DOE CSP R&D:
Component Award Overview

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Component Breakdown

- Collectors
  - Abengoa – Development of a next-generation parabolic trough collector
  - Alcoa – Parabolic trough system design
  - SkyFuel – Commercial development of an advanced linear Fresnel
  - Solar Millennium – Advanced high-temperature trough collector development

- Reflectors
  - 3M – Cleanable and hardcoat coatings for silvered polymeric mirrors
  - Abengoa – Development of an advanced polymeric reflector
  - PPG Industries – High performance reflector panels

- Engines
  - Brayton – Brayton solar power conversion system
  - Infinia – 30-kW maintenance-free Stirling engine

- Receivers
  - PWR – Solar power tower receiver development
Abengoa Solar
Development of a next-generation parabolic trough collector

Description
• The project aims to reduce the cost of collector technologies that could be deployed in the US in the 2010-2013 time frame (short-term), and employ innovative approaches to developing the next generation of lower-cost parabolic trough technologies (mid-term).

Innovative features
• The Phoenix parabolic trough near-term advanced design
  • Aluminum space frame design
  • Larger aperture width
  • Fewer parts, improved manufacturing, quicker assembly and installation
• Lower cost structure designs
  • Steel space frame or torque tube
  • Blue sky concepts
  • Reflective films

Progress
• The Phoenix Gen2 has been integrated into Xcel Cameo Power Plant (Palisade, CO)
  • Eight collectors, each 150 meters long
  • The first CSP/coal integrated plant (would offset ~900 tons of coal/year)
• The Phoenix Gen3 will be used in Abengoa’s Solana project (Gila Bend, AZ)
  • 280MW CSP power plant (will be the largest solar power plant in the world)
  • Set to break ground in 2011

Resources
• Total Project: $14.0M
  • DOE Funds: $7.2M
  • Cost Share: $6.8M
Solar Millennium
Advanced high-temperature trough collector development

Description
• The project aims to develop an advanced geometry parabolic trough collector, the HelioTrough. The HelioTrough has three primary goals: higher performance, lower cost, and the potential to operate with a molten salt heat transfer fluid.

Innovative features
• Heliotrough parabolic trough development
  • Torque tube design
  • Counterweights (making the torque tube the center of gravity)
  • Larger aperture, receiver diameter, SCE length
  • Fewer drives, foundations, wiring, etc.

Progress
• A HelioTrough Demonstration Loop has been built at SEGS V (Kramer Junction, CA)
  • Four collectors, each 190 meters long
  • Included alignment jigs
  • Commissioned in December 2009
  • Will incorporate molten salt into test loop
• The HelioTrough will be used in Solar Millennium’s upcoming US projects
  • Amargosa 1 & 2: combined 484MW; Nye County, NV; 2011
  • Blythe Solar Project: combined 1GW; Blythe, CA; 2013
  • Ridgecrest Solar Project: 250MW; Ridgecrest, CA; 2013
  • Palen Solar Project: combined 500MW; Desert Center, CA; 2013

Resources
• Total Project: $5.9M
  • DOE Funds: $3.3M
  • Cost Share: $2.6M
Description
• The project aims to develop and commercialize large-area second-surface mirrors that are superior in value, in terms of cost and performance, to existing mirrors available on the market.

Innovative features
• Low iron glass substrate
• Thick silver layer reflective coating
• Encapsulation layers
  • Organic (for mechanical protection)
  • Inorganic (for chemical protection)
• Low-cost fabrication process

Progress
• Production run of solar mirror glass in April 2010
  • 1,320 pieces, totaling ~133,500 ft²
  • Produced for Compact Linear Fresnel Reflector (CLFR) solar system

Resources
• Total Project: $3.6M
  • DOE Funds: $2.2M
  • Cost Share: $1.4M
Pratt & Whitney Rocketdyne
Solar power tower receiver development

Description
• The project aims to develop a molten salt central receiver through the design, fabrication, and testing of a sub-scale large receiver. Manufacturability of large-scale receivers and cost effectiveness will be validated.

Innovative features
• Advanced, high-temperature tube materials
• New tube-to-structure clip system
• Higher performance insulation system
• More efficient manufacturing and assembly processes

Progress
• In the process of finalizing design details, analysis, and drawing creation
• In the process of requesting and receiving quotes from vendors
• Prototype receiver will be tested at Sandia facility
• Central receiver will be incorporated into future Solar Reserve tower designs

Resources
• Total Project: $2.9M
  • DOE Funds: $1.9M
  • Cost Share: $1.0M