SESSION 5C

TARGETING SUSTAINABLE DG/CHP GROWTH AND PERFORMANCE

Moderator: Kurt Scheuermann, Itron

PAPERS:

A Benchmark Tool for PV Generation: How Much Less Than Expected? And Why?
Robb Aldrich, Steven Winter Associates, Norwalk Connecticut
Performance Degradation of Photovoltaic and Combined Heat and Power Systems in a Statewide Incentive Program
Dr. Ryan Firestone, Navigant Consulting, Walnut Creek, California
Jennifer Barnes, Navigant Consulting, San Francisco, California
Identifying High Value CHP Candidates Using a Low-Cost Methodology
Susan Haselhorst, ERS, North Andover, Massachusetts
David Larson, National Grid, Waltham, Massachusetts

SESSION SUMMARY:

This session examines the "expected" versus "observed" performance of solar photovoltaic (PV) and combined heat and power (CHP) systems. The presenters identify some of the reasons why PV and CHP systems fail to perform as expected and introduce news ways in which we can less expensively begin to target more sustainable growth of these systems.

Solar PV systems are an increasingly popular renewable energy option being pursued across the country. At the end of 2010, there were over 110,000 PV systems installed across the country, and it is likely that this number will increase four to five fold by 2020. As more and more states deploy PV systems, it is important to know how well PV systems perform relative to expectations. Based on evaluation of hundreds of smaller PV systems, Aldrich has found PV systems commonly generate less electricity than expected. In his paper, Aldrich reviews findings from the field and provides a methodology for identifying and quantifying the causes for discrepancies in PV performance. The proposed inspection method can help PV programs bring expected generation estimates more closely into alignment with observed generation.

Beginning in 2001, California embarked on an ambitious program to increase deployment of distributed generation (DG) and CHP systems within a utility setting. As of the end of 2009, California's Self-Generation Incentive Program (SGIP) had deployed over 1,300 DG and CHP systems representing over 350 MW of generating capacity. Evaluations on the SGIP have shown a disturbing downward trend of CHP capacity factor over time. Armed with over six years of hourly performance data from a large number of PV and CHP systems, Firestone and Barnes investigated performance degradation issues occurring within the SGIP. Combining performance data with interviews of SGIP participants, Firestone and Barnes assemble statistically compelling relationships between system degradation and possible causes. Results of their analysis show interestingly strong correlations between CHP system outages and system age and fuel prices. Diving further into possible causes of CHP outages, Firestone and Barnes uncover how the complexity of CHP systems, their operation and associated economics influenced participant decisions on continued operation of CHP systems. The Firestone and Barnes paper also builds upon Aldrich's investigation into PV performance. Using hourly

PV performance data from close to 400 PV systems interwoven with interviews of PV system owners, Firestone and Barnes examine the role of monitoring, PV system cleaning and equipment failure on PV performance degradation. Their findings provide valuable insights to organizations planning or implementing PV incentive programs.

To build sustainable DG and CHP markets, we need a good understanding of the reasons why DG and CHP system performance may differ from expectations. In more austere economic times, we also need a better understanding of viable markets for deploying high value DG and CHP systems. Haselhorst and Larson offer a low-cost methodology for identifying high value CHP prospects. Unlike traditional technical or economic potential studies, Haselhorst and Larson focus on near-term applications to derive the highest value market segments to be targeted for CHP development. Economic modeling based on customer gas billing data, hourly weather data and SIC codes generates lists of economically attractive CHP sites broken out by market segments. By considering pricing, commercially available CHP technologies and current market barriers, Haselhorst and Larson have offered a way for cost-effectively identifying commercially viable and sustainable CHP prospects.