

The Value of Geothermal in Nevada's Changing Energy Market

Geothermal power is a reliable, economical, and clean option to provide baseload power for the growing U.S. power system.

Nevada's power system is currently in a paradigm shift led by one of the most forward thinking pieces of state energy legislation... Already a leader in Renewable Portfolio Standard targets, in 2013, the Nevada legislature added SB 123 to its arsenal to fight climate change, protect ratepayers from fossil fuel price shocks and maintain a reliable grid supplied by indigenous resources. SB 123 has accelerated the divestiture from over 1000 MW of existing coal power by 2025 and replace at least 350 MW of that capacity with renewable energy.

Geothermal is an economic development and job engine.



Retirement of emission-heavy coal plants will provide opportunities for more environmentally friendly geothermal power plants. Among energy sources which are suitable for baseload production, geothermal power represents the smallest environmental impact and the biggest job footprint. With its fleet of 180 MW of geothermal power plants in Nevada and 625 MW worldwide, Reno-based Ormat Technologies, Inc. services and supports our fleet of power plant across the U.S. employing nearly 300 employees in Nevada alone. The economic footprint keeps expanding with facilities spread throughout Nevada spending on average \$5.2 million per year in the host communities. During construction a typical plant employs over 280 local workers.

Direct economic impact to local community for a 30 MW geothermal development¹

- Drilling: \$21.4 million/107 new jobs
- Construction: \$33.7 million/420 new jobs
- Operations: \$5.2 million annual/29 new jobs
- Property taxes: \$500,000 annual
- Full-time skilled jobs at the power plant: 15-20



Geothermal is a key player in grid reliability.

Geothermal power offers significant ancillary benefits that provide great value to grid reliability and stability including: baseload capacity, voltage regulation, flexible capacity, and inertia. Neighboring states are spending significant sums to procure these services in order to accommodate solar photo voltaic, wind and other intermittent resources.

Geothermal power plants can ramp up and down very quickly, multiple times per day. A normal ramp rate for a geothermal turbine is over 20% of nominal power per minute, comparable to the top-of-the-line gas turbine.

As penetration of intermittent resources increase, the value of geothermal power should increase due to its ability to both provide baseload renewable power and flexibility reserves. This allows for further integration of intermittent renewable resources and green flexibility reserves requiring less backup fossil fuel generation.

Baseload or load following using gas-fired generation is needed but is also more costly than geothermal power when factoring in ancillary costs of natural gas electrical generation.²

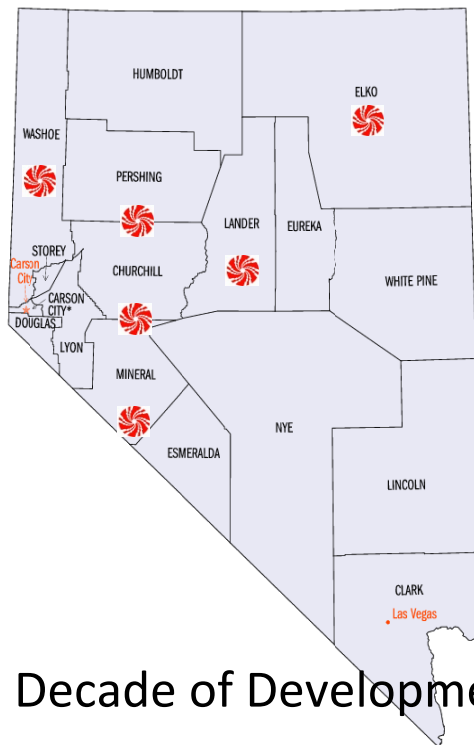
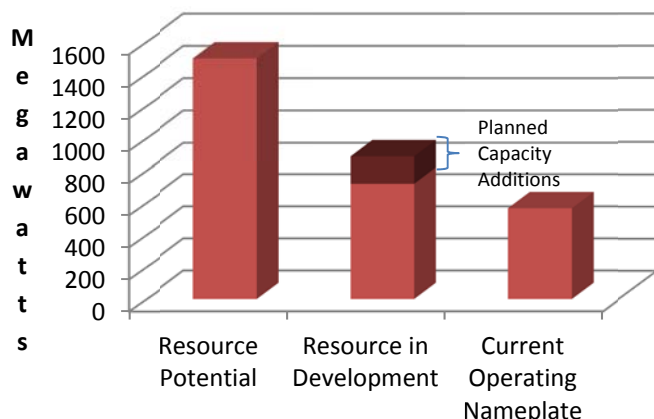
The transition from a coal to a natural-gas-dominated electricity system is important, but alone is not sufficient to meet U.S. climate goals. A natural-gas-centered power system still carries significant economic, environmental, and public health risks.³ Geothermal is part of the solution and an extremely important piece of our energy puzzle.

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Nevada is a **geothermal superpower**!

Nevada leads as one of the most business-friendly environments for geothermal power in the U.S. and globally. If Nevada was its own country, it would rank 8th for nameplate geothermal capacity. Currently there are 45 projects in exploration or development representing more than 500 MW of defined resource⁴ and the potential for more than 1500 MW additional development.⁵

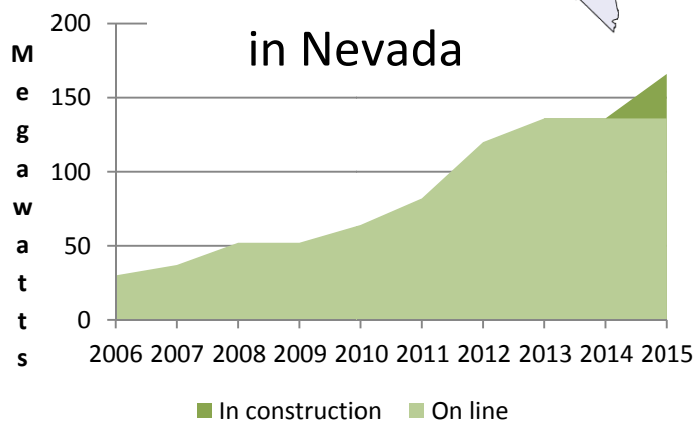
Nevada's Geothermal Potential



Geothermal makes good economic sense.

Geothermal projects produce energy for decades at stable, affordable prices. Viewed in terms of life cycle costs, geothermal power is economically attractive, providing long-term fixed power prices, reducing energy price volatility, helping to avoid price spikes and energy crises, which can impose severe economic penalties on business and local communities. Unlike intermittent renewable resources like wind and solar, geothermal resources do not trigger integration costs like back-up generators, storage facilities and others. These "hidden" costs can add 20% or more to the cost of energy from intermittent resources.²

Ormat's Decade of Development in Nevada



¹ Wahlstrom & Associates. 2011. "Economic benefits of proposed Dixie Meadows geothermal power plant, Churchill County, Nevada." Reno, NV: Prepared for Ormat Technologies.

² Linvill, Carl, John Candelaria and Catherine Elder. 2013. "The Value of Geothermal Energy Generation Attributes: Aspen Report to Ormat Technologies." Agoura Hills, CA: Aspen Environmental Group. Unpublished manuscript.

³ Union of Concerned Scientist (UCS). 2013. "Gas Ceiling Assessing the Climate Risks of an Overreliance on Natural Gas for Electricity." Washington DC: UCS. Accessed September 24, 2013. http://www.ucsusa.org/assets/documents/clean_energy/climate-risks-natural-gas.pdf

⁴ Matek, Benjamin. 2014. "2014 Annual U.S. & Global Geothermal Power Production Report." Washington, DC: Geothermal Energy Association (GEA). Accessed April 28, 2014. <http://geo-energy.org/events/2014%20Annual%20US%20&%20Global%20Geothermal%20Power%20Production%20Report%20Final.pdf>

⁵ Klein, Christopher, et al. 2004. "New Geothermal Site Identification and Qualification." Geothermex for CEC (PIER).