

### What is the RE-Powering America's Land initiative?

Demand for renewable energy is increasing in the United States. Through its *RE-Powering America's Land: Siting Renewable Energy on Potentially Contaminated Land and Mine Sites* initiative, the U.S. Environmental Protection Agency (EPA) identified more than 11,000 EPA tracked sites and nearly 15 million acres that have potential for developing solar, wind, biomass and geothermal facilities. Using potentially contaminated land and mine sites to develop renewable energy facilities can preserve greenfields; provide developers with access to existing infrastructure; create jobs; and enable potentially contaminated property to return to a productive and sustainable use.

### What is geothermal energy?

Geothermal energy is extracted from heat stored in the earth. This heat comes from the original formation of the planet, radioactive decay of minerals, tectonic activity and solar energy absorbed at the surface. Geothermal facilities use this heat to generate electricity. Three types of geothermal production were evaluated for this study:



A geothermal power plant in Mammoth Lakes, CA

- **Flash power plant** – Uses geothermal reservoirs of water with very high temperatures that flow up through wells in the ground under its own pressure. As it flows upward, the pressure decreases and some of the hot water boils into steam. The steam is then separated from the water and used to power a turbine that generates electricity.
- **Binary power plant** – Uses the heat from lower temperature geothermal resources to boil a working fluid, usually an organic compound with a low boiling point. The working fluid is vaporized in a heat exchanger and used to turn a turbine that generates electricity.
- **Geothermal heat pump** – The upper 10 feet of the earth maintains a nearly constant temperature between 50° and 60°F (10°-16°C). Geothermal heat pumps take advantage of this resource to heat and cool buildings using significantly less energy.

### What are some examples of geothermal facilities being successfully sited on contaminated land?

Some formerly contaminated sites are using geothermal heat pumps. The Green Institute in Minneapolis, Minnesota, a former brownfield site, uses a geothermal heat pump to regulate the building's temperature. According to an article posted by the National Renewable Energy Laboratory (NREL) entitled *Geothermal Developers Remain Optimistic*, there is increased interest in geothermal energy production. Installed geothermal power generation capacity increased by approximately 4% since 2007.

### How much geothermal potential exists on contaminated sites?

#### Flash power plant – 173 sites

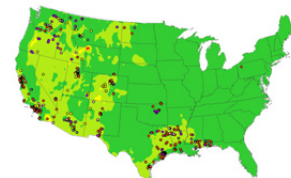
Resource temperature  $\geq 149^{\circ}\text{C}$  (300°F) Well depth  $\leq 4.5$  km  
Distance to transmission lines  $\leq 10$  miles Acreage  $\geq 10$  acres  
Distance to graded roads  $\leq 25$  miles

#### Binary power plant – 474 sites

Resource temperature  $\geq 93^{\circ}\text{C}$  (200°F) Well depth  $\leq 3$  km  
Distance to transmission lines  $\leq 10$  miles Acreage  $\geq 10$  acres  
Distance to graded roads  $\leq 25$  miles

#### Geothermal heat pump – 9,112 sites

All sites are considered viable for geothermal heat pumps, though sites with near surface temperatures of 10°C (50°F) to 24°C (75°F) are preferred.



EPA tracked sites with geothermal binary power plant potential

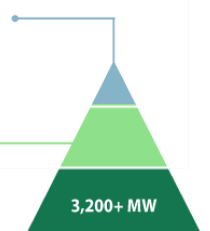
### Estimating total technical potential

#### Geothermal technical potential for EPA tracked sites: more than 3,200 MW

**Market potential** – The portion of the economic potential that could be achieved given current costs, policies and technical constraints.

**Economic potential** – The portion of the technical potential that is economically viable, but requires additional policies to break down market barriers.

**Technical potential** – Potential that is technically possible, without consideration of cost or practical feasibility.



For more information on geothermal technologies, visit: [www.nrel.gov/learning/re\\_geothermal.html](http://www.nrel.gov/learning/re_geothermal.html)

For more information, visit [www.epa.gov/renewableenergyland](http://www.epa.gov/renewableenergyland) or contact [cleanenergy@epa.gov](mailto:cleanenergy@epa.gov)