
2012 STRATEGIC DIRECTIONS IN THE U.S. ELECTRIC UTILITY INDUSTRY

A BLACK & VEATCH REPORT



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Welcome to the 2012 *Strategic Directions in the U.S. Electric Utility Industry Report*. For the sixth year, Black & Veatch has endeavored to capture the changing attitudes and priorities among U.S. electric utilities. While the results of this year's report show the continuity of many recent industry trends, we also note significant changes that have or are starting to affect participating organizations.

Analysis of this year's responses indicates the beginning of an evolutionary period in utilities' business models brought forth by a myriad of new challenges and opportunities ranging from electric vehicles and cheap and abundant natural gas supplies, to new ways of engaging customers. We also see the industry's view of "sustainability" shifting from a limited "green" initiative outlook to one in which it is an essential business strategy.

At the same time, the electric industry remains mired in legislative and regulatory uncertainty. The time has come for legislators and regulators to make a decision on the carbon issue, as well as other key regulations and/or incentives. Utilities cannot make decisions on critical infrastructure investments designed to last for decades based on rules that may or may not apply for more than a Congressional term.

Sincerely,

DEAN OSKVIK | PRESIDENT & CEO
Black & Veatch's global energy business

JOHN CHEVRETTE | PRESIDENT
Black & Veatch's management consulting division

For utilities and industry leaders, it is time for us to take a leading role in educating our customers and government officials about the importance of these issues. Why should customers want a smart grid rather than oppose it? Why should regulators allow for fair return on investments in the technology? Why is it essential that the federal government make a decision regarding carbon? Ultimately, the answer to each of these questions comes back to being able to provide the same level of reliability we enjoy today in a more efficient, more environmentally sound and more cost-effective manner.

Black & Veatch is grateful to everyone who participated in our report. We would also like to acknowledge the Black & Veatch professionals who contributed their insights and analysis for this report. To continuously improve our products for the industry, we welcome your questions and comments regarding this report and other items. You can reach us at ConsultingInfo@bv.com.

THE BLACK & VEATCH ANALYSIS TEAM

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Environmental Regulation

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KEVIN CORNISH

Smart Grid and Intelligent Infrastructure

Kevin Cornish is an Executive Consultant in Black & Veatch's Management Consulting Division. With more than 25 years of experience in the industry, Cornish specializes in the integration of intelligent infrastructure systems into utility enterprise systems such as GIS and OMS, among other areas.

JEFF EVANS

Customer Engagement

Jeff Evans is an Executive Consultant within Black & Veatch Management Consulting Division and specializes in advanced metering infrastructure, business case development and meter reading technologies.

RUSSELL FEINGOLD

Rates and Economic Regulation

Russell Feingold is a Vice President within Black & Veatch's Management Consulting Division where he leads the Ratemaking and Financial Planning Services Group. He has more than 30 years of experience serving electric and gas utilities on a broad range of projects.

MARK GABRIEL

Executive Summary and Nexus of Water and Energy

Mark Gabriel is a Senior Vice President within Black & Veatch's Management Consulting Division. He has more than 20 years of experience and authored the book *Visions for a Sustainable Energy Future*, which won the 2009 Indie Award for Excellence in Environmental Writing.

GREG HOPPER

Implications of Domestic Natural Gas

Greg Hopper is a Managing Director in Black & Veatch's Management Consulting Division. Greg has more than 20 years of experience in the Oil & Gas industry and leads the company's Natural Gas and Power Generation Fuels Practice.

FREDERICK JENNINGS

Financial Overview

Frederick Jennings is a Managing Director in Black & Veatch's Management Consulting Division. He has more than 34 years experience in utilities strategy, business planning, technology implementation and operations improvement.

WILLIAM KEMP

Sustainability as Business Strategy

William Kemp is a Vice President with Black & Veatch's Management Consulting Division where he serves as a trusted advisor to numerous energy and water utilities. Kemp has more than 30 years of experience in the utility industry and leads the company's Sustainability Pathfinder service line.

ERIC POWELL

Mergers & Acquisitions

Eric Powell is a Director within Black & Veatch's Management Consulting Division. He has extensive experience across the energy space – marrying industry, investments, and consulting. Most of which is framed in changing conditions in energy and other asset/process-intensive industries, including M&A in power, oil, and gas markets.

WILLIAM ROUSH

Electrification of Transportation and Renewable Energy

William Roush is a Renewable Energy Consultant within Black & Veatch's global energy business. With more than 15 years of experience in the industry, Roush is the current President of the Heartland Solar Energy Industries Association and past Advisory Committee Member of the Solar Electric Power Association.

EVERYTHING CHANGES WHILE STAYING RELATIVELY THE SAME

BY **MARK GABRIEL**

In the 12 months since the last Black & Veatch electric utility industry report, the industry has seen its primary fuel choice challenged and natural gas prices drop to levels not seen since 2001. A historically warm winter across much of the country drove down consumption (and hence revenue), creating a cash crunch for many utilities. Further, the industry's hopes for some progress on the regulation of carbon continue to wax and wane in a U.S. Congress unable to make a decision.

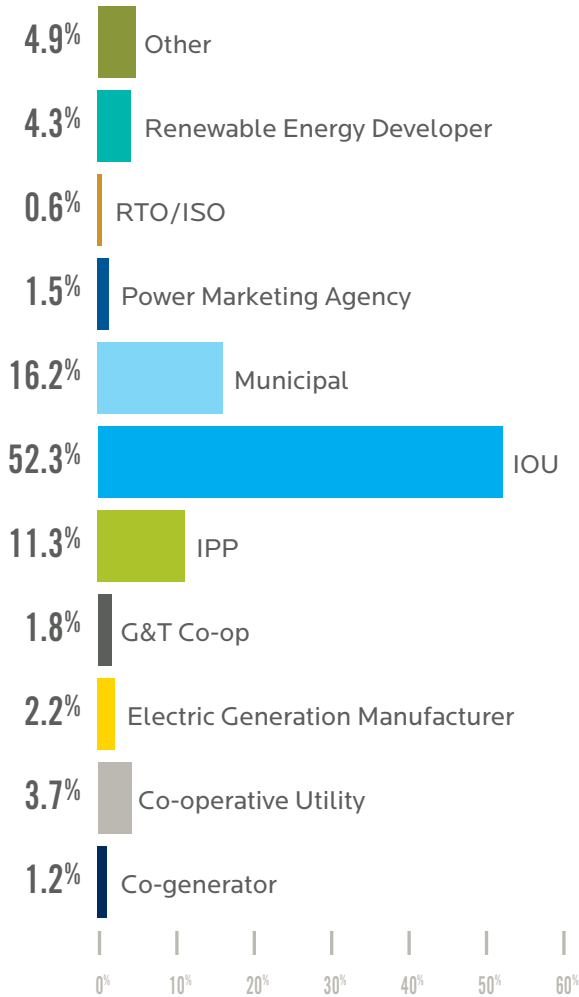
Yet for all of the changes across political, economic and cultural lines, results from this year's report are strikingly consistent with those of the past three years in terms of concerns, worries and the potential impacts of regulation and other requirements. Perhaps it is the historic focus of the industry on reliability and safety; perhaps it is a return to back-to-basics management approaches; or perhaps it is the generally conservative nature of the industry, which results in this remarkable consistency from year-to-year.

Black & Veatch conducted its sixth annual electric utility industry survey from 22 February through 23 March 2012. Analyzed survey responses are from qualified electric

utility industry participants. Statistical significance testing was conducted and represented results have a 95 percent confidence level.

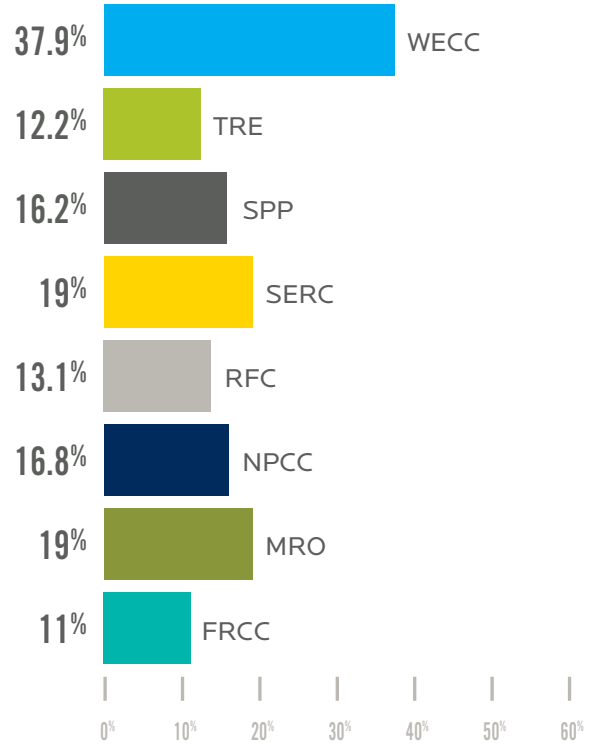
Utility respondents represented a broad cross section of the industry (Figure 1) and country. The eight mainland regional reliability councils under the North American Electric Reliability Corporation (NERC) were represented in this survey. Figure 2 provides an overview of the percentage of respondents from each of these regions. Responses were also grouped by four geographic regions, as noted in Figure 3, to give additional insights into geographic differences.

FIGURE 1
UTILITY RESPONDENTS BY TYPE OF ORGANIZATION



Source: Black & Veatch

FIGURE 2
UTILITY RESPONDENTS BY NERC REGION(S) SERVED



Source: Black & Veatch

FIGURE 3
UTILITY PARTICIPANTS BY REGION



Source: Black & Veatch
Survey participants were classified by geographic region. Where statistically valid and relevant, survey responses were analyzed for regional differences. Figure 3 provides an overview of how each region is classified.

KEY SURVEY FINDINGS

The industry, according to the survey, continues to hold fast to some fundamental beliefs: that there will be some certainty on carbon; that prices for electricity will continue to rise; that while coal has a future, renewables have a growing but limited one; and that water is a critical environmental concern. There is also significant agreement in several interesting areas – interesting because undoubtedly a survey of the general public, regulators or legislators on the same topics would most likely yield different results. When it comes to “viable clean energy” technologies, for example, the “big three” that electric utilities project for 2020 are natural gas, hydroelectric and nuclear (see Figure 19 on page 29). While conjecture, it is doubtful the general public would rate any of those choices as particularly “green” technologies.

More than 90 percent of utility respondents believe, however, that renewables will increase prices for consumers anywhere from 5 to 30 percent, with the largest percentage (38 percent) assuming a 10 percent increase for their customers. This may tie to the 65 percent of utility respondents who reported rate increases during the past year, and the 92 percent who reported that the cost of regulations will cause prices to rise for consumers (see Financial Section). More than 60 percent of utility respondents believe they will hit their renewable energy targets – but a surprisingly 25 percent of utility respondents stated they do not know if it is achievable. One has to wonder whether the pending increase in rates due to renewables and the potential demise of the production tax credit are behind this uncertainty.

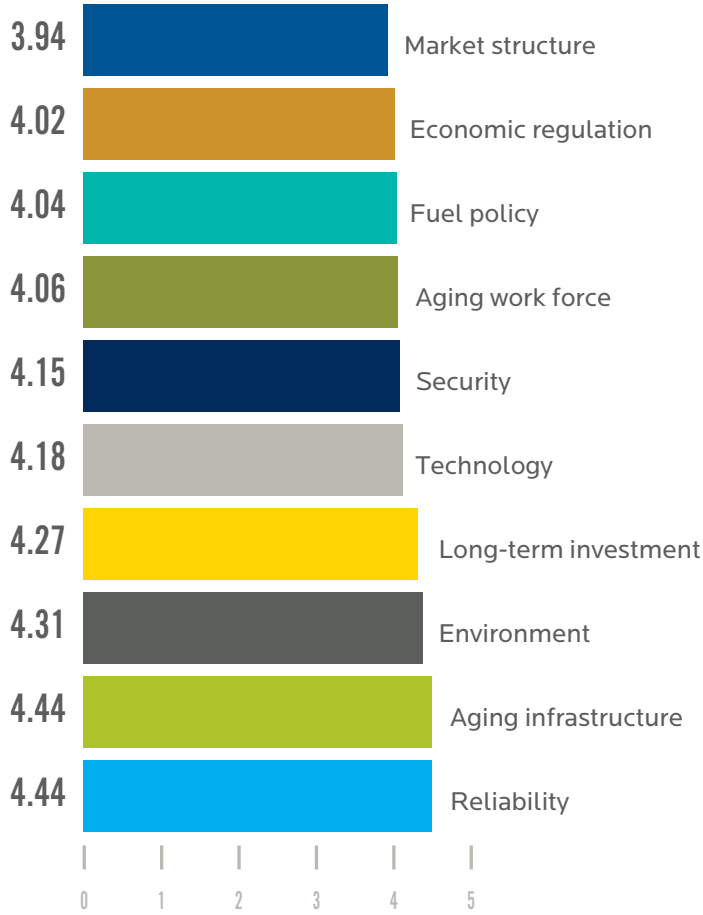
Reliability, aging infrastructure (not work force) and the environment continue their reign as the top industry concerns (Figure 4), followed closely by the need for long-term investment. Interestingly, security and technology – inextricably linked in terms of deployment, are tied in the fifth position. While water did not make the Top Ten Issues list, it did come in second only to carbon emissions legislation in terms of environmental concerns. In fact, when water supply (second) and water effluent (sixth) are combined, they rise to the top of environmental concerns.

The hope for certainty in carbon emissions legislation is common across all regions and, as it has since 2008, leads the ranking in environmental concerns followed closely by water supply (see Table 2 on page 40). Interestingly, when broken down into the four geographic regions, Northeast

respondents rank disposal and storage of nuclear fuel as their top concern – an issue that does not even make the top three in the Midwest, South or West. The concern over nuclear disposal, overall, jumped significantly since 2009 when it was near the bottom of industry issues – likely due to the lingering influence of the unfortunate incidents at Fukushima, as well as the abandonment of plans for a national geologic storage facility at Yucca Mountain.

The potential impact of environmental regulation continues to be a primary focus for utility survey respondents. It is interesting to note that the survey’s timeframe in March pre-dated (and yet predicted) the U.S. Environmental Protection Agency’s (EPA) and Department of Interior’s new hydraulic fracturing rules issued in May. More than 80 percent of respondents saw this coming in their crystal balls. Of course, 93 percent of survey respondents believe these new rules – and any subsequent rule additions, will have a significant or slight upward pressure on the price of natural gas (see Figure 17 on page 27). Respondents’ prediction on the price of natural gas in 2020 showed a virtual tie between \$4-\$6 per MMBtu and \$6-\$8 per MMBtu. More than one-fifth of survey respondents (22 percent), perhaps those who have been around to watch historical gas price fluctuations, reported not knowing where the price will be in the same period.

FIGURE 4
TOP 10 INDUSTRY ISSUES



Source: Black & Veatch

Survey participants were asked to rate on a scale of 1 to 5, where 1 indicates “very unimportant” and 5 indicates “very important,” the importance of each of the above listed industry issues. Once again, reliability and aging infrastructure top the list among all utility participants.

Regulations are also causing concern regarding the operational effectiveness of utilities as well as concern for increasing rates. A full 86 percent of respondents believe there will be impacts on operational effectiveness with 16 percent believing it will be “significant” (see Figure 5 on page 13). Regulatory impacts are also key drivers in investment, the development of sustainability plans

and the perception of utilities on Wall Street – either for stock price or bond ratings. Concern over whether or not utilities will be able to recover adequate returns on investment – or any costs for that matter - for smart grid investments, weigh on the minds of utility respondents. This is especially true now that American Recovery and Reinvestment Act dollars are almost gone.

EXECUTIVE SUMMARY

Smart grid, which burst onto the survey scene several years ago, continues to struggle from “a lack of customer interest and knowledge,” which utility respondents view as the single greatest impediment to investment programs. Yet, when pressed further, more and more companies are investing in systems to improve customer communications, which are driven by smart systems. More than three-fourths (76.9 percent) will be building customer self-service websites, expanding their web presence, social media and potentially implementing variable rates – all areas in which the smart grid is a key component or at least a primary enabler. It may be that the grudging acceptance of intelligent infrastructure is part of the historically conservative nature of the business when even “fast followers” are viewed as radically different and risk takers.

Regulation at the federal and state/local level is also influencing the market for merger and acquisition (M&A) activity. The 2011/2012 timeframe has seen three significant mergers and acquisitions and, for the first time, the Black & Veatch survey looked at the impacts of these activities. With Exelon/Constellation, Duke/Progress and Northeast Utilities/Nstar each at some stage in the M&A process, all utilities are considering their own futures and what these mergers really mean. The vast majority see financial scale rather than operating synergies as a driving force of profitability in this area moving forward. The benefits of scale are particularly apparent when considering that regulators require most utilities to either hand over, or at least share, cost cutting and operational savings with customers – especially in light of continued slow load growth or declining kilowatt hour sales.

Looking at the numbers, the industry has changed remarkably in some capacities while remaining steady in its core function. For example, 58 percent of utility respondents believe “when fiscal realities are fully considered in the United States,” there is still a future for coal. This is a significant drop from the 81.5 percent who indicated this to be the case in last year’s survey. As noted within, the industry is taking more environmental concerns into account than ever before even though nearly a third (29.2 percent) believes that global warming is still “speculative.” It is not unexpected that an industry that prides itself on reliability, safety and long-term investment focuses so intently on certainty; potentially at the risk of missing dynamic changes. It could be as Voltaire once noted, “Doubt is not a pleasant condition, but certainty is absurd” with many more surprises to come in a rapidly changing energy market.

**“DOUBT IS NOT A PLEASANT
CONDITION, BUT CERTAINTY
IS ABSURD.”**

– VOLTAIRE

Black & Veatch is helping Los Angeles Department of Water & Power ensure reliable electric service for its customers by considering a more holistic approach to the future demand for vital resources.



FINANCIAL OVERVIEW

BY **FREDERICK JENNINGS**

Financial issues facing U.S. electric utilities, and the ramifications associated with these issues, pervade the responses to Black & Veatch's 2012 survey. Typically a consistent area of concern in previous market reports, current and emerging financial issues will largely be affected by the need to invest in operational technologies and competitive generation resources, as well as environmental and regulatory compliance programs.

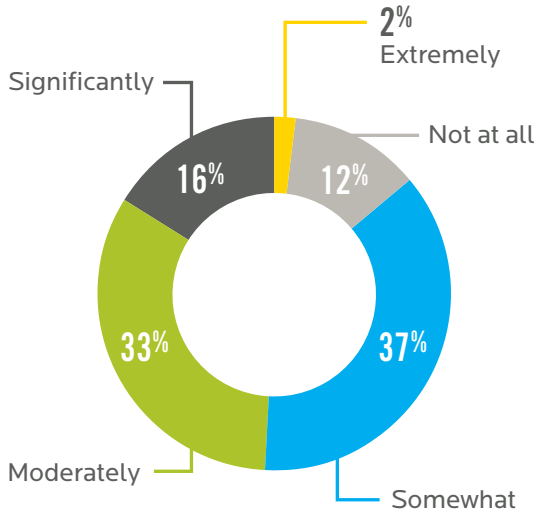
Strong financial planning continues to be necessary in order to gauge economic risk from factors such as smart grid investments, capital spending programs, the potential for cessation of production tax credits and distributed renewable generation. In order to survive, utilities must balance economic risks against enterprise financial performance goals and rate impacts. While there is little-to-no consistency among respondents regarding which technology investments will be required, all survey groups agree that technology initiatives will be implemented and that a strong balance sheet will be necessary to support financing these and other major system-related projects. There is also consensus that the drive for financial strength may encourage further merger and acquisition activity (see Merger & Acquisitions within this section for additional detail).

Clearly, utilities are working to maintain financial strength by adopting a variety of approaches. Utility respondents report that cost-cutting measures are in place and more than two-thirds say these measures are having a detrimental impact on operational effectiveness (Figure 5). In the face of upward cost pressures, it appears that utilities, in particular, will continue to look inward for additional savings while expanding technology investments. Approximately 75 percent of respondents indicated that cost-cutting gains must be shared in part or in whole with customers (Figure 6). This suggests that

utilities will concentrate on investments that leverage cost reduction gains and avoid rate adjustments. As a result, financial management through cost-cutting exclusively is fast becoming an ineffective strategy for maximizing balance sheet strength.

These realities create new price pressures on already rising rates. Two-thirds of utility respondents stated that the average rates for their customers have increased (Figure 7). Moving forward, more than 90 percent of utility respondents believe compliance with regulatory and environmental rules will further raise rates – more than 50 percent stated compliance programs will increase rates “significantly” (Figure 8 on the next page). Additional concerns that may impact overall corporate financial performance comes from increasing concern over cost recovery of smart grid investments.

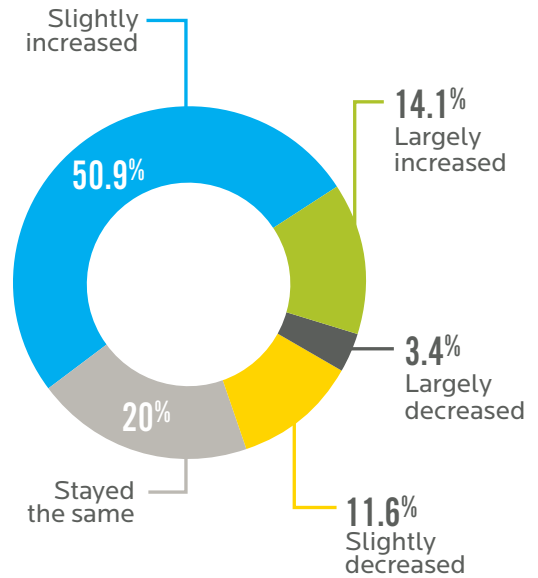
FIGURE 5
COST CUTTING AND OPERATIONAL EFFECTIVENESS



Source: Black & Veatch

Survey participants were asked, "How much has cost cutting reduced the operational effectiveness of the gas and electric utility industries?" More than 85 percent of utility participants stated cost cutting has reduced operational effectiveness to some degree.

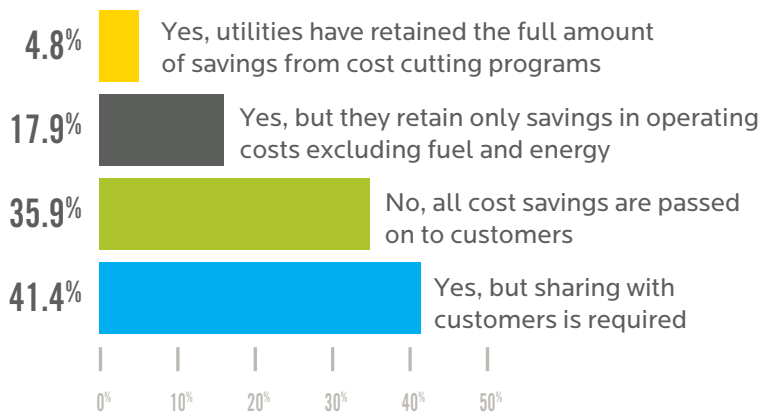
FIGURE 7
AVERAGE CUSTOMER RATES



Source: Black & Veatch

Survey participants were asked to finish the following sentence, "The average rates to your customers have..." More than two-thirds of participants stated customer rates have increased to some degree.

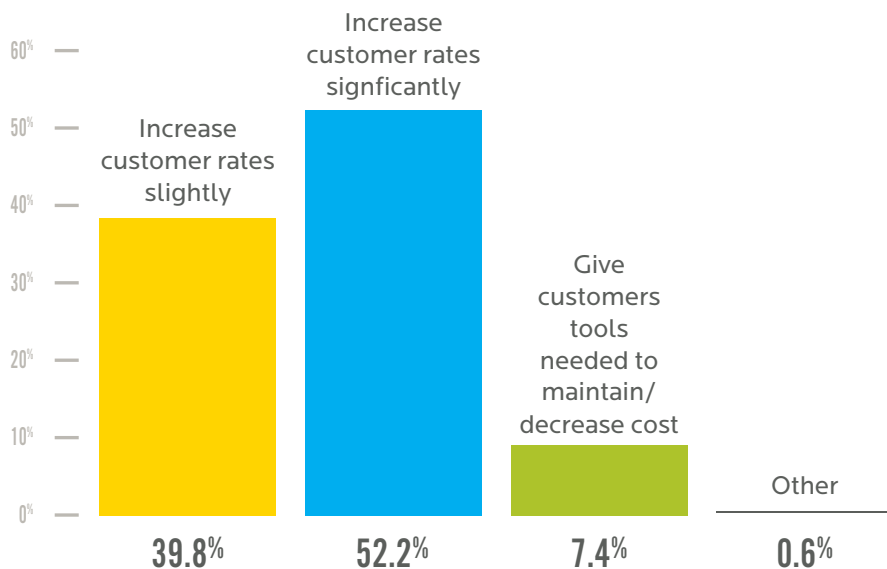
FIGURE 6
ARE UTILITIES IN YOUR STATE PERMITTED TO RETAIN COST SAVINGS FOR THE BENEFIT OF SHAREHOLDER/STAKEHOLDER?



Source: Black & Veatch

Survey participants were asked, "Has your regulator permitted utilities to retain cost savings for the benefit of the shareholder/stakeholder?" Approximately 75 percent of respondents indicated that cost-cutting gains must be shared in part or in whole with customers.

FIGURE 8
IMPACT OF REGULATION ON CUSTOMER RATES



Source: Black & Veatch

Survey participants were asked to complete the following sentence, “Compliance with regulatory and environmental rules as they are currently proposed will likely...” More than half of survey participants stated compliance will increase customer rates significantly.

Despite cost and rate concerns, capital expenditures and investments in electric infrastructure look to be on the rise in 2012. Half of survey respondents indicated their utilities will invest more in 2012 than in 2011, with one-quarter of respondents saying spending levels will remain the same and one quarter indicating spending levels will decrease.

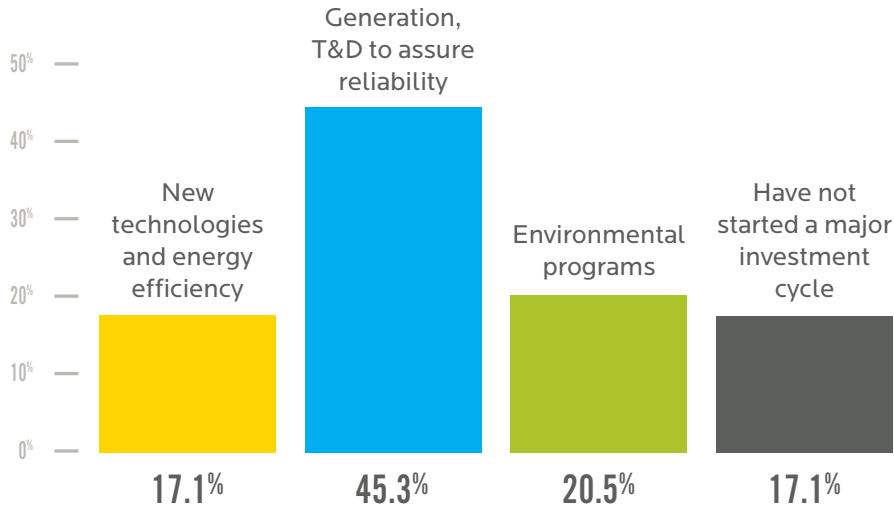
Utility leaders indicated they are investing in reliability, environmental compliance, as well as new technology programs. More than 80 percent of survey respondents indicated they have embarked on a major investment cycle. Figure 9 outlines where the money is going.

The concept of “sustainability” is gaining acceptance among utilities. Earning opportunities from sustainability support the “green to gold” concept and utility leaders are taking note. More than two-thirds of utility survey respondents believe that earnings opportunities exist in the future but the ease of capture is evenly split among respondents as to whether these opportunities

are readily available (Figure 10). Despite the significant shift in attitude, one-third of utility respondents still view sustainability as having little financial benefit to the utilities or worse, even posing risk to financial performance.

Survey results indicate a general increase in the overall importance and need for formal, structured financial planning and governance. As outlined throughout this report, issues facing the industry today are significant. Overcoming each carries with it a large price tag, indicating the convergence of finance with utility operations, regulatory compliance and new technologies. The financial burden of meeting today’s needs continues to place upward pressure on customer rates. Continuation of rate increases places utilities at risk of running afoul of regulatory expectations. Clear business cases, financial and capital spending programs and continuous communication with customers will become increasingly more important to build good will despite rising rates.

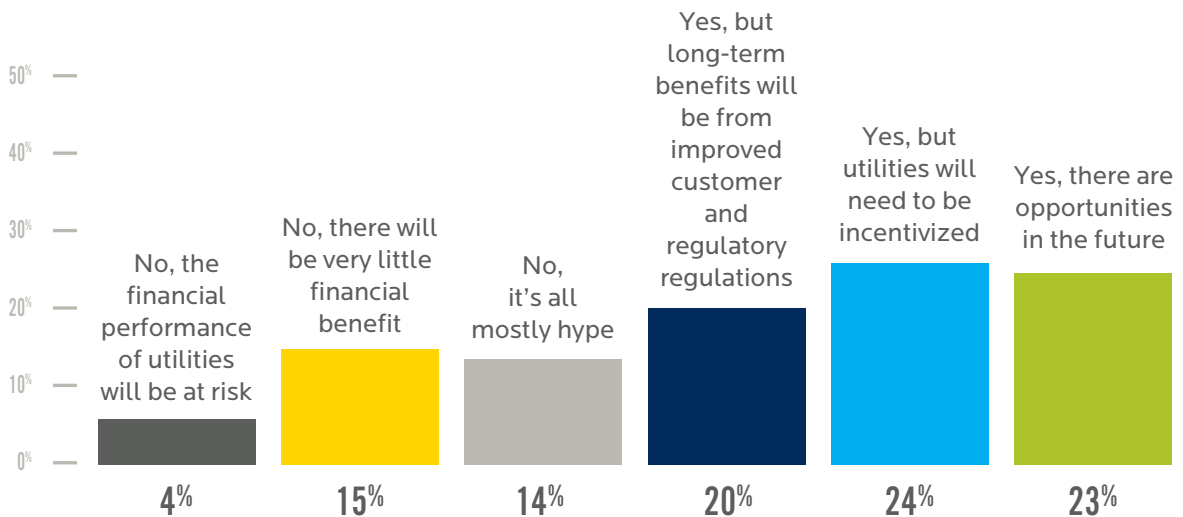
FIGURE 9
AREA OF CONCENTRATION FOR MAJOR INVESTMENTS



Source: Black & Veatch

Survey participants were asked to select one of the above categories that best represents where their major investments are most concentrated.

FIGURE 10
ARE THERE EARNINGS-ENHANCING OPPORTUNITIES IN "GREEN" AREAS?



Source: Black & Veatch

Survey participants were asked if they believe there are significant earnings-enhancing opportunities for utilities in "green" areas of the economy. More than two-thirds indicated there is potential.

ELECTRIFICATION OF TRANSPORTATION

BY **BILL ROUSH**

One particularly high-profile issue addressed by the survey is the potential impact of electric vehicles (EVs) on the generation market. Based on the data, respondents are either tremendously optimistic about EVs becoming significant contributors to load, or not fully aware of the energy consumption of these vehicles. Respondents were asked to estimate how much of their annual load they expect EVs to represent by the end of specific time frames with an average response of 7 percent of load by 2025. To meet this number, Black & Veatch estimates more than 65 million EVs will need to be in use by 2025. This requires an exponential year-over-year increase in EV sales. In 2011, General Motors sold less than 8,000 of its Chevy Volts, while sales of Nissan's Leaf just surpassed 9,600¹.

The majority of survey respondents indicated they were willing to fund some actions to accelerate market penetration of EVs and natural gas vehicles (NGVs). These actions include pilot programs, fueling station investments for their fleet and the general public. Some utilities have joined groups such as their local Clean Cities Commission that promote all types of alternative fueled vehicles in order to plan, prepare and encourage EV and NGV adoption. The opportunity to electrify the transportation sector could be a new market segment

for electric utilities. However, while this represents a load growth opportunity, it will likely require significant planning and potentially even organizational changes to pursue. For instance, most utilities don't have people dedicated or experienced with studying the impact of electric vehicles on the distribution system. They also may not have people well versed in promoting electric vehicles and understanding the technology of the car, the new charging infrastructure, or the economics of it all.

¹"Electric vehicle sales struggle in April." *The Detroit News*. May 1, 2012. <http://www.detroitnews.com/article/20120501/AUTO01/205010401/1361/Electric-vehicle-sales-struggle-in-March>.

BY THE NUMBERS

MEETING 7 PERCENT OF ELECTRIC LOAD

(1 percent of load = **37.5** billion kilowatt hours (kWh)²
The average EV uses **4,000** kWh per year³)

$$\frac{37.5 \text{ billion kWh}}{4,000 \text{ kWh}} = \frac{9,386,232 \text{ Electric Vehicles} \times 7}{65,704,184 \text{ Electric Vehicles}}$$

² Source: U.S. Energy Information Administration 2010 U.S. Electric Retail Sales

³ Based on average consumption of 0.33 kWh per mile at 12,000 miles per year

MERGERS & ACQUISITIONS

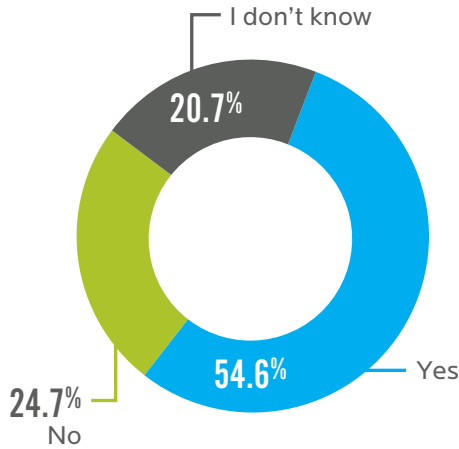
BY **ERIC POWELL**

In the last two decades, mergers and acquisitions (M&A) have been the preferred strategic means for utilities' attempt to preserve shareholder value. Utilities maintain a keen focus on ways to drive shareholder value while balancing the impact on rate payers – cost reduction – especially in the current market of financial, regulatory, and market pressures. Framing synergistic goals around financial scale remains the key driver in achieving overall value and performance. Given the current marketplace, integrating operational synergies in a coherent manner is emerging as a strategic part of capturing and sustaining value – whether financial or operational – as well as addressing current market issues.

Electric utility M&A activity in North America continued at a modest pace in 2011, in what has been one of the market's cyclical lulls. Strong utility stock values, providing valuable currency for deals, coupled with the need to reposition for shifts in energy market fundamentals, drove surges in announced transaction numbers and volume in the 1998-2000 and 2005-2007 periods. Due to the economic crisis and ongoing soft recovery, deal flows have slowed from those levels, hovering around the \$60-80 billion range in 2009-2011 for transactions involving North American utility targets. While behind-the-scenes churn was strong as many utility companies screened deals, most could not find compelling rationales for moving forward with large-scale transactions.

Based on 2012 survey responses, financial scale rather than operating synergies has gained importance as the strategic driver for most of the recent larger-scale utility M&A deals. U.S. utilities are looking at aggregate investment needs of at least \$100 billion per year for the next decade to fund new generating plants, comply with environmental regulations and upgrade aging infrastructure. Scale also helps with managing or sharing the risk of very large single investments (e.g., new baseload plants). Larger companies with stronger balance sheets and more financial flexibility will be able to compete more effectively for the capital resources necessary to fund their core investment needs. As noted in Figure 11, the majority of utility respondents agree that the need for strong finances is a major current driver for M&A transactions.

FIGURE 11
STRONG FINANCE DRIVING UTILITY M&A

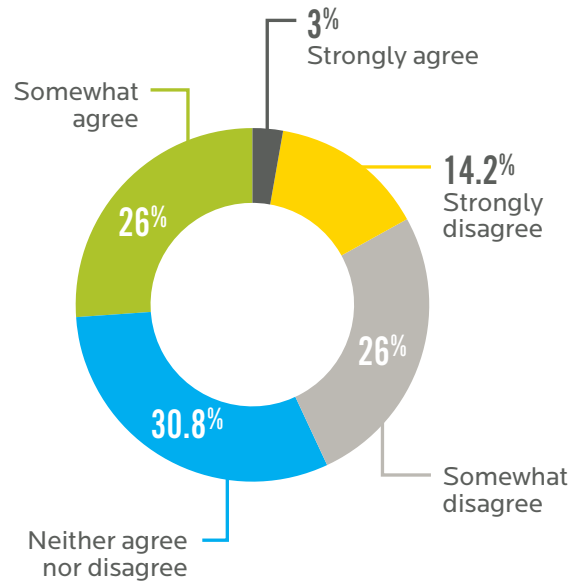


Source: Black & Veatch
Survey participants were asked, “Do you feel the need for strong balance sheets to finance major generation and transmission projects will drive a significant increase in utility mergers and acquisitions over the next five years?” More than half answered “yes” to this statement.

Operating scale as a rationale for utility M&A has not been forgotten, however. Load growth has slowed, but costs keep rising, especially as mandates on coal assets grow as a result of emission retrofits, natural gas conversions or retirements. In addition to capital investment needs, upward rate pressure is coming from aging workforces, security requirements, and new customer technologies. To keep base rate increase trajectories in a range acceptable to regulators – and maintain the earnings growth that underpins stock value, utility management has to look at all options for reducing costs.

In past M&A cycles, cost savings from operating synergies were featured front and center as the main benefit to utility customers from M&A transactions and were expected by regulators in order to gain approval. This year’s survey respondents were somewhat skeptical that M&A transactions will be critical for reducing utility costs (Figure 12). In fact, more utility respondents disagreed (41 percent) than agreed (30 percent) with that notion, reflecting a large shift from 2011 (20 percent and 37 percent, respectively).

FIGURE 12
UTILITY M&A WILL REDUCE COSTS



Source: Black & Veatch
Survey participants were asked how strongly they agree with the statement, “U.S. utility mergers and acquisitions will be critical to driving down utility costs.” More utility respondents disagreed than agreed with this statement.

Utility managers are skeptical about the availability of significant cost reduction opportunities within their companies, whether or not in an M&A context. More than half of utility respondents thought the near-term role of cost containment in maintaining earnings would be “not much” or less. While a certain level of fatigue in cost reduction efforts is understandable, new approaches to process and technology can still deliver substantial cost reductions in most utilities. Electric utilities may feel that other approaches for cost reduction will be more important in the future – they may still be skeptical that M&A transactions really produce cost reductions. This skepticism is common but ill-founded. The statistical evidence shows clearly that cost increases for merging utility companies tend to be lower than for companies not involved in a transaction over the same time period (Table 1 on the next page).

BUSINESS MODEL EVOLUTION

TABLE 1
M&A IMPACTS ON OPERATIONAL COSTS

Function	Mean Four-Year Cost Change ¹		Statistic	Comment
	Merger Group	Non-Merger Group		
Generation Non-Fuel O&M	-0.64%	8.90%	-2.06	Significant at >90%
Transmission O&M	-27.70%	17.39%	-4.67	Very highly significant
Distribution O&M	3.75%	4.83%	-0.33	Much weaker merger impact
Customer Service	0.04%	24.01%	-3.72	Highly significant
A&G	-5.30%	7.08%	-2.12	Significant at >90%
Total Non-Fuel O&M	-2.42%	9.68%	-1.64	Significant at almost 90%

Source: Black & Veatch analysis of FERC-reported cost data

¹Real reduction in cost from year before to three years after close

Interestingly, and despite this evidence, state regulatory commissions appear to be accepting the argument that synergies do not matter as much anymore when considering mergers and acquisitions. Many recent transactions (e.g., UIL-Iberdrola gas, Duke-Progress) have been approved without explicit commitments on cost synergies or flow-through of cost reductions to customers. This might be in part due to regulatory commissions realizing that the customers will harvest the benefits of cost reduction soon enough, if utilities come in regularly for base rate cases that re-set the cost baselines.

M&A is a means to a strategic end. In the back drop of financial pressures and colliding market forces, the question for utility management becomes: What role does M&A play in executing strategies that can both address current energy and financial market challenges, and unlock benefits for shareholders and rate payers – or how can M&A transactions help maintain performance and reduce costs?

After the deal closes, some utilities may find themselves in an extended cycle of reframing their synergy goals around financial scale, rather than following through on the operational integration strategy. Granted, financial scale is an increasingly important driver of M&A activity. But the lack of a strong operational lens in strategic intent can detract from the continuing value of M&A as a means of cost reduction as well as from maintaining the appropriate level of capabilities and sustaining momentum as the integration evolves. Integrating financial, operational and capability lenses better positions a utility to breaking the cycles of chasing synergies. However, the integration of these heavily depends on a utility having the right Coherence, Capabilities, and Culture.

Coherence in Strategic Intent. With Boards increasingly involved in the agenda-setting, utility management must present a clear case that M&A transactions will align their business and operating model more strongly with the company's strategic intent. Assessing strategic options against their own business platform (market structure, geography, asset vintage, fuel type, regulatory environment, and market/environmental conditions) helps utilities:

- Clarify the need for rationalizing current operations to prepare for growth
- Optimize its business platform and sustain current status
- Synchronize the business model from asset or geographical perspective and grow
- Expand and diversify around core asset/fuel portfolio and value chain

As an example, Black & Veatch helped a merchant client to consider a buy-out option in its power purchase agreement. Baselining its operations, Black & Veatch tested EBITDA scenarios in light of uncertainties in future load growth and market, fuel, and carbon prices. Black & Veatch advised the client on ways of optimizing fuels contracts, fleet operations, and dispatch periods in the remaining economic and useful life of its assets, as well as ensured a level coherence in how the client optimized its current business platform.

Preserving the Right Capabilities. With utilities undergoing great change at the same time that their workforces are aging and talent is exiting, management must understand very well the capabilities and competencies that are required to achieve and preserve value. Anchoring strategic intent in the capability requirements (key processes, governance, people, technology, and performance metrics) can create insights on how prospective M&A transactions can bridge capability gaps as well as preserve the right capabilities for the merged entity's operating model. In the above example, the merchant owner must synchronize assets and provide decision-making discipline central to its operating model. In doing so, it would have employed capabilities that address commercial integration and

optimization, capital planning, and market origination. All of which is enabled by matching the right capabilities with the imperatives of the operating model.

Institutionalizing a Culture of Performance. Given the broad scope of activities in M&A transactions, finding incremental sources of value can be attractive but elusive. There are various choices and trade-offs regardless of the strategy, which make value delivery even more difficult without the appropriate culture. Institutionalizing a "best fit" culture of performance enables an ongoing model of performance rather than a one-time effort to create synergy value. These efforts, whether pre- or post-merger, take time to reach recurring steady-state benefits and require focused leadership, commitment, and patience from all stakeholders. However, the journey towards ingraining a culture of performance is easier in the pre-merger context – which offers a better opportunity to drive a culture of accountability and continuous feedback that occur naturally.

Black & Veatch expects M&A activity to continue with financial flexibility as a primary driving force for most transactions. Regardless of the rationale, utility executives considering M&A transactions should focus on assets and operations that can complement business models and fuel base, provide economies of scale, and help manage operational risks. Having the right Coherence, Capabilities, and the right Culture, pre- and post-transaction, offer the right lens for utilities to achieve significant value, in both real and industry-normalized terms, as well as address current market issues.

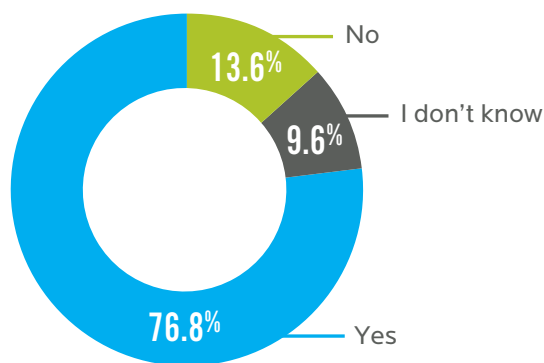
CUSTOMER ENGAGEMENT

BY JEFF EVANS

Utilities have been engaged in a multi-year effort to redefine their relationships with customers, transitioning from a traditional regulated *ratepayer* mentality to a more interactive and enabling relationship. This transition has changed the method of communication between utilities and its customers as well as the content of the communications. With the rapid acceptance of new communications technology in the consumer marketplace, utilities that do not embrace the changing expectations risk a decline in customer satisfaction and negative stakeholder reactions.

Nearly 80 percent of utilities responding to the Black & Veatch survey identified that they offered some form of self-service capabilities to their customers through their company's website (Figure 13). While this is a dramatic increase from the past, it should be noted that in industries such as telecommunications, banking, or merchandizing virtually all companies maintain a web presence to provide customer service and drive business. So while the 80 percent figure demonstrates progress as utilities embrace web-based solutions, it also illustrates that the utility industry has not evolved as rapidly as others to embrace the use of the Internet to support customer engagement. These self-service capabilities are often linked to the advent of smart metering investments in that business cases have traditionally included a large dose of customer participation as part of the rationale for such systems.

FIGURE 13
CUSTOMER SELF-SERVICE WEBSITE



Source: Black & Veatch

Survey participants were asked, "Does your utility offer a customer self-service website?" Nearly 80 percent do provide some form of self-service via the web.

Furthermore, the definition of customer self-service can vary significantly. Interactive Voice Response (IVR) capabilities at many utilities allow customers to execute transactions such as outage reporting or pay by phone without the aid of a person. Utility websites offer a range of services that customers can initiate or conduct. Technology allows utilities to expand the scale, reach and interactive nature of customer self-service creating a more beneficial customer experience at a reduced cost of service.

While the survey did not explore the specific services or features of the Internet-based self-service sites that utilities purported to provide, a review of the web presence of utilities would show that there is a wide range of sophistication and richness of websites offered by utilities to their customers and stakeholders. Some utilities use the web only to support online billing or view utility announcements and information. Others have a more expansive presence including:

- **Energy surveys and recommendations.** For this feature, utilities require customers to complete a survey of their household, appliances and home information. This enables residential customers to analyze actual usage and obtain energy-savings recommendations. This positions the utility as the knowledge provider and a dependable source of information for customers.
- **Interval usage data.** The implementation of advanced metering infrastructure (AMI) and smart meter programs enables utilities to make interval usage data available to customers. Interval data – from electric, water and/or gas utilities – tends to have the most value to customers. However, experience shows that customers are not necessarily interested in kilowatt-hour (kWh) information, rather how their energy saving activities translate into dollars, carbon footprint or other more personally relevant views.
- **Customer alerts and rate comparisons.** Web-based tools enable consumers to gain knowledge from and take ownership of their interval usage data.
- **Enrollment support for direct load control or demand response programs.**

THE UTILITY INDUSTRY SIGNIFICANTLY LAGS THE BROADER MARKETPLACE IN THE INTRODUCTION OF SMART PHONE APPLICATIONS.

The variability of services offered illustrates that many utilities have significant opportunities to expand their range of content of Internet-based engagement strategies and provide value to customers while driving utility strategies and reducing transaction costs.

The utility industry significantly lags the broader marketplace in the introduction of smart phone applications with only 40 percent of respondents indicating that they currently support these tools (Figure 14 on page 25). As the “appification” of smart phone use and strategies increases, utilities must decide how to leverage these tools. Studies released in early 2012 show that more than 30 percent of U.S. households are now wireless only, and some states are allowing traditional telecommunications service providers to discontinue land-line services. This will further accelerate the migration to wireless. However, the rapid response expectations that smart phones create can be a challenge for utilities. When enabling applications on a smart phone, utilities need to be concerned with the timeliness of the information and the ability to refresh information disseminated to the end users.

Typical smart phone-enabled services include services access to static information, notifications or alerts, bill pay and the ability to check account balances. Other applications provide bill notification alerts that inform customers when their expected bill exceeds a target amount.

Forward-looking utilities are considering using smart phones in more interactive ways. Instead of relying on traditional single-purpose, in-home display devices (IHDs) to support pre-payment programs, utilities can leverage their AMI systems in conjunction with back-office billing applications and conduct all customer notification and interaction via smart phones – significantly lowering the program costs and ease of enrollment in these programs. Other utilities are enabling outage notification and anticipated response times to be delivered via smart phones – a particular challenge as the utility must balance the desire to minimize notification latency with the desire to provide complete outage scope information with minimal false-positive information.

The industry is also reconsidering the value of IHDs used in many home area network applications. While high-end IHDs enable participation in demand response programs and even some limited applications, the capabilities of smart phones and tablet-type devices has greatly dwarfed the capabilities of even the most sophisticated IHDs. The portability and increasingly ubiquitous nature of smart phones may make IHDs obsolete just as the industry solves the technical challenges that make IHD programs possible. As utilities gain more experience with these programs and a better understanding of what level of interaction and type of information customers want from their utilities, we will undoubtedly see an expansion in the number and innovativeness of these solutions.

For many utilities customers, the term smart grid translates into smart metering or AMI as these are the programs that most directly impact residential consumers. Utilities have not traditionally sold their investment programs to the population at large, instead having focused on regulators, utility boards, key stakeholders and internal employee groups. Proving prudence in investment and customer benefit to these groups has been sufficient.

The need to promote benefits to consumers is dependent on the business cases that validate smart grid expenditures. Many business cases incorporate a significant customer or societal benefit, such as demand response, and require a greater level of customer

acceptance. The degree of customer acceptance required thus influences the level of promotion required. After all, not achieving customer benefits can place recovery of smart grid costs at risk. Business cases focused more on the achievement of operational benefits, such as operations and maintenance cost reductions or capital cost expenditure avoidance, are not dependent on consumer buy-in. Customer promotion may be less important in these cases, unless the specific program comes under public scrutiny.

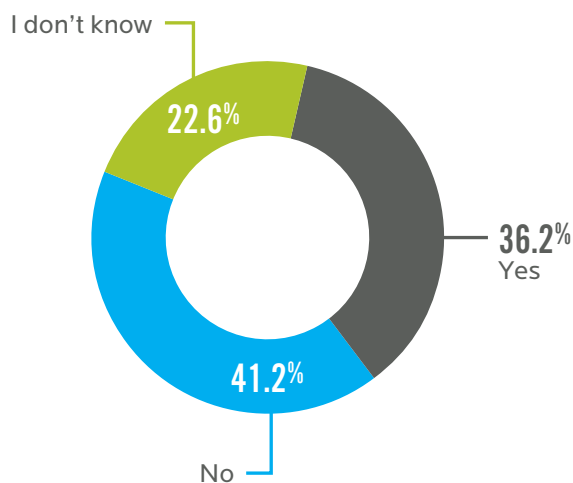
Customer communication, particularly as it relates to smart grid initiatives, is an area of tremendous opportunity for electric utilities. Nearly half of survey respondents indicated they have made no attempt to promote the customer benefits of smart grid programs (Figure 15). The industry has been the recipient of increasingly aggressive and volatile special interest group communications aimed at customers of these initiatives. Information, whether or not it is true, is readily available on the Internet that raises questions on the health impacts, privacy concerns, cost effectiveness and overall security of smart meter systems and implementations. For this reason, customer education is important. Left unheeded, rising customer concerns can influence legislation and regulation, such as the opt-out provisions the industry is currently experiencing.

Depending on the existing relationship that the utility has with its customers and the level of trust that has been created, customers will either look to their utility for guidance and information, or not. In the event the utility-customer relationship has been tested by other issues (such as poor storm response, rate increases, or contentious municipalization activities), the utility may have a hard time developing a real dialogue with customers.

In the event that a dialogue is established, the real question becomes – what exactly is it that the utility wants to communicate to their customers about smart grid. Since utilities have tended not to communicate about investment opportunities or actions in the past, what makes smart grid different? What is it that the utility wants customers to do, or is going to enable customers to do, that is new? Why does it matter? Utilities must

place themselves solidly in the customer perspective framework and create a customer engagement strategy that leverages all of the mediums available and links the smart grid communications messages with broader messaging to ensure a consistent approach that is meaningful to customers.

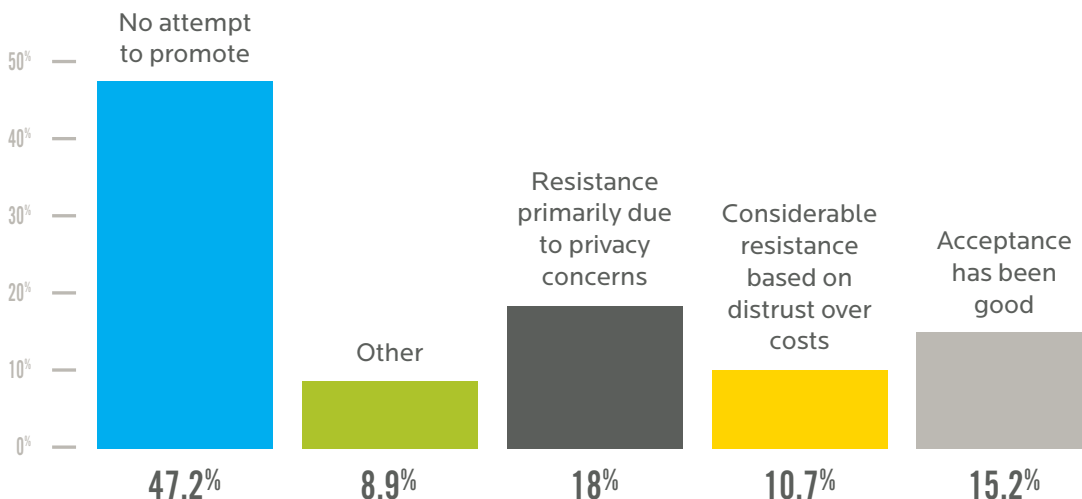
FIGURE 14
REMOTE CUSTOMER ACCESS THROUGH PHONES



Source: Black & Veatch
Survey participants were asked if they offered remote customer access through smart phones. More than one-third of utility participants have this capability.

CUSTOMER EDUCATION IS IMPORTANT. LEFT UNHEEDED, RISING CUSTOMER CONCERNS CAN INFLUENCE LEGISLATION AND REGULATION, SUCH AS THE OPT-OUT PROVISIONS THE INDUSTRY IS CURRENTLY EXPERIENCING.

FIGURE 15
ACCEPTANCE OF SMART GRID BENEFITS ACROSS YOUR RATE BASE



Source: Black & Veatch
Survey participants were asked if they have attempted to promote the benefits of smart grid to their rate base, and, if they have, how do they rate the acceptance of these benefits. Nearly half of utility participants indicated they have not attempted to promote smart grid benefits.

IMPLICATIONS OF DOMESTIC NATURAL GAS

BY GREG HOPPER

North American natural gas reserves, once thought to be high cost and diminishing in nature, have reversed course and are now expected to serve as a baseload energy source for decades to come. Driving this change are the technological advances in the exploration and production of non-conventional reserves, most notably shale gas, which has rejuvenated the gas industry. The massive scale and accessibility of North American shale gas has many implications for consumers and businesses, particularly the electric industry.

Though the industry is more than 10 years into the development of shale gas resources, estimates of economically recoverable North American natural gas have increased year over year. Recent estimates by the Energy Information Administration (EIA)² indicate that technically recoverable gas resources in the United States exceed 2,200 trillion cubic feet (Tcf). At current consumption levels, this equates to approximately 90 years of supply to meet market demands. While the question concerning the adequacy of available gas resources is now of less interest to industry stakeholders, the location of specific resources, the cost of extracting them, and the construction of pipelines to deliver them to market, are now key issues facing gas market participants.

Finding and development costs for shale resources are heavily influenced by the properties of the specific shale rocks and the costs of fully completing a producing well. Technology and improved understanding of shale formations have cut the cost of production nearly in half in the last five years. Notwithstanding, rising environmental costs are expected to impart upward pressure on the price of gas over time. The extent to which regional environmental costs add to price increases may cause shifts in the location of shale production.

LOW GAS PRICES STIMULATE NEW MARKETS

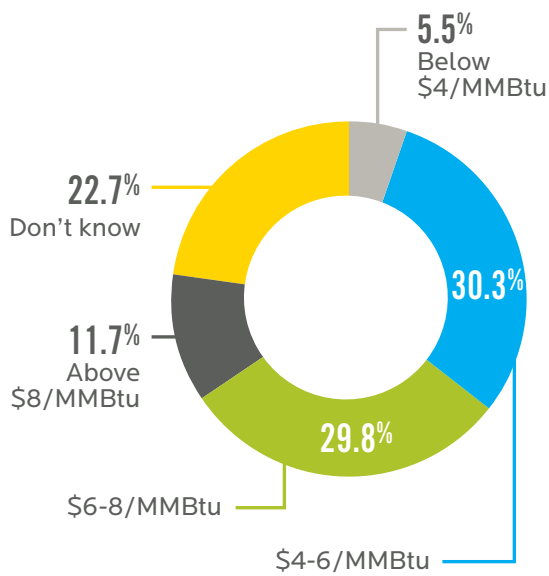
In 2008, natural gas prices at the Henry Hub in southern Louisiana, a primary price reference point for the global natural gas market, topped \$13 per MMBtu. During the price run up, power generators driven by emissions concerns, fiscal pressures and the need for reliable fuel stocks pivoted their capital investments for future generation needs to the development of renewables, nuclear and clean coal technologies.

Since that time, rapid shale gas production growth from multiple supply basins has created a supply “bubble” that dropped Spring 2012 prices below \$2 per MMBtu. The drive to produce highly valuable natural gas liquids in tandem with shale gas has subsidized the cost of producing natural gas. However, few industry watchers expect prices will remain this low. Black & Veatch’s most recent energy market forecast projects the price range will be between \$4-\$6 per MMBtu through 2020. Survey responses align with this projection, with 37 percent agree that gas prices will be \$6 per MMBtu or below by 2020. In contrast, only 12 percent expect prices will be \$8 per MMBtu or higher (Figure 16).

²EIA AEO 2012

Lower prices, and increasing energy industry confidence that shale resources are large and sustainable, have positioned the gas industry to capture the lion's share of new generating capacity builds for the foreseeable future. Although renewables and nuclear investments will continue to be part of the fleet, natural gas is clearly the preferred technology to replace coal as North America's primary energy source. In addition to low prices, the decreased price volatility that accompanies plentiful production further increases the attractiveness of gas to utility and merchant generators alike.

FIGURE 16
NATURAL GAS PRICE FORECAST FOR 2020

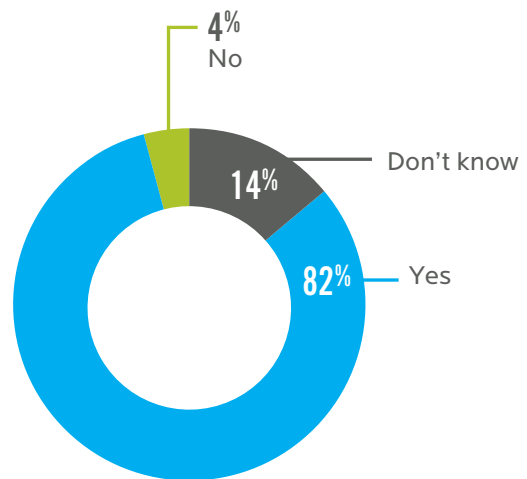


Source: Black & Veatch
Survey participants were asked the price range they expect natural gas prices in North America to be in 2020 based on Henry Hub price in 2012 dollars). The majority of the utility participants believe gas will remain below \$8 per MMBtu through 2020.

RISKS CENTER ON SAFETY AND ENVIRONMENTAL CONCERNS

Although the energy industry has gained confidence in the geology and technology underlying the economics of shale and non-conventional production, concerns remain about the risks of environmental and political opposition. As noted in the survey results, more than 80 percent of utility respondents expect that the U.S. Environmental Protection Agency (EPA) will impose regulations to regulate hydraulic fracturing activity as it relates to water (Figure 17). In particular, concerns about hydraulic fracturing safety have arisen as numerous state and federal government agencies, as well as public watchdog groups, have reacted to the rapid growth of shale-gas fields. The opposition has been greatest in locations such as New York State, where there is little or no prior experience with petroleum resource developments. Common objections have centered on potential impacts to drinking water supplies, air emissions and road traffic.

FIGURE 17
EPA ON HYDRAULIC FRACTURING



Source: Black & Veatch
More than 80 percent of utility participants stated they believe the EPA will impose requirements on groundwater monitoring or treatment of produced water from the hydraulic fracturing process.

BUSINESS MODEL EVOLUTION

The most frequent issue cited by opponents of hydraulic fracturing is the large volumes of water required in the process, added chemicals and whether use of these supplies threatens the adequacy of water needed by other types of users. In a report commissioned by the U.S. Department of Energy in 2009, the Ground Water Protection Council and ALL Consulting, LLC found that a typical shale-gas well requires at least 3 million to 4 million gallons of water for drilling and completion, including hydraulic fracturing. Water transportation and handling can be a logistical challenge, as are the precautions taken to prevent wastewater spills – especially in Pennsylvania where geology and regulations do not support injection wells. As such, the transportation of wastewater to disposal wells in Ohio generates a significant cost.

Research conducted by Black & Veatch showed that shale gas water costs are higher than those for industrial water in the 50 largest U.S. cities. As of 2010, shale-gas developers paid at least 1.4 cents per gallon for source water, and another 11-to-16 cents per gallon to handle the wastewater. In contrast, the most expensive industrial water associated with municipalities was 0.7 cent per gallon for source water and 1.7 cents per gallon for wastewater. This research is consistent with the survey results where 70 percent of utility respondents expect EPA regulation of hydraulic fracturing and water use will influence natural gas prices but not substantially (Figure 18). However, shale gas developers are highly motivated to reduce water costs and have moved toward recycling and on-site treatment to reduce total volumes and transportation needs.

EVOLVING PIPELINE INFRASTRUCTURE NEEDS

The North American natural gas pipeline grid was primarily built to move natural gas from the Gulf Coast and southwestern United States, and western Canada, to consuming markets throughout North America. The emerging shale basins in the Northeast, predominantly the Marcellus basin located in Pennsylvania, New York and West Virginia, have created substantial changes in the movement of gas supplies across the country. Pipelines constructed to transport gas from Texas and Louisiana to the Northeast are now experiencing substantial drops in

volume as Marcellus production grows. In some cases, gas is now being shipped from the Northeast back to Louisiana to avoid bottlenecks in Pennsylvania and access the more liquid Gulf Coast gas market.

This shift of supply has in turn created the resurgence of pipeline rate cases to redesign rates or establish new billing determinants. Pipelines and their customers are both considering innovative ways to reapportion costs and fairly allocate risks as contracting and shipper volumes change.

With increased gas use for power generation concern is growing as to whether adequate pipeline infrastructure will exist to deliver supplies to power plants on a reliable basis. Numerous studies are underway by various parties to assess the compatibility of the electric and gas grids, and the need for additional infrastructure investments.

IMPACTS TO THE ELECTRIC INDUSTRY

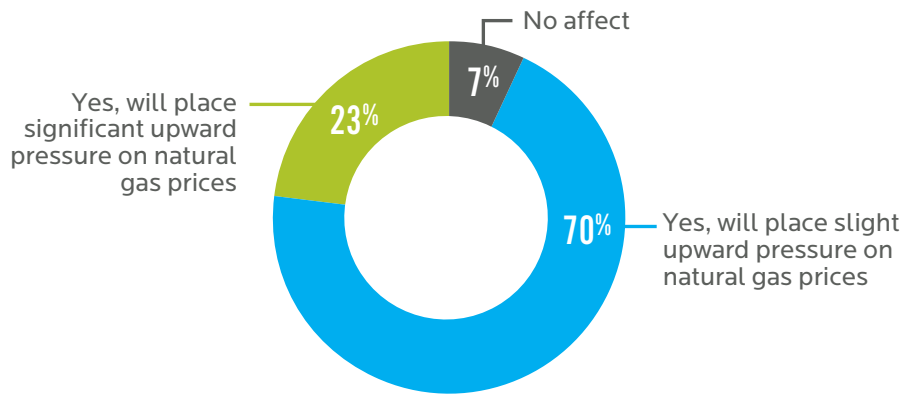
Overall, the shift towards natural gas and the growing resource base in North America is creating price stability and long-term assurance of natural gas as a generation fuel. Natural gas is now viewed as the clear leader among clean energy technologies to address green house gas emissions (natural gas has only 42 percent of the carbon output of coal) in the United States. Natural gas is now tied with nuclear in environmentally friendly technologies the industry should emphasize. In addition, nearly 80 percent of all survey respondents – representing utilities and non-utility organizations viewed natural gas as an economically viable technology without portfolio standards, credits or subsidies (Figure 19). Comparatively, just over half of respondents indicated this will be the case for nuclear.

This shift will require different approaches in obtaining and managing natural gas as fuel to a growing North American gas-fired power generation fleet. To take advantage of gas supply resources, utilities must first re-evaluate their existing gas supply portfolios. It is important to learn where flexibilities exist in order to reconfigure the fuel portfolio to lower costs and to reach shale resource supply basins. Within the gas supply portfolio, utilities will need optionality through

transportation, storage and delivered supply. This will allow utilities to reposition supply access as opportunities arise. Finally, utilities should explore participation in

the natural gas supply chain as an investor by bringing demand and capacity commitments to fund additional and needed infrastructure.

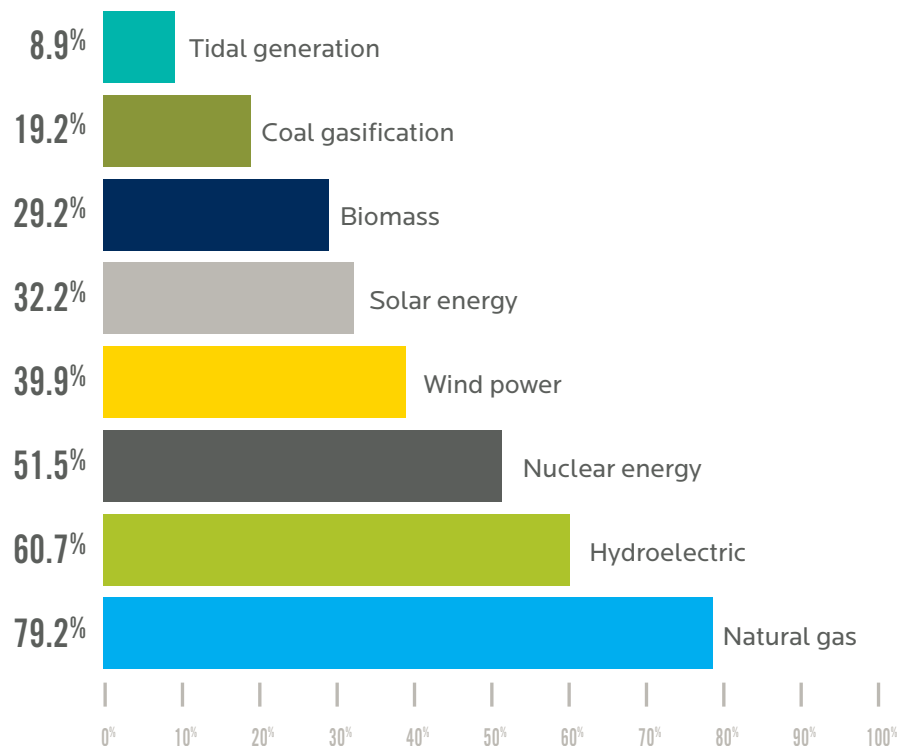
FIGURE 18
IMPACT OF EPA REGULATIONS ON NATURAL GAS PRICES



Source: Black & Veatch

More than 90 percent of survey participants believe EPA regulations will increase natural gas prices at some level. Finding economic resolutions to water and other environmental and socioeconomic concerns is an important step in assuring the power industry that gas is a reliable and economic fuel over the long term.

FIGURE 19
VIABLE CLEAN ENERGY TECHNOLOGIES



Source: Black & Veatch

Survey respondents were asked to select the technologies listed above that they believed would be economically viable by 2020 without portfolio standards, credits, subsidies or substantial carbon prices. The chart above reflects the inputs of all survey respondents representing utility and non-utility entities.

SUSTAINABILITY AS BUSINESS STRATEGY

BY **WILLIAM KEMP**

As an area of increasing focus for utilities, the broader public and regulators, sustainability continues to gain ground as a commercially valuable framework for integrating diverse stakeholder perspectives and managing political and environmental risks. Nonetheless, the Great Recession and the slow growth in its aftermath have forced utility managers to focus more strongly on the economic dimensions of sustainability. And, with a host of new regulations that will dramatically influence sustainability considerations recently implemented or in the various stages of the court system, responses to the 2012 electric survey demonstrate that utilities continue to strengthen the integration of the sustainability perspective into their planning processes and external relations.

Revising a utility's business model to generate adequate earnings and maintain access to capital in tough economic times has assumed priority over community and environmental concerns. This rebalancing of the three sustainability perspectives (economics, environment, community – or profit/planet/people) is a natural reaction to market forces and one that will likely shift again once the economy fully recovers.

The level of consideration in utility resource planning processes to various economic and environmental issues provides insights into the balancing of sustainability perspectives. According to 2012 survey responses, utilities still focus primarily on financial impacts and reliability in screening potential system investments (Figure 20). In other words, utilities are asking, "Is the investment needed to maintain adequate levels of reliability, and can we and our customers afford it?"

According to the survey, public power utilities tend to be less concerned about environmental issues in their resource planning. This could be explained by the

fact that many of the public power respondents to the survey come from non-generating utilities, meaning these organizations only provide distribution services. Environmental issues and regulations have the greatest impact on the generation function, which is why distribution utilities would worry less about environmental regulations.

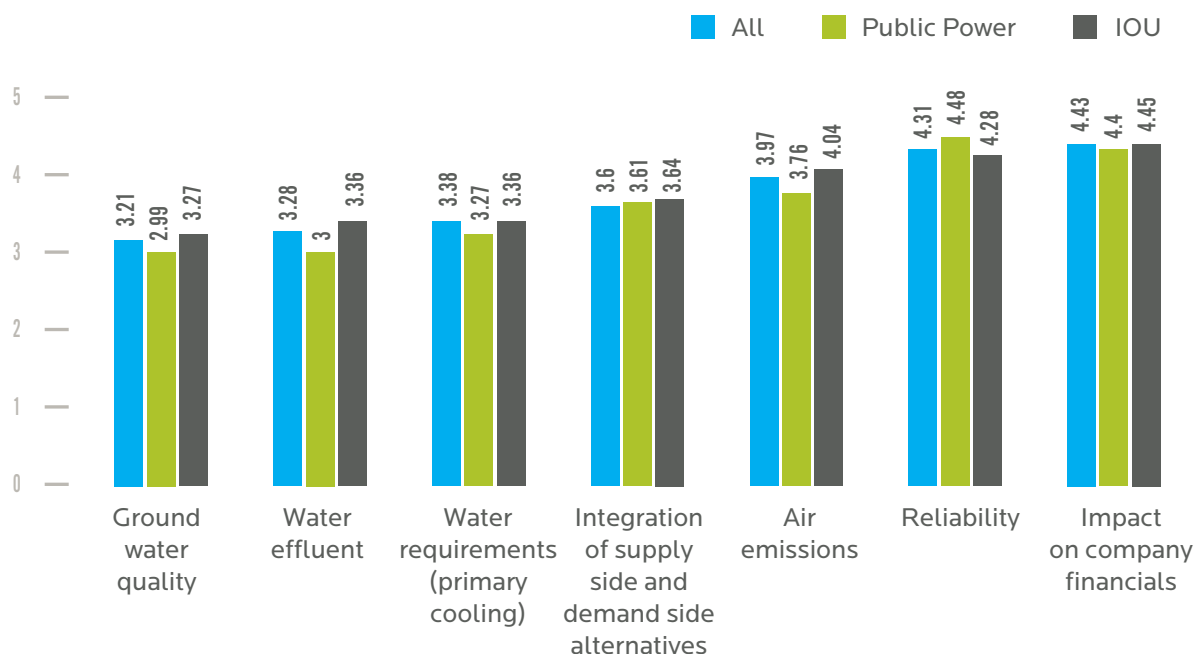
Overall, public power utilities tend to be more enthusiastic adopters of sustainability principles since their governance structure allows them to internalize much of the community and environmental perspective, in addition to traditional economic drivers. Public power utilities are more explicitly accountable to direction from local political entities (i.e., their boards or mayors), and that political direction often includes the positions of local environmental groups. This dynamic is also consistent with the history of Black & Veatch's consulting experience. Most of our early consulting assignments around sustainability strategies and plans were for municipally owned water utilities.

OVERALL, PUBLIC POWER UTILITIES TEND TO BE MORE ENTHUSIASTIC ADOPTERS OF SUSTAINABILITY PRINCIPLES SINCE THEIR GOVERNANCE STRUCTURE ALLOWS THEM TO INTERNALIZE MUCH OF THE COMMUNITY AND ENVIRONMENTAL PERSPECTIVE, IN ADDITION TO TRADITIONAL ECONOMIC DRIVERS.

The 2012 survey data also show that in the electric utility industry, public power utilities still give more consideration in planning to sustainability than investor-owned utilities (IOUs), but the margin is narrowing. Nearly one-third of public power respondents said their companies give sustainability strong or very strong consideration in business and strategic planning. IOUs are just a percentage point behind. On the other hand, exactly one-third of public power respondents said sustainability received less than a moderate consideration, compared with 36 percent for IOUs. Interestingly, 9 percent of public power respondents said their utilities did not consider sustainability at all, perhaps reflecting the strong focus of many public power utilities on minimizing rates to customers (Figure 21 on the next page).

Also of note, more respondents identified in the West region stated their companies give moderate or greater consideration to sustainability. This is largely attributed to differences in “green” politics across the regions as well as concerns for water supply.

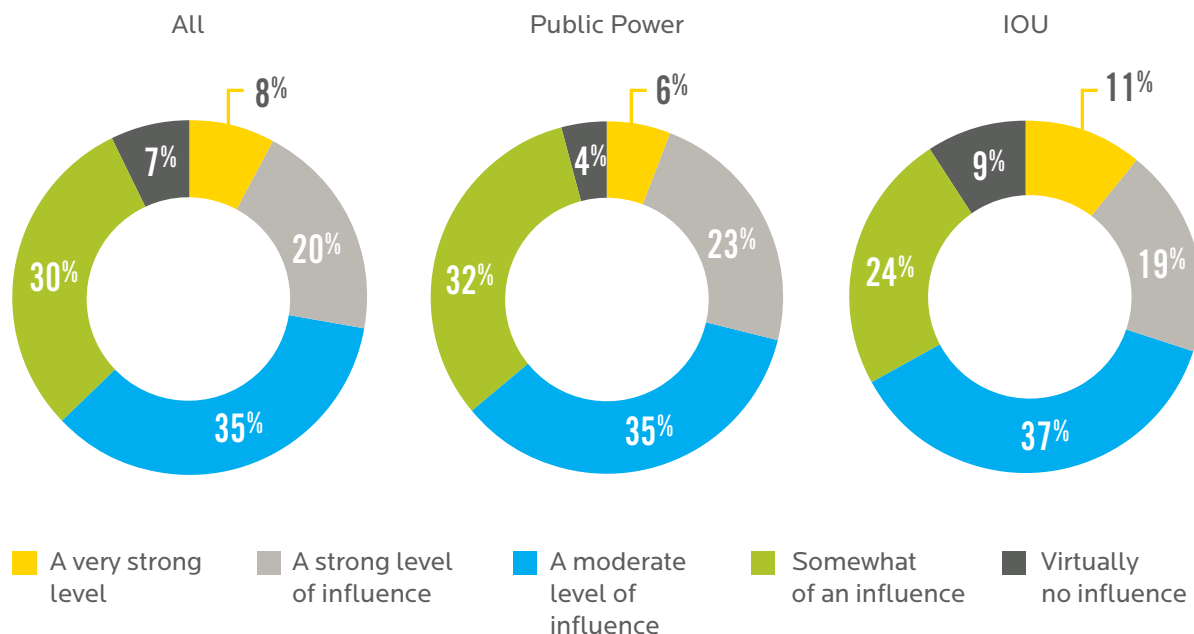
FIGURE 20
CONSIDERATION FOR RESOURCE PLANNING PROCESS



Source: Black & Veatch

Survey respondents were asked to rate on a scale of 1 to 5, where 1 indicates “least considered” and 5 indicates “most considered,” how strongly each of the above issues are considered in their utility’s resource planning process. The chart above provides the average response for each issue.

FIGURE 21
SUSTAINABILITY INFLUENCE ON CORPORATE PLANNING



Source: Black & Veatch

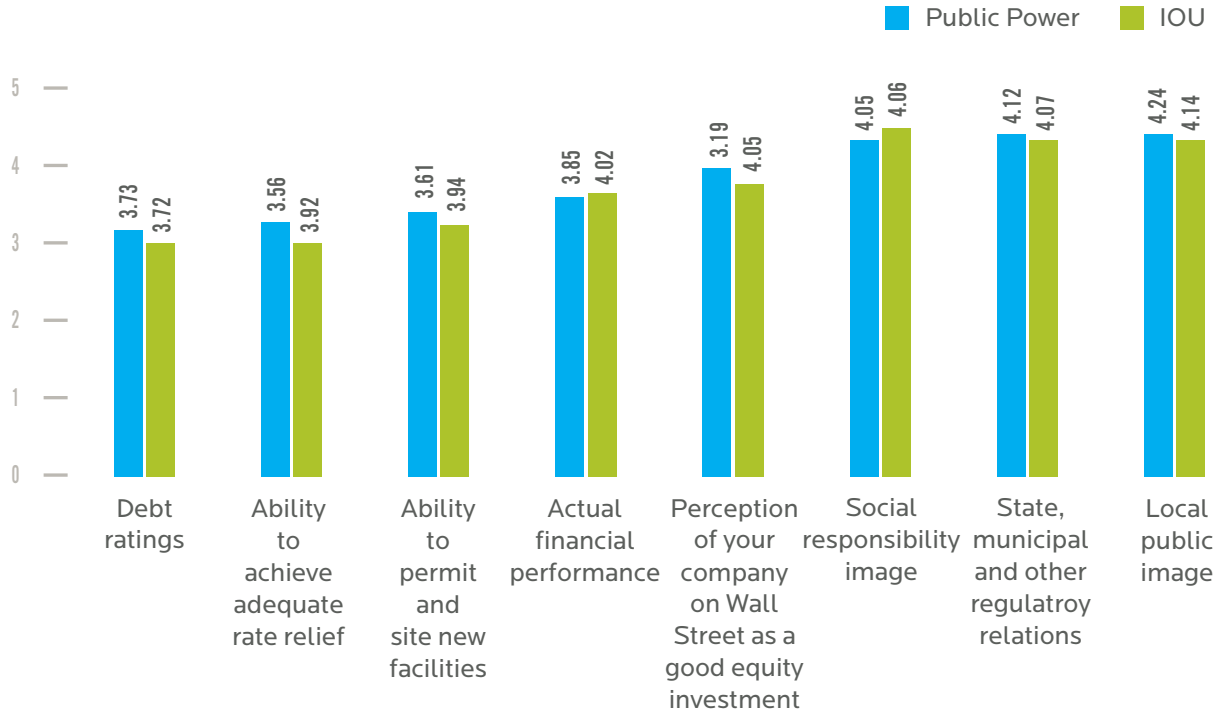
Survey participants were asked how strongly sustainability considerations influence their corporate business and strategic planning. The chart above reflects responses from utility representatives.

Utilities believe that sustainability-related activities are most important for positioning with external audience (community, regulators, customers, investors), but only by a slight margin over the importance for internal performance (Figure 22). Again, the trend is toward utilities seeing real commercial value in sustainability. IOUs see more value than public power utilities in using sustainability activities to support siting/permitting and recovery of costs through rates, perhaps because they are more tightly regulated, and can use sustainability as a means of marshalling support before their regulators.

Data from other surveys that assessed the environmental values of younger generations show a clear long-term trend of increasing consumer demand for sustainable practices. Young people expect the companies that supply their goods and services to be good environmental stewards, and industry is responding. This cultural “greening” is a mega-trend that utilities would be wise to incorporate into their decision-making – or they may bear consequences from diverging from their customers’ path.

Companies and industries can be characterized as progressing through four stages in their path toward embracing sustainability (Figure 23). Most utilities and manufacturers are still in stages one or two. The bigger long-term pay-off lies in transforming the utility value chain and creating differentiated business models, so that sustainability is about more than short-term business continuity or public perception. The right balance between near-term costs and future benefits from reduced environmental risks or improved community and environmental health must be defined through a process of analysis and engagement. The support of important stakeholders such as regulators and interveners must be enlisted in the required decisions. The utility can then fulfill its role in providing vital energy services in a manner that meets the needs of the present without compromising the ability of future generations to meet their own needs. That is the essence of sustainability.

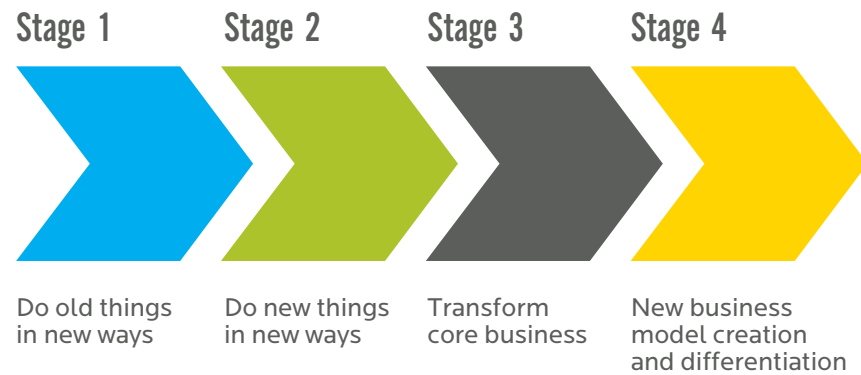
FIGURE 22
IMPORTANCE OF SUSTAINABILITY POLICIES



Source: Black & Veatch

Survey respondents were asked to rate on a scale of 1 to 5, where 1 indicates “very unimportant” and 5 indicates “very important,” how important they believe having good sustainability policies, planning processes and practices are for the above listed items. The chart above provides the average ranking for each item.

FIGURE 23
PATH TO SUSTAINABILITY



Source: Black & Veatch

THE NEXUS OF WATER AND ENERGY

BY MARK GABRIEL

The nexus – or crossroads – between water and energy has been with the industry since its founding a hundred years ago whether due to the use of hydro or the need for water to cool fossil generation. It continues today with the additional water needs for utility scale solar, solar water heating and tidal power advances.

The critical interplay between water and energy continues to be a key concern among utility survey respondents – and that does not yet include the impacts of water issues on the growing supply and reliance on natural gas from unconventional sources or significant changes coming for water from the Environmental Protection Agency.

For the sixth straight year, water supply issues were second only to carbon emissions legislation as the top environmental concern in the industry (Figure 24). However, when coupled with the concern for water effluent concern (ranked 6th overall), clearly water rises to the top overall. Non-utility respondents even ranked the issues of water supply and effluent higher than utilities. On a geographic basis, it is interesting to note that the Midwest ranked water supply significantly further down the list and flipped water effluent concerns with water supply issues. Undoubtedly this is due to the fact that the majority of generation is coal based, making the concerns of carbon, mercury, SO₂, NOx and particulates the more critical items.

Year over year trending has been consistent with 2012 water concerns slightly below 2011 but continuing to follow the major jump seen between the 2009 and 2011 timeframes. This can be tracked to increases in EPA regulations, issues such as the California once through cooling mandates and several years of drought conditions in various parts of the country including Texas in 2011 and the southeast in 2009/2010.

As noted in the Executive Summary, environmental concerns ranked third behind reliability and aging infrastructure – but extremely close (4.27 vs. 4.47 for reliability and 4.45 for aging infrastructure). Given that the issue of water (combined supply and effluent) is at the top of environmental considerations, utilities and non-utilities alike recognize the important challenges of the water/energy nexus.

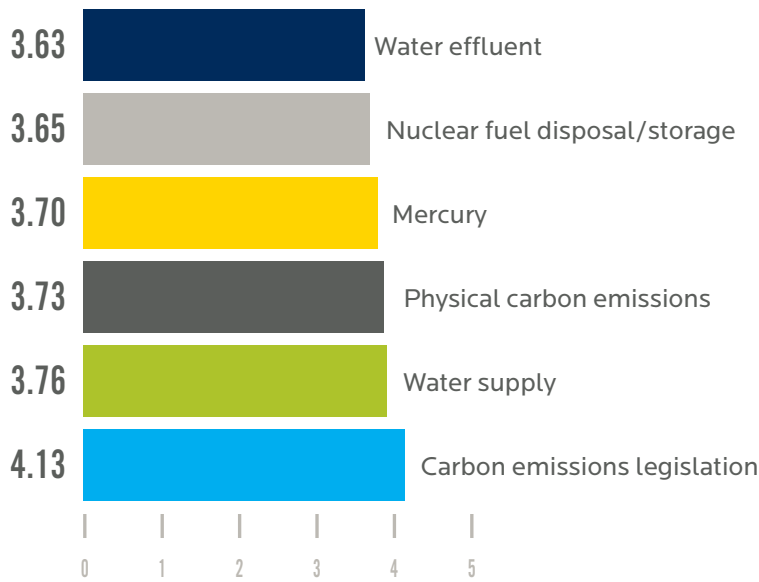
The connection between clean energy (renewables) and water is not always made. Hydroelectric is ranked second only to natural gas in terms of viable clean energy technologies (60.7% vs. 79.2%) yet is ranked sixth in the Northeast, fourth in the West (where it is prevalent) and third in both the South and Midwest. Of course, in many jurisdictions, large scale hydro does not count towards renewable energy standards – even as it is viewed by utilities as a reliable and critical resource. Ironically, while its rankings are not high in the United States, respondents from other countries rank hydro the highest environmentally friendly technologies where it beats out solar by a handy margin. It is not surprising the utility respondents – most of whom are engineers – view hydroelectric just behind natural gas in terms of viable technologies given its reliability and history.

The importance of water in utility management is clear in resource planning where it takes three of the seven categories – and is the only area mentioned more than once (Figure 25). While any single water category is ranked behind integration of supply and demand side alternatives, reliability, air emissions and the impact on

company financials, taken *together*, the three legs of the water stool – ground water quality, water effluent and water requirements (primarily cooling) are major concerns of the respondents to the question. It is apparent that water has become one of the major factors in resource planning over the past several years.

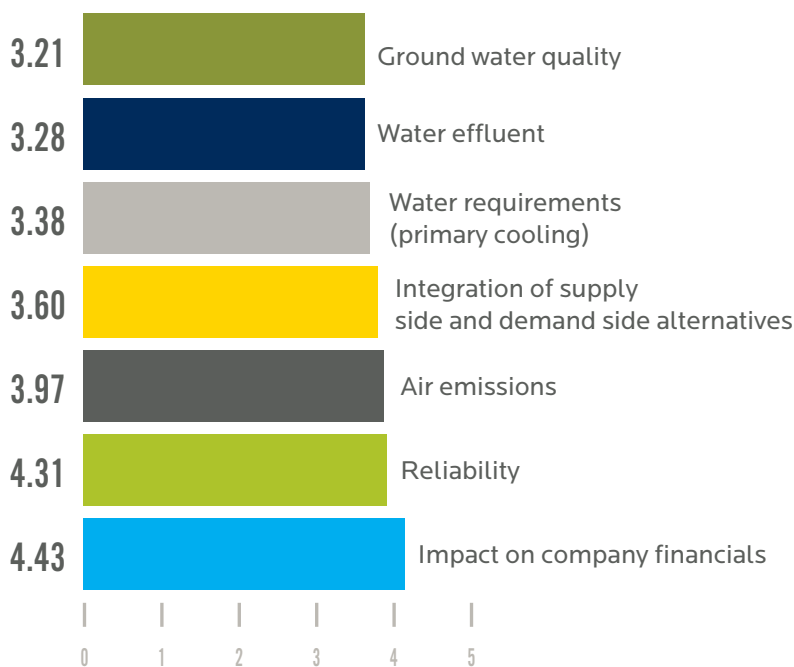
Water and energy remain closely tied for the utility business – this nexus continues to be top-of-mind as utilities plan for the future, manage their assets and work through critical issues of the environment, finance and planning.

FIGURE 24
TOP SIX ENVIRONMENTAL CONCERNS AMONG UTILITIES



Source: Black & Veatch
Survey participants were asked to rate on a scale of 1 to 5, where 1 indicates “least concerned” and 5 indicates “most concerned,” a variety of environmental concerns in the electric utility industry. The chart reflects the top six environmental concerns based on the average ranking of each item.

FIGURE 25
TOP CONSIDERATIONS IN UTILITY RESOURCE PLANNING



Source: Black & Veatch
Survey participants were asked to rate on a scale of 1 to 5, where 1 indicates “least considered” and 5 indicates “most considered,” how strongly each of the listed items are considered in their utility resource planning process. The chart represents the average ranking of each item.

RATES AND ECONOMIC REGULATION

BY **RUSSELL A. FEINGOLD**

While economic regulation was overshadowed by issues such as aging infrastructure, reliability, and the environment in this year's survey, it is clear that regulation and the ratemaking process continue to be important factors impacting the electric utility industry landscape. In fact, economic regulation received a ranking of 4 out of 5 (with 5 indicating "very important") from this year's survey respondents demonstrating that it remains a top factor influencing a broad array of operational and financial management decisions.

For industry participants, the impact of economic regulation and the resulting rates charged by utilities has a fundamental impact on the pace at which they adopt new technologies, address critical infrastructure needs, and manage their long-term financial performance. At the same time, consumers are directly impacted by regulatory decisions through the rates they pay, creating significant pressures to move cautiously on rates, especially during periods of economic downturn.

Ongoing interactions between utility and regulator are guided in the broadest sense by the "regulatory compact," which aims to satisfy the financial expectations of utilities and their investors while achieving "public interest" objectives on behalf of energy consumers. For regulators, finding the right balance between providing safe and reliable electric utility service and managing the level of electricity rates to consumers continues to be a challenge.

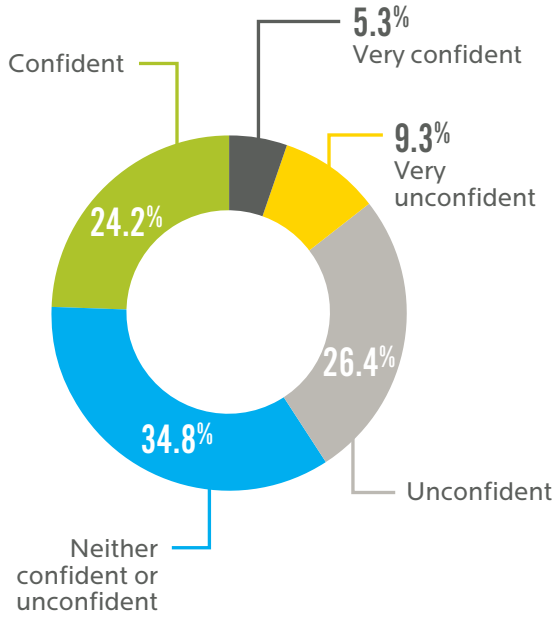
Ever increasing costs incurred by utilities to comply with tightening environmental rules and rising employee-related expenses impact their profitability levels. So it is not surprising to see in this year's survey that approximately 65 percent of survey respondents indicated that the average electric rates to utility customers have either slightly increased or largely increased (Figure 26). Nor is it surprising that more than 90 percent of utility respondents believe rates will continue to rise as a result of meeting regulatory and environmental rules (see Figures 7 and 8 on pages 13 and 14).

Decisions made by regulators can influence the manner in which new technologies are pursued by utilities. Underscoring this point, survey respondents ranked Regulatory Requirements as the most important factor in motivating investment in new technology in the electric utility industry. (See Figure 37 on page 49)

At the same time, it is important to recognize that how utilities bring new technology proposals to the regulator can also influence how receptive they, and other stakeholders, are to the particular technology offering, and to the likelihood of eventual regulatory approval. This is most evident with the evolving technology developed to support the industry's ongoing smart grid initiatives. Nearly one-third of utility respondents indicated that they were "unconfident" or "very unconfident" that utilities in their states will be able to recover the costs of smart grid in an effective and timely manner in the future (Figure 26).

Part of the reason for this lack of optimism may stem from the uncertainties around the regulatory policies and processes related to smart grid investments. Nearly half of survey respondents stated their respective regulators have either not yet articulated a policy, or that policies consist of either no recovery of costs or recovery of costs only without normal return on investment (Figure 27).

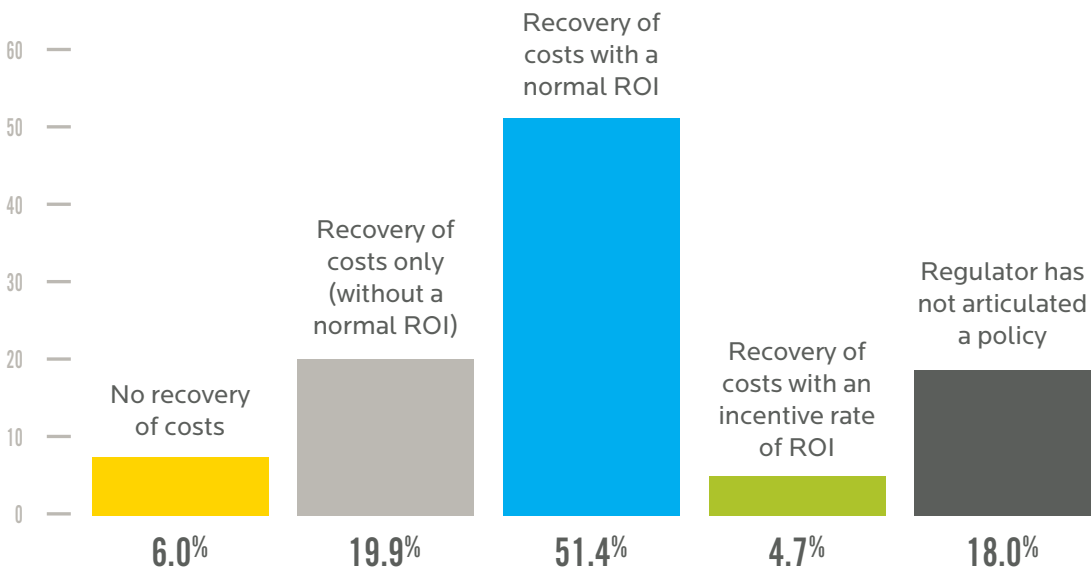
FIGURE 26
CONFIDENCE IN SMART GRID COST RECOVERY



Source: Black & Veatch

Survey participants were asked, “What is your level of confidence that utilities in your state will be able to recover the costs of smart grid in an effective and timely manner in the future?” More than one-third of utility participants are either “very unconfident” or “unconfident” in their ability to recover costs associated with smart grid investment.

FIGURE 27
POLICY OF REGULATORS REGARDING SMART GRID COST RECOVERY



Source: Black & Veatch

Survey participants were asked which of the above descriptions most closely resembles the policy of their respective regulators. Nearly half of survey respondents stated their respective regulators have either not yet articulated a policy, that policies consist of either no recovery of costs, or policies allow for recovery of costs only without a normal return on investment.

As investments in smart grid technology are deployed by utilities, the technology will facilitate the implementation of more sophisticated pricing and rate design approaches, including Time-of-Use (TOU) rates. TOU rates are based upon a rate structure with different prices for electricity usage during different blocks of time, usually defined for a 24-hour day. Other types of TOU rates include Real Time Pricing (RTP) and Critical Peak Pricing (CPP). RTP consists of a rate structure where the price for electricity fluctuates hourly reflecting changes in the wholesale price of electricity (typically known to customers on a day-ahead or hour-ahead basis). CPP rates include a pre-specified high rate for electricity usage designated by the utility to be a critical peak period.

Under these types of rates, customers can save on energy costs if they are able to modify their usage patterns to minimize demand during peak periods. This in turn enables utilities to reduce their system costs in a commensurate manner as a result of customer actions. However, at this time, the survey results show that approximately one-quarter of the survey respondents indicated that “early results” from TOU rate programs are available, with a smaller percentage of respondents indicating that no cost savings were achieved to date.

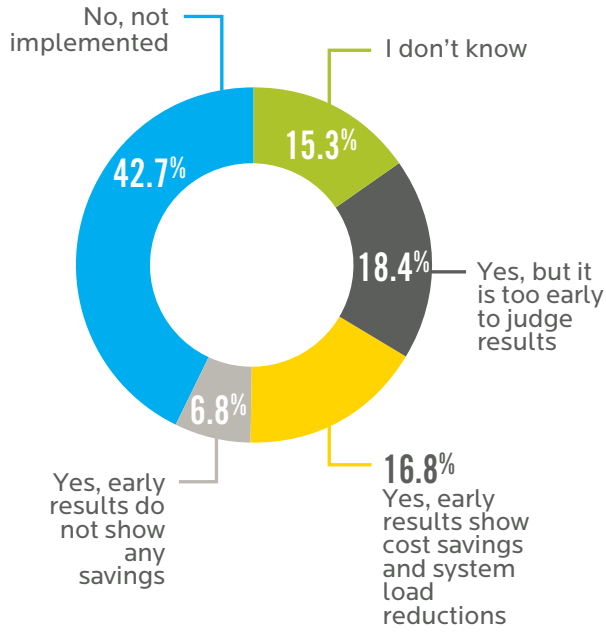
The survey does not distinguish between traditional “bucketized” TOU rates and hourly pricing TOU rates such as critical peak pricing and peak time rebate. Given this, the wide variation of experiences is not unexpected. There are many complexities for creating TOU rates that pass regulatory scrutiny while also having sufficient difference between peak and off-peak rates to create incentives for customers to shift load or reduce consumption. Also unknown is whether the TOU rates were implemented in conjunction with AMI programs. Implementing TOU rates with AMI programs presents a timing challenge that should be managed carefully so as to not confuse customers. However, when available AMI-provided interval data is combined with the TOU program, it provides a much richer experience for customers and the ability for them to better manage energy consumption between TOU periods.

While the introduction of a TOU rate in itself can have a small conservation effect due to the increased understanding among customers of energy or water consumption patterns, it is the financial impact that truly gets their attention. Unfortunately, this is also the area where regulators are most concerned and the result is often a blunted TOU rate differential that results in lower impact opportunities and reduced customer response. These challenges should be food-for-thought for the 43 percent of utilities that identified themselves as not having implemented TOU programs (Figure 28).

With the continuing infrastructure and environmental compliance requirements faced by electric utilities, the political push towards achieving greater energy efficiency targets, and a new era of technological innovation quickly entering the picture, it is imperative that regulators are able to properly align the interests of consumers and utility shareholders. To accomplish this, all utility stakeholders will have to find common ground by balancing the need to promote a more efficient electric generation, transmission and distribution system with the financial burden placed on the consumer.

While the process of regulation is not well understood or appreciated by most consumers, and involving them in the regulatory process requires significant effort on the part of both regulators and utilities, it is important to identify the benefits for consumers, and obtain their buy-in even as rates increase. By nearly any measurement, today’s electricity remains a relative bargain for customers, even at higher rates. The utility service can be provided safely and reliably, both now and in the future, only if the utility is financially healthy enough to undertake the needed investment in the infrastructure that will continue to provide such service.

FIGURE 28
TIME-OF-USE COST OPTIONS



Source: Black & Veatch

Survey participants were asked if their utility has structured rates to offer TOU cost options that enable customers to modify their usage patterns and associated costs. More than 40 percent have not implemented TOU programs.



ENVIRONMENTAL REGULATION

BY **ANDY BYERS**

Consistently listed as a Top 5 issue in previous Black & Veatch Electric Utility reports, environmental regulations and compliance ranked as the third most important issue of concern in 2012, with an average relative importance rating of 4.31 out of 5. This year's rating likely reflects the increases in uncertainty and concern raised by the convergence of a number of U.S. Environmental Protection Agency (EPA) rulemaking activities. At the time of the survey, the status of potentially significant rulemakings facing the industry ranged from the pre-proposal stage to finalized, and already in litigation, which serves to fuel much of the uncertainty and apprehension.

A closer examination of the individual environmental concerns demonstrates that carbon emissions legislation ranks as the most significant concern among respondents (Table 2). Since the inception of this survey, carbon emissions legislation has always topped our survey, as it clearly has the greatest potential impact on current power generation industry. Although carbon legislation passed the U.S. House of Representatives in 2009, its subsequent failure in the Senate in 2010 has since rendered it a dead issue politically.

However, there is general expectation that Congress will revisit this sometime in the foreseeable future. In the interim, the EPA is moving forward with regulations requiring permitting of greenhouse gas emissions and more recently, the proposal of a performance standard for new power plants. If EPA's actions survive ongoing legal challenges, industry may actively turn to Congress to seek an economy-wide structure for carbon legislation to more equitably spread the burden and responsibility for stemming national greenhouse gas emissions.

TABLE 2
TOP 5 ENVIRONMENTAL CONCERNS AMONG UTILITIES

2012	2011	2010/09
Carbon Emissions Legislation	Carbon Emissions Legislation	Carbon Emissions Legislation
Water Supply	T-2nd Water Supply	Water Supply
Physical Carbon Emissions	T-2nd Nuclear Fuel Disposal/Storage	NOx
Mercury	Nuclear Safety	Mercury
Nuclear Fuel Disposal/Storage	Water Effluent	SO ₂

Source: Black & Veatch

Water supply concerns ranked second, which likely reflects concerns over the availability of water, and also the ongoing saga of regulating cooling water intake design and performance. The EPA is in the process of reworking a rulemaking it finalized in 2004 but suspended in 2007 in the midst of litigation. Before the revised rule proposal was released in March 2011, many industry watchers speculated that the EPA's revision would essentially force all plants using once-through cooling systems to convert to a closed-cycle cooling tower configuration. As proposed, the rule will still require upgrades of intake screens, fish diversion and recovery, reduced flow velocities and/or overall intake design, and will defer entrainment technology determinations to the individual states. While the EPA has agreed by consent decree to finalize this rule in July 2012, the uncertainty over its final requirements and how state requirements may differ is reflected in the survey results.

The relative ranking of nuclear fuel disposal and storage concerns jumped when it became apparent that further development of a national geologic storage facility for spent nuclear reactor fuel and other high level radioactive waste at Yucca Mountain in Nevada would be cancelled. Ever since funding for development of the Yucca Mountain waste site was eliminated from the Federal budget by Congress on April 14, 2011, more than 65,000 tons of high level spent nuclear waste has been stranded in temporary storage facilities at 76 reactor sites across the United States. Just as the Fukushima disaster raised public concerns over safety at operating nuclear generation facilities, the longer nuclear waste remains on these sites without plans for final disposition may only intensify community concerns and risk increasing local opposition of recertification of on-site storage. The combination of these events likely contributed to "nuclear fuel disposal/storage" being ranked at the top environmental concern this year by respondents categorized in the Northeastern Region, where several nuclear facilities are under review for relicensing.

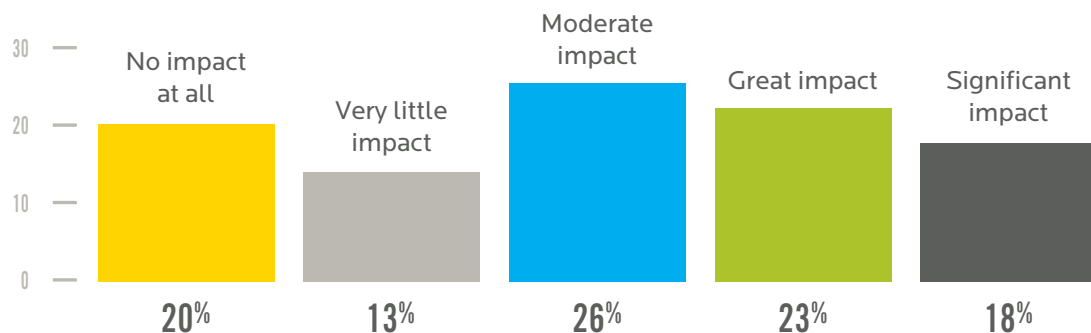
Regulation of particulates, Sulfur Dioxide (SO₂) and Nitrogen Oxide (NOx) emissions were equally rated by respondents as areas of concern, reflecting the emerging requirements under the proposed Transport cap-and-

trade rulemaking and pending EPA decisions on state implementation plans to impose Regional Haze Best Available Retrofit Technology (BART) requirements. The proposed Transport rulemaking was finalized as the Cross State Air Pollution Rule in July 2011, and was slated to take effect in January 2012. The rapid timetable sent many utilities scrambling to implement interim short-term measures until more comprehensive air quality control retrofits or fuel switching projects could be completed and implemented. Although a stay was granted on Dec. 30, 2011, providing some timing relief, the litigation has only contributed to the overall uncertainty over the future of SO₂ and NOx emission regulation in the eastern United States.

Concern over mercury regulation has grown steadily over the years, and now ranks fourth among all environmental concerns in the survey. This reflects the development of mercury and air toxics regulations that have progressed from the EPA's survey of industry emissions in 2009, to proposal of the Utility Maximum Achievable Control Technology (MACT) rule in 2010, to its finalization as the Mercury and Air Toxics Standards (MATS) in December 2011. While the final rule provided some relief in terms of certain emission limits and compliance deadline extensions, several companies have cited this rulemaking in announcing the planned retirement of a number of smaller, older coal-fired in the coming years.

Coal handling and ash disposal received a 3.56 average rating of importance from our survey respondents. The EPA proposed in 2010 to re-designate ash as either a special hazardous waste or solid waste, but has since yet to take any final action. In the event EPA classifies ash as hazardous wastes, 67 percent of survey respondents indicated that it would adversely affect their operations, with 41 percent saying the impacts would be great or significant. Not surprisingly, this issue was rated higher by respondents in Midwestern and Southern states where more plants with wet ash handling and ponds are located (Figure 29 on the next page).

FIGURE 29
IMPACT OF ‘COAL COMBUSTION RESIDUALS’ RULE



Source: Black & Veatch

Survey participants were asked what impact the potential classification of coal ash as a hazardous waste would have on their utility operations. More than 40 percent believe such a classification would have a “great” or “significant” impact on their operations.

The combination of these environmental regulatory drivers is expected to result in retirements of coal-fired assets by the end of the decade. Amongst survey respondents, 54 percent said that they expected some early retirements, with 41 percent projecting a few early retirements among older or smaller coal-fired plants, while 13 percent responded that many retirements were anticipated even among larger and newer plants (Figure 30). Geographically, more respondents in the Midwest (MRO and RFC regions in particular) answered that some retirements were expected, which corroborates our own market projections as the area of the country where more smaller older plants will be challenged to justify additional capital expenditures on environmental controls and upgrades. However, it was interesting to see an equal number of respondents saying that plant retirements from EPA regulations would or would not compromise reliability of electricity delivery in their service region, while 21 percent said it was too soon to tell (Figure 31).

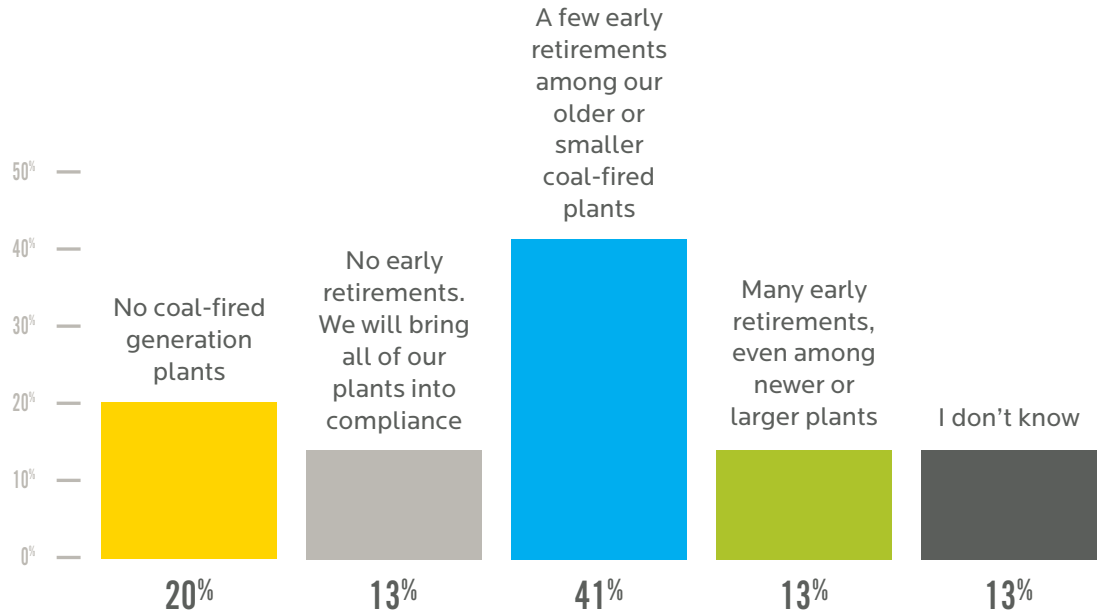
Given the current status of proposed and final rulemakings, as well as judicial reviews and consent decrees driving further environmental regulatory actions, this issue is likely to remain a top industry concern for years to come. While individual compliance requirements and deadlines will likely continue to shift over time, the convergence of these regulatory actions and their implications for generation planning will demand

close consideration and detailed assessments over the coming years. Additional unknowns such as public opinion, political agendas, legal decisions and economic conditions may likely influence the future of many of these initiatives. Nevertheless, given their shortened compliance timeframes and cost implications, the risks inherent in planning for making major investments and implementing strategies for future positioning in the market are driving this year’s ranking for environmental regulation concerns.

GIVEN THE CURRENT STATUS OF PROPOSED AND FINAL RULEMAKINGS, AS WELL AS JUDICIAL REVIEWS AND CONSENT DECREES DRIVING FURTHER ENVIRONMENTAL REGULATORY ACTIONS, THIS ISSUE IS LIKELY TO REMAIN A TOP INDUSTRY CONCERN FOR YEARS TO COME.

FIGURE 30

IMPACT OF EPA REGULATIONS ON COAL-FIRED GENERATION ASSETS

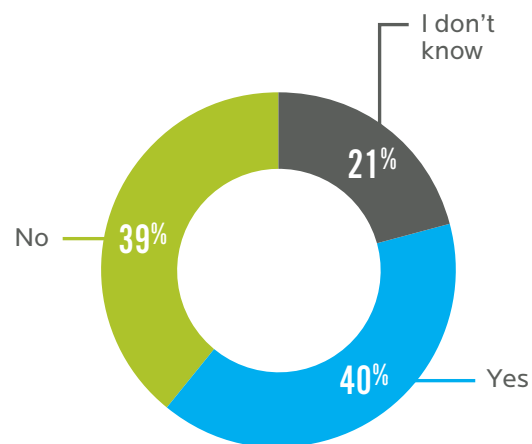


Source: Black & Veatch

Survey participants were asked, "How will current and planned EPA regulations affect the economic useful lives of your coal-fired generation assets?" More than half stated the regulations would result in early retirements of some assets.

FIGURE 31

EPA REGULATIONS ON RELIABLE DELIVERY OF ELECTRICITY



Source: Black & Veatch

Survey participants were asked if the reliable delivery of electricity in their regions is potentially compromised by retirements of baseload generation assets as a result of EPA regulations.

RENEWABLE ENERGY

BY **BILL ROUSH**

Reflecting the impact of several major government-sponsored initiatives and significant private investment, renewable energy generation overall has doubled during the last five years, while overall electric load growth has remained flat. Looking ahead, continued growth in renewable generation will be driven by renewable portfolio standards, which now exist in 29 of the 50 states. Growing industry confidence in renewable energy generation – and the ability of these technologies to address a broad array of electric industry concerns – has had a marked impact on the industry’s view of renewable energy.

Demonstrating the industry’s shift away from skepticism towards renewables, participants who selected a “lack of acceptable (renewable) resources” as a barrier to increasing renewable generation has steadily declined during the last three years (Figure 32). As this year’s survey data indicates, the question is no longer “if” we have available renewable resources, but “what” is the cost? And perhaps, most importantly, do we have the technology to deliver this energy to customers without sacrificing reliability. More than half of utility respondents (52 percent) cited “cost of competitive nonrenewable energy” as the greatest barrier to increasing renewable generation in this year’s survey, while 26 percent selected “intermittent operation,” and 13 percent viewed “transmission” as the greatest barrier.

It is also interesting to note that utilities have rapidly moved from having some level of concern whether renewable resources are available in quantity to looking for opportunities to enhance earnings by deploying renewable technology. In this year’s survey, 68 percent of utility respondents say there can be benefits from renewables in the form of customer and regulatory relations, incentivized investments or future revenue generation.

The industry’s view towards solar, in particular, is worth noting. For the second year in a row, solar energy was ranked fourth among “environmentally friendly” technologies that the industry should focus on, behind conventional nuclear, natural gas and hydroelectric clean(er) energy technologies (Figure 33).

Yet, of the traditional renewable energy technologies, solar was the top ranked item, not just overall, but in all regions of the country. While the survey did not specify between photovoltaic (PV) and solar thermal technology, it is highly probable that the significant improvements in PV technology, cost and flexible configurations (e.g., solar farms and urban rooftops) is driving its broader development and use.

More good news for the renewable industry is the emerging shift from the central generation, one-way flow model to a distributed generation and storage model. A large portion of utility respondents (42 percent) stated they have begun to lay the groundwork for this significant change (Figure 34 on page 47). Such a paradigm shift could do much to enable and integrate renewables, both central station and distributed, by using smart grid tools and energy storage. Considering that virtually the entire electric grid was conceived and built for one-way power

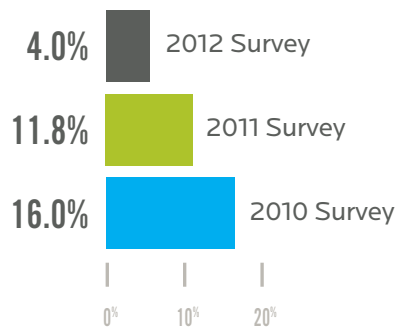
flows, altering that model means important considerations at every step of the way. There are massive investments and critical reliability to protect. If some aspects of this new utility model can be added and actually improve the system, such as with quick-response storage, it may create new services that were not available previously.

CONSIDERING THAT VIRTUALLY THE ENTIRE ELECTRIC GRID WAS CONCEIVED AND BUILT FOR ONE-WAY POWER FLOWS, ALTERING THAT MODEL MEANS IMPORTANT CONSIDERATIONS AT EVERY STEP OF THE WAY.

Despite tremendous progress, significant challenges remain towards increasing renewable energy's overall portion of the U.S. energy mix. While nearly 90 percent of respondents stated they believe they will be integrating intermittent resources (primarily solar and wind) into their systems by 2015, a relative few (38 percent) expect intermittent sources will make up more than 10 percent of their total generation. This is a decline from the 2011 survey as last year, nearly half (46 percent) of survey participants believed solar and wind would make up more than 10 percent of their generation by 2015.

There are many factors that may be causing utilities to re-evaluate the deployment of intermittent resources, including a greater emphasis on non-intermittent renewables such as biomass, hydro and geothermal, to meet RPS requirements. However, one issue is clearly having an impact on more moderate expectations for growth in wind and solar – the potential expiration of Production Tax Credits (PTCs) on wind programs.

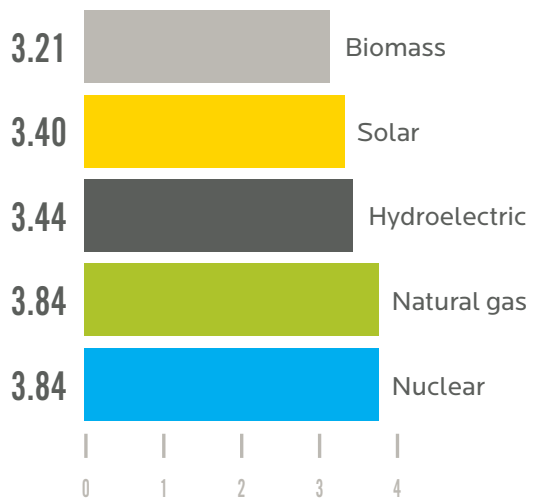
FIGURE 32
CHANGING VIEW ON AVAILABILITY OF RENEWABLE RESOURCES



Source: Black & Veatch

Since 2010, survey participants stating "lack of acceptable resources" as a barrier to increasing renewable generation has steadily declined. Today, the question is more about cost rather than availability of resources.

FIGURE 33
TOP 5 "ENVIRONMENTALLY FRIENDLY" TECHNOLOGIES



Source: Black & Veatch

Survey participants were asked to rate on a scale of 1 to 5, where 1 indicates "least emphasis" and 5 indicates "most emphasis" various environmentally friendly technologies the industry should emphasize. The chart above reflects the average response for each technology.

The PTC issue is of specific importance. Approximately half of survey respondents think the PTC for wind will be renewed before its expiration at the end of 2012 (Figure 35). While some long-standing energy tax breaks do not have expiration dates, the emerging renewables industry has repeatedly had to deal with this issue. Given the potential impact on the viability of certain projects without the PTC, the uncertainty reflected in the electric utility industry as shown by this survey's 50-50 "coin-toss" prediction is an example of the negative impact of expiring tax credits. And, as history shows, previous lapses in the PTC resulted in an uncertain investment climate and repeated boom/bust cycles for the industry.

Another challenge to renewable energy growth is the overall lack of electricity load growth in the industry. More than 90 percent of survey participants stated that their load growth is either declining, flat or less than historical growth rates. If this continues, then renewables will only be implemented to meet RPS requirements and potentially to replace generation from coal plant retirements. On the other hand, if load were to revert to historical growth norms, then new generation would be required and renewables would likely represent some part of the development mix.

Despite overall lack in load growth, utilities are still investing in their infrastructure. As noted in the Financial Section, more than 80 percent of survey respondents indicated they are embarking on a major investment cycle. Nearly half are concentrating their spending on generation, transmission and distribution systems to ensure reliability and 17.1 percent are investing in energy efficiency and new technologies such as smart grid and renewables.

To the extent that renewables can be part of the reliability solution, this will create opportunities for a more sizeable fraction of utility investment spending to be directed their way. This is particularly likely for baseload renewables such as geothermal and biomass. But those technologies have their own challenges, resource identification in the case of geothermal and an uncertain policy environment for biomass.

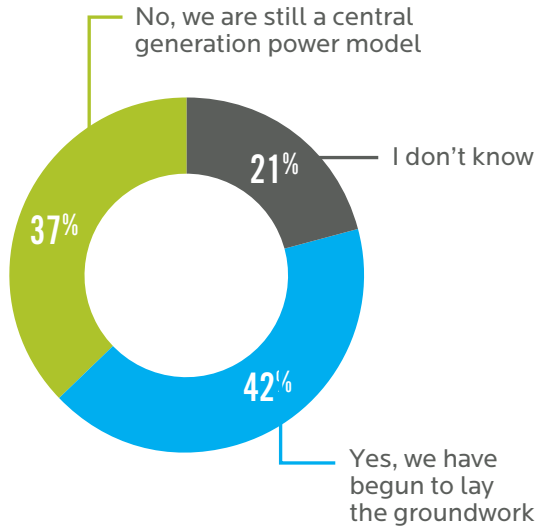
We can't make solar and wind into base load power sources, but storage, better forecasting and policy changes that allow for bidding into power markets in a shorter time frame than the current "day ahead" model may allow for greater use of these abundant resources. The percentage of utility respondents planning or working on energy storage projects is virtually unchanged this year from last at 22 percent. If energy storage technology can be affordably added to reduce intermittency from solar and wind generation, it may also expand the market for these technologies.

Cost and the ability to recover these costs through the rate base is another challenge to renewable development. A majority of respondents (61.6 percent) thought a rate increase caused by renewable energy of 10 to 20 percent would cause a majority of their customers to object to further expansion of renewables. Nearly 26 percent said it would take a rate hike of only 5 percent for this type of customer reaction. Some RPS programs include a provision limiting the rate impact of the RPS to some stated percentage, typically around 2 percent. Efforts to impose this kind of cost limiting language may become more common to address cost concerns as well as aid regulatory bodies in understanding and allocating the costs of renewable energy (Figure 36).

Finally, the cost of renewables versus the cost of natural gas plays, one of, if not the most important role in future growth in this market. Extended forecasts for low natural gas prices further sway the balance of favor towards natural gas generation and Black & Veatch's own Energy Market Perspective forecasts that natural gas will be the predominant U.S. generation fuel by 2035.

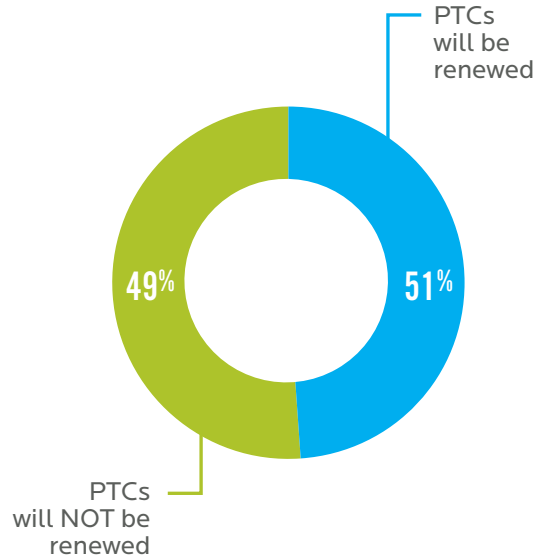
It is possible that some of these retired assets will be replaced with renewable energy technologies, but this will largely depend on what is retired. Other deciding factors for retirements include plant location and ability to provide grid support. With today's natural gas prices, and abundant domestic supply, one can infer that the long-term renewables market may have some challenges competing outside of RPS requirements during the next 20 years.

FIGURE 34
MODIFICATION TO GENERATION SERVICE MODEL



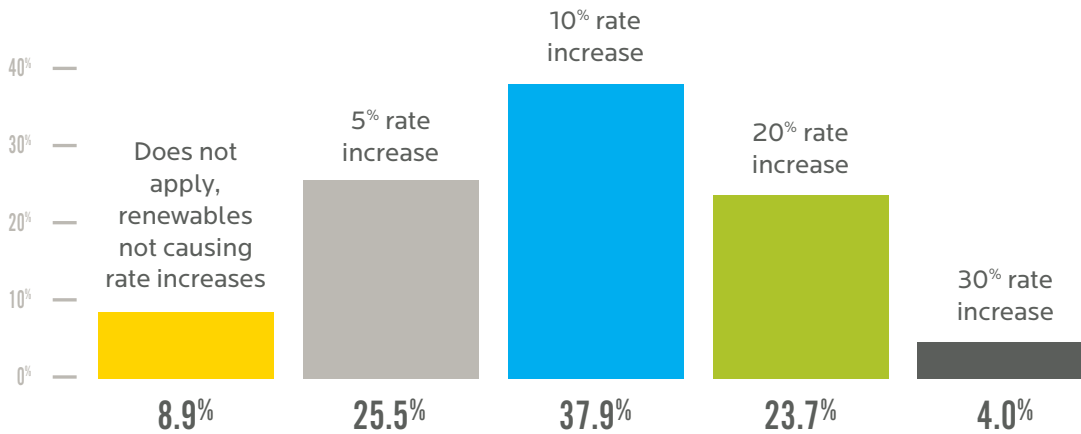
Source: Black & Veatch
 Survey participants were asked if their utility has begun modifying its service model to accommodate distributed generation. More than 40 percent indicated this process is underway.

FIGURE 35
RENEWAL OF PRODUCTION TAX CREDITS



Source: Black & Veatch
 Survey participants were asked if they believed PTCs slated to expire 31 December 2012 would be renewed. There is a nearly 50-50 split among all utility participants indicating uncertainty in this area.

FIGURE 36
LEVEL OF TOLERABLE RATE INCREASES FOR RENEWABLE GENERATION



Source: Black & Veatch
 Survey participants were asked, "What level of overall rate impacts from roll-in renewable resource costs would cause the majority of your customers to object to further expansion of renewables?" More than one-fourth stated that a rate increase of only 5 percent would spur customer objections.

SMART GRID AND INTELLIGENT INFRASTRUCTURE

BY KEVIN CORNISH

Over the past few years, the concept of smart grid has become both a fundamental aspect of utilities' operational landscape, and a focus of significant stakeholder interest. From the earliest stages of its development, the utility industry enjoyed high-profile political and regulatory support for smart grid initiatives, though recent attention in the marketplace can be viewed as decidedly mixed. Today, electric utilities are challenged to incorporate the core elements of the technology, and the business process improvements into their operations by harnessing the vast amount of information made available by smart grid solutions. However, the industry is also caught between potentially competing forces of rapid technological advancement and a continuation of the utility-regulatory status quo.

Responding to regulatory requirements remains the primary motivation for industry participants to invest in new technology. This was closely followed by the impact of government incentives and need to respond to competitive energy markets (Figure 37).

As has been the case for much of the electric utility industry's history, the need to respond to, and operate within, the established regulatory framework is paramount to their performance and viability. Considering the broad impact of electric utilities on the overall population, this regulatory framework has grown to include traditional state public utility commissions, regional governing bodies, and federal regulation as well as municipal oversight. Notwithstanding all of the political attention on electric utility smart grid initiatives, the state regulatory bodies in particular, have continued to exert their influence over utilities' investments, including those in smart grid related initiatives.

While state regulatory commissions retain project approval responsibility, the U.S. federal government

has been heavily supportive of smart grid technologies. The impact of government incentives is mostly due to the recent U.S. Department of Energy (DOE) smart grid and demonstration project grants administered through the American Recovery and Reinvestment Act (ARRA). Through these programs, utilities were able to direct federal funds towards smart meter programs, many of which utilities had already planned, or were in the preparation stage.

ARRA grants allowed for the acceleration of these particular projects, but questions arose about their potential to create significant additional value. Given that the supported projects were primarily foundational smart metering projects with less focus on broader initiatives such as distribution volt/var solutions, Distribution Management System (DMS) implementations, or foundational telecommunication networks; there is likely to be little continued impact of these projects beyond support for follow-on, value-added projects by grant recipients at the conclusion of the ARRA funding. The demonstration project grants may have more lasting

impact if the results of the projects are supportive of additional widespread investments in the technologies under study. However, the industry may not see visible impact of these programs for years.

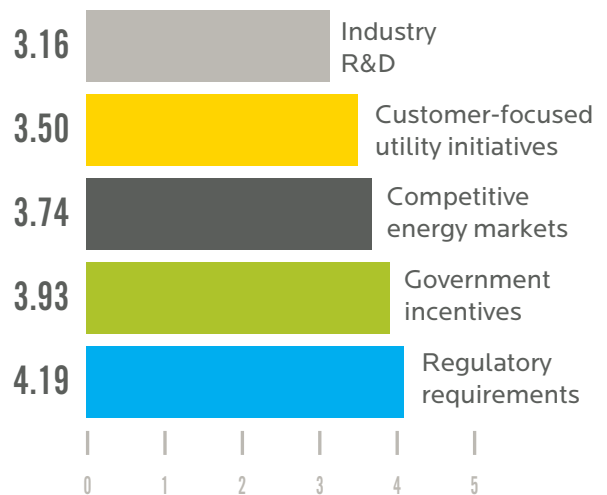
Customer-focused initiatives and utility research and development (R&D) were the two lowest motivators for investing in technology. Pure R&D has been dramatically reduced in the utility industry as competitive pressures and a focus on performance-based spending evaluation has taken over. Utilities have not been able to justify pure research and have looked to vendors and other market participants to provide this R&D, especially industry associations such as EEI, APPA, and NRECA or quasi-governmental agencies. In terms of the customer focused initiatives motivator, rarely are technology investments solely focused on the customer.

The absence of customer-focused technology investments is likely due to the fact that it is difficult to create a business justification for projects of this nature. Also, many examples of customer impacting initiatives such as investments in outage communications systems, customer self-service solutions, etc., are often wrapped into larger operational or organizational business system improvement initiatives. So while many of these initiatives have significant customer service value – they are not exclusively customer focused, and therefore, not branded as such. In the end, it remains the need to respond to regulatory mandates and the pressures of obtaining the allowable rate of return on its investments that drives investor owned utilities.

Security has always been a concern of utilities, though prior to the rise of distributed computing and the implementation of advanced control systems, the focus was on physical security and the restriction of access to critical facilities. Today, utility security issues have evolved to include all aspects of the utility enterprise

including the critical information networks that link almost all operational aspects of today’s electric, gas or water utility. As utility information technology and operational technology solutions became more integrated, utilities have become a focus of cyber attacks and therefore susceptible to new types of internal and external threats. Reflecting this new reality, respondents have identified security for computers and networks and command and control systems as higher priorities than the defense of core utility generation, transmission, and distribution assets (Figure 38 on the next page). This is an acknowledgment of the challenges that utilities face in properly securing an interconnected network as part of an overall enterprise security architecture.

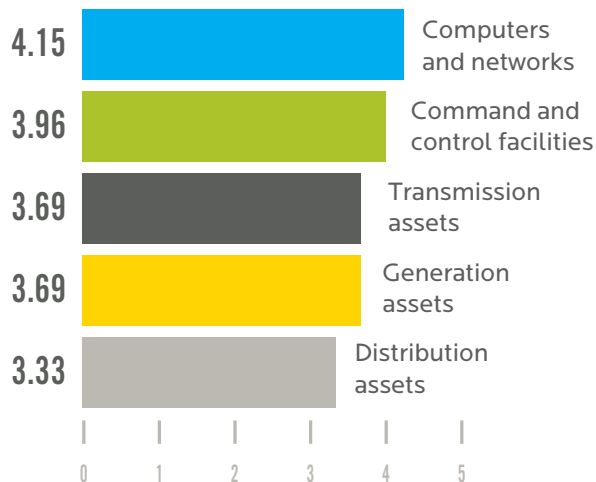
FIGURE 37
MOTIVATION FOR NEW TECHNOLOGY INVESTMENT



Source: Black & Veatch
Survey participants were asked to rate the significance of each factor for motivating the industry to invest in new technology based on a scale of 1 to 5, where 1 indicates “least motivation” and 5 indicates “most motivation.” The chart above provides the average rating for each factor.

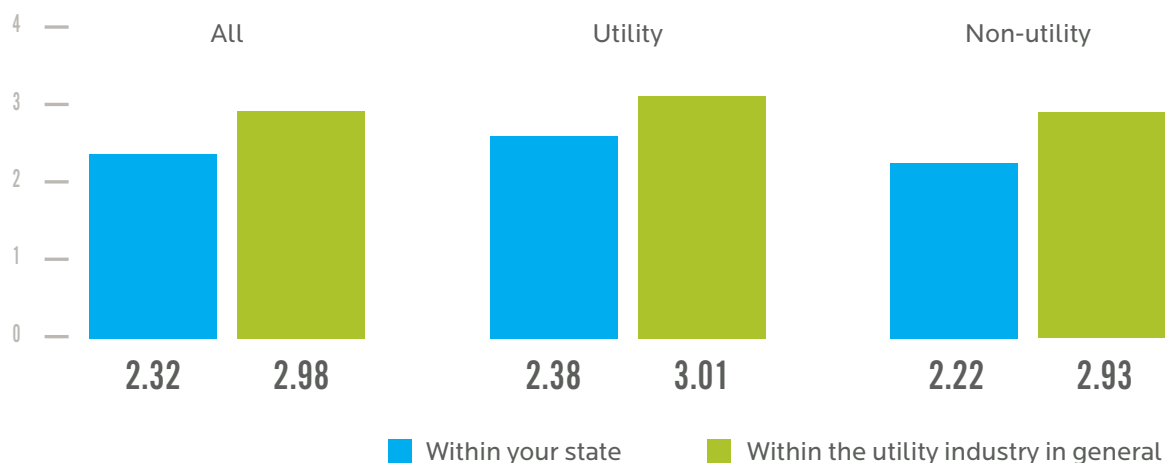
SUSTAINABILITY

FIGURE 38
CYBER SECURITY RISK CONCERNS



Source: Black & Veatch
Survey participants were asked to rate on a scale of 1 to 5, where 1 indicates "least concerned" and 5 indicates "most concerned," their cyber security concerns for the listed aspects of their utility's operations. The chart above reflects the average response for each item.

FIGURE 39
UNDERSTANDING OF SMART GRID



Source: Black & Veatch
Survey respondents were asked to rate on a scale of 1 to 5, with 1 meaning "very poorly understood" and 5 meaning "very well understood," how well they believe smart grid is understood within their state and within the utility industry. The chart above provides the average responses for utility and non-utility participants.

Another aspect of security relates to the privacy and management of customer-related information including financial data, personally identifiable information and detailed energy consumption data. As utilities collect and manage increasing amounts of customer-specific information, the industry must heed the examples of the retail and e-Commerce industries that have been the object of numerous hacking events, designed to capture customer financial data or expose vulnerabilities in company systems. The answer remains to be seen how the industry will guard the security and privacy of the data while also integrating smart metering data into the utility smart grid analytics framework.

As the deployment of smart grid technologies progresses, respondents in aggregate indicated that smart grid is better understood outside their home states than within. This appears to represent the frustration that utilities have within their own immediate purview and perhaps a hope that the broader market has things better under control (Figure 39). Unfortunately, since it is impossible for things to be better everywhere else but nowhere else, the reality must be that smart grid is generally not well understood, or at least not as well understood as utilities would like.

In some ways, this situation makes sense. “Smart grid,” as a term, encompasses a wide range of technology solutions and initiatives. Each of these initiatives has value and benefits that, when combined into a fully functioning network, take on a broader capability and deeper value. It is a complex and ever evolving mixture of opportunities that can vary with each specific utility depending on their starting point. Thus, utilities, regulators, market participants and other interested stakeholders all can have a different perspective on what smart grid is, what particular aspects are important and how the utility should progress with and implement technology opportunities. While this can come across as a dysfunctional condition for people that are expecting a singular definition of smart grid, utilities should accept this as the natural contention given the wide variation in positions.

Respondents generally agreed that the industry has not made a strong business case for smart grid, with utilities having a slightly more favorable (although still less than

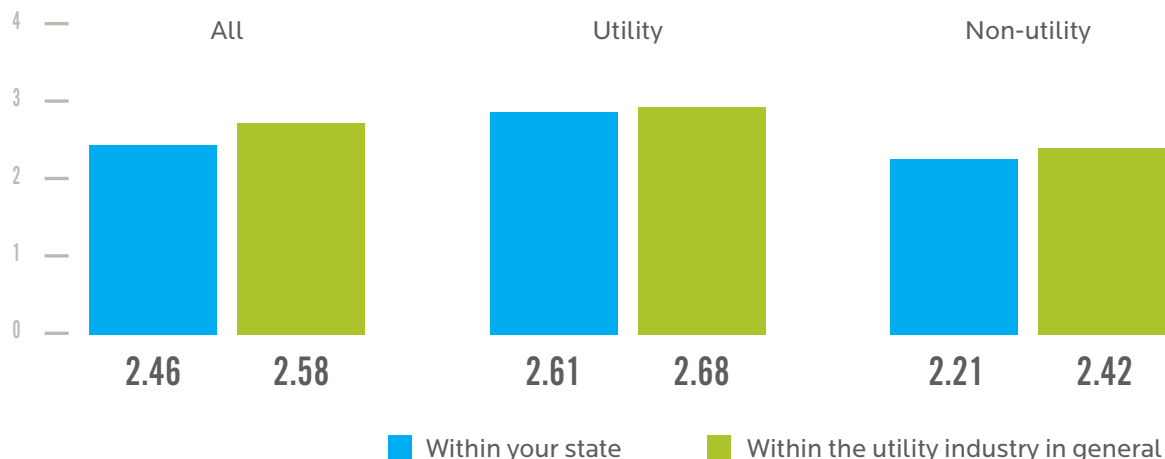
neutral) view than non-utilities (Figure 40 on the next page). A major factor in this could be the complexities mentioned above and the differing viewpoints of the term “smart grid” but also the challenge in defining what makes a good business case.

For a utility that wishes to pursue a smart grid investment, a good business case is one that shows positive value based on the utility’s investment hurdle; allows the utility to proceed with the investment; and, if regulated, to obtain rate recovery for the investment. To regulators, a good business case may be one that conforms to the proper process of evaluating and valuing prudent investments. While to other stakeholders, a good smart grid business case may be in how the investment structures risks and rewards, which may be viewed differently than how the utility would prefer. All of these views become important with smart grid business cases that depend on some aspects of societal benefits in order to achieve a positive outcome.

As noted in the Rates & Regulatory section, there is a fair amount of uncertainty related to rate recovery for smart grid programs. This may partially explain the responses to the initial question identifying regulatory mandates as the primary driver for utility smart grid investments. Conceptually, if a utility is responding to a regulatory mandate, they should have a greater likelihood of positive investment recovery. We have seen that play out in several U.S. states and Canadian provinces where legislation essentially mandated smart metering solutions and provided for rate recovery.

Another aspect could be due to the fact that utility respondents see only about 56 percent of the benefits of smart grid investments accruing to the utility in terms of lower costs and operational efficiencies while the rest are considered societal benefits to which the utility gets no or little compensation (Figure 41 on the next page). Simply put, it is difficult to justify assuming the risks and efforts to implement a program where a significant portion of the benefits flow elsewhere.

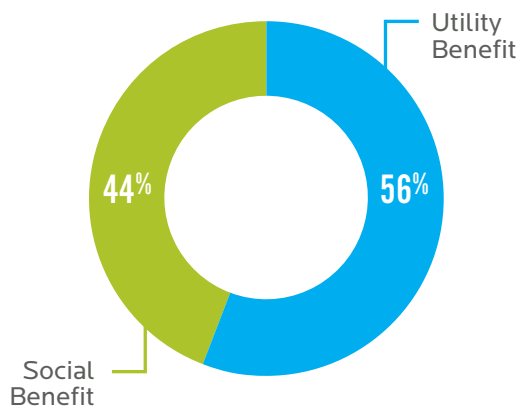
FIGURE 40
QUALITY OF SMART GRID BUSINESS CASES



Source: Black & Veatch

Survey participants were asked to rate on a scale of 1 to 5, where 1 indicates “very poorly made” and 5 indicates “very well made,” how well utilities have made their business case for smart grid. The chart above reflects the average responses among utility and non-utility participants.

FIGURE 41
UTILITY VERSUS SOCIETAL BENEFITS



Source: Black & Veatch

Survey participants were asked what proportion of the net benefits of their respective smart grid plans are related to utility benefits and what portion are related to societal benefits. The chart above reflects the average of all responses.

Once again, utilities have rated “customers’ lack of interest and knowledge” as the greatest impediment to investments in smart grid (Figure 42 on the next page). This is an interesting perspective as customers have traditionally not been expected to have significant knowledge of utility investment criteria and business case justification. Granted that certain customer classes and interested stakeholders have often participated in regulatory proceedings or project approval discussions, but it is a new twist that the industry expects a relatively disinterested customer base to become invested in the process of smart grid investment. This is partially a result of the initial social euphoria and excitement about smart grid initiatives as an avenue of reducing customer costs and providing them with more control – a situation that most customers have not yet experienced.

After the lack of customer interest, utilities and non-utilities identified issues ranging from regulatory support, capital investment and ongoing support to the lack of technical maturity of the solutions as impediments to investment. Each represents a valid concern that has been consistently mentioned in previous surveys. Though the regulatory and financial investment appeal of the smart grid investments has been covered, the lack of technical maturity is more difficult to describe.

As some smart grid initiatives implement leading technologies such as Distribution Management Systems (DMS), integrated Volt-Var optimization solutions, or tier 2 service-territory wireless communications systems to support distribution automation, utilities have encountered challenges related to the newness of the solutions, the lack of significant utility implementation experience, and issues with integrating the new systems into legacy applications. Some, but not all, of these issues are related to the maturity of the solutions, while others are more affected by the project’s implementation.

In terms of the future projections, half of respondents expect the level of smart grid investment to slow and shift to other areas – including towards information systems or a focus on heavier transmission and distribution expenditures. This perspective could well be due to the fact that much of the initial smart grid investment was

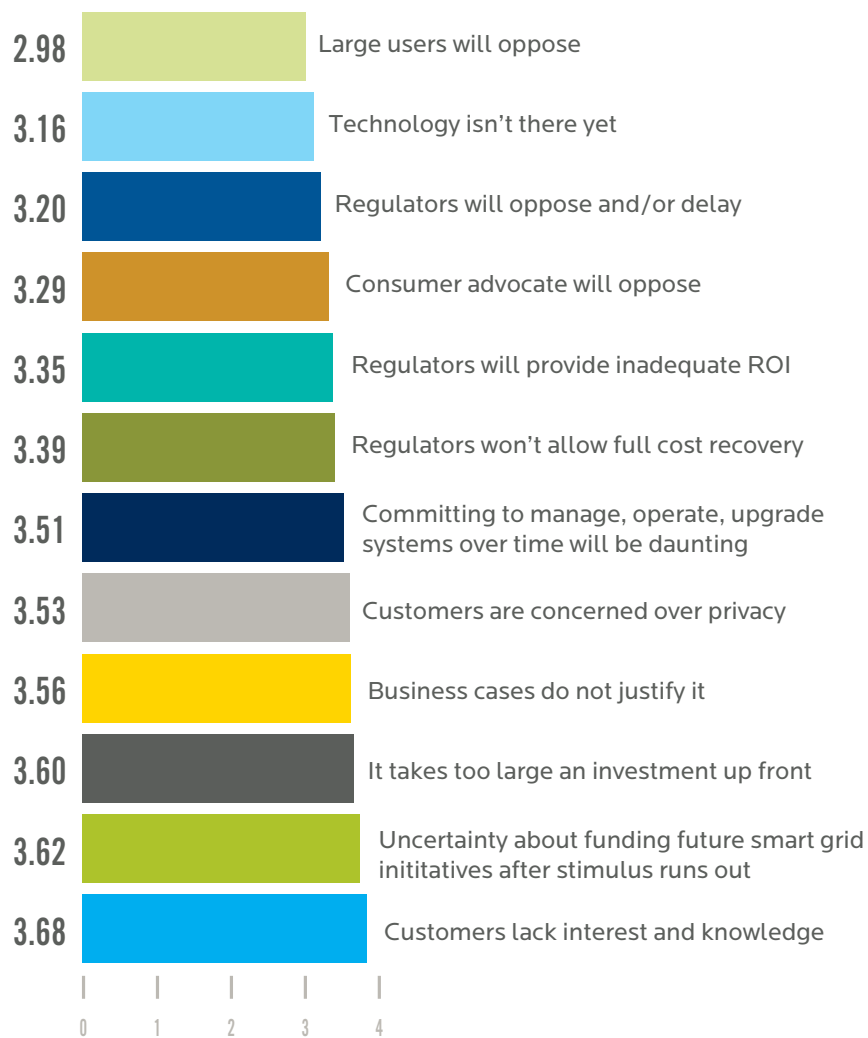
focused on smart metering, or AMI solutions and with these foundational systems in place, the focus now shifts into other areas that can build on these initial investments. A slightly smaller number of utilities expect similar levels of smart grid investments with some emphasis on the business justifications associated with bottom-line savings.

The themes that permeate the respondents’ answers to the smart grid investment issue include the need to produce comprehensive and complete business case justifications that can withstand regulatory and stakeholder scrutiny, the need to work closely with and within the regulatory construct, and the need to better engage customers and stakeholders. Overlaying these imperatives is the need to continue to evaluate what smart grid really means to the utility.

Black & Veatch believes that the responses support the position that utilities will continue to invest in smart grid enabling technologies that provide operational efficiency enhancements or meet corporate or regulatory goals. However these projects will need to prove their financial merit and continue to pass state and other regulatory scrutiny. Despite no single definition of smart grid, there is great value to be gained for utilities and customers though the progress will be more evolutionary than revolutionary. For some utilities, the focus will be leveraging recently deployed AMI systems to deliver more information that can be used to drive other applications or initiatives. Other utilities will need to invest in telecommunication systems to support the data generation and usage-intensive smart grid applications.

Additionally, the industry must continue to engage the public over the value and benefits of these smart grid technologies to counter an increasingly organized opposition. Moving forward, there will be many opportunities to position smart grid technologies as opportunities for both consumers and utilities. Specific benefits of such opportunities are detailed within the Customer Engagement section of this report.

FIGURE 42
GREATEST IMPEDIMENTS TO SMART GRID INVESTMENTS



Source: Black & Veatch

Participants were asked to rate on a scale of 1 to 5, with 1 indicating "very low impediment" and 5 meaning "very large impediment," the degree to which several issues impede smart grid investments. The chart above reflects the average response for each issue.



The Black & Veatch industry survey covered many areas, some of which were not included within the full analysis. The following are charts that were not included within the analysis portion of the report, but provide additional insight into industry trends.

GLOBAL INDUSTRY TRENDS: 2012 VERSUS 2011

2011		2012	
Energy/commodity prices will rise significantly	3.81	Energy/commodity prices will rise significantly	3.71
A price for carbon will be established regionally and/or nationally	3.07	A price for carbon will be established regionally and/or nationally	3.10
Renewable energy technologies will advance to the point that they are unquestionably competitive with more traditional sources of supply	2.68	Renewable energy technologies will advance to the point that they are unquestionably competitive with more traditional sources of supply	2.72
Utilities will experience a proportionately large increase in revenues derived from information-related services as compared with revenues derived from energy sales	2.55	Utilities will experience a proportionately large increase in revenues derived from information-related services as compared with revenues derived from energy sales	2.53

Source: Black & Veatch

Survey participants were asked how strongly they agree or disagree with each of the above listed statements on a scale of 1 to 5, where 1 indicates "strongly disagree" and 5 indicates "strongly agree." Non-utility respondents (such as consultants) rated "Utilities will experience a proportionately large increase in revenues derived from information-related services" higher than utility respondents.

THREE-YEAR COMPARISON OF THE TOP 10 ISSUES

2009/2010		2011		2012	
Reliability	4.05	(Economic) regulation	4.20	Aging infrastructure	4.44
(Economic) regulation	3.93	Aging infrastructure	4.19	Reliability	4.44
Aging work force	3.93	Reliability	4.16	Environment	4.31
Environment	3.81	Technology	4.03	Long-term investment	4.27
Long-term investment	3.81	Environment	3.92	Technology	4.18
Aging infrastructure	3.75	Long-term investment	3.76	Security	4.15
Technology	3.55	Aging work force	3.75	Aging work force	4.06
Security	3.37	Fuel policy	3.64	Fuel policy	4.04
Market structure	3.32	Security	3.52	Economic regulation	4.02
Fuel policy	3.31	Market structure	3.40	Market structure	3.94

Source: Black & Veatch

Each year survey participants are asked to rate on a scale of 1 to 5, where 1 indicates "very unimportant" and 5 indicates "very important," each of the above listed long-term issues within the electric utility industry. The chart above reflects the average rating of each during the past three years.

THREE-YEAR COMPARISON OF “ENVIRONMENTALLY FRIENDLY” TECHNOLOGY RANKINGS

2009/2010		2011		2012	
Nuclear energy	4.19	Nuclear energy	3.87	Nuclear energy	3.84
Natural gas	3.29	Natural gas	3.75	Natural gas	3.84
Wind power	3.28	Hydroelectric	3.50	Hydroelectric	3.44
Hydroelectric	3.23	Solar energy	3.42	Solar energy	3.40
Coal gasification	3.21	Wind power	3.25	Biomass	3.21
Solar energy	3.20	Coal gasification	3.24	Wind power	3.14
Biomass	3.11	Biomass	3.07	Coal gasification	2.98
Tidal generation	2.71	Tidal generation	3.00	Tidal generation	2.71

Source: Black & Veatch

Each year, survey participants are asked to rate on a scale of 1 to 5, where 1 means “least emphasis” and 5 means “most emphasis,” where the industry should place its emphasis in environmentally friendly technologies. Nuclear has been the top-ranked technology since the survey’s inception. Natural gas tied with nuclear this year, while wind power continues to slide down in rankings.

THREE-YEAR COMPARISON OF TOP ENVIRONMENTAL CONCERNS

2009/2010		2011		2012	
Carbon emissions legislation	4.17	Carbon emissions legislation	3.88	Carbon emissions legislation	4.13
Water Supply	3.16	Water Supply	3.86	Water Supply	3.76
NOx	3.00	Nuclear fuel disposal/ storage	3.86	Physical carbon emissions	3.73
Mercury	3.00	Nuclear Safety	3.81	Mercury	3.70
SO ₂	2.98	Water effluent	3.39	Nuclear fuel disposal/ storage	3.65
Particulates	2.82	Physical carbon emissions	3.33	Water effluent	3.63
Water effluent	2.78	Coal handling and ash disposal	3.32	Particulates	3.59
Coal production	2.71	Mercury	3.26	NOx	3.59
Nuclear fuel disposal/ storage	2.70	NOx	3.25	Nuclear Safety	3.58
Coal transportation	2.65	SO ₂	3.23	SO ₂	3.54
Site remediation	2.54	Particulates	3.17	Coal handling and ash disposal	3.49
		Site remediation	3.08	Coal production	3.27
		Coal production	3.03	Site remediation	3.23
		Coal transportation	2.70	Coal transportation	2.94

Source: Black & Veatch

Each year, survey participants are asked to rate the environmental concerns listed above on a scale of 1 to 5, where 1 indicates “least concerned” and 5 indicates “most concerned.” Carbon emissions and water supply have been the top environmental concerns throughout the history of the Black & Veatch survey.

TOP 10 ISSUES BY NERC REGIONAL RELIABILITY COUNCIL

FRCC		MRO		NPCC		RFC	
Reliability	4.61	Aging infrastructure	4.47	Aging infrastructure	4.53	Aging infrastructure	4.53
Aging infrastructure	4.44	Reliability	4.39	Reliability	4.45	Environment	4.37
Security	4.42	Environment	4.21	Environment	4.31	Long-term investment	4.33
Fuel policy	4.33	Security	4.18	Security	4.27	Security	4.30
Environment	4.31	Long-term investment	4.15	Technology	4.18	Reliability	4.26
Technology	4.28	Technology	4.05	Long-term investment	4.16	Economic Regulation	4.09
Long-term investment	4.25	Aging work force	4.02	Market structure	4.13	Technology	4.05
Aging work force	4.17	Market structure	4.00	Economic Regulation	4.09	Market structure	4.05
Market structure	4.03	Fuel policy	3.95	Aging work force	4.04	Fuel policy	3.88
Economic Regulation	3.92	Economic Regulation	3.90	Fuel policy	4.04	Aging work force	3.86

Source: Black & Veatch

The table above shows the ranking of the Top 10 issues by NERC regional reliability councils/organizations.

ENVIRONMENTALLY FRIENDLY TECHNOLOGIES BY NERC REGIONAL RELIABILITY COUNCIL

FRCC		MRO		NPCC		RFC	
Nuclear energy	4.17	Natural gas	3.79	Natural gas	3.93	Natural gas	4.07
Natural gas	4.03	Nuclear energy	3.71	Nuclear energy	3.89	Nuclear energy	4.00
Biomass	3.53	Solar energy	3.46	Solar energy	3.62	Hydroelectric	3.30
Coal gasification	3.50	Hydroelectric	3.33	Biomass	3.47	Solar energy	3.23
Solar energy	3.42	Wind power	3.23	Hydroelectric	3.44	Biomass	3.21
Hydroelectric	3.31	Biomass	2.95	Wind power	3.24	Wind power	3.12
Wind power	3.25	Other	2.95	Other	3.06	Other	2.93
Other	3.00	Coal gasification	2.94	Coal gasification	2.89	Coal gasification	2.77
Tidal generation	2.92	Tidal generation	2.65	Tidal generation	2.78	Tidal generation	2.62

Source: Black & Veatch

The table above provides the ranking of environmentally friendly technologies the industry should emphasize by NERC regional reliability council.

SERC		SPP		TRE		WECC	
Reliability	4.41	Environment	4.43	Aging infrastructure	4.43	Aging infrastructure	4.44
Environment	4.39	Reliability	4.42	Reliability	4.40	Reliability	4.40
Aging infrastructure	4.33	Aging infrastructure	4.34	Environment	4.38	Environment	4.33
Long-term investment	4.20	Long-term investment	4.15	Market structure	4.15	Long-term investment	4.31
Fuel policy	4.16	Technology	4.09	Long-term investment	4.08	Technology	4.25
Security	4.07	Security	4.08	Security	4.08	Aging work force	4.07
Technology	4.03	Market structure	4.04	Technology	4.00	Economic Regulation	4.06
Aging work force	4.02	Fuel policy	4.02	Economic Regulation	4.00	Security	4.06
Economic Regulation	3.92	Economic Regulation	3.98	Aging work force	3.97	Fuel policy	4.00
Market structure	3.87	Aging work force	3.94	Fuel policy	3.95	Market structure	3.91

SERC		SPP		TRE		WECC	
Nuclear energy	4.07	Nuclear energy	3.96	Natural gas	4.05	Natural gas	3.89
Natural gas	3.93	Natural gas	3.79	Nuclear energy	3.78	Nuclear energy	3.79
Hydroelectric	3.33	Solar energy	3.34	Solar energy	3.53	Solar energy	3.52
Coal gasification	3.33	Wind power	3.26	Wind power	3.33	Hydroelectric	3.51
Solar energy	3.26	Hydroelectric	3.23	Other	3.30	Biomass	3.14
Biomass	3.10	Other	3.07	Coal gasification	3.03	Other	3.13
Other	3.08	Biomass	2.98	Hydroelectric	3.03	Wind power	3.12
Wind power	2.97	Coal gasification	2.92	Tidal generation	2.85	Coal gasification	2.81
Tidal generation	2.57	Tidal generation	2.65	Biomass	2.85	Tidal generation	2.74

APPENDIX

COMPARISON OF ENVIRONMENTAL CONCERNS BY NERC REGIONAL RELIABILITY COUNCIL

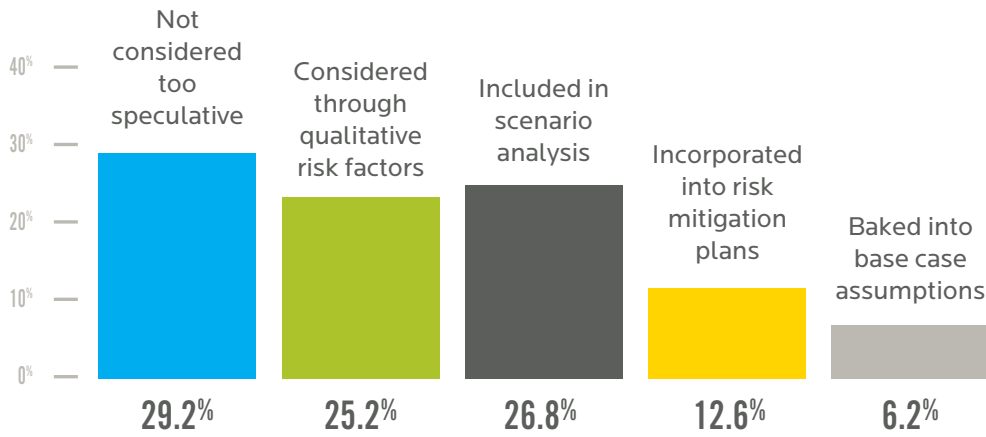
FRCC		MRO		NPCC		RFC	
Carbon emissions legislation	4.31	Carbon emissions legislation	4.06	Carbon emissions legislation	4.13	Carbon emissions legislation	4.09
Water supply	4.28	Mercury	3.76	Water supply	3.91	Mercury	3.74
Nuclear safety	3.94	NOx	3.66	Nuclear fuel disposal/storage	3.87	Physical carbon emissions	3.71
Mercury	3.94	Nuclear fuel disposal/storage	3.53	Nuclear safety	3.78	Nuclear fuel disposal/storage	3.67
Water effluent	3.94	Physical carbon emissions	3.52	Water effluent	3.76	Coal handling and ash disposal	3.65
Coal handling and ash disposal	3.89	SO ₂	3.50	Physical carbon emissions	3.69	Particulates	3.65
Physical carbon emissions	3.72	Coal handling and ash disposal	3.50	Mercury	3.64	Water effluent	3.58
Nuclear fuel disposal storage	3.67	Water effluent	3.47	Particulates	3.60	Nuclear safety	3.56
Site remediation	3.56	Particulates	3.47	NOx	3.55	Nox	3.56
SO ₂	3.50	Nuclear safety	3.40	SO ₂	3.53	SO ₂	3.51
Particulates	3.47	Water supply	3.40	Coal handling and ash disposal	3.35	Water supply	3.49
Coal production	3.42	Coal production	3.16	Coal production	3.31	Coal production	3.07
NOx	3.39	Site remediation	3.06	Site remediation	3.22	Site remediation	3.07
Coal transportation	3.28	Coal transportation	2.89	Coal transportation	2.89	Coal transportation	2.77

Source: Black & Veatch

The table above provides the ranking of top environmental concerns by NERC regional reliability council. Water supply are among the top concerns in Texas, Florida and Southeastern councils, while emissions concerns related to mercury and NOx are two of the top three concerns in the Midwest Regional Organization.

SERC		SPP		TRE		WECC	
Carbon emissions legislation	4.05	Carbon emissions legislation	4.00	Water supply	4.10	Carbon emissions legislation	4.15
Mercury	3.87	Mercury	3.83	Carbon emissions legislation	3.95	Physical carbon emissions	3.84
Water supply	3.84	SO ₂	3.75	Mercury	3.85	Water supply	3.78
Nuclear fuel disposal storage	3.77	Physical carbon emissions	3.75	Nuclear fuel disposal/storage	3.73	NOx	3.67
Coal handling and ash disposal	3.72	Water supply	3.74	NOx	3.65	Nuclear fuel disposal storage	3.64
Nuclear safety	3.70	NOx	3.64	Coal handling and ash disposal	3.60	Mercury	3.59
Water effluent	3.70	Particulates	3.62	Physical carbon emissions	3.59	Particulates	3.59
NOx	3.64	Water effluent	3.62	Particulates	3.58	Nuclear safety	3.55
SO ₂	3.61	Nuclear fuel disposal/storage	3.58	SO ₂	3.50	SO ₂	3.48
Physical carbon emissions	3.60	Nuclear safety	3.55	Water effluent	3.48	Water effluent	3.46
Coal production	3.56	Coal handling and ash disposal	3.51	Coal production	3.40	Site remediation	3.22
Particulates	3.49	Coal production	3.28	Nuclear safety	3.38	Coal handling and ash disposal	3.15
Site remediation	3.05	Site remediation	3.11	Site remediation	3.13	Coal production	3.15
Coal transportation	3.03	Coal transportation	2.96	Coal transportation	2.75	Coal transportation	2.68

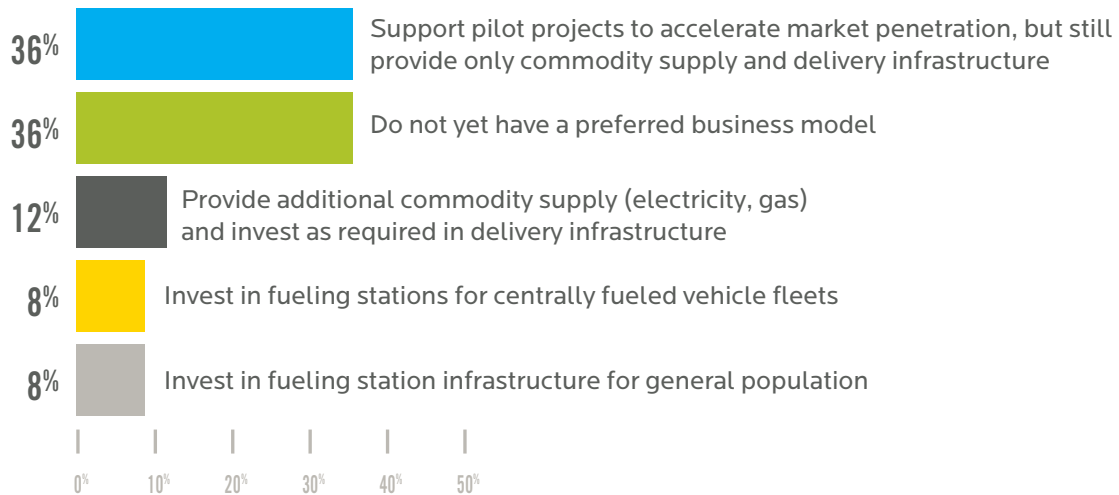
CONSIDERATION FOR PHYSICAL IMPACTS FROM GLOBAL WARMING



Source: Black & Veatch

Survey participants were asked how the potential physical impacts from global warming are considered in their long-term resource planning. Nearly one-third of utilities believe global warming to be too speculative.

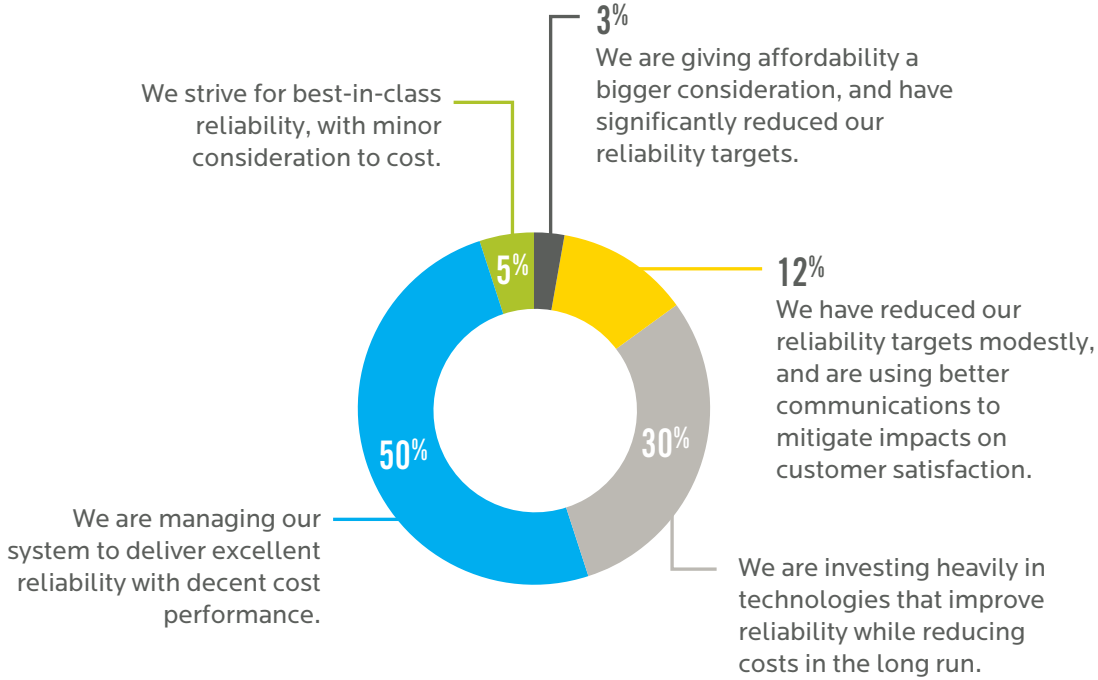
BUSINESS MODEL FOR ALTERNATIVE FUEL VEHICLES



Source: Black & Veatch

Survey participants were asked which of the above statements best represents their company's preferred business model for alternative fuel vehicles, such as electric vehicles and natural gas vehicles. More than one-third are supportive of pilot programs to accelerate market penetration.

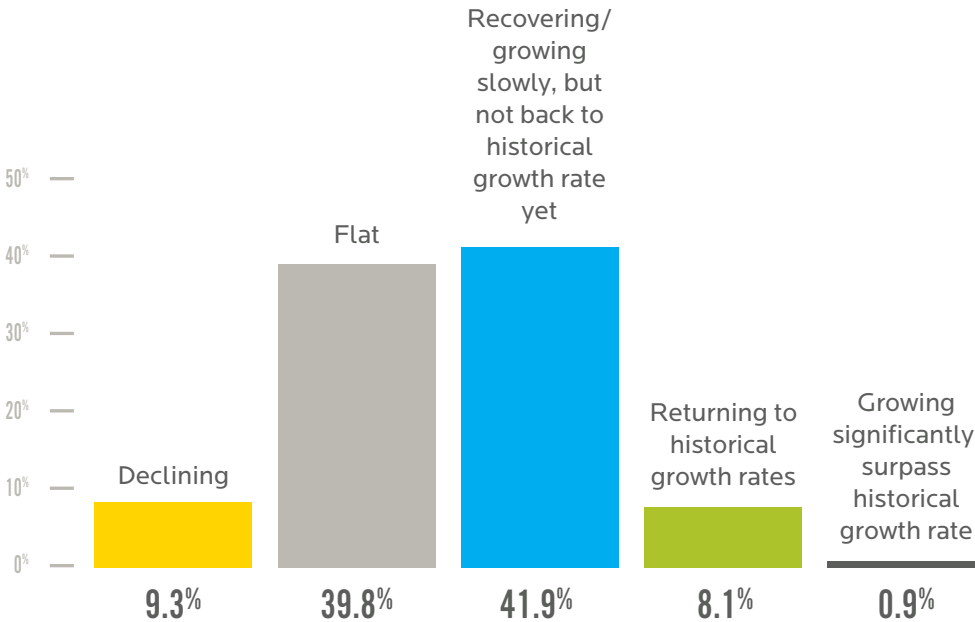
RELIABILITY AND AFFORDABILITY VERSUS NERC-COMPLIANT



Source: Black & Veatch

Survey participants were asked how their utilities balance reliability and affordability while remaining NERC-compliant. More than half of utility respondents emphasize reliability over cost performance.

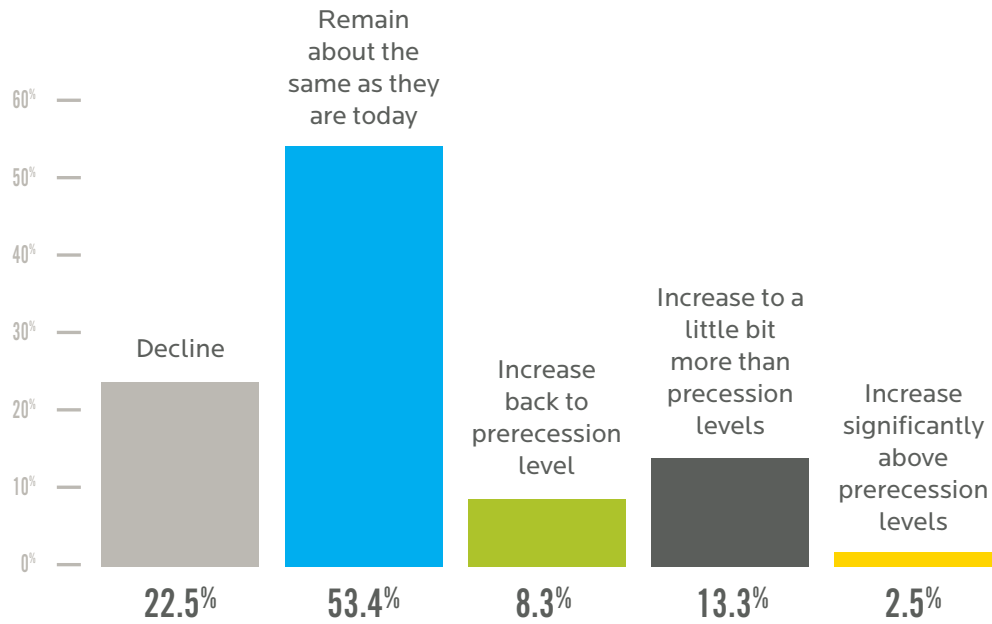
CURRENT LOAD GROWTH RATE



Source: Black & Veatch

Utility participants were asked, "What is the current load growth rate for your utility?" Approximately half stated that their load is growing to some degree.

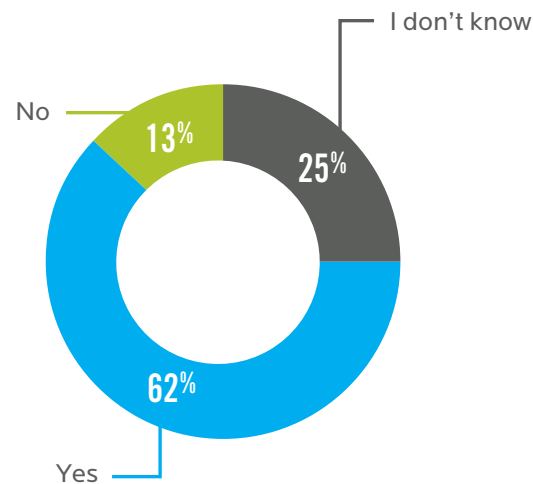
UTILITY EMPLOYMENT



Source: Black & Veatch

Survey participants were asked how they expect the number of employees within their organization to change during the next two years. The majority believe employment levels will remain the same or increase to some degree. More than 20 percent believe employment levels will decline.

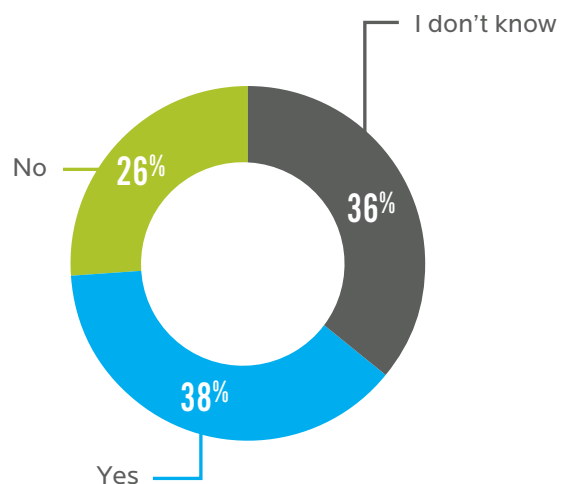
RENEWABLE PORTFOLIO TARGETS



Source: Black & Veatch

Utility participants were asked if renewable portfolio targets set in their respective operating areas are achievable. Nearly two-thirds believe renewable targets are achievable.

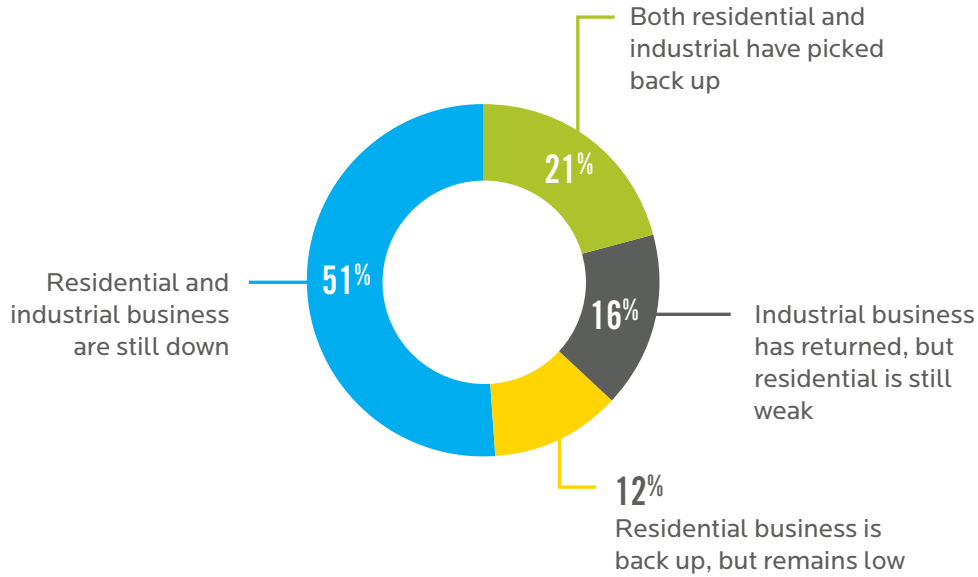
REPORTING REQUIREMENTS FOR SUSTAINABILITY GOALS



Source: Black & Veatch

Utilities were asked if their regulators require utilities to report on progress towards achieving sustainability goals. Nearly 40 percent are required to report on sustainability goals.

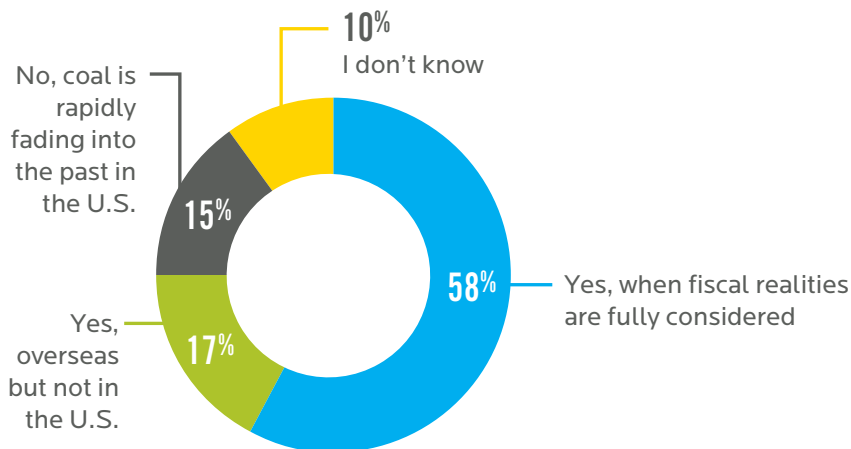
ECONOMIC RECOVERY



Source: Black & Veatch

Survey participants were asked, "Do you think the economy is making a recovery in your region?" More than half of utility respondents stated that residential and industrial business is still down.

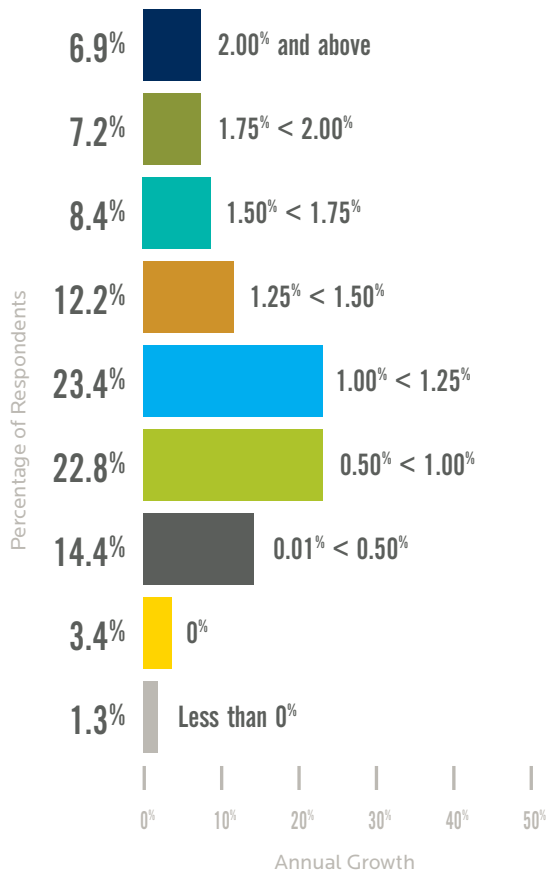
FUTURE OF COAL IN U.S. POWER INDUSTRY



Source: Black & Veatch

Utility respondents were asked, "Is there a future for coal in electricity generation?" Less than 60 percent believe there is a future for coal in United States power generation industry.

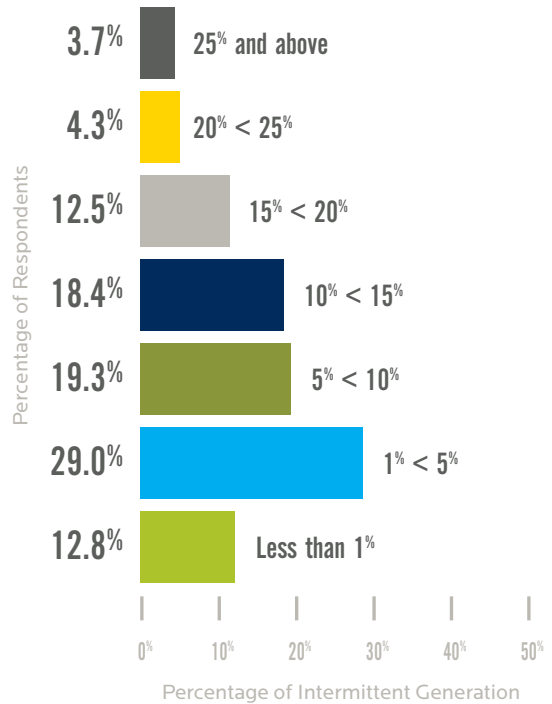
AVERAGE ANNUAL ENERGY GROWTH RATE FORECAST



Source: Black & Veatch

Utility participants were asked, "Over the next five years, what do you expect the average annual energy growth rate to be for your utility?" More than half project annual growth to be less than 1.25 percent.

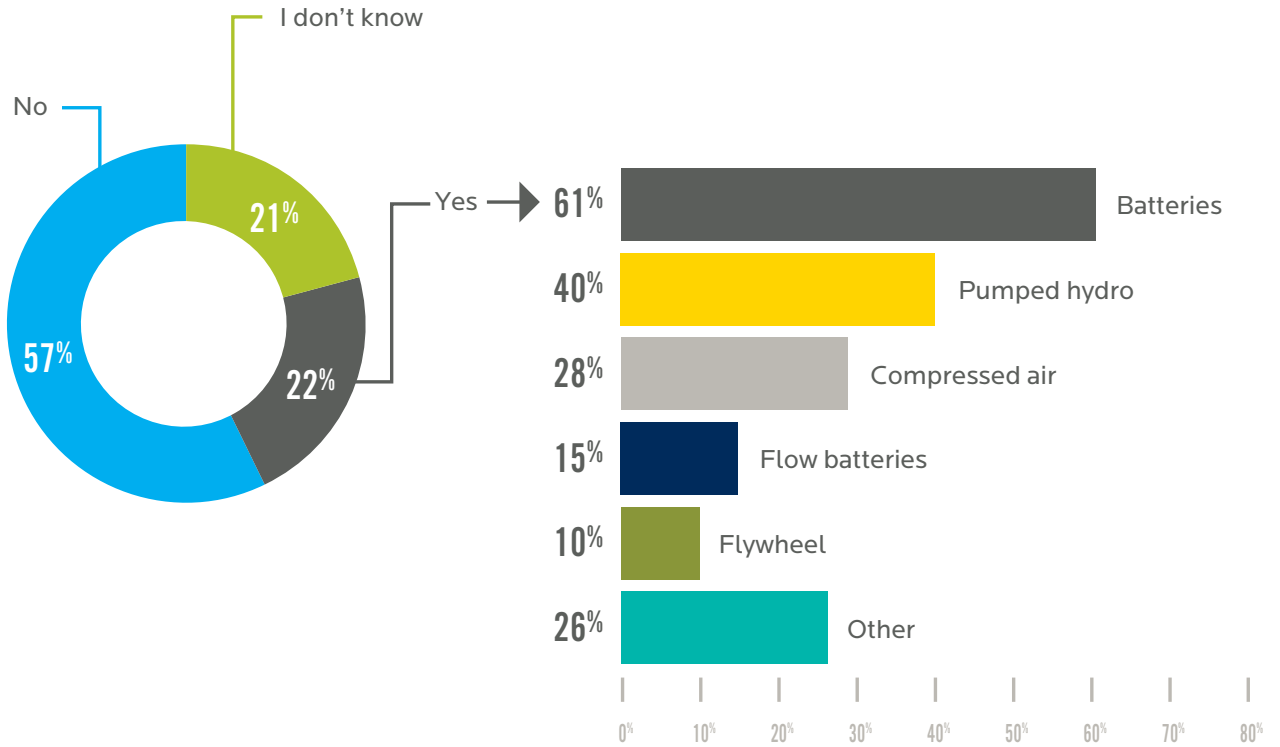
ENERGY FROM INTERMITTENT GENERATION RESOURCES BY 2015



Source: Black & Veatch

Utility participants were asked, "What percentage of your utility's energy requirements will be produced by intermittent generation resources by 2015? Nearly two-thirds of respondents project intermittent renewables will account for less than 10 percent of their total energy requirements. .

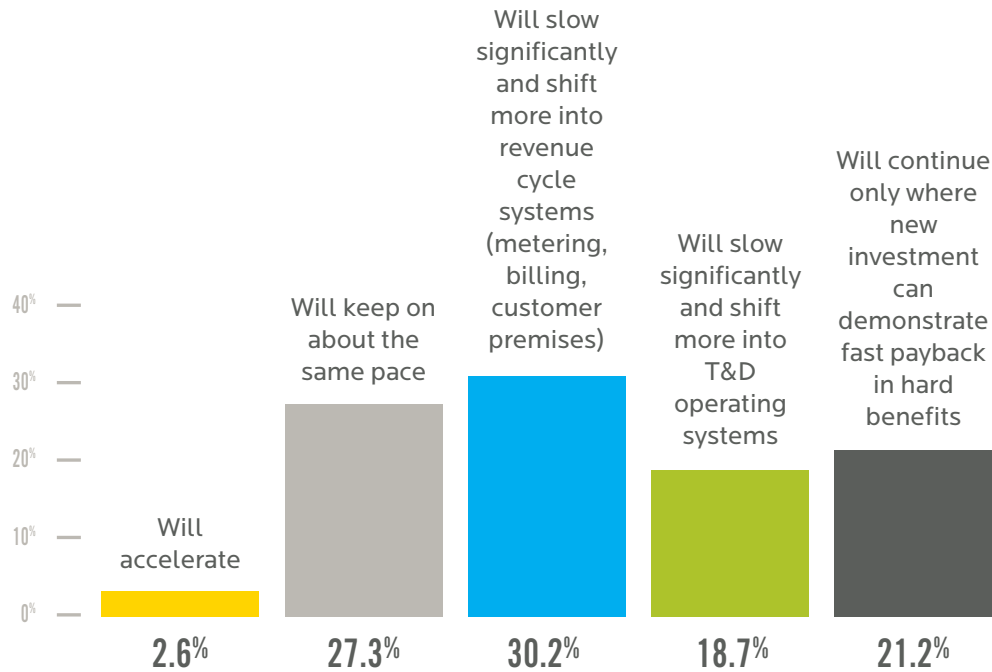
ENERGY STORAGE SYSTEMS



Source: Black & Veatch

Survey participants were asked if their utility has plans to implement energy storage systems at a commercial scale. Participants who answered "yes" were then asked to identify what energy storage systems they plan to implement in the near future? More than one-fifth answered yes, the majority of which stated they plan to implement battery systems.

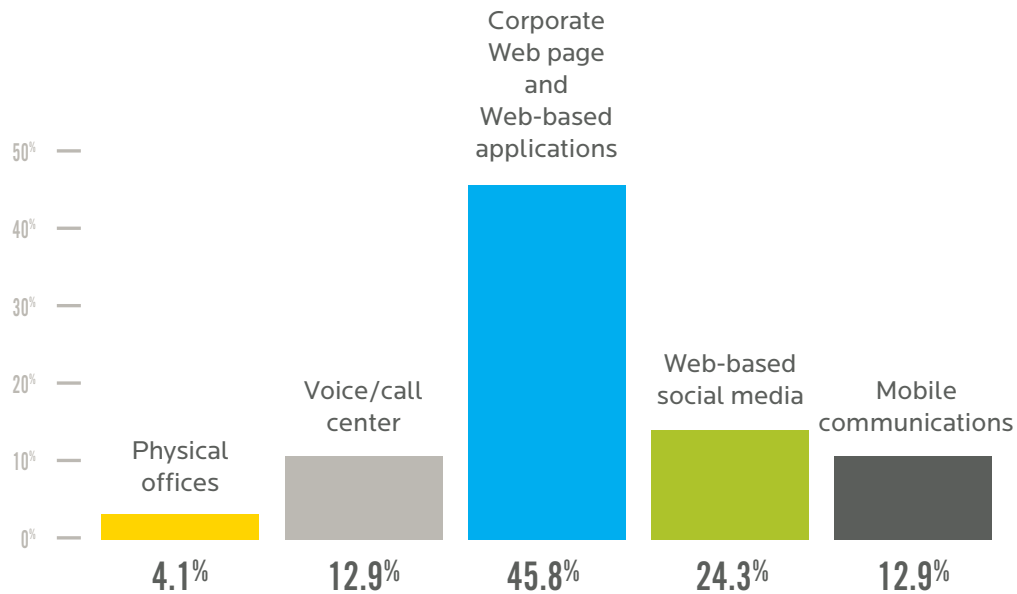
SMART GRID DEVELOPMENT AFTER ARRA



Source: Black & Veatch

Utilities were asked which of the above statements best describes their company's view on the trajectory of smart grid development after ARRA grant funds run out. More than two-thirds indicated development will slow to some degree.

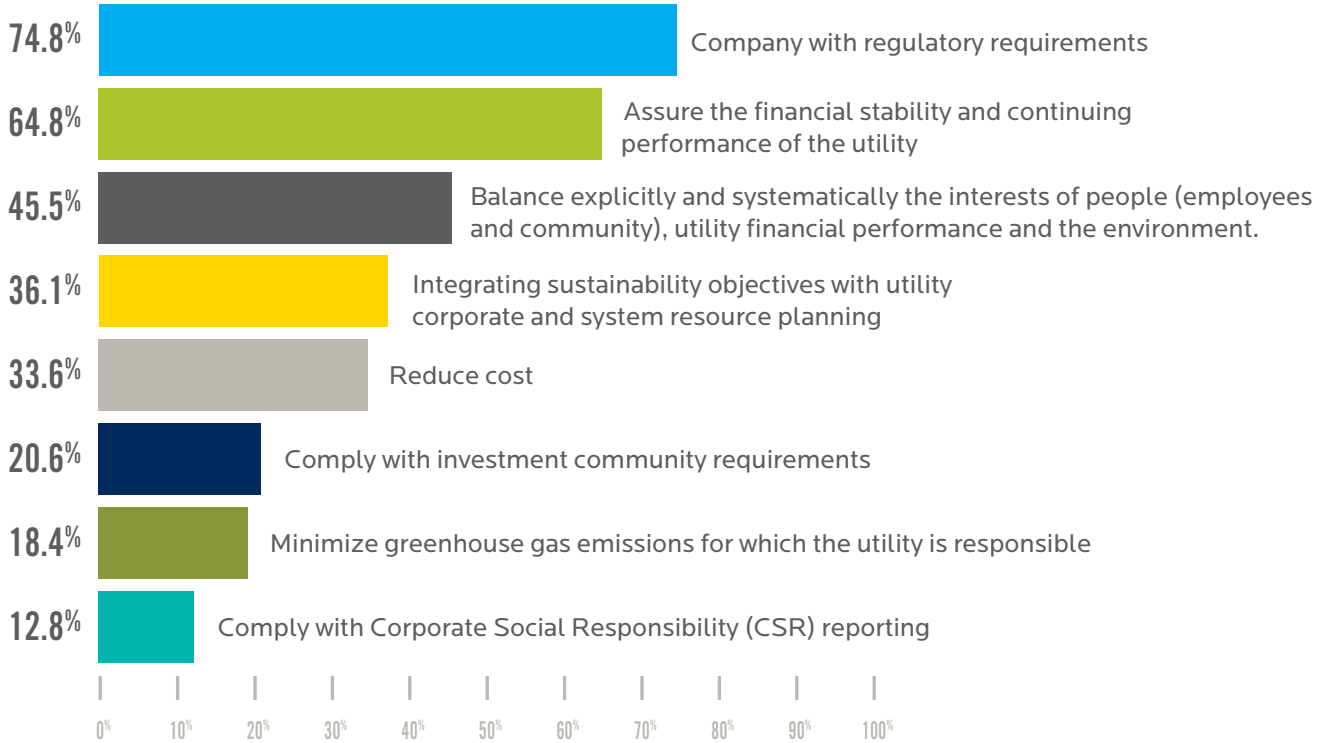
CUSTOMER INTERACTION CHANNELS



Source: Black & Veatch

Utility participants were asked which of the above channels is targeted by their utility for the greatest growth in volume of customer interaction over the next three years. Corporate web pages and web-based applications are focus areas for nearly half of utility respondents.

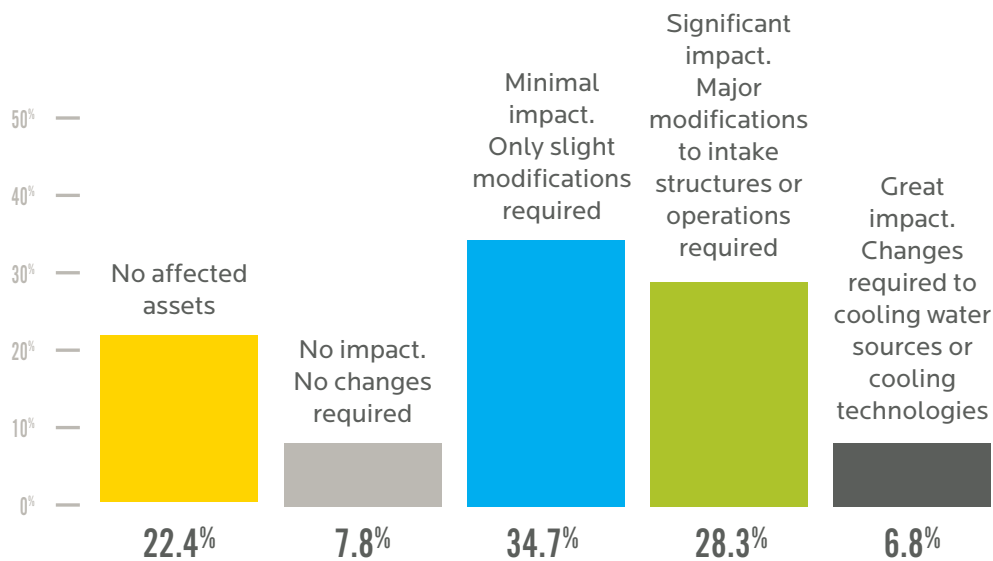
TOP SUSTAINABILITY FOCUS



Source: Black & Veatch

Utility participants were asked to select the three primary focus areas they have when engaging in sustainability planning. Compliance with regulatory requirements and fiscal stability were the top choices.

IMPACT OF PROPOSED 316B REGULATION ON COOLING WATER



Source: Black & Veatch

Utility participants were asked what level of impact will the phase-in of the proposed 316b regulations on cooling water will have on their utility's generation assets. More than one-third stated the regulations will have either a "significant" or "great" impact.

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