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# 2011 STRATEGIC DIRECTIONS SURVEY RESULTS

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Managing the Transition in the Electric Utility Industry



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Building a world of difference.®



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# INTRODUCTION

Welcome to the 2011 *Strategic Directions in the Electric Utility Industry* survey results, which has captured the changing attitudes and priorities of North American utilities for half a decade. When Black & Veatch launched the survey five years ago, it was directed to – and almost exclusively read by – members of the industry. However, an increasing emphasis on energy policy and the technologies that support it have helped place the survey results into the mainstream media.

The survey once again explored the traditional utility-focused questions regarding operations and regulations. This year, we also attempted to dig deeper into the new technologies on the horizon. And as you will see, we discussed the possible timing and impact of new paradigms that will face the industry, such as electric vehicles. We also evaluated the attitudes toward global competition in the renewable energy field.

Of the nearly 700 people who responded to this year's survey questionnaire, some 530 provided input to each question. We attribute this to the in-depth approach we took in seeking out the opinions of those in the industry. However, we will make every effort to continue to enhance and streamline the survey instrument in the future so that it is easier to complete in a shorter amount of time.

Black & Veatch is grateful to everyone who participated in this year's survey. I also would like to acknowledge Black & Veatch professionals who contributed to this report. Profiles for these industry thought leaders can be found on pages 6 and 7.

I welcome your comments and feedback, either regarding the questionnaire, this report or both. You can reach me at [consultinginfo@bv.com](mailto:consultinginfo@bv.com).

Sincerely,

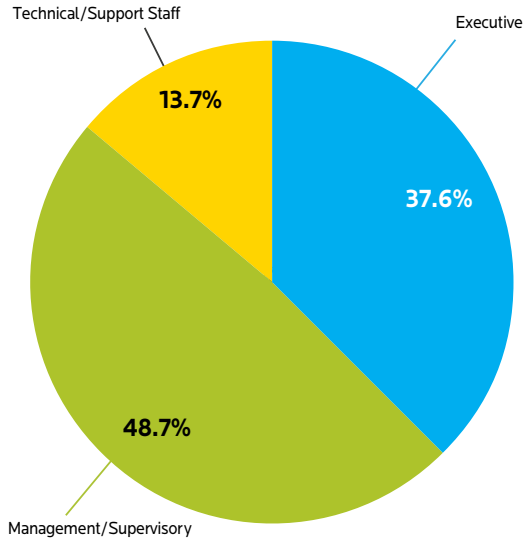
**Rodger E. Smith**

President, Black & Veatch's Management Consulting business

# ABOUT THE 2011 SURVEY

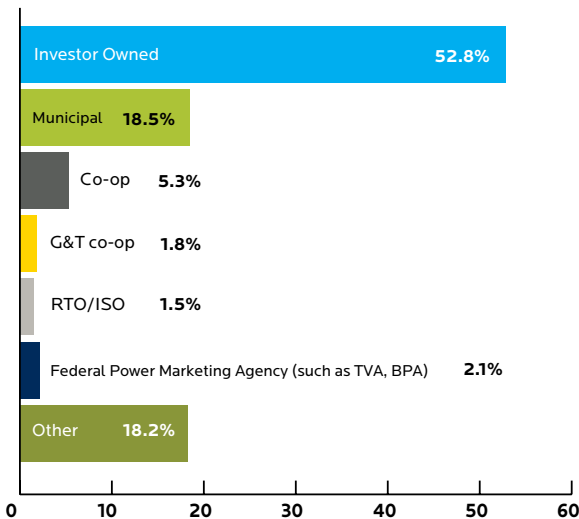
## Respondents' Profile

The respondents to the survey listed their job functions largely as executive- or management/supervisory-level positions.



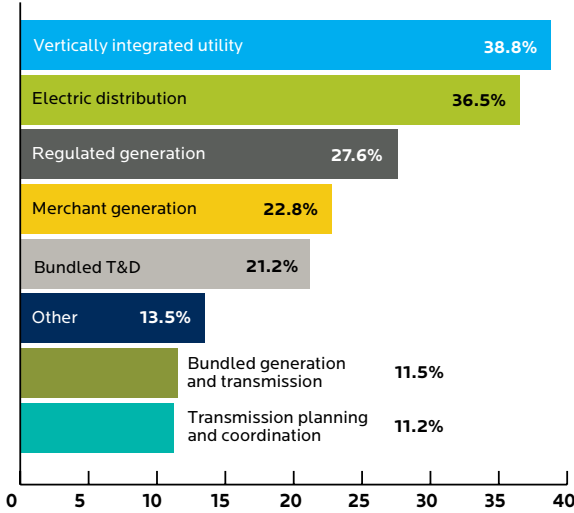
Source: Black & Veatch

Utility respondents represented a broad cross section of the industry, with Investor-Owned Utilities providing the largest percentage of respondents.



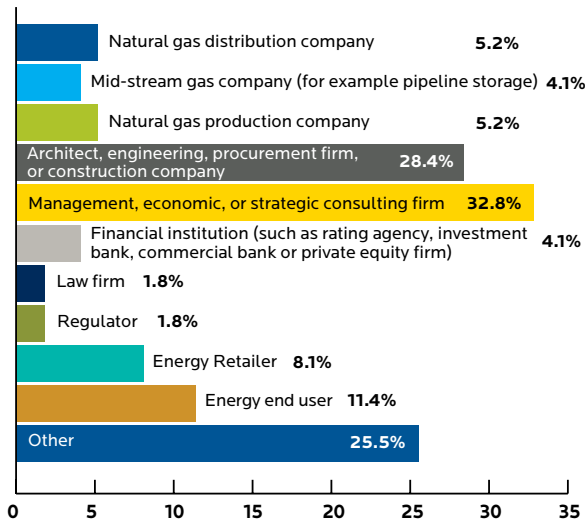
Source: Black & Veatch

The electric utilities that responded listed the businesses they participate in to include:



Source: Black & Veatch

In addition to direct employees of utilities, others from the industry were invited to participate in the survey. The opinions of the “Other” respondents are included in the questions identified with “All Respondents” in the annotation. This year, 18.2 percent of responses were from people classified as others. The following chart provides an overview of the types of organizations represented by those classified as others.



Source: Black & Veatch

## Please Note the Chart Labels

Every chart included within this report was generated from responses to the 2011 survey. Some charts will reflect responses from all survey participants, while others will reflect responses from a specific grouping of respondents. For clarity, all charts are identified with one of the following labels:

- **Utility Respondents:** Where a question was very specific to the business of a utility, we excluded “Other” responses. These charts are marked “Utility Respondents.”
- **Public Power/Investor-Owned Respondents:** Where significant differences exist between the responses of Public Power Utilities and Investor-Owned Utilities, we often included a separate chart for each, marked “Public Power Respondents” and “IOU Respondents.”
- **All Respondents:** All other responses are marked as “All Respondents,” meaning that the opinion of every industry stakeholder who responded is represented.

# Black & Veatch's Reviewing Team

To help put survey responses in perspective, Black & Veatch asked some of its most senior advisers to analyze survey responses and offer their insights and opinions. The following provides a brief description of the professional who contributed their analysis to the survey, and the subject matters they covered.

## **Executives Summary – Richard Rudden**

Richard Rudden is a Senior Strategy Consultant and a member of Black & Veatch's Management Consulting Advisory Board. Rudden authored the original survey and has participated significantly in every annual survey since its inception, providing him with a unique perspective that helps put the results and the trends into context.

## **Business & Technology Drivers – Bill Kemp**

Bill Kemp is an Associate Vice President and Managing Director of Black & Veatch's Pathfinder Strategy Development Services. He has directed more than 300 management consulting projects in the areas of strategic planning, mergers & acquisitions, technology and market economics, market analysis and industry restructuring. Kemp is a recognized professional in energy economics and one of the principals in the development of Black & Veatch's strategic plan.

## **Sustainability & Environmental Concerns – Mark Gabriel**

Mark Gabriel is a Senior Vice President and Executive Director of Black & Veatch's Strategy Practice. He is a nationally recognized author and speaker who has helped utilities create and refine strategic plans; developed technology roadmaps to support business initiatives; evaluated organizational dynamics; and provided marketing assessment to further the development and application of new technologies. Gabriel is the author of *Visions for a Sustainable Energy Future* (Fairmont Press), which provides a blueprint for utility technology strategy. The book won the 2009 Indie Award for Excellence in Environmental Writing.

## **Renewable Energy – Bill Roush & Ryan Pletka**

Bill Roush and Ryan Pletka are Renewable Energy Consultants within Black & Veatch's Consulting Engineering Services business, providing feasibility studies, due diligence, plan and project development support for a variety of renewable energy technologies. Roush brings nearly 30 years of experience in renewable energy, with a specialization in solar energy. Pletka is the lead analyst of government incentives and regulatory policy. Both are frequent speakers in industry forums, authors of numerous articles and opinion pieces, and are active members of various industry associations and groups.

## **Smart Grid – Chip Scott & Kevin Cornish**

Chip Scott and Kevin Cornish joined Black & Veatch in 2010 when the company acquired Enspira Solutions, one of the most successful Smart Grid design and integration companies in the industry. Both are highly regarded utility IT professionals who help plan and deploy some of the most complex utility Smart Grid and system integration projects in the industry.

### ***Global Competitiveness – John Achenbach***

John Achenbach is an Associate Vice President and leads all technical due diligence and independent engineering activities within Black & Veatch's Management Consulting business. His team supports investors with project analysis prior to financial closing; provides due diligence to support bids and acquisitions; performs independent reviews of proposed plant improvements or expansions; and supports new financing, acquisition or divestiture of portfolios. Achenbach's level of activity in the internationalized renewable infrastructure business and numerous international assignments give him a unique view of the energy industry's future.

### ***The Role of Natural Gas in North American Electricity Generation – Scott Smith***

Scott Smith is a Vice President within Black & Veatch's Management Consulting business and leads the company's Industry Vertical consulting practice. He has more than 25 years of energy industry experience, including energy market analysis, storage valuation, risk management, asset optimization, business strategy development and energy decision analysis.



# EXECUTIVE SUMMARY

By Richard Rudden

## Trend Lines

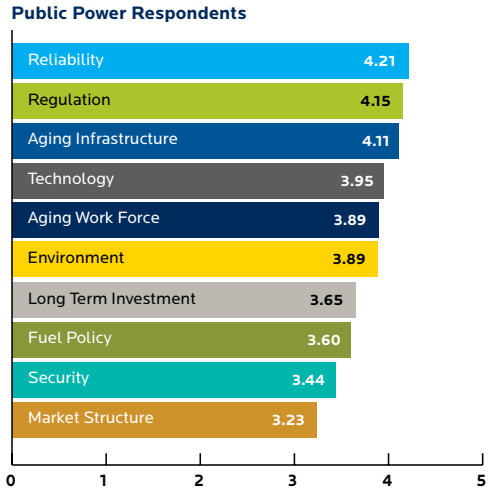
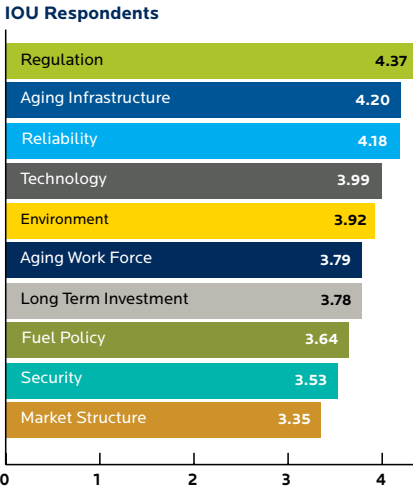
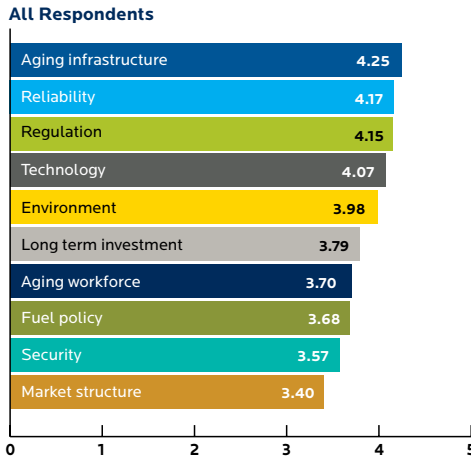
Black & Veatch's fifth annual survey marks a significant transition in an evolutionary fashion from prior years. This year Black & Veatch has expanded with a more global presence in its perspectives, focused on the issues that prior surveys indicated were important ones and dived more deeply into the responses. This enabled Black & Veatch to identify and better appreciate the numerous interconnections among the issues covered in the survey.

In this survey, Black & Veatch has seen a greater intensity of general concern about industry issues, as well as significant shifts in respondents' views. Black & Veatch also has seen the emergence of new issues, a few of which were prompted, no doubt, by the insightful questions asked. Other responses were likely influenced by the earthquake, tsunami and nuclear crisis in Japan, because the survey was conducted shortly thereafter. Still other responses could have been affected by recent world cyber security events, such as the sophisticated, high-profile hacking of one of Iran's nuclear facilities, the Wikileaks releases and a number of security breaches at commercial data centers. This year's results paint an interesting and complex mosaic of the often-conflicted state of mind of utilities and other industry leaders.

This Executive Summary provides a high-level perspective on the most compelling issues addressed in the survey and, where appropriate, places this year's responses in the perspective of prior years' results. In many cases, the 2011 results were an affirmation of trends identified previously, while in other cases, new and important issues emerged. More in-depth discussion of the issues will be found in the topic-specific sections following this Executive Summary.

## The "Top 10" – Is There a Black Swan Here?

In 2006, Black & Veatch undertook an analysis of the issues that would drive change in the U.S. power industry in the coming years. It convened a group of Black & Veatch thought leaders, and also engaged outside professionals, to help identify and better understand how the industry environment was evolving. This resulted in a white paper and list of the "Top 10" issues. As Black & Veatch explored these issues in 2006, the team agreed that it would be valuable to survey industry leaders to obtain the views of the people in the field – executives, managers and staff who had to plan around industry trends and who also had to grapple with the issues head-on, every day. This created the first *Strategic Directions in the Electric Utility Industry* survey.



Source: Black & Veatch

Since the first survey in 2006, respondents were asked to rank the Top 10 issues. This year's results, shown above, identify how Investor-Owned Utilities (IOUs) and Public Power Respondents ranked the issues this year. The results were fairly consistent from year-to-year in prior surveys, mostly focusing on "Reliability" as either the No. 1 or No. 2 issue.

As will be discussed in more detail later in this report, "Aging Infrastructure" occupied first place among all respondents this year (when non-utility respondents are included), with "Reliability" in second. Perhaps driven by advances – and failures – in Smart Grid and related IT development, "Technology" has advanced rapidly toward the top of the list, moving from eighth place in 2008 to fourth in 2011.

With recent cyber security publicity, "Security" has moved up only slightly, ranking last in 2006 and 2007, to only ninth place in the 2009/10 and 2011 surveys. Perhaps the industry regards the potential for a successful cyber attack as a "Black Swan" – an event regarded

as highly unlikely, but with consequences that would be severe were such an event to occur. The highly improbable trifecta of the huge Oshika earthquake, the resulting tsunami and the impact on the Fukushima power plant is an example of bad things happening that no one expected. Recently, Rhode Island Representative and House Armed Services Committee member Jim Langevin expressed concern over the security of the nation's infrastructure when he said:

*"The utilities don't have (the incentives that the financial sector has) to secure their systems. The owners and operators of electrical grids don't get it. Their risk calculation is not the same as what the government has in protecting the public. The regulatory agencies don't have the authority to require standards or guarantee safety."*

The power industry may disagree, but there is food for thought here.

## **Nuclear and Carbon Are Major Areas of Concern**

Even though respondents viewed the Washington, D.C., landscape as more utility-friendly as a result of last year's elections, concerns over carbon dioxide legislation and nuclear waste disposal and storage were at the top of the list in virtually every respondent group. Carbon legislation and nuclear waste policy are both areas in which the federal government plays a significant role, but so far has not shown its utility-friendly stance on these matters. Carbon legislation is a significantly larger concern than physical carbon emissions.

## **Water Continues To Bubble to the Surface**

Confirming the trends shown in previous years' surveys, water supply issues continue to creep up the list of future concerns. IOUs appear less concerned about water as a pressing environmental issue than their brethren in other utility sectors. Perhaps public power systems are more concerned due to their geographical proximity to water supplies that have been threatened, because proportionately more of these utilities either rely on hydropower, or are affiliated with municipal and federal water supply departments or agencies. While water supply ranks only fourth among IOUs as an environmental issue, IOUs expressed the most concern about the broader issue of water management. Water effluent is far less of a concern among all of the survey sectors.

## **Toxic and Particulate Emissions**

After water supply, nuclear waste and carbon legislation, particulate and toxic chemical emissions (such as mercury, nitrogen oxide, sulfur dioxide and particulates), occupy the next most important group of concerns. The relative scores among them are neck-in-neck along a narrow range of 3.30 to 3.34 (out of 5.0). Respondents are least concerned about coal-related production, transportation, ash handling and disposal. The concern level surrounding coal-related issues is somewhat elevated relative to prior years, perhaps because of recent Environmental Protection Agency (EPA) rules regarding the control of emissions. Notwithstanding these concerns, more than 80 percent of all respondents believe there is a future for coal, once the economic and financial realities of competing fuels are considered.

<sup>1</sup> "Speed Dial," Jim Langevin, *Bloomberg Businessweek*, April 25 – May 1, 2011, page 56.

## Utility Industry Macroeconomics and Policy Influencers

The macro-economic factors that respondents believe will have the greatest impact on their enterprises include three related to state and municipal finance: state and state agency deficits (in first place, with a score of 3.70); municipal deficits (in second, with a score of 3.65) and bond and credit markets (in fifth place, with a score of 3.52). Two other factors relate to greenhouse gases (GHG): federal GHG regulations (third place with a score of 3.58); and state and regional GHG regulations (fourth place with a score of 3.54). While the three factors related to state and municipal finance impact the public power segments the most, the IOUs share many of these as their top concerns.

## Global Warming – Opinions Move at a Melting Glacier’s Pace

During the span of the survey, a gradually decreasing percentage of respondents believe that global warming is occurring as the result of a natural cycle, dropping from 56 percent in 2007 to 51 percent this year. While this trend suggests more respondents are moving into the “global warming is caused by man” school of thought, the small majority (51 percent) believe global warming is a natural, cyclical phenomenon. Utilities as a group remain more skeptical, by a fair margin, of global warming as a long-term anthropogenic phenomenon than other nonutility respondents. Part of this shift may be attributed to the fact that this year’s respondents had proportionally more nonutility participants, who tend to be stronger believers in anthropogenic warming.

## Fuels of Choice

This year, natural gas overtook nuclear as the preferred, “environmentally friendly” fuel, according to all of the respondents (although the utilities as a subgroup regarded nuclear as slightly more preferable, than natural gas). Nuclear had been in first place since the survey began in 2006. The displacement of nuclear with natural gas is consistent with respondents’ rising concern about nuclear waste disposal and cost. A vast majority of IOUs and municipalities felt that shale gas would remain available at a reasonable cost. In the longer term, municipalities were slightly more bullish: 53 percent of municipal respondents stated shale gas would be available at reasonable costs beyond 2030, while 49 percent of the IOUs agreed.

Hydraulic fracturing (fracking) was seen as a major impediment to shale gas by 24 percent of all respondents. Nearly half of all respondents (45 percent) said fracking would not be a major problem; however, they did expect the issue to create some upward price pressure.

## Cyber Security Concerns Increase Significantly

Concern about cyber attacks has increased substantially, with greater concern expressed about the vulnerability of utility computers and networks, as well as command and control centers. Even though transmission remained second among security concerns, the strength of the concern over command and control vulnerability increased by more than 25 percent since the 2009/10 survey. The overall increase in concern across all categories about cyber vulnerability (including command and control, transmission and other components of utility systems) was nearly 11 percent, as measured by the change in the arithmetic average of the scores within the five cyber security categories since last year.

## **Obstacles to Significantly Increased Use of Renewable Energy Technologies**

The low cost of coal and other competitive fuels, such as natural gas, is regarded by all respondents as the greatest barrier to significantly increased use of renewable energy technologies. IOUs and municipalities largely disagreed with the statement that renewable energy would become unquestionably competitive with more traditional energy sources during the next five years. It appears that nonutility respondents were far more optimistic. As discussed later in this report, there are a number of new technologies which, although not technically “renewable,” will improve the coordination and effectiveness of renewable energy sources or create new clean energy opportunities, such as storage and electric vehicles (EV).

## **Electric Vehicles – A Huge Opportunity, Assuming Everybody’s Crystal Ball Is Working**

Optimism about electric vehicles was confirmed when respondents provided their estimates on the saturation of EVs in their markets during various future time frames. The IOUs estimated EV market shares will grow from 1.03 percent in 2012 to 8.11 percent by 2025. The municipalities were more optimistic in the short run, but less so in the long run, indicating a share of 1.23 percent by 2012, but only 6.79 percent by 2025.

The G&T (Generation & Transmission) Cooperatives and Federal Power Marketing Agencies (FPMA) were, on average, most optimistic. They projected a 1.29 percent saturation in 2012 and 10.87 percent by 2025. This may be attributed to the fact that the FPMAs are more directly under the control of the federal government and therefore are more susceptible to executive orders mandating pro-EV programs.

Similarly, many municipal systems are affected by city and mayoral mandates to be aggressive in implementing EV technology (e.g., New York City). These market share expectations, if proven, represent an incredible source of growth for electric utilities, as well as potential challenges regarding load patterns and distribution system design challenges. Some think the Smart Grid will be the answer.

## **Visions for the Smart Grid**

The Smart Grid offers the promise of greater energy efficiency and power system reliability. However, a common vision of the Smart Grid and agreement on its economics continue to be somewhat evasive. All of the respondents, as a group, believed that the concept of Smart Grid is neither well defined within their states nor across the industry.

Municipalities viewed the Smart Grid as less well defined than the IOUs. Further, respondents did not think there was a shared, common vision for the Smart Grid between utilities and regulators. Just under a third of all respondents felt that utilities and their regulators were “miles apart,” while almost 38 percent felt the visions were “close, but needed to be closer.” Thus, more than two-thirds of respondents felt there was a distance between utility and regulator visions for Smart Grid.

## The Smart Grid Business Case – Very Much About Societal Benefits

The distance felt regarding Smart Grid may be in part because respondents seem to have little confidence in the business case made in the industry at large. All respondents gave low grades for the quality of the Smart Grid business case, possibly because they believe much of the net benefit associated with Smart Grid relied on the inclusion of “societal benefits,” a concept that is not always easy to define and usually difficult to quantify.

It may be perceived that the inclusion of societal benefits creates some fuzziness in the business case. On average, all respondents indicated that 48 percent of the net benefits identified in utility business cases were derived from societal benefits. In other words, only a little more than half of the total benefits are associated with direct, measurable (or reasonably estimated) utility cost savings.

## Impediments to Smart Grid – It’s the Customer

According to all respondents, the greatest impediment to Smart Grid implementation is a lack of customer interest and knowledge, although the municipal utility subsegment regarded economic and financial issues as the primary obstacles. Among municipals, the two factors that tied for first place were the size of the upfront investment and the ongoing capital, operating and maintenance costs.

The second impediment within IOU and nonutility respondent groups was what to do with Smart Grid programs after stimulus funding from the American Recovery and Reinvestment Act of 2009 (ARRA) was fully expended. This concern is consistent with municipalities’ concern about ongoing capital, operating and maintenance costs.

## An Information-Centric Revenue Model for Utilities? Not Anytime Soon.

In many people’s minds, Smart Grid would serve as a great enabler for utilities wanting to enter into the “information business.” However, utility respondents overall do not see their businesses evolving into information-centric revenue models. Utilities grade this opportunity very poorly (about 2.5 out of 5.0 for all utility groups). On the other hand, the nonutility respondents appear to have a much higher expectation.

## Sustainability – A More Common Set of Views than Expected

All respondents hold very similar views of how sustainability is defined and its objectives. More than 61 percent agreed that the objective of sustainability is to “*Explicitly and systematically balance the interests of people, utility financial performance and the environment.*” This combination of considerations is often referred to as the Triple Bottom Line (TBL).

Approximately 20 percent of respondents felt the objective of sustainability was to “*Assure the financial stability and continuing performance of the utility.*” Only 17.5 percent of IOU respondents believed that assuring financial stability and performance was the primary objective of sustainability, while 26.7 percent of municipal respondents believed so.

There was unanimity among all respondents that balancing financial, societal and environmental objectives was the first of three focus areas of their sustainability planning processes, while assuring financial stability was second. They were also unanimous that complying with regulatory reporting requirements was their third most important area. All respondents agreed that sustainability issues affected their overall business planning to at least “some degree,” “moderately” or “strongly.”

## **Where’s the Real Pay Off for Sustainability?**

While all respondents indicated that meeting sustainability goals was most important to both social responsibility and local public image, the difference in scores for IOU and public power subsegments is striking. For IOUs, Wall Street perceptions were their most important factor. For municipalities, it was their actual financial performance that was most important. Both the municipal and IOU scores were very high (approximately 4.0), suggesting that financial performance and financial markets are of paramount importance in establishing – and meeting – sustainability plans and goals.

## **Relevance of Sustainability to Resource Planning**

When asked which elements of sustainability planning were most strongly considered in utility resource plans, the traditional utility issues came up first and foremost – virtually unanimously across all respondent sectors. Consideration of the impact of sustainability planning on financial performance was first (4.32); the impact on reliability was second (4.17); and the impact on air emissions was third (3.57). The integration of demand-side management and energy efficiency came in as a distant fourth (3.49) and water requirements fifth (3.39).

Note the juxtaposition of water requirements in fifth place here, with water supply and management being identified as critical issues elsewhere in the survey. Other critical issues normally considered important to sustainability planning, such as employment, the local economy, local infrastructure development and other effects on local environment and populations, either barely eked out placement in the top five of one of the segments, or did not place at all. Water issues other than supply – such as groundwater quality and water effluent – also scored lower than might be expected in the context of sustainability planning.

## **Are “Green” Business Opportunities Real for Power Utilities?**

There has been much talk about utilities seizing the “green opportunity” to enhance revenue streams, so this year Black & Veatch asked some questions about it. Less than 13 percent of all respondents saw the green opportunity as real and unconditional, and a very large number of those holding this view were the nonutility respondents. Only about 9 percent of IOU and 3 percent of public power respondents believed this was the case.

A little more than a fifth of all respondents thought “*yes (green opportunities exist), but they are limited for now,*” and about a quarter of all respondents believed, “*yes, but enlightened regulation will be required*” to provide the proper incentives. It is clear that the utility subsegments were generally more bearish on green opportunities than the non-utility respondents. It’s hard to tell if the concern is with green technologies, the economics or the fact that utilities have little confidence that they will be permitted to keep any profits they may derive. It is probably a combination.

## The Urge to Merge Is Strong

The survey results suggest increasing pressure for utility mergers and acquisitions (M&A) in the United States. Just short of two-thirds of all respondents felt that M&A will be “important,” “very important” or “extremely important.” The respondents believe that the major drivers of M&A activity will be to improve balance sheets, reduce costs and achieve merger synergies, some of which can be retained by shareholders.

More than two-thirds of all respondents feel that strong balance sheets will be necessary to finance much-needed generation and transmission over the next five years. In Black & Veatch’s view, these investments will be critical in dealing with legislative uncertainty, carbon risk, the development of high-cost generation (e.g., nuclear and coal with carbon capture and sequestration) and the construction of significant new transmission to interconnect renewable energy.

The need for further cost reduction is also feeding merger mania. While recent cost reduction programs have helped the bottom line, utilities continue to seek additional opportunities to control costs. More than half of IOUs feel “a lot more can be done” to reduce costs. But about 50 percent of all respondents are concerned that past cost cutting has reduced utility effectiveness “moderately,” “significantly” or “extremely.”

Given the need to build strong balance sheets and reduce costs without further harming utility effectiveness, it is no surprise that 41 percent of IOUs agree “somewhat” or “very strongly” that mergers are necessary to drive costs down further. Also, respondents agreed very strongly that acquisitions of U.S. utilities by foreign-domiciled companies will increase.

It appears that money can be made for shareholders through both cost cutting and M&A synergies. Some 81 percent of IOU respondents indicated they have been able to retain at least some portion of reduced costs for the benefit of shareholders through the regulatory treatment of net cost savings. Additionally, 7 percent of IOUs indicated they have been able to retain all of their savings, while 74 percent have been required to share cost savings with ratepayers, still leaving some benefit for shareholders.

## Globalization – Some (But Not Too Much) Angst in the U.S. Power Industry

Respondents’ views on the effects of globalization on their business or the U.S. utility industry at large vary considerably, but the concern is not acute. Approximately half of all respondents, including IOU and G&T Cooperative subcategories, are “concerned” or “very concerned” about losing the manufacturing of renewable technologies to overseas businesses.

The public power respondents appear a little bit less concerned. That may be in part due to the fact that municipalities appear less involved with purchases overseas, possibly as a result of a higher incidence of “Buy American” provisions in municipal purchasing guidelines.

Depending upon the country from which equipment was purchased, between 30 percent and 38 percent of IOUs report having purchased significant amounts of energy equipment and technology from overseas, but only 22 percent to 31 percent of municipalities reported such purchases.



The purchases appear to be spread out evenly among a number of countries, with Germany the most and China the least. Opinions were fairly consistent among all respondents about which countries represented the greatest competitive energy threats to the United States. China was first, India second and Germany third.

## **Globalization Continued**

All respondents agreed with the statement that acquisitions of U.S. utilities by foreign-domiciled companies would increase. The next highest point of agreement was that the United States was at risk of losing skills and capabilities to overseas companies. However, the distribution of concerns expressed by IOUs and municipalities were a bit different. The first point of agreement among IOUs was the loss of talent, but their second strongest point of agreement was that M&A would be vital to the viability of the U.S. utility industry. Respondents expressed the sentiment that acquisitions of U.S. utilities by foreign-domiciled companies would increase.

Municipalities also agreed most strongly that the United States is at risk of losing talent and capabilities overseas, but their second strongest point of agreement was that there would be an increase in acquisitions of U.S. assets by foreign interests.

## **In Which Areas Will the U.S. Retain its Global Leadership?**

Even though respondents expressed some concerns about global competition and enterprise and asset acquisitions, they believed there were a few areas in which the United States would retain its lead, or at least hold its own in the future. The top three areas were solar, nuclear and wind, with comparable views held among all respondent subcategories. Electric vehicles and Smart Grid technologies ranked fourth and fifth, respectively.

## **The Rest of this Report**

The balance of this report addresses and amplifies all of the issues identified above, as well as others that are likely to be of interest. Each section was written by one or multiple experienced Black & Veatch professionals in the fields addressed, with an emphasis on in-depth analysis and opinion.

This report contains a large volume of data, some of which is subject to subtle interpretation. Black & Veatch acknowledges that other, equally qualified professionals may come to different conclusions using the same data. As a result, the reader may find differences in the interpretations, conclusions and opinions expressed by the panel – or may even interpret the data differently. Black & Veatch hopes these differences will engage readers and help further illuminate the topics discussed and challenge intellectual curiosity.

# BUSINESS & TECHNOLOGY DRIVERS

By Bill Kemp

The last three years certainly took a toll on the power industry. Commercial – particularly industrial – sales plummeted in 2008-09, dropping revenues far below budgeted levels and forcing utility managers to implement deep cost cuts. To the industry's credit, the lights stayed on, nobody went bankrupt and utilities survived the long, dark night of the Great Recession.

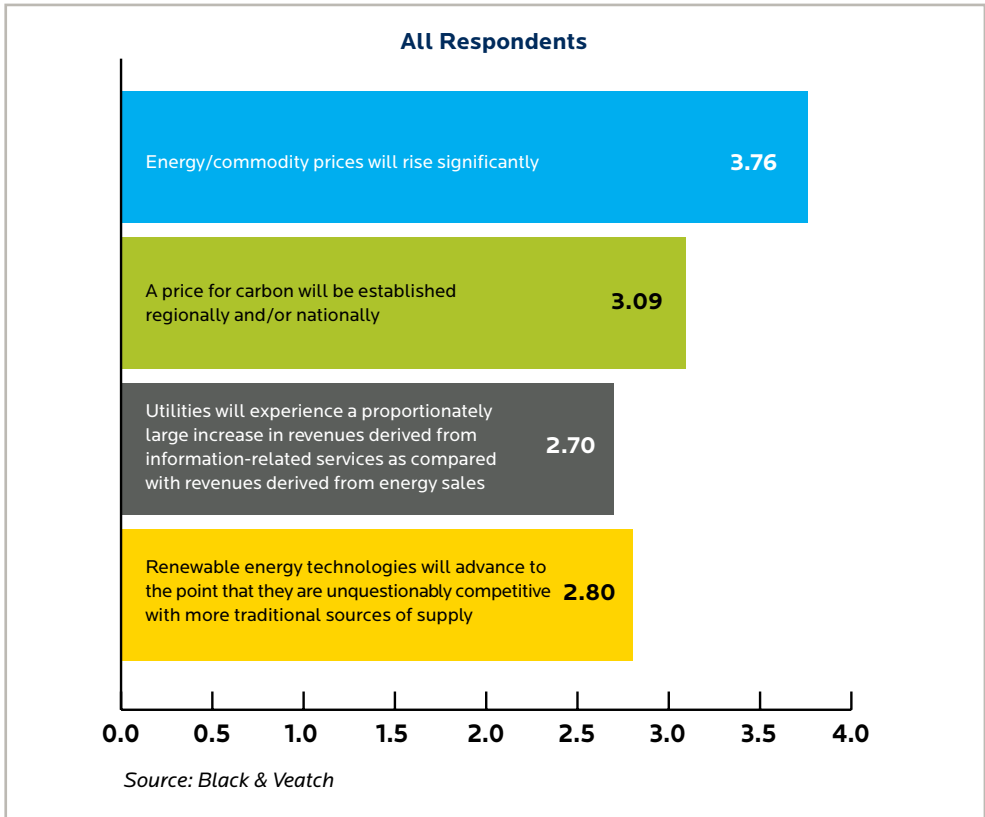
A new day is dawning and the utility landscape has changed significantly. Since early 2010, sales and utility financial health have been bouncing back. As utility executives ponder their longer-term financial future in an environment of diminished sales growth expectations, the search for growth engines is back on the agenda.

But the landscape has changed, and there are still storm clouds on the horizon. The industry is not simply going back to status quo ex ante – the business and technology environment of 2007. Rather, the post-recession electric utility industry is being shaped by business, technology and regulatory drivers, such as:

- Utility stock prices – helped along by historically low interest rates – have surged, fueling a significant uptick in M&A activity as companies seek to position themselves for the future.
- New technologies, such as shale resource hydraulic fracturing and Smart Grid, are driving changes in costs, performance and, ultimately, the balance of market forces.
- Assisted by growing technological power at their fingertips, customers increasingly expect empowerment and engagement in ways that stretch utility capabilities.
- Growing political momentum for “clean,” or at least lower carbon, energy supplies.
- Deadlines for complying with EPA-mandated reductions in conventional pollutants are looming – with very large price tags.
- Conflicting policy and regulatory priorities. Utilities are facing a multitude of demands to spend money on policy mandates, but there is not a lot of regulator willingness to raise rates to do it. This is a tough circle to square – and that's even before carbon reduction costs.

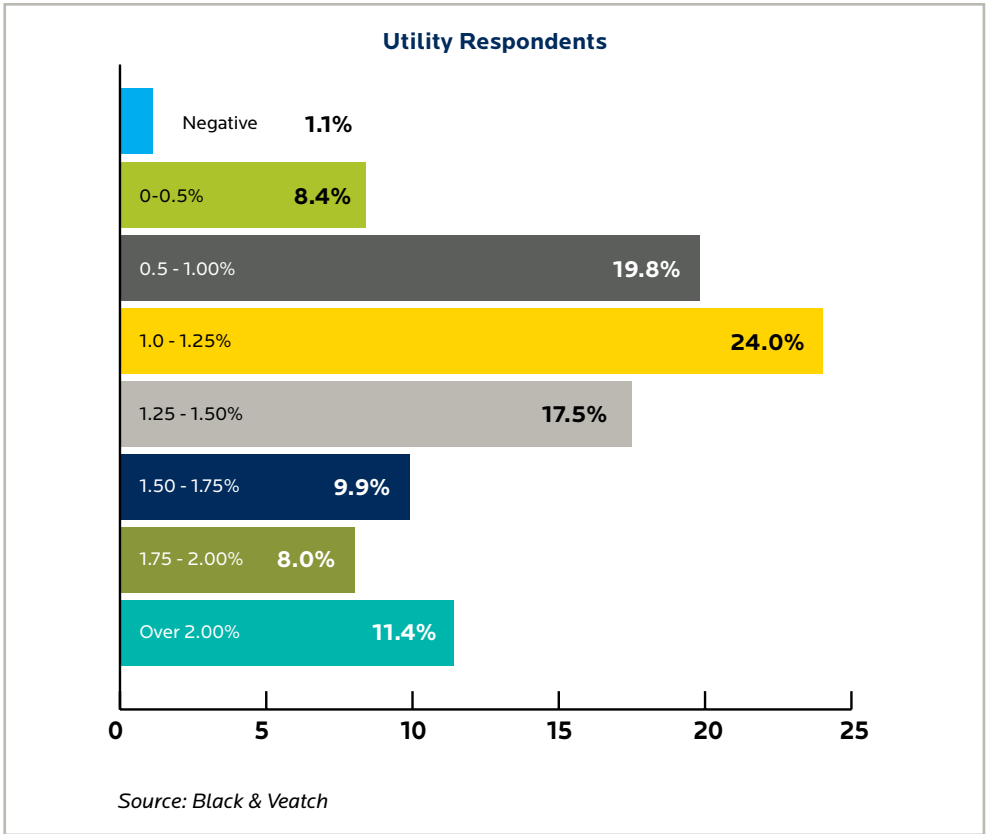
In these and many other ways, the ongoing trends in the power industry continue to move us along, even while they are mediated by the more volatile influences of economic growth and regulation. The haze of uncertainty may have lifted a bit with more stable fuel prices and a recovering economy, but the diversity of opinions and priorities across the electricity industry is still fascinating. Let's see how utility managers, as represented by the large sample in the 2011 survey, are viewing the evolving strategic landscape.

**Question 1: Many changes in the market are driven by global “industry trends.” Please indicate how strongly you agree or disagree with each of the following statements on a scale of 1 to 5 (where 1 indicates “very strongly disagree” and 5 indicates “very strongly agree”) over the next five years.**



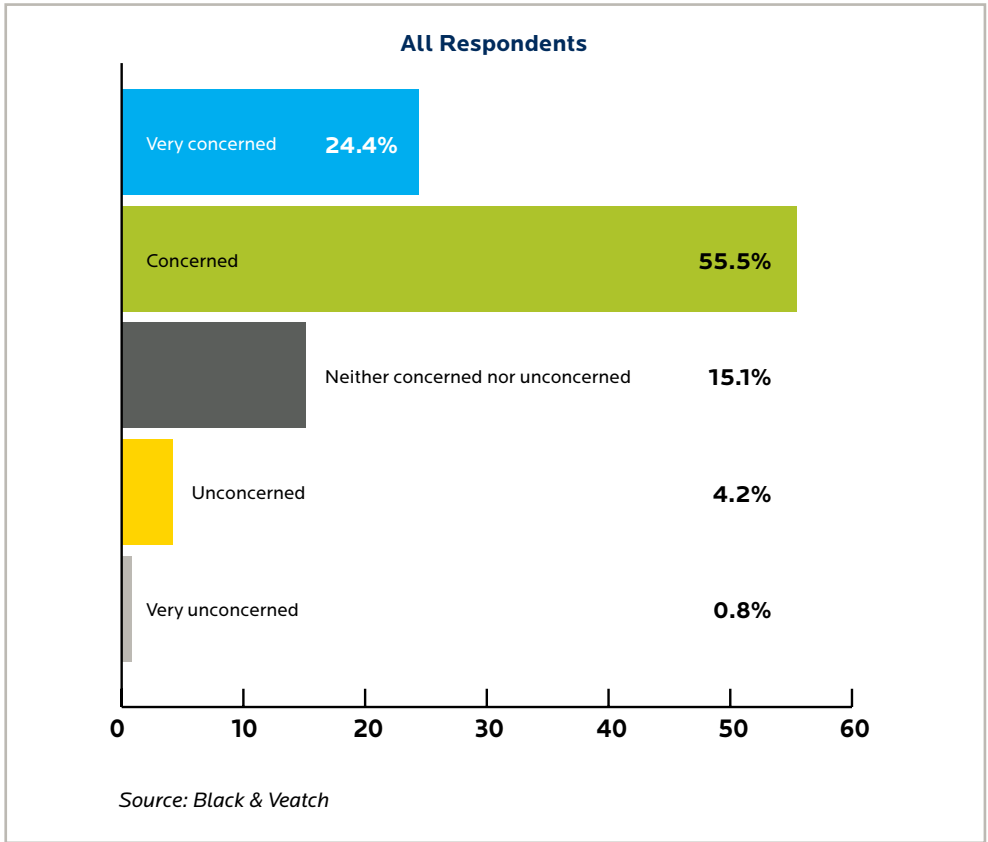
- A strong majority of respondents expect energy/commodity prices to rise significantly, although the public power segment was more evenly split.
- Only a slim plurality expects a carbon price to be set, with IOUs more skeptical.
- Expectations are low across the board for utilities to make money in information-related services.
- A majority in both segments do not think renewables will be clearly competitive with traditional generation. Interestingly, the IOU response on renewable competitiveness is bimodal, with more skeptics than believers; not many were neutral.

**Question 2: Over the next five years, what do you expect the average annual energy growth to be for your system?**



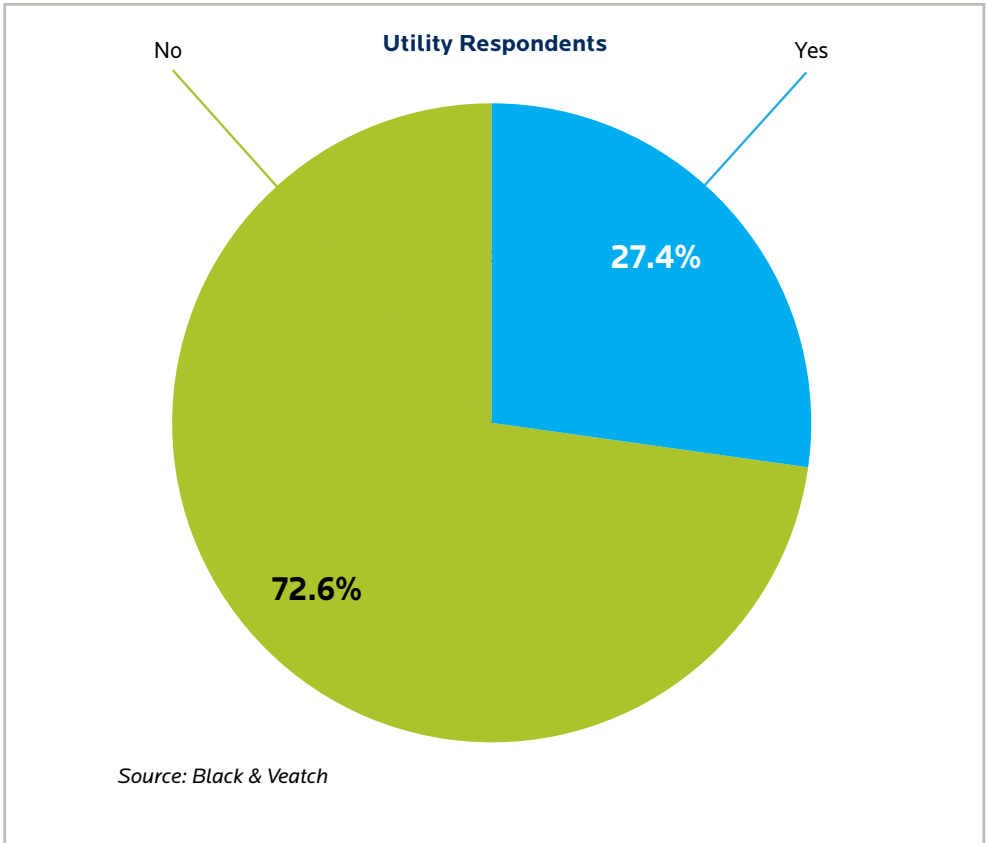
Long-term load growth expectations have shifted up only modestly since the 2009/10 survey. Approximately 15 percent of IOU respondents moved their growth forecasts up from the 1-1.5 percent range to the 1.5-2 percent range.

**Question 3: How concerned should the utility industry be about sales levels over the next five years and their effects on the bottom line, including debt coverage?**



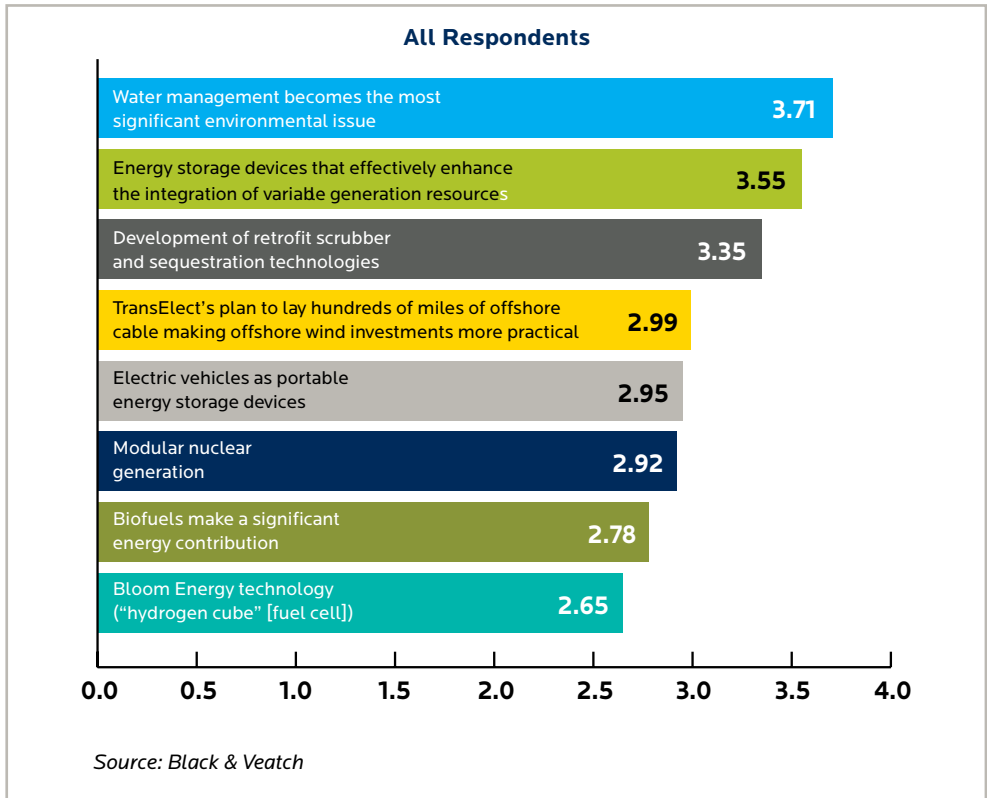
Where is load growth in the “new normal”? Nearly 80 percent of respondents across the industry are “concerned” or “very concerned” about the financial impacts of low sales growth. This is one of the industry’s most pressing concerns.

**Question 4: Last year, respondents to our survey saw loads “bouncing back” at rates greater than historical growth rates as the economy recovers. Have you experienced such a bounce back where recent growth rates have exceeded your historical rate of load growth?**



Despite Energy Information Administration statistics showing that aggregate U.S. electricity sales bumped up smartly in 2010, with overall growth versus 2009 in the 4 percent to 5 percent range, and industrial loads increased 6 percent to 8 percent, almost 73 percent of respondents say their company has not seen a bounce back. Many companies apparently see the 2010 sales increase as largely related to the abnormally cold 2010 winter and hot 2010 summer.

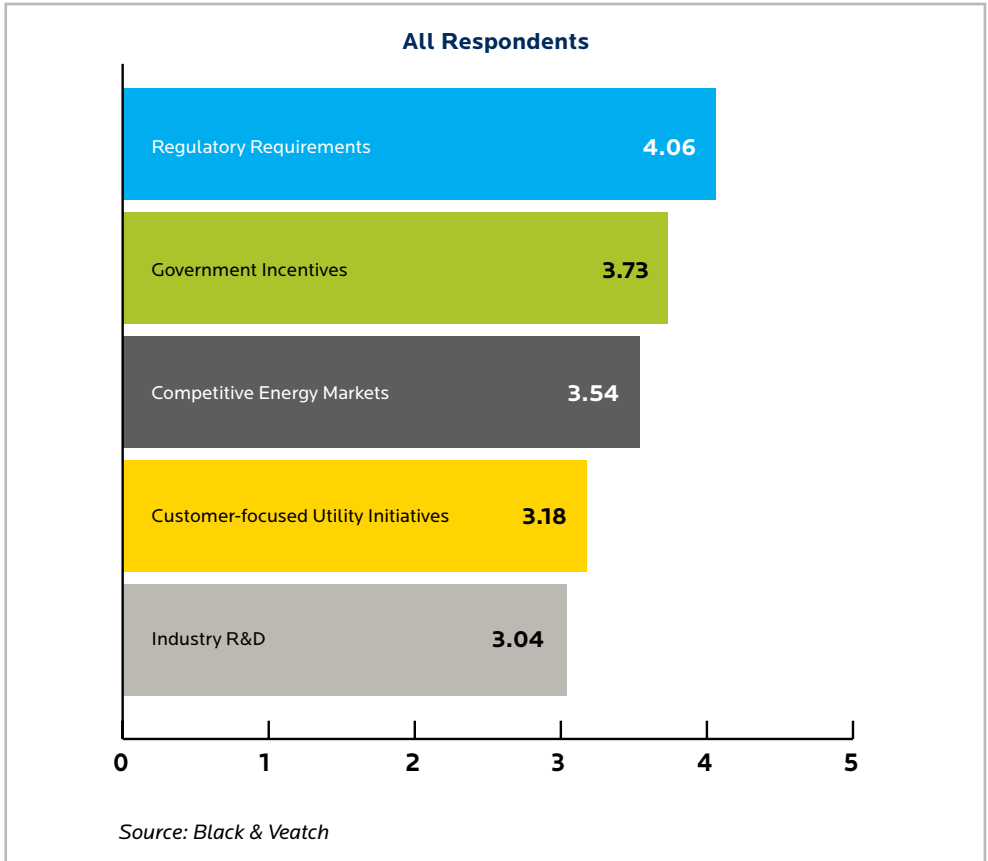
**Question 5: Certain technology or business innovations have the potential to change the industry. Please rate how significant an impact you believe each of the following will make on the industry, on a scale of 1 to 5 (where 1 indicates “no impact” and 5 indicates “significant impact”).**



Technologies drive economics, which drive markets, which, over the longer term, drive regulation. When asked which of these technology or business innovations are expected to have major impacts on the electricity industry, respondents ranked them in the following order. Public power respondents are generally a bit more skeptical on technology impacts, perhaps reflecting their later adopter pattern.

- 1. Water management.** The water and energy nexus grows more vital.
- 2. Energy storage.** The necessary companion to intermittent generation.
- 3. Retrofit scrubber and sequestration.** Technically feasible, but very expensive.
- 4. Offshore cable.** About an even split on whether offshore transmission will matter.
- 5. Electric vehicles as storage.** The impact on utility sales probably more important than storage.
- 6. Modular nuclear.** Will its time come?
- 7. Biofuels.** Not yet in the industry's sights.
- 8. Fuel cells.** Slow progress.

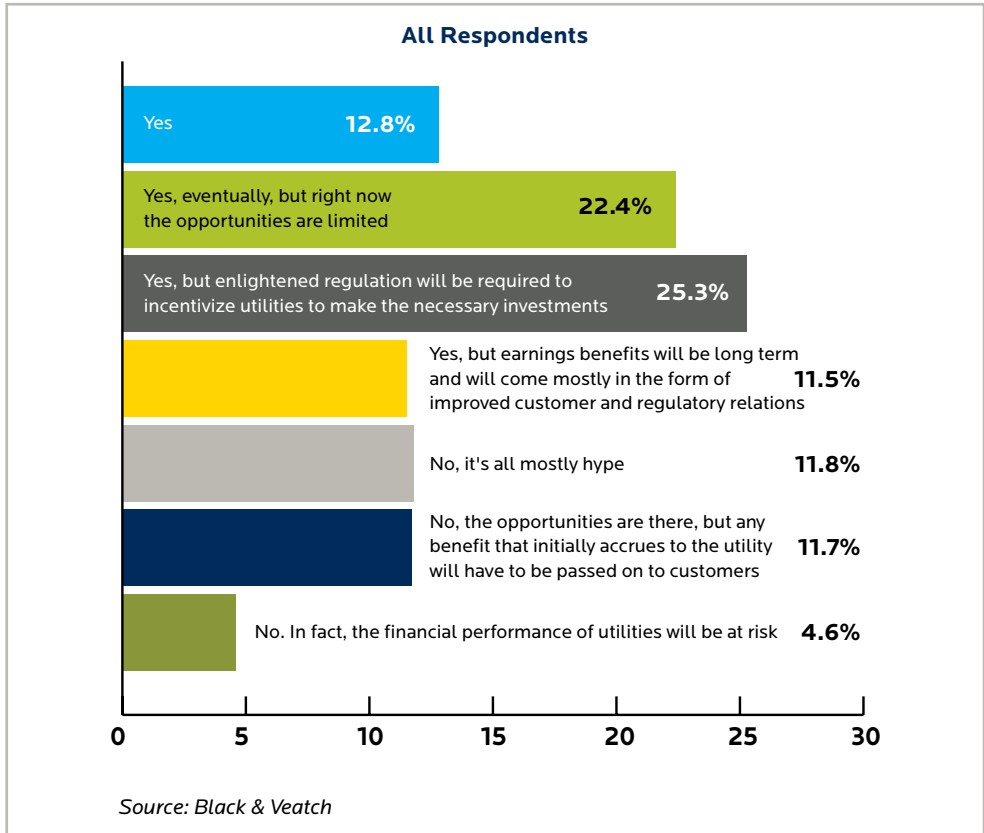
**Question 6: On a scale of 1 to 5 (where 1 indicates “low motivation” and 5 indicates “great motivation”), what factors most motivate the industry to invest in new technology?**



Sticks (regulatory requirements) and carrots (government incentives) are the strongest motivators for utility investment in new technology, even for public power entities. Industry R&D has less impact.

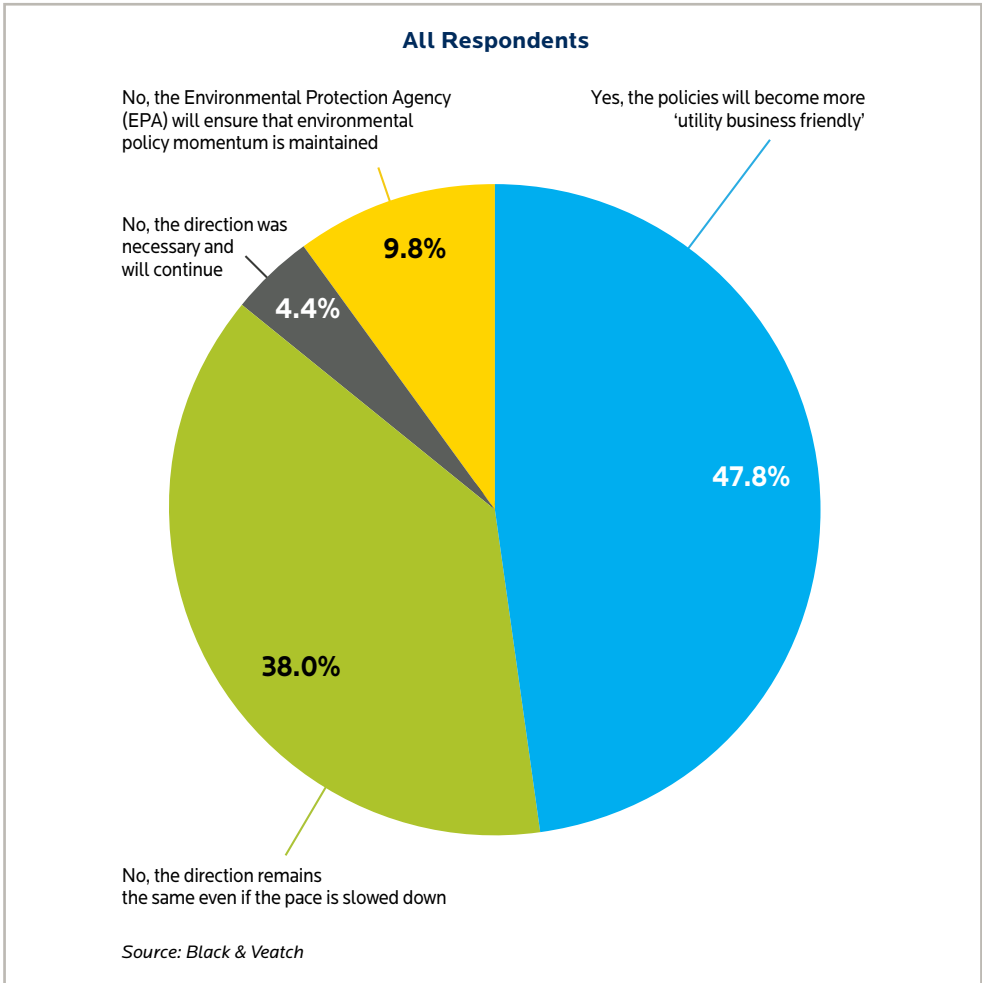


**Question 7: Do you believe there are significant earnings-enhancing opportunities for utilities in “green” areas of the economy? (Please select the one answer that most closely resembles your opinion or captures the most pressing issues.)**



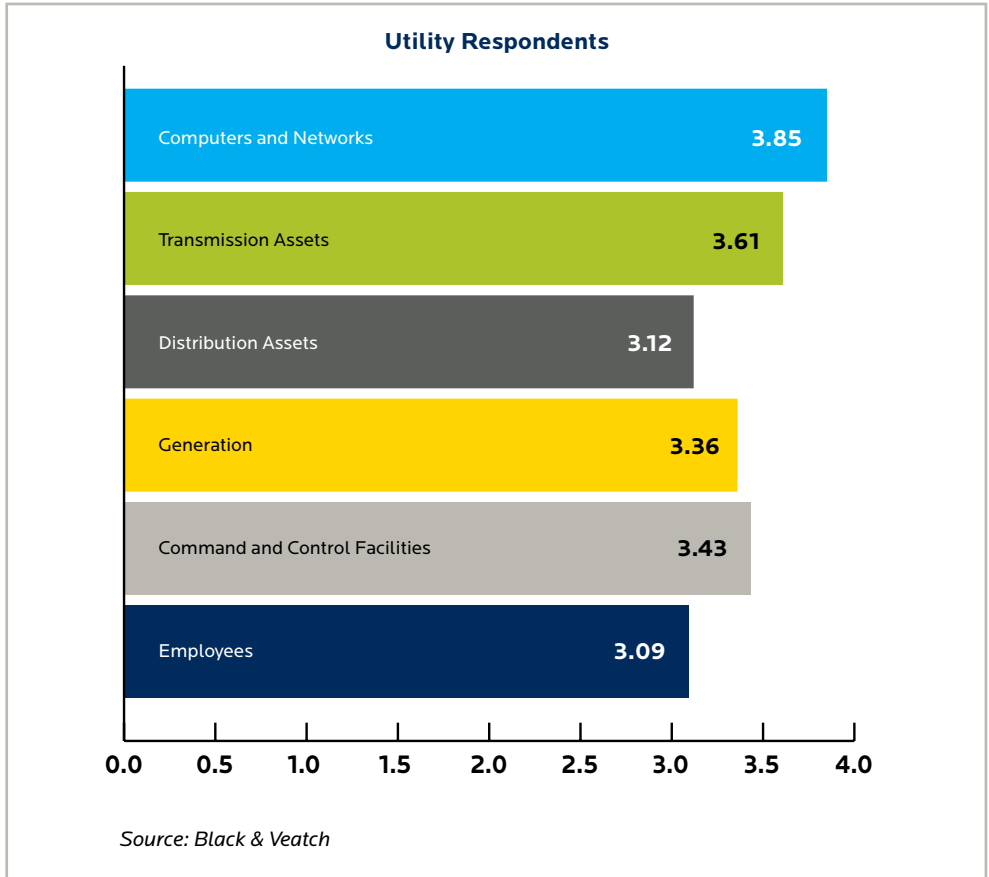
The majority of respondents, approximately three-fifths, feel there are opportunities to make money in “green” areas, but regulatory support will usually be necessary. Assurance of cost recovery is the first hurdle.

**Question 8: Do you believe that the recent shifts in the balance of power between Democrats and Republicans in both chambers will redirect carbon-related energy policy?**



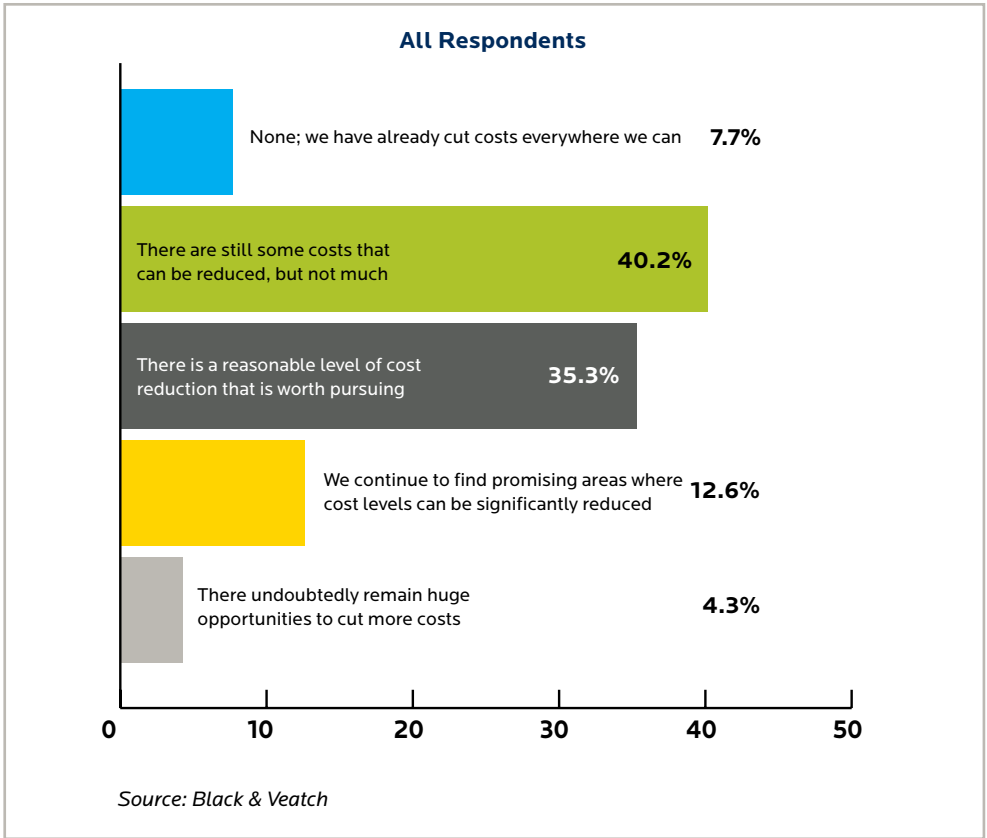
On the political front, opinion is split fairly evenly about whether more Republican power in Congress would redirect carbon-related energy policy. IOUs tend to think more often that the path would not change much, perhaps because of state Public Utility Commission actions.

**Question 9: The essential nature of your service to the economy and community makes the security of your operations important. What aspects of your operations do you consider most at risk on a scale of 1 to 5 (where 1 indicates “little risk” and 5 indicates “great risk”)?**



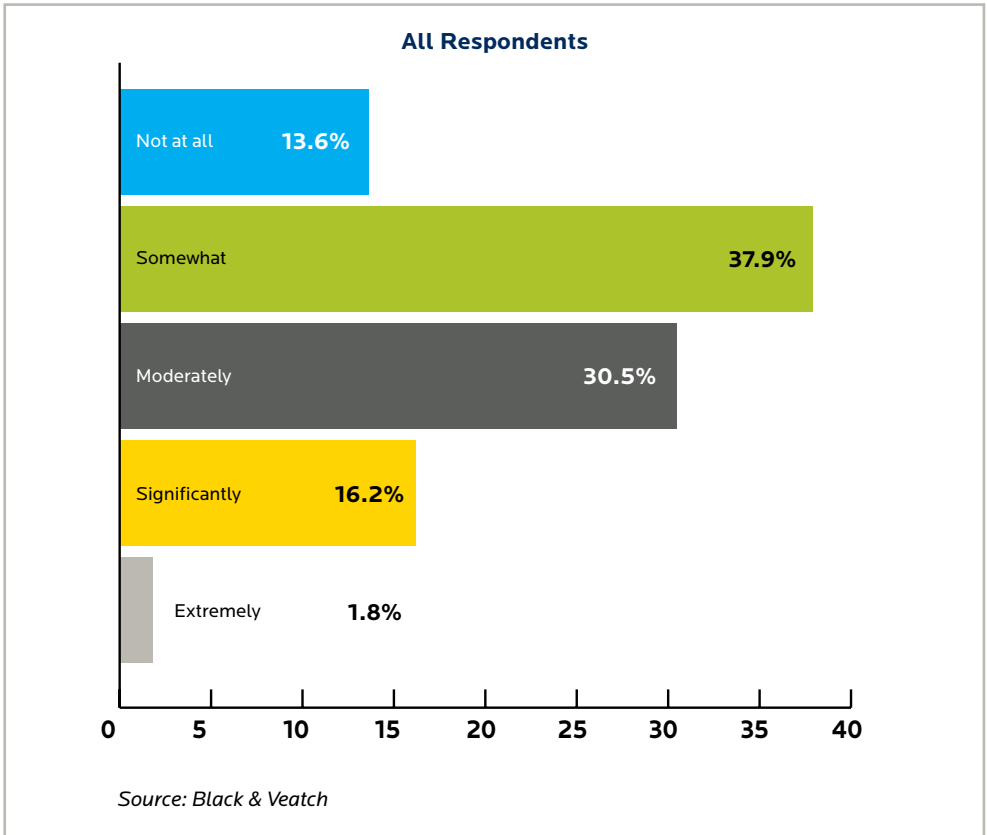
Information technology (computers and networks) and transmission assets are viewed as the biggest security risk, with command/control and generation facilities not far behind.

**Question 10: How much of a role will cost containment play in the next two years in maintaining utility profitability?**



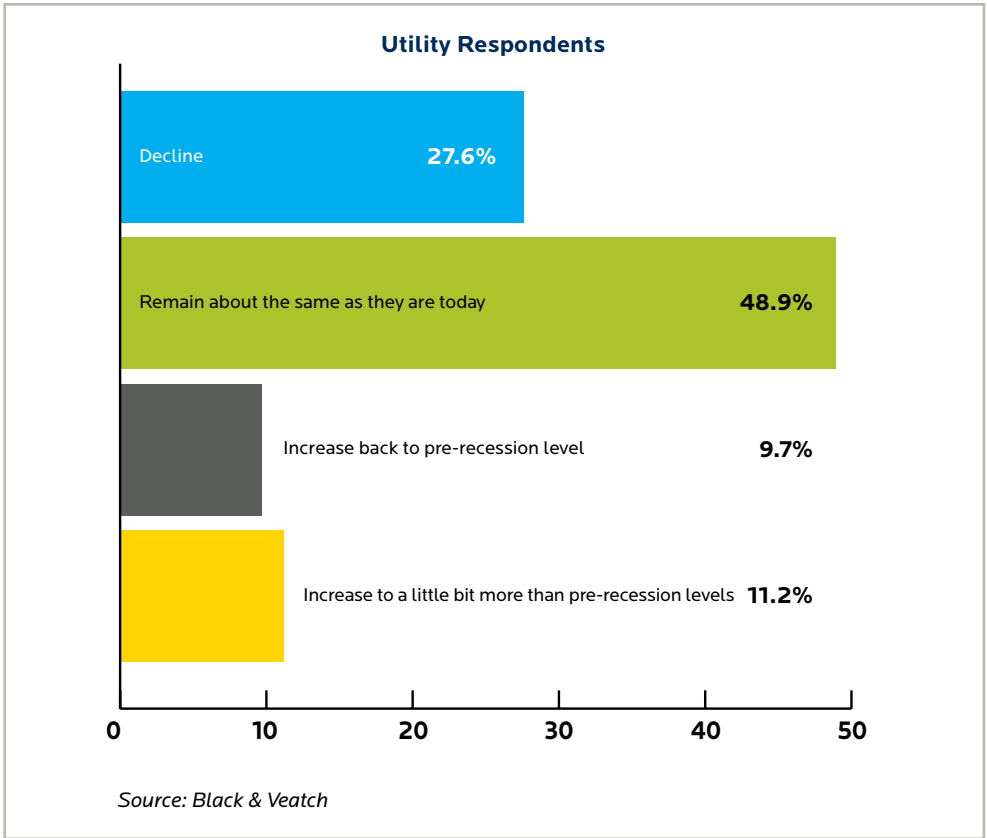
To meet financial goals, utilities continue to try to find places to reduce costs. But more than 70 percent of respondents say the cost reduction potential is “not much” or “reasonable.” They feel the low-hanging fruit has already been picked in most companies, particularly in the public power segment.

**Question 11: In your opinion, how much has cost cutting reduced the operational effectiveness of the gas and electric utility industries?**



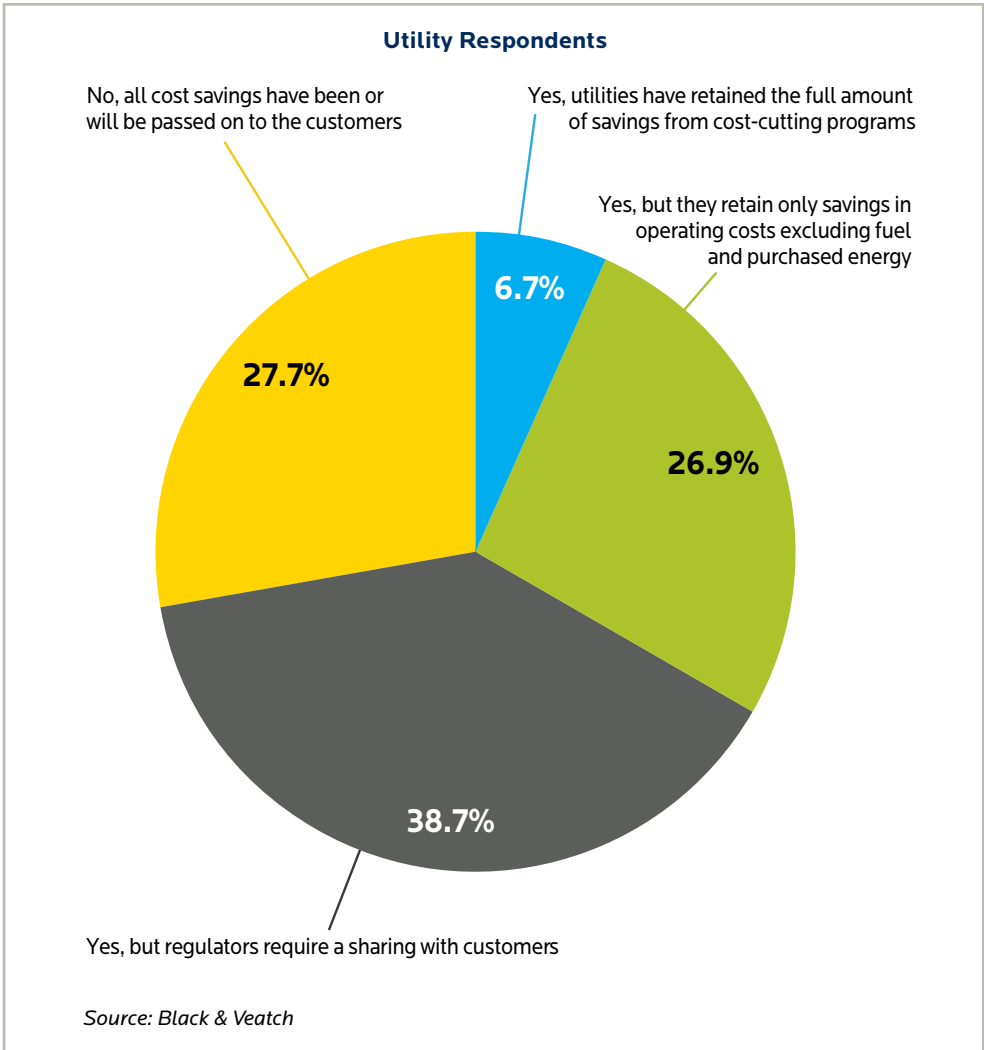
Almost half of industry respondents (more in the public power segment) feel recent cost cutting has gone beyond the fat and into the muscle, reducing operational effectiveness at least moderately.

**Question 12: Over the next two years, do you expect the number of employees in your organization to:**



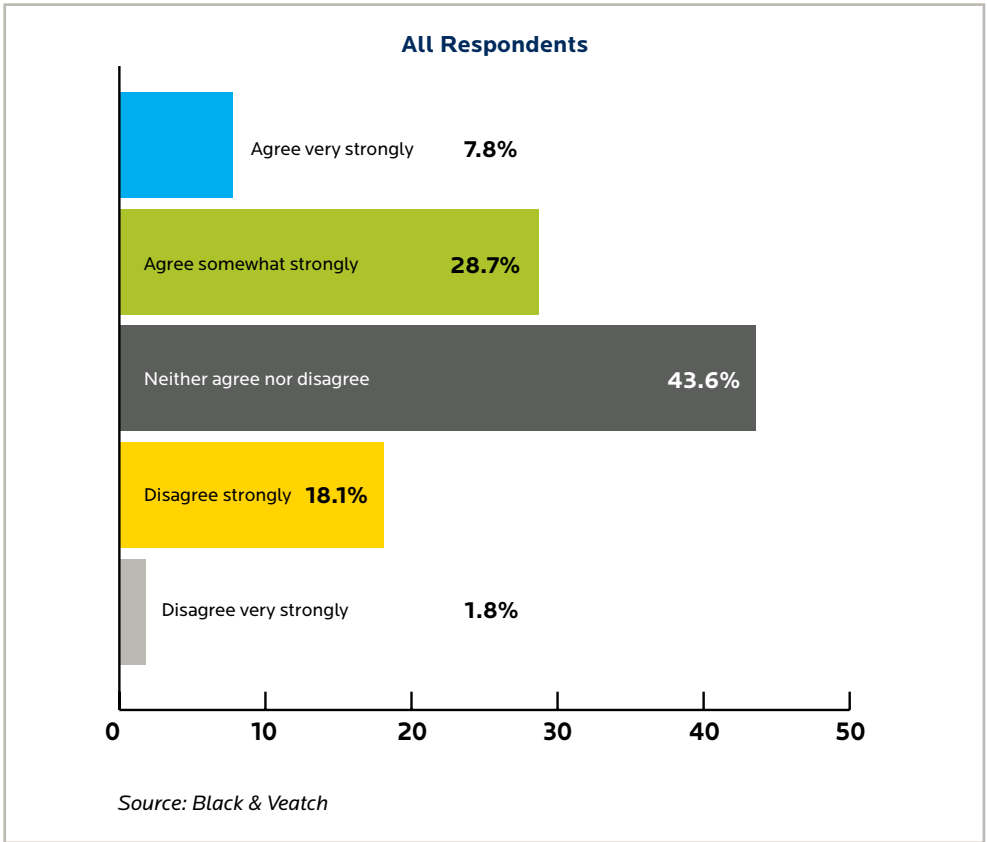
Reflecting their cost consciousness, more than 70 percent of respondents say the headcounts in their organizations will stay flat or decline during the next two years. However, a fair number plan to grow total staffing.

**Question 13: Has your regulator permitted utilities to retain cost savings for the benefit of the shareholder?**



The regulatory incentives for cost cutting remain weak. Most utilities can flow cost savings through to their bottom line only for some cost categories, and only until the next general rate case.

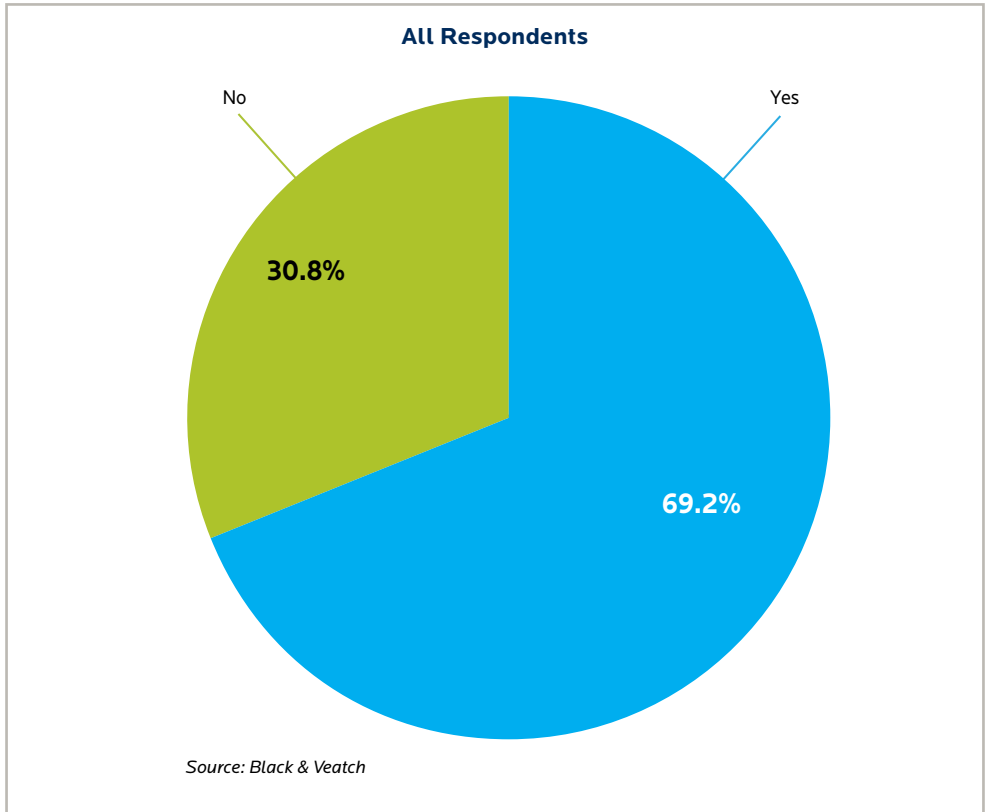
**Question 14: How strongly do you agree that U.S. utility mergers and acquisitions will be critical to driving down utility costs?**



Respondents generally expect mergers and acquisitions to be important, but not necessarily critical, to driving down utility costs.

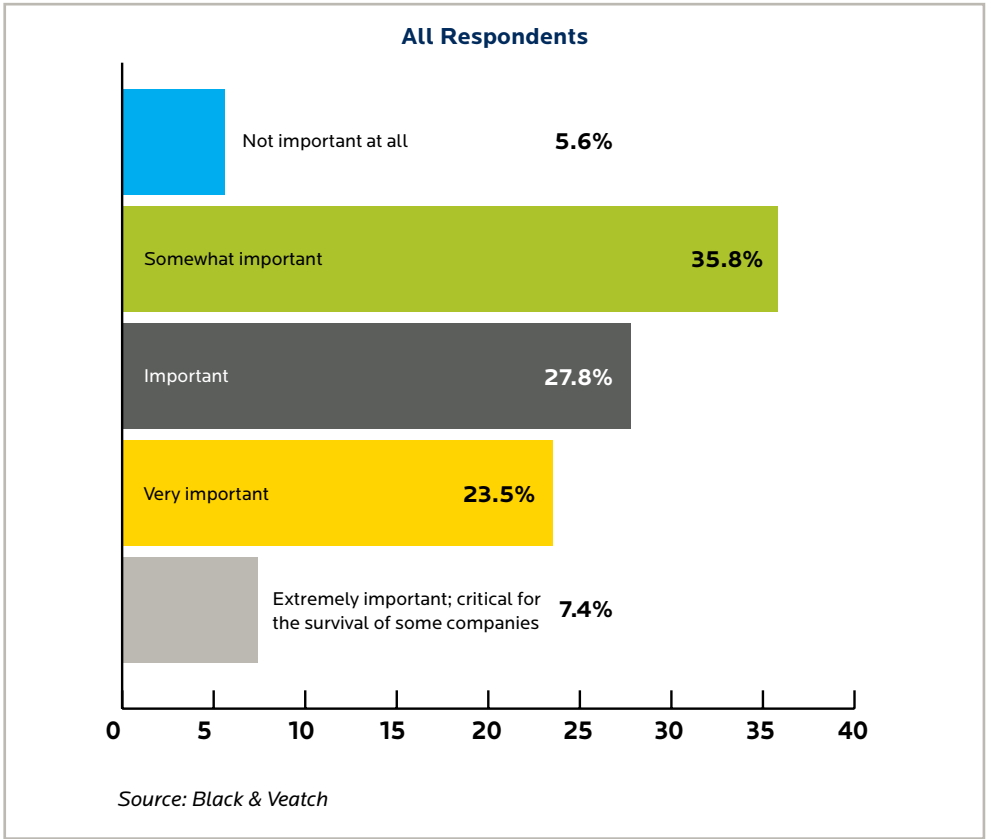


**Question 15: Do you feel that the need for strong balance sheets to finance major generation and transmission projects will drive a significant increase in utility mergers and acquisitions during the next five years?**



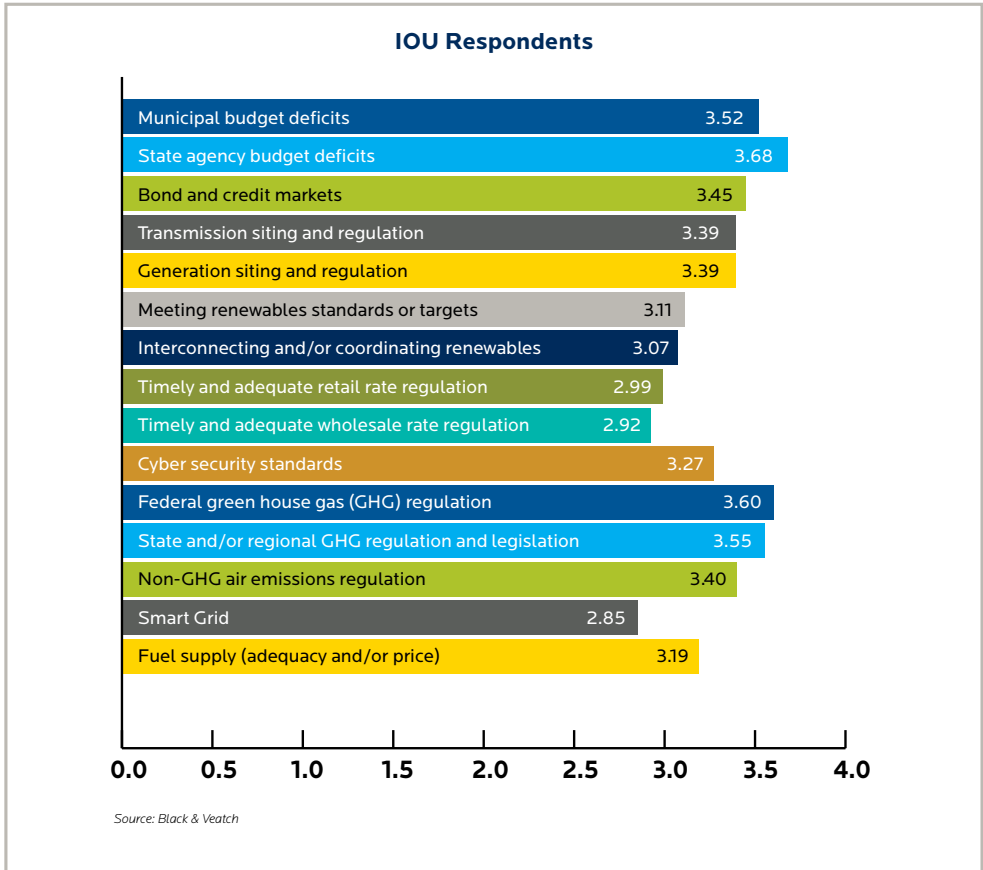
Almost 70 percent of respondents believe the large-scale and heavy financing requirements for many upcoming generation or transmission projects will drive an increase in utility merger and acquisition activity. Scale can reduce unit costs and enhance capital access.

**Question 16: How important will mergers and acquisitions be over the next five years to the electricity and natural gas industries?**

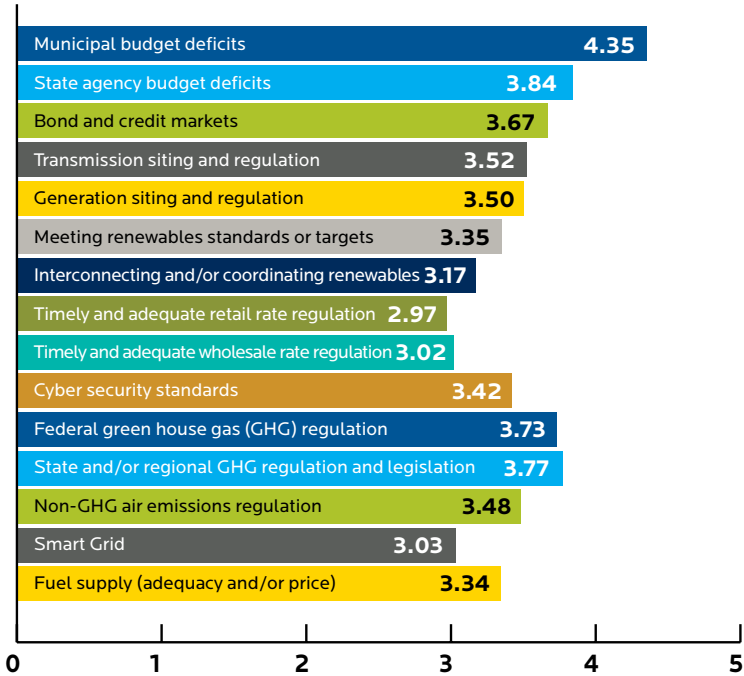


Merger and acquisition activity will be important, very important or extremely important to the industry during the next five years, according to 60 percent of IOU respondents and 48 percent of public power respondents. Mergers and acquisitions are more of an environmental factor rather than a business tactic for the public power sector. (NOTE: The chart shown reflects how ALL RESPONDENTS viewed the importance of M&A activity).

**Question 17: Tell us what effect the following market conditions or utility initiatives might have on your enterprise in the future (where 1 indicates “positive impact” and 5 indicates “adverse impact”).**



### Public Power Respondents



Source: Black & Veatch

Respondents think a number of market conditions or industry initiatives could have adverse future impacts on utility enterprises, with state agency budget deficits, municipal budget deficits, greenhouse gas regulation and bond and credit markets leading the list. The public power respondents were much more likely to expect strongly adverse impacts from budget deficits and credit markets since they are more directly affected by these factors.

Factors with expected large positive impacts are harder to find. Respondents are cautiously optimistic about potential benefits from Smart Grid technologies, good regulation at the wholesale and retail level and meeting the renewables challenge (Renewable Portfolio Standards' (RPS) targets and integration).

## Wrap-Up

The following outlines key themes related to business and market drivers that have emerged from this year's survey responses:

- Regulation still plays a central role, especially for IOUs. Utilities are reluctant to make investments or take risks unless they have regulators on board.
- Utilities are worried about the expected ratcheting down of sales growth.
- Credit markets and new environmental regulations are also top concerns.
- Cost cutting in recent years has gone beyond fat and into the muscle, reducing operational effectiveness.
- Infrastructure is aging and reliability may be threatened.

### Where Is Growth in the “New Normal”?

Electricity industry managers clearly believe long-term load growth has ratcheted down. Approximately 70 percent of respondents expect long-term load growth after recovery from the Great Recession to be less than 1.5 percent per year (see graphic on page 19). This compares with an average of 2.5 percent to 3 percent per year from 2002 through 2008, and even higher growth rates in earlier decades.

If more modest load growth lies ahead, electric utilities must make up that earnings' contribution from other sources. The growth portion of their total return will be smaller, and share prices will shrink unless alternative sources of growth (at acceptable risks) can be tapped and made credible to investors.

### Refueling the Growth Engine for Energy Utilities

The “back-to-basics” strategy used by many utilities to rebuild financial strength and lower their risk profile in recent years may no longer be adequate. Managing costs to earn allowed Return on Equity (ROE), and investing in assets to meet growing customer needs, is a tried-and-true business model for regulated utility businesses. However, in an environment of rising fixed costs and flat or anemic sales growth, this model presses against political constraints on raising rates and bills. An earnings gap will result unless utilities tap new sources of growth. While opportunities abound for investment in both established and emerging business models, the challenge, especially for midsized utilities, is picking opportunities with a sound strategic fit and manageable scale and risk.

### In-System Investments: The Easy Answer?

The viability of the in-system investment growth strategy depends on the utility's ability to win support for its value proposition from regulators and customers. Customers must see some clear benefit from increased reliability and reduced environmental impacts. In some “greener” service territories, this may work.

For example, Richard Kelly, the CEO of Xcel Energy, has asserted that Xcel's customers are willing to pay higher rates to serve these ends. Certainly utilities in the many states with RPS are testing this proposition by raising rates to support renewables mandates.

Nonetheless, with likely slower growth in the U.S. economy during the medium term, a continued emphasis among consumers in reducing debt and expenses, and a drive by many states to encourage economic development and job creation, proposed increases in utility rates will become more constrained politically and in-system investments will reach their limits as a growth engine. Many utilities expect to reach these limits in the 2014 through 2016 time frame, as the costs of complying with the U.S. EPA's conventional pollutant regulations work their way through rates.

### **Why the Urge to Merge?**

When it comes to nonorganic growth (outside of the core business in the home territory), the game board for most utilities has featured primarily geographic expansion and value chain extension, often through M&A. One factor frequently cited regarding benefits of M&A transactions is scale economies. Larger utilities have relatively less overhead expense and should be able to garner increased efficiencies at many stages of their value chain (i.e., generation dispatch, transmission & distribution, procurement, logistics, customer service).

The survey respondents thought one big motivator for M&A activity is cost reduction (see *graphics on pages 31 - 33*). That all sounds plausible, but in reality, the data on scale economies indicate that the leaner organization of most midsized utilities keeps them competitive on a total unit cost basis.

Another driver for merger interest, echoed by the survey results, is the increased scale that is required to finance and execute large capital projects, such as nuclear power plants or high voltage, interregional transmission lines. Their capital costs can run into the \$5 billion to \$15 billion range. To finance such investments, a correspondingly large balance sheet is needed.

Data on stock performance of acquiring utilities show that to move to a faster growing value trajectory, M&A transactions should be more than one-off deals. Utilities that use M&A as a tactic to pursue a larger strategic objective, with multiple transactions over time, tend to outperform their peers financially. M&A transactions or other strategic moves (i.e., alliances, joint ventures, technology licenses, etc.) can be useful tactics to expand capabilities and increase scale in the targeted value chain segments. M&A transactions are a means to a strategic end.

### **Conclusion**

A new day is indeed dawning, and those storm clouds still crowd the sky. The old Polynesian navigators found their way across the Pacific based on stars and wave patterns. We need to follow our own strategic stars, while watching for the patterns in the turbulence that foretell what's over the horizon. While the industry survived the Great Recession, it cannot go back to the 2007 mentality for business planning. Emerging changes in fundamental technologies and business practices will reshape – in many significant ways – the operating regime of the industry.

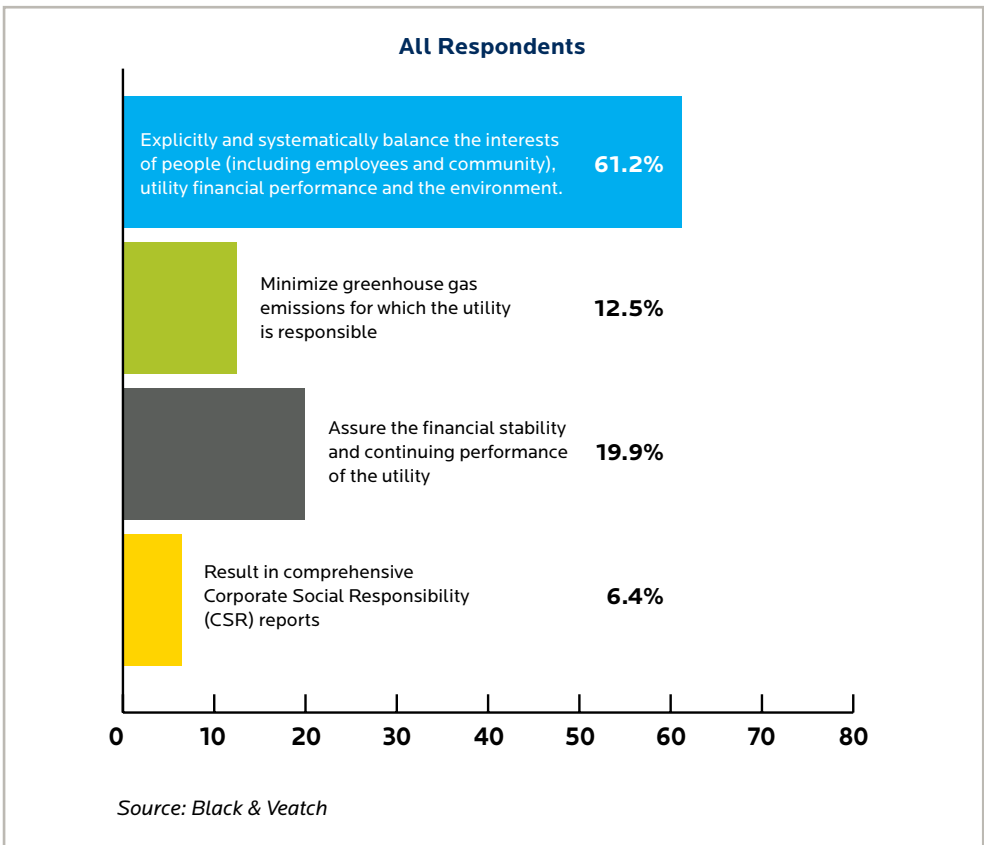
The Great Recession taught that the industry can survive even the most challenging of economic times. While anemic load growth is a top concern, the earnings growth engine can be refueled at manageable risks, and strategy execution sharpened. The upcoming wave of new technologies, regulations and business practices will demonstrate how the industry can adapt and thrive, leaving a more sustainable legacy for our successors.

# SUSTAINABILITY & ENVIRONMENTAL CONCERNS

By Mark Gabriel

The concept of sustainability – and its inclusion into utility planning processes – continues to gain mainstream acceptance as companies recognize the value it can bring to the planning process. The refinement of sustainability’s definition into a broader concept, combined with its benefits to the environment, people and the bottom line, has continued its acceptance by utility executives.

More than 60 percent of all survey respondents agreed on the best definition of sustainability: Explicitly and systematically balance the interests of people (including employees and the community), utility financial performance and the environment.



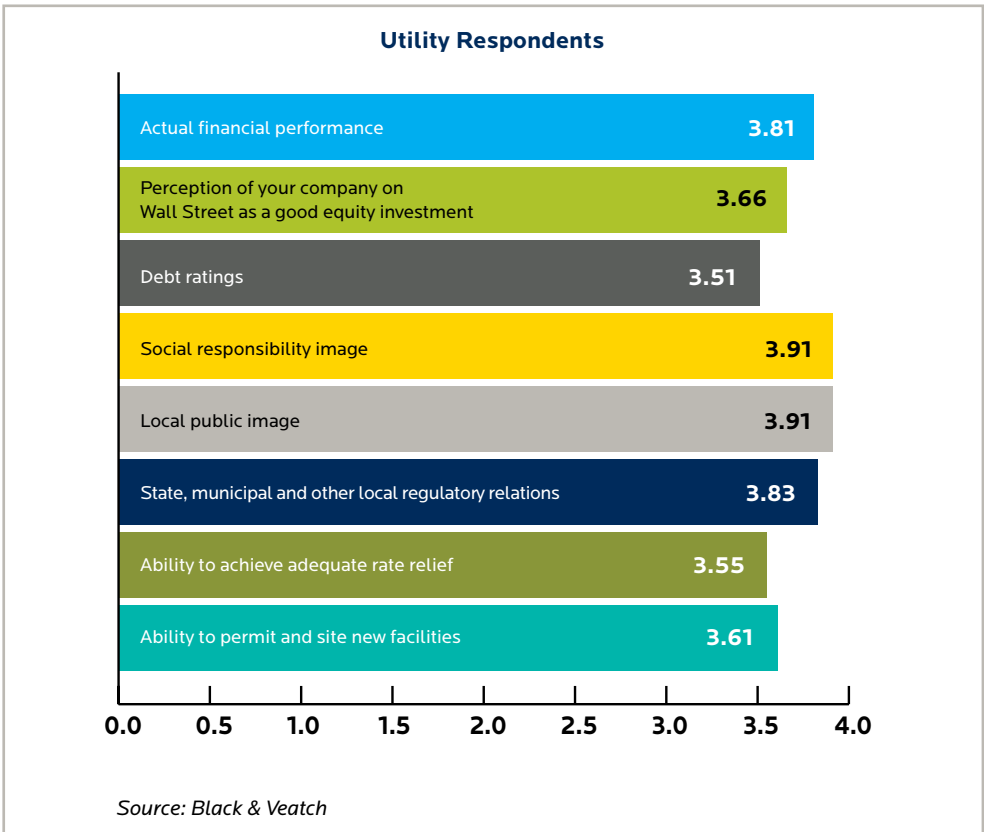
Translating sustainability and environmental concerns into practice – with the appropriate measurements – continues to be somewhat tempered by the pressures of system reliability and acceptance that the balance must be maintained between the cost of sustainability, the impacts on rates and, certainly, system operations. Whether it is the development of carbon roadmaps, driving toward improved Corporate Reporting Initiative rankings, or simply using

issues of the environment as part of the resource planning process, utilities are continuing to be influenced by sustainability concerns.

Perhaps the most telling issues are those surrounding water, which has moved up as a more significant environmental concern. Water, both in terms of supply and effluent, will have a major impact on generation now and into the future. As unconventional natural gas production continues to shape the market, and utility-scale solar demands the use of water, concerns increasingly push the water and energy nexus higher in terms of importance for utility operations and planning.

Perhaps the greatest change in this regard is the recognition of the complexity of issues surrounding sustainability and its impact on the bottom line – whether driven by those utilities seeking a better image, those understanding the financial benefit of a different environmental approach, or those simply trying to meet regulatory imperatives while keeping the lights on.

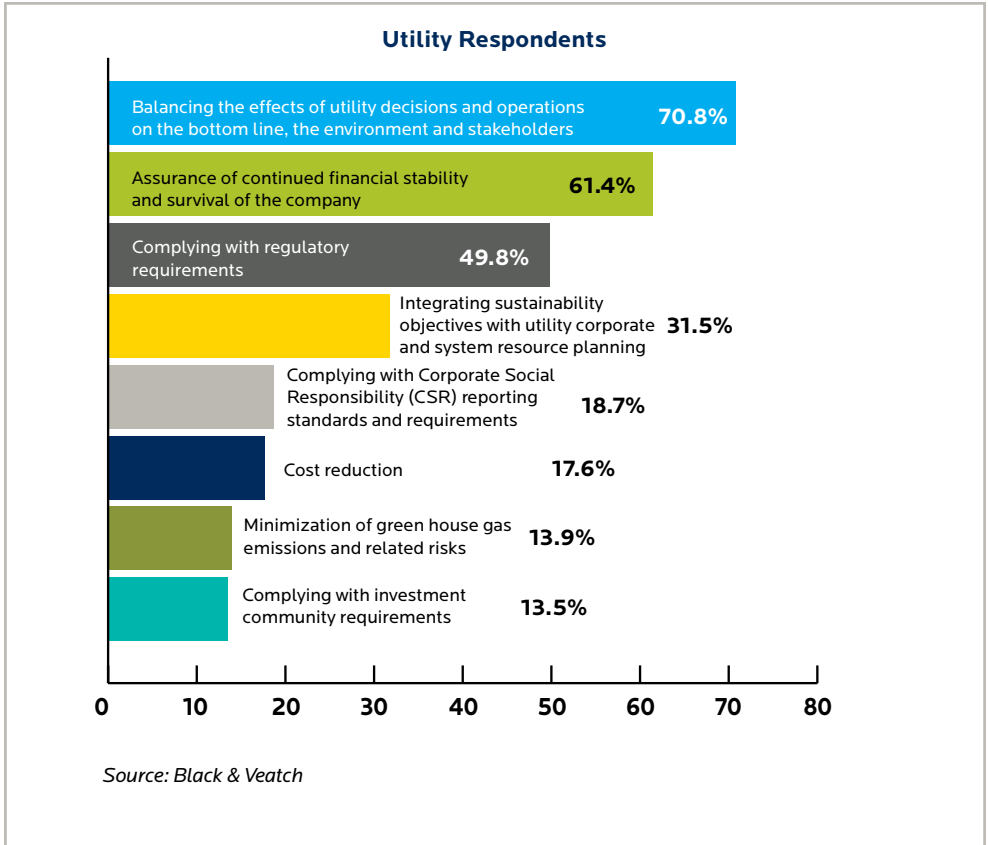
**Question 1: How important do you believe having good sustainability-related policies, planning processes and practices are for the following items on a scale of 1 to 5 (where 1 indicates “not important” and 5 indicates “extremely important”)?**





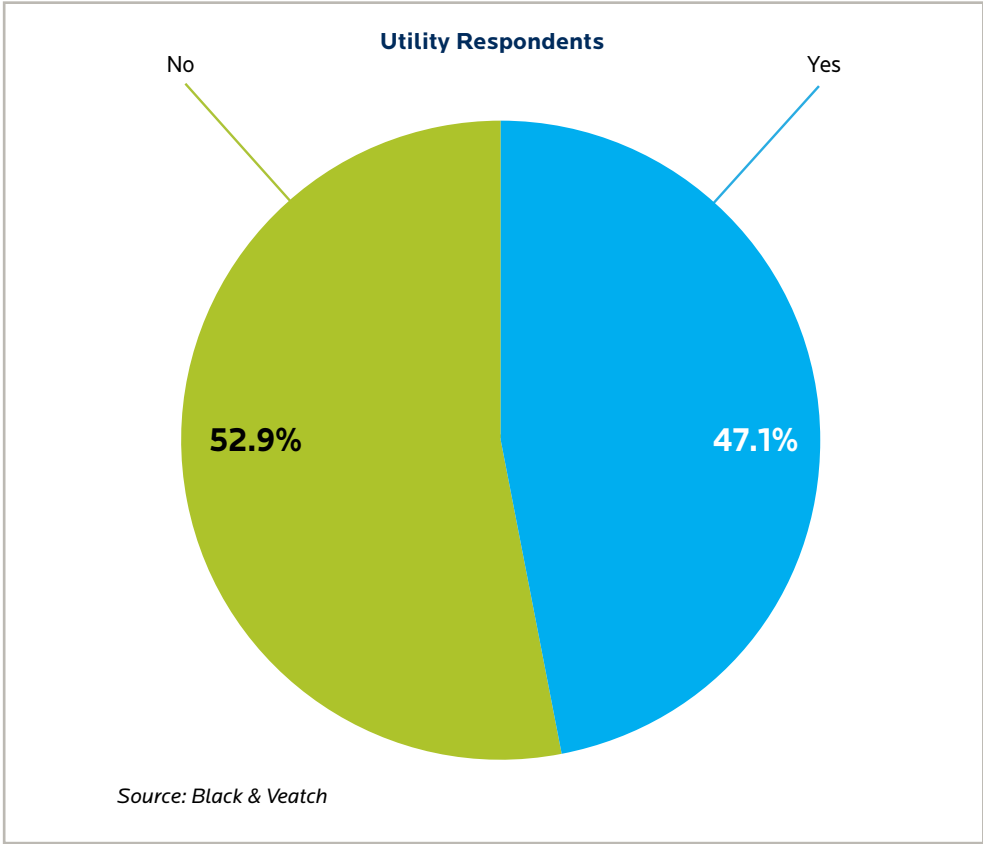
Even as low natural gas prices impact renewables and their price competitiveness, sustainability continues to rise as a concern and major influence on how the utility industry views the future. Regulation, perception and corporate image rank as the lead drivers in the minds of utility executives as they manage their companies with a heightened sense of urgency in terms of meeting sustainability goals while maintaining financial stability and security. Financial performance, the usual bellwether for utilities, ranked lower than local image, social responsibility, the perception of the company on Wall Street and regulatory relations, and just ahead of the ability to site and permit new facilities.

**Question 2: Which of the following are your utility’s three primary focus areas when engaging in sustainability planning?**



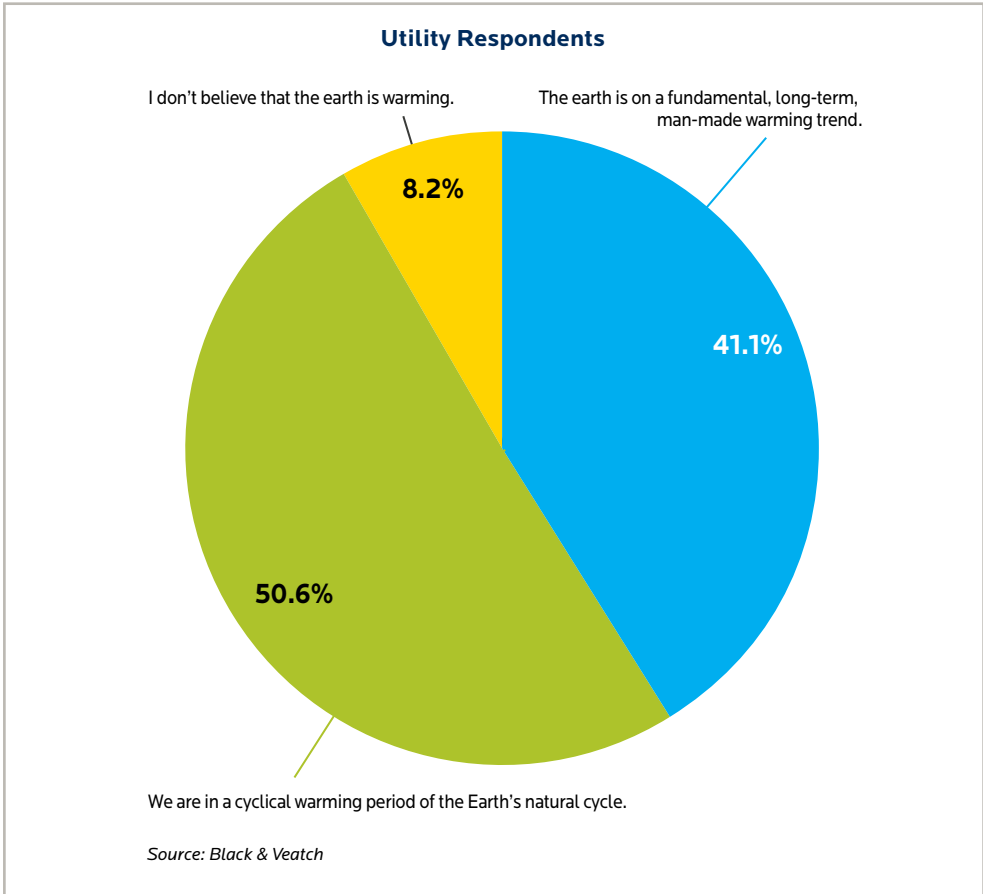
It is clear that the energy industry has bought into the more refined definition of sustainability, with more than 70 percent of respondents focusing on the TBL impacts balancing people, utility financial performance and the environment. The response dwarfed the other more singular definitions of minimizing GHG emissions, simply looking at financial stability or meeting the needs of comprehensive Corporate Social Responsibility (CRS) reports.

**Question 3: Does your regulator have any requirement that utilities report on their progress toward achieving sustainability goals?**



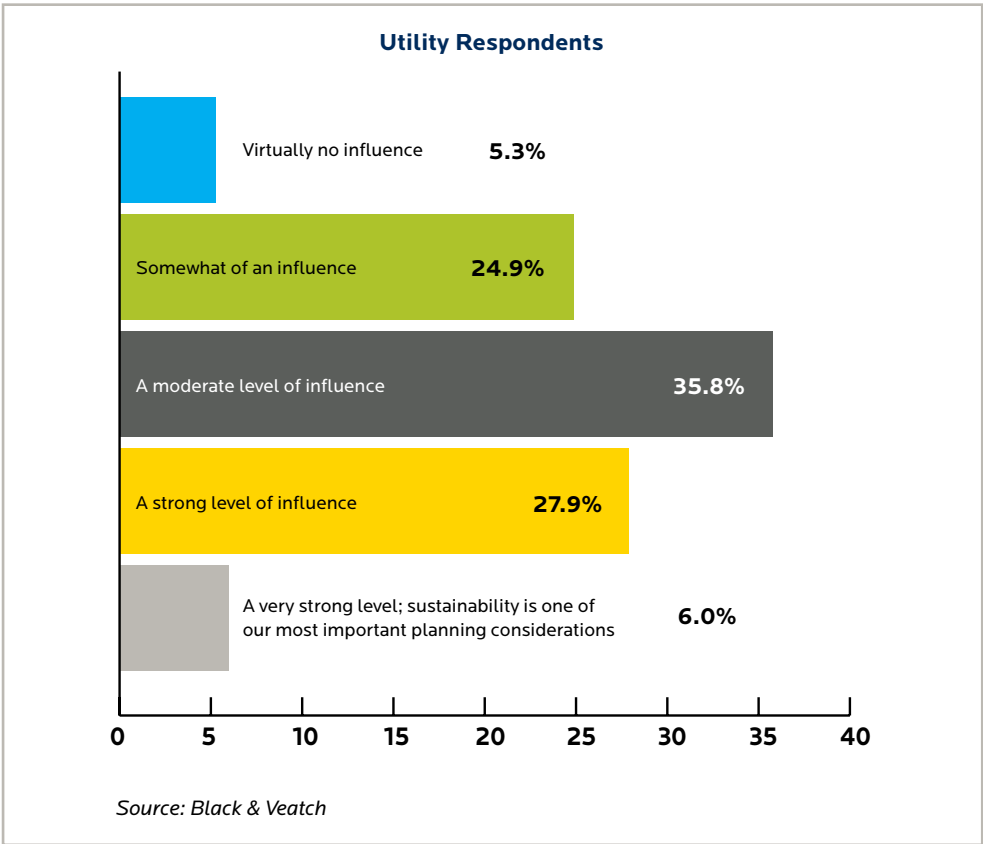
More than 50 percent of respondents tell Black & Veatch that their regulators do not require progress reports on sustainability goals.

**Question 4: Do you personally believe that fundamental, long-term anthropogenic warming is taking place, or are we simply in a cyclical period of warming that is the result of the earth's natural cycles?**



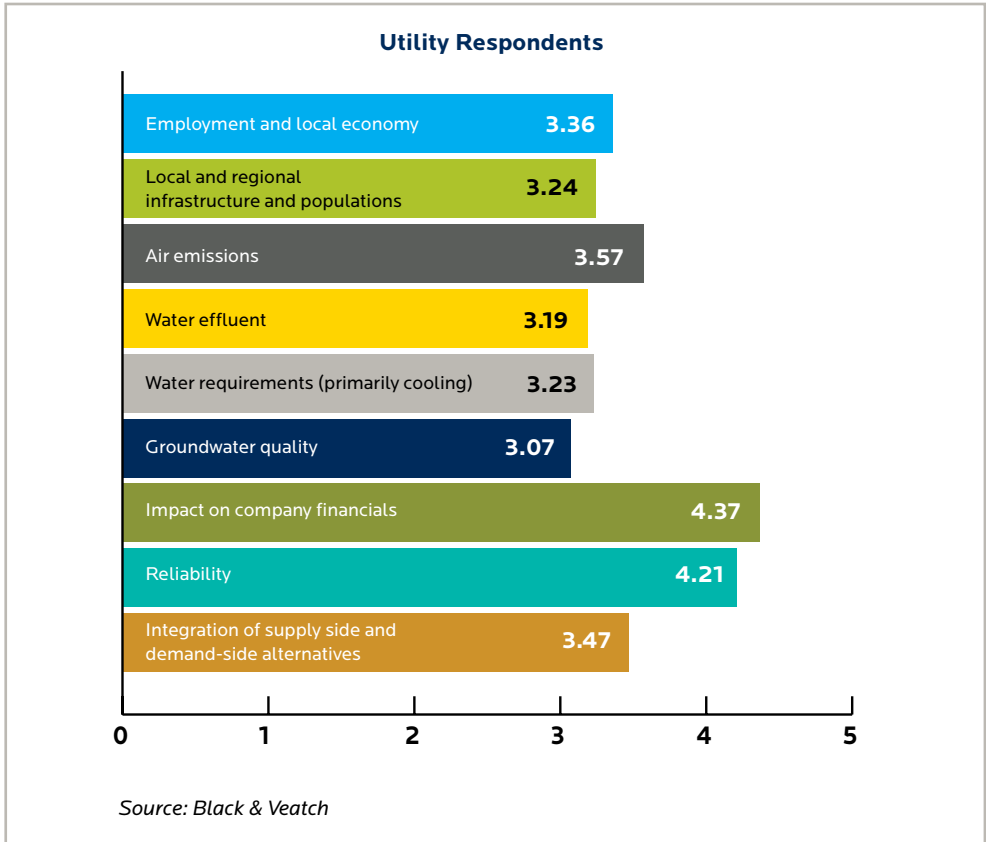
Utility executives have remained fairly consistent in their view that the earth is warming, with 91 percent agreeing that something is taking place. Nearly 51 percent do not believe this is of man-made causes. Interestingly, the total number believing in global warming in the utility industry is higher than the what Gallup Survey on the Environment has found during the past two years and is very close to the skeptics in the general public, with 48 percent in the Gallup poll believing that the threat is exaggerated.

**Question 5: How strongly do sustainability considerations influence your corporate business and strategic planning?**



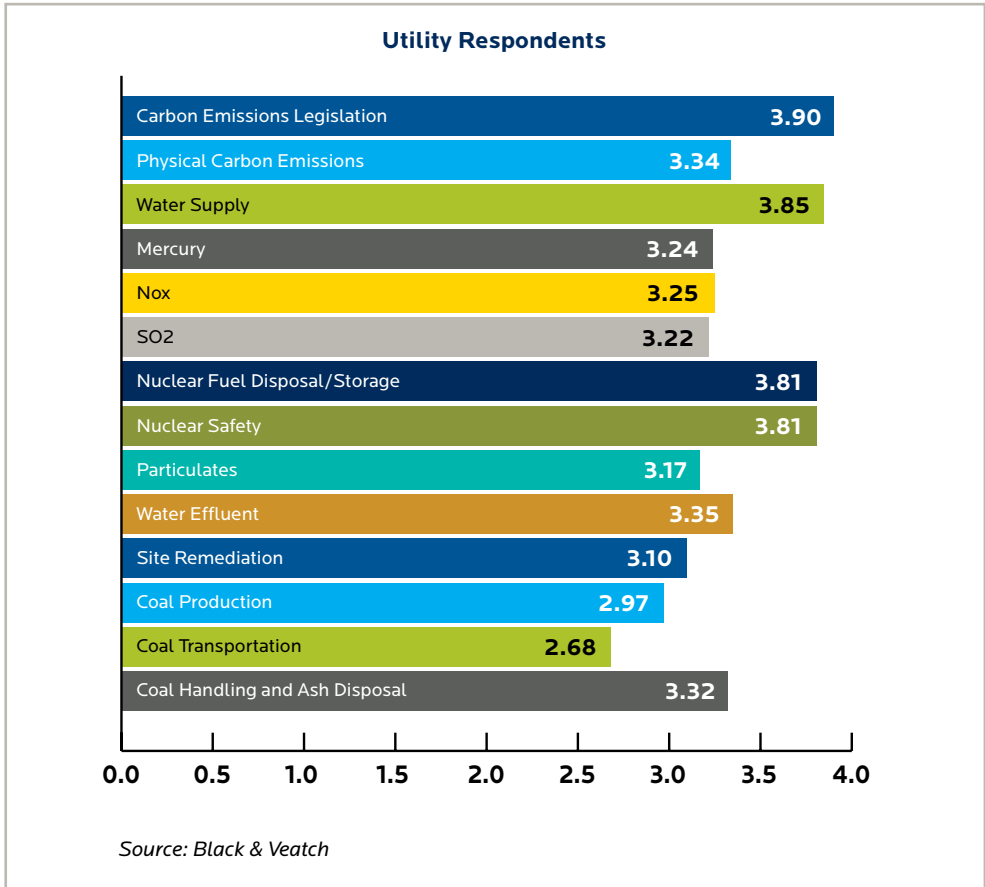
Sustainability and the environment are now incorporated more into utility decisions and planning than ever before, with nearly 70 percent of the utility respondents saying they have a very strong, strong or moderate influence on corporate business and strategic planning. A little more than 5 percent of utility respondents said sustainability had “virtually no influence.”

**Question 6: How strong are the following considerations in your utility’s resources planning process on a scale of 1 to 5 (where 1 indicates “no consideration” and 5 indicates “very strong consideration”)?**



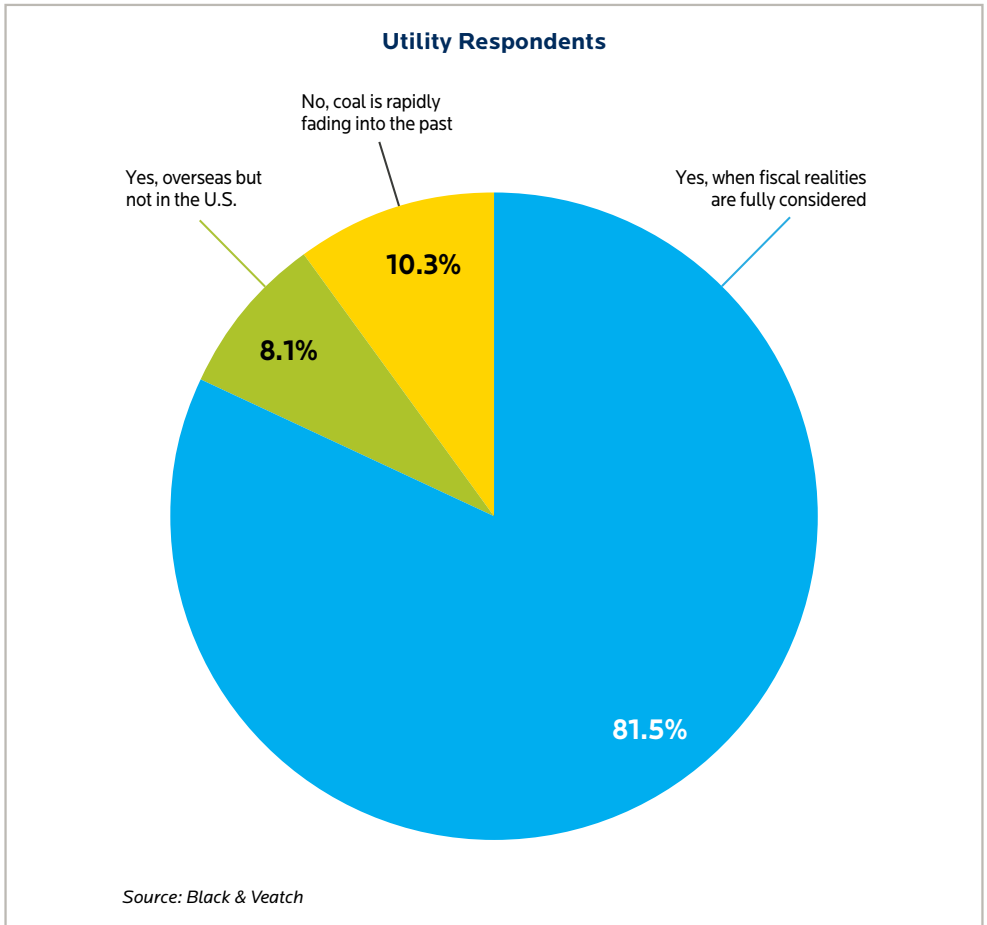
The critical issue in balancing the effect of any resource planning efforts lies first and foremost on financial considerations, with reliability second. One interesting note is the continued emergence of water. It is apparent from the concerns in terms of utility planning that the nexus of water and energy is now gaining significant attention from utility executives as part of their resource planning processes. The combination of groundwater, water for cooling and water effluent makes up a significant piece of the resource planning concerns. These are rounded out by areas like air emissions and “local” issues, such as employment and the economy.

**Question 7: Please rate the following environmental concerns on a scale of 1 to 5 (where 1 indicates “less concern” and 5 indicates “more concern”).**



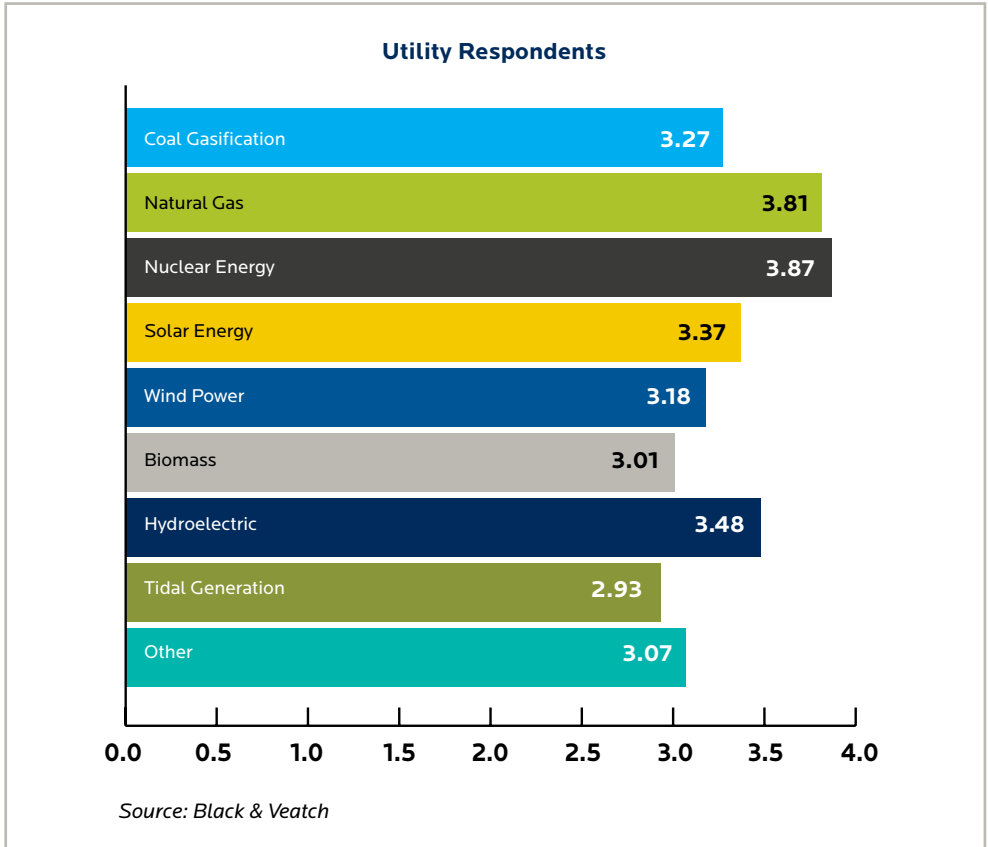
The rise of water issues was evidenced by it finishing second on the list of environmental concerns, trailing only carbon emissions. In fact, water supply (ranked second) and water effluent (ranked fifth) bracketed the more traditional worries of nuclear fuel disposal/storage and nuclear safety (these issues tied for third in the rankings). Of course, this survey was conducted immediately following the Fukushima disaster, so the increased emphasis on nuclear safety is not a surprise. Coal did not make the top six, but issues surrounding its handling of ash disposal (ranked sixth) and mercury (ranked eighth) made the cut.

**Question 8: Is there any future for coal?**



A vast majority, 81.5 percent, of utility respondents believe that when fiscal realities are fully considered, there is a future for coal-fired generation. Just more than 8 percent believe it does not have a future in the United States but does overseas. Finally, 10.3 percent believe coal is fading into the past.

**Question 9: Where do you believe the industry should place its emphasis on environmentally friendly technologies? Please rate on a scale of 1 to 5 (where 1 indicates “less emphasis” and 5 indicates “more emphasis”).**



Even though this survey was conducted immediately following the Fukushima disaster in Japan, nuclear energy still edged out natural gas as the place for the industry to place its emphasis on environmentally friendly technologies. As might be expected, this slight edge is considerably lower than last year, when nuclear scored 4.2 among all survey respondents and natural gas and wind tied for second with a score of 3.4.

The six-hundredths of a percent difference across the utility respondent base between natural gas nuclear energy is extremely small – but in the rankings, nuclear outpaced natural gas more than 10 percentage points in the “more emphasis” category. Solar was the third-highest ranked technology for emphasis. Interestingly, the respondents believe more emphasis should be placed on hydroelectric than wind.



## Wrap-Up

It appears the industry's acceptance of the importance of sustainability is resulting in its incorporation into planning. The reasons for this acceptance do revolve around the bottom line – and that impact will be felt in terms of investments, technology choices and public image.

Utilities still have a challenge in translating their desired state of being viewed as a sustainable enterprise with the investments necessary to make it “real” and not just “green washing.” The challenge is twofold: managing the financial and reliability thresholds with a more sustainable end state, and building a new vision of their enterprise, which focuses on the broader picture of the environment and all of the aspects of sustainability.

It is clear from the survey responses that utilities are taking their role in environmental stewardship more seriously, but the final step of bringing sustainability to the core of strategy has yet to be taken. This is both a matter of financial accountability and historical artifact in how the industry has been operating successfully for more than 100 years. As issues of water, capacity and sustainable supply continue to play out, it is apparent that the changes will continue to occur in building a new future in an increasingly complex universe of possibilities.

# RENEWABLE ENERGY

By Bill Roush & Ryan Pletka

As U.S. utilities implement more renewable energy, Black & Veatch wants to have a better understanding of how things are going as this generation segment becomes more of an established part of generation options. Utilities have moved beyond the demonstration installations and are wrestling with these new technologies in a more mainstream way as they seek to deploy hundreds of megawatts of renewables.

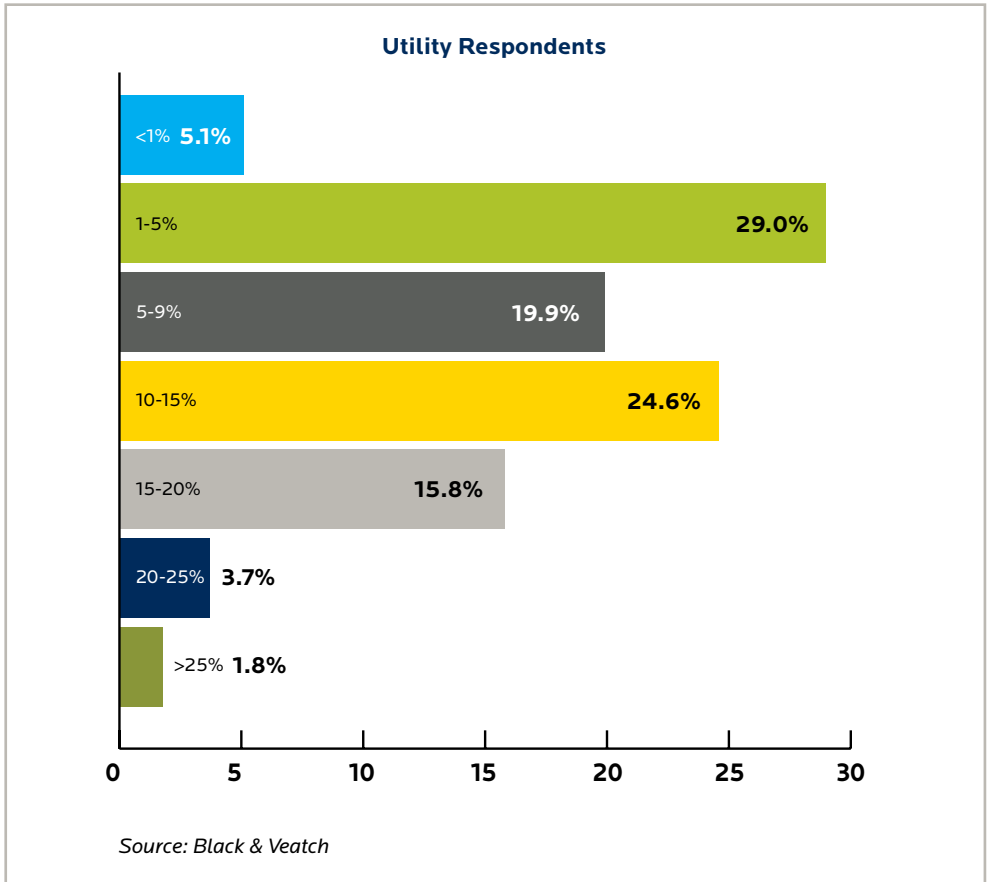
This year, Black & Veatch asked utilities about their renewable energy concerns, largely centered on costs. The one carry-over question from last year relates to barriers to renewable generation for utilities and this also had a cost aspect. Black & Veatch asked utilities to be predictive and let us know what they saw for renewable generation percentages on their systems.

New this year was a series of questions regarding energy storage technologies and their utility-scale implementation plans. Other than pumped hydro, energy storage has not been a significant part of utility-scale generating systems. New storage technologies are emerging to take their place in utility systems that have variable and dispersed loads, intermittent solar and wind generation sources and increasing power quality and security concerns. Black & Veatch wanted to know if utilities saw energy storage becoming a part of their system. If they did, Black & Veatch wanted to know more about what kinds of storage technologies they thought might be used in their service territories. Furthermore, Black & Veatch was interested to know when these technologies might be brought online.

Also new to the 2011 survey are questions regarding electric vehicles and the expected impact this new transportation technology will have on electric utilities. Expanded electrification of ground transportation could represent a sizable new market for electric power, and Black & Veatch wanted to know what utility leaders expect.

While there are many technical, marketing and policy issues to be dealt with in changing even a part of the liquid-fueled automotive system over to electric power, Black & Veatch believed a defining question would be what utility leaders expected in terms of total percentage of their generation devoted to electric vehicles. Black & Veatch doesn't know what the future holds, but these utility leaders see interesting times ahead for this segment of the market.

**Question 1: What percentage of intermittent generation resources do you foresee in your system by 2015?**

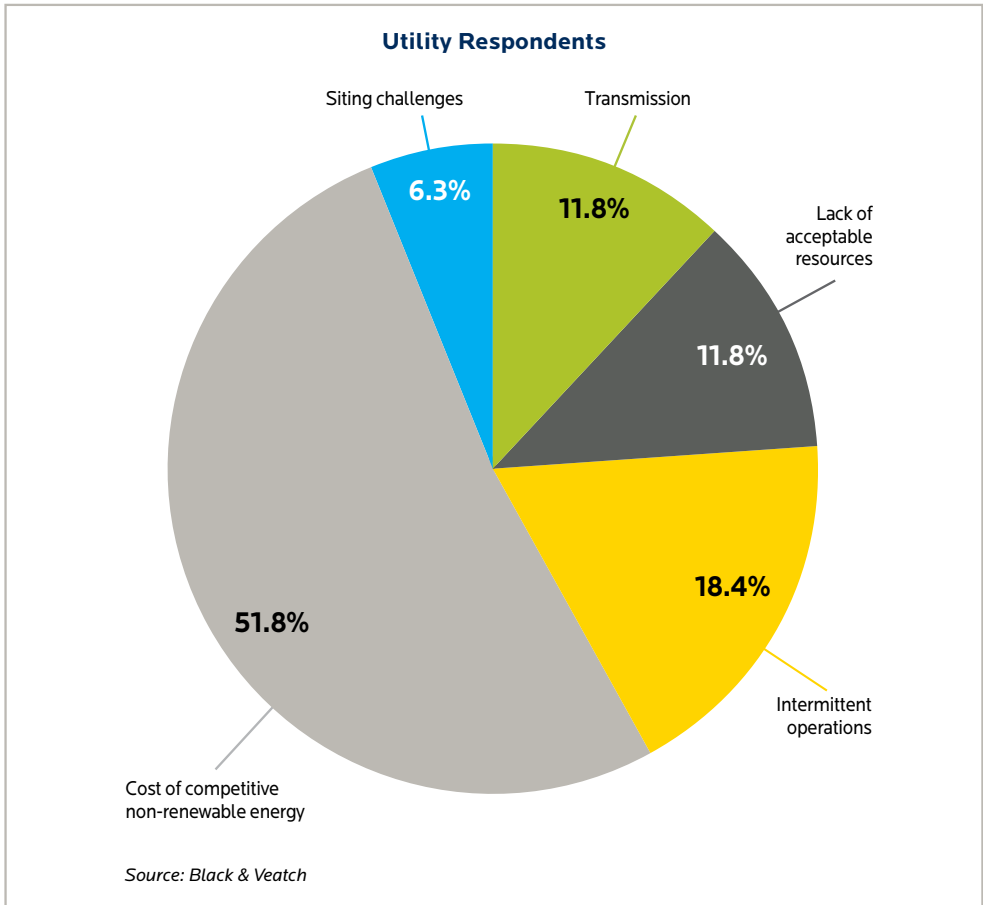


Intermittency is an issue with PV and wind, much less so with solar thermal, and not at all with biomass and geothermal. Very few utilities thought their percentage of intermittent renewables (PV and wind) would fall below 5 percent or rise above 25 percent. Within that 5 percent to 25 percent range, the G&T Cooperatives tended to the high end, while IOUs weighed in toward lower percentages.

There seems to be a consensus (more than 65 percent) that most utilities will have double-digit solar and wind percentages in their systems by 2015. This would be a major change from the 2009 EIA estimates that put wind generation at less than 1 percent of U.S. generation, and solar at a fraction of that.

As recently as Black & Veatch's 2008 survey, a similar percentage of utilities had, or planned to have, some kind of renewable project on their system. In just two short years, those tentative steps regarding all renewables have grown to expectations for just solar and PV – the intermittent resources – to become a significant portion of supply.

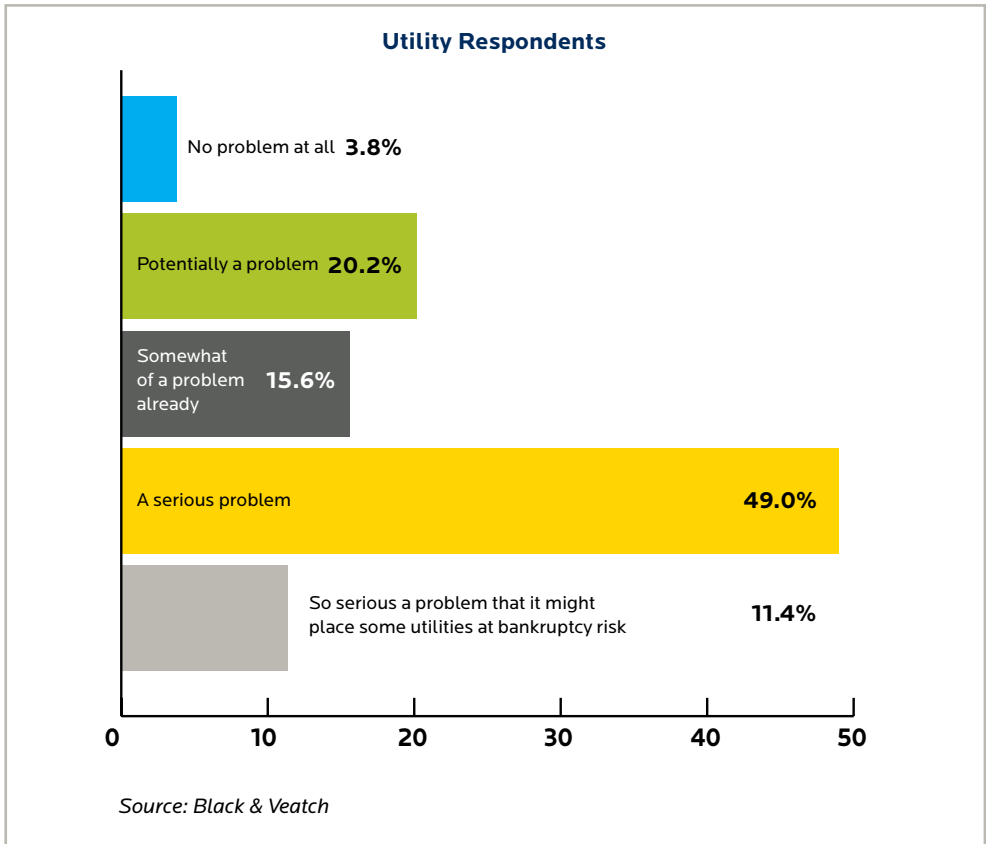
**Question 2: Which of the following is the greatest barrier to significantly increasing renewable generation on your system?**



Overwhelmingly (nearly 52 percent), cost is seen as the greatest barrier for increasing renewable generation into utility systems. Siting challenges, lack of resources and transmission issues received the lowest percentages. Intermittent operation was a lesser concern, except for G&T Cooperatives, which ranked them even higher than cost.

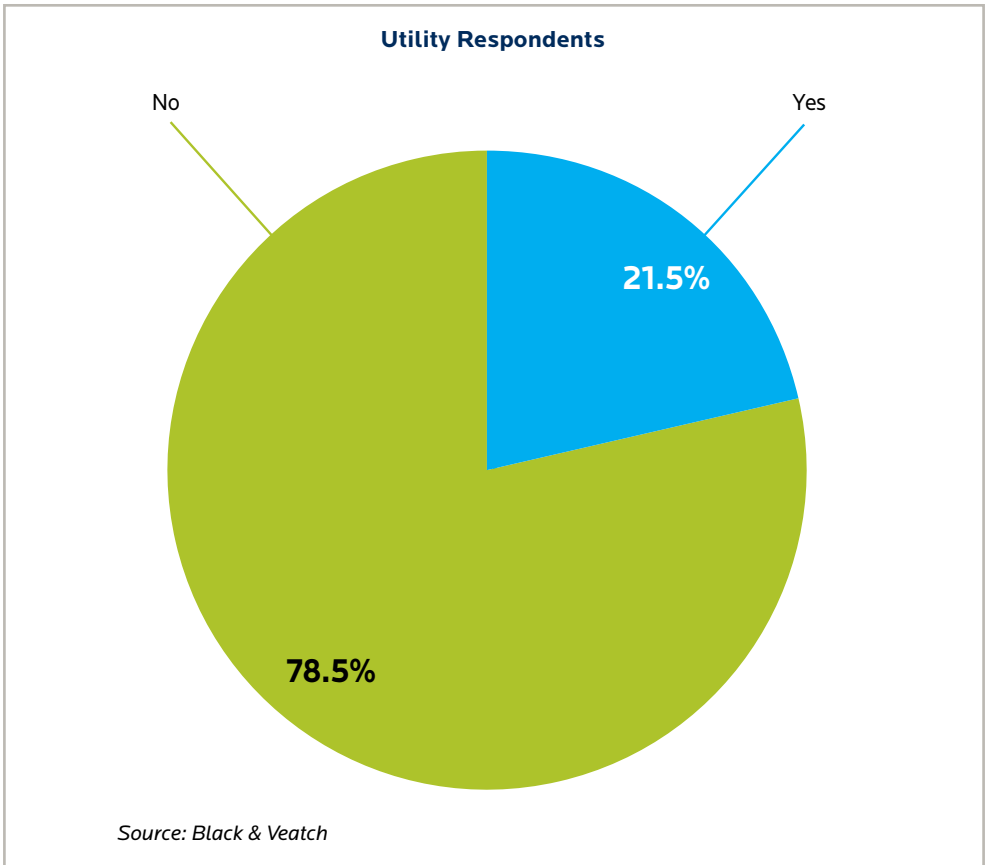
The issues of lack of resources, intermittency and transmission all dropped as a percentage of concern from Black & Veatch's 2009/10 utility survey, while cost rose as a concern. In the economic conditions we recently have been experiencing, the cost of everything seems to be a major concern. In addition, the relative low cost and availability of natural gas have made low-carbon electric generation cost comparisons even more competitive.

**Question 3: How much of a problem would it be to be unable to recover substantially all of the costs of power purchased from renewable resources whose price is above system average generation and purchased power costs?**



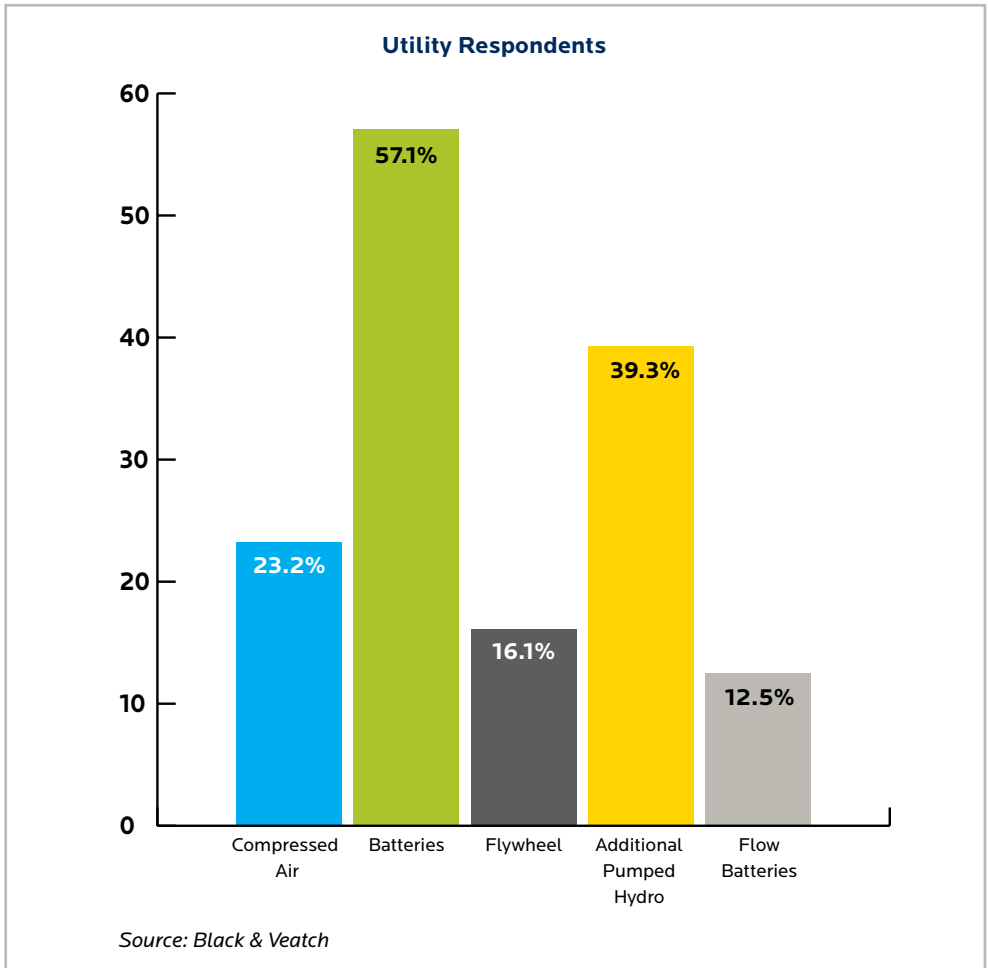
As might be expected, an inability to recover costs is seen overwhelmingly as a potentially serious problem, with some utilities (more than 15 percent) seeing the problem now. This can be viewed as a sign that renewable energy has taken a step into the mainstream world of reality, where costs really do matter – and high costs matter even more. Will people be willing to pay more for the perceived benefits of renewable power? Will PUCs allow recovery of costs, especially when these costs are significantly higher than recent, relatively lower costs of natural gas?

**Question 4: Do you have plans to implement any energy storage systems at a commercial scale?**



While most utilities do not plan energy storage projects at this time, a significant number (approximately 20 percent) do. This is not unlike how any new technology moves to market. Some users become “first adopters” and move to implement the new technology. Others wait until they see benefits for their operations and hope that costs will come down. Actually, 20 percent is a higher percentage than typical for early adopters, which usually fall in the lower single digits. A 20 percent implementation rate may signal that energy storage has already moved beyond the initial curiosity of a few and toward adoption by a more mainstream segment.

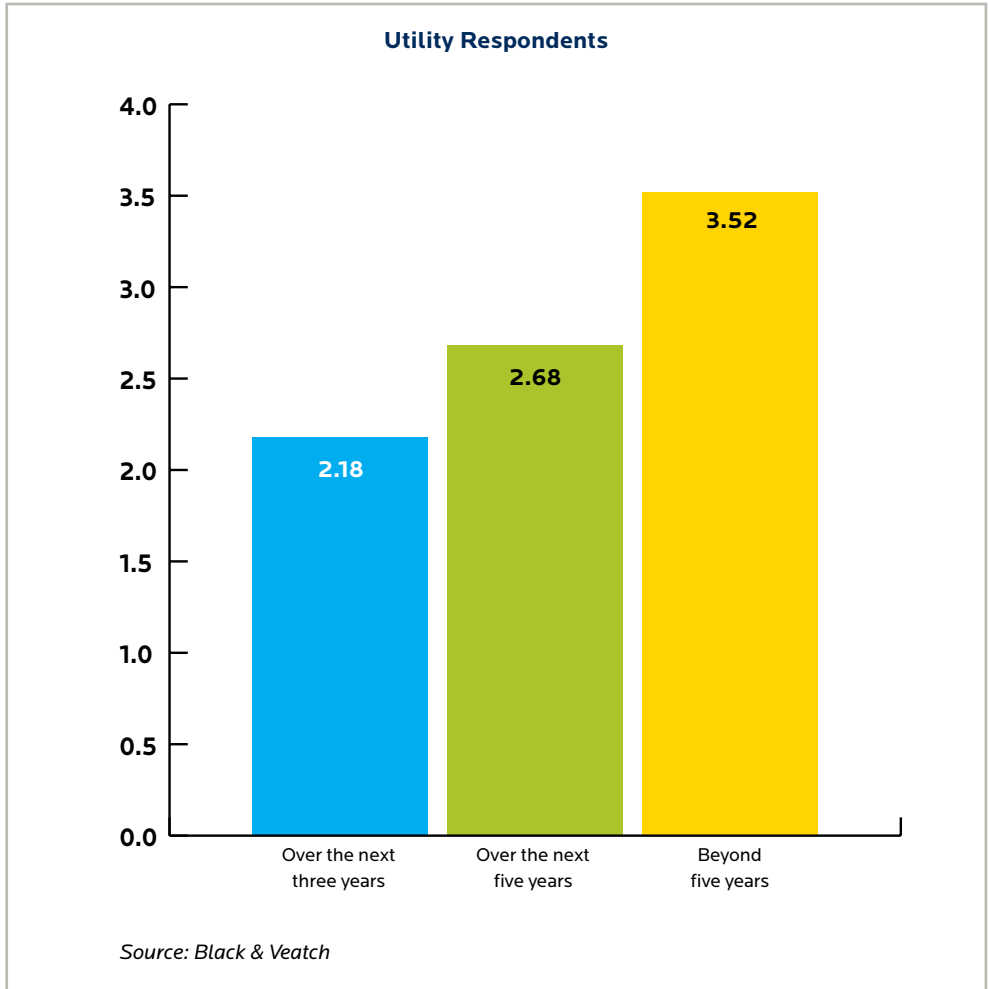
**Question 5: Which Energy Storage technologies do you plan to implement?**



While batteries led the number of responses for planned energy storage technology, all five technologies (compressed air, batteries, flywheel, pumped hydro and flow batteries) had double-digit percentages of utilities planning to implement, and each technology had multiple responses planning implementation. The number of responses was highest from IOUs and municipal utilities, so they may lead the market in this field.

It is also important to note that approximately 20 percent of all utility survey participants responded positively to this question. Still, of this group, almost 40 percent stated that their utility was planning battery storage projects. That is a significant market for this new industry segment. Similarly, enough utilities responded favorably that we should be seeing several commercial-scale projects of all the technologies during the next few years.

**Question 6: On a scale of 1 to 5 (where 1 indicates “extremely unimportant” and 5 indicates “extremely important”), how important a role will energy storage have in your system?**

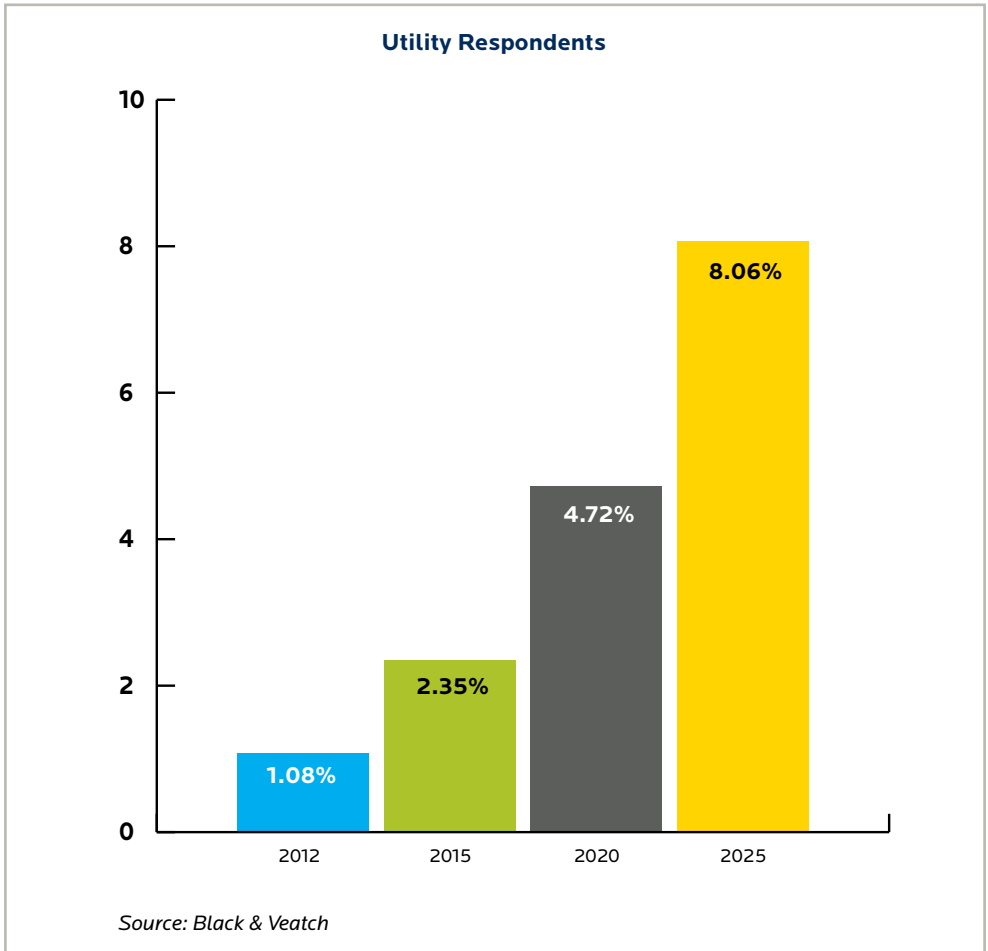


Responses to this question show an increasing role for energy storage during the next several years. In fact, the percentages move strongly from low in importance in the near term (three years), to much higher in importance in five years or more.

Nearly all of the utilities responded to this question, much higher than the number responding to Question 5 regarding plans to implement energy storage. A majority of IOUs, G&T Cooperatives and FPMAs; 49 percent of municipals; and 41 percent of cooperatives say that energy storage will be either important or extremely important beyond 2016. That is an encouraging sign for those in the energy storage industry.



**Question 7: Approximately what proportion of your annual load (energy) do you expect electric vehicles to represent by the end of 2012, 2015, 2020 and 2025?**



Black & Veatch survey respondents are looking for electric vehicles to account for 1 percent of load by 2012. That is approximately 5,300 megawatts (MW) of baseload (coal, nuclear, biomass, geothermal or hydro) capacity. Furthermore, they are suggesting that they expect this total to double at every marker year noted in the question to account for 8 percent of generation. That would require electric vehicles to consume the power equivalent of approximately 42,000 MW of baseload capacity in the United States by 2025.

This is a sizable number and nearly equals the capacity of coal plant retirements Black & Veatch expects during a similar time period. Clearly, survey respondents see a new market developing that will require serious management decisions regarding how that new obligation is met.

## Wrap-Up

Overall, survey responses acknowledge that significant renewable resources are available to be harnessed, and this year's results indicate there has been a decline in the percentages concerned with this basic resource issue. There also was a noticeable drop in technical concerns with renewable energy in that resource. Concerns about transmission and intermittency also dropped. An exception was that some G&T Cooperatives in the survey must be concerned with how to manage PV and wind resources on their systems, as intermittency was listed as a higher level concern for them.

One way to deal with the intermittency of solar and wind is energy storage. Energy storage can tackle other grid challenges as well, including reliability, power quality and growth or system stress issues. It is still unclear who the energy storage market customers are, however. There may be utilities that are using them to better manage their system. It could be private operators or ISOs seeking revenue from arbitrage or ancillary services finding their niche. Private developers may decide that adding value to their PV and wind projects will be financially rewarding. End users may be sufficiently concerned about power quality and security to add storage. Perhaps all of the above will occur.

Adding to these possibilities are grid interactive plug-in hybrid electric vehicles that could potentially become part of the energy storage industry, or a powerful competitor. Much depends on the policy decisions made in the next months and years regarding how storage is treated in the highly regulated electric utility marketplace.

The number of utilities planning to implement energy storage may become significant enough to launch a new energy storage industry. Or, it may provide just enough business to move energy storage closer to the "Valley of Death," where a few demonstration projects test technical feasibility, but don't provide the market mechanisms to create revenue for sustained business operations.

While many utilities don't have current plans for energy storage (*see page 53*), they do see energy storage as growing in importance for their utility as indicated by their responses to Question 6 (*see page 55*). Those responses indicate that utilities view storage as a segment of increasing importance in a five-year time frame, which is close to near-term by utility standards. This is a sign of potentially growing business opportunities and challenges for the new energy storage industry.

There is increasing concern in this year's survey that the costs to bring renewable resources online might be higher than what many would like. The realities of cost seem to be coming to the forefront as more utilities wrestle with how to pay for significant amounts of new renewable technologies. While there have been significant cost reductions in solar PV during the last two years, it remains costly compared to historical generation, although it is now competitive with other renewables in certain situations. Furthermore, natural gas generation appears more cost-competitive than recent years, and its supply outlook is favorable.

In one question, Black & Veatch asked utility leaders, "What environmentally friendly technologies should the industry emphasize?" (*See Question 9 on page 47.*) Following nuclear and natural gas, the highest-rated technologies were solar and hydroelectric power. This is interesting in that hydropower has – until recently – been thought of as a mature technology with all its good sites already developed.

Several characteristics of hydropower are being recognized, generating appreciation for the resource. Hydropower can be flexible in its output, is emissions-free and can produce significant baseload generation. New technology is either on the horizon or entering the picture in the form of efficient turbine designs for repowering and smaller turbines for in-conduit hydropower. Even in this mature industry, there are R&D activities, such as the testing of more compact turbines using superconductivity to fit more generation in a smaller space.

Most importantly, there is a realization that there are more options for hydropower than just dams on major rivers. This includes conventional storage projects, run-of-river applications, as well as new and/or existing water conveyance systems such as transmission pipelines, canal drop structures or dam fish release outlets.

Solar was a popular option among renewables. Of course solar takes several forms and could have been thought of by survey respondents as either concentrating on solar thermal (a southwestern United States option), PV (which have the advantage of working almost anywhere) and even solar thermal for water heating.

The solar resource is abundant and other questions in the survey seem to indicate that utility leaders understand that. It may be too that the “more emphasis” part of Black & Veatch’s question brought some of the many deployment options for PV to mind. The full range of possible deployment options for PV is only beginning to be explored by most electric utility systems in the United States. Those options include utility-scale PV, commercial PV (discount stores and warehouses) and distributed PV on homes, small businesses and even on utility poles. Commercial and distributed PV can be on either the customer or utility side of the meter.

In addition, a multitude of PV programs can add value and help utilities meet RPS requirements, save costs or add revenue.<sup>2</sup> Some examples of these are:

- Utility ownership of solar assets
- Community solar projects that meet distributed RPS requirements at a lowered cost
- Auction, bid or other mechanisms that increase competition and lower solar costs
- Green pricing programs that support solar incentive programs

There are many PV technologies, such as monocrystalline silicon, polycrystalline silicon, multiple “thin-film” types and even concentrated PV. In addition, there are multiple mounting systems, such as stationary, single-axis tracking, two-axis tracking, ballasted rooftop and more. All of these choices, plus other siting aspects, affect performance and thus revenue from the project.

Wind industry pricing is very competitive in the current environment. The economic slowdown has hampered project development, slowing the sales of current turbine models at a time when the industry is attempting to introduce new, more powerful turbines to buyers. Additionally, Chinese manufacturers are looking to enter the export market. Promising new markets, such as Brazil and Turkey, are looking to increase domestic content

<sup>2</sup> “Utility Solar Business Models” Quarterly Bulletin, *Electric Power Research Institute/Solar Electric Power Association*, February 2011, page 3.

of wind generation equipment. New turbine technologies at competitive prices can open up new areas for development. All of this together makes for competitive turbine pricing, but it also presents many choices and decisions regarding solutions (turbine choices, locations, wind farm designs and layouts) for potential projects. Being up-to-date with the wind industry is as important as it is in the fast-moving solar industry.

Biomass was a choice for more emphasis by a lower number of respondents than solar, hydro or wind. That is interesting in that one form of biomass use, co-firing waste biomass in existing coal plants, often has a low cost compared to other renewables, or even compared to other forms of conventional generation.

Of course, it is not an option everywhere, and there are engineering challenges of material handling and co-firing methods that need to be solved for each project. Biomass as a fuel choice in stand-alone generation plants also has to wrestle with U.S. regulatory uncertainty regarding emission rules, which has delayed some promising projects.

Black & Veatch did not offer geothermal as a possible response, but several respondents wrote it in as it has been growing in investment and generation. Geothermal, given a strong resource site, can deliver significant baseload power – at a reasonable cost – to meet consumer demand and Renewable Portfolio Standard requirements.

There will likely be increasing discussion, debate, legislation and rulings regarding cost-recovery issues for renewable energy as it becomes a higher percentage of total generation. States like Iowa and Florida have dealt with these issues, in different ways, but both without a strong RPS requirement, which has been the biggest policy driver for renewable energy development.

Other states, like California and New Jersey, are adjusting, reviewing and refining RPS requirements with an eye toward cost efficiency but continued growth in renewable development. Renewable energy projects are getting rigorous reviews regarding permitting, costs and reliability issues, as is appropriate for the mainstream power contributors they have become.

# SMART GRID

By Chip Scott & Kevin Cornish

The term “Smart Grid” has emerged from relative obscurity to the seemingly most used term in the electric utility industry, all in a very short period of time. Unfortunately, a common understanding and concise definition have not evolved in concert with this expanded usage.

From the electric utility perspective, Smart Grid ranges from integration of more efficient generation sources through improved T&D systems, to end-use customer information and energy management solutions. This covers the entire industry infrastructure. Thus, the seemingly simple term defies concise explanation, and the concept tends to be based on the perspective from which one views it, such as generation, distribution planning, transmission system operations, consumer advocacy, regulatory requirements, commercial energy service, residential service or other stakeholders.

While the term has not been as significant a factor in the gas and water industries, Smart Grid is gaining acceptance and common use there also. The gas or water Smart Grid is expected to provide improved production management of gas and water, more efficient storage, improved distribution, reduction in system losses and expanded customer engagement.

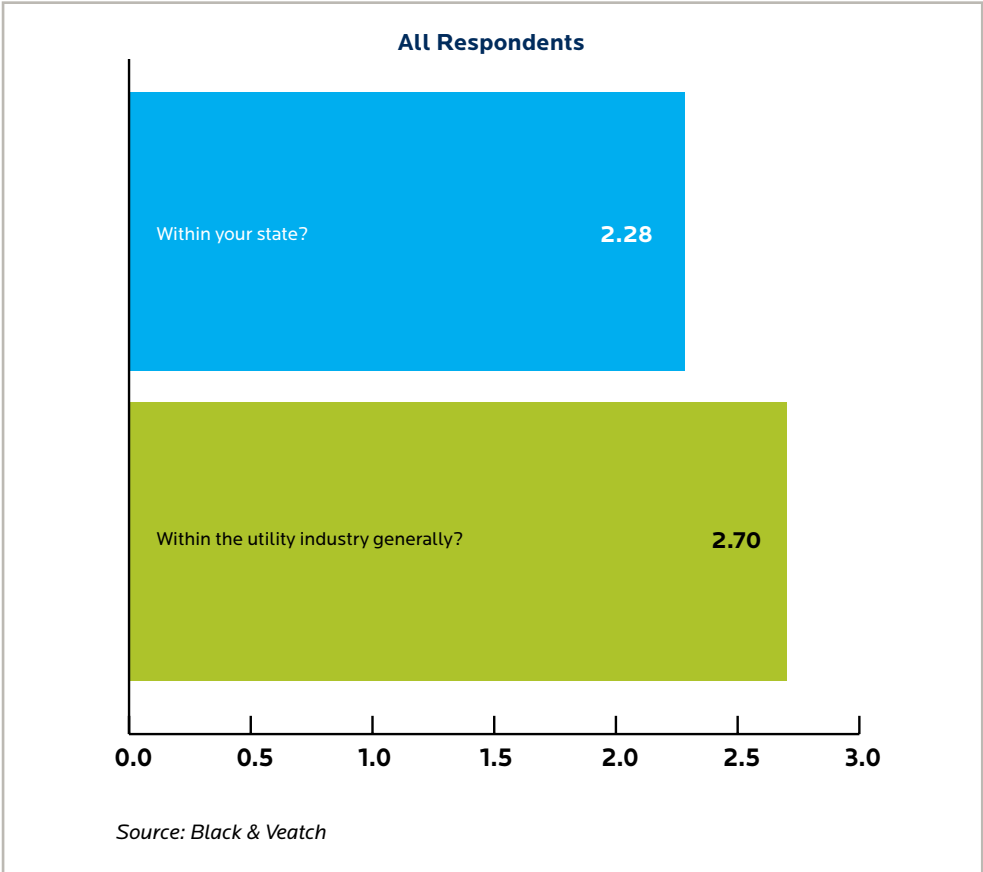
Since it became common lexicon, the term Smart Grid has been used to promise a grid that will be more reliable, lower cost, more green, more open and informative, better integrated and more efficient, among a long list of similar adjectives. The practical result of these varied perspectives is that seemingly all stakeholder groups, such as utilities and their customers, regulators (at both the federal and state levels), consumer advocates, special interest groups, etc., all have different views and agendas on what the Smart Grid should accomplish.

These divergent perspectives make the commitment to achieving Smart Grid opportunities more difficult to define, quantify and justify. Without common alignment of program objectives, approval from regulators, utility boards and consumer advocates becomes difficult. Beyond the difficulties associated with program approval, the greater concern may be for the ability of the industry to reach the future state Smart Grid promises.

Therefore, as utilities progress with plans, requests and projects along the continuum of Smart Grid initiatives, it is critical to have well-defined corporate strategies on how the Smart Grid will impact all stakeholders. Business opportunities can then be evaluated and prioritized based on their ability to accomplish these goals. These strategies must be grounded in effective business case justifications that can withstand regulatory and stakeholder scrutiny.

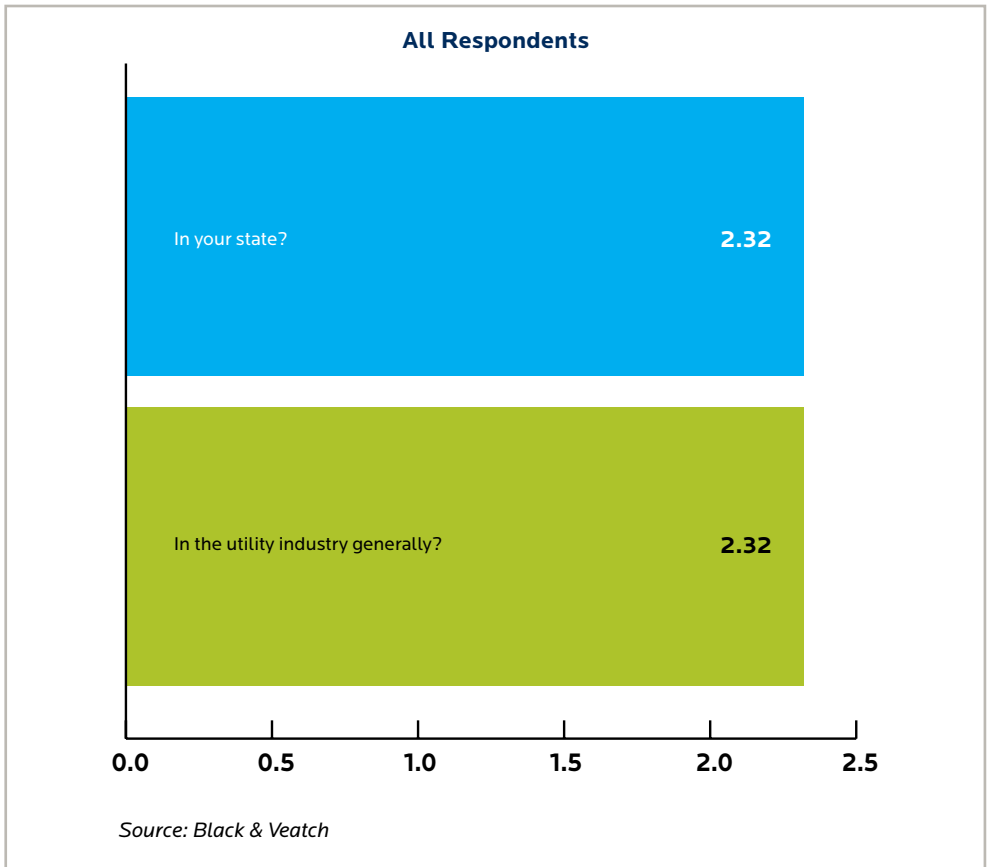
With a sound business case and justification in hand, utilities then need to engage customers and explain the benefits of specific Smart Grid programs. Failure to take control of the conversation and messaging could result in others defining the program and managing the Smart Grid hype – both positively and negatively.

**Question 1: How well do you believe the Smart Grid is defined and understood? Please rate on a scale of 1 to 5 (where 1 indicates “undefined” and 5 indicates “well defined”).**



The answers to this question indicate that there is low confidence in how well understood the term Smart Grid is believed to be, with almost half stating that the term is “undefined” or “somewhat undefined” across the industry. Interestingly, respondents indicated that within their own states, the term is generally much less understood, with nearly two-thirds in the “undefined” and “somewhat undefined” categories, surpassing the average even further and indicating a general belief (or perhaps hope) that the industry understands Smart Grid better than their personal experiences would suggest.

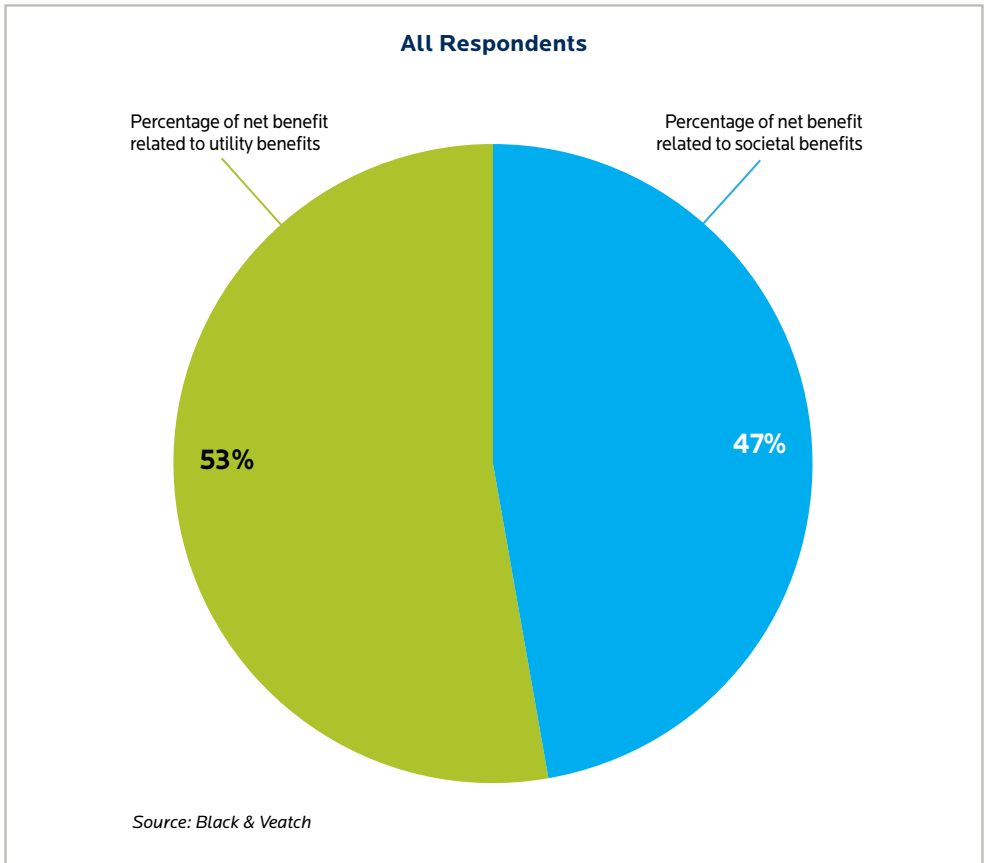
**Question 2: How well do you think utilities have made their business cases for Smart Grid? Please rate on a scale of 1 to 5 (where 1 indicates “not well made” and 5 indicates “very well made”).**



Viewing the data table behind this chart, approximately 58 percent of respondents indicated a negative impression of how well utilities have made their business cases for Smart Grid initiatives, with this negative perspective very similar for the respondent’s own state or the general industry.

While 17 percent of the respondents indicated that the utilities in their own state “have made” or “very well made” their business case justification, they were less certain about the industry in general, with only 12 percent favorable perceptions. This would indicate that a small percentage of respondents believe they are doing a good job compared to others. As the low intensity score for both indicates, few are comfortable with the current business case.

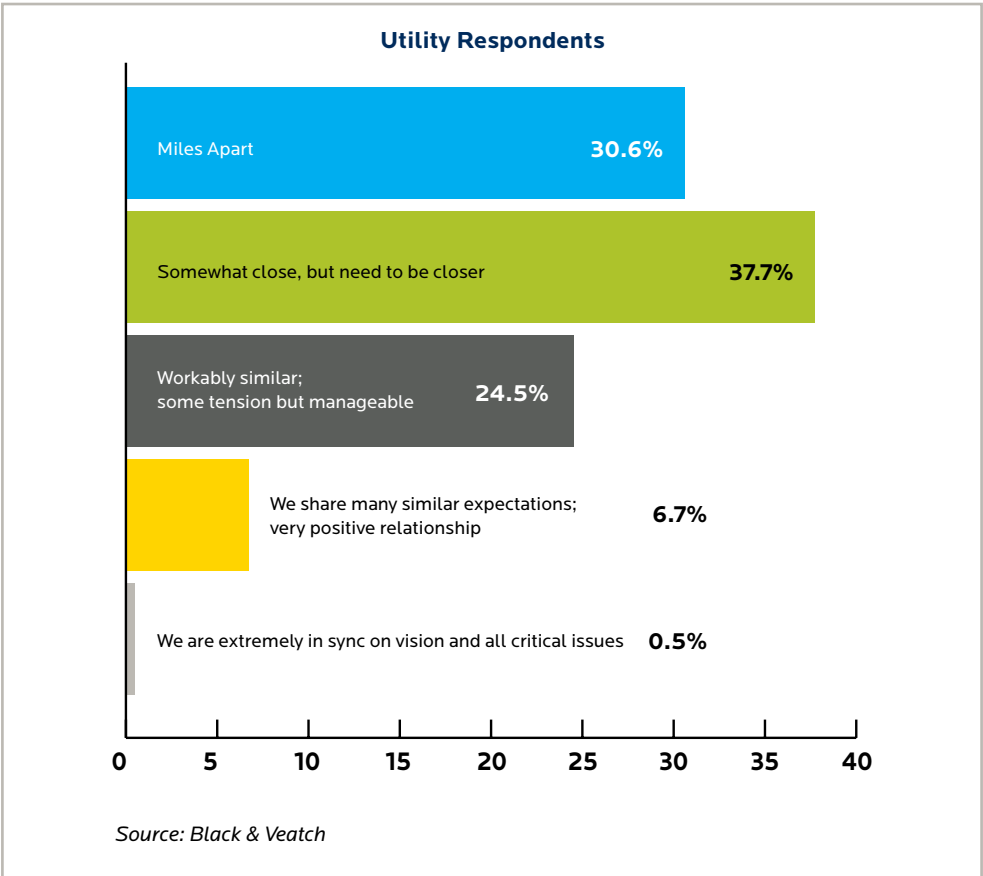
**Question 3: Roughly what proportion of the net benefits of your Smart Grid plans are related to utility benefits (i.e., utility cost savings and new revenues) vs. related to societal benefits (i.e., benefits that accrue to the public that are not reflected – nor are likely to be reflected – in utility books of account, such as customer savings and convenience, reduced emissions and other local economy benefits?)**



Respondents appear to believe that Smart Grid benefits are relatively evenly split between utility and societal benefits – with approximately 53 percent accruing to the utility and 47 percent to society. This would appear to represent the general belief by the utility industry that the Smart Grid has significant and quantifiable benefits to society beyond those benefits that accrue to utility ratepayers through improved utility efficiency.

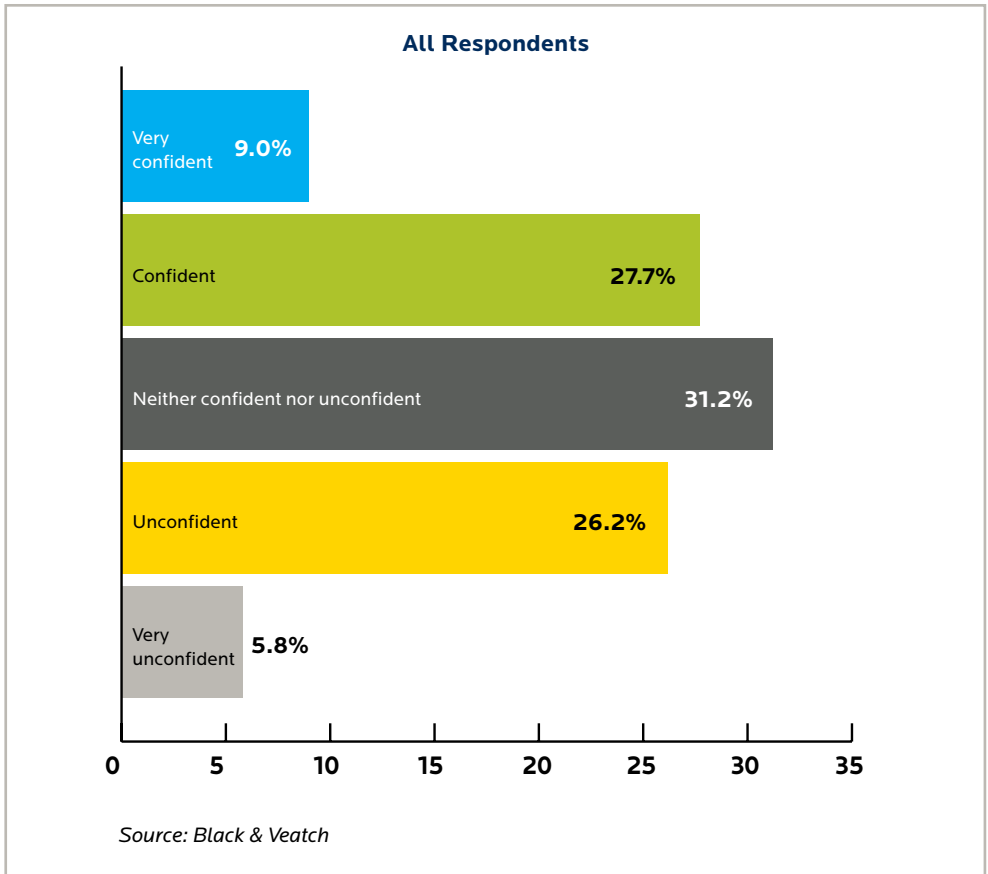


**Question 4: Regarding your confidence that your regulator and the utilities within the state hold the same vision and expectations for Smart Grid, how far apart or in synchronization do you believe the vision and expectations are of your regulators vs. utilities within your state?**



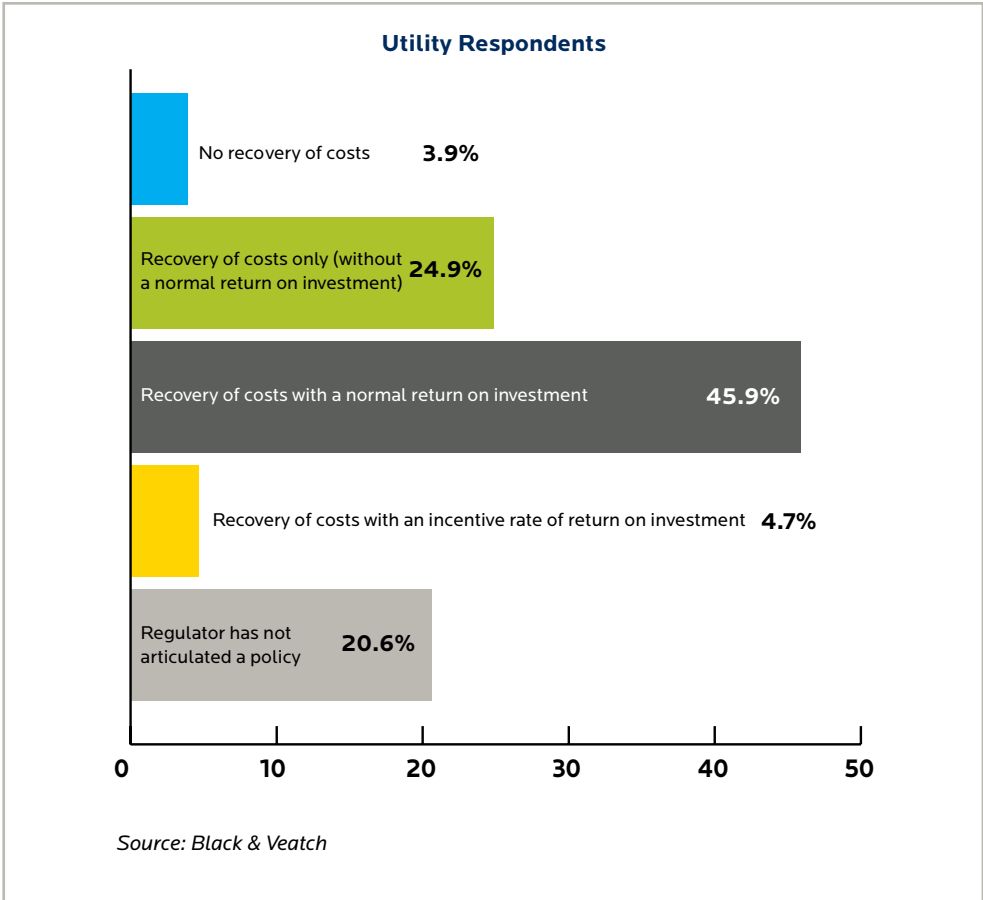
Respondents believe there are significant differences in how regulators view Smart Grid and utilities' expectations for the Smart Grid. Just more than 7 percent of respondents believe their regulators share expectations or are in sync. In addition, only 25 percent stated that while differences exist in expectations, they are workable. The implication is that approximately two-thirds of utilities and their regulators are not in sync regarding the critical issues and expectations for Smart Grid programs.

**Question 5: 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?**



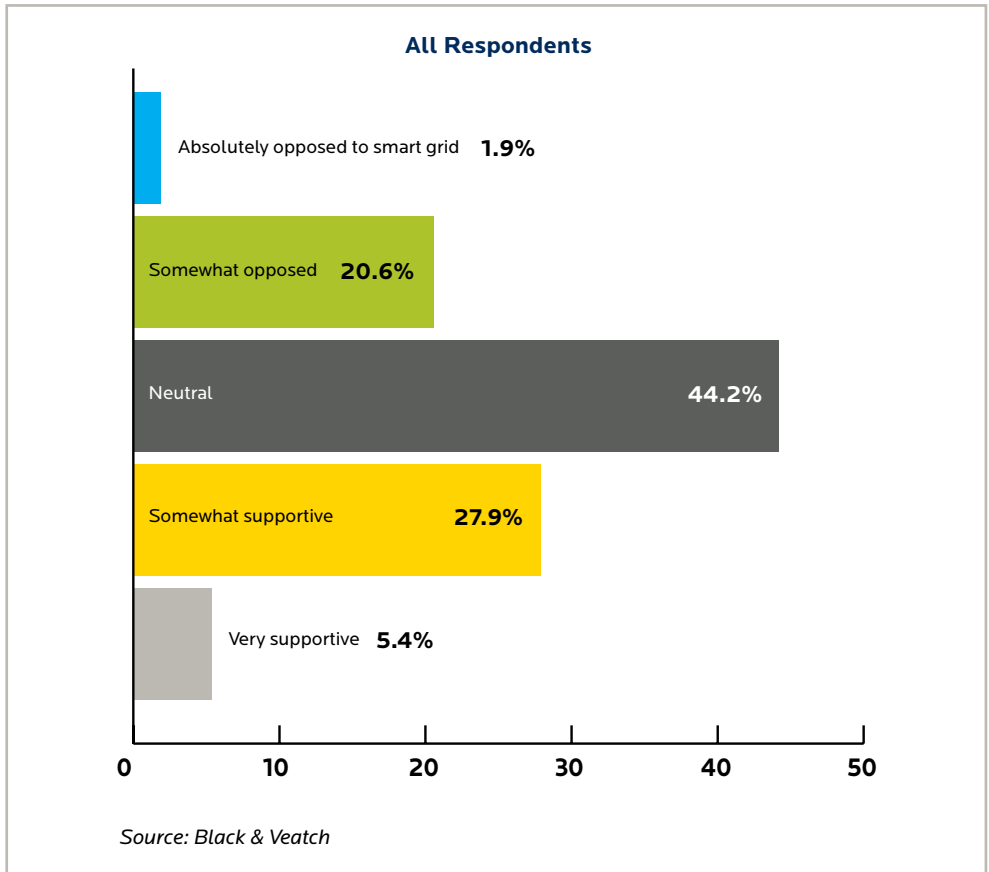
The responses to this question follow remarkably close to a standard distribution, with only slightly more respondents expressing confidence than those without confidence that they will obtain cost recovery. Given the previous answers regarding a lack of common definition of Smart Grid, differences in expectations and poor opinion of business case efforts, the answer to this question would appear overly confident. On the other hand, responses could also be symptomatic of expectations based on traditional utility cost recovery experience and the expectation that Smart Grid projects will not be treated any differently.

**Question 6: With regard to Smart Grid cost recovery (capital costs and expenses), which of the following most closely resembles the policy of your regulators?**



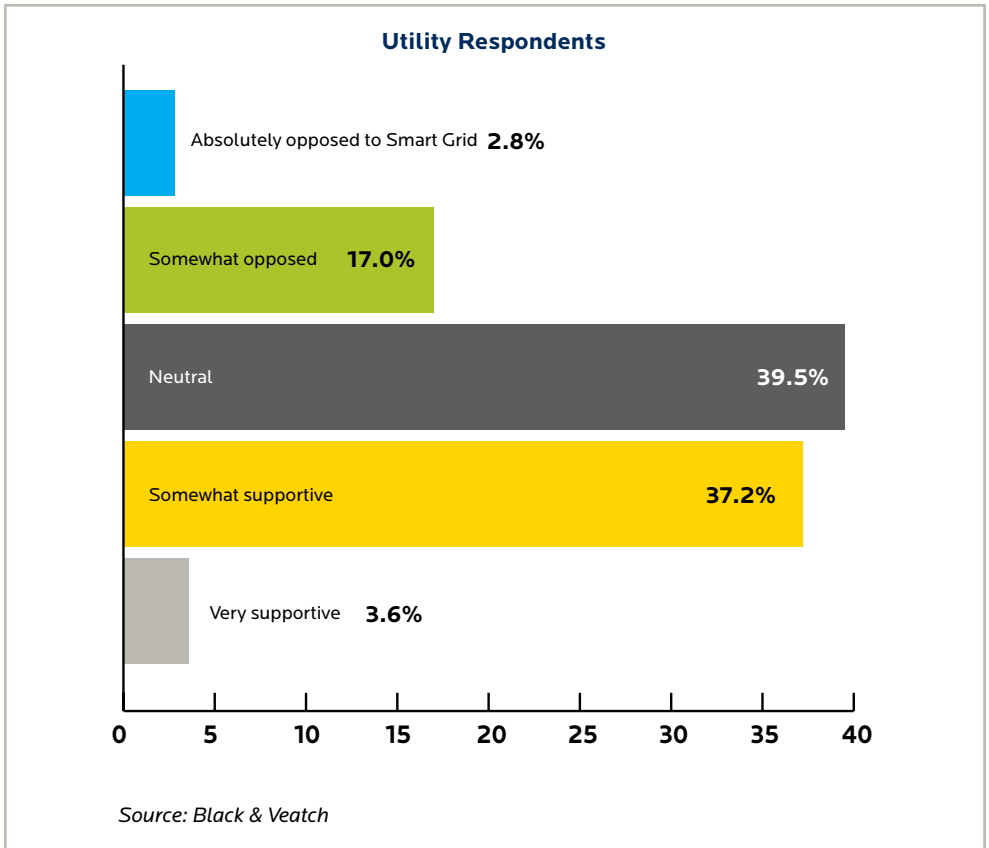
Approximately two-thirds of respondents expect cost recovery with or without a normal return on investment. However, nearly 20 percent indicate a high degree of uncertainty due to no articulated regulatory position. A small percentage indicates that their regulators do not support Smart Grid investment. If cost recovery is not granted, it is understood that the utility will likely not pursue the investment.

**Question 7: Generally speaking, what is the position of consumer counsel in your state relative to Smart Grid implementation?**



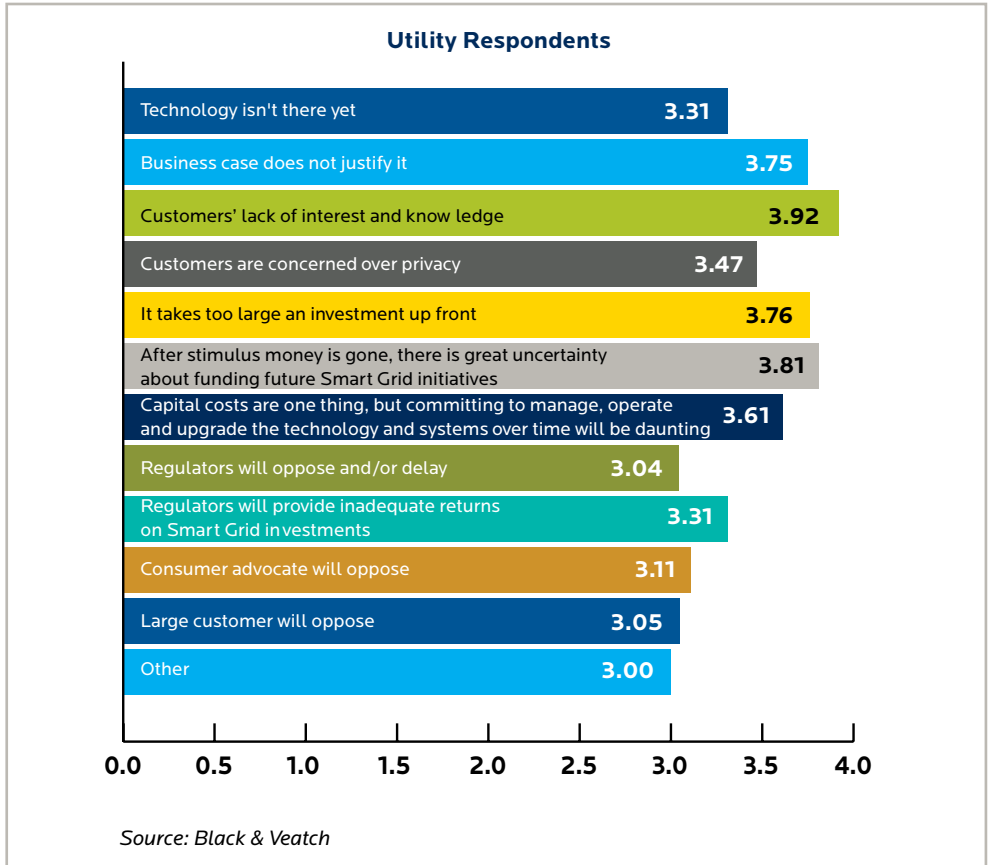
The responses to this question also closely resemble a normal distribution, with a slightly higher percentage expressing consumer counsel support for Smart Grid in their state, and a very small percentage actually are opposed to it. These responses align with those for Question 5 (see page 65), indicating that if consumer counsel supports Smart Grid investments, utilities anticipate obtaining cost recovery.

**Question 8: Generally speaking, what is the position of large commercial and industrial customers in your state relative to Smart Grid implementation?**



Respondents appear to believe that large commercial and industrial customers are likely to be slightly more supportive of Smart Grid investments than consumer counsels. However, among these customers there is still a nearly 20 percent negative perception.

**Question 9: On a scale of 1 to 5 (where 1 indicates “very low impediment” and 5 indicates “very large impediment”), to what degree are the following issues impediments to the implementation of the Smart Grid?**



Respondents believe the largest impediment to Smart Grid implementation is “customers’ lack of interest and knowledge,” reflecting the significant impact external stakeholders have on a utility’s ability to implement Smart Grid initiatives. The next greatest impediments are generally related to costs, a lack of business case justification and, interestingly, an apparent belief that financial support may be difficult to obtain after American Recovery and Reinvestment Act stimulus funds are expended.

## Wrap-Up

The Smart Grid landscape across North America is a patchwork of diverse, technology-based initiatives – all having, somewhere in their core, a common goal of improving the current state of the grid. In most cases, the focus is on the electric grid, although gas and water utilities are increasingly embracing the term Smart Grid to cover technology innovation on the production and delivery systems for those commodities. The common use of the term “Smart Grid” belies the fact that the term does not have a universal, well-accepted definition.

Not surprising, answers to the Black & Veatch survey question, “*How well do you believe the Smart Grid is defined and understood?*” reflect a relatively low confidence in how universally the term “Smart Grid” is applied. Approximately 45 percent of respondents stated the term is completely or somewhat undefined across the industry. Interestingly, respondents also indicated that, within their own states, the term is even less understood, with almost 64 percent in the “undefined” or “somewhat undefined” categories. This seems to indicate that, while people realize the high-level of confusion over the term in their own daily activities and experiences, they believe that the industry at large is less confused. Could this be due to industry marketing messages that suggest there is more definition than experience indicates?

A natural progression would be to ask how the industry can create a common definition of the term Smart Grid. Upon reflection, this task could be daunting, so a more manageable inquiry for an individual utility would be, “How can we create a common, working definition of the term within our stakeholder community that can be used to ensure a basis of understanding for discussions?”

This exercise could likely result in a dissection of the broader Smart Grid term into manageable segments that could account for different stakeholder perspectives. While this represents a valuable exercise with the potential to reduce contention and develop a more unified focus, this is an avenue that many utilities do not seem to be pursuing in earnest. In addition to having a common basis for a discussion on Smart Grid, it is essential to turn this understanding into a focused and unique vision that defines how a particular utility sees the Smart Grid supporting core corporate goals or its mission.

This high-level vision must then be turned into strategy, or perhaps a series of interlinked strategy components, that takes the range of the possible and turns it into specific and definable business opportunities that are deemed worth pursuing. As Smart Grid initiatives revolve around innovative technologies, revamped business processes and new delivery methodologies, it is necessary to evaluate the business opportunities in a rigorous and well-documented manner that withstands the scrutiny of internal management, regulators and interested stakeholders.

Utilities have traditionally performed project financial evaluations, but the challenge with many Smart Grid initiatives is that the business cases are reviewed by the regulators and other stakeholders with a level of critical analysis not seen in most other utility projects. Additionally, internal competition for capital and organizational focus results in increasingly critical attention in the management review cycle.

These high-visibility business cases remain a focal point of discord. According to the survey results, approximately 58 percent of respondents indicate a negative impression of how

well utilities have made their business cases for Smart Grid initiatives, with this negative perspective very similar for the respondent's own state or the general industry. If this assessment is valid, then utilities have a major uphill effort to define, educate and sell stakeholders on the value of Smart Grid investments.

Creating well-formed and informative business cases is a time-consuming and intensive process. The utility must perform a current situational analysis, understand the possible vendor and solution landscape and envision a future state. All of this occurs prior to making specific project choices or creating detailed business requirements.

Many assumptions are made in support of the work required to implement the project and about the future state itself. These assumptions can be the focal point of contention, as they often have significant impact on the project financials – to the extent that small variations can mean the difference between positive and negative business case outcomes. Examples abound where utilities have made project approval decisions based on high-level financial evaluation, only to be told by their regulators to go back and perform a more rigorous assessment. This immediately adds an element of strife to the discussion. To avoid this, it is recommended that utility managers perform consistent and rigorous business case methodologies on all potential Smart Grid investments.

One of the most difficult aspects of many Smart Grid business case efforts is identifying and quantifying societal benefits of the proposed solution. Societal benefits include customer savings due to fewer outages; improved power quality; reduced energy costs passed along to consumers; improved customer services; and the leverage of information for end-customer energy management purposes. While all of these benefits are real, there is wide variability in how they are valued or even if they are quantitatively valued in the utility business case.

Respondents appear to believe that Smart Grid benefits are relatively evenly split between utility and societal benefits – with approximately 53 percent accruing to the utility and 47 percent to society. This would appear to represent the general belief by the utility industry that Smart Grid has significant and quantifiable benefits to society beyond those benefits that accrue to utility ratepayers through improved utility efficiency. But if this is true and well understood by all stakeholders, wouldn't there be more widespread support for Smart Grid initiatives?

Once a potential Smart Grid opportunity is defined, evaluated and approved, it then moves to the implementation stage. An important element in project execution is ensuring business benefits identified in the business case, and on which project approvals were granted, are obtained. This benefits realization effort is vital in proving to regulators and skeptical stakeholders that there is real value in Smart Grid initiatives and the utility can deliver this value.

Benefits realization represents an area where many utilities do not have much discipline, because traditionally, project management in the utility was more concerned about project completion than ensuring that the business impacts were managed and supported. Change management and business process redesign are critical to taking advantage of the transformational nature of many Smart Grid solutions, and a well-articulated methodology to obtain, track and review project key performance and delivery metrics must be developed.



A key stakeholder for utilities is the regulatory community. Although this includes federal, state and local regulatory bodies, state utility commissions have the most impact from the standpoint of project approval. Depending on a regulator's position on Smart Grid projects, this category may be treated to special review and approval criteria. Going back to the initial concept of not having a common framework for the definition of the term "Smart Grid," survey respondents believe that significant differences exist between how the regulators view the Smart Grid and what utilities expect from it.

Approximately two-thirds of respondents believe their utilities and regulators are not in sync regarding critical issues of Smart Grid expectations. As mentioned above, the need for a common understanding of potential Smart Grid investments – and realistic expectations of the improvements that these investments drive – is essential.

Slightly more respondents than not express confidence that they will obtain cost recovery for Smart Grid investments. Given the previous discussion concerning the absence of a shared Smart Grid definition, differences in expectations by regulators and poor opinions of business case efforts, the answer to this question appears overly confident. On the other hand, response may be symptomatic of expectations based on traditional utility cost recovery experiences. It may also reflect anticipation that Smart Grid projects will not be treated differently.

In addition to the regulatory community impact, respondents indicate the relevant consumer counsel, and large commercial and industrial customers also provide varying degrees of support for Smart Grid investments. Again, this is understandable regardless of how well the value of Smart Grid is understood; different perspectives of needs would produce a degree of variation of support.

In examining the obstacles to Smart Grid implementation, respondents believe that the largest impediment is due to "customers' lack of interest and knowledge." This reflects the significant impact external stakeholders have on a utility's ability to implement Smart Grid initiatives or to reap the entire potential benefit of the investments. It would appear that concentrated and effective communication is the only way to attack this impediment. While utilities regularly communicate to rate payers, they infrequently communicate with this audience as their customers – a profound difference in attitude and actions. Looking across the industry, there remains much room for improvement in customer engagement strategies and actions. The timing of these communications is vital, since waiting too long to begin the communications and education processes can result in potentially significant pitfalls.

Second to customer communication, cost represents the largest impediment to Smart Grid implementation. This includes a lack of business case justification, initial capital costs that are too large and, interestingly, an apparent belief that, after the ARRA funds are expended, financial support may be difficult to obtain. The business justification and large capital costs tie directly to the quality and robustness of the business case work described here.

If the financial and business analysis is rigorous and positive, then the utility should have the tools and information needed to work through these first two impediments. The belief that termination of the flow of ARRA funding will make financing more difficult is an interesting one, and given the number of utilities that are implementing Smart Grid projects without ARRA funding, this concern appears to be misplaced. Although funding

for specific recipient projects will end, the industry will continue its momentum – having gained valuable traction through the effective use of the grant monies – and will be better positioned to deliver cost-effective solutions to non-recipient utilities. It is also important to remember that the vast majority of ARRA Smart Grid funding was focused on Advanced Metering Infrastructure (AMI) projects, whereas Smart Grid opportunities are much more expansive than just this segment.

As utilities develop Smart Grid visions, strategies, tactical plans and resultant project justifications along the continuum of Smart Grid initiatives, it is critical to have well-defined corporate strategies on how the Smart Grid will impact all stakeholders. Business opportunities can then be evaluated and prioritized based on their ability to accomplish these goals.

Smart Grid strategies must be grounded in effective business case justifications that can withstand regulatory and stakeholder scrutiny. With this type of sound, prudent program justification, utilities need to engage their customers to explain the benefits of the Smart Grid – both to the utility and society. Otherwise, the program will be defined by others who will manage the Smart Grid hype – both positively and negatively.

# GLOBAL COMPETITIVENESS

By John Achenbach

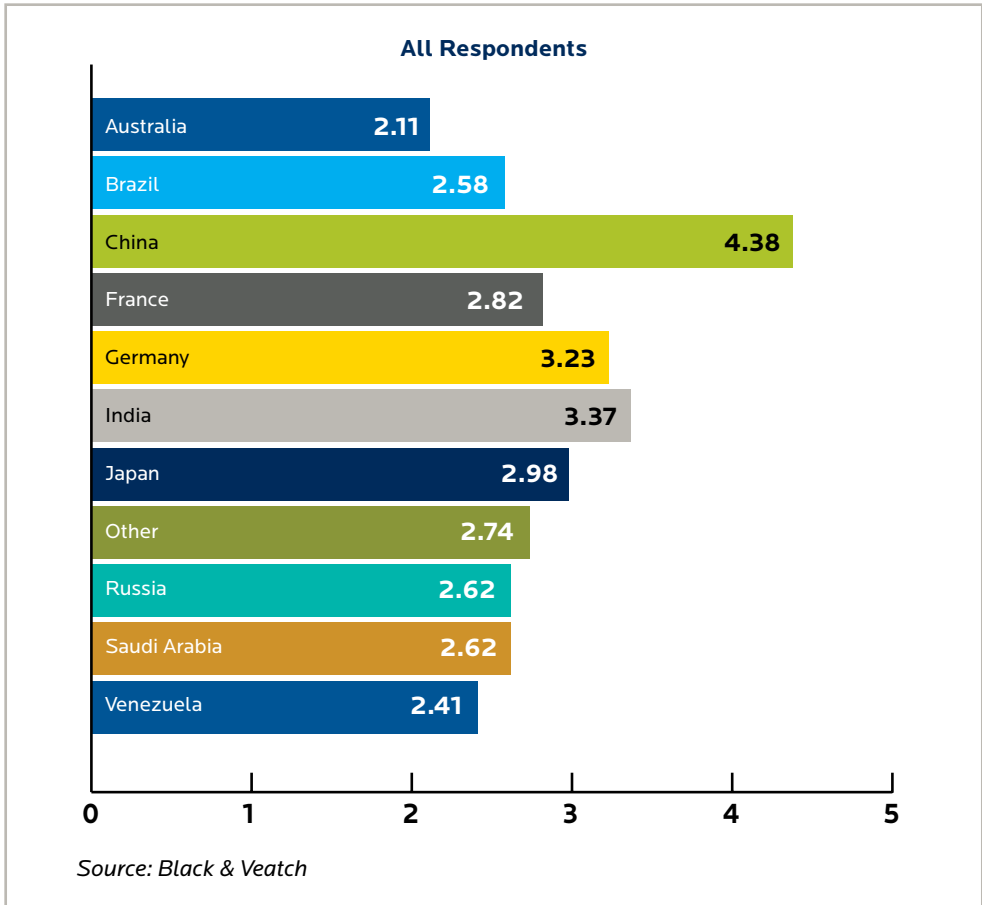
As is the case with most industries, the U.S. power industry is facing increasing competition from overseas manufacturers, developers and even lenders in the renewable sector. However, this is not a new trend. The U.S. federal government's direct subsidies and favorable tax incentives, along with numerous state-level RPSs, have attracted offshore interest for the past decade.

This is particularly true in the wind sector. While wind project development is down nearly 50 percent from 2009 to 2010, a similar trend has emerged in the solar photovoltaic PV space, which more than doubled in the same time frame. This is a result of the reconsideration of favorable renewable solar energy tariffs in Europe. European solar PV equipment suppliers ramped up production to support an expected rise in demand for panels and ended up with excess capacity.

The significant increase in demand for solar energy in both the United States and Canada represents a near-term solution to this excess capacity problem. In addition, it has been favorable to North American developers because the resulting competition to supply panels has placed a significant downward pressure on price. The demand for solar energy in North America has also attracted the interest of Asian suppliers. While they are lagging behind their European counterparts in the marketplace, they are actively pursuing opportunities.

This year, Black & Veatch asked utilities – for the first time – about global competition, views on the U.S. power industry's capability to compete with offshore suppliers and decisions related to purchasing equipment or technology from offshore suppliers.

**Question 1: While each country represents a different competitive threat to the United States depending upon the technologies or services that are competing, how would you rate each of the following countries as an overall competitive threat to the U.S. energy industry?**

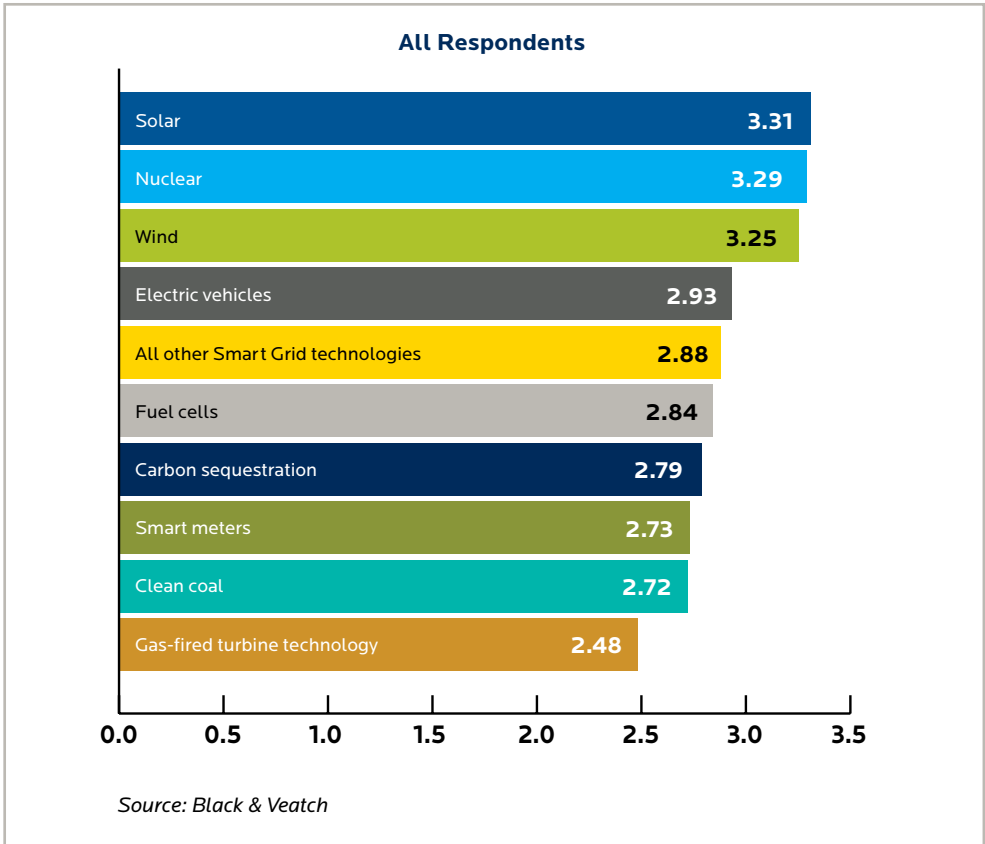


Not surprisingly, China was ranked as the “greatest threat” by approximately 56 percent of respondents. The next nearest ranking in the category was India, but by a much lower percentage of respondents – just under 11 percent.

Chinese equipment suppliers have been competing for offshore supply contracts for a number of years and are increasingly competing for opportunities to provide major power equipment, and in some cases full Engineering, Procurement and Construction services, outside China. This includes both wind and solar PV sectors, where through acquisition of several European manufacturers, and in some cases Chinese domestic supply capability, they are now competing in the U.S. market.

China’s progress is slow at the moment since Chinese suppliers are experiencing the logistical issues of establishing sales, service and inventory storage in North America. It is expected that these will be resolved through a combination of acquisition and partnerships with established players in this market.

**Question 2: For each of the following technologies, please rate your perception of the United States’ competitiveness to global competitors on a scale of 1 to 5 (where 1 indicates “U.S. continued to lead” and 5 indicates “U.S. at risk”).**

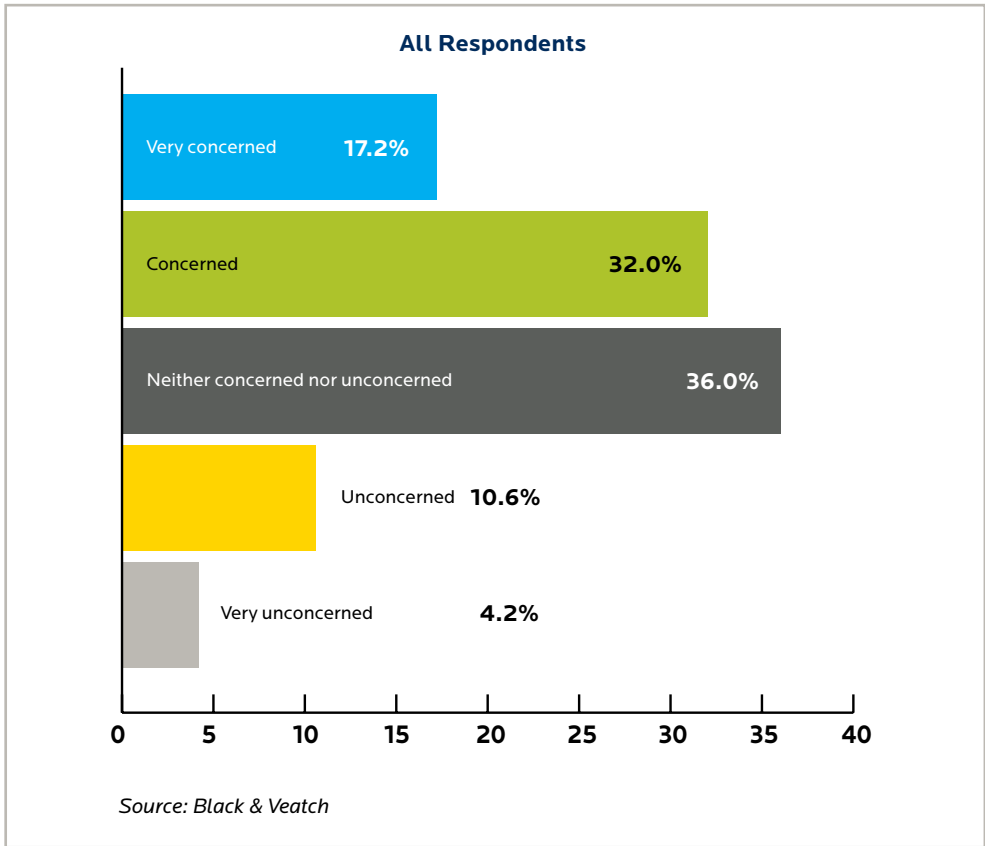


Responses to this question suggest U.S. solar, nuclear and wind industries are at some risk of losing their competitive positions. Two of the three – wind and nuclear – already are dominated by offshore entities.

In the wind sector, General Electric is the only firm with U.S. ownership that is ranked in the top ten, based on installed capacity. For nuclear, while some of the reactor technology providers may have familiar names, once again with the exception of General Electric, they are owned by Japanese or French companies. Additionally, General Electric’s nuclear entity is now a joint venture with the Japanese firm Hitachi.

With solar PV, the involved parties include numerous entities from North America, Europe and Asia, with no single dominant player having yet emerged. There is some barrier to entry as new entities, particularly from Asia, do not have a long track record and therefore are at some disadvantage with respect to being considered “bankable” by investors and lenders. This may help mature U.S. solar PV companies maintain their market share for at least the near future.

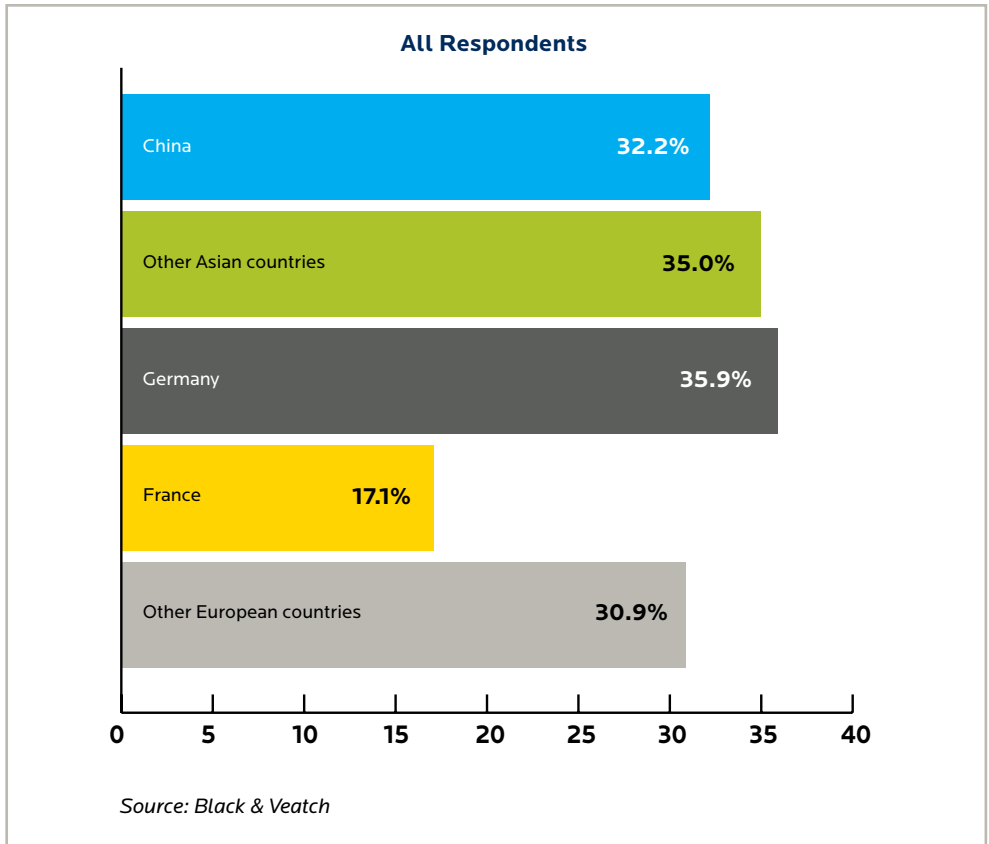
**Question 3: How concerned are you about the increasing concentration of renewable technology manufacturing overseas?**



The majority of respondents (a total of 50.8 percent) answered this question as “Neither concerned nor unconcerned,” “Unconcerned” or “Very Unconcerned,” suggesting this is not an important issue to the industry. The reasons may include that for major equipment, there are sufficient industry standards to provide a level of confidence, providing that the procurement specification includes the proper references.

As mentioned in previous question responses, there also is a natural barrier to entry for offshore manufacturers with respect to the need for providing services and parts to clients. One last point on this issue is that in the solar PV industry, many suppliers of panels have engaged experts for “bankability reports.” This independent review of key aspects of manufacturing, testing, etc., is helping provide additional confidence to potential buyers of panels, particularly from Asian suppliers.

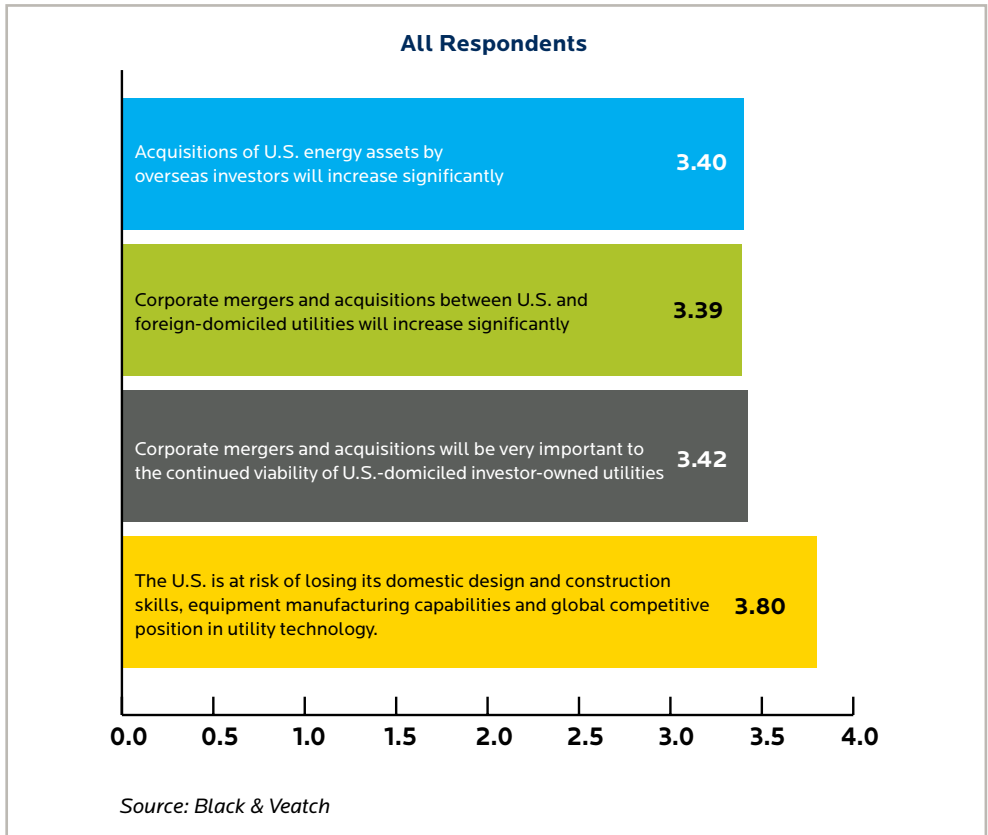
**Question 4: Have you purchased – or do you plan to purchase – a significant amount of manufactured energy equipment/technology from China, other Asian countries, Germany, France or other European countries?**



The responses to this question are consistent with the previous question regarding concern about overseas manufacturing, or at least a recognition that purchases from overseas suppliers are becoming inevitable. A majority of responders indicated they would procure equipment from each of the countries or regions listed.

When considered for renewables, this makes complete sense. As stated earlier, many of these technologies have limited options for purchasing from U.S.-based sources. In addition, overseas manufacturers of renewable technologies are increasingly considering at least partial U.S. manufacturing to meet “Buy American” sourcing requirements associated with the U.S. Department of Energy, as well as with similar local content requirements of several Canadian provinces. The result is that the line between local and offshore sourcing is getting a bit blurry.

**Question 5: Please rate how strongly you agree or disagree with each of the following statements in reference to the five years on a scale of 1 to 5 (where 1 indicates “very strongly disagree” and 5 indicates “very strongly agree”).**



Approximately 75 percent of all survey participants responded to this question and their responses are consistent with other questions regarding global competition. Requirements for local content and the attractive marketplace throughout much of the United States for renewable projects are encouraging ongoing M&A within the sector. Respondents anticipate this type of activity will continue.

There is one notable exception to the trends suggested in the responses. Since the time that the responses were received, the full extent of the tragedy in Japan with the earthquake, tsunami and subsequent damage to the Fukushima Daiichi nuclear power plant has become better understood. This is likely to have a significant and negative impact on the appetite for M&A activities from Japanese entities in the power sector.

The tremendous cost to rebuild in Japan will likely consume their attention for several years. For example, Tokyo Electric Power Company (TEPCO) had taken a 10 percent interest in Nuclear Innovations North America (NINA) and the new reactors at South Texas. Recently, NINA announced that TEPCO was no longer participating in this project. There likely will be further impacts on offshore investments for participants in the Japanese power industry as the full impact of the tragic earthquake and subsequent tsunami is digested.



## Wrap-Up

The results of the survey reflect the inevitable understanding that, for a myriad of reasons, the United States is becoming less of a manufacturing economy and more of a service economy. While there are some trends suggesting otherwise, such as quickly rising labor costs in parts of Asia, one should expect to see a continued trend toward offshore supply of power industry equipment.

Given the challenges of meeting local codes and specifications – and the need for local content to qualify for government financial support and/or tariffs – there is a strong incentive for foreign companies to expand into the U.S. marketplace through M&A or a local facility for partial manufacturing or finishing. These changes are also resulting in net reductions in material costs for renewable components, particularly for wind and solar. While some of the downward price trend is a result of the global recession and a lack of demand, it would be reasonable to expect these technologies to continue their downward pressure on price as the economy recovers. The net result is that these renewable technologies are slowly approaching costs that will compete with conventional resources.

There is another reason for the global attraction to the U.S. renewable power industry. Other continents have invested heavily in these technologies ahead of the United States, particularly Europe. The result is that the expertise on design, construction and operation of these technologies resides offshore. One example is offshore wind. While the U.S. power industry is just now approaching construction on its first projects, a significant number of plants already have been built throughout Europe, where there is less land available for large-scale wind plant development.

The unique design, construction and operational challenges of turbines located in water suggest that experienced, European-based equipment suppliers and design and construction companies will be involved in at least the initial offshore wind projects in the United States – and utilities and investors will welcome participation by such firms. A similar trend was observed during the last few years with solar PV project development. The base of participants included those firms that had successfully developed and/or built solar PV projects in Spain and Germany.

All players in the U.S. renewable power industry value experience and, for this reason, welcome global participation. However, several checks and balances have been established until these technologies mature. As mentioned above, “bankability reports” are very much a part of the current solar PV industry, and Black & Veatch is an active player in preparing these reports. Other aspects of these projects, such as resource assessments, have become much more closely scrutinized by project participants, especially to account for the impact of international equipment suppliers. The focus on available resources is based on lessons learned with forecasts for U.S. wind farms, leading to a much closer study of resource predictions for both solar PV and new wind projects.

# THE ROLE OF NATURAL GAS IN NORTH AMERICAN ELECTRICITY GENERATION

By Scott Smith

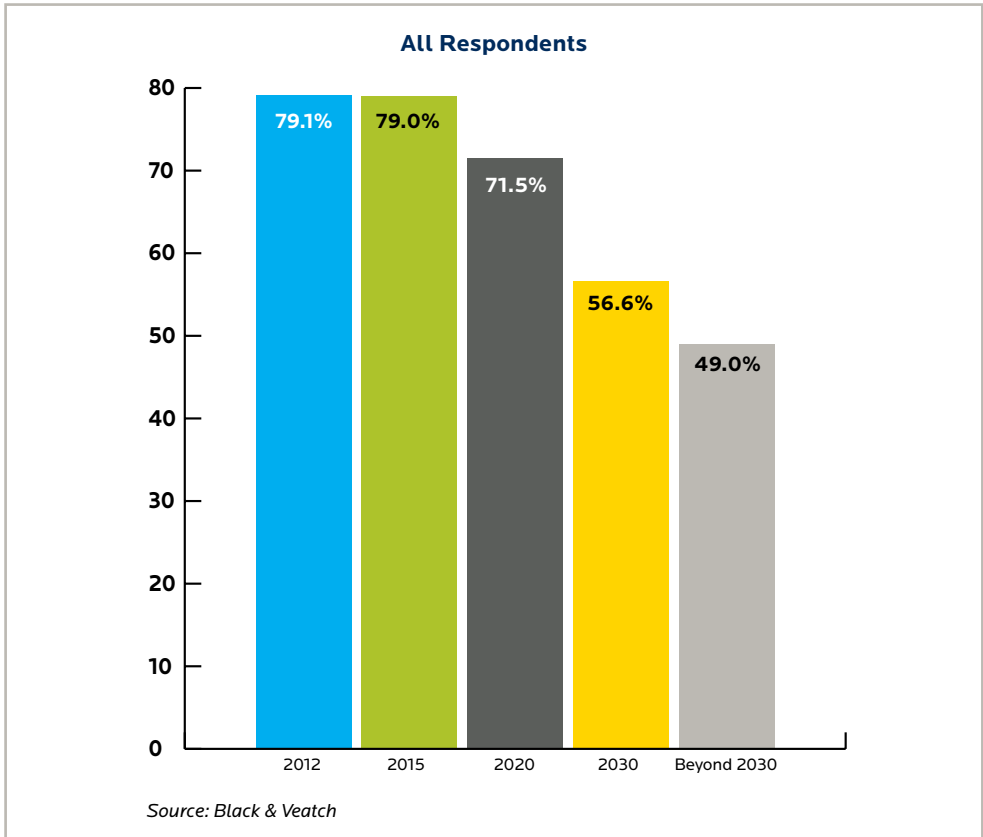
The technological advances in extracting natural gas from shale rock during the last decade have made a hitherto expensive – but abundant – resource economically available to the North American market. Technological advances to date have increased the amount of recoverable shale resources, while natural gas production continues to expand. However, hydraulic fracturing (fracking) and water disposal issues currently are creating roadblocks to fully understanding the ultimate size of this natural gas resource base.

With the growing amount of natural gas supply expected to come from shale resources, natural gas demand for power generation is expected to continue to rise during the next decade. Natural gas is increasingly being used to generate electricity because it typically expels approximately 40 percent less carbon dioxide emissions when compared with other fossil fuels. It also is readily available and is currently price competitive.

The U.S. EPA's proposed air quality regulations, such as the Clean Air Transport Rule and Utility MACT, will require substantial near-term investments in emissions-control equipment on coal plants, and will likely accelerate retirements of a significant amount of coal-fired units in the continental United States. However, the rules are more relaxed than originally anticipated, yielding some re-thinking on existing coal assets.

As a result of these key market drivers and factors, Black & Veatch expects total North American natural gas demand for power generation to grow from approximately 21 billion cubic feet per day (Bcf/d) in 2010, to 24 Bcf/d by 2015, and to reach 28 Bcf/d by 2020.

**Question 1: Will shale gas continue to be available at a reasonable cost and play a significant role as a generation fuel for the periods through 2012, 2015, 2020, 2030 & beyond 2030?**

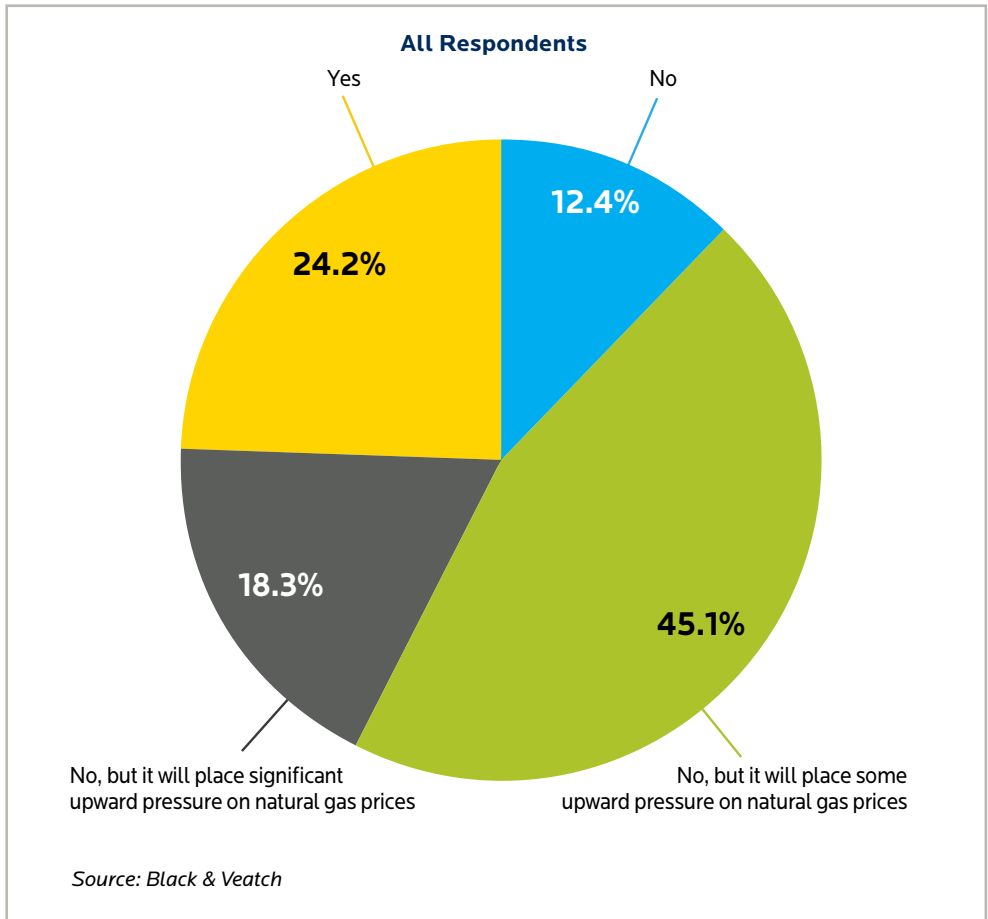


The majority of survey respondents indicate that shale gas will be available at a reasonable cost and will play a significant role as a generation fuel through 2030.

A significant part of the cost for shale natural gas is driven by finding and development (F&D) costs. F&D describes the costs associated with acquiring and producing hydrocarbons. Interestingly, industry-reported F&D costs for shale resources show substantial variation and, in general, lack transparency. Black & Veatch has studied company-specific and basin-specific research on F&D costs in emerging shale basins and found that F&D costs for shale plays were varied according to time period, location and reporting producers.

When normalized, the range of average F&D costs across the different shale plays and producers has ranged in recent years from \$2.12/Mcf to \$3.11/Mcf. The “economics” of production of natural gas are further enhanced through the simultaneous production of natural gas liquids and/or crude oil in certain shale reservoirs. Much of the recently observed shale resource drilling activity in North America (for example the Eagle Ford play in south-central Texas) has been focused on shale resources with significant liquids and crude oil production.

**Question 2: Do you believe the “fracking” issue will significantly impede the development of shale gas reserves?**



The majority of survey respondents (63.4 percent) believe fracking issues will place some upward pressure or significant upward pressure on natural gas prices. Black & Veatch’s analysis of implications from water use – including the treatment of water once it is produced with shale gas – and fracking related to costs for producing shale resources are both material and uncertain.

Future costs will depend significantly on costs of wastewater disposal or treatment relative to the productivity of an average shale-gas well in a given play. Using information on water requirements associated with the relatively mature Barnett Shale play, supplemented by cost information available on newer shale plays, the incremental cost of water-related procurement and disposal can increase F&D costs by roughly 10 percent to 50 percent. The ultimate impact will be moderate increases in natural gas prices in order to economically recover these increased costs.

## Wrap-Up

Black & Veatch has analyzed the natural gas supply potential from shale resources and found that total natural gas production from shale plays can grow to approximately 16 Bcf/d to 17.0 Bcf/d in 2015 and from approximately 16 Bcf/d to 29 Bcf/d in 2020 depending on the realized outcomes of the listed uncertainties, such as resource availability, F&D costs and natural gas demand. Accordingly, shale gas volumes under all circumstances are expected to substantially grow from current production levels of approximately 11 Bcf/d and become a substantial resource to the North American market which, in turn, will increase the role that natural gas plays as a fuel source in power generation.

# HAVE WE ASKED THE RIGHT QUESTIONS?

By Rodger E. Smith

The questions posed and answers provided within this report, and indeed within the industry itself, provide interesting insights on how insiders view the issues that confront our organizations. But as an industry, and as a nation, are we asking the right questions?

As President Obama said in his State of the Union address: "The future is ours to win, but to get there we can't just sit still." This is good advice, but day-to-day, the lack of a comprehensive and coherent energy policy has encouraged the industry to remain fragmented and stagnant. Having no policy actually *is* policy. As leaders, we must collaborate to move the industry forward.

Identifying the correct goal is a good place to start. Currently, the stated national goal is to produce 80 percent of our energy through renewable sources by 2035. If John F. Kennedy had used a similar tactical view in 1960, he might have identified building the solid rocket engine as our national goal instead of saying we will put a man on the moon and bring him safely home by the end of the decade.

Based on what abundant and affordable energy means to our economy, a realistic goal might be to have the most reliable, most cost-effective energy in this country so we are the most competitive economy on the planet. Renewable energy and CO<sup>2</sup> reduction are part of the mix, but they must be timed and deployed to support this goal. These things are complications to meeting the goal, not the goal itself.

Finally, there are a lot of opinions to be considered in setting policy and establishing regulations that are shaping the utility industry. But industry leaders need to stand together and take charge of the debate. Nobody knows their business better than they do, and they need to advise policy makers on what types of regulatory policy help them do what they do best: deliver reliable, safe and cost-effective electricity.

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