SAND2021-10218C

Horizontal High-Temperature Particle Conveyance (HOTPAC) 37368

Horizontal Conveyance Design May Improve LCOE

1. Impact

Technoeconomic models were updated with refined information on capital and operating costs of conveyance systems. Increased knowledge base of system design, cost, and heat losses between major CSP components. Vendors of conveyance systems have gained knowledge of key technical requirements of CSP plants.

2. Project Goal

Identify the technical readiness, performance limits, capital and installation costs, and expected thermal and parasitic losses of one or more horizontal particle conveyance designs in commercial-scale CSP systems. Limited testing will be performed to validate assumptions and potentially detect unexpected technical challenges. Results will be incorporated into one or more technoeconomic models and refined calculations of LCOE will be discussed.

3. Method(s)

Design and cost analysis. Lump capacitance thermal modeling on chutes and skips. On-sun testing of particle temperatures in chutes at the NSTTF.

4. Outcome(s)

Refined economic data on particle conveyance improves LCOE from previous assumptions.

5. Conclusion/Risks

Horizontal conveyors may be temperature limited in insulated environments. Vertical integration of hot storage and heat exchangers is feasible. Detailed engineering to support bin floor should be part of future work.

6. Team

SNL is managed and operated by NTESS under DOE NNSA contract DE-NA0003525

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Visuals

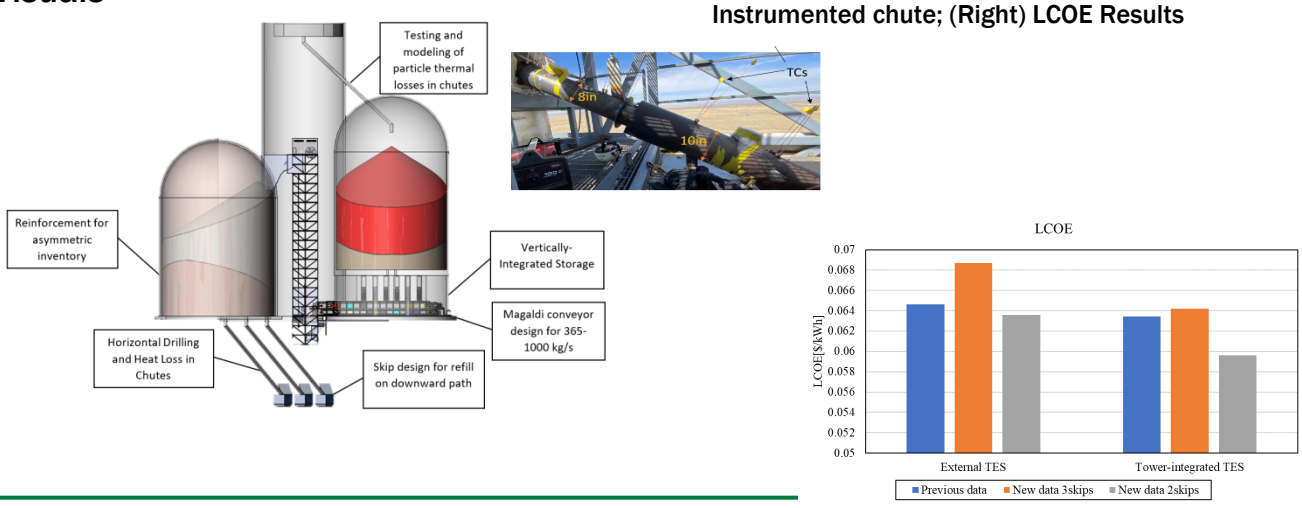

Figure 1. (Left) Primary focus areas of HOTPAC; (Mid) Instrumented chute; (Right) LCOE Results