



Binary Cycle Plant

SIGNIFICANT FIGURES





Geothermal Industry

Industry seems to be under appreciated, unknown source of clean, renewable energy.

Binary cycle plant allows for cooler geothermal reservoirs to be used in comparison with other geothermal plants.

Reason for potential unpopular energy choice: High up-front cost



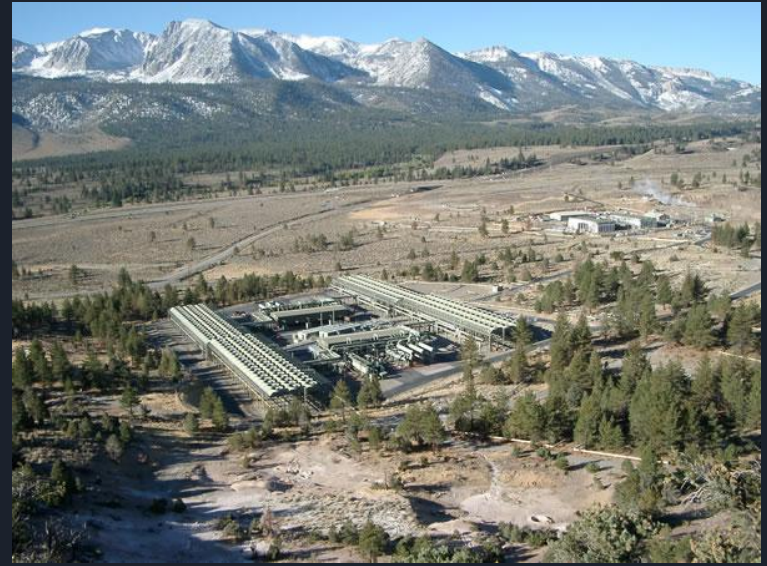
Mammoth Pacific Inc.

Located in the Sierra Nevada mountain range in
CA.

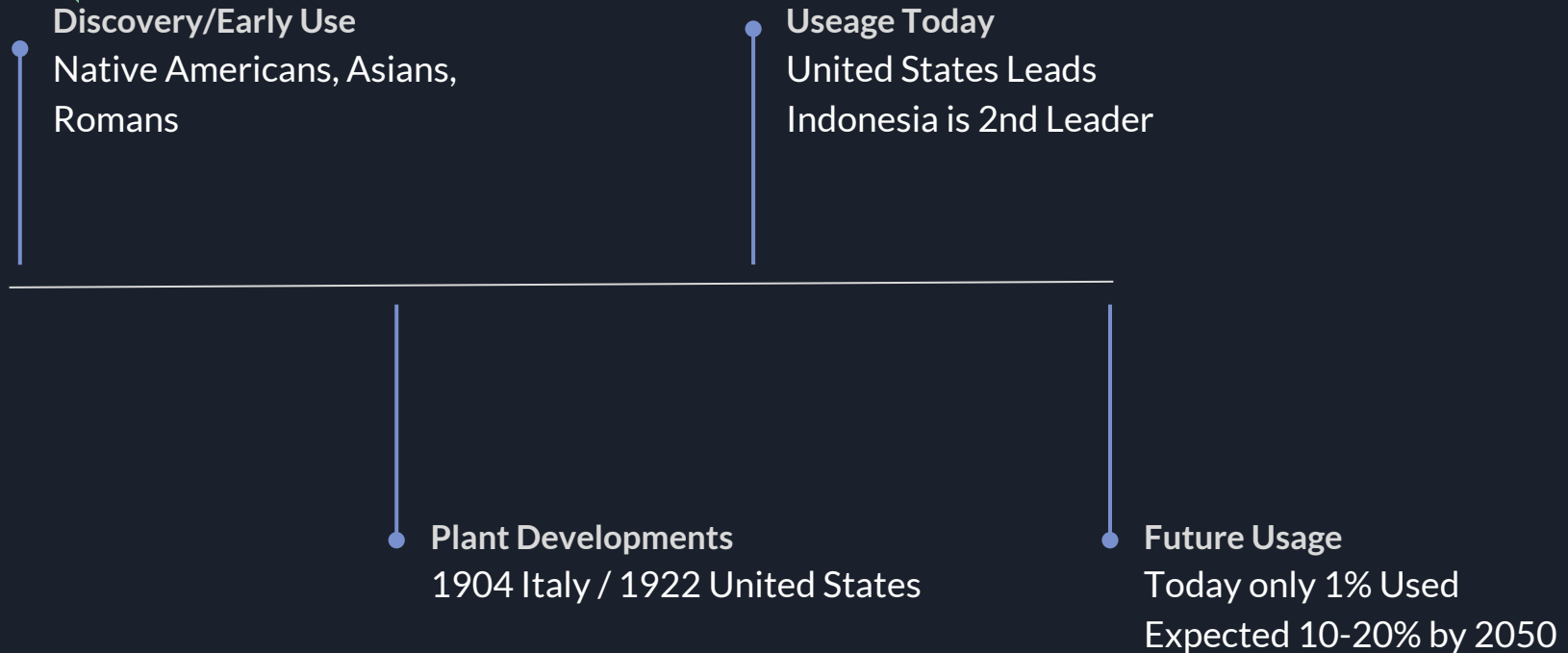
Award winning complex

Production of binary cycle plant, and
maintaining facilities

Sell electricity to Southern California Edison
and Pacific Gas & Electric



Geothermal Energy History



Geothermal Energy History

Prince Piero Ginori Conti, with his prototype generator that could provide enough wattage to light 4 light bulbs at a time.

Indigenous people utilizing Geothermal Energy.



How the Technology Works

- Pump drilled to natural hot water source
- Hot water “flash vaporizes” a secondary fluid through heat exchanger
- This *binary* fluid is what makes the *binary* cycle plant different from the two other types of geothermal plants
- Pressurized steam turns turbines
- Turbines generate electricity

Key: 1 Wellheads 2 Ground surface 3 Generator 4 Turbine

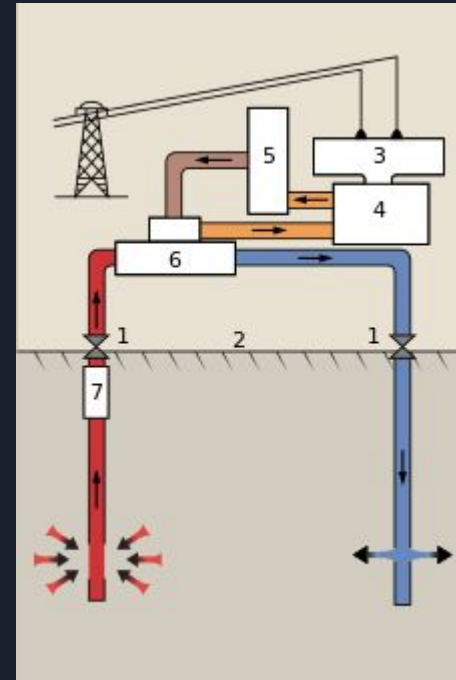
5 Condenser 6 Heat exchanger 7 Pump

Hot water

Cold water

Isobutane vapor

Isobutane liquid



How the Technology Works

- Steam exits turbine and is cooled back into fluid in the condenser
- Fluid is cycled back through the heat exchanger
- Meanwhile, natural cooled water returns to source
- No gas emissions

Key: 1 Wellheads 2 Ground surface 3 Generator 4 Turbine

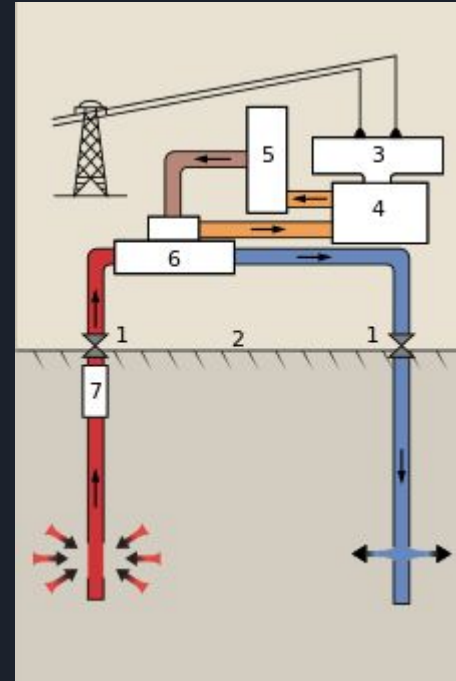
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Manufacturing Process :

- Drilling
- Casing/Cementing
- Construction



Problems With Construction

Monetary cost

Drilling Impact



Development of Geothermal Energy

- Geothermal energy harnessed in the form of hot springs
 - Gain in commercial value
- Communities form around geothermal sources
- Resources pipelined to homes and buildings (early 1900s)
 - Use as main water source
 - Heating systems



Development of Geothermal Energy

- Geothermal plants being established for the first time in California (1960)
- Italy, New Zealand and Mexico have recorded usage of geothermal energy prior to 1960s
 - Hydrothermal oriented and steam-powered energy

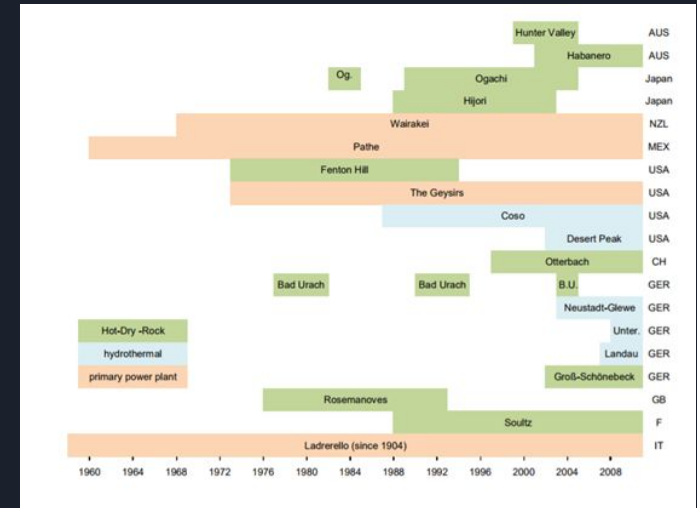


Figure above shows the location and time period regarding where and when different forms of geothermal energy were commonly being used.
(<https://www.geothermal-energy.org/pdf/IGAstandard/WGC/2010/0605.pdf>)

