

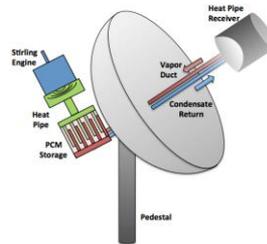
PROJECT OBJECTIVES

Goal:

- Demonstrate the feasibility of significant thermal storage for dish Stirling systems to leverage their existing high performance to greater capacity
- Demonstrate key components of a latent storage and transport system enabling on-dish storage with low exergy losses
- Provide a technology path to a 25kW_e system with 6 hours of storage

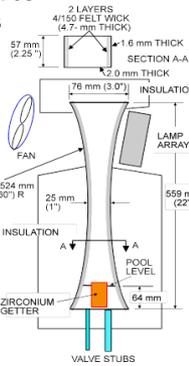
Innovation:

- Leverage high performance heat pipes to support feasible system layout
- Develop and test high temperature, high performance PCM storage
- Optimize storage configuration for cost and exergy performance
- Latent storage *and* transport matches Stirling cycle isothermal input¹



APPROACH

- PCM development and selection
 - Literature searches and modeling to develop candidate eutectics
 - Sample fabrication and characterization to develop properties
 - Modeling of compatibility with potential containment
 - Long-term testing of compatibility
- PCM Compatibility enhancement
 - Identify and develop or optimize coating chemistries to protect containment materials
 - Short-term and long-term compatibility exposure testing
 - Compatibility coating development and testing
- Heat Pipe
 - Felt wick enhancements for robust high performance²
 - Long-term performance and durability testing
- Proof-of-concept hardware subscale demonstration



²Baturkin, V., Vladilen Zaripov, Charles E. Andraka "Development of Advanced Capillary Porous Structures of High Temperature Heat Pipes for Solar Receivers for Dish/Stirling Systems," Proc. 14th international heat Pipe Conference (14th IHPC).

Q2 KEY RESULTS AND OUTCOMES

- Compatibility studies
 - Sample coatings via solution coating and thermal spray by commercial firms
 - Thermal cycling of coatings performed (CTE concerns)
 - New coating options identified for ternary PCM with thermal spray application
 - Application of downselected coatings to short-term test initiated
 - Enhanced powder screening method initiated
- Heat pipe advanced wick development
 - Two heat pipe wicks assembled into bench scale devices
 - Bakeout, sodium fill, wetting underway
 - Short term testing expected early Q4



Durability heat pipe rigged for bake and fill, with defined volume fill container above

NEXT QUARTER

- PCM candidate evaluation and compatibility
 - Complete short term exposure test and analysis of selected coatings with ternary PCM
 - Design long-term PCM/coating compatibility tests conducive to coating application methods.
- Heat pipe advanced wick development
 - Complete sodium processing of heat pipe wicks in test devices
 - Complete short-term wick performance tests and compare performance to model (2 wicks)
 - Complete initial non-destructive wick thickness baseline measurement
 - Initiate long-term testing of wick durability (1 wick)