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Smart grid is becoming mainstream, with solutions providing distribution networks with a valuable set of potential tools to help them deliver electricity reliably, safely and cost-effectively. Varying national energy challenges, regulation and industry structures mean that there will be no single “right” timing and approach for deploying smart grid technologies and solutions around the world. Utilities face a key choice of where and how quickly they should transition from traditional/classical to smart technologies.

Distribution grids have become smarter and will continue to do so. In the medium term, we are likely to see some pathfinder utilities forge ahead with large-scale deployments of smart grid solutions, while the majority will look to deploy discrete solutions. Accenture has identified three strategic practical approaches to how smart grid might be exploited:

- **Incremental traditionalist** – Opportunistic, small-scale smart grid investments, focused on low risk and steady returns with limited operational drivers for deployment beyond mandated solutions.

- **Smart grid challenger** – Significant investments as smart grid solutions take the place of traditional ones. This approach will be commonly adopted by utilities facing significant challenges such as reliability problems, ageing assets or capacity constraints.

- **Smart grid embracer** – Extensive smart grid investment with aggressive pursuit of new revenue streams and engagement in significant business and operating model changes.

This paper will provide a review of the challenges driving the uptake of smart grid solutions and consider how the variations in challenges for each nation could result in diverging priorities for smart grid investment. Following on from the national challenges, the paper focuses on the tasks required to determine and execute the appropriate smart grid strategies for utilities.
Networks at the heart of our energy challenges
Distribution networks around the world must respond to a number of major energy industry challenges in order to safeguard the ongoing delivery of electricity to consumers. Major challenges include:

- Reliability and resilience of supply
- Energy security and independence
- Control over rising electricity costs
- Support for demand growth
- Environmental sustainability
- Evolving distributed generation technologies

While the exact configuration of the future grid depends on a wide variety of regionally specific contextual factors and drivers, one thing is certain: networks will be more complex. Their final state will be determined by local requirements and how tensions across the different drivers are reconciled. For example, the availability of cheap natural gas in North America is pushing gas-based, self-generation technologies faster than expected; while in Europe, such solutions are many years away, owing to comparatively high prices for natural gas.

### Reliability and resilience of supply

As the dependence on a constant supply of electricity increases, reliability is becoming paramount, with consumers becoming less forgiving of interruptions. A number of instances of high-profile failures, such as in India during the summer of 2012 when half a billion people were left without power, in Italy where 50 million people were impacted for more than 12 hours in 2003, and widespread blackouts in the United States and Canada that same year (and again in 2009), have focused attention on reliability. Severe weather has taken its toll—as in the case of US outages during Superstorm Sandy in 2012. Maintaining and replacing ageing infrastructure is a major concern, with many countries’ assets on the grid at, near or past the end of their useful life. Cyber attacks on the electricity grid are increasing, and will continue to be a critical threat to power delivery. All over the world, there are calls for the grid to be strengthened against these types of threats. Comparing the system reliability across countries reveals large variations in performance (see Figure 1).

### Energy security and independence

Continuity of energy supply is a key national aim for all governments but, for some, the challenge is particularly acute. For example, Japan, an island nation with limited natural energy resources, has moved away from nuclear power in the wake of the 2011 Fukushima Daiichi disaster, leaving a major gap in the country’s electricity generation portfolio. To compensate, Japan has had to import more natural gas, with 2012 imports more than 23 percent higher than those of 2010, as well as implement an aggressive agenda around smart metering and energy efficiency.

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**Figure 1. System average interruption duration index (SAIDI) for selected countries, 2012 (scale in minutes).**

- China: 480
- Canada: 311
- Australia: 262
- United States: 138
- Brazil: 110
- Spain: 72
- United Kingdom: 70
- France: 63
- Italy: 48
- Netherlands: 33
- Japan: 17
- Korea: 15
- Germany: 15
- Singapore: <1

Note: SAIDI = Total duration of sustained interruptions in a year/total number of consumers.
Source: Accenture analysis, 2013.
Germany, which is also moving away from nuclear post-Fukushima, has focused on renewables as its favored generation method. Unlike Japan, Germany has access to other electricity networks through interconnectors with other European countries. As long as imports and exports between these networks remain open and efficient, these interconnectors could assume the continued energy security for Germany and the other European countries.

In contrast, the US energy security and independence position has been transformed by the development of shale gas and oil. For example, total gas reserves increased by 49 percent from 2006 to 2011, and improving extraction techniques are increasing the oil reserves rapidly, with an annual increase of 12.5 percent from 2010 to 2011. If these trends continue, it is likely that the United States will have high levels of energy independence over the next 20 years.

Finally, for many countries, energy independence is not yet achievable due to a lack of energy resources. These countries will be relying on new technologies such as renewables and storage reaching grid parity on a consistent basis, which will happen over time. In a globalized world, however, no country is isolated, and improved energy security can be pursued at an economically competitive cost through a broad range of approaches. For example, some countries are pursuing long-term supply contracts, such as those agreed between the United Kingdom and Norway or Qatar and Russia. Others are buying upstream assets, as China has been doing extensively in Africa.

A combination of diplomatic negotiations and infrastructure investment, such as between the European Union and Russia, are being pursued to secure long-term supplies while, for others, geopolitical considerations are influencing a shift in their energy mix, such as Germany’s vigorous mandate for renewable generation.

Control over rising electricity costs

The cost of electricity raises varying issues in different parts of the world. Contrast, for example, the situation in the United States where, despite investments in generation, transmission and distribution of approximately $80 billion each year for the next three years, prices are still a fraction compared to most of the world’s developed economies, largely as a result of low fuel costs from shale gas. Many other markets around the world have generally had low wholesale prices, but investment in transmission, distribution and support for renewables has driven retail electricity prices higher. In Australia, for instance, household electricity prices have risen 40 percent since 2007, and are expected to rise an additional 30 percent by 2014. In the United Kingdom, gas and electricity prices have doubled over the past seven years. Not surprisingly, such increases impacting consumers are beginning to sow the seeds of consumer discontent associated with unprofitable investment in renewables.

High electricity prices can act as a constraint on the ability of network companies to invest to meet their other challenges. Investment to maintain or improve reliability is critical for some countries, but is an unsustainable trend where electricity prices are already very high. Increasing spend on network infrastructure driving up retail prices may force individuals, businesses, communities and politicians to seek more cost-effective alternatives such as fuel substitution. Utilities are increasingly finding that the analytics associated with smart grid deployments have the potential to significantly reduce costs and, therefore, electricity prices through specific initiatives such as theft reduction, improved asset utilization, Volt/VAR control and process improvements.

Support for demand growth

Demand for electricity will increase in line with developmental factors in various regions of the world. For example, there are some 1.3 billion people in the developing world with no access to electricity. In developing countries, remote microgrids may offer a cost-effective, sustainable solution to providing electricity and heat. According to Pike Research, the global remote microgrid market is estimated to increase from 349 to 1,100 megawatts (MW) by 2017—a total project revenue of more than $10.2 billion. On the other hand, rapidly increasing urbanization and economic growth is driving demand ever higher in many developing economies.

Electricity demand expectations are fundamental for a network company’s investment strategy. All networks can be expected to progressively move from growth-dominated to replacement-dominated investment, reflecting the underlying demographic and economic changes. The greatest challenge is likely to arise from step changes in demand. For example, while total demand in many developed economies is flat or declining, there is the potential for fuel substitution—for example, arising from a mass switch to plug-in electric vehicles (PEVs) and the move to electric space heating—which in turn would drive higher growth in electricity demand. Similarly, mass uptake of distributed renewables, such as solar photovoltaic (PV), would cause local reduction in demand in concert with two-way power flows as excess generation is exported into the distribution network.
Environmental sustainability

Legislation to address local pollution and climate change emissions is having a major impact on utilities’ generation activities. At a local level, air quality is being addressed by mandates such as China’s target of a 30 percent reduction in heavily polluting industries by the end of 2017 or the European Union’s standards for air quality. In addition, many countries are also attempting to achieve targets for greenhouse gas emissions in line with the United Nations Framework Convention on Climate Change by 2020 and beyond. Accordingly, tough targets for low- or lower-carbon generation are in place in many countries, requiring a move to a more distributed supply solution that necessitates significant increases in network capacity to carry renewables or distributed generation. For example, at the end of 2012, Denmark was covering more than 30 percent of the country’s electricity consumption from wind energy, with an official target of 50 percent by 2020. Germany’s high feed-in tariff has driven what is currently the world’s largest PV market at 28 gigawatts (GW) (out of a global total of 102 GW in 2012).

In the United States, rooftop PV will likely achieve grid parity for about 100 million households in the early part of the next decade and fuel cells are already becoming competitive in many states—with the size of units for domestic use being the main barrier to greater penetration.

Greater technological innovation in transport could also see the substitution of gasoline and diesel-powered vehicles for electric vehicles or those powered by natural gas in many countries. Similarly, efforts to reduce the environmental impact of space and water heating could result in large-scale take-up of new technologies such as solar heating and heat pumps that could have substantial impacts on electricity demand.

Network companies are playing a key role in facilitating the efforts to increase the environmental sustainability of the electricity system. New technical challenges are likely to arise as the scale of deployment of lower-carbon solutions increases.

Evolving distributed generation technologies

Deployment of distributed generation, such as rooftop PV and smaller-scale wind, is likely to grow significantly in locations with generous financial support for deployment, such as China, Japan, Germany and within the United States. There is a risk that this could relegate utilities to acting as second-tier suppliers or, in the worst-case scenario, providers of last resort to many domestic consumers, particularly if domestic-scale energy storage becomes cost effective.

Greater distributed generation increases the complexity of electricity flows in the network and will place additional demands on the ability to manage those effectively. Developments to date suggest that, depending on the region, utilities are often not yet ready, willing or able to compete in the distributed generation market. New entrants are taking the lead and dominating the beyond-the-meter generation market, offering solar PV systems and financing. As technologies develop, other players such as natural gas utilities offering fuel cells will compete head on with electric utilities for a greater share of customers’ wallets.
The potential of a smarter grid: Global perspectives assessment

In developing a robust strategy for smart grid, the first step is developing an understanding of the tipping points that could alter the industry investment landscape, in terms of consumer and governmental support for investment and the broad national energy challenges that could substantially alter the functional requirements of the network. In this section, Accenture has analyzed the national energy challenges to help understand: 1) whether there are particular national energy challenges that would influence the speed of uptake of smart grid solutions and 2) the degree of support that smart grid deployment is likely to get from regulators, companies and consumers.

Methodology

Accenture analyzed 15 countries against five of the six key challenges detailed in the previous section to help determine the priorities for distribution companies in the next five years (see Figure 2). The five national energy-related challenges assessed are:

1. Environmental sustainability
2. Reliability and resilience of supply
3. Energy security and independence
4. Control over rising electricity costs
5. Support for demand growth

A sixth challenge we considered, evolving distributed generation technologies, was not assessed as this is largely expected to be a global driver of change, rather than one that is nationality-specific.

In addition, we have rated the degree of support for smart grid deployment from three groups:

1. Government and regulatory
2. Utilities
3. Consumers

![Figure 2. High-level methodology for assessment of national energy challenges and smart grid deployment support.](image-url)

**Countries**

- Australia
- Brazil
- Canada
- China
- France
- Germany
- India
- Italy
- Japan
- Netherlands
- South Korea
- South Africa
- Spain
- United Kingdom
- United States of America

**National challenges**

Scored and ranked on 18 factors covering five national challenges

- Environmental sustainability
- Reliability and resilience of supply
- Energy security and independence
- Control over rising electricity costs
- Support for demand growth

**Support for the smart grid**

Scored and ranked on 12 factors covering levels of support for smart grid

- Government and regulatory
- Utilities
- Consumers

Challenges mapped to potential network responses to determine priority actions

- Improve asset utilization
- Reduce theft
- Increase renewables carrying capacity
- Etc.
Each country was scored against 30 metrics that provide insight into the national energy challenges or the support for smart grid deployment. For example, considering environmental sustainability, PM10 particulate levels were evaluated as part of the local air pollution assessment and domestic and industrial electricity prices were used as part of the controlling electricity costs assessment. The national climate change challenge was assessed in a semi-quantitative manner by comparing current emissions to stated targets to provide a view of how difficult it would be to meet national targets, not a simple assessment of the levels of current greenhouse gas emissions. By combining these assessments, each country was given a score based on its relative ranking. Then, to gauge the degree of support for smart grid, we analyzed areas such as the presence or absence of a national strategy for smart grid, the level of funding available for smart grid investments, the presence of smart grid pilots and consumer support levels for action on climate change.

Addressing a varied mix of energy challenges

As would be expected, distribution networks are facing considerable variations in national energy challenges (see Figures 3, 4, 6, 7, 8 and 9).

Environmental sustainability

European and developed Asian economies face large environmental challenges, largely driven by legally binding climate change commitments, such as the 20-20-20 targets in Europe and commitments to the United Nations Framework Convention on Climate Change. China and India also face significant challenges from poor air quality; in addition, China has committed to substantial efficiency targets to meet climate change commitments that are likely to significantly challenge its utility companies. The United States and Canada face a lower degree of challenge from environmental requirements than the other countries analyzed. The growth of shale gas in particular has meant that delivering against climate change targets in the next five years should be easier than for the other countries analyzed. For example, the total annual carbon dioxide (CO₂) emissions from power generation in the United States were 2,039 million metric tonnes in 2012, the lowest annual emissions for the sector since 1996.

Figure 3. Environmental sustainability challenges facing assessed countries.

<table>
<thead>
<tr>
<th>Level of challenge</th>
<th>Environmental sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>China</td>
</tr>
<tr>
<td></td>
<td>Japan</td>
</tr>
<tr>
<td></td>
<td>Netherlands</td>
</tr>
<tr>
<td></td>
<td>Spain</td>
</tr>
<tr>
<td>Low</td>
<td>Germany</td>
</tr>
<tr>
<td></td>
<td>Italy</td>
</tr>
<tr>
<td></td>
<td>India</td>
</tr>
<tr>
<td></td>
<td>South Africa</td>
</tr>
<tr>
<td></td>
<td>United Kingdom</td>
</tr>
<tr>
<td></td>
<td>France</td>
</tr>
<tr>
<td></td>
<td>South Africa</td>
</tr>
<tr>
<td></td>
<td>Brazil</td>
</tr>
<tr>
<td></td>
<td>United States</td>
</tr>
<tr>
<td></td>
<td>Canada</td>
</tr>
<tr>
<td></td>
<td>Australia</td>
</tr>
</tbody>
</table>

Note: Weighting for this assessment was based on each country’s degree of local pollution (PM10) and level of climate change target. For example: China’s ranking is largely driven by its levels of local pollution; while the Netherlands, with lower local pollution, ranks high due to significantly higher climate change targets as a result of EU 20-20-20 commitments. Source: Accenture analysis, 2013.
Reliability and resilience of supply

The rapidly developing economies of China, India and South Africa will face the greatest challenges to develop and maintain strong reliability of supply (see Figure 4). Western European countries, Japan and South Korea have more limited challenges from reliability in the next five years, though maintaining their strong historic performance over the long term will not be a simple task. The United States, Canada and Australia stand out among the developed economies with more significant reliability challenges. These are, in part, related to their exposure to extreme weather conditions—a much more common concern among North Americans, for example, as highlighted by the respondents to Accenture’s Digitally Enabled Grid executive survey (see Figure 5).

Energy security and independence

Japan and South Korea, the countries with the greatest energy security challenges, have limited energy resources and restricted electricity interconnection with other countries (see Figure 6). Japan’s short-term energy security concerns are also accentuated by the current closure of its nuclear fleet. The countries with lowest levels of challenge are, unsurprisingly, those with significant energy reserves. Growth of tar sands (Canada), shale gas (United States), and bioethanol (Brazil and United States) has transformed the energy mix of some countries. China has a relatively strong position on electricity energy security due to its large coal deposits and increasing interconnection between regions. A number of European countries have significant energy security challenges due to a relative lack of indigenous resources. Changes to the national generation fleets (closure of nuclear plant in Germany and increasing renewables in all countries) are likely to place greater emphasis on maintaining energy security through interconnection and demand flexibility.

Figure 4. Reliability and resilience challenges facing assessed countries.

<table>
<thead>
<tr>
<th>Level of challenge</th>
<th>Reliability and resilience of supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>South Africa, China, India, Brazil, Canada, Australia, United States, Spain, France, Italy, United Kingdom</td>
</tr>
<tr>
<td>Low</td>
<td>Japan, South Korea, Netherlands, Germany</td>
</tr>
</tbody>
</table>

Source: Accenture analysis, 2013.

Accenture’s Digitally Enabled Grid program: 2013 executive survey methodology

Accenture conducted an executive survey among utilities executives worldwide involved in the decision-making process for smart grid-related matters in their company. The survey results are based on questionnaire-led interviews with 54 utilities executives in 13 countries, conducted via telephone in 2013 for Accenture by Kadence.*
Figure 5. Survey responses on the likelihood of extreme weather concerns driving investment in reliability and outage solutions.

Will concerns over robustness to adverse/extreme weather drive additional investment in your company in outage management and restoration capabilities by 2020?

![Survey Response Chart]

- **Very likely + likely**: 41%
- **Very unlikely + unlikely**: 59%

Base: All respondents, grid operations section.
Source: Accenture’s Digitally Enabled Grid program, 2013 executive survey.

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Figure 6. Energy security and independence challenges facing assessed countries.

<table>
<thead>
<tr>
<th>Level of challenge</th>
<th>Energy security</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Japan</td>
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<td></td>
<td>South Korea</td>
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<td></td>
<td>Germany</td>
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<td>France</td>
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<td>Spain</td>
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<td></td>
<td>South Africa</td>
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<td></td>
<td>United Kingdom</td>
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<td>Brazil</td>
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<td>India</td>
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<td>Netherlands</td>
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<tr>
<td></td>
<td>China</td>
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<td>United States</td>
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<tr>
<td></td>
<td>Canada</td>
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<tr>
<td></td>
<td>Australia</td>
</tr>
</tbody>
</table>

Source: Accenture analysis, 2013.
Control over rising electricity costs

European countries generally have greater challenges from high electricity costs and significant additional pressure likely to come from further renewables deployment and air quality legislation (see Figure 7). The United States and Canada stand out among developed economies with low electricity costs, driven in part by cheap natural gas. However, the relatively high per capita electricity usage in North America means that there is still likely to be significant pressure on utilities from consumers and regulators to keep prices low. The developing economies generally have low electricity costs compared to most developed economies. In these countries, maintaining a low electricity cost is seen as critical to ensuring continued, rapid economic growth, and the full costs of electricity are not necessarily passed through to all consumers. Brazil stands out among developing economies with electricity costs comparable to Western European rates. While high electricity prices may help utilities drive consumer efficiency measures, it may also provide a constraint on investment that would result in an increase in tariffs.

Support for demand growth

Developing economies face greater pressure from electricity demand growth due to increased industrial demand, urbanization and growing per capita usage. The United States, Canada and Australia also display demand growth challenges, though these are driven mainly through population growth rather than per capita usage increases (see Figure 8). The European countries, Japan and South Korea have more limited demand growth challenges as they have stable or decreasing populations and, in some cases, decreasing per capita usage. France and the United Kingdom stand out as the European countries with the highest demand growth challenges, due to stronger population growth and higher urbanization rates than the other European countries.

An aggregated view: Challenges and propensity toward smart grid deployment

Our assessment demonstrates that all assessed countries have specific national challenges that could drive the deployment of specific smart grid solutions in the near term. When viewed in aggregate (see Figure 9), however, it is clear some countries face a broader set of challenges that could result in more pervasive use of smart grid solutions. In particular, the developing economies of China, India and Brazil face a wide-ranging set of challenges that warrant consideration of most of the available smart grid solutions. The European and North American countries generally have moderate degrees of challenge, suggesting significant near-term complexity to which network operators will need to respond. Within the EU countries, the need to meet climate change agreements will be a particular consideration, but other challenges are also likely to be important, including the cost of electricity and energy security, particularly for Italy, Spain and Germany. Although countries such as South Korea scored relatively low on this assessment, it does not infer that the challenges driving investment are negligible. While South Korea does not have many of the significant shorter-term challenges that other countries are grappling with, it would still make sense to start the network on a path that has resilience against the greater challenges in the longer term.

Figure 7. Electricity cost challenges facing assessed countries.
Figure 8. Support for demand growth challenges facing assessed countries.

Figure 9. Average level of challenge and propensity toward smart grid by country, all assessment areas combined.

Source: Accenture analysis, 2013.
An overview of the potential future network solutions

Accenture mapped these national energy challenges to the potential network solutions distribution companies may implement as a response. We chose 10 responses covering consumer solutions, carrying capacity, and asset efficiency and performance (see Figure 10).

Combining views to highlight the potential for future network solutions for each country, as well as aggregating results for countries with significant similarities (details for each country level can be seen in the Appendix), Figure 11 provides a view on the potential for each network solution.

Europe

In general, the countries of Western Europe display similar functionality priorities. This assessment might be expected given their similar regulatory structures, pollution commitments and ages of their networks. Overall, locating solutions to help them meet their climate change targets forms the key challenges, and this is reflected in the strong importance placed on increasing the carrying capacity for low-carbon solutions and facilitating consumer demand reduction and demand flexibility. However, high costs are also a factor, and improving asset utilization and reducing retail costs would also likely be key areas of focus. Theft, network reliability and outage response tend to be lower priorities for most countries, though there are some disparities.

The United States, Canada and Australia

The United States and Canada have similar functional priorities for their distribution networks—primarily, the improvement of network reliability and outage response. The importance of network performance has been increased by higher consumer concern about reliability, potentially exacerbated by recent high-profile failures resulting from extreme weather events like Superstorm Sandy. Australia has similar challenges to Canada and the United States, although the higher electricity prices may constrain its investment options. The smaller size of the Australian electricity system, along with its lack of interconnection, would likely require additional efforts to build flexibility into the network itself through demand response and storage, if economically viable.

The contrast in challenges between North American and European distribution utilities is supported by the Accenture survey (see Figure 12). In fact, according to survey respondents, the requirement to improve grid reliability and outage response is clearly seen as a priority when looking at smart grid solutions by the majority of the North American respondents. On the other hand, in comparison, European respondents more commonly point to areas such as accommodating utility-scale renewables, distributed sources of energy and new sources of demand as high-priority drivers for smart grid deployment. Interestingly, North American respondents are more likely to look at smart grid solutions to manage metering and distribution operations costs than European respondents, despite the significantly lower electricity costs in North America.
Figure 11. Relative importance of different network solutions by region.

Select highlights by region:
- Developing economies: Countries in this region would require end-to-end solutions; addressing reliability and outage are key
- Europe: Addressing consumer challenges and renewables and new load capacity are critical
- North America and Australia: Addressing outage and reliability are critical
- Japan and South Korea: Focus on energy independence, reliability and load capacity

Source: Accenture analysis, 2013.

Figure 12. Drivers of smart grid deployment.

What is or would be the importance of the following value levers in the decision to deploy smart solutions in your company?

<table>
<thead>
<tr>
<th>Value Lever</th>
<th>Europe</th>
<th>North America</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve grid reliability and outage response</td>
<td>89%</td>
<td>72%</td>
</tr>
<tr>
<td>Improve end-consumer energy efficiency and conservation</td>
<td>81%</td>
<td>67%</td>
</tr>
<tr>
<td>Lower the costs of distribution operations</td>
<td>79%</td>
<td>67%</td>
</tr>
<tr>
<td>Accommodate utility-scale renewables</td>
<td>74%</td>
<td>89%</td>
</tr>
<tr>
<td>Accommodate distributed sources of energy</td>
<td>74%</td>
<td>100%</td>
</tr>
<tr>
<td>Accommodate new sources of demand</td>
<td>72%</td>
<td>83%</td>
</tr>
<tr>
<td>Reduce costs of metering and retail customer service</td>
<td>70%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Base: All respondents.
Source: Accenture’s Digitally Enabled Grid program, 2013 executive survey.
Japan and South Korea

In contrast to North America, Japan has a limited need to improve its network reliability, but faces major challenges to control electricity costs and enable renewables and potential new loads such as electric vehicles. The historically reliable network in Japan provides a potential buffer to allow increased distributed generation by increasing the reliability risk by a small degree. This buffer could help to reduce the costs of increasing renewable generation hosting though would require significant education of the public and regulators to gain widespread approval. South Korea has a similar set of challenges to Japan although electricity prices are lower, which is likely to result in fewer constraints on its approach.

Developing economies

The developing economies of Brazil, China, India and South Africa show broadly similar challenges though with some notable exceptions. All four countries share a strong need to address network reliability and outage response to limit outage duration, as would be expected in rapidly growing distribution systems. The implications of China’s environmental targets can be seen in its need to increase the capacity for hosting embedded renewables and facilitate demand flexibility. Brazil, India and, to a lesser extent, South Africa have a stronger opportunity to reduce average cost per kilowatt-hour (kWh) through the reduction of energy theft. In addition, Brazil faces more acute pressure from its high energy prices. As these economies develop, it would be expected that cost pressures would increase in importance over the next 10 years.

Implementing: The degree of support for smart grid deployment

The choice of whether to move to smart grid technologies and solutions will be strongly influenced by three groups: government/regulatory, consumers and the utilities themselves.

To determine shorter-term levels of support, we looked at practical demonstrations of commitments from those three groups, such as existing deployments and pilot studies and the presence of a stated strategy for smart grid, and weighted their degree of support for smart grid deployment for each group.

The results (see Figure 13) show a wide range in support, with significant variances between countries and across the different types of support—government/regulatory, utility and consumer. China, Japan and South Korea show the greatest degree of support, and it is likely that these countries will press on most quickly with deployment. Some European countries such as the United Kingdom, the Netherlands and Germany display a low degree of support, particularly from consumers.

Figure 13. Levels of support for smart grid technologies and solutions from government and regulators, utilities and consumers.

Source: Accenture analysis, 2013.
Methodological note: Smart grid support

To gauge the degree of support for smart grid, we analyzed the following areas:

Government/regulatory:
• Presence or absence of a national smart grid strategy
• Availability of funding support for smart grid projects
• Presence of a smart metering deployment mandate
• Degree of regulatory support in place for smart grid

Consumers:
• Consumer concern relating to reliability
• Consumer interest in home, distributed generation solutions
• Consumer support for climate change action
• Consumer desire for purchasing electricity from utilities with large percentage of renewables sources

Utilities:
• Smart grid strategy articulated by the majority of companies
• Smart grid funding articulated to the public and shareholders
• Presence and scale of smart grid pilots
• Presence and scale of existing significant smart grid deployments

Note that the consumer metrics are not specifically addressing the consumer interest in smart grid solutions or technologies. Given the technical nature of the smart grid, it is more appropriate to gauge consumer interest in factors that would support smart grid investment, such as reliability or climate change action.

Insights from Accenture’s Digitally Enabled Grid executive survey: Barriers to smart grid deployment

As shown in Figure 14, European respondents noted that the two most common barriers were the business case and a lack of regulatory or policy support, suggesting that policymakers need to work with utilities further if they want to see larger-scale deployment of smart grid solutions. North American respondents seem to be more focused on practical considerations of the technology.

No single model for smart grid deployment

It is clear from our analysis that there is no single path forward for smart grid; considerable variation in national energy challenges imply a heterogeneous take-up of smart grid technologies and solutions in terms of timing and choices of technologies and solutions.

Figure 14. Current barriers to deployment of smart technologies and solutions.

What are the main current barriers for the deployment of smart solutions for your network?
Select three

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Europe</th>
<th>North America</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited return on investment from smart grid technology</td>
<td>67%</td>
<td>1</td>
</tr>
<tr>
<td>Lack of regulatory or policy support</td>
<td>56%</td>
<td>2</td>
</tr>
<tr>
<td>Lack of mature technology solutions</td>
<td>52%</td>
<td>1</td>
</tr>
<tr>
<td>Cyber security concerns</td>
<td>48%</td>
<td>3</td>
</tr>
<tr>
<td>Consumer antipathy or opposition</td>
<td>37%</td>
<td></td>
</tr>
<tr>
<td>Lack of skills</td>
<td>24%</td>
<td></td>
</tr>
</tbody>
</table>

Base: All respondents.
Source: Accenture’s Digitally Enabled Grid program, 2013 executive survey.
Evaluating the options for smart grid business models

Future of the grid: Smart or not?

While we noted that the key national energy challenges impacting networks vary significantly between countries, the bottom line is that utilities need to respond. The critical questions are: How and when? There is no question that smart grid technologies and solutions have the potential to address many of the key network challenges. This is confirmed by Accenture's survey, where respondents indicate a very diverse and broad set of value levers as important or critical to deploy smart solutions (see Figure 15). Some network functionality, however, may also be delivered through more traditional technology and approaches (e.g., traditional network hardening). So while the theoretical potential of the smart grid is undeniable, the way forward needs to be navigated pragmatically.

Making robust decisions: A segmentation approach for smart grid opportunities

Decisions on deployment of smart grid solutions will increasingly become a mainstream business decision. The majority of respondents to the Accenture survey see smart grid as providing cost-effective solutions in the network area (see Figure 16). However, a clear approach is needed to verify that smart grid opportunities are properly assessed by the business. One approach is to segment the smart grid opportunity landscape into different types of investment based on their risk and opportunity levels.

Accenture's view is that such a segmentation framework should have four levels of decision making to reflect increasing levels of uncertainty and dependency and hence investment at risk (see Table 1).

Figure 15. Importance of value levers in the decision to deploy smart grid solutions.

What is or would be the importance of the following value levers in the decision to deploy smart solutions in your company?

<table>
<thead>
<tr>
<th>Value Lever</th>
<th>Not important at all</th>
<th>Not very important</th>
<th>Important + critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve levels of service for end consumers</td>
<td>7%</td>
<td>11%</td>
<td>82%</td>
</tr>
<tr>
<td>Improve grid reliability and outage response</td>
<td>15%</td>
<td>17%</td>
<td>68%</td>
</tr>
<tr>
<td>Improve end-consumer demand response (e.g., reduce/shift peak consumption)</td>
<td>6%</td>
<td>2%</td>
<td>92%</td>
</tr>
<tr>
<td>Improve end-consumer energy efficiency and conservation</td>
<td>17%</td>
<td>15%</td>
<td>68%</td>
</tr>
<tr>
<td>Lower the costs of distribution operations (lower losses and cost to operate)</td>
<td>2%</td>
<td>6%</td>
<td>92%</td>
</tr>
<tr>
<td>Accommodate distributed sources of energy (e.g., smaller-scale solar, wind, etc.)</td>
<td>6%</td>
<td>20%</td>
<td>74%</td>
</tr>
<tr>
<td>Accommodate utility-scale renewables (e.g., large-scale wind, hydro, solar, etc.)</td>
<td>6%</td>
<td>20%</td>
<td>74%</td>
</tr>
<tr>
<td>Accommodate new sources of demand (e.g., plug-in electric vehicles)</td>
<td>13%</td>
<td>17%</td>
<td>69%</td>
</tr>
<tr>
<td>Reduce costs of metering and retail customer service</td>
<td>6%</td>
<td>2%</td>
<td>92%</td>
</tr>
<tr>
<td>Enable markets for new energy and energy-related services and products</td>
<td>6%</td>
<td>11%</td>
<td>83%</td>
</tr>
<tr>
<td>Reduce non-technical losses (e.g., energy theft)</td>
<td>6%</td>
<td>2%</td>
<td>92%</td>
</tr>
</tbody>
</table>

Base: All respondents.
Source: Accenture's Digitally Enabled Grid program, 2013 executive survey.
Figure 16. Survey respondents’ views on the impact of smart grid on the costs for grid upgrading/maintenance.

The adoption of smart technologies will reduce the costs of upgrading/maintaining the grid by 2030.

![Pie chart showing 28% Agree and 72% Disagree]

Base: All respondents. 
Source: Accenture's Digitally Enabled Grid program, 2013 executive survey.

Table 1. Accenture's smart grid segmentation approach, with four levels of decision making.

<table>
<thead>
<tr>
<th>Smart grid continuum</th>
<th>Key characteristics</th>
<th>Sample investments</th>
</tr>
</thead>
</table>
| 1                    | New technologies and techniques across the network that can extract more value from existing smart grid investment with minimal incremental cost | - Apply analytics to high-latency smart meter consumption and voltage data to: 
  - Plan based on actual versus estimated load and voltage and reduce unnecessary redundancy 
  - Persistently reduce network voltage on viable circuits 
  - Generate granular asset load profiles to support condition-based asset management |
| 2                    | One-off investments in smart grid technologies or solutions with a clear, compelling near-term business case | - Post-fault automation 
- Predictive (asset failure) asset management |
| 3                    | Smart grid technologies or solutions with the potential to compete with traditional alternatives | - Investment in individual schemes to respond to thermal and voltage constraints 
  - Dynamic asset rating 
  - Demand response 
  - Active voltage control |
| 4                    | Large-scale investment at risk to grow or defend future revenues and maintain a sustainable network | - Comprehensive low-voltage sensing 
- Major IT/OT upgrade to support enhanced real-time visibility and control/active network management 
- Upgrade of the communications backbone 
- Commercial capabilities to contract and manage a portfolio of distributed energy resources, including providing ancillary services to the system operator |
Across the smart grid continuum, leading utilities will continually reassess their position as they manage a portfolio of smart investments that run from the highest level to the lowest. They will also invest in maintaining and shaping the external relationships (primarily: consumers, policymakers/regulators and other industry participants) that drive the risk versus return trade-off.

It is level four that presents the biggest challenge to network companies. At this level, a utility makes the decision to invest in transformational change and fundamentally change people, process and technology to support a new approach to managing and operating the network. A compelling reason is needed to take this leap in the near term rather than adopting a "wait-and-see" strategy.

Currently, there appears to be a significant degree of optimism concerning the potential upside for smart grid investment benefits. A majority of respondents to Accenture’s survey indicated that they believed that the scale of benefits would exceed the initial forecasts (see Figure 17). Strong post-project appraisal and knowledge sharing with other utilities should be used to help to articulate the presence and scale of any upside to the business case.

Currently, there appears to be a significant degree of optimism concerning the potential upside for smart grid investment benefits. A majority of respondents to Accenture’s survey indicated that they believed that the scale of benefits would exceed the initial forecasts (see Figure 17). Strong post-project appraisal and knowledge sharing with other utilities should be used to help to articulate the presence and scale of any upside to the business case.

**Trigger points for disruptive smart grid deployments**

Some utilities are facing challenges and opportunities that have the potential to justify the pursuit of a more radical strategy and invest in the supporting business and operating model. In fact, the Accenture survey indicates that almost one-third of respondents expect to move to a pervasive use of smart grid solutions by 2030 (see Figure 18).

We see three areas where a step change in the industry would trigger the assessment of such a strategy for the pervasive deployment of smart grid solutions:

- Load discontinuities and network capacity changes
- Grid parity for solar PV and storage packages
- Regulatory risk and market potential

**Figure 17. Survey response to scale of benefits from smart grid investments.**

Benefits from smart grid/meter deployments will exceed the initial forecasts

![Figure 17. Survey response to scale of benefits from smart grid investments.](image-url)
Load discontinuities and network capacity and access

A network business is neither credible nor sustainable if it cannot meet demand. Mass or highly localized electrification of heating or transportation, and rapid and concentrated traditional load growth could present serious difficulties for highly utilized networks where there is a long lead time on traditional reinforcement or access challenges (e.g., in very densely populated areas). In these cases, access to smart technologies and solutions that can be applied with pace and certainty to maintain security of supply could be critical.

Grid parity of solar PV plus storage

Parts of Australia and California are already experiencing the impact of mass adoption of small-scale solar PV. In the United States, the price and availability of shale gas have the potential to drive consumers toward natural-gas-powered self-generation and heating. And in every region of the world (starting with the sunniest), we face a future in which decreasing PV panel and installation prices combined with cheaper storage, begin to displace centralized generation and the principles of existing, centralized power networks. If consumers have a cost-effective option to move off the grid, a significant component of the revenues is put at risk, which may require a utility to address its cost base and services in a more radical fashion.

However, the risk to the traditional model still exists and could result in falling revenues. This situation would result in the remaining consumers having to shoulder a higher proportion of the fixed costs, likely driving further distributed generation adoption and penalizing consumers who are unable to afford the required capital outlay. Alternatively, the network value would have to be written down and investors would have to accept lower returns. Neither outcome appears sustainable.

Utilities under threat from PV and other micro-generation technologies may need to look at more radical strategies to develop new revenue streams and integrate all this new generation while maintaining quality and security of supply. For example, solutions could include developing new charging mechanisms to incentivize consumers with micro-generation to stay connected to the network or developing and maintaining microgrid solutions on behalf of consumer groups.

Figure 18. Expectations for the scale of smart grid deployment in the longer term for distribution grids.

Which of the following network operating models will best characterize your network by 2030?

- Predominantly traditional/ conventional technologies
- Pervasive use of smart technologies and distributed generation
- Hybrid – traditional/ conventional technologies with selected deployment of smart technologies and distributed generation

31%
67%
2%

Base: All respondents.
Source: Accenture’s Digitally Enabled Grid program, 2013 executive survey.
Regulatory risk and market potential

The degree to which risks are mitigated by the regulator and opportunities are created by the market could change markedly, resulting in significant changes in the case for disruptive smart grid deployment. While respondents to Accenture’s survey seem to see an uncertain future relative to future revenue models, only 25 percent see traditional asset-based returns as a model for growth (see Figure 19). The pervasive deployers from Figure 18 expect to experience greater changes to their revenue model, with 35 percent of them seeing a significantly redefined revenue model by 2030.

At this stage, it is Accenture’s view that technologies such as distributed generation, storage, plug-in electric vehicles and microgrids have the potential to impact competition and regulatory models in a fundamental way over the longer term. The Accenture survey indicates that a substantial degree of competition from new entrants is expected, even within the next five years (see Figure 20). While increased competition in areas such as distributed generation and demand aggregation is not surprising, a significant number of respondents expect competition to increase in areas much closer to the core asset business, such as embedded energy storage, power electronics hardware and services and even last-mile network deployment.

An appropriate approach is to consider these potentially disruptive factors as part of a scenario-planning exercise that articulates the value of investing in smart grid technologies and solutions in the shorter term to mitigate the risk of future value destruction or to secure future revenue streams.

A characteristic of many disruptive technologies in asset-intensive industries such as utilities is that they take longer to become mainstream than initially expected, but that the disruption they cause is larger than expected. This is due to the fact that disruption is often caused by a combination of changes or technological improvements that each alone can have minimal impact but, when combined, can alter the landscape of an industry. For example, the growth of demand for unleaded gasoline was kick-started by the mandated requirements for catalytic convertors in cars as lead was linked to catalytic poisoning and failure of the convertor. Similarly, the combinations such as low-cost distributed generation and cost-effective storage solutions could be highly disruptive. Utilities need to understand and monitor such potential tipping points.

Figure 19. Expectations of the long-term business model for distribution businesses.

What best describes how you expect your distribution business model to be by 2030?

- Asset-based returns plus significant revenue growth opportunities due to CAPEX investment in infrastructure: 25%
- Significantly redefined revenue model: 23%
- Asset-based returns plus significant revenue growth opportunities due to beyond-the-meter products and services (e.g., solar PV, EV charging, etc.): 8%
- Asset-based returns with limited revenue growth opportunities: 21%
- Asset-based returns with core business revenue reduction due to bypassing of the distribution grid by distributed generation and microgrids: 13%
- Other: 10%

Base: All respondents excluding standalone retail companies.
Source: Accenture’s Digitally Enabled Grid program, 2013 executive survey.
What to do next?

Trade-offs and the strategic options will vary across countries, reflecting investment returns expectations and the degree to which the utility is vertically integrated. Accenture has identified a series of possible strategic responses for network and integrated utilities to implement today (see Table 2). The position should be reviewed each year as the environment develops to either accelerate or decelerate the pace of smart adoption and investment. Due to the wide-ranging, interconnected nature of the benefits of many smart solutions, it is essential to verify that all parts of the business are considered when assessing potential investments. As we move down the list of strategic responses, from incremental to more clearly disruptive approaches to smart grid adoption, the level of investment risk increases, as does the potential for revenue outperformance against steady-state returns and the potential to manage disruptive changes to the business model.

We are still in the early stages of smart grid deployment, and there remain many uncertainties about the durability of regulatory support, maturity of technologies, strength of business cases and the degree of impact the solutions will have on business operations. Knowledge sharing with other utilities is vital to help clear these uncertainties and lower risks of deployment.

Conclusion

It is clear that there is no single “right” operating model for the future of the grid around the world. National energy challenges, varying industry structures and legacy network characteristics mean that each distribution company needs to incorporate smart grid technologies and solutions in a way that meets its specific needs. In the medium term, it is likely that some pathfinder utilities will move ahead with large-scale deployments of smart grid solutions, while the majority will look to deploy discrete solutions.

Further smartening of the distribution network is inevitable for all utilities. Smart capabilities will be increasingly built into network assets, many consumers will demand increasing amounts of information and the costs of delivering smart solutions are likely to decrease as volumes rise. Smart solutions should be seen as a natural extension of the ongoing improvement of the distribution grid and distribution companies must be able to make decisions on whether to invest in a particular smart grid solution as a standard part of asset investment planning processes.

A natural consequence of further smartening of the network is that new capabilities will be required. However, the addition of these new capabilities cannot be allowed to compromise the delivery of financial and asset performance from the rest of the network. Successfully optimizing a portfolio of smart and traditional assets will be a critical requirement.

Figure 20. Expectations of the level of competition from new entrants in the next five years.

Do you believe competition from new entrants will increase in the following areas in the next five years?

Respondent who selected “Yes”

<table>
<thead>
<tr>
<th>Service Area</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beyond-the-meter solutions focused on energy efficiency and demand response</td>
<td>85%</td>
</tr>
<tr>
<td>Data-related services (e.g., services that leverage energy consumption data)</td>
<td>85%</td>
</tr>
<tr>
<td>Distributed generation</td>
<td>67%</td>
</tr>
<tr>
<td>Demand-side aggregation (i.e., load-shifting services to distribution and transmission companies or direct to electricity markets)</td>
<td>59%</td>
</tr>
<tr>
<td>PEVs and associated charging infrastructure</td>
<td>57%</td>
</tr>
<tr>
<td>Smart metering services</td>
<td>52%</td>
</tr>
<tr>
<td>Microgrid development and operations</td>
<td>48%</td>
</tr>
<tr>
<td>Embedded (distribution) energy storage</td>
<td>46%</td>
</tr>
<tr>
<td>Power electronics hardware and services (e.g., deploy and sell power electronics-enabled services to distribution companies or consumers)</td>
<td>43%</td>
</tr>
<tr>
<td>Last-mile deployment (e.g., electricity network, meter and communications infrastructure)</td>
<td>43%</td>
</tr>
</tbody>
</table>

Base: All respondents.
Source: Accenture’s Digitally Enabled Grid program, 2013 executive survey.
<table>
<thead>
<tr>
<th>Business model</th>
<th>Smart grid continuum</th>
<th>Context</th>
<th>Three-to-five year strategic priorities</th>
<th>Business-model-specific impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incremental traditionalist</td>
<td>Opportunistic investment at Level 1</td>
<td>Owner targeting long-run, low-risk yield and growth of regulated asset base</td>
<td>Protect existing revenues, maintain pace with regulatory expectations, use established solutions with slow scaling, avoid investment at risk of stranded assets, minimize business disruption, take lowest risk and cost approach to mandated smart metering</td>
<td>Medium-voltage automation for post-fault restoration, new assets are smart-ready where incremental cost is small, smart meter data for network analytics, targeted application of demand response for constrained areas of the network where traditional solutions face major challenges</td>
</tr>
<tr>
<td></td>
<td>Opportunistic investment at Level 2</td>
<td>High degree of uncertainty over low-carbon adoption and decarbonization of the generation mix</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Limited investment at Level 3</td>
<td>Significant spare network capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No investment at Level 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smart grid challenger</td>
<td>Extensive investment at Level 1</td>
<td>Ageing network and reliability challenges (extreme weather events), consumer demands for innovation and efficiency, regulatory support for smart investment; e.g., increased rate of return, localized capacity constraints</td>
<td>Fund a portfolio of pilots and provide proactive support for smart solutions through scheme-level investment appraisal, innovate to meet consumer expectations, build consumer relationships to support active participation, target investment in key enabling capabilities (including communications and IT/OT), pursue opportunistic pursuit of new revenue streams using alliance partners to reduce risk</td>
<td>Advanced fault management using smart meter data, retrofit enhanced smart functionality on existing network assets to improve low-voltage visibility and control, long-run demand response/distributed generation contracts with consumers or aggregators to defer or avoid network reinforcement, analytics-enabled dynamic asset rating offered to major connections consumers where upstream reinforcement is required, provide ancillary services to the system operator, including commercial aggregation and virtual power plant operation</td>
</tr>
<tr>
<td></td>
<td>Extensive investment at Level 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Significant investment at Level 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No investment at Level 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smart grid embracer</td>
<td>Extensive investment at Level 1</td>
<td>Competitive, liquid and volatile wholesale markets, low-carbon electricity, and stable with low-hanging benefits realized</td>
<td>Pursue new revenue streams aggressively, make significant smart investments without guaranteed regulated returns, engage in major business and operating model change including mergers and acquisitions, drive change actively in regulation to disrupt the status quo</td>
<td>Operate the local distribution network to provide ancillary services to the system operator, integrated application of smart technologies and analytics across the network to defer and avoid reinforcement, consumer segmentation analytics and targeted engagement to grow a portfolio of distributed energy resources</td>
</tr>
<tr>
<td></td>
<td>Extensive investment at Level 2</td>
<td>New entrants establishing themselves in new markets, smart metering technology in and stable with low-hanging benefits realized</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Extensive investment at Level 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Extensive investment at Level 4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Strategic responses to smart grid deployment.
Responding: An overview of the potential future network solutions

Figure 21. Relative importance of different network solutions by region, European countries.

Level of importance

High electricity costs would encourage action on retail operations costs in some European countries, such as Germany and Italy.

Increasing the carrying capacity for low-carbon generation and new loads are key for most European countries.

Supporting electricity conservation among consumers and promoting demand flexibility would be important, given the climate change commitments and high electricity costs for European countries.

United Kingdom  Germany  France  Netherlands  Spain  Italy

Source: Accenture analysis, 2013.

Figure 22. Relative importance of different network solutions by region, North America and Australia.

Level of importance

Improving reliability of electricity delivery is the area of highest focus for all three countries.

Australian networks appear to have similar functional requirements, except an increased need to manage costs could encourage adoption of solutions such as implementing asset utilization and reduced retail costs.

Unlike the European countries, there is generally a significantly lower requirement to accommodate new, low-carbon solutions in the near term, although some areas of networks are likely to see significantly higher penetration.

United States  Canada  Australia

Source: Accenture analysis, 2013.
Figure 23. Relative importance of different network solutions by region, Japan and South Korea.

Level of importance

High

Japan's high electricity costs are likely to favor the use of solutions that improve asset utilization and reduce retail costs

Both Japan and South Korea have significant supply and demand-side targets to address climate change, which would require significant action to increase carrying capacity and reduce demand

Improving reliability of electricity delivery is a low priority, as both countries have low levels of outages

Low

Japan

South Korea

Source: Accenture analysis, 2013.

Figure 24. Relative importance of different network solutions by region, developing economies.

Level of importance

High

High demand growth is likely to result in greater adoption of improved asset utilization approaches

Theft reduction solutions are critical to help the long-term management of electricity costs, particularly in India and Brazil

Significant environmental challenges plus large demand growth are likely to favor the use of renewables and solutions to support the management of consumer demand growth

Improving reliability of electricity networks is a key challenge for all the emerging economy countries assessed

Low

Brazil

South Africa

China

India

Source: Accenture analysis, 2013.


4. Ibid.

5. Accenture analysis.


* Countries in scope for Accenture’s Digitally Enabled Grid program executive survey: Argentina, Australia, Brazil, Canada, France, Germany, Italy, Japan, Netherlands, Spain, Singapore, United Kingdom, United States.
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For more information on Accenture’s Digitally Enabled Grid program, go to www.accenture.com/digitallyenabledgrid.

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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.

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