossil fuels) but also from an economic point of view: the French Agency for Energy and the Environment (ADEME) documents that geothermal district heating could guarantee sustainable heat at 15 €/MWh, against the 51 €/MWh attributable to fossil gas, even beyond the current energy crisis.