

A commercially driven case for the investment in, and development of, a zero-emission sustainable energy source will attract capital and accelerate the transition to net-zero. Geothermal energy is a high reliability clean baseload energy source which is available globally. The use of tax and regulatory policy will advantage the uptake of geothermal energy while providing opportunities for quality jobs.

Geothermal: Making a Beneficial Transition from Hydrocarbons

Significance

The ability to transition to zero-emitting sustainable and renewable resources with a high-capacity factor is required to meet COP 26 targets as we transition to less hydrocarbons. Geothermal energy typically has capacity factors above 90%, is weather invariant, can produce heat or electricity and has ultra-low or zero on-site emissions of greenhouse gases.

Technical aspects

Earth's surface heat flow averages about 42,000 gigawatts. It is currently estimated that the geothermal electricity potential ranges from 35 – 140 gigawatts, about 0.3% of the total. However, use of enhanced geothermal systems may easily double this estimate. At year-end 2020, geothermal provided 15.6 gigawatts of installed power generation and is projected to grow by more than threefold to nearly 50 gigawatts by 2050.

Commercial implications

Pricing for geothermal energy as heat or electricity on a unit basis (\$/therm, \$/kwh,) is currently competitive with hydrocarbon sources provided the heat source is of high quality and existing infrastructure and wellbores can be utilised. This degree of competitiveness will be improved through technological advances which lower development costs and increase the efficiency of heat to energy conversion.

Community implications

Access to reliable baseload energy sources enables economic activity and social welfare. Reduction of greenhouse gases through replacement of hydrocarbons as an energy source mitigates the social impacts of climate change. Geothermal developments provide quality employment opportunities.

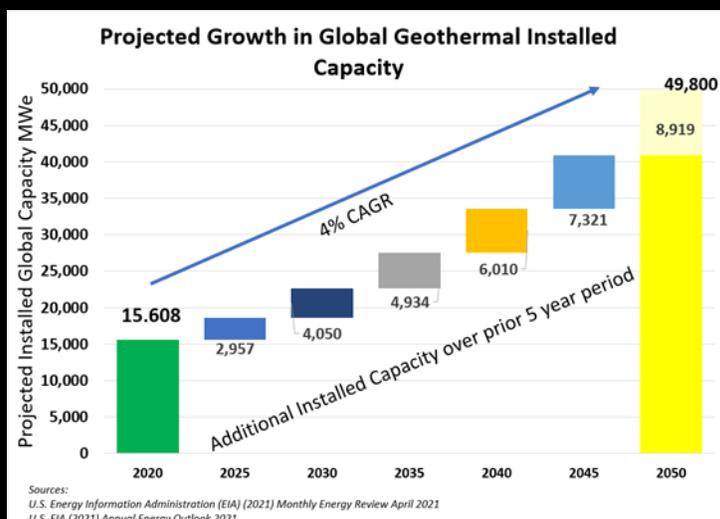
Policy & regulatory implications

Tax policies can be used to advantage geothermal developments through:

- accelerated depreciation/cost recovery
- tax incentives, including lower tax and royalty rates
- carbon credits

Way forward & solutions

- present and publicize commercial geothermal investment cases to attract capital
- advocate for tax policy incentives to improve profitability
- Improve understanding of geothermal cases with respect to carbon footprint and reliability



Key takeaways

- Geothermal energy is clean and competitive with existing high-carbon energy sources
- Large untapped resources which may be accessed with existing technology
- Applications for industrial, agricultural, and residential use
- High reliability factor (>90%) when compared against other renewable energy sources
- Utilisation of existing infrastructure and wellbores improves price competitiveness (\$/therm, \$/kwh) with conventional heat and power sources

“Energy can be extracted without burning a fossil fuel such as coal, gas, or oil. Geothermal fields produce only about one-sixth of the carbon dioxide that a relatively clean natural gas-fuelled power plant produces, and very little if any, of the nitrous oxide or sulphur-bearing gases.”

US Office of Energy Efficiency and Renewable Energy
<https://www.energy.gov/eere/geothermal/geothermal-faqs>

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