mass save
Savings through energy efficiency

Combined Heat and Power Incentive Program

Massachusetts' Program Administrators

Kevin Harnett, P.E.

Joint AEE/ASHRAE Session
April 6, 2011

Presentation Objective

- **Following the presentation, attendees will understand**:
  - Availability of Incentives for Combined Heat and Power Projects in Massachusetts
  - Incentive Levels
  - Requirements for Receiving an Incentive
  - Which Projects have the best chance of being approved
  - Development Process: Interactions between utility, customers, engineers, and developers.
  - Application & Supporting Documents & Analysis
  - Program Performance Evaluations

Introduction

- Green Communities Act of 2008:
  - CHP projects are considered an Energy Efficiency Measure eligible for Incentive Funding by Program Administrators (“Utilities plus Cape Light Compact”)
- Substantial incentives for qualified projects
- Extensive submission and due diligence requirements
  - Not all projects will qualify.
- Post installation evaluation of results

CHP Incentives Amounts for Qualifying Projects

Incentives

- Over 150 kW, up to $750 per kW
- 150 kW or less, $750 per kW

Other Caps

- No more than 50% of Installed Cost
- Potential Program Administrator Budget Limitations

Incentive Requirements

- **Passes Massachusetts' Benefit/Cost Test**
  - DPU mandated utility model determines whether funding is allowed.
    - Installed and Ongoing Maintenance Costs
    - CHP System Electric & Thermal Efficiencies
    - Run hours with full utilization of thermal output
    - Timing of electric generation
- **60% Combined Electric and Thermal Efficiency (HHV basis)**
  - A project which barely exceeds the minimum efficiency requirements is unlikely to have a BCR > 1.0
- **Overall Building Energy Efficiency Measures are also implemented**

Comparison of Utility Benefit/Cost Economics vs. Customer Economic Analysis

	Utility Economics	Customer Economics
Installed Cost of Equipment	Yes	Yes
Maintenance Costs	Yes	Yes
Value of Electric Power and Fuel	Avoided Cost	Customer's Retail Cost
Peak Period	Coincident with ISO-NE	Defined according to Rate Tariff
Value of Alternative Portfolio Standard	Not considered	Considered
Taxes Paid or Avoided	Federal Tax Credits are considered. Other taxes are not considered.	Taxes paid or avoided along with the value of Federal and State Investment Tax Credits are considered.

Typical Sectors Receiving Funding

- Nursing Homes
- Large apartment complexes
- Hotels
- Universities
- Hospitals
- Multi-shift industrial operations which utilize hot water or steam

CHP Approval Process

- Follows Custom Application Process.
- Supported with detailed analysis which reconciles to monthly fuel and electric bills.
- PA will pay the customer up to 50% of the cost for an approved third party Engineering Technical Assessment ("TA").
- CHP contractor who provides adequate supporting detail may not require a separate third party Engineering Technical Assessment ("TA").
- Approval of Incentives may occur with or w/o a Proposal from an installation contractor.
- Projects qualifying for an incentive will be issued a pre-approval letter.
  - **Customers relying on an incentive should delay purchasing or installing a system until receiving a pre-approval letter.**
    - May result in being disqualified if likely to be a free rider.

Application Supporting Details
(Refer to Guidebook for Details)

- Facility Use/Mechanical Equipment
- Isolate Thermal Loads available for offset by a CHP Unit
  - Seasonal (Space Heating)
  - Daily Profiles of Thermal Loads (i.e. Domestic Hot Water)
  - Constant Loads (i.e. Process)
- CHP Installed and Maintenance Costs
- CHP System Detail & Minimum Requirements Document (“MRD”)
  - System Type
  - Manufacturer/Model or Generic Specification
  - kW Output
  - Electric and Thermal Efficiency
  - Thermal Output: Quantity/Temperature/Pressure
  - Parasitic Loads
  - Methods of Control/Operational Sequences

Application Supporting Details, cont'd

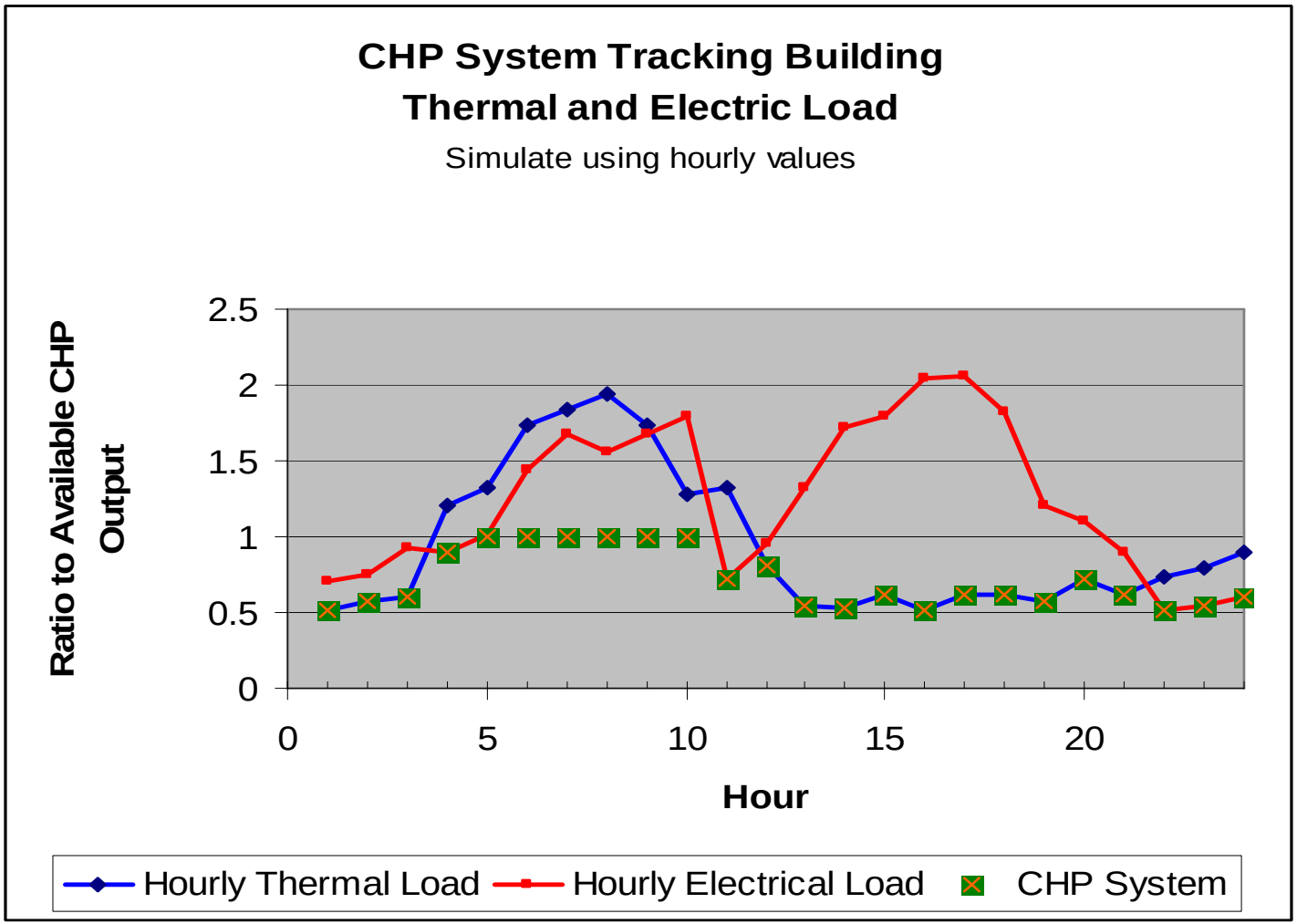
Hourly Simulations

- Spreadsheet with hourly analysis - summarized monthly and annually
  - Fuel input
  - Electric production (according to Peak and Off-Peak periods)
  - Thermal output: produced, utilized, dumped
  - Parasitic loads
- Hourly Modeling (Pre- and Post-CHP): Difference (assuming no export) reflects CHP system operation:
  - Purchased: Fuel, kWh energy and kW demand

Documentation of Baseline Loads

- Existing Loads Documented
  - Electric utility may be able to provide hourly interval data
  - Gas utilities may have hourly or daily gas use
  - Thermal loads may be identified from BAS information
  - Temporary metering may be required
  - If Metered load info is not available
    - Engineering load estimates may be utilized if approved by the PA.
- Hourly load data should reconcile with monthly billing use
- Additional adjustments for planned building EE

Importance of Hourly Simulations



Importance of Hourly Simulations (cont'd)

	Predicted Annual Hours with Thermal Tracking	
	Monthly Analysis (thermal load assumed flat throughout the month)	**Hourly Analysis** (thermal load assumed flat within each hour)
Hotel	6,270	4,617
Apartment	7,069	6,411

New Construction Baseline Analysis

- For New Construction, the absence of historical data requires the use of an approved building simulation model to estimate the baseline prior to the installation of a CHP system.
- The CHP Baseline must incorporate the assumption that cost-effective building EE Measures are installed.
- A separate hourly simulation model would generally be used to estimate CHP system performance.

Post Inspection

- Installation conforms with MRD
- PA processes 80% of the incentive payment
- 20% holdback until completion of Commissioning Process with Analysis of Metered Data

Metering Requirements

- Metered Results
  - Typically 15 minute intervals
    - Fuel fired to CHP system
    - Power produced
      - Gross
      - Less: Parasitics
      - Net Power
    - Thermal Energy: Produced, Utilized, and Dumped
- Program Administrator accesses customers' meters
- Adds supplemental metering if necessary

Program Performance Evaluations

- CHP projects receiving an incentive are subject to an independent evaluation (as is the case for all EE programs)
  - Program Administrators claimed kWh savings are adjusted based on results of these evaluations (considers measurement of equipment performance and along with free riders)
  - Provides feedback on Program Implementation
  - Incorporates results to improve program and analysis of future proposed projects

Other Key Information

- Electric Utility Interconnection is a separate process
  - Incentive Approval does not guarantee interconnection approval (& vice-versa)
- Substantial Tax incentives for CHP Projects
- Variety of Tools available to Assist in CHP Development Process:
  - CHP Incentive Guidebook:
  - CHP Prospect form to assist in initial screening
  - To access the above two documents, paste the below link into your browser and scroll down

    http://www.masssave.com/business/building-or-equipment-upgrades/find-incentives/incentive-details-business-custom-retrofit-nstar?q=08e57708-ba3d-4963-8c9f-89d9027d6e39
  - Sample Hourly Simulation Model

Summary

- Substantial Incentives available for qualified projects.
- Stringent requirements to qualify.
- Projects with high utilization of thermal output operating a substantial number of equivalent full load hours have the best chance of being funded.
- During development: Early and ongoing involvement with the Program Administrator is essential.