



Geothermal Cheat Sheet

Binary Power = Power is generated by a secondary fluid, with a lower boiling temperature than water, which is heated through a heat exchanger by geothermal heat.

CCUS = Carbon Capture, Utilization and Storage

Closed Loop (D) = A geothermal system that uses a working fluid in a closed loop to extract heat from the earth. No brine is extracted from the earth and the working fluid is circulated through an isolated loop.

Combine Cycle = Steam first produces power in a steam turbine and subsequently condensed in a vaporizer of a binary plant, which produces additional power.

Conventional Geothermal (C) = Large wellbore, deep, purpose drilled wells for power generation and/or heat recovery. The systems are applicable to a wide variety of geological settings where earth's naturally occurring heat can be recovered and utilized. However, they need high permeabilities and large inter-formational fluid volumes to be commercially successful. **C-1** is conventional low temperature geothermal operating at 30°C to 70°C. **C-2** is conventional geothermal operating from 70°C to 170°C. **C-3** is conventional geothermal operating above 170°C and includes supercritical systems.

Coproduction = Geothermal energy is produced at the same time as other resources, such as oil, gas or critical minerals.

Direct Use = Geothermal heat is used directly, to heat buildings, for agriculture, industry or for tourism. No electricity is generated.

EGS = Enhanced (Engineered or Advanced) Geothermal Systems = A geothermal reservoir created by injection and fracking, allowing for geothermal energy to be extracted anywhere there are hot rocks present.

ESG = Environmental, Societal and Governance

Flash Power = Power is generated by high temperature geothermal fluids that convert to steam at earth's surface, turning a turbine.

GeoExchange® / Borehole Heat Exchanger (A) = Also known as Geothermal Heating and Cooling (GHS), Ground Source Heat Pumps (GSHP) and Earth Coupled Heat Pumps (ECHP). These systems utilize shallow, purpose drilled, narrow wells with heat exchanger tubing installed, circulating a working fluid. They also require heat pumps. These systems can be used to cool and to heat; but they cannot (with current technology) generate power. Systems can operate as warm as 32 °C, and as cold as -1 °C when transferring heat to/from the ground.



GeoExchange® / Shallow Subsurface (B) = systems use heat pumps to recover and store heat from various sources, in the ground. Heat pumps extract atmospheric heat during summer months, storing it for extraction during the winter. Heat exchange systems can also use groundwater or surface water as the thermal storage mechanism or even the heat transfer mechanism.

Geothermal = The naturally occurring heat of the earth. Geothermal heat is generated by the radioactive decay of elements in the upper crust (83%), as well as primordial heat from the formation of the planet (17%). Temperature normally increases with depth.

GHG = Green House Gasses

MWe = Mega Watts of electric power a power plant can output.

MWth = Mega Watts of thermal power required as power plant input.

Open Loop = A geothermal system that uses formation fluid as a working fluid to extract heat from the earth. Hot water is pumped from a depth to the surface where the heat is extracted before the water is reinjected into the earth.

ORC = Organic Rankine Cycle = A low efficiency binary power generator that allows for geothermal electrical generation at temperatures as low as 80°C (currently).

Retrofit Downhole Heat Exchanger (E) = A closed loop heat exchanger installed in a wellbore. These can be used in geothermal wells that do not have sufficient fluid flow, for geothermal co-production, or for hydrocarbon coproduction. They can operate at almost any depth, and any temperature > 100°C.

Sedimentary System = Geothermal energy is generated by heat released during decay of radioactive elements in the earth's crust and trapped by overlying sedimentary rocks.

Volcanic System = Geothermal energy is generated by hot volcanic rocks that can range from solid to molten.