The European geothermal industry: A hotbed of potential ready to erupt

SPE Aberdeen Geothermal 2024 Seminar

Shruti Raghuram, Senior Analyst and Product Manager – Geothermal

Rystad Energy Geothermal Solution
21 February 2024
Geothermal is an extremely small slice in the global power mix pie

Geothermal’s position in the global power mix
Installed power generation capacity in gigawatts (GW)

8,960 GW

Source: Rystad Energy Renewables & Power Solution
Geothermal developments in more than 90 countries, but a few hot spots dominate

*Geothermal heat includes end-uses of agriculture, aquaculture, horticulture and district heating where wells deeper than 500 meters (1,640 feet) are used. Source: Rystad Energy Geothermal Solution*
What role does Europe play in the geothermal market today?

Geothermal power generation installed capacity
Gigawatts electric (GWe)

- Europe accounted for 1.9 GWe at the end of 2023
- Others

- Germany
- Portugal
- Italy

Geothermal heating installed capacity
Gigawatts thermal (GWT)

- Europe accounted for 4.9 GWT at the end of 2023

- Others

*Geothermal heat includes end-uses of agriculture, aquaculture, horticulture and district heating where wells deeper than 500 meters (1,640 feet) are used.
Source: Rystad Energy Geothermal Solution
Geothermal’s power application in Europe has taken a step back amidst the rising importance of clean heating

Power generation installed capacity in Europe
Megawatts electric (MWe)

Source: Rystad Energy Geothermal Solution
All eyes on Europe: Germany and Netherlands set to lead the charge, offer huge growth opportunities

Heating installed capacity in Europe
Megawatts thermal (MWt)

*Geothermal heat includes end-uses of agriculture, aquaculture, horticulture and district heating where wells deeper than 500 meters (1,640 feet) are used.
Source: Rystad Energy Geothermal Solution
All eyes on Europe: Germany and Netherlands set to lead the charge, offer huge growth opportunities

Geothermal heating investments in Europe
Billion USD

*Geothermal heat includes end-uses of agriculture, aquaculture, horticulture and district heating where wells deeper than 500 meters (1,640 feet) are used.
Source: Rystad Energy Geothermal Solution
Existing heating networks and industries represent growth opportunities for the direct use market

Map of geothermal projects in Europe

Map of district heating networks in Europe

Map of industries with high emissions in Europe

Source: Rystad Energy Geothermal Solution
Existing heating networks and industries represent growth opportunities for the direct use market
Scoring the 8,612 towns with district heating in Europe for geothermal potential

**Supply score drivers**
- **Technical:** Are subsurface conditions favorable for geothermal?
- **Operational:** Is there a history of drilling experience, either from geothermal or oil and gas available nearby the heating network?
- **Demand score drivers**
- **End-user demand:** Is the area a heavily populated area?
- **Sentiment:** Is the general interest and sentiment around geothermal in that area rising?
- **Alternatives to geothermal:** Are there already a large share of biomass or non-renewable installations in the area?
- **Government initiatives:** Have central or local governments already initiated plans and targets for geothermal capacity additions?

**Source:** Rystad Energy Geothermal Solution
Market movers such as EGS and AGS can alter the landscape

Enhanced Geothermal System and Advanced Geothermal System projects
Number of projects

Advanced Geothermal System (AGS)
Enhanced Geothermal System (EGS)

Source: Rystad Energy Geothermal Solution
Lithium supply chain stands to benefit greatly from a growth in geothermal drilling

Locations of lithium extraction projects using geothermal brine

Source: Rystad Energy Geothermal Solution
Government policies are key to bring about this geothermal wave in Europe

Legend
- Policy
- Funding incentives
- Regulation
- Policy and funding incentives
- Funding incentives and regulation
- Policy and regulation
- Policy, funding incentives and regulation

Source: Rystad Energy Geothermal Solution
Geothermal relies on all of these components to navigate the road to 2050

**Governmental support**
- Streamlined regulatory processes
- Funding incentives
- Policies that promote project development

**Disruptive technologies**
- Enhanced Geothermal Systems
- Advanced Geothermal Systems
- Breakthrough drilling technologies

**Support from the O&G industry**
- Portfolio diversification
- Subsurface expertise
- Repurposing O&G wells for geothermal

**Co-location projects**
- Lithium extraction
- Green hydrogen and green ammonia
- Carbon Capture and Storage

Source: Rystad Energy Geothermal Solution
Disclaimer

This presentation has been prepared by Rystad Energy (the “Company”). All materials, content and forms contained in this report are the intellectual property of the Company and may not be copied, reproduced, distributed or displayed without the Company’s permission to do so. The information contained in this document is based on the Company’s global energy databases and tools, public information, industry reports, and other general research and knowledge held by the Company. The Company does not warrant, either expressly or implied, the accuracy, completeness or timeliness of the information contained in this report. The document is subject to revisions. The Company disclaims any responsibility for content error. The Company is not responsible for any actions taken by the “Recipient” or any third-party based on information contained in this document.

This presentation may contain “forward-looking information”, including “future oriented financial information” and “financial outlook”, under applicable securities laws (collectively referred to herein as forward-looking statements). Forward-looking statements include, but are not limited to, (i) projected financial performance of the Recipient or other organizations; (ii) the expected development of the Recipient’s or other organizations’ business, projects and joint ventures; (iii) execution of the Recipient’s or other organizations’ vision and growth strategy, including future M&A activity and global growth; (iv) sources and availability of third-party financing for the Recipient’s or other organizations’ projects; (v) completion of the Recipient’s or other organizations’ projects that are currently underway, under development or otherwise under consideration; (vi) renewal of the Recipient’s or other organizations’ current customer, supplier and other material agreements; and (vii) future liquidity, working capital, and capital requirements. Forward-looking statements are provided to allow stakeholders the opportunity to understand the Company’s beliefs and opinions in respect of the future so that they may use such beliefs and opinions as a factor in their assessment, e.g. when evaluating an investment.

These statements are not guarantees of future performance and undue reliance should not be placed on them. Such forward-looking statements necessarily involve known and unknown risks and uncertainties, which may cause actual performance and financial results in future periods to differ materially from any projections of future performance or result expressed or implied by such forward-looking statements. All forward-looking statements are subject to a number of uncertainties, risks and other sources of influence, many of which are outside the control of the Company and cannot be predicted with any degree of accuracy. In light of the significant uncertainties inherent in such forward-looking statements made in this presentation, the inclusion of such statements should not be regarded as a representation by the Company or any other person that the forward-looking statements will be achieved.

The Company undertakes no obligation to update forward-looking statements if circumstances change, except as required by applicable securities laws. The reader is cautioned not to place undue reliance on forward-looking statements.

Under no circumstances shall the Company, or its affiliates, be liable for any indirect, incidental, consequential, special or exemplary damages arising out of or in connection with access to the information contained in this presentation, whether or not the damages were foreseeable and whether or not the Company was advised of the possibility of such damages.

© Rystad Energy. All Rights Reserved.
Rystad Energy is an independent energy consulting services and business intelligence data firm offering global databases, strategic advisory and research products for energy companies and suppliers, investors, investment banks, organizations, and governments.

Headquarters: Rystad Energy, Fjordalléen 16, 0250 Oslo, Norway
Americas +1 (281)-231-2600
EMEA +47 908 87 700
Asia Pacific +65 690 93 715
Email: support@rystadenergy.com

© Copyright. All rights reserved.