

High-potential Working Fluids for Next Generation Binary Cycle Geothermal Power Plants

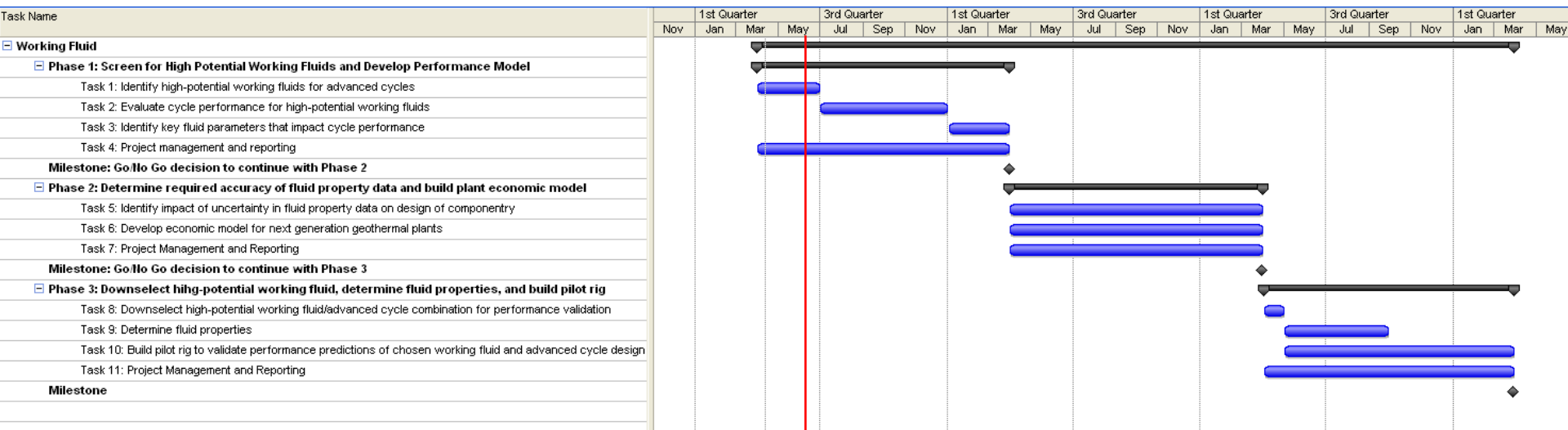
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Specialized Materials and
Fluids and Power Plants

- 3-Phase, 3-Year Effort - \$3.75M total, including 20% cost share by GE
 - **Timeline**
 - Project start date – January 29th, 2010
 - Project end date – February 28, 2013
 - Percent complete – 3%
 - **Budget**
 - Total project funding = \$3.75M, DOE share = \$3.0M, Awardee share = \$0.75M, Funding for FY10 = \$0.69M (\$0.55M DOE)
 - **Barriers – N: Energy Conversion at Low Temperature**
 - **Partners – AltaRock Energy, Inc.**



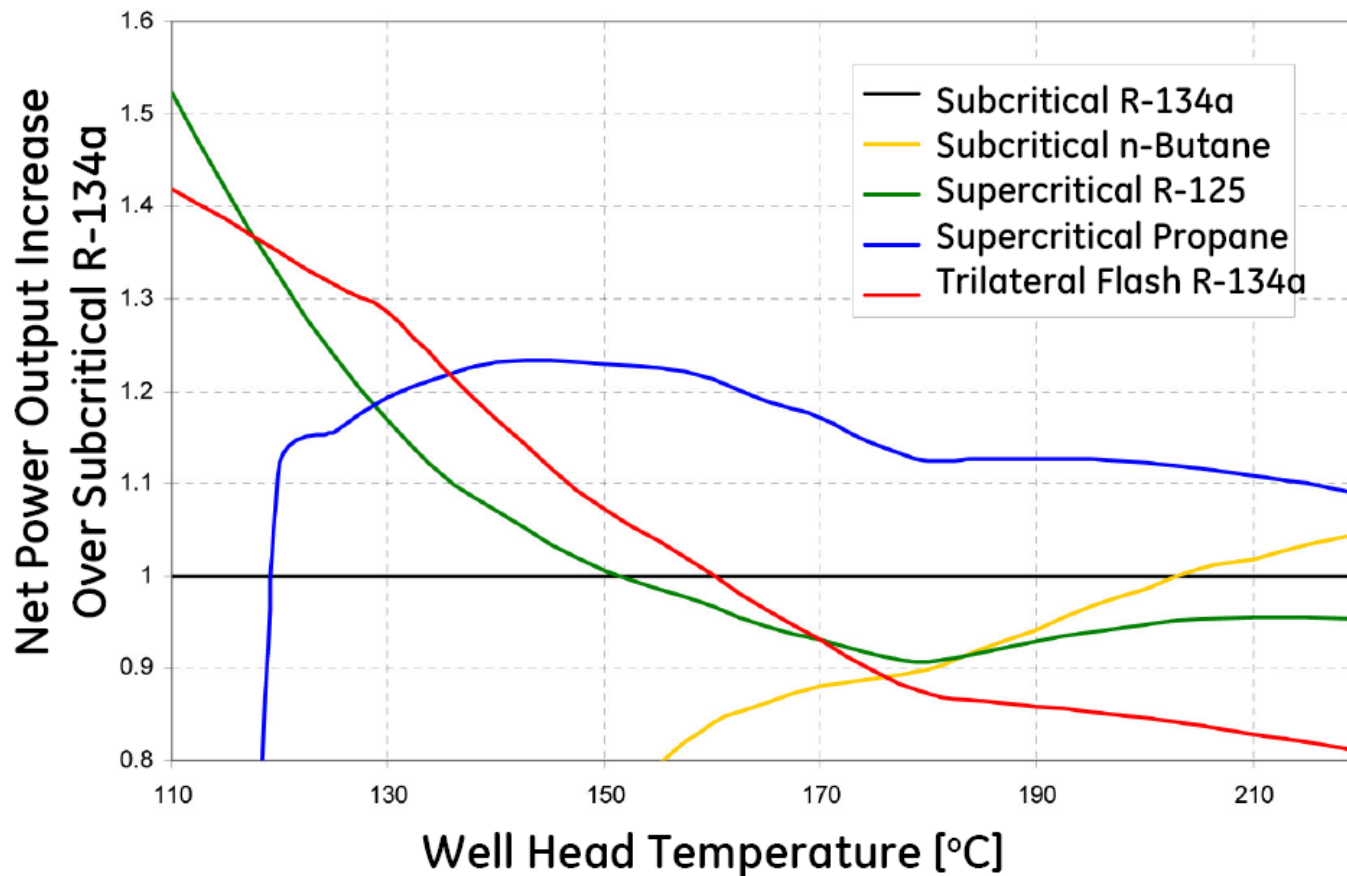
- EGS wells deeper – more costly
- Invest more into energy conversion unit to lower overall cost
- Evaluate combinations of high-potential working fluids / advanced cycles
- Find cost optimum for drilling vs. power conversion cost

Overall Objective: Find optimized working fluid/advanced cycle combination for EGS applications

Three-phase Approach:

- 1: Identify high-potential working fluids. Develop thermo physical model predicting net power output for high-potential working fluids. Document impact of key fluid properties.
Milestone - GO/NO GO March 2011
- 2: Identify technology gaps. Determine required fluid property accuracy for reliable component design. Develop integrated thermo economic cost model and predict cost for different fluids/cycles including drilling cost.
Milestone - GO/NO GO March 2012
- 3: Down select working fluid / cycle for potential EGS site. Improve fluid knowledge if necessary. Build and design pilot scale rig for validation
Milestone - Complete February 2013
- Whenever possible use existing GE expertise and technology.

- Assembling Fluid Database
- Field Trip / Kick-off with AltaRock



Find optimized working fluid/advanced cycle combination for EGS applications and demonstrate predicted performance in pilot-scale rig by February 2013.

Planned activities in remainder of FY 2010 and 2011

- Complete Phase 1:
 - Identify high-potential fluids
 - Test high-potential fluids in thermo physical models for advanced cycles
 - Milestone - **GO/NO GO March 2011**
- Begin Phase 2:
 - Identify technology gaps.
 - Determine required fluid property accuracy for reliable component design.
 - Develop integrated thermo economic cost model

- Objective: Find optimized working fluid/advanced cycle combination for EGS applications
- 3-year, \$3.75M effort
- Project commenced on April 1st, 2010
- Phase 1 to be completed March 31st, 2011
 - Identify high-potential working fluids
 - Develop thermo physical model predicting net power output for high-potential working fluids
 - Document impact of key fluid properties

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