

Geothermal Energy: The Global State of Play and Its Role in the Energy Transition

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Summary

As the world accelerates efforts to meet net-zero targets, geothermal energy stands at the intersection of technical innovation, financial opportunity, and human resource transition. With its unique ability to provide baseload, renewable energy for both electricity generation and direct heat applications, geothermal is emerging as a vital solution for decarbonization and global sustainability.

This presentation will explore the global state of play for geothermal energy—mapping key deployment regions, emerging technologies, and supportive policy landscapes. While geothermal is often discussed in the context of power generation, its direct use applications—from district heating to industrial processes—offer an immediate and scalable decarbonization pathway for diverse sectors.

Addressing the Food-Water-Energy Trilemma

As demand for energy grows alongside a rising global population, the food-water-energy trilemma poses an urgent challenge. Geothermal is uniquely positioned to help solve these interconnected crises:

- **Energy Security:** As a firm, renewable energy source, geothermal provides stable heat and electricity, reducing reliance on fossil fuels and intermittent renewables. Its applications extend beyond power, supporting industrial processes, hydrogen production, and critical mineral extraction.
- **Food Production:** Geothermal heat enables year-round greenhouse agriculture, enhancing food security in both cold climates (e.g., Iceland, Canada) and arid regions (e.g., Kenya, Turkey). It supports aquaculture and post-harvest processing, reducing food waste and carbon emissions from transportation.
- **Water Scarcity:** Geothermal-driven desalination and water purification provide sustainable freshwater sources in water-stressed regions. Additionally, geothermal heating reduces the energy intensity of wastewater treatment, aligning with global efforts to secure clean water access.

A Technical, Financial, and Human Resource Opportunity

The oil and gas sector possesses the subsurface expertise, infrastructure, and workforce needed to unlock geothermal at scale. Drilling technology, well management, reservoir modeling, and financing mechanisms developed for petroleum can be repurposed to accelerate geothermal deployment. However, bridging this gap requires:

- Strategic policies to support drilling risk mitigation and long-term market stability.
- Financial instruments to unlock investment, such as tax credits, risk insurance, and carbon pricing mechanisms.
- Workforce transition programs to reskill petroleum engineers, geologists, and field operators into geothermal careers.

By aligning technical innovation, policy frameworks, and financial strategies, geothermal can emerge as a mainstream solution for both the energy transition and the food-water-energy nexus. This talk will provide a comprehensive overview of global trends and concrete opportunities to accelerate geothermal's role in shaping a more resilient and sustainable world