Utility Ownership of Combined Heat & Power

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The Value Proposition:

Utilities as stakeholders in CHP facilities can expand such investments and bring about multiple market benefits.

To Discuss today:

- Benefits to utilities and customers
- Barriers to utility ownership of CHP
- Actions to overcome barriers
Why Utilities are Well-Suited to CHP

- Utilities can make long term investments
- They know their distribution systems
- They know their customers
- Costs can be rate-based
- Majority of benefits are system-wide
The Challenges..

*Oh, so many challenges!*

Combined Heat & Power (CHP) has many benefits and many risks…

They seldom align
The Yin & Yang of CHP

Benefits

• Low cost electricity
• Low cost thermal energy
• Stable natural gas demand
• Cost-effective generation asset
• System reliability and resiliency
• Customer competitiveness

Risks

• Construction Costs
• Operation Costs
  • Cost of Natural Gas
  • Price of Electricity
• Long-term reliability of:
  • host
  • host’s thermal needs
  • Utility’s needs

Benefit to Host, Utility, Both
Benefits to a Gas Utility

- Cost effective build-out of infrastructure
- Reliable high-load customers
- Reduces revenue instability risk
- Customer attraction & retention
Benefits to Electric Utilities

• Low cost energy resource
• Lower infrastructure costs
• System reliability and resiliency
• Environmental compliance pathway
• Multiple revenue streams
Low Cost Efficiency Resource

Massachusetts MassSave portfolios:
• 2010 C&I cost of saved energy: $0.022/kWh
• 2011 C&I cost of saved energy: $0.016/kWh
• 2011 CHP cost of saved energy: $0.007/kWh

Maryland BG&E CHP program:
• 2012-2014 program cost: $0.005/kWh
# Low Cost Energy Infrastructure

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Net Cost ($/MWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TECO Polk 2-5 1129MW CC Conversion</td>
<td>$59.21</td>
</tr>
<tr>
<td>PNM 252MW CC</td>
<td>$75.76</td>
</tr>
<tr>
<td>PNM 177MW Gas Turbine</td>
<td>$88.93</td>
</tr>
<tr>
<td>PNM 85MW Gas Turbine</td>
<td>$85.19</td>
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<tr>
<td>400MW GTCC DOE</td>
<td>$62.82</td>
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<tr>
<td>FPL Cape Canaveral 1210MW CC</td>
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<tr>
<td>DOE 600MW Coal</td>
<td>$92.26</td>
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<tr>
<td>Pacificorp 302MW CC</td>
<td>$72.24</td>
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<tr>
<td>DOE 1350 MW Nuclear</td>
<td>$77.52</td>
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<tr>
<td>Pacificorp 50MW Biomass</td>
<td>$104.50</td>
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<tr>
<td>TECO Polk 6 581MW CC</td>
<td>$68.59</td>
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<tr>
<td>Taurus 70 CHP 7.3MW</td>
<td>$61.67</td>
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<tr>
<td>Titan 130 CHP 14.5MW</td>
<td>$57.21</td>
</tr>
<tr>
<td>Titan 250 CHP 21.1MW</td>
<td>$54.24</td>
</tr>
</tbody>
</table>

Source: Sterling Energy Services 2013
Deferred Infrastructure Investments

- CHP can be a distribution asset if strategically sited
  - Geo-targeting of efficiency resources
- Transmission planning/non-transmission assets
  - 70% of transmission system: at least 25 years old
  - FERC Order 1000 delineates framework for transmission utilities to spread costs of non-transmission assets among all users
Enhanced System Reliability

• As grid nears peak capacity, line losses can triple (normally ~7%)
  • Ontario Power Authority Summer 2006
  • $57 in fuel per MWh generated,
  • $115 in transmission losses per MWh delivered

• Transformers fail at a rate that rises exponentially as system nears peak

• Ancillary services

• Support alternative fuels and renewables
Enhanced System Resiliency

- Distributed nature enables quicker recovery
- Generators used frequently are more likely to work when needed
- Public safety
- Reduced economic losses

- CHP supported critical facilities during Hurricane Katrina and Superstorm Sandy
Many power plants are at, or beyond their design-life and are due for replacement.

They can be replaced with more baseload plants or cleaner distributed facilities.
Natural Gas Markets & Coal Retirement

- EPA regulations are only half the story
- Low natural gas prices & rising coal prices are facilitating a shift from coal to natural gas generation
- Retiring plants generally are older, (40+ years) have little or no pollution controls, and often don’t run full time
“At Risk” Coal Generation by Region:
Greatest Potential Problems in Midwest & South Central

Source: ICF International for INGAA (May 2010)
CHP as a Compliance Pathway

Because CHP is 40% more efficient than central generation, it can be used:

- By utilities to meet State Implementation Plan (SIP) NOx requirements
  - Eligibility of output based compliance mechanisms was authorized by EPA in 2000
- States can have set-asides for CHP
- to comply with Clean Air Act rules (Section 111(d)) for power plants for CO2 emissions
- By industrial boiler owners to comply with new Boiler MACT rules for HAPs
Multiple Products, One Facility

Possible Revenue Streams:

- Electricity
- Ancillary Services
  - Load following
  - Volt-VAR support
  - Spinning & non-spinning reserve
- Thermal: steam, hot water, chilling
- Pollution credits
Where is CHP Being Deployed?

2005 to Present. Source: ICF CHP Database
Utility Actions to Encourage CHP

- Plan to include CHP
  - Conduct feasibility assessments
  - Include CHP in resource planning
- Pilot CHP projects
  - Experiment with ability to dispatch
  - Measure and monitor all system benefits
- Screen and approve developers
- Identify best customers & locations
Regulatory Actions to Encourage CHP Ownership by Utilities

• Develop a method to calculate energy savings from CHP that recognizes system benefits

• Set the groundwork for evaluation of avoided emissions in related to new and forthcoming Clean Air Act rules

• Give CHP equal value in resource planning

• Address state-specific regulatory barriers to greater utility ownership of CHP

• Expand the project deployment time limit in energy efficiency programs
Thank you!

This presentation is based on:

*Utilities and the CHP Value Proposition*

Anna Chittum and Kate Farley

ACEEE Research Report # IE 134

http://www.aceee.org/research-report/ie134

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ACEEE CHP Resources

- Check out your state’s CHP policy profile: http://aceee.org/topics/chp

- ACEEE report and white papers on CHP and utilities: http://aceee.org/blog/2013/07/are-utilities-missing-out-benefits-co