How can utilities survive energy demand disruption?

Accenture's Digitally Enabled Grid program - 2014 edition

High performance. Delivered.
Toward a digitally enabled grid model

The proposition of enabling the utility grid with more digital capabilities has the potential to dramatically improve the performance of the energy system, including better asset performance, optimization of power delivery, greater efficiency, more effective utilization of distributed energy sources, and new revenue from advanced services. Industry executives are reconciling their view of potential opportunities from investing in more advanced digital grid capabilities with the substantial threats also emerging from new energy technologies. As utilities face potential demand reduction of more than 15 percent due to new energy technologies by 2025, utility executives are now under even greater pressure to make strategic choices and evolve. These choices have the potential to reshape the role of the utility and forge new ways of doing business (and new business models), shaped by regulators, industry leaders, and market competitive forces.

The 2014 Accenture Digitally Enabled Grid executive survey found that utilities executives’ perceptions of the impact of technology disruption shifted significantly from our 2013 findings. Today, more utility executives are concerned about the likely impact of technology adoption to utility economics and network performance, as well as the potential impact of new competition (see Figure 1).

Through the 2014 Digitally Enabled Grid research program, Accenture sought to understand how the adoption of new energy technologies will disrupt network costs and performance, and challenge the existing business model. While utilities executives are more keenly aware this year of the significant risk to the industry from demand disruption, they may have overestimated the potential risk of customers moving entirely off-grid and the anticipated decline in revenues. Through extensive scenario modeling and analysis, as well as in-depth interviews with utilities executives, Accenture provides a view of the likely impact of technology adoption and specific insights to help utilities identify a path to a more digitally enabled grid.

Figure 1. Accenture Digitally Enabled Grid executive surveys: Trending insights.

<table>
<thead>
<tr>
<th>Utilities executives expect...</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grid faults to increase by 2020 as a result of distributed, renewable generation (low-voltage connection)</td>
<td>41%</td>
<td>61%</td>
</tr>
<tr>
<td>Grid faults to increase by 2020 as a result of large-/utility-scale renewables (medium-voltage connection)</td>
<td>33%</td>
<td>53%</td>
</tr>
<tr>
<td><strong>Revenue impacts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distributed generation to have an impact on revenue reduction by 2030</td>
<td>43%</td>
<td>61%</td>
</tr>
<tr>
<td>Microgrids to have an impact on revenue reduction by 2030</td>
<td>30%</td>
<td>51%</td>
</tr>
<tr>
<td><strong>Competition</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Competition from new entrants in power electronics hardware and services will increase in the next five years</td>
<td>46%</td>
<td>73%</td>
</tr>
<tr>
<td>Competition from plug-in vehicles and associated charging infrastructure will increase in the next five years</td>
<td>59%</td>
<td>81%</td>
</tr>
</tbody>
</table>


New energy technologies disrupting energy demand include:
- Energy conservation and demand response
- Energy efficiency through insulation and efficient appliances
- Energy substitution, such as the electrification of vehicles and heating
- Distributed generation, such as photovoltaics (PV), storage, and mini-and micro-combined heat and power
Fatal disruption?

Accenture has identified three scenarios that sum up the potential impact of disruptive energy technologies, based on the following assumptions:

**Status quo**
- Long-term trends in energy demand and electricity price
- No major breakthrough on technology costs
- Withdrawal of subsidies by 2018
- Low-consumer interest in the uptake of new energy products and services

**Demand disruption**
- Energy efficiency and distributed generation possible without subsidies
- Falling technology costs
- Moderate rise in electricity prices
- Greater penetration from shifting consumer sentiment
- Moderate reduction in load

**Perfect storm**
- Subsidies continue to the early 2020s
- Technology costs plummet
- Electricity prices rise (to cover the subsidy and integration costs)
- Customers accelerate energy technology deployment
- Significant load reduction and revenue losses

For each scenario we calculated how the adoption of energy demand-disrupting technologies could drive down energy demand and therefore utilities’ revenues by 2025 (see Figures 2 and 3).

Figure 2. In the United States, revenue reduction based on reduced load could be between $18 and $48bn.

Accenture Model – US Residential and Commercial Demand (excluding prosumer generation)

1 At current retail prices
Source: Accenture analysis.
Figure 3. In the EU, the greatest risks to demand are in the next six years, with a potential reduction of 235 TWh in the perfect storm scenario.

Accenture Model – EU-10 Residential and Commercial Demand* (excluding prosumer generation)

According to Accenture analysis, the path most likely to emerge is the moderate ‘demand disruption’ scenario. The status quo may be too conservative, as the economics of distributed technologies continue to improve. The perfect storm is unlikely due to natural limitations on viability and cost constraints associated with consumers addressing their entire energy consumption through solar and storage. For example, a large number of consumers have practical limitations on roof availability, such as building ownership, or lack the appropriate orientation of roof space for solar PV. Also, the amount of storage capacity required to be self-sufficient is prohibitively large, both in terms of cost and space occupied. In addition, it is likely that most policy makers will be wary of extending subsidies for distributed generation for long periods due to spending constraints and the adverse impact on electricity prices. Demand disruption offers the most realistic potential scenario, while the ‘perfect storm’ represents a less likely, worst-case outcome. As a result, the potential impact of these scenarios on demand is compelling industry leaders to consider new distribution models, to take steps to influence emerging policies and to minimize the threats to performance and earnings (see Figure 4).

Figure 4. Demand disruption is the most likely scenario in the next ten years, and has important implications.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Key assumptions</th>
<th>Rationale</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand disruption</td>
<td>Greater penetration of energy efficiency (EE), and distributed generation (DG)</td>
<td>Adoption of EE and DG possible without policy support</td>
<td>Reduction in load (relative to Status quo)</td>
</tr>
<tr>
<td></td>
<td>Falling tech costs</td>
<td>Presence of scale players facilitating adoption</td>
<td>Increase in impact on operations complexity and reliability</td>
</tr>
<tr>
<td></td>
<td>Moderate rise in electricity prices</td>
<td></td>
<td>Drop in revenues and earnings</td>
</tr>
<tr>
<td></td>
<td>Shifting customer sentiment</td>
<td></td>
<td>Changes accelerate with favorable economics</td>
</tr>
<tr>
<td></td>
<td>Moderate reduction in load</td>
<td></td>
<td></td>
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</tbody>
</table>

*Belgium, France, Germany, Italy, Netherlands, Poland, Portugal, Spain, Sweden and the United Kingdom

At current retail prices

Source: Accenture analysis.
Navigating demand disruption

Utility companies are at a tipping point of change. Technology is being adopted more aggressively as prices fall. The potential for customers to deploy distributed generation without subsidies looms large. Our analysis shows that by 2015 solar PV will be at grid parity—equal to or less than the cost of power purchased from the grid—across Australia, many states in the United States, and several European member states.

Utilities can navigate through demand disruption by rethinking their role going forward (see Figure 5), evolving from the pure-play transporter of energy and expanding to sophisticated energy services; for example, beyond-the-meter services such as energy efficiency, storage and automation. To migrate to such a model, utilities should focus on engaging with regulators to define new models that will secure the long-term viability of the distribution business via the adoption of new tariff structures, opening up new markets for services, and aligning subsidies. In addition, a real opportunity to improve supply reliability and increase earnings potential lies in investing in grid optimization. This comprises automation, sensing devices and real-time analytics capabilities to improve real-time management of the grid. It also includes advanced demand response solutions to encourage consumers to use energy in a more flexible way.

Figure 5. As a new distribution model for utilities is shaped, strategic choices will be necessary.
Accenture believes that with the right plan and effective monitoring and control, utilities companies can balance investment with an opportunity to establish a more cost-effective, optimized grid. Whether improving grid operations in the short term, achieving better distributed energy resources integration and control, or transitioning to a digitally enabled grid role, the following three key steps can help utilities to manage demand disruption:

**Step 1**
Pursue ‘no regrets’ capabilities that improve performance in today’s model

**Step 2**
Devise a strategic roadmap of investments in capabilities and assets that will be valuable in the new model

**Step 3**
Manage a portfolio of ‘plays’ and stakeholder migration plans to protect results and transition in the new model
About the Digitally Enabled Grid program

Our Digitally Enabled Grid research program comprises:

**Scenario modeling**

Accenture developed three scenario models to assess how distributed energy resources, energy efficiency, energy substitution and energy conservation and demand response would impact the network and business models. We considered five drivers of adoption: regulatory climate, technological innovation, electricity prices, macroeconomic factors and consumer choices.

**Executive survey**

Accenture conducted an executive survey among utilities executives worldwide involved in the decision-making process for smart grid-related matters in their companies. The survey results are based on questionnaire-led interviews with 85 utilities executives in 20 countries, conducted via telephone in 2014 for Accenture by Kadence. The executives represent the following countries: Australia, Belgium, Brazil, Canada, China (including Hong Kong), France, Germany, India, Indonesia, Ireland, Italy, Japan, the Netherlands, Poland, South Africa, Spain, Sweden, Thailand, the United Kingdom, and the United States.

**What is the path toward the future digital grid?**

Accenture’s Digitally Enabled Grid program provides actionable insights and recommendations around the challenges and opportunities utilities face along the path to a smarter grid. Drawing upon primary research insights from utilities executives around the world as well as Accenture analysis, The Digitally Enabled Grid examines how utilities executives expect smart grid technologies and solutions to contribute to their future networks.

For more information on Accenture’s Digitally Enabled Grid program, go to www.accenture.com/utilities.

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About Accenture

Accenture is a global management consulting, technology services and outsourcing company, with more than 305,000 people serving clients in more than 120 countries. Combining unparalleled experience, comprehensive capabilities across all industries and business functions, and extensive research on the world’s most successful companies, Accenture collaborates with clients to help them become high-performance businesses and governments. The company generated net revenues of US$30.0 billion for the fiscal year ended Aug. 31, 2014. Its home page is www.accenture.com.

About Accenture Smart Grid Services

Accenture Smart Grid Services focuses on delivering innovative business solutions supporting the modernization of electric, gas and water network infrastructures to improve capital efficiency and effectiveness, increase crew safety and productivity, optimize the operations of the grid and achieve the full value from advanced metering infrastructure (AMI) data and capabilities. It includes four offering areas which cover consulting, technology and managed solutions: Work, Field Resource Management; Transmission & Distribution Asset Management; Advanced Metering Infrastructure and Grid Operations.