CHP as a Boiler Replacement Opportunity Webinar (4/30/13) Question and Answer Log

Q1: Would you have a link to a database of boilers? I would like to do some analysis on age, type of boilers etc.

A1: A database of survey results from EPA's Information Collection Requests related to development of the Boiler MACT is available at:
http://www.epa.gov/airtoxics/boiler/boilerpg.html

Q2: Question for Jay - why was NPV negative (it seemed like) while payback was 5ish years.

(Answered during webinar)

Q3: Question on PSU CHP system. The efficiency graph that stabilized around 70% was based on LHV or HHV?

A3: CHP system efficiency was calculated using 13,400 Btu per pound coal (dry basis), 1,020 Btu per cubic foot natural gas and 142,000 Btu per gallon of No. 2 fuel oil.

Q4: Can speaker Jay West provide more details on selling energy to the grid. Is the assumption that the CHP system becomes a FERC-certified Qualified Facility? Is there a simple rule of thumb or publically available data set that indicates what price the utility must or is willing to pay for energy sales?

(Answered during webinar)

Q5: Could you please provide a link to where we can get the CHP fact sheet that was dicussed?

A5: The 'CHP as a Boiler Replacement Opportunity' fact sheet referred to during the webinar is available at:
http://epa.gov/chp/documents/boiler_opportunity.pdf

Q6: You mentioned that thermal needs aren't sufficient to support production of all of your on site electricity needs. This surprises me - as I would think the campus would have a high thermal load (dorms, heating, cooling).

A6:
Campus Electric and Steam Demands
Campus electric demand ranges from about 50 MW in the summer to about 30 MW in the winter. Chilled water is produced using electric chillers. Campus steam demands are primarily heating and are provided by both high pressure (150psig) and low-pressure (13 psig) distribution systems.

Campus high and low-pressure steam demands are about the same; each range from a low of 40,000 lb/hr in the summer to a high of 200,000 lb/hr in the winter.

Electric and Steam Production - WCSP

At PSU West Campus Steam Plant co-gen, low pressure system is served by backpressure steam turbine-generators as well as turbine driven feed-water and lube-oil pumps and turbine driven draft fans. All turbines exhaust steam to the low pressure campus supply.

Turbine-Generator Set steam conditions:
Turbine inlet: 240/540 psig/^{o}F.
Turbine outlet: 13/540 psig/^{o}F

Each turbine produces about 35 lb-steam/kW-hr of electricity generated. T-G 2 is rated at 2.5 mW. T-G 3 is rated at 3.5 MW

At these steam rates, electricity production ranges from 1,100 kW-h to 5,700 kW-h. With the contribution of the feed-water, lube-oil pumps and draft fans to the low-pressure system, the steam produced by the turbine-generator sets is even less. Typical summer electric generation is about 500 kW. Winter generation is about 3.5 MW. Far below that of the campus electric demand.

Electric and Steam Production - ECSP

At East Campus Steam Plant co-gen, high pressure system is served by combustion turbine with heat recovery steam generator (CT/HRSG). The 7mW Solar Taurus 70 coupled with HRSG produces about 30,000 lb/hr steam without duct firing and about 117,000 lb/hr steam with duct firing. While additional CTs would possibly meet the electrical demands, they would be way oversized for the low thermal loads in the summer.

Q7: To Jay: What impact have you seen on project viability from the anticipated costs associated with utility interconnection changes and stand-by charges.

(Answered during webinar)

Q8: It sounds like financing is an obstacle for the next phase of this project. Has the university explored third-party financing options? Or is there a reason why you want to keep the project "on your balance sheet"?

(Answered during webinar)

Q9: How important was the loss of fuel diversity in your decision making? Did you consider EE upgrades to solid fuel boiler, adding CHP, and using the output-based regulations as an option?

A9:
In our presentation, we described both the ECSP CT/HRSG addition and WCSP MACT

compliance strategies. This response addresses the question separately for ECSP and WCSP.

The ECSP CT/HRSG decision addressed campus steam capacity concerns as well as on-site electrical generation needs. Energy efficiency improvements to WCSP, while considered, were not an option. Output-based regulations were not well developed in our 2006 planning timeframe.

The WCSP MACT compliance strategies did examine fuel diversity and energy efficiency. Although output-based regulations are still not well developed, the energy efficiency advantages and corresponding greenhouse gas improvements that we are seeing at ECSP are very compelling. For these reasons, PSU is closely evaluating additional CHP as an extension to MACT compliance at WCSP.

Q10: The question is addressed to Jay because he mentioned gas price stability in 3-5 years as the advantage of Gas-fired CHP. What is the gas price trend compared to the average life span of a CHP if I plan to install Gas-fired CHP plant?

A10: U.S. natural gas supply and price projections completed by the Department of Energy indicate that the price of natural gas is expected to be stable and relatively low, compared to recent years, for the next 20+ years. More information is available at: http://www.eia.gov/forecasts/aeo/er/.