

Project Title: Hybrid Solar Coal Gasifier

Technology Area: Gasification Systems

Technology Manager: Jenny Tennant

Total Obligations: \$149,988

Project Duration: Duration: 06/28/12 - 03/27/13

Performer: Advanced Cooling Technologies Inc.

Agreement Number: SC0008355

Project Description: The goal of the project is to develop a hybrid solar/coal gasification plant that couples concentrated solar power tower technology with coal gasification enabled by a fuel flexible, heat pipe gasification reactor. The thermal energy from the concentrated solar power tower stored in molten salts can be used for preheating the coal to ~500 °C or generate steam required for gasification. Process system analysis has revealed that using steam from solar energy for gasification provides a greater benefit than preheating coal. The steam from solar power plant transferred to the coal gasification system is predicted to reduce the CO₂ emissions for coal gasification processes. In addition, the fuel flexible reactor enables the use of natural gas to further reduce the carbon emissions. The project will fabricate and test an annular heat pipe integrated fluidized bed gasification reactor and convert the input steam to hydrogen to validate the feasibility of indirect heated steam gasification via heat pipes. Additional Phase 1 objectives include (1) the development of a detailed thermo-chemical model to aid in the design and integration of heat pipes into the system; (2) completion of a performance evaluation; and (3) analysis of scale-up costs and full-scale operation in collaboration with Pratt & Whitney Rocketdyne once subscale reactor yield, efficiency, and operating conditions are identified.