Newberry Geothermal Energy: A Candidate Site for the DOE FORGE

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• DOE initiative to develop a national site for EGS research and development

• FORGE’s mission is to enable cutting-edge research, drilling, and technology testing, as well as to allow scientists to identify a replicable, commercial pathway to EGS.

• Strong focus on initiating and sustaining fracture networks in basement rock
Phases of FORGE

• Phase 1
  • Idaho National Laboratory- Snake River Plane, ID
  • Sandia National Laboratory- Fallon, NV
  • Sandia National Laboratory and US Navy- West Flank of Coso, CA
  • University of Utah- Milford, UT
  • Pacific Northwest National Laboratory- Newberry Volcano, OR
  • Presentations to DOE in early June

• Phase 2
  • Maximum of 3 sites

• Phase 3
  • Final FORGE site
  • Implementation
Newberry Geothermal Energy (NEWGEN) FORGE

- Consortium of partners
  - Pacific Northwest National Laboratory
  - Oregon State University
  - AltaRock Energy, Inc.
  - GE Global Research
  - Statoil

- Extended consortium
  - Academic
  - Industry
  - Government

Blade Energy, Inc., Cascade Volcano Observatory (USGS), Cornell University, Lawrence Livermore National Laboratory, Paulsson, Inc., Stanford University, University of Oregon
The NEWGEN FORGE Core Team

• Pacific Northwest National Laboratory- project lead
  – High-performance computing, high T/P geochemistry, materials development, large project management

• Oregon State University
  – Leading geosciences program, faculty knowledge of alternative energy and geophysics, extensive research facilities, large project management

• AltaRock Energy, Inc.
  – Full-service geothermal energy company with industry experience in greenfield development, stimulation technology, and wellfield management. Field experience at Newberry EGS Demonstration.

• GE Global Research
  – Hub of GE technology development with broad energy portfolio. Focus on delivering cleaner, more efficient solutions to every part of energy sector

• Statoil
  – International energy company with operations in 37 countries, 22,000 employees, and over 40 years of experience in oil and gas technology
The NEWGEN FORGE Site

- 40+ years of existing background data from exploration and research

- Entire area meets FORGE standards for temperature and permeability at depth
  - 1750-2250 m, 175-225 °C

- Three existing well pads

- Two existing 10,000 ft deep hot, dry wells
The NEWGEN FORGE Site

- **Pad-29**
  - Five acre gravel pad
  - Existing injection well and EGS reservoir
  - Existing sump
  - Productive water well on pad

- **Pad-16**
  - Five acre gravel pad
  - 11,599 ft hot dry well
  - CO2 cap with up to 550 psi WHP
  - Productive water well on pad
  - Existing sump

- **Pad-17**
  - 5 acre gravel pad
  - 800 ft TG well with seismic monitoring
Conceptual Geologic Model

- Combine 40+ years of data from exploration and research
  - Geology
  - Hydrology
  - Seismology
  - Geophysics (MT, gravity)
  - Light Detection and Ranging (LiDAR)

- Model in EarthVision software
  - Hosted at PNNL
  - Remote access available
Research at NEWGEN FORGE

• Interested parties submit R&D proposals to NEWGEN team
  – Safety and transparency are primary importance

• Science Technology Analysis (STAT) Team selects projects
  – STAT: 30% DOE appointed proposal review team
  – Must maintain permit compliance
  – Fulfill Environmental, Safety and Health requirements
  – Technical reviewer and NEWGEN Directors and Core Capability teams comments

• Data dissemination and sharing plan
  – Timely release of data as appropriate considering IP rights & project participants
  – National Geothermal Data System
Environmental, Safety and Health at NEWGEN FORGE

- Comprehensive ES&H Plan being developed
- Induced Seismicity Mitigation Plan
  - Proposed expansion of MSA up to 23 stations
  - Magnitude and depth limits
- Environmental Monitoring
  - Groundwater protection
  - Invasive weed management
Benefits and Support

- NEWGEN supporters
  - US Senators Jeff Merkley and Ron Wyden
  - Oregon Governor Kate Brown
  - Oregon Department of Energy
  - Economic Development for Central Oregon
  - Deschutes County Board of County Commissioners
  - Bend City Council
  - Bend Chamber of Commerce
  - City of La Pine
  - La Pine Chamber of Commerce
  - Sunriver HOA
Benefits and Support

• FORGE funding breakdown
  – Phase I: $2M split among 5 teams
  – Phase II: $29 M split among up to 3 teams
  – Phase III: funding subject to appropriations

• Research focused on improving EGS success
  – Advance EGS technology to compete with wind, solar, and fossil fuel power sources
  – Reduce cost of deployment
  – Improve ROI, encourage investment in EGS

• Benefits to Central Oregon
  – Jobs- construction, maintenance, operations
  – Visiting scientists will utilize local housing, restaurants, entertainment
Community Engagement

• Community outreach and education
  – Provide speakers for local events
  – Presentations to academic, industry and research groups
  – Staff booths at local festivals

• Encourage student engagement
  – Research projects
  – Internships
  – Field trips

• Information
  – Website
  – Blog
  – Facebook
  – Twitter
  – Community events
Summary

• NEWGEN is one of five sites competing to be selected for FORGE

• Consortium of partners with extensive knowledge in geothermal technologies, industry, practices, and project management

• NEWGEN has significant advantages for EGS R&D
  – Extensive site characterization
  – EGS reservoir already successfully created
  – Range of pad and well conditions will allow multiple projects at one time
  – Existing permits and infrastructure
  – Close access to competent local contractors and service providers
  – Supportive and engaged local community
  – DOE and AltaRock have already invested significantly at Newberry
Information

• NEWGEN FORGE Website  www.newberrygeothermal.com

• NEWGEN FORGE Blog  www.blog.newberrygeothermal.com

• NEWGEN FORGE Facebook  www.facebook.com/newberryEGS

• NEWGEN FORGE Twitter  @NewberryEGS