Performance Assessment of Cogeneration Systems in California

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Abstract

Over the past several years, customer-sited cogeneration systems have been viewed as one way to mitigate electrical supply shortages. On the utility side, achieving this goal requires that cogeneration systems operate at a relatively high capacity factor, especially during peak periods. On the customer side, the cogeneration system must be capable of reducing operating costs. Our firm has recently completed an evaluation of operational customer-sited cogeneration systems installed during 2002 through 2004 under the Self-Generation Incentive Program (SGIP). This paper will present the results of an in-depth performance evaluation that was conducted for the SGIP Working Group to evaluate the effectiveness of useful thermal energy recovery of on-site cogeneration systems receiving incentives from the program.

In an earlier study, an initial evaluation of cogeneration system cost-effectiveness was performed for SGIP. This study raised some interesting questions regarding the actual operational efficiencies of cogeneration systems. Incorporating fuel consumption, thermal energy recovery and prime mover performance data obtained through the Program’s measurement and evaluation monitoring efforts, actual measured performance was compared with the engineering estimates of performance for each project.

This paper will also explore some of the key drivers behind the unexpectedly low thermal energy recovery and overall plant performance. A stepwise approach to reconciling the estimated and actual performance was implemented. If common threads were identified, they were documented in an effort to guide future cogeneration system installations. Because the performance data include the actual timing (hour and month) of cogeneration system operation, the effects of this distributed generation resource is evaluated taking into account the large differences between peak and off-peak energy costs and benefits. This program-level distributed generation analysis can help program designers and policy makers to understand the limitations of smaller cogeneration applications relative to those systems envisioned under PURPA and thus may have important policy implications for the future of cogeneration and distributed generation programs throughout the U.S.