// FACT SHEET

GEOTHERMAL POWER

There is an installed worldwide electrical generating capacity from Geothermal sources of nearly 10,000 megawatts (MW) supplying 60 million people in 24 countries. The United States is the world leader in the generation of electrical power from Geothermal energy with some 2,850 MW of which 2,492 MW is in California.

What is Geothermal Power?

- Geothermal power is a form of renewable energy utilizing subsurface hot water or steam created by the heat beneath the earth's surface. Heat from the earth's molten core in areas of volcanic activity or at the juncture of the earth's tectonic plates, flows naturally toward the cooler surface to form hot springs, geysers, steam vents (fumaroles) and boiling mud pots.
- Low temperature Geothermal sources can be utilized to heat and cool residential and commercial buildings by installing heat pump systems. High temperature (240° C+) sources can be extracted with standard well drilling technology in the form of hot water or steam to power turbines and produce clean, renewable electrical energy.

Green energy is energy from renewable resources through environmentally and socially responsible developments.

WHY GEOTHERMAL?

- Geothermal energy offers a number of environmental and economic advantages over traditional fossil fuel sources.
- Geothermal power plants are both "clean" and "green". Clean electricity refers to alternative energy technologies such as Geothermal that result in a net environmental improvement relative to existing energy production (e.g. from fossil fuels). Green energy is energy from renewable resources through environmentally and socially responsible developments.
- Geothermal power plants also have the distinction of being "baseload" power sources. That is, they can operate continuously at up to 98% capacity because they have a constant source of "fuel" and require little downtime for maintenance. And, Geothermal plants are not affected by changing weather conditions.
- From an economic perspective, Geothermal energy can be very price competitive. While initial investment is high, lifetime costs are low because the fuel source is free, it is located at the generation plant site (no transportation costs) and it is renewable. Large scale Geothermal operations require economic transmission links.

THE TECHNOLOGY

- The physical facilities required for a Geothermal power plant include production and injection wells, a gathering and injection system, a power generation plant and a transmission line.
- Production wells are constructed by directional drilling from a small number of drill pads (as few as three depending on the size of the reservoir), thus reducing both project costs and potential environmental impacts. Typical well depths are 3,000 meters or less.
- Wells are drilled using established technology similar to that employed in the oil and gas industry.
- The gathering system consists of pipelines that transport the steam or hot water from the wellheads to the generating plant which uses standard turbine technology. An injection system uses non-productive wells to return process water to the underground reservoir.

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Our mandate is to develop a viable independent power industry in BC that serves the public interest by providing cost-effective electricity through the efficient & environmentally responsible development of the province's energy resources.

KEY LINKS

Canadian Geothermal Energy Association
www.cangea.ca

U.S. Geothermal Energy Assoc.
www.geo-energy.org

U.S. Geothermal Resources Council
www.Geothermal.org

BC Ministry of Energy, Mines & Petroleum Resources
www.gov.bc.ca/empr

BRITISH COLUMBIA'S POTENTIAL

- BC Hydro has identified 16 prospective Geothermal sites in the province, with the six most likely prospects having an estimated Geothermal potential of over 1,000 megawatts collectively. Others estimate the provinces potential to be approximately 3,000 MW of capacity.
- The best prospect for immediate development in BC is the South Meager Geothermal Project located 55 km north of Pemberton. South Meager, with average temperatures of 260 degrees Centigrade, has been assessed as having a potential generating capacity of up to 100 MW (enough to supply 80,000 homes).
- Other Geothermal prospects include Pebble Creek at North Meager (est. 300–700 MW); Canoe Hot Springs near Valemount (est. 50 MW); Mount Cayley near Squamish (est. 20–100 MW); Lakelse Hot Spring east of Prince Rupert (est. 10–50 MW); and Mount Edziza in northwest BC (est. 200–800 MW). All the BC prospects are "hydrothermal" in nature – i.e. hot water rather than steam.

ENVIRONMENTAL & REGULATORY CONSIDERATIONS

- Geothermal projects in BC are subject to the Geothermal Resources Act and Regulations; and to a full range of provincial licensing and permitting requirements covering land leases, drilling permits, wildlife protection, public health and safety, environmental monitoring and protection, road construction and water use. Projects in excess of 50 megawatts are subject to review under the BC Environmental Assessment Act and Canadian Environmental Assessment Act.
- Since the fuel source for Geothermal generating plants is either natural steam or hot water, they produce virtually no air emissions. Elements such as nitrous oxide, hydrogen sulfide, sulfur dioxide, carbon dioxide and particulates may be present in the source "fuel" – but in extremely low amounts that can be controlled by an abatement system.
- Land impacts also are minimal. Geothermal power plants are typically constructed at or near the Geothermal reservoir – there is no need to transport 'fuel' to the plant – and require only a few acres for the plant buildings. Geothermal plants generally have a low profile. Geothermal wells and pipelines may cover a considerable area but do not prohibit other uses such as farming, livestock or wildlife grazing and recreational activities.
- Water from a plant's cooling towers is reinjected to the Geothermal reservoir to recharge the reservoir, so there is no release to groundwater and surface water sources.
- Production and injection wells are constructed with casing materials that prevent cross-contamination with groundwater systems.
- Uniquely, The Geysers Geothermal reservoir in northern California is being recharged by the daily injection of millions of gallons of treated waste water from two local municipalities.

SOCIOECONOMIC BENEFITS

- The South Meager Geothermal Project expects the following socioeconomic benefits related to construction and operation of a 100 MW generating plant and associated transmission line.
- Construction of generating plant, substations, transmission line and other facilities would employ some 250–350 personnel over a two-year construction period.
- Once in operation, these facilities would employ some 30–40 persons full-time. Work related to road and transmission route maintenance and similar services would be sub-contracted locally, with employment varying on a seasonal basis.
- The capital cost of a 100 MW generating plant and associated facilities is estimated at some $400 million, including expenditures on the initial resource confirmation program.
- The project will generate substantial payroll and tax revenues. Significant spin-off employment and business opportunities are expected with respect to the purchase of equipment, supplies and services from local and area sources.