Geothermal

Source Metadata

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IEA Technology Definition

The IEA classifies geothermal energy as a renewable technology that harnesses heat from the Earth's interior for electricity generation and direct heating applications. The ETP Technology Guide distinguishes conventional hydrothermal systems (commercial) from enhanced geothermal systems (EGS), which are at demonstration stage. Geothermal provides baseload renewable power with capacity factors exceeding 80%.

Technology Readiness & Deployment

Conventional geothermal power is commercially deployed with approximately 16 GW installed globally, led by the United States, Indonesia, the Philippines, Turkey, and Kenya. The IEA projects annual geothermal capacity additions will reach historic highs by 2030, tripling the 2024 rate. However, the IEA rates geothermal as not on track for net zero targets, requiring a rapid step-up in investment and policy support. Enhanced geothermal systems show promise but remain pre-commercial.

Key Metrics & Benchmarks

Geothermal LCOE typically ranges from USD 50-100/MWh for conventional hydrothermal. Capacity factors of 80-95% make geothermal the most reliable renewable source for baseload power. Direct-use geothermal for heating serves over 100,000 thermal MW globally. The technology produces minimal lifecycle greenhouse gas emissions compared to fossil baseload alternatives.

LATAM Relevance

Latin America sits on the Pacific Ring of Fire, giving it significant geothermal potential. Mexico has the fourth-largest geothermal capacity globally (approximately 1 GW at Cerro Prieto). Chile, Colombia, Peru, and Central American nations have identified substantial untapped geothermal resources along the Andes. Colombia's Nevado del Ruiz and Chiles-Cerro Negro systems are under exploration.

Critical Minerals Link

Geothermal systems require steel and specialized alloys for well casings and piping resistant to high-temperature corrosive fluids. Copper is used in generators and power plant equipment. Geothermal brines can contain lithium as a byproduct, creating potential co-extraction opportunities relevant for battery mineral supply chains, particularly in Chile and Argentina.

Cleantech Taxonomy Crosswalk

Maps to Cleantech Taxonomy sectors: ES (Energy Systems) — geothermal power generation and direct heat; BU (Buildings) — district heating from geothermal; IN (Industry) — industrial process heat from geothermal sources.

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