Sandia National Laboratories

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A Demonstration of Moving Particle TES

Sandia National Laboratories

Peregrine Turbine Technologies

Echogen Power Systems

Chugach Electric Association

ESGC Summit 2024

Project Summary

Moving Particle Thermal Energy Storage (MPTES)

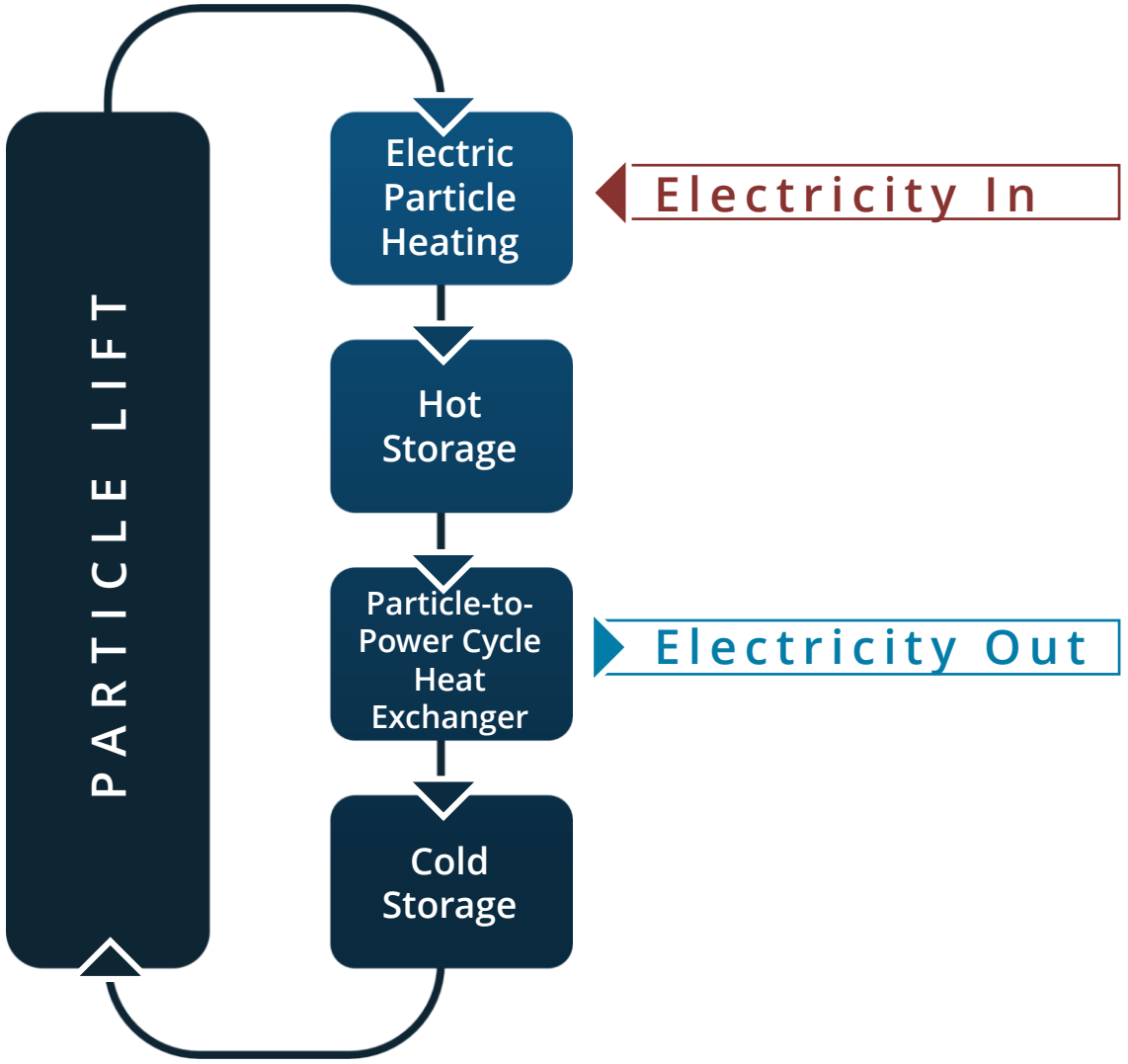
- Thermal energy storage as sensible heat
- Low cost storage media (sand or other particles)
- High temperature ≥ 600 °C storage
- Particle recirculation loop

Energy in: Resistive electric heater (η_h=98%)

Energy out: Power cycle (η_t= 35-60%)

Commercial system round-trip-efficiency (RTE) = 33-57%

Technology Overview



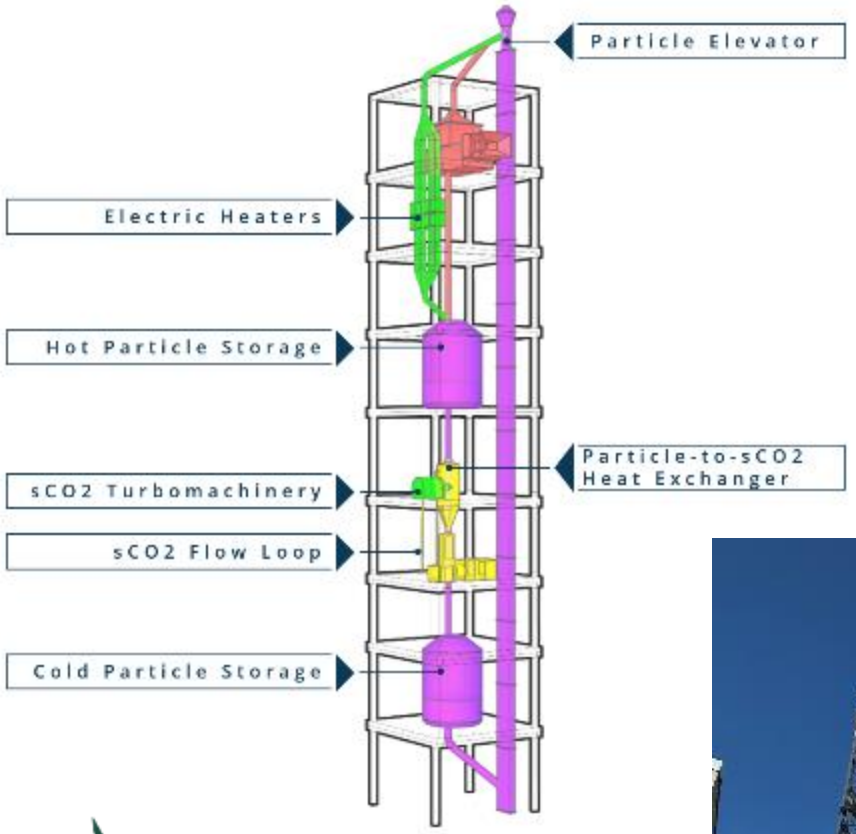
Project Summary

Scope/Objectives

- Demonstrate 100 kW_e x 10+ hr MPTES
  - sCO2 Power Cycle
  - Gen3 Particle Pilot Plant Test Facility
- Assess key performance indicators for multiple charge, hold, discharge scenarios
- Work with leading edge industry members
- Overcome low TRL technology barrier
- De-risk investment for 5-10 year deployment

Timeline:

- 3.5 year project
- Completion December 2027



PEREGRINE TURBINE TECHNOLOGIES

ECHOGEN power systems

CHUGACH

Peregrine Turbine Technologies

Components from Peregrine's 1MWe Merlin Engine Utilized

- Turbopump
- Stage 1 Turbogenerator

Merlin System Thermal Efficiency is 45% at Design point 750°C Turbine Inlet Temp.

Turbopump run off-design to limit pressures and temperatures

Turbogenerator Nameplate Capacity is 350 kWe.

Test Targeted to produce 100 kWe for 10 hours.

Peregrine-Provided Components from the Merlin 1MWe Power Skid