Utility Perspective on DG/CHP

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Executive Summary

» New CHP technologies are emerging, some of which are able to meet California emission requirements*. 
» Micro-CHP has the potential to be equally disruptive as solar PV. 
» California Executive Order: add 4 GW by 2020, 6.5 GW by 2030. 
» But, these executive orders are not supported by policy directives. 
» Some policies actually discourage CHP (e.g., departing load charges). 
» Natural gas utilities are exploring various ways to accelerate adoption given a stable commodity price/supply forecast. 
» Electric utilities currently have little incentive to promote CHP – active engagement by utilities can help reach growth targets 
» Other countries have made progress with accelerated adoption of Micro-CHP: Germany, South Korea and Japan. 
» More innovative business models and regulatory policies are needed in order to move this technology platform forward in the U.S.

*0.07 lbs/MWh NOx, 0.10 lbs/MWh CO
Drivers and Trends

- Utilities and regulatory agencies have long focused on the safety, reliability and security of critical infrastructure.
- Energy policy is currently focused on:
  - Increasing the use of energy efficiency/demand response
  - GHG emissions and criteria pollutant reduction
  - Energy security
- Most customers will elect to remain grid-connected. Emerging technologies will provide a wider choice of products and services.
- The electric ‘smart’ grid will eventually feature plug-and-play interconnection for residential on-site generators.
- ‘Decoupling’ momentum continues in the U.S.
- Natural gas is a clean, reliable and affordable energy resource (beyond the ‘bridge’).
- Utility business/regulatory models will need to adapt/evolve to emerging technologies and policy trends.
The Utility World Today

Energy Flow

Natural Gas

Gas Storage
The Utility World Tomorrow

Energy Flow

Distributed Solar Power
Energy Storage
Smart Meter
Smart Home
Smart Office
Clean Transportation

Gas Storage
Fuel Cell

Hydrogen

Smart Grid

Biofuels
Renewable NG

Glad to be of service.
The Natural Gas Utility

» Supply/price forecast stability
» Domestic fuel = energy security
» Declining throughput per customer
» Opportunities for commodity growth:
  ▪ On-site generation (e.g., CHP)
  ▪ Transportation (CNG, LNG)
» Carbon footprint reduction
  ▪ Supply side (e.g., biofuels, H₂ injection)
  ▪ End-use (capture & utilization of CO₂)
» New business models under consideration to accelerate adoption of CHP
Favorable Supply/ Price Forecast

» Abundant supply/stable price outlook.
» Cost of production forecast to decline 20% over next 5 years.
» Moderate demand growth.

Natural Gas Price Forecast

Natural Gas Supply

Source: EIA

Source: ICF – The Opportunity for CHP in United States, May 2013
Relatively slow CHP capacity growth in the U.S./CA over the past several years

- National: 82 GW over the last 5 years = 500 MW/year (CAGR = 3%)
- CA: 8.5 GW over the last 5 years = 40 MW/year (CAGR = 7%)
- CA new CHP capacity technical potential through 2030: 16 GW (ICF)

Source: ICF Consulting
The Electric/Combination Utility

» Electric utilities are concerned about steep growth curve of solar PV:
  - Growing number of interconnection points creates issues with grid stability, voltage regulation, safety
  - Utility incentives often impact rates of remaining customers
  - Utilities would like for CHP capacity to be flexible and dispatchable

» Increasing awareness of rate impact to support key policy goals:
  - EE/DR
  - RPS
  - Energy Storage
  - Is CHP next?

» Electric utilities currently have little incentive to promote CHP

» Business as usual → modest growth

» CHP growth can reach growth targets with active engagement from electric utilities
## Electric Utility CHP Concerns/Issues

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<tr>
<th>Issue</th>
<th>Description</th>
<th>Impact</th>
<th>Future Considerations</th>
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<tr>
<td>California Departing Load Charges (DLC)</td>
<td>DLC pays for EE, RD&amp;D and stranded assets.</td>
<td>DLC equates to fee of ~$0.016/kwh paid only to CA electric utilities</td>
<td>Exemption could require ratepayer subsidy</td>
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<td>Standby Charges</td>
<td>Standby charges pay for backup utility infrastructure</td>
<td>Could be in the range of $x - $y/kW/month</td>
<td>Exemption could require ratepayer subsidy.</td>
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<td>Net Metering</td>
<td>Customer pays for net electricity use on annual basis</td>
<td>Significant benefit to customers</td>
<td>Enablement could be ratepayer subsidy</td>
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<td>Interconnection</td>
<td>Each micro-CHP device would be connected to grid, similar to solar PV</td>
<td>System not built to move power in both directions; safety issues with outages and islanding</td>
<td>Smarter grid could mitigate this issue</td>
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<td>Feed In Tariff/Export of Electricity to Grid</td>
<td>Customers pays set price for electricity exported to the grid based on marginal cost (+ externalities?)</td>
<td>Depends on pricing</td>
<td>Could be a ratepayer subsidy if export price is above market; energy storage could help</td>
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<td>Other Technical Challenges</td>
<td>Proper system design, sizing and operation</td>
<td>Ensures reduction in GHG emissions and criteria pollutants</td>
<td>Could help justify incentives/subsidy</td>
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Keys to Accelerating Adoption of Micro-CHP

» Develop more cost-effective technologies which meet strict emission standards (e.g., CARB-2007).
» Minimize net electricity exports.
» Enable net metering, eliminate DLC.
» Consider funding for incentives and subsidies by gas ratepayers (instead of electric ratepayers)
» Ensure that CHP is included in the definition of ZNE.
» Encourage active engagement by electric utilities.
» Implement a regulatory framework for utilities to participate in investment opportunities.