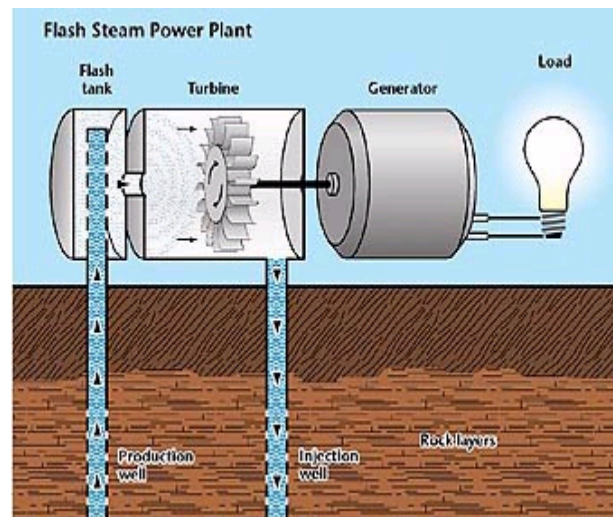


TECHNOLOGY DEVELOPMENT PROJECT FACT SHEET

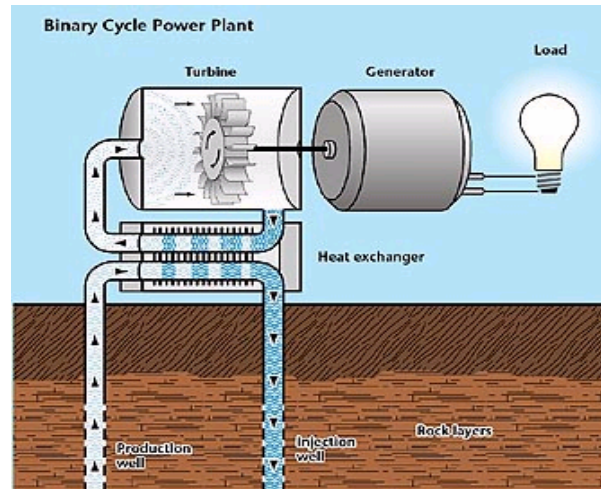
RT008: GEOTHERMAL ENERGY TECHNOLOGY

Geothermal Energy is heat (thermal) derived from the earth (geo). It is the thermal energy contained in the rock and fluid (that fills the fractures and pores within the rock) in the earth's crust. Depending on the geophysical conditions that exist at a geothermal site, different technologies can be used to utilize the geothermal energy.

Flash Steam Power Plant. When geothermal water is about 1-1/2 times hotter than boiling water, 300°F or more, it can be used to create electricity. For these systems, flash-steam power plants are required. The geothermal fluids are brought to the surface through production wells that are drilled deep into the earth. The hot waters are highly pressurized at those depths. As the water pressure is reduced during transit to the power plant, 30 – 40% of the water flashes (explosively boils) to steam. The steam is separated from the remaining hot water and fed to a turbine/generator unit to produce electricity. The residual water is returned to the reservoir through injection wells to help maintain pressure and prolong productivity.



Binary-Cycle Plants are for lower temperature geothermal reservoirs, 250 - 300°F. In this plant, geothermal waters are passed through a heat exchanger to heat a secondary fluid that vaporizes at a lower temperature than water. The working fluid vapor spins the turbine/generator unit, is condensed back to liquid before being re-vaporized at the heat exchanger. The heat-depleted geothermal water is injected back into the reservoir.



Hybrid Power Plants. In a Hybrid Power Plant, Flash and Binary processes are both used.

Hot Dry Rock The geothermal engineer usually drills two wells into hot dry rock, holding little or no steam or water. The wells are connected through cracks in the rocks. Cold water is pumped down one well and brought up the second as hot water. At the surface, this hot water is used to make electricity.

Dry Steam Plants. A few geothermal reservoirs produce mostly steam and very little water. The steam shoots directly through a rock-catcher and into the turbine.



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