

High-Temperature Falling Particle Receiver Project Overview

SAND2015-8639PE

*Exceptional service
in the national interest*



Contributors:

Sandia National Laboratories
Georgia Institute of Technology
Bucknell University
King Saud University
German Aerospace Center (DLR)

Clifford K. Ho

Concentrating Solar Technologies
Sandia National Laboratories

SAND2015-XXXX (contents from 7383 PE)

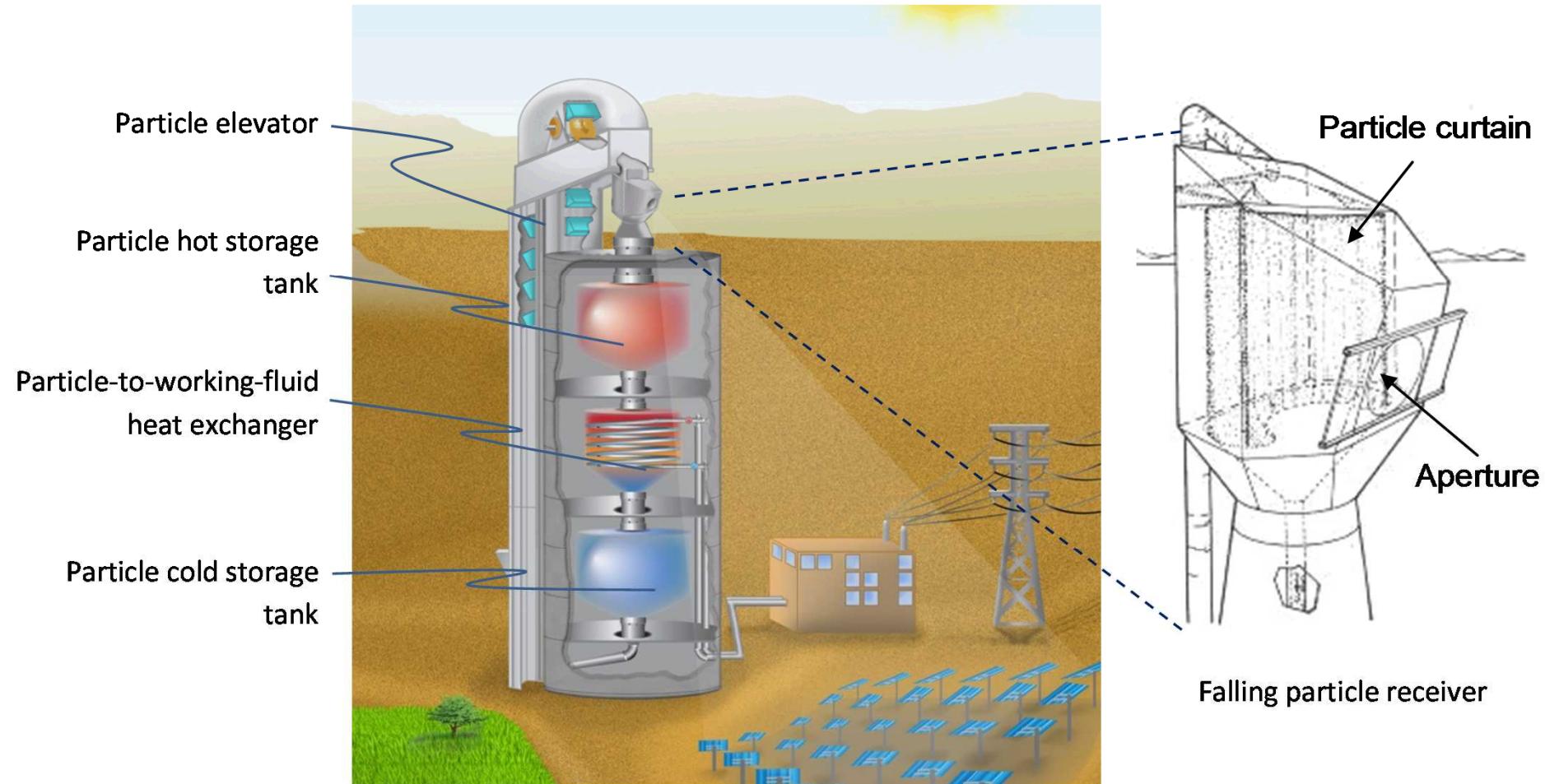


Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.



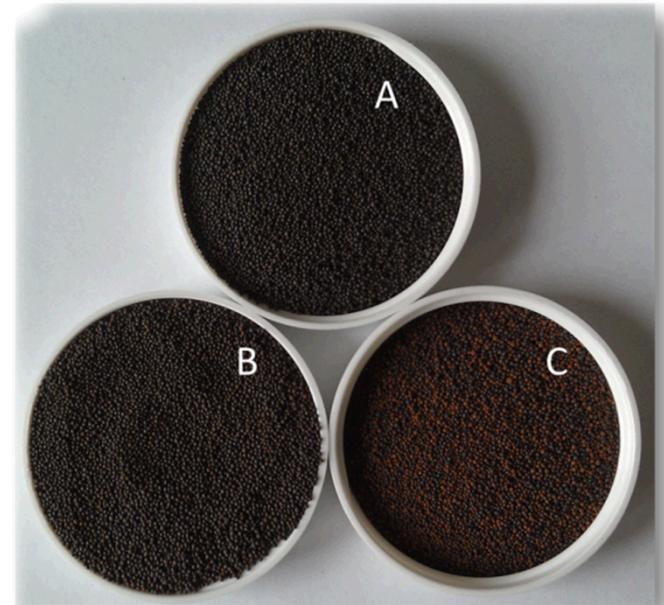
High Temperature Falling Particle Receiver

(DOE SunShot Award FY13 – FY15)



Advantages of Particle Receivers

- Direct heating of particles
 - Higher temperatures than conventional molten salts
 - Enable more efficient power cycles
 - Higher solar fluxes for increased receiver efficiency
- Direct storage of hot particles
 - Reduced costs

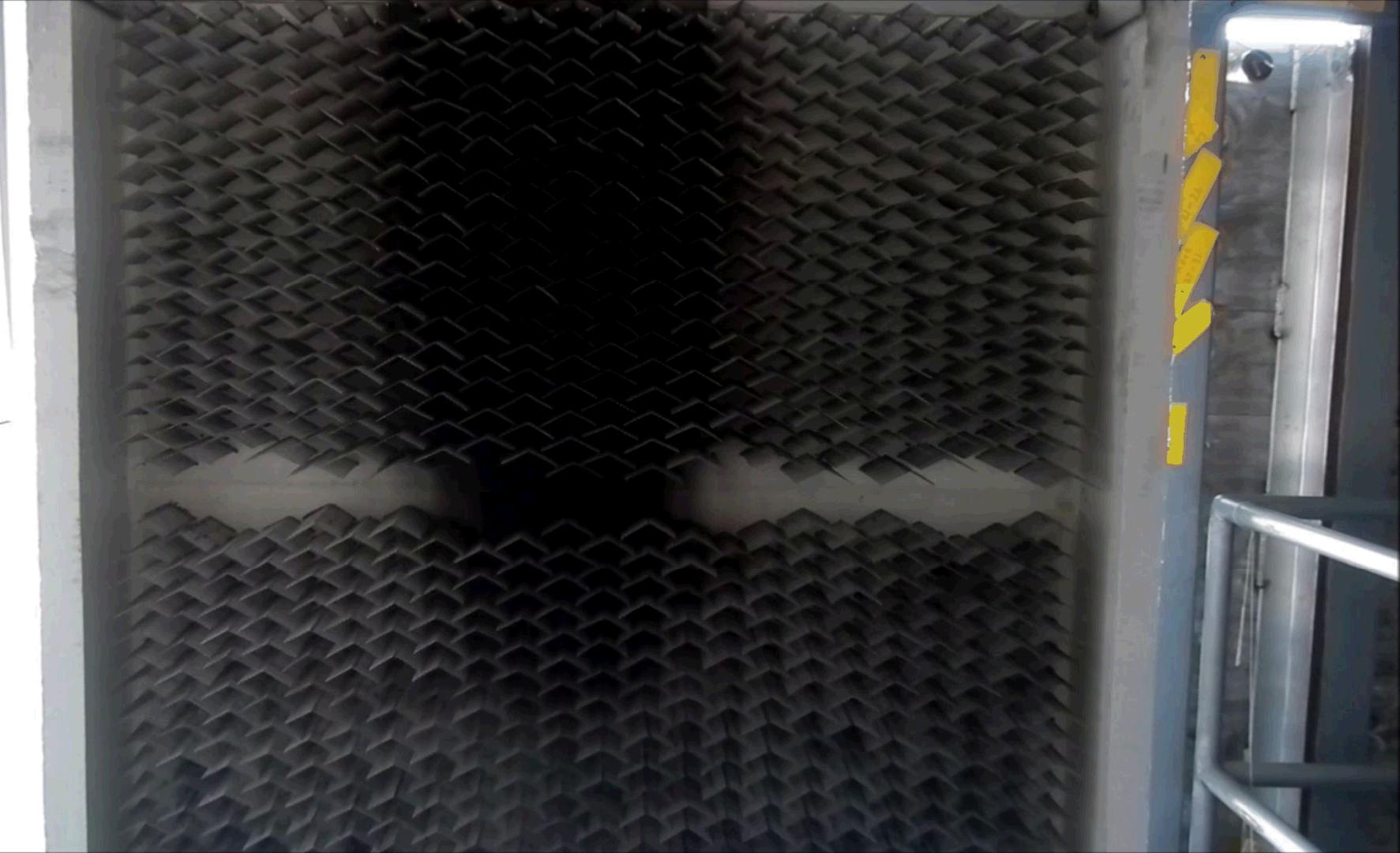


CARBO ceramic particles (“proppants”)

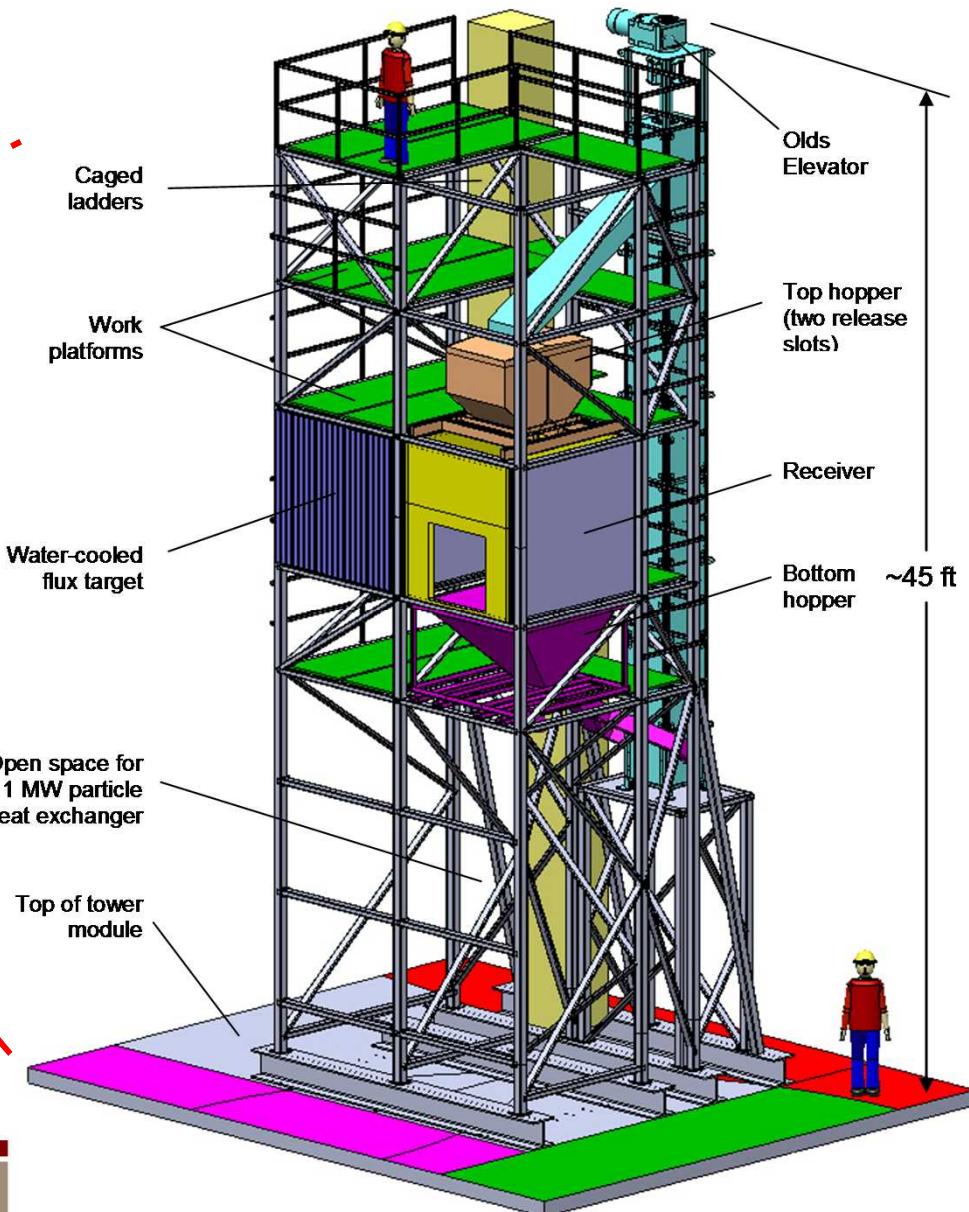
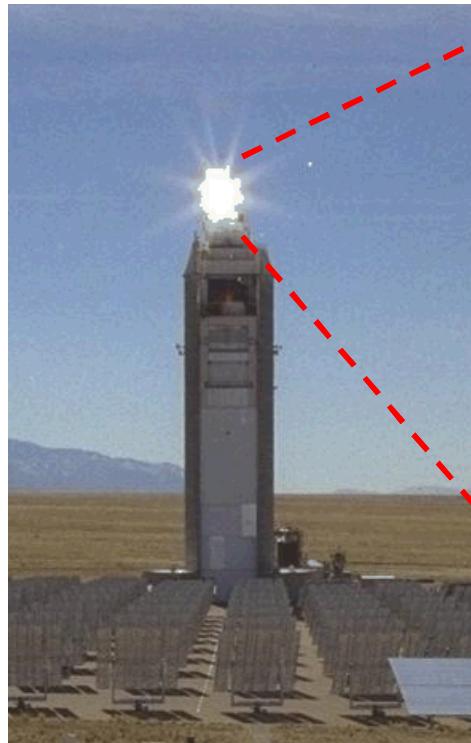
Particle Receiver Designs – Free Falling



Particle Receiver Designs – Pachinko



Prototype System Design

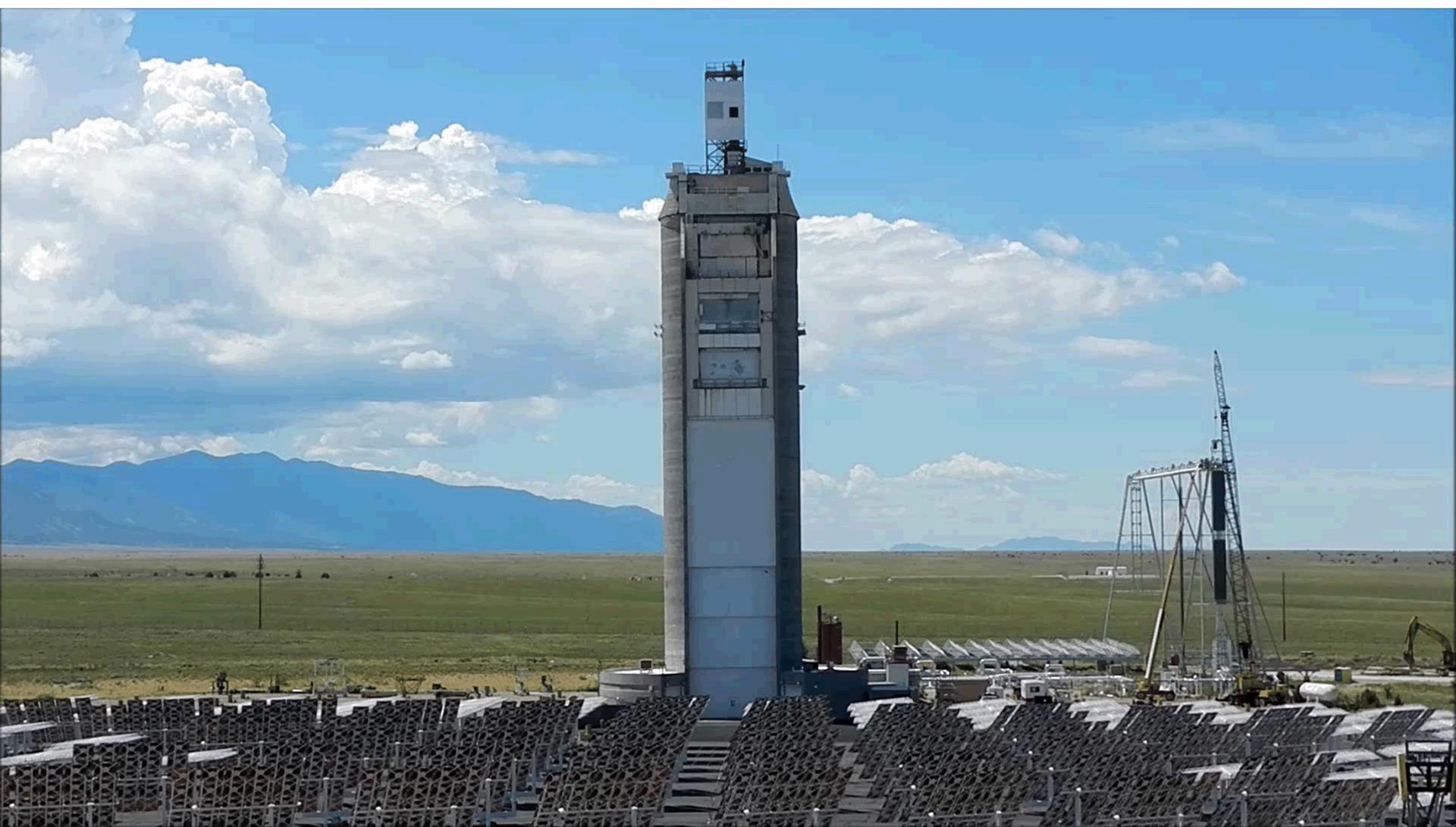


On-Sun Tower Testing



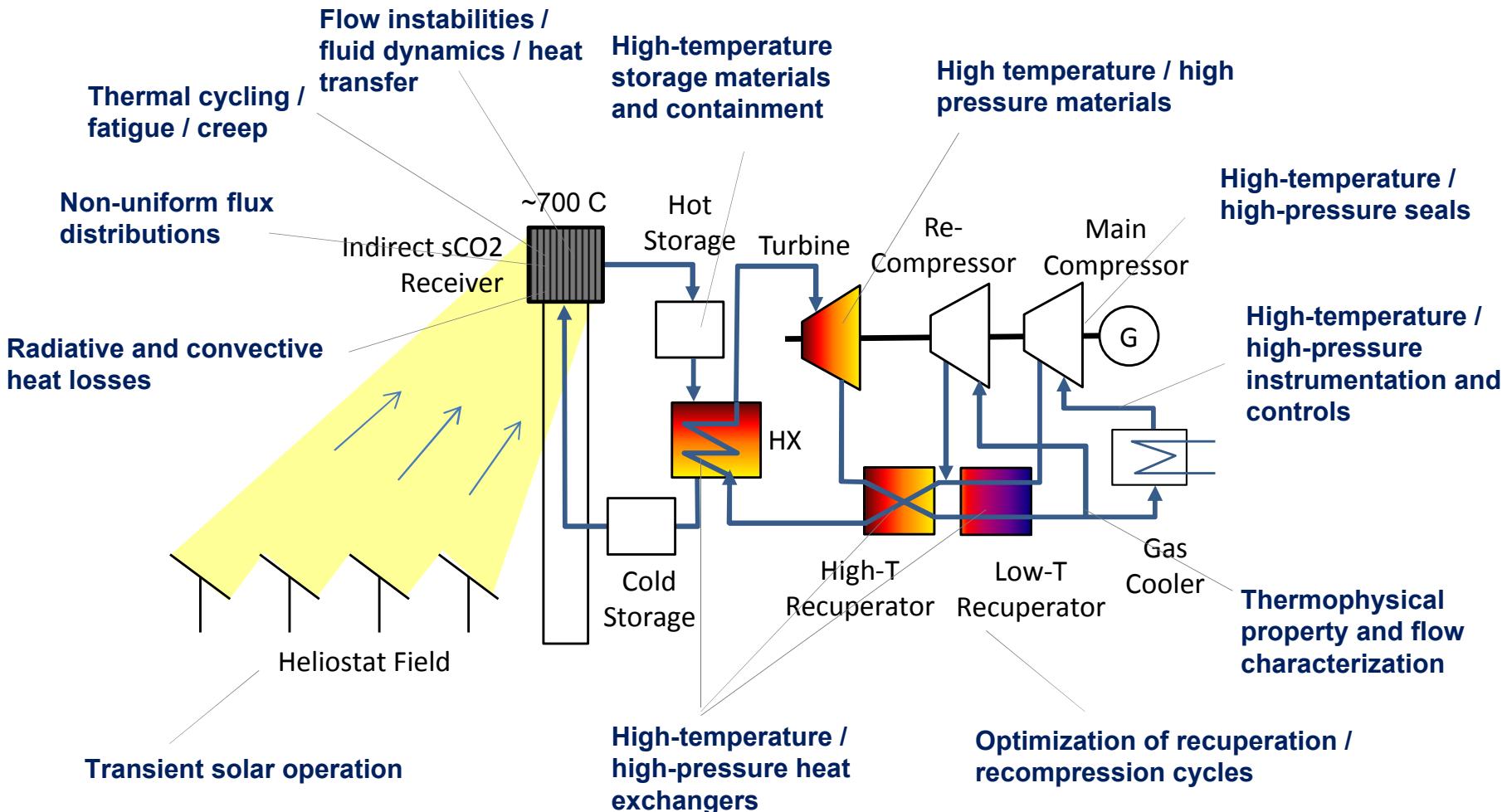
Over 300 suns on receiver
(June 25, 2015)

On-Sun Tower Testing



Over 600 suns peak flux on receiver
(July 20, 2015)

Solarized Supercritical CO₂ Power Cycle



Presentations at SolarPACES 2015



■ **Wednesday, Oct. 14**

- 10:30, Auditorium 1, Josh Christian – Particle Receiver Design Requirements
- 11:10, Auditorium 1, Roberto Zanino – Discrete Element Modeling Free-Falling Particle Curtain
- 15:05, Auditorium 1, Ken Armijo – Using Magnetic Field to Control Particle Flow

■ **Thursday, Oct. 15**

- 11:10, Auditorium 1, Cliff Ho – On-Sun Testing of Particle Receiver

Acknowledgments



Award # DE-EE0000595-1558

- **Sandia National Labs**
 - Josh Christian, Daniel Ray, JJ Kelton, Kye Chisman, Bill Kolb, Ryan Anderson, Ron Briggs
- **Georgia Tech**
 - Sheldon Jeter, Said Abdel-Khalik, Matthew Golob, Dennis Sadowski, Jonathan Roop, Ryan Knott, Clayton Nguyen, Evan Mascianica, Matt Sandlin
- **Bucknell University**
 - Nate Siegel, Michael Gross
- **King Saud University**
 - Hany Al-Ansary, Abdelrahman El-Leathy, Eldwin Djajadiwinata, Abdulaziz Alrished
- **DLR**
 - Birgit Gobereit, Lars Amsbeck, Reiner Buck