U.S. & International Overview Geothermal Energy: Heating Up

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About GEA



We are 150 companies that work 80% global geothermal market or about 60 countries



Outline

O Discussion of International Market Trends O Focus attention on U.S. O U.S. Policy Overview





International Geothermal Power Nameplate Capacity (MW)





Global Geothermal Development Goals and Pledges



- 🖉 World Hydrothermal Geo Potential
- IRENA/UNFCCC Global Geothermal Alliance Goal
- Announced Country Geothermal Development Goals



Operating Capacity by Technology Type





Geothermal Resources of the United States

Favorability of Deep EGS

Most Favorable

Least Favorable

Identified Hydrothermal Site (≥ 90°C)

N/A* No Data**

include shallow EGS resources located near hydrothermal sites or USGS assessment of undiscovered hydrothermal resources. Source data for deep EGS includes temperature at depth from 3 to 10 km provided by Southern Methodist University Geothermal Laboratory (Blackwell & Richards, 2009) and analyses (for regions with temperatures ≥150°C) performed by NREL (2009). Source data for identified hydrothermal

Map does not

sites from USGS Assessment of Moderate- and High-Temperature Geothermal Resources of the United States (2008). • "N/A" regions have temperatures less than 150°C at 10 km depth

ess than 150°C at 10 km depth and were not assessed for deep EGS potential. • **Temperature at depth data for deep EGS in Alaska and Hawaii not available.

NREL

s map was produced by the National Renewable Energy Laboratory for the US Department of Energy. ober 13, 2000 Author: Billy, L. Boherte

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Source: National Renewable Energy Laboratory

Policy Impact on U.S. Industry





Geothermal Project Cost and Risk Profile at Various Stages of Development



Source: World Bank, 2012



Policy and Regulatory Instruments Supporting Deployment of Renewable Electricity



'Investment Phase incentives' are the most helpful in the U.S. for constructing new projects *with high upfront risk* when tailored fairly to geothermal power's unique needs



Asymmetrical Incentives For Example,

California Incentive	Solar	Geothermal Power
Federal PTC or ITC	Yes 30% ITC	Yes PTC/30% ITC
Expires	Begin construction by 12/31/2019 Phased out by 12/31/2022	Begin construction by 12/31/2016
Clean Power Plan CEIP	Yes	No
State tax credit/rebate	Yes	No
Property tax exemption	Yes	No
Special rates/net metering	Yes	No
Renewable energy credits	Yes SRECS	Only RECS



Stalled Project Development in California



ASSOCIATION





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Thank You