Geothermal Power Generation

Geothermal Plant Types:

- Flash Plant
- Binary Plant
- Total Flow Plant
- Plant Conversion Efficiency
- Conceptual Model
- Self Cleaning Rotors
- Sensible-to-Latent Heat Transfer
- Sensible-to-Sensible Heat Transfer
- The Total Flow Advantage:
- The Total Flow Advantage:
- Geothermal Electric Power Production begins thousands of feet below the earth's surface in large underground reservoirs. Water in the reservoir is processing potentially doubles the plant overall output for a given resource and significantly decreases plant capital cost.

- Challenges and Solutions:
- The Helidyne TFC (Trilateral Flash Cycle) expander is an innovative, high flow rate, pure rotary design that addresses both of the design prior studies are limited by an inherent built-in ratio — typically about 5:1.

- Helidyne LLC has developed an innovative, positive displacement rotary TFC expander for use in geothermal and geopressure power generation applications. The expander is intended to replace the turbine currently employed in traditional plants as the prime mover. The major advantage of the Helidyne TFC is that it permits the geofluid to be directly used as it emerges from the geothermal well. The “total- flow” strategy makes possible the recovery of available thermal energy by flushing the brine entirely within the expander cavity instead of an external flash tank. These brine processing advantages come with a given margin and significantly reduce plant capital cost.

- Geopressure Power Generation

- A New Energy Market:
- Any pressurized well, either producing oil (like BP’s blown out Gulf well) or abandoned wells delivering mostly water, can generate electricity regardless of operating pressure, temperature or distance from the surface.

- The Gulf Coast contains approximately 5,000MW of geopressure energy worth $2.1 billion in annual wholesale electricity sales. The region has over 1.5 million wells that could be potential sources of geopressure energy. Geopressure wells rise to the surface naturally under extreme hydraulic pressures (4,000 -12,000 psi) as evidenced by large gushers that occasionally accompany new oil discoveries.

- Utilizing an organic working fluid in an ORC plant provides several other key advantages in addition to reduction in plant size and friendly turbine environment:
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- Geopressure Design Options

- Problematic Past:
- The “Pelton wheel” turbine suggested as best choice with the following problems:
  - no re-injection if the well is producing oil
  - no cooling tower or cooling water required
  - no refrigerants
  - no heat exchangers
  - expensive titanium impulse wheels for this reason.
  - 2,000 psi is the upper limit for Pelton wheel buckets

- Promising Future:
- Geopressure Power Generation

- 200 Foot Oil Gusher

- Total Recorded Wells

- Off and On Shore Geopressure Wells

- Direction of Flow and Pressure Confinement

- Geopressure Design Options

- Helidyne LLC

- General Rotor Shape

- Sensible-to-Latent Heat Transfer

- Sensible-to-Sensible Heat Transfer

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