

Understanding Early Retirement of CHP Systems:

Going Beyond First Year Evaluations



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2015 IEPEC Conference — Long Beach, California

What is Combined Heat and Power



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What is Combined Heat and Power







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Why use CHP

- Increased efficiency / environmental benefits / savings
- Reliability / resilience
- Deferral of distribution system upgrades



California's Self Generation Incentive Program

Originally created in 2001 552 projects* / 260 MW capacity Behind the * As of 12/31/2014, non-renewable projects only meter, < 10 MW



SGIP Evaluation History

Twelve annual impact evaluation reports

Four process evaluation reports

Numerous other technical reports
Cost effectiveness
Market transformation
DG optimization



http://www.cpuc.ca.gov/PUC/energy/DistGen/sgip/sgipreports.htm

Technologies in the SGIP

- Advanced Energy Storage
- Fuel Cell (CHP and Electric-Only)
- Gas Turbine
- Internal Combustion (IC) Engine
- Microturbine
- Pressure Reduction Turbine
- Wind Turbine



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Impact Evaluation: Focus on Utilization

How much are SGIP CHP systems being utilized?



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Metered Data: Annual Capacity Factor

System Type	Number of Systems
Fuel Cell – CHP	88
Fuel Cell – Electric Only (Elec.)	83
Gas Turbine	9
IC Engine	187
Microturbine	109

$$CF = \frac{\sum_{h=0}^{8,760} NGO_h(kWh)}{System Size (kW) \cdot 8,760 hrs}$$

Where NGO_h is the hourly electrical generation of a CHP system



Operation Status Surveys

- Intended to <u>supplement</u> metered data with binary (yes/no) operational information
- Not a representative process evaluation sample
- Captures anecdotal information about CHP system operation



Annual (2013) Capacity Factor





Portion of Capacity Online





Operational Status Surveys

Responses from offline systems





Capacity Factor of Online Projects





Discussion

Emerging technologies, emerging markets Your mileage may vary

Periodic overhauls

- □ Not a typical efficiency measure
- □ Cannot "set it and forget it"



Conclusions

- SGIP CHP system retirement rates are much less than typical economic lifetimes
- CHP system retirements have a direct impact on program evaluation



Recommendations

- Evaluate CHP programs yearly and calculate savings each year
- Process evaluations provide significant value
- Eligibility criteria and incentive payment mechanisms should encourage long-term operation







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