

SETO CSP Program Summit 2019



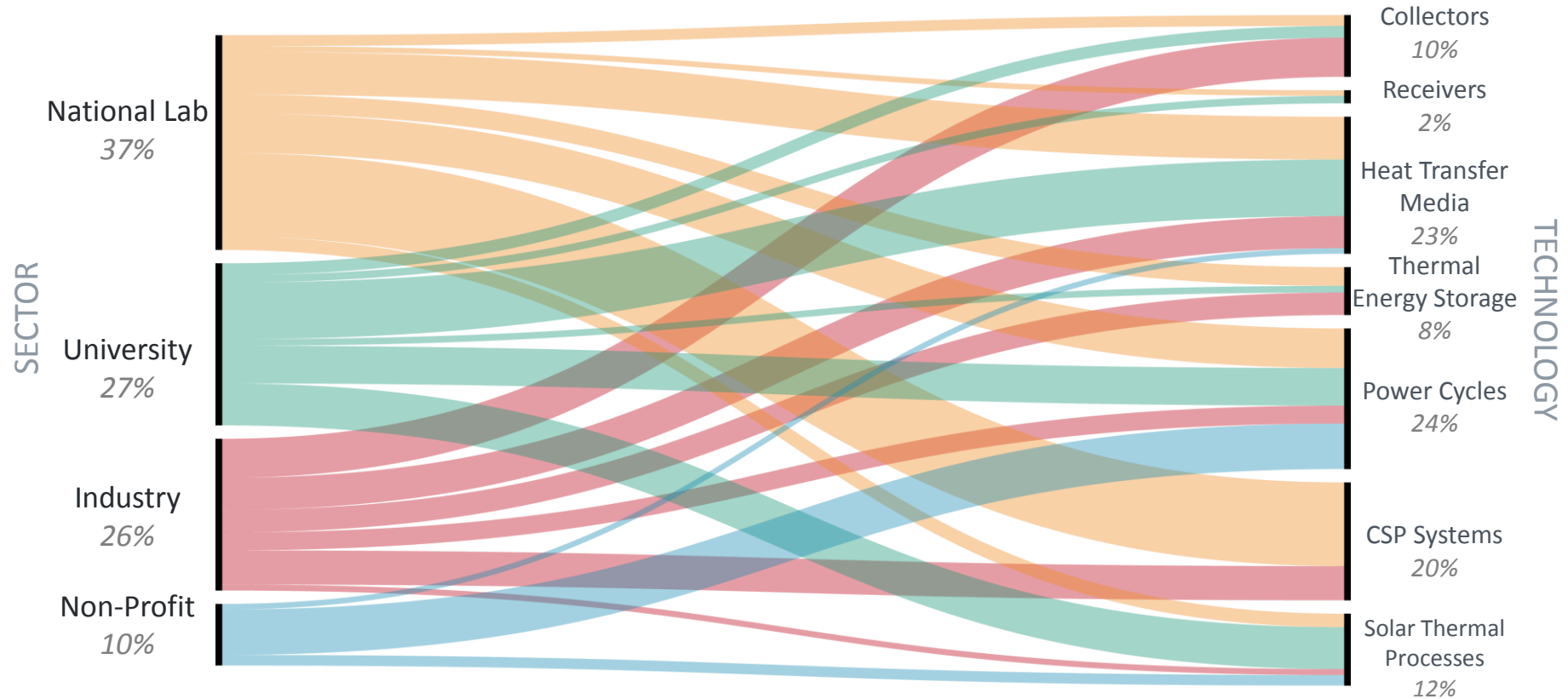
energy.gov/solar-office

Concentrating Solar Thermal Power DOE Program Overview

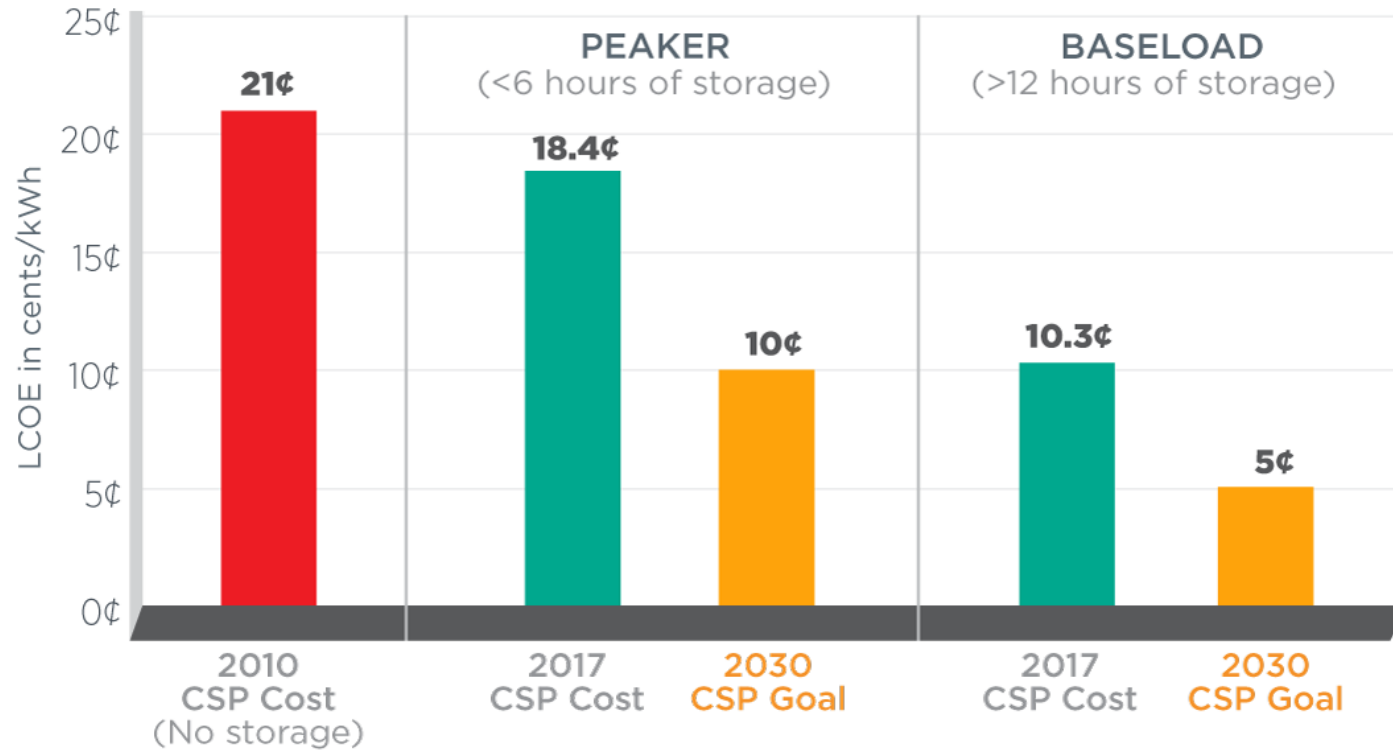
SETO CSP Program Summit 2019
March 18, 2019

Dr. Avi Shultz, Program Manager

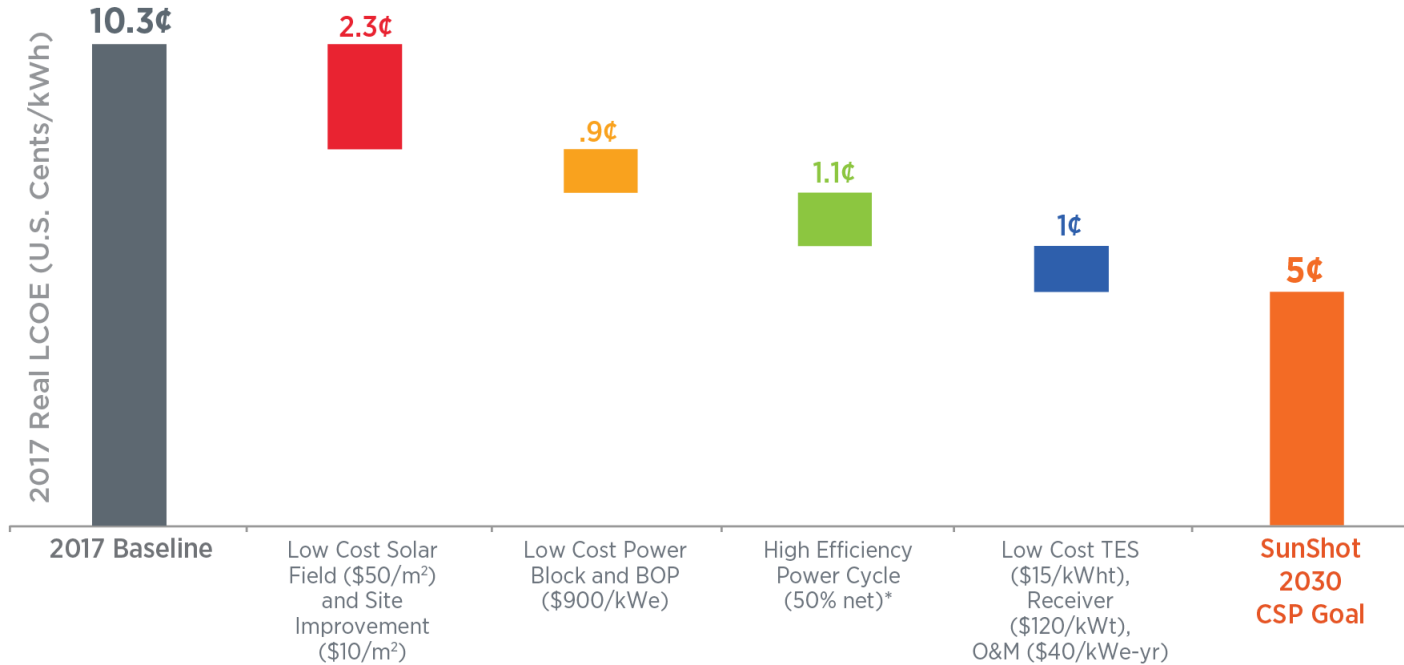
CSP Awardee Breakdown by Funding



2030 DOE Levelized Cost of Electricity Targets

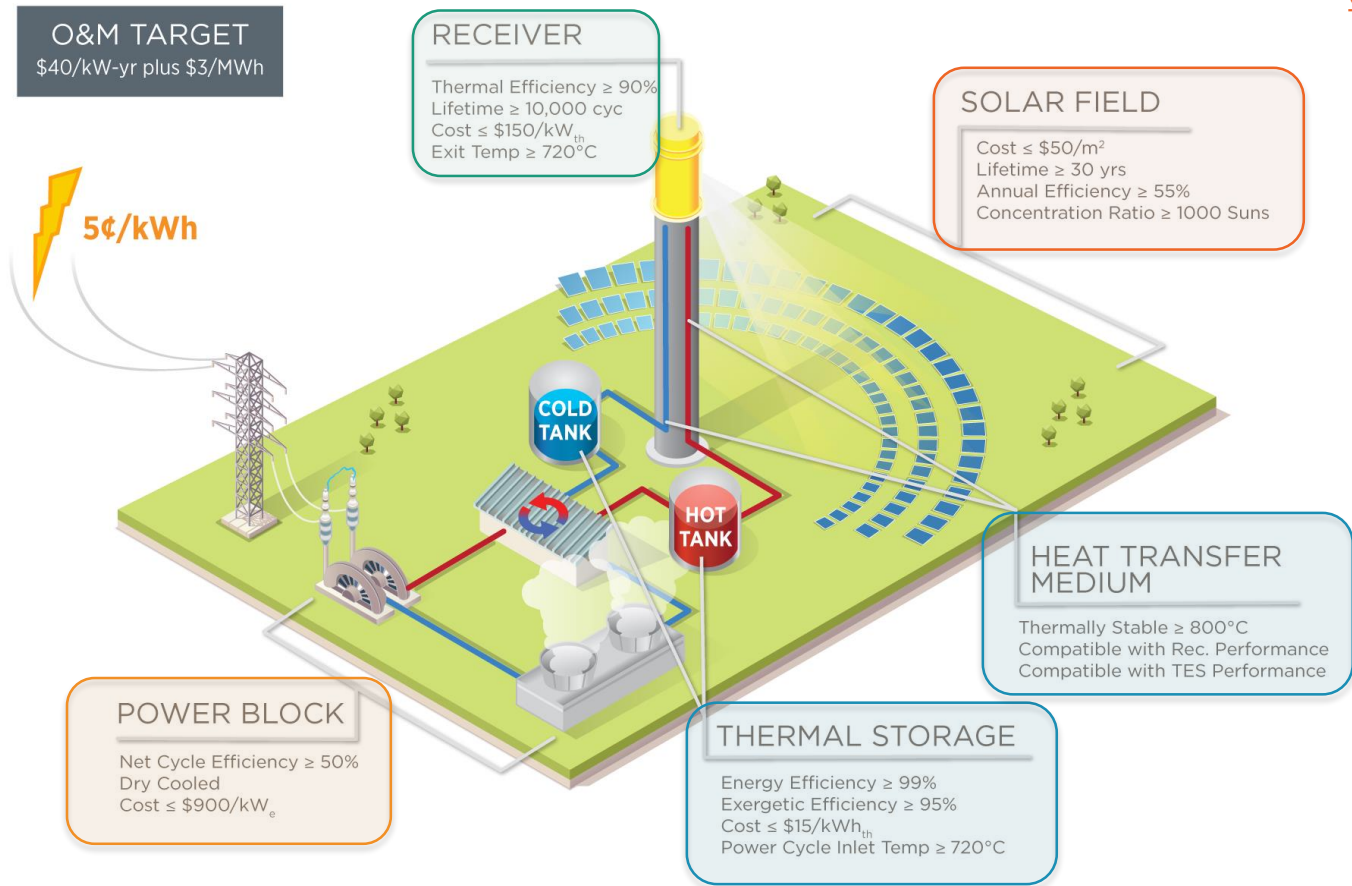


A Pathway to 5 Cents per KWh for Baseload CSP



*Assumes a gross to net conversion factor of 0.9

CSP Program Technical Targets



Collector Field

- Optical Physics
- Structural design and dynamics
- Manufacturing and automation
- Sensors and control

Receivers

- Optical properties
- Coatings
- High temperature materials
- Chemistry
- Heat Transfer, Fluid Mechanics

TES and HTF

- Chemistry
- High temperature materials
- Materials Science
- Heat Transfer, Fluid Mechanics

Power Block

- High temperature materials
- Turbomachinery
- Manufacturing and automation
- Sensors and control

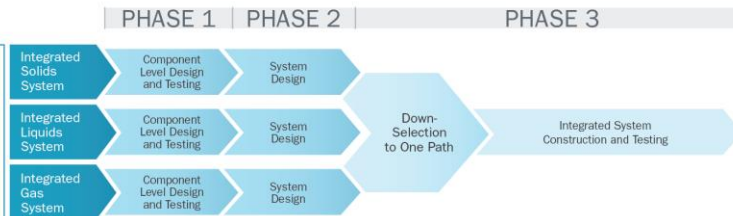
Gen3 CSP: Raising the Temperature of Solar Thermal Systems

$$\eta = 1 - \frac{T_C}{T_H}$$



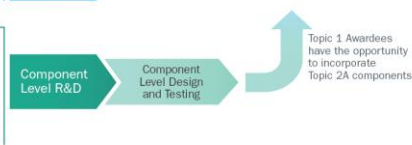
TOPIC 1

- Sandia National Laboratories
- National Renewable Energy Laboratory
- Brayton Energy



TOPIC 2A

- Brayton Energy
- Hayward Tyler
- Massachusetts Institute of Technology (x2)
- Mohawk Innovative Technology
- Powdermet
- Purdue University



TOPIC 2B

- Electric Power Research Institute
- Georgia Institute of Technology (x2)
- Rensselaer Polytechnic Institute
- University of California, San Diego
- University of Tulsa



Next Generation CSP will Leverage Next Generation Power Cycles



Supercritical CO₂: a dense, compressible fluid

- Compact turbomachinery
- Good compatibility with dry cooling
- Fewer loss mechanisms and parasitics

10 MW_e STEP Test Facility

- \$100 M Program managed by FE begun in 2017
- Awarded to Gas Technology Institute, facility located at Southwest Research Institute
- Capable of testing all components of Cycle Integrated with controls & instrumentation
- Resolve issues common to multiple potential heat sources
- Reconfigurable facility capable of 700 °C and 300 bar operation

Solar Process Heat and Solar Desalination

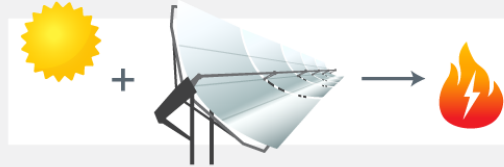
TOPIC AREA 1:

Innovations in thermal desalination technologies

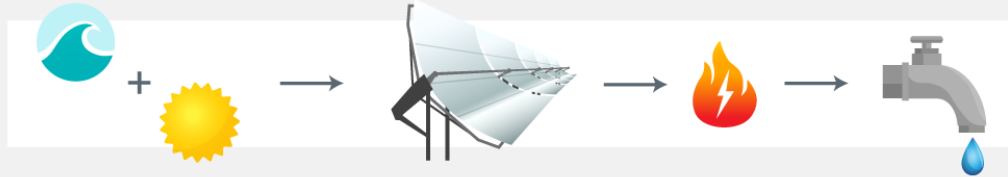


TOPIC AREA 2:

Low-cost solar thermal heat



TOPIC AREA 3: Integrated solar desalination systems



TOPIC AREA 4: Analysis for solar thermal desalination

- Total federal funds awarded: \$21,000,000
- 14 selected projects began in Fall 2018
- Technical targets:
 - Increase thermal efficiency of desalination
 - Reduce Levelized Cost of Heat to $\leq 1\text{¢/kWh}_t$
 - Achieve Levelized Cost of Water $\leq 50\text{¢/m}^3$

Recent Request for Information

- **Category 1: CSP with Long-Duration Thermal Energy Storage** – is it possible to extend CSP capacity to weekly and seasonal storage?
- **Category 2: CSP Coupled with Pumped Thermal Energy Storage** – can CSP with TES look more like PV+Batteries?
- **Category 3: Materials and Manufacturing for CSP** – how can CSP best benefit from advanced manufacturing technologies?
- **Category 4: Autonomous Solar Collector Fields** – can solar collector performance and O&M simplified by maximizing autonomy of the system?

SETO CSP Team

Technology Managers



Mark Lausten, PE
On contract from
Allegheny S&T



Levi Irwin, PhD
On contract from Mantech



Matt Bauer, PhD



Andru Prescod, PhD, MBA
On contract from Mantech



**Rajgopal 'Vijay'
Vijaykumar, PhD**



Shane Powers
On contract from Mantech

Technical Project Officers



Christine Bing, MBA, PMP



Christian Philipsen

Financial Project Analyst Operations



Patty Clark, MBA, PMP
On contract from Allegheny S&T



Meisha Baylor
On contract from Red Horse

Science & Technology Policy Fellowship Opportunity

- Play an integral role in establishing and implementing new projects and initiatives to make solar energy more affordable and reliable.
- Learn about the federal government and its role in advancing science and technology.

Design and implement national R&D strategies for:

- Photovoltaic Technology
- Concentrating Solar Power Technology
- Technology to Enable better Solar Integration with the Grid

Eligibility:

- The opportunity is available to highly talented scientists and engineers holding bachelor's, master's, or Ph.D. degrees of all quantitative backgrounds as well as applicants with relevant post-degree experience.



Applications are accepted on a rolling basis with two annual review dates:

January 15 | June 15



For additional information or to apply:

VISIT: <https://www.zintellect.com/Posting/Details/3603>

EMAIL: DOE-RPP@orau.org

CSP Review Overview

- Monday, March 18
 - 3:45 PM – 6 PM: Poster Session and Networking
- Tuesday, March 19
 - 8:30 AM – 10 AM: Gen3 CSP Panel and Discussion
 - 10:30 AM – 12 PM: Molten Salts; Particle Technologies; Desalination Collectors and Systems
 - 12:00 PM – 2 PM: Lunch and Poster Sessions
 - 2 PM – 3:30 PM: Components for Gen3; Thermal Energy Storage; Desalination
 - 4 PM – 5:30 PM: Metals and Materials; Power Cycles; Collectors

U.S. DEPARTMENT OF
ENERGY

Office of ENERGY EFFICIENCY
& RENEWABLE ENERGY

SOLAR ENERGY TECHNOLOGIES OFFICE

CSP PROGRAM SUMMIT **2019**