Geothermal Energy

Tools of the Trade
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The Opportunity

- Many currently unknown geothermal systems likely exist
- The expertise and technology exists to locate these systems
- New plant technologies allow the use of low to moderate temperature water
- Geothermal systems may be located on or nearby military lands
Greenfield Exploration

- Three key ingredients
  - Groundwater
  - Thermal anomaly
  - Rock permeability
- System types
  - Deep circulation
  - Magmatic heat
Regional Exploration - Modeling

- Fuse exploration data using GIS
  - Faults
  - Fault offsets
  - Earthquakes
  - Extension
  - Shear
  - Strain
  - Hydrothermal alteration
  - Temperature gradients
  - Geochemistry
  - Hydrology
  - Young volcanic activity
Local Exploration

- Hydrology (aquifer recharge)
  - Perennial streams
  - Rivers
  - Lakes
  - Paleolakes
Local Exploration

- Thermal anomaly detection
  - Historical data/information
  - Thermal imagery
  - Geothermometers
  - Shallow (2 m) probes
  - Hydroprobe (~30 m)
  - Helicopter drill rigs
  - Deep TG drilling
Local Exploration

- Reservoir/Permeability
  - Geologic mapping
    - Initial structural model
  - Soil geochemistry
  - Geophysics
Mapping – Remote Sensing

- Faults
- Lithology
- Hydrothermal alteration
- Field work

Above left: Fault map using DEM 3D base

Right: Spatial enhancement of multispectral image

Below left: Hydrothermal alteration (magenta/white)
Soil Geochemistry/Water Chemistry

- Mercury surveys
- Soil gasses
- Mobile metal ions
- Thermal ion dispersion
- Vegetation spectra

Geothermometers

Sagebrush Spectrum
Geophysics

- Gravity
- Magnetics
- Self potential
- Resistivity
Development

- Synthesize data
- Create conceptual model
- Site drilling targets
- Begin drilling
  - Modify conceptual model
- Build power plant
- Build infrastructure
  - Pipelines
  - Transmission
  - Injection
- Generate electricity
Power Plants

- Dry steam
- Flash (>360°F)
- Binary (225°F - 360°F)
We can do it! Thank you.

EGI

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