Smart Grid Challenges & Choices: Utility Executives' Vision for the New Decade

March 23, 2010
“Within the next 10 years we will revamp our entire process to be more efficient.”
– North American utility executive
Background

• In October 2009, President Obama announced $3.4 billion in Recovery Act funds to spur the transition to the smart energy grid, the largest single energy modernization investment in U.S. history*

• The Recovery Act, along with the need to improve delivery networks and relationships with customers, will drive and shape the utilities industry in the coming decade

• Against this backdrop, Oracle surveyed North American C-level utility executives to understand their vision for the next 10 years, how the smart grid will evolve in our communities and homes, and what challenges and opportunities lie ahead

Methodology

• Oracle conducted telephone and online interviews with 150 North American C-level utility executives in January 2010

Sample Demographics:

<table>
<thead>
<tr>
<th>Primary Country of Operation</th>
<th>Executive Role/Title</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>Owner/Partner</td>
<td>3%</td>
</tr>
<tr>
<td></td>
<td>President/CEO/COO</td>
<td>21%</td>
</tr>
<tr>
<td></td>
<td>CFO/Controller/Treasurer</td>
<td>3%</td>
</tr>
<tr>
<td></td>
<td>CIO/CTO</td>
<td>4%</td>
</tr>
<tr>
<td>Canada</td>
<td>EVP/SVP</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>VP/Assistant VP/Principal</td>
<td>3%</td>
</tr>
<tr>
<td></td>
<td>General Manager/Managing Director</td>
<td>64%</td>
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Key Findings

• Over the next decade, utilities will primarily focus on improving service reliability and operational efficiency, as well as implementing smart metering.

• Currently, just one in five utilities is moving forward with system-wide smart grid deployment.

• Executives believe the greatest challenges will be the cost of the transition to smart grid and ensuring effective communication with customers.

• Still, they expect wide-scale adoption of smart grid components. Nearly all utility executives believe consumers will benefit from smart grid in the next 10 years.
Priorities for the Next Decade

- Utilities have customers in mind; say top priority is improving service reliability

| #1 | Improving service reliability and operational efficiency (45%) |
| #2 | Implementing smart metering (41%) |
| #3 | Developing demand response and energy efficiency programs (37%) |
| #4 | Updating physical infrastructure (23%) |
| #5 | Offering real time pricing options (17%) |
| #6 | Increasing your renewable portfolio (15%) |
| #7 | Optimizing existing business processes (14%) |

"Reliability is the goal for us, but smart grid is an objective to reach that goal."

Take Away: Reliability and Efficiency Trump All

*Executives asked to select their top two priorities
Few Moving Forward with Full Deployments

• Only a small percentage of utilities are pioneers with system-wide deployments

Overall, what is your utility's philosophy on smart grid deployment?*

We are waiting to see what our peers are doing

- < 100,000 customers: 34%
- 100,000+ customers: 13%

We are executing internal research/preparing a cost/benefit analysis

- < 100,000 customers: 26%
- 100,000+ customers: 17%

We are taking steps forward with trials or pilot programs

- < 100,000 customers: 18%
- 100,000+ customers: 49%

We are leading the charge with system-wide deployment

- < 100,000 customers: 22%
- 100,000+ customers: 21%

Take Away: Vast Majority Holding Back. Why?

*Executives asked to select the response that most closely matched their utility's approach
Smart Grid Predictions: Utility Adoption

- Utilities expect smart metering and demand response pricing to take off first

What smart grid components will see wide-scale utility adoption most quickly?*

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>63%</td>
<td>Smart metering</td>
</tr>
<tr>
<td>48%</td>
<td>Demand response and critical peak pricing</td>
</tr>
<tr>
<td>38%</td>
<td>Smart distribution and/or transmission operation devices</td>
</tr>
<tr>
<td>30%</td>
<td>Integration of renewables</td>
</tr>
<tr>
<td>26%</td>
<td>Increase in smart sensors on the network</td>
</tr>
<tr>
<td>21%</td>
<td>Accommodation of plug-in hybrid electric vehicles (PHEVs)</td>
</tr>
</tbody>
</table>

“[Our priority is] improved service and reliability for our customers. The first steps will involve outage management systems and integration with smart metering infrastructure communication.”

Regarding renewables:

- Utility executives believe hydro power and wind energy will be the most feasible alternative energy sources

Take Away: Priorities and Predictions Align

*Executives asked to select up to three smart grid components
Consumers Will Benefit

- Nearly all utility executives believe consumers will benefit from smart grid in the next 10 years

**Top Benefits***:

<table>
<thead>
<tr>
<th>Benefit</th>
<th>&lt; 100,000 customers</th>
<th>100,000+ customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>More/better energy usage information to enable smarter energy choices</td>
<td>86%</td>
<td>82%</td>
</tr>
<tr>
<td>Reduced carbon footprint/improved environment</td>
<td>51%</td>
<td>74%</td>
</tr>
<tr>
<td>More reliable power</td>
<td>52%</td>
<td>60%</td>
</tr>
<tr>
<td>Reduced energy costs</td>
<td>43%</td>
<td>62%</td>
</tr>
</tbody>
</table>

*Larger utilities* are significantly more likely to believe consumers will see certain benefits from smart grid.

"The concept is using renewable energy together to lower costs and increase reliability."

**Take Away: Know More, Use Less**

*Executives asked to select all that apply*
Smart Grid Predictions: Consumer Adoption

- When it comes to consumers, utility executives anticipate increased demand for in-home displays and smart appliances

If smart grid comes to fruition, consumers will flock to*:

- In-home displays for real-time access to usage and cost data (62%)
- Smart appliances (51%)
- Mobile device portals (31%)
- Distributed energy resources (18%)
- PHEVs/EVs (11%)
- Electricity storage (10%)

Take Away: Demand for Information, Control

*Executives asked to select the top two advancements that they believe will take off fastest with consumers if smart grid comes to fruition
Cost Concerns

• While smart grid is coming, executives grapple with transition costs

Top Concerns*:

- Consumer reactions to rate increases: 43%
- Cost to comply with environmental mandates: 38%
- Rate recovery of the cost of improving grid infrastructure: 30%
- Changing customer expectations/the need for better communication: 24%
- Rate caps and regulatory disallowances: 21%

Universal Concerns:
Utilities of all sizes and at all stages of smart grid adoption struggle with these issues

“[We need] clear and consistent work on the business case.”

Take Away: Greater Emphasis on Measuring and Communicating Benefits Required

*Executives asked to select the two most troublesome issues that keep them up at night
Burning Questions

• Before utilities can fully embrace smart grid, executives seek answers to three key questions*:

  What will smart grid cost?

  How will we recover our investments?

  How will consumers react?

“We need to find out how interested customers are in actively controlling energy use.”

Take Away: Grid Transformation = Business Transformation. Are We Doing Enough?

*Executives asked: Is there anything your organization needs to understand better before moving forward with smart grid? What unanswered questions do you have?”
Recommendations: Getting There Together

- Utility executives say collaboration will drive smart grid success

Top Recommendations*:

#1: Sharing best practices with peers (80%)

#2: Developing an information architecture strategy (76%)

#3: Developing smart grid industry standards (71%)

#4: Publishing results of pilot projects and internal research (63%)

“Educate Consumers – It will be a learning process for everyone, including the utility companies and their employees.”

Take Away: Share Lessons Learned; Build a Technology Foundation

*Executives asked to select all that apply
The Next Big Thing

- Smart grid plays a key role in utilities’ vision for the future

Excluding smart grid, what do you believe is the “next big thing” for the utilities industry?*

- Renewables (including nuclear, solar, and wind power)
- Energy storage and distributed generation
- Automated meter readings
- Rate-structure changes
- More transmission lines
- CO2 legislation
- Overall conservation efforts

When asked if we will still use the term “smart grid” five years from now, the majority of utility executives said yes

Take Away: More than a Fad; Smart Grid is Here to Stay

*Open-ended response question
Our Take…

• **Prepare for change:** Though few utilities are leading the charge, nearly all see a future in smart grid technologies. Develop organization-wide priorities and strategies that include information architecture and transition timelines. “Rip and replace” is not inevitable, but innovation is. Start small but plan big with an end in mind.

• **Tear down silos:** Organizational barriers and legacy information systems have made it difficult for utilities to share information. Open communication, transparent processes, and standards-based IT tools will help utilities extract the full value from smart grid implementations and minimize data duplication.

• **Understand and educate your market:** Smart grid success will require a significant education effort. Consumer participation and engagement is critical – and customers must understand what’s in it for them. Seek community partners and develop a comprehensive communications plan.

• **Develop information management strategies:** Smart grid technologies will flood utilities with information. Plan ahead and partner with key technology providers that can help define information management strategies and architectures to capture, protect, analyze, use, and share data effectively and in real-time across your organization.

• **Share results:** Many utilities have smart grid questions surrounding investment requirements, ROI, and customer interest levels. To move the industry forward, utilities must engage with industry thought leaders and share their experiences with their peers.
Thank You

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