Project to Develop and Demonstrate an Advanced Low Temperature Heat Recovery Absorption Chiller Module at a Distributed Data Center

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Abstract

The proposed Low Temperature Absorption chiller project was to test and apply standard design operating strategies that will significantly enhance the single stage hot water fired absorber performance for CHP applications. The project was terminated because the host site required to serve at the basis of design and where measurement and verification testing was to be undertaken could not support the project in a manner consistent with the project delivery schedule.

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Project Report

The proposed Low Temperature Absorption chiller project was to test and apply standard design operating strategies that will significantly enhance the single stage hot water fired absorber performance for CHP applications. These applications are typically characterized by supply temperatures that are significantly below nominal rating 'on' temperature to the absorber of 240 F (equivalent to 10 psig steam) as well as requiring very low 'off' temperatures from the absorber back to the engine jacket. While many hot water fired single stage absorption chillers can be derated for the lower than nominal 'on' temperature, very few have been performance tested to meet the return temperature to the engine. This results in lower than expected cooling capacity, reduced heat recovery efficiency and requires the use of dump radiators to remove the heat from the system. In addition, derated absorbers typically require very high condenser water flow rates (5 to 7 GPM per ton or higher) to optimize performance at the lower temperatures. Performance mapping this chiller at these new conditions and demonstrating the performance in the field will lead to better design models and system performance.

The subject contract was awarded on 10/1/ 2009 a little over one year after the award was announced. The original proposal was submitted in July of 2008 and DOE's announcement of intent to negotiate with Exergy was received on September 4, 2008. Since that time, the bottom dropped out of the financial markets and furthermore, the market for commercial and industrial HVAC systems collapsed. This latter collapse dramatically affected a key subcontractor to the extent that they are suspending most of their research and development efforts and withdrew from the project. A replacement subcontractor was sought and found the revised proposal was delivered to DOE in March of 2010. Contract Modification II was issued May 26, 2011 to proceed on the revised SOPO. The project was put on hold in October of 2011 by DOE for project review (partially completing Tasks 1.1, 1.2, 2.1 and 2.2) (see Task Milestone Schedule) and allowed to restart in December of 2011.

No work could proceed on the project since December of 2011 since the host site developer was unable to proceed with their work in support of the project which is the reason DOE terminated the project on March 31, 2013.

No technical work was completed on this project prior to termination.

Task/Milestone Schedule

Task	Title or Brief Description
Subtask 1.1	Establish Contracts
Subtask 1.2	Develop Stage/Gate Process
Subtask 2.1	LT Absorber Design Review & Modeling
Subtask 2.2	LT Absorber Site Selection and Design Requirements
Subtask 2.3	LT Absorber Design Development & Fabrication Drawings
Subtask 2.4	LT Absorber Chiller Fabrication
Subtask 2.5	LT Absorber Performance Testing
Subtask 3.1	LT Absorber Module Design
Subtask 3.2	LT Absorber Module Fabrication Drawings Review and Submittal
Subtask 3.3	LT Absorber Module Fabrication & Functional Testing
Subtask 4.1	Balance of Plant Design Development
Subtask 4.2	Installation Drawings
Subtask 4.3	Site Layout and Preparation
Subtask 4.4	CHP Plant Installation
Subtask 4.5	CHP Plant and ICHM Commissioning
Subtask 4.6	CHP Plant Field Performance Measurements