ADDITIVELY MANUFACTURED sCO_2 POWER CYCLE HEAT EX. FOR CSP 08737

Novel Binderjet HX enables 5¢/kWh CSP cost

1. Impact

- Develop high performance, low-cost additive HX enabling $900/kW, sCO2 power block and 5 ¢/kWh CSP plant
- Cost reduction by $175/kWe (0.9 ¢/kWh)

2. Project Goal

- Develop Binderjet process for a compact HX design with complex features
- High efficiency core design enabling 50% volume and material reduction
- Modular HX to result in low cost sCO2 power cycle recuperator

3. Method(s)

- Binderjet process dev. & core design to meet performance goals
- Create and model modular HX design
- Sub-scale HX performance test (ΔP/P, UA)
- Cost modeling, final HX design & Tech2market

4. Outcome(s)

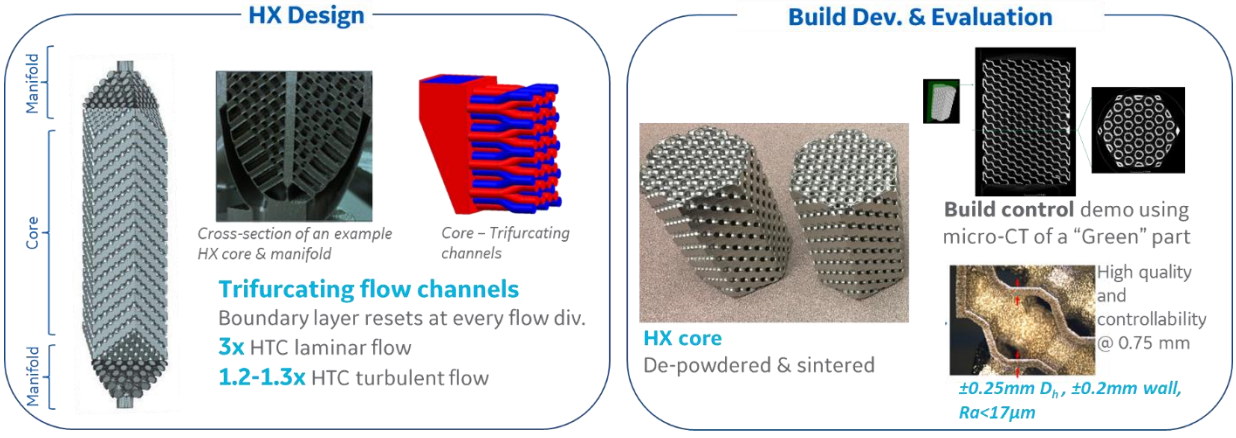
- Build control (±0.25mm D_h, ±0.2mm wall, Ra<17µm) demonstrated
- Modular HX with integrated manifold built & sintered
- HX tests – ΔP/P <2%, UA > 2.6E6 W/°C
- Estimates demonstrate recuperator cost < 90% Weiland model

5. Conclusion/Risks

- Low-cost, high-performance sCO2 power cycle recuperators help meet 2030 SETO CPS plant cost goals making CSP competitive
- Subscale HX tests to validate 'UA' and 'ΔP/P' estimates

6. Team

William Gerstler, Ananda Barua, Daniel Erno, Yongxiang Wang, Shenyan Huang, Lana Osusky, Naveenan Thiagaraja



Acknowledgment: "This material is based upon work supported by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) under the Solar Energy Technology Office (SETO)Award Number DE-EE0008737."•Disclaimer: "This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof."