Project Overview

• ~10% Complete
• Budget
  – $15.5MM total project
  – Proposed $2.0MM DOE award, $13.5 recipient share
  – $0 funding FY ‘09, $2.0MM FY ‘10
• Partners - none
Project Overview

• Barriers
  – Access to transmission – none since it’s tied in to existing plant, however modification to the interconnection agreement most likely required
  – Lack of Reliable Resource Information – above-ground nature of project reduces resource risk, but impacts to resource enthalpy unknown
  – Siting, Leasing & Permitting – although minimal modifications to existing permits required, project schedule could be impacted by BLM NEPA review and new Chemical Action Plan (CAP) permit
Relevance/Impact of Research

- Use of waste heat from low temperature brine otherwise lost
- Produces additional renewable energy without using additional geothermal resource
- Cost effective
  - additional well drilling is not required
  - existing plant infrastructure and space available
- Improves overall plant efficiency, since additional geothermal resource is not required
- Use of 100% air cooling eliminates dependence on water supply
- Minimal impacts on existing plant
- Operational testing of scaling potential of lower brine temperatures beneficial to other similar facilities
- Provides operational database of a geothermal bottoming binary plant
Scientific/Technical Approach

1) Pump

2) Heat Source

3) Heat Source

4) Turbine

5) Generation

6) Heat Rejection

Brine Injection Pipeline
Scientific/Technical Approach

• Solicit Proposals
  – Supply: specified available brine and ambient conditions
  – BOP Engineering: identified plant tie-in requirements
  – Construction: use defined scope of work with supply and BOP drawings

• Analysis
  – Effect on brine scaling potential
  – Generation voltage level
  – Makeup water requirements
  – Permit Impacts
  – Space requirements

• Phase 1 Go/No-Go – October 2010
  – Obtain Permits
  – Complete Engineering
  – Prove Economic Feasibility
Accomplishments, Expected Outcomes and Progress

• **Binary Plant Equipment Supply**
  – RFP was released and response proposals were reviewed and evaluated
  – Supplier has been selected
  – Contract negotiations to commence
  – COD expected 15-18 months from NTP

• **Permits – In process**
  – BLM NEPA review required, expectation is a DNI due to installation on pre-disturbed area
  – Chemical Action Plan (CAP) required due to fluid selection
  – Modification required to air permit prior to install, building/pressure vessel permits during/post construction
  – Modification required to County Special Use Permit

• **BOP Engineering**
  – Award for BOP engineering has been made
  – Contract negotiation is proceeding
Project Management/Coordination

• Project Management Plan
  – Phase 1 – Feasibility Study, Permitting and BOP Engineering Design
  – Phase 2 – Procurement, Installation, and Commissioning of Equipment
  – Phase 3 – Operation and Maintenance

• Schedule
  – Phase 1 – Oct 2010
  – Phase 2 – COD expected 15-18 months from NTP
  – Phase 3 – Perform O&M, Report Non-Proprietary Data for 2 Years

• Spending Plan
  – Phase 1 - $359,900
  – Phase 2 - $14,974,728
  – Phase 3 - $150,000
Future Directions

• Execute Supply Contract – June 2010
• Award BOP Engineering Contract – June 2010
• Award Construction Contract – September 2010
• Perform Mechanical/Electrical Plant Tie-ins – October 2010 Outage
• Complete Foundations – July 2011
• Equipment Delivered to Site – September 2011
• Complete Construction, Commission, and Test – October 2011
• Ongoing O&M, DOE Reporting, and Brine Chemistry Monitoring – thru October 2013
Project Summary

• Extraction of Waste Heat From 223F Geothermal Brine

• New Injection Temperature 170F With No Scaling Expected

• 5.6 MW Renewable Energy Added With No Additional Geothermal Resource

• No Water Needed; 100% Air Cooled

• Minimal Impact on Air Permit