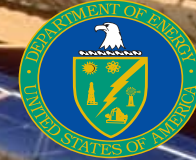


Parabolic Trough Technology Development

Hank Price, Mark Mehos, Chuck Kutscher

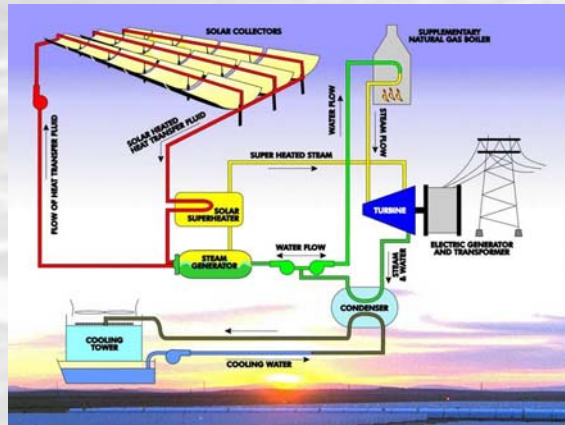
National Renewable Energy Laboratory
Golden, CO 80401



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Parabolic Troughs Solar Power Plants



Parabolic Trough Solar Power Plants

Parabolic troughs currently represent the most cost-effective solar technology for developing large utility-scale solar electric power systems. These systems are also one of the most mature solar technologies, with commercial utility-scale plants that have been operating for over 20 years. Parabolic-trough solar-concentrator electrical generation systems use curved (parabolic shaped), sun-tracking mirrors to focus sunlight on a vacuum insulated receiver at the focus of the parabolic mirrors. A heat-transfer fluid is heated as it passes through the receiver and then is sent to a heat exchanger to generate high-pressure superheated steam. The steam is used to power a conventional Rankine cycle steam turbine/generator, which produces electricity.

Program Goal:

Develop parabolic trough power plant technologies that will be able to compete cost competitively with conventional fossil power technologies as dispatchable intermediate load generation in the wholesale bulk-power market (COE 6 – 8 ¢/kWh).

Technology Areas:

- ▶ **Solar Field**
 - Receiver Technology
 - Concentrator Development
- ▶ **Thermal Energy Storage**
 - Advanced Heat Transfer Fluids
 - High Temperature Molten-Salts
- ▶ **Power Plant Technology**
 - Solar Optimized Power Cycles
 - Dry Cooling
 - O&M Cost Reduction
- ▶ **Systems Integration & Testing**
 - Model Development
 - Testing
 - Analysis

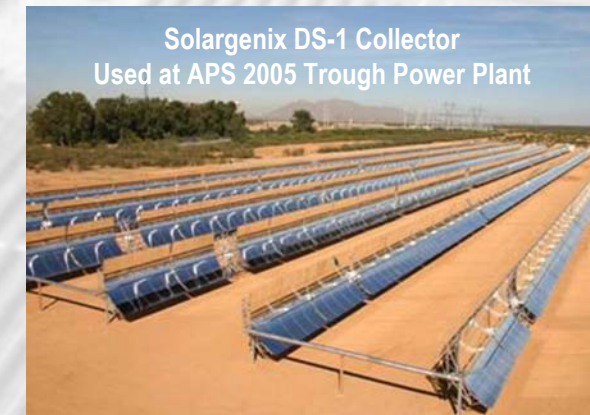
Parabolic Trough Rankine Cycle Power Plant



Recent Parabolic Trough Concentrator Development



New Solargenix SGX-1 collector developed during 2005



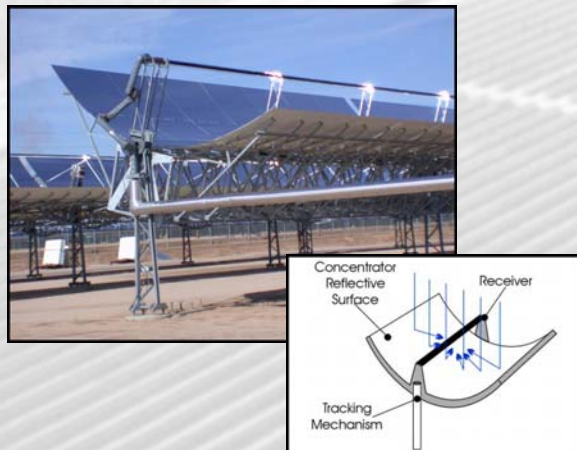
New Gossamer Organic Hub System



- SGX-1 Collector:**
- Gossamer organic hub
 - 50% fewer parts than DS-1
 - 30% lighter
 - 1/3 time required for field assembly
 - Uses low-cost extruded parts
 - No alignment of mirrors required
 - Simple drilling jigs provide high tolerances

SGX-1 is being used in Nevada Solar One Plant

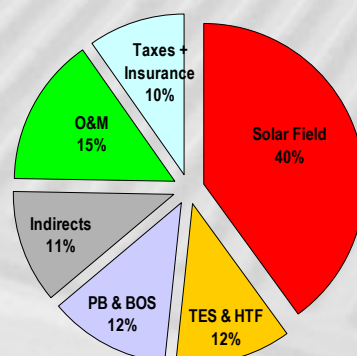
How it works.



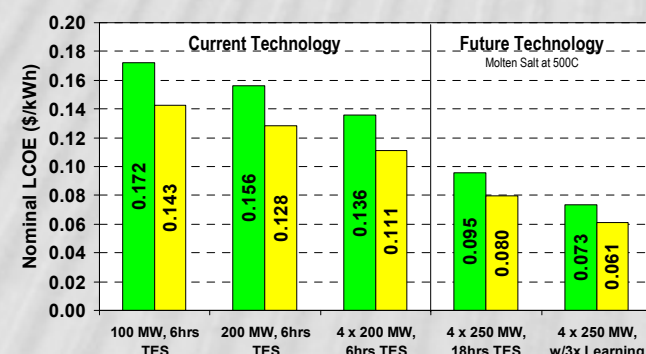
Parabolic Trough Solar Technology



Breakdown of LEC
for 100 MWe System in Barstow, CA



The Cost of Solar Power



2006 Nexant Study:
Optimum Size ~200MWe
For Current Technology

