PROJECT PROFILE

Bradley Airport Energy Center

5.8-MW CHP System

Project Overview

Bradley International Airport in Windsor Locks, Connecticut has a central energy plant with Combined Heat and Power (CHP) that provides electricity, heating, cooling and hot water for the main passenger terminals at the airport. The CHP facility has been in operation since 2002, at which time it featured three Waukesha engine-generators. Waste heat from the engines is used for heating and also to power a 500-ton Trane single-stage hot water absorption chiller, which supplies chilled water year round for the airport. In 2010, the facility started the process of adding a fourth engine, a 2 MW Waukesha APG2000, natural gas-fired internal combustion engine (IC) and heat recovery hot water boiler. Thermal energy is recovered from the jacket cooling water of the four engines and exhaust heat of the old and new engines (800°F and 1200°F, respectively), in order to generate 220°F hot water used by the airport. This cogeneration plant was constructed in one year, within an existing building originally used for food preparation by the airlines.

Quick Facts

LOCATION: Windsor Locks, CT
FACILITY PEAK LOAD: 5.8 megawatts (MW)
EQUIPMENT: Three 1.266 MW Waukesha engine-generators and a 500-ton Trane single-stage absorption chiller installed in 2002 and a 2 MW Waukesha APG2000 gas fired internal combustion (IC) engine-generator with a heat recovery hot water boiler added in 2010.
FUEL: Natural Gas
USE OF THERMAL ENERGY: Heating, cooling & hot water for the airport terminal.
USE OF ELECTRICAL ENERGY: Displaces loads previously supplied by the local utility.
AVERAGE CAPACITY FACTOR: 99.999 %
CHP IN OPERATION SINCE: 2002

Reasons for CHP

The primary motivation for establishing the Combined Heat and Power (CHP) energy center was to increase energy security, as the airport was encountering numerous power outages from their central power supplier. Additionally, the airport wanted to lower its operating costs and decided that a CHP plant would allow for substantial operating cost savings when compared to a conventional central heating/cooling plant.

CHP Equipment Configuration & Operation

The Bradley Energy Center (BEC) uses four (4) Waukesha natural gas reciprocating engines to generate a combined 5.8 MW output of electric power. Thermal energy is captured from the engine jacket cooling water and exhaust gases of the four engines for use in the HVAC systems throughout the airport. This energy is used to make hot water for space heating in the winter and provides reheating for the air handler units in the summer. Additionally, waste heat is used to generate chilled water through the use of a 500-ton Trane single effect hot water absorption chiller. Two 12 MMBtu/hr Cleaver Brooks boilers provide supplemental heating if necessary and serve as emergency backup if the engine-generators are out of service. The CHP plant is equipped with emissions controls meeting state and federal requirements; all in accordance with the CT DEEP issued Air Permits and EPA regulations.

The plant also has a utility approved 4,900 nominal voltage electrical interconnect, allowing power generation in parallel with the utility's electrical grid or in island mode. Island mode enables the airport to disconnect from the electric grid and

solely rely on CHP power output in the event of a grid power failure.

2 MW Gas Engine-Generator

Three 1.266 MW Gas Engine-Generators

500-ton Absorption Chiller

Two 12 MMBtu/hr Boilers

Lessons to Share

- Maintenance service contacts with qualified service providers can serve to maximize equipment life.
- To avoid unplanned outages, tie-ins with existing systems should to be carefully coordinated in the installation stage.
- It is important to allow space in the CHP mechanical room design for future system expansion.
- The use of stainless steel piping is suggested to avoid premature failure from corrosion due to high temperature exhaust from rich burn engines.

For More Information

U.S. DOE NORTHEAST CHP TECHNICAL ASSISTANCE PARTNERSHIP
160 Governors Drive, Amherst MA 01003-9265
Phone: 413-545-0684, Fax: 413-545-1027
www.NortheastCHPTAP.org

The Northeast CHP TAP is a U.S. DOE sponsored program managed by the Pace Energy & Climate Center located at Pace Law School and by the Center for Energy Efficiency and Renewable Energy located at the University of Massachusetts Amherst
Date produced or updated: February 2016