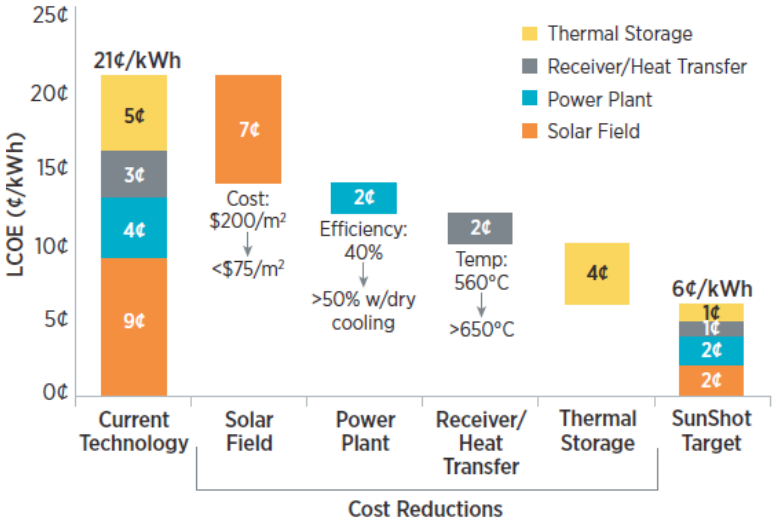
National Laboratory Concentrating Solar Power Research and Development

Motivation

The U.S. Department of Energy (DOE) launched the SunShot Initiative as a collaborative national endeavor to make unsubsidized solar energy cost competitive with other forms of energy on the grid by the end of the decade. Significant cost and performance improvements across all major concentrating solar power (CSP) subsystems—solar fields, power plants, receivers, and thermal storage—are necessary to achieve the SunShot cost goal of $0.06/kWh.



Program Description

The National Laboratory CSP Research and Development program addresses the technical barriers toward achieving the technoeconomic targets of the SunShot Initiative. The multi-year projects are funded based on a competitive proposal process. In addition to R&D projects, the program also funds core capabilities at Sandia National Laboratories (SNL) and the National Renewable Energy Laboratory (NREL). The National Laboratory CSP Research and Development program supports 12 different projects, including core capabilities, at 6 DOE national laboratories, for an anticipated investment of approximately $30 million over three years. The projects will develop technologies spanning near-term to long-term and applicable to dish, trough, linear Fresnel, and tower systems.

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Low-Cost Heliostat for Modular Systems
Principal Investigator: Dr. Chuck Kutscher ◊ NREL ◊ Project Period: 2012–2015

Direct s-CO_2 Receiver Development
Principal Investigator: Mike Wagner ◊ NREL ◊ Project Period: 2012–2015

Degradation Mechanisms and Development of Protective Coatings for TES and HTF Containment Materials
Principal Investigator: Dr. Judith Gomez ◊ NREL ◊ Project Period: 2012–2015

System Advisor Model Enhancements for CSP (Core Capability)
Principal Investigator: Ty Neises ◊ NREL ◊ Project Period: 2012–2015

Sandia National Laboratories

High-Temperature Solar Selective Coating Development for Power Tower Receivers
Principal Investigator: David Gill ◊ SNL ◊ Project Period: 2012–2015

Dish/Stirling High-Performance Thermal Storage
Principal Investigator: Chuck Andraka ◊ SNL ◊ Project Period: 2012–2015

DOE National Solar Thermal Test Facility (Core Capability)
Principal Investigator: Cheryl Ghanbari ◊ SNL ◊ Project Period: 2012–2015

Fundamental Corrosion Studies in High-Temperature Molten Salt Systems for Next-Generation CSP Systems
Principal Investigator: Dr. Brenda Garcia-Diaz ◊ SRNL ◊ Project Period: 2012–2015

Low-Cost Metal Hydride Thermal Energy Storage System for CSP Systems
Principal Investigator: Dr. Ragaiy Zidan ◊ SRNL ◊ Project Period: 2012–2015

High-Efficiency Thermal Energy Storage System for CSP
Principal Investigator: Dr. Dileep Singh ◊ ANL ◊ Project Period: 2012–2015

High-Temperature Thermal Array for Next Generation Solar Thermal Power Production
Principal Investigator: Dr. Steve Obrey ◊ LANL ◊ Project Period: 2012–2015

Low-Cost Self-Cleaning Reflector Coatings for CSP Collectors
Principal Investigator: Dr. Scott Hunter ◊ ORNL ◊ Project Period: 2012–2014

Innovation

By innovating the next generation of CSP technologies, this program will lead to subsequent system integration, engineering scale-up, and eventual commercial production for this renewable and dispatchable electricity generation application. Achieving the SunShot cost target is projected to result in the cumulative installation of approximately 28 gigawatts of CSP by 2030, which would be able to meet about 3% of the total U.S. annual demand.

Contacts and Information

Joseph Stekli, Technology Development Manager ◊ joseph.stekli@ee.doe.gov
Ranga Pitchumani, Director, Concentrating Solar Power ◊ ranga.pitchumani@hq.doe.gov

More information is available at
www.solar.energy.gov/sunshot/csp_lab_rnd.html

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