

RystadEnergy

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

SPE Aberdeen Geothermal 2024 Seminar

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Aberdeen Section

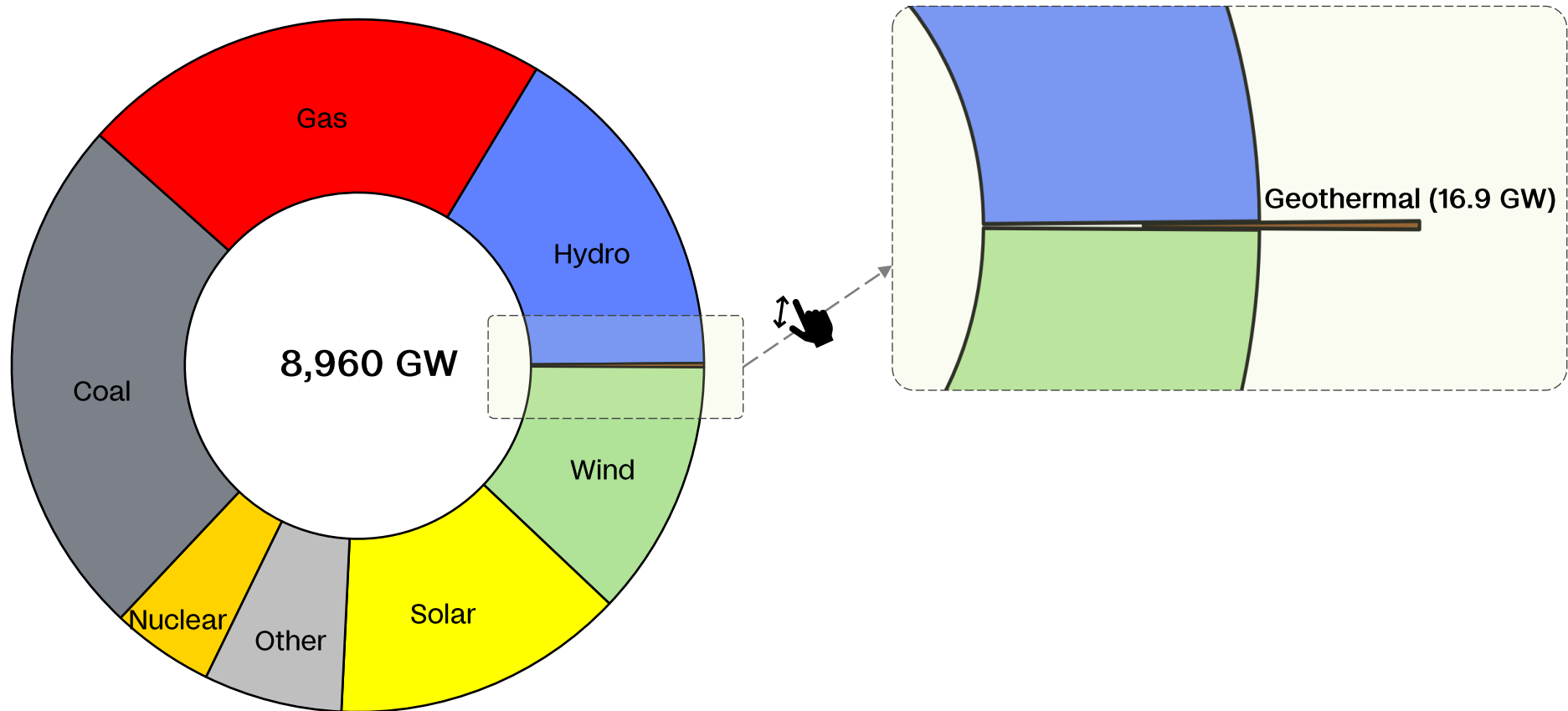
Rystad Energy Geothermal Solution

21 February 2024



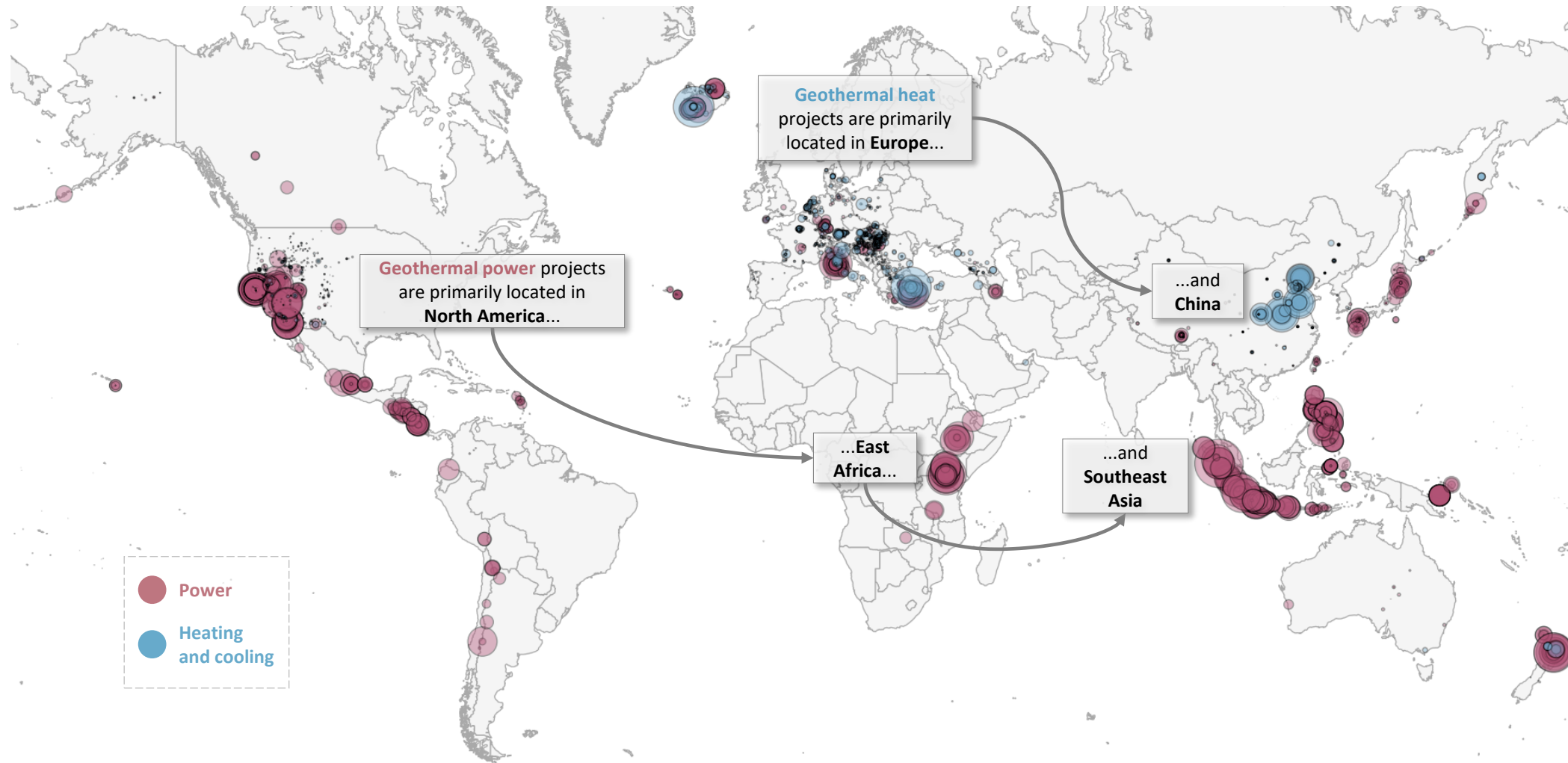
Geothermal is an extremely small slice in the global power mix pie

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



Source: Rystad Energy Renewables & Power Solution

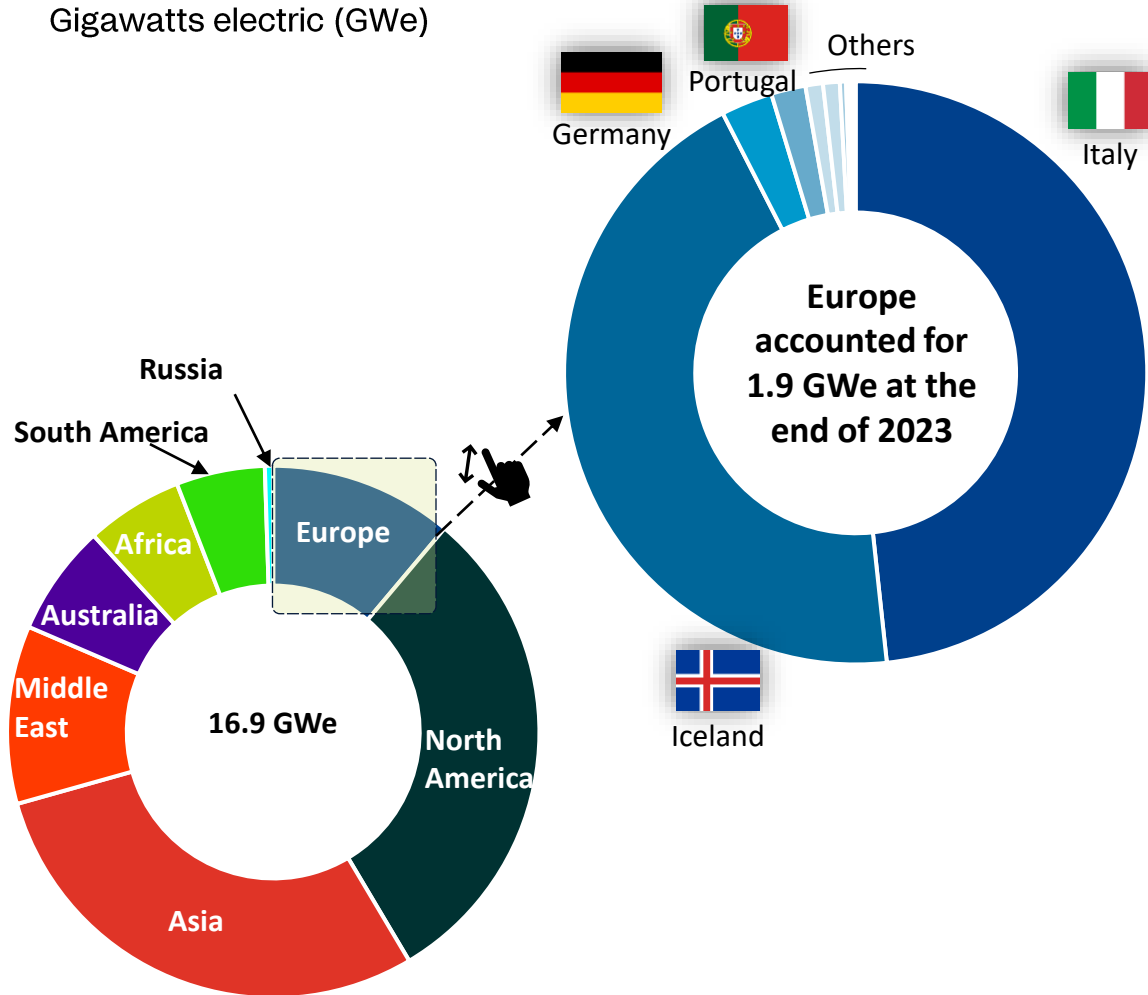
Geothermal developments in more than 90 countries, but a few hot spots dominate



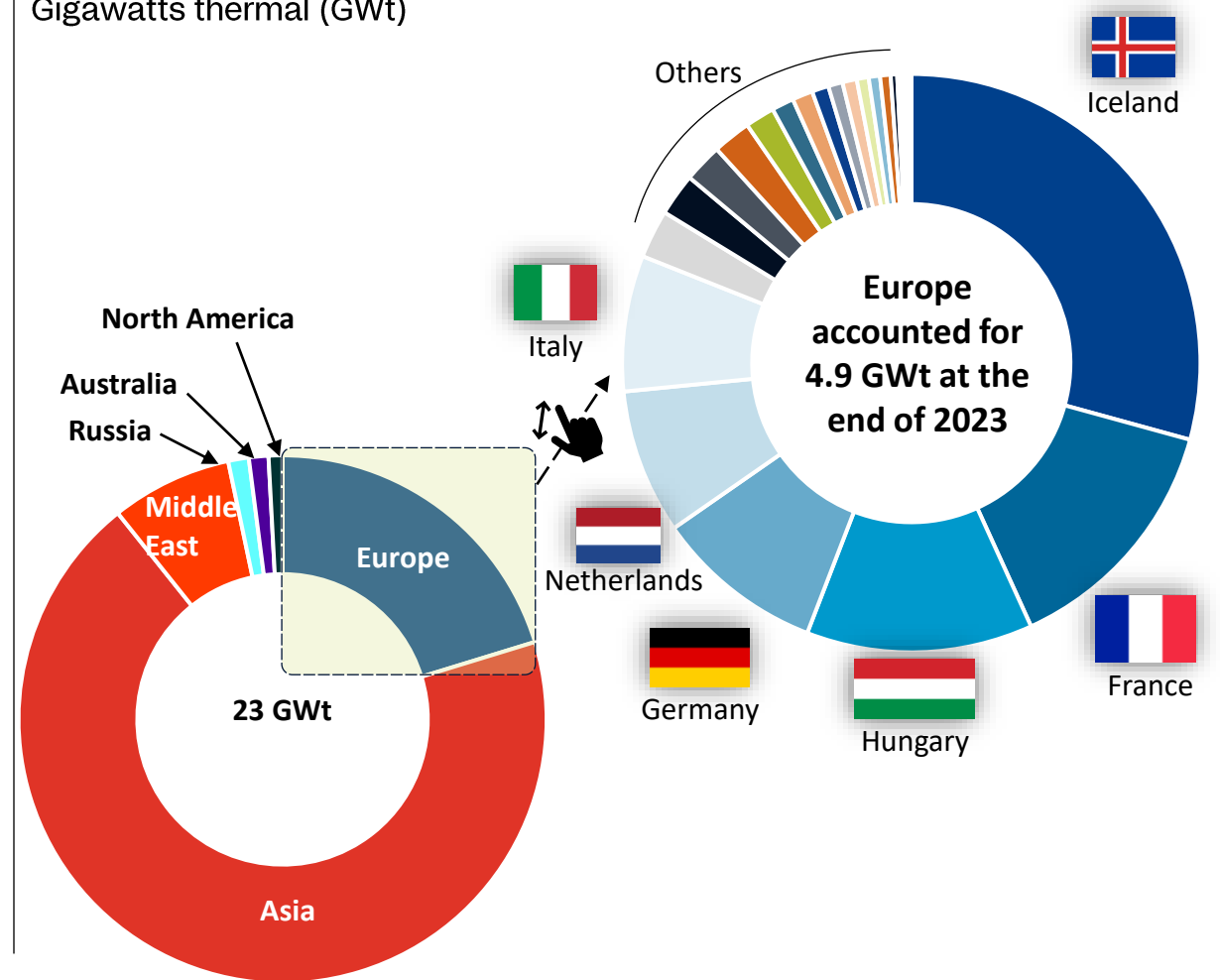
*Geothermal heat includes end-uses of agriculture, aquaculture, horticulture and district heating where wells deeper than 500 meters (1,640 feet) are used.
Source: Rystad Energy Geothermal Solution

What role does Europe play in the geothermal market today?

Geothermal power generation installed capacity
Gigawatts electric (GWe)



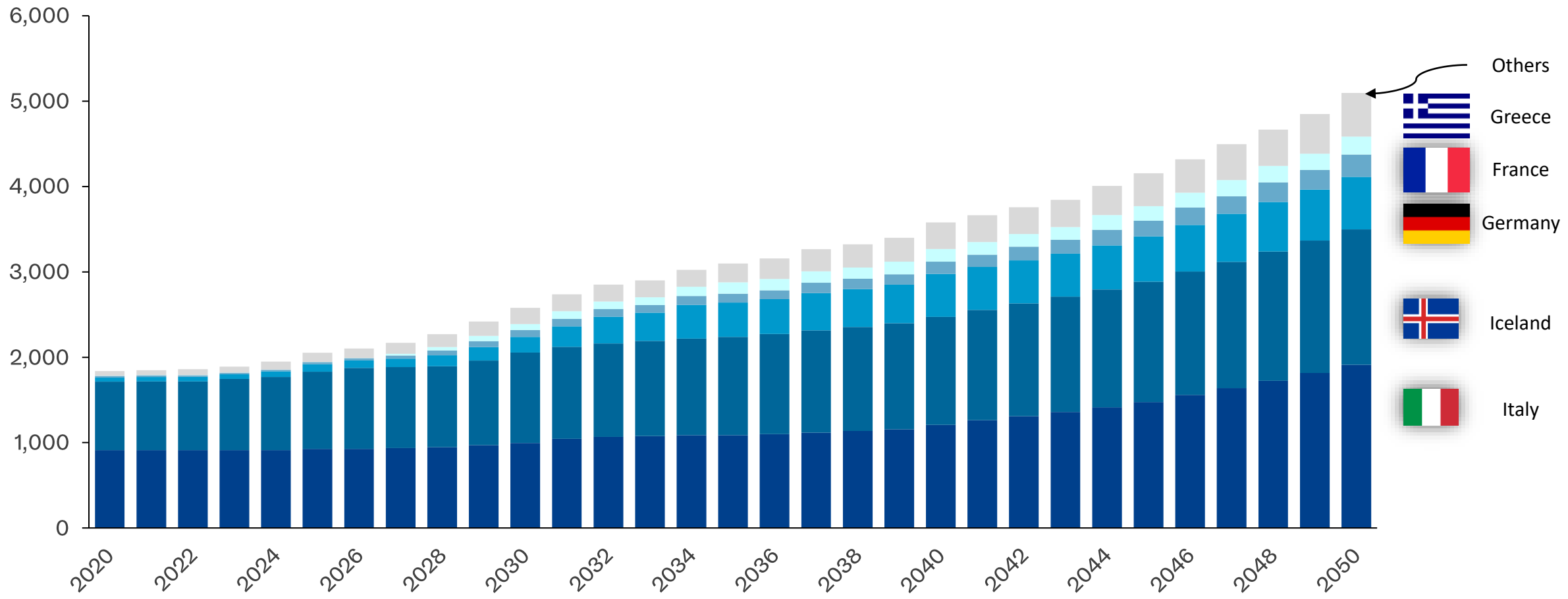
Geothermal heating installed capacity
Gigawatts thermal (GWt)



*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

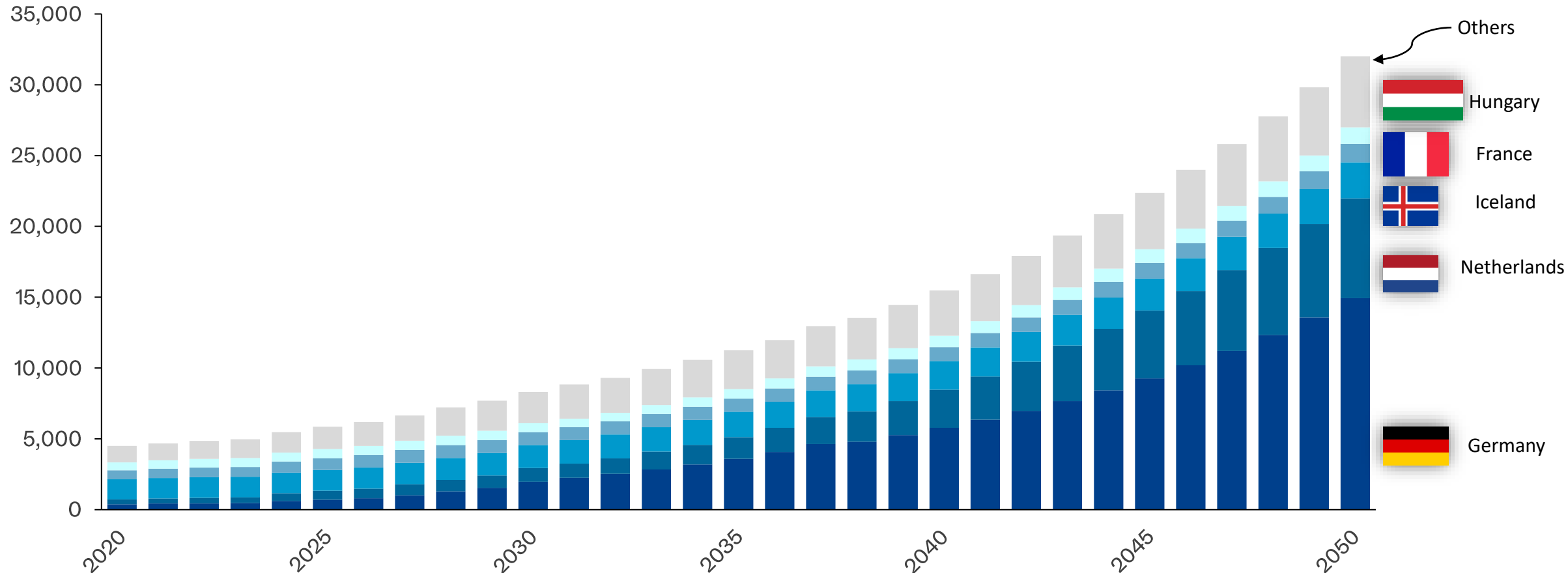
Power generation installed capacity in Europe
Megawatts electric (MWe)



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)

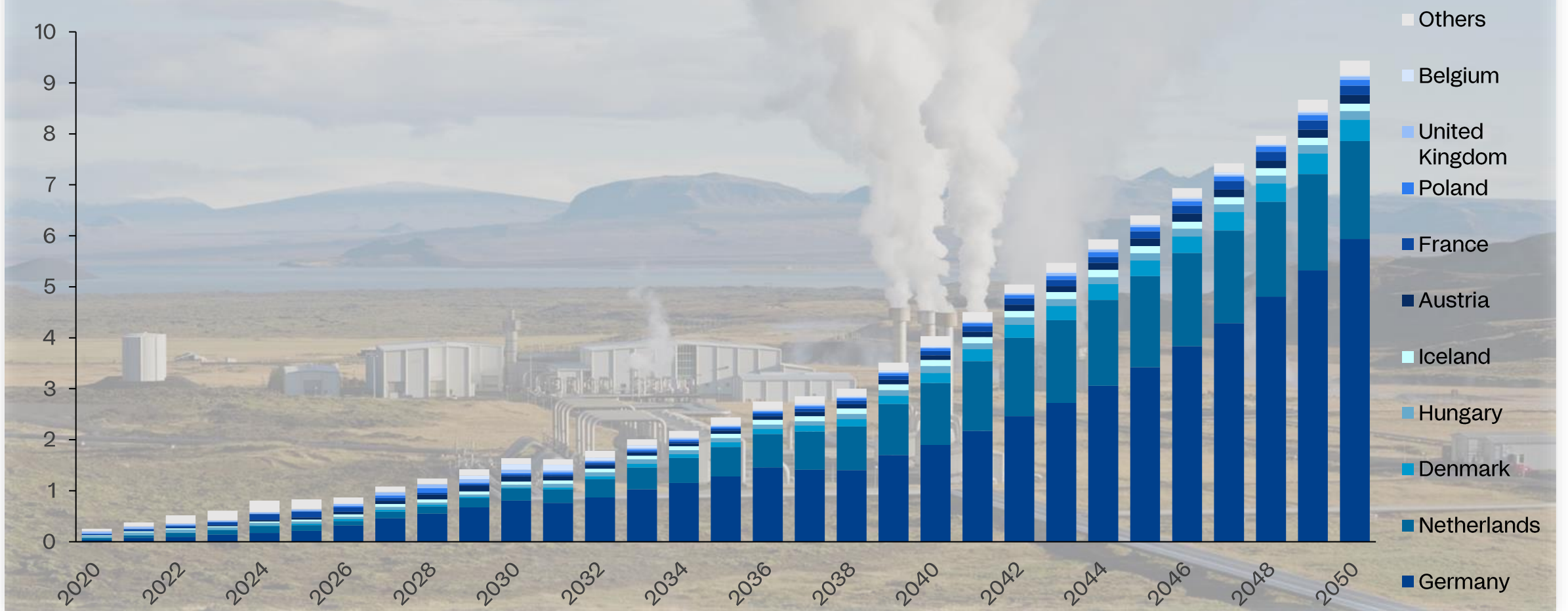


*Geothermal heat includes end-uses of agriculture, aquaculture, horticulture and district heating where wells deeper than 500 meters (1,640 feet) are used.
Source: Rystad Energy Geothermal Solution



All eyes on Europe: Germany and Netherlands set to lead the charge, offer huge growth opportunities

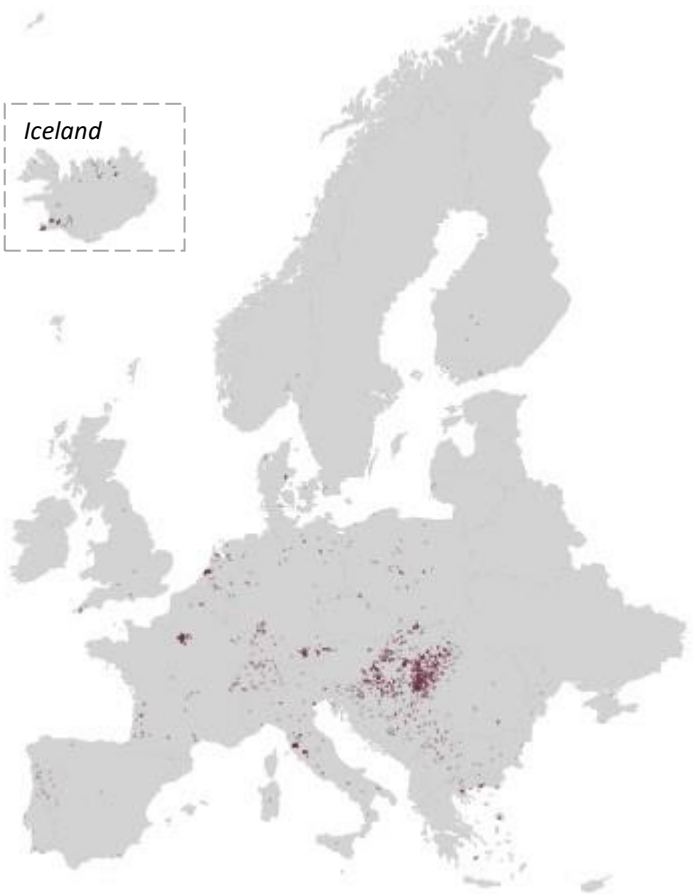
Geothermal heating investments in Europe
Billion USD



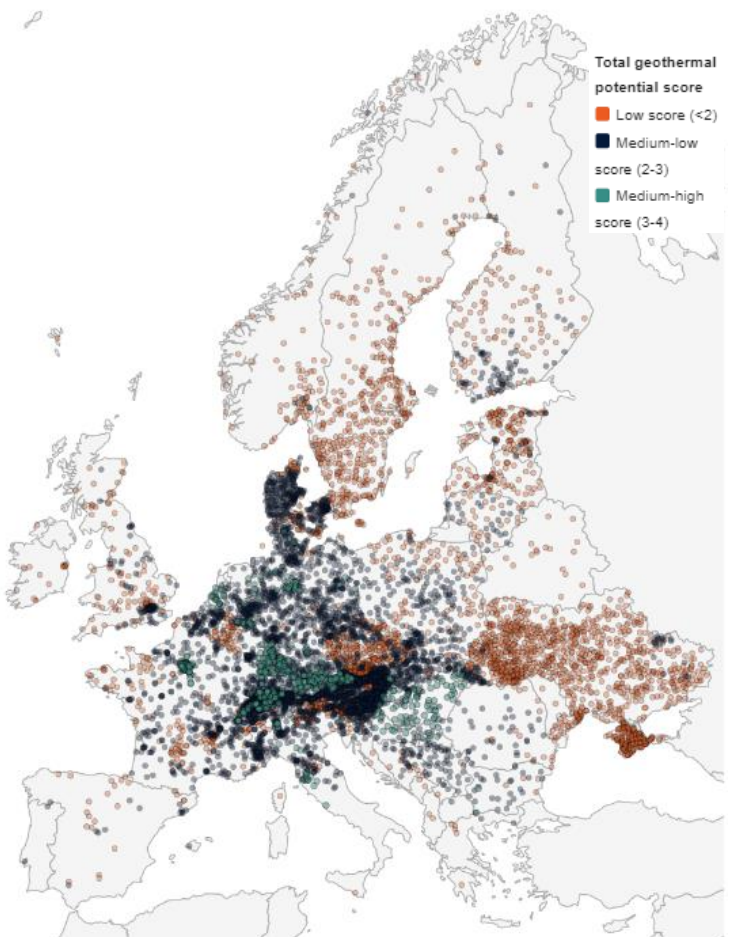
*Geothermal heat includes end-uses of agriculture, aquaculture, horticulture and district heating where wells deeper than 500 meters (1,640 feet) are used.
Source: Rystad Energy Geothermal Solution

Existing heating networks and industries represent growth opportunities for the direct use market

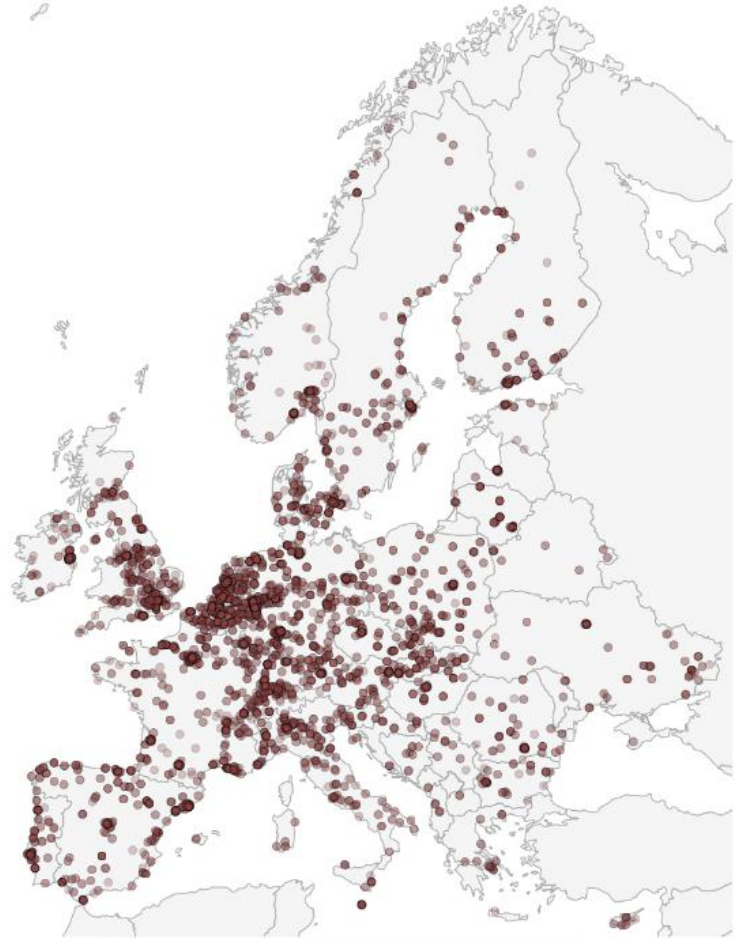
Map of geothermal projects in Europe



Map of district heating networks in Europe



Map of industries with high emissions in Europe

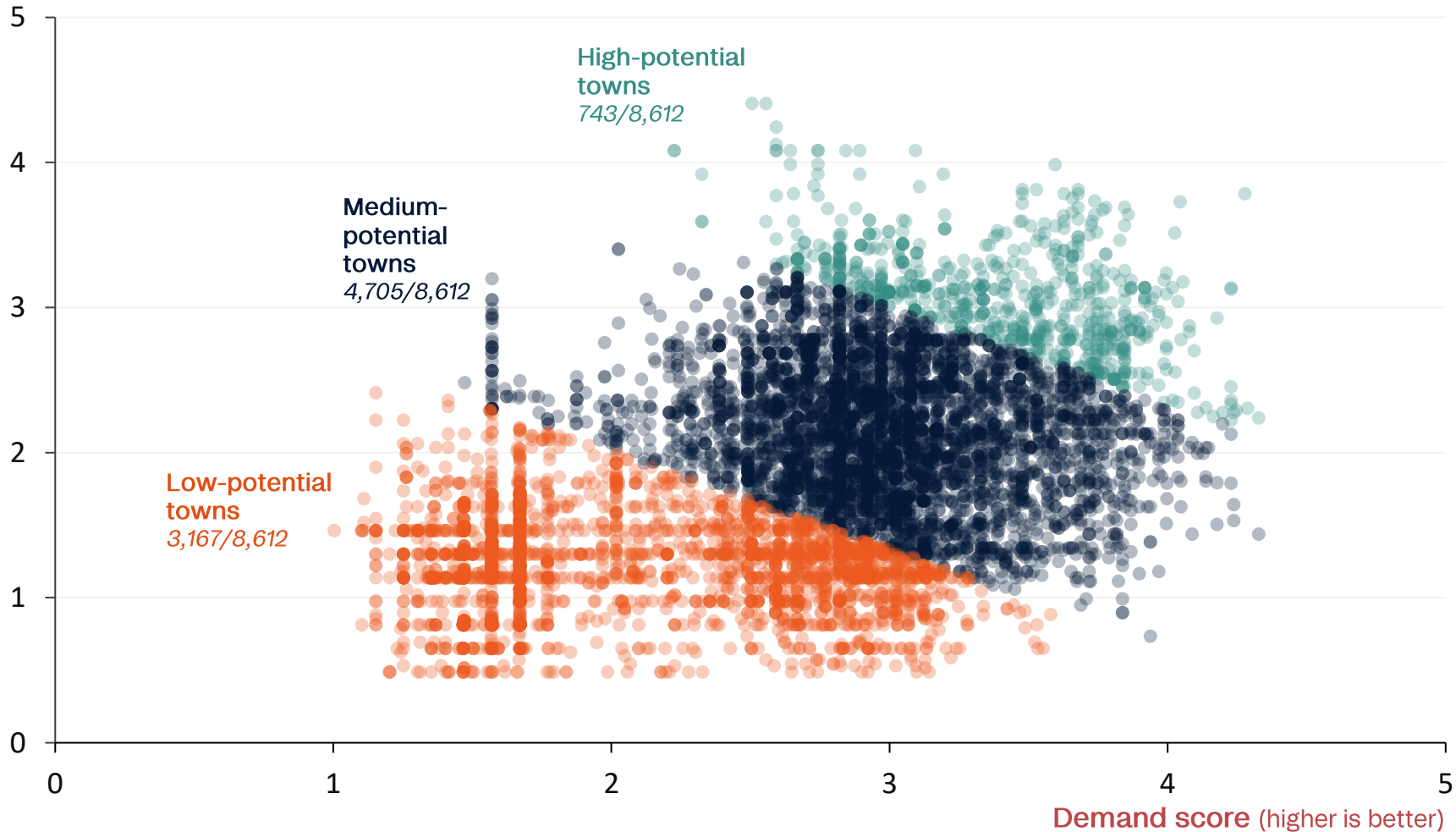


Source: Rystad Energy Geothermal Solution

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 (higher is better)



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

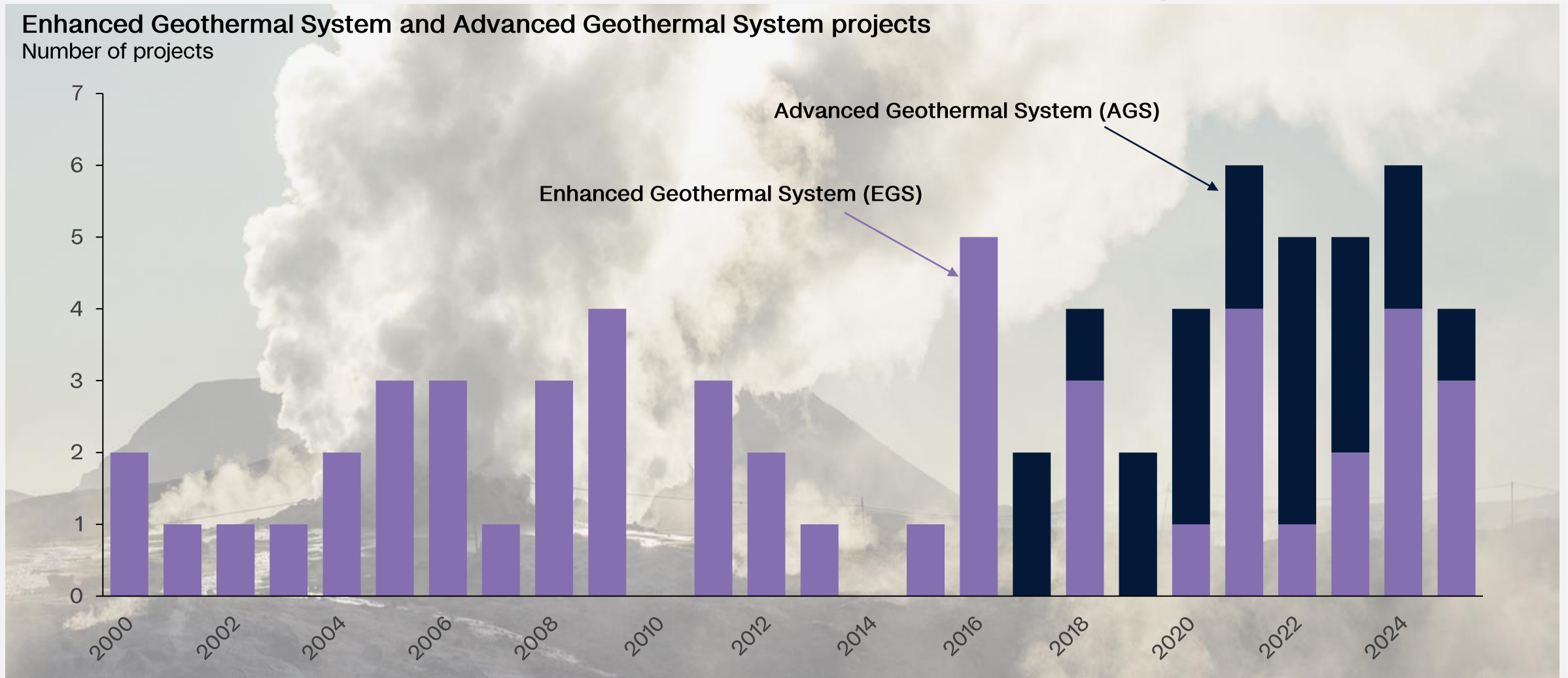
Are there already a large share of biomass or non-renewable installations in the area?

Government initiatives

Have central or local governments already initiated plans and targets for geothermal capacity additions?

Market movers such as EGS and AGS can alter the landscape

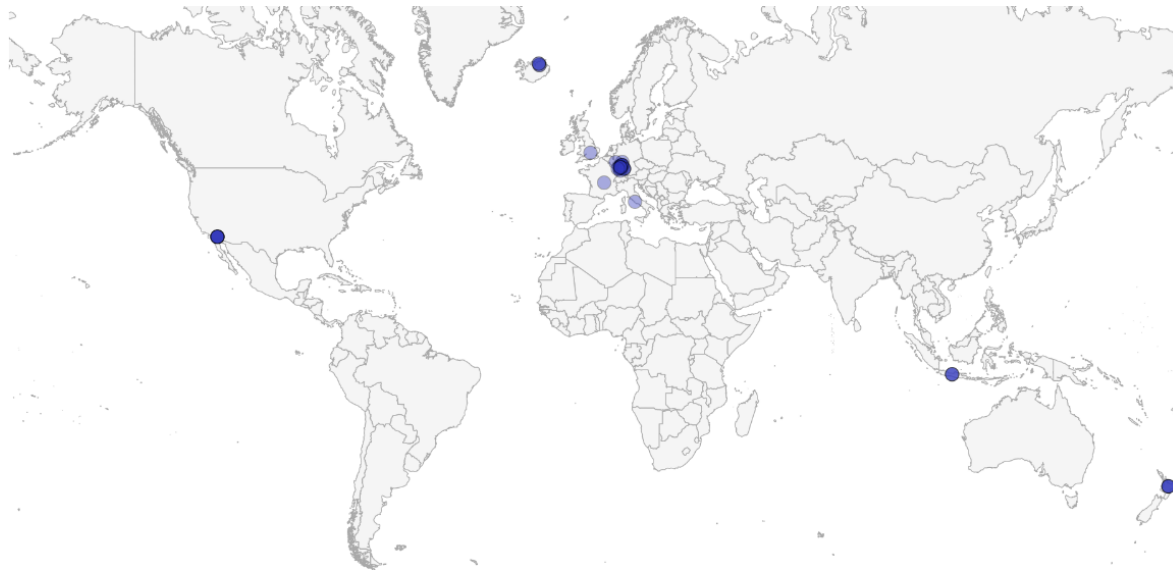
Enhanced Geothermal System and Advanced Geothermal System projects
Number of projects



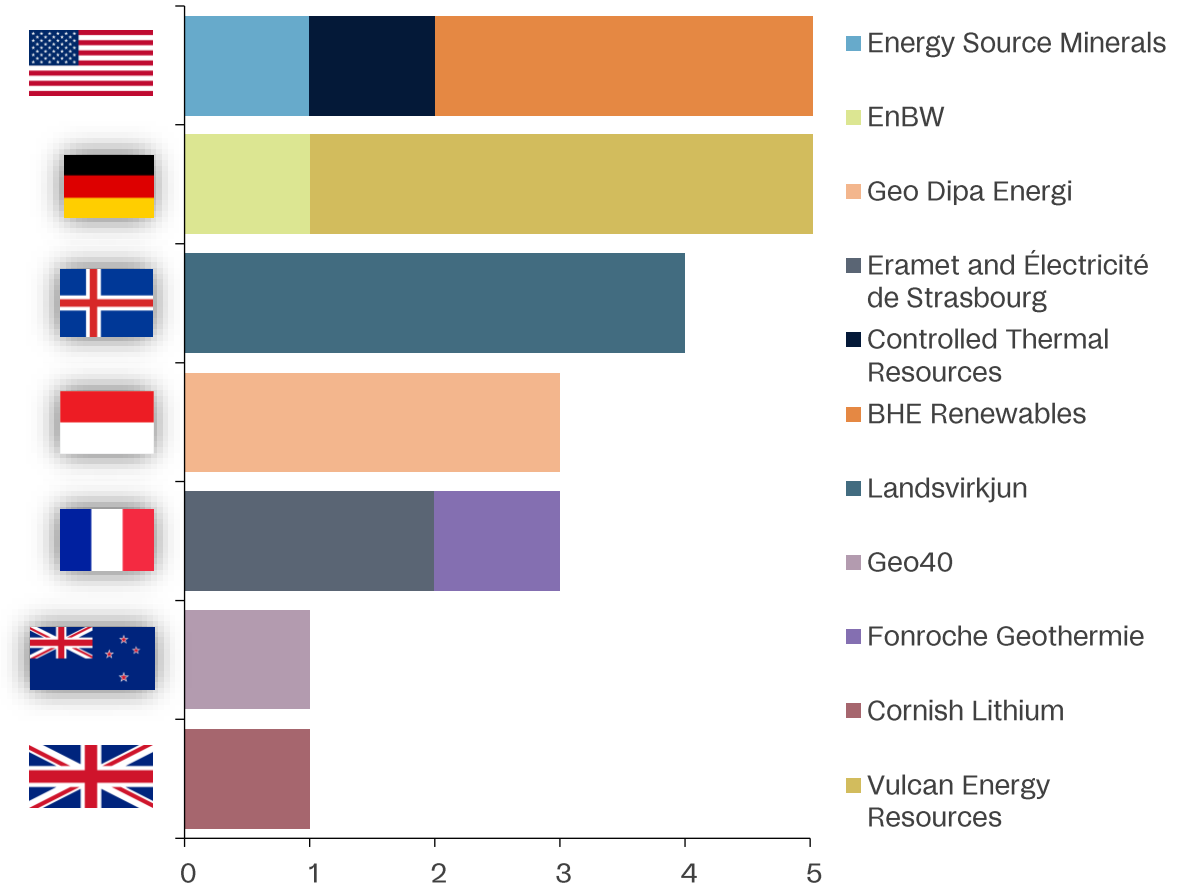
Source: Rystad Energy Geothermal Solution

Lithium supply chain stands to benefit greatly from a growth in geothermal drilling

Locations of lithium extraction projects using geothermal brine

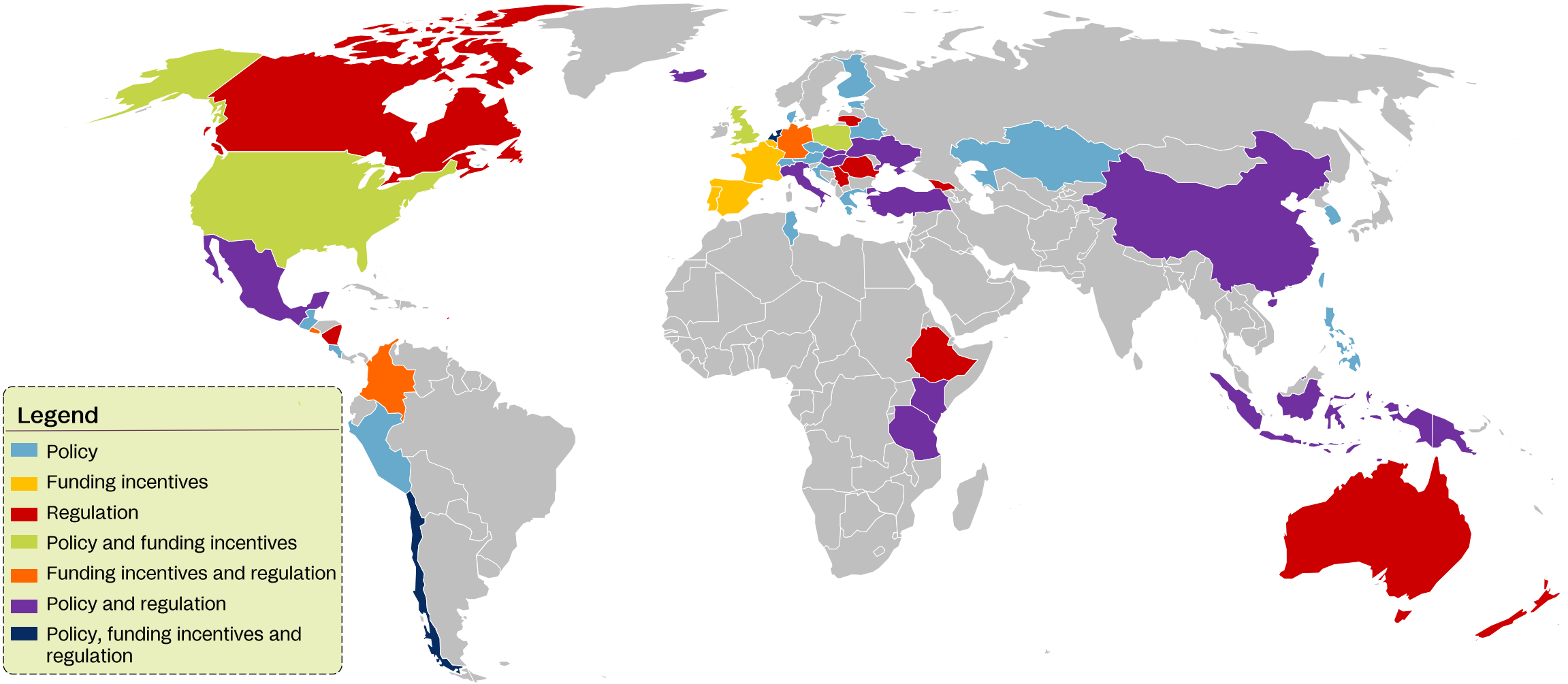


Locations of lithium extraction projects using geothermal brine
Count of projects



Source: Rystad Energy Geothermal Solution

Government policies are key to bring about this geothermal wave in Europe



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

Geothermal Energy's road to 2050

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

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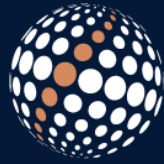
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