2014

Global

UTILITY EVOLUTION

Benchmarking Study

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Autodesk is delighted to sponsor the 2014 Global Utility Evolution Benchmarking Study conducted by McDonnell Group. This report offers perspective and insight on the industry's most pressing topic – change.

Moving to a lower carbon emissions environment, understanding the changing nature of supply and demand, and defining business models that can accommodate new commercial realities are not trivial undertakings. Yet, in spite of being in a season of change, utility leaders around the globe are committed to not only exploring but also responding to the tasks at hand with vigor and determination.

The International Energy Agency (IEA) in their World Energy Outlook 2013 forecasts[1] worldwide demand for electricity will increase by more than two-thirds and gas by almost a half between 2011 and 2035. Securing investor, regulatory, customer and community confidence to fund and advocate the infrastructure base to meet this demand, against a backdrop of a changing industry, represents an enormous challenge. Precisely how the relationship between utility companies and utility infrastructure takes shape over this period is clearly still a work in progress. What is certain though, is companies will need to adjust to a more rapid pace of change and demonstrate best-in-class mastery of both capital projects and management of assets across their life.

In response, we expect stakeholders to increasingly turn to building information modeling (BIM) to help them make the right infrastructure decisions and deliver projects efficiently across an array of asset types – from power plants to substations to transmission corridors to distribution networks and more.

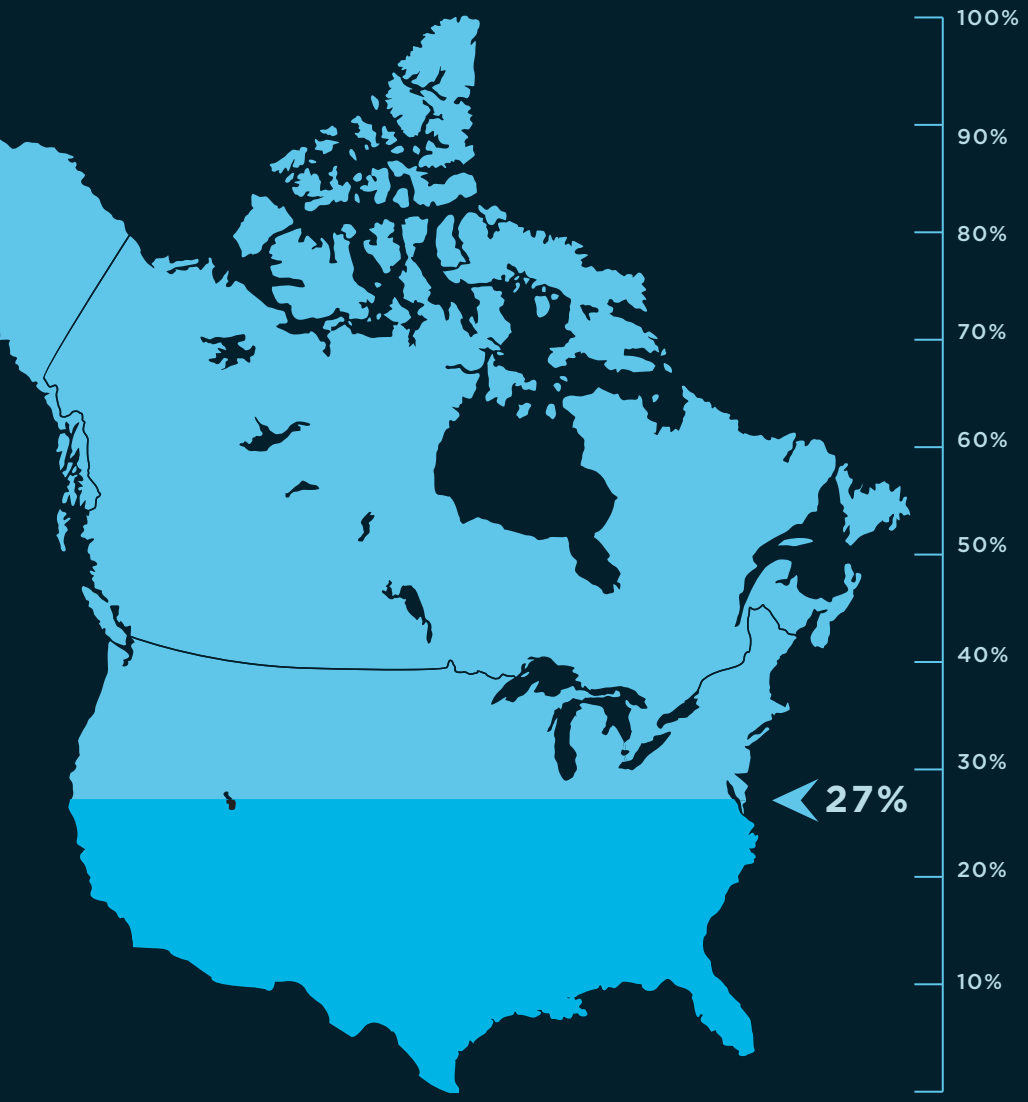
As our urban environments become more complex, and expectations placed on utility companies continue to evolve, so today's emerging technology trends will move from innovative concepts to tomorrow's mainstream fixtures of doing business: cloud computing and big data to help match demand with infrastructure investment, social computing and crowd-sourcing to aid engagement with communities, 3D printing and digital fabrication to improve operations and maintenance, are just three possibilities.

Energy though is more than KWhs and BTUs. Today, over a billion people lack access to modern energy infrastructure, and the quality of life such access entails. Perhaps the application of these emerging technologies to this epic challenge will deliver the ultimate benefit to the industry and society alike.

Compiled through in-depth interviews, this report offers an inside look into how senior decision-makers at large utilities throughout U.S. and Europe are leading the way for innovation, spurring change and preparing for the future. Our sincere thanks and appreciation to those who participated in this research initiative as we strive to add value to the industry's strategic dialogue and propel thought leadership.

Dominic Thasarathar
Thought Leader
Construction, Utilities, Natural Resources
Autodesk

[1] 2013, International Energy Association (IEA), *World Energy Outlook 2013 Factsheet*



24

NUMBER OF NORTH AMERICAN UTILITIES PARTICIPATING

35

NUMBER OF STATES SERVED BY UTILITIES PARTICIPATING

39.8

NUMBER, IN MILLIONS, OF NORTH AMERICA'S POPULATION SERVED BY PARTICIPATING UTILITIES (27%)

90.6

REVENUE, IN BILLIONS, OF THE U.S. PARTICIPANTS ALONE

7

NUMBER OF EUROPEAN UTILITIES PARTICIPATING

29

NUMBER OF COUNTRIES SERVED BY PARTICIPATING EUROPEAN UTILITIES (55%)

62

NUMBER, IN MILLIONS, OF EUROPE'S POPULATION SERVED BY PARTICIPATING UTILITIES (27%)

INTRODUCTION

PERSPECTIVES FROM TODAY'S LEADERS IN AN EVOLVING INDUSTRY

There is no question the utility industry is facing a turning point as a number of forces converge and compel utilities to rethink their customer strategy, transform their business models, redesign and streamline their business processes and build a more integrated infrastructure. The crux of this Autodesk in-depth study is to explore how the utility industry is adjusting, responding, and tracking to keep pace with today's evolving landscape.

This report is uniquely based on long-form interviewing of senior leaders within North American and European utilities. It allows the voices of utility leaders to come through via extended conversations. We first asked executives, unprompted and without suggestion, to name their key challenges. Later in the study, we asked them to rank their level of involvement in addressing ten key trends. We also examined their priorities in terms of how they are "voting with their dollars" by looking at which capital projects they are funding or planning to fund.

Our methodology did not include an online survey. It depended on the willingness of tremendously busy senior utility executives to spend an average of 30 minutes on the phone with us sharing their candid views. We are deeply grateful to the 30 leaders--eighty-one percent of whom are senior vice presidents, directors, or department heads--for making their insights available to the larger utility community in this way. (Full demographic details at the end of this report.)

There is strong consensus--within our respondents and among those of other studies--that change is coming. With forty-two percent of utility leaders responding their company's strategic planning horizon is between 3-5 years and thirty-two percent stating a 5-10 year horizon, the report shows utility companies seem more focused on their current state with room for improvement in their future planning strategies for the next ten years and beyond. As for the opportunities and threats, utility leaders identified top threats including regulatory constraints and the talent gap followed by the rise of distributed generation. Though labeled a threat initially, alternative forms of generation were also described by respondents as an opportunity, in addition to citing technology and innovation, analytics, and efficiency gains.

The study found utilities have a relatively immature strategy around the trend of exploiting new business opportunities around home automation, commercial energy management, and other services "beyond the meter." In addition, all signs point to the changing nature of the end consumer transitioning to a supplier. Utilities are proactively looking to adapt and uphold the heart of their mission to deliver safe, reliable, affordable power to all while preparing for a future with new technologies and consumer preferences, as well as the need to reduce carbon emissions.

All signs point to a change in the traditional utility business model and to a growing role for new automation technologies in solving many of the complexities of the 21st century grid.

THE FOUNDATION

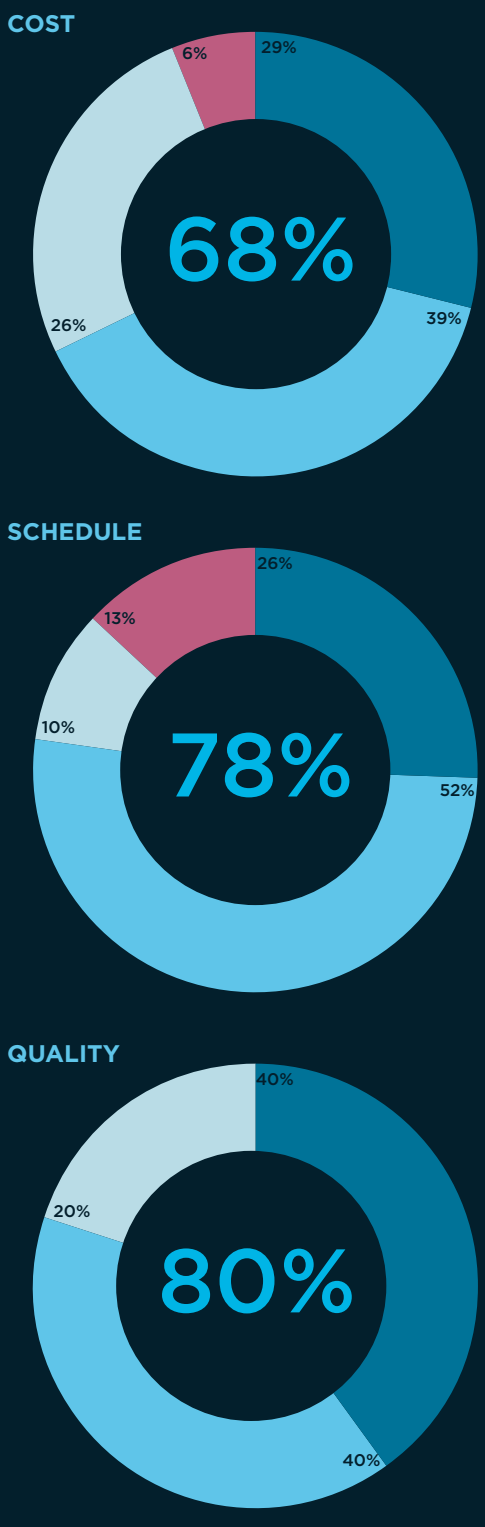
In essence, a utility is an energy enterprise comprised of capital assets and infrastructure projects. It is a functioning organism operating with finite resources and within a regulatory environment. This utility benchmarking discussion takes into account these realities around the historic core of the utility business.

Utility leaders see limited budgets, growing customer demand, increasing distributed generation, and risk of infrastructure failure in the midst of an ever-shifting regulatory environment as top factors to juggle within their capital portfolios. Smart grid and other infrastructure expansion and renewal projects typically involve major capital investments. The study asked utility leaders to evaluate how successful their capital projects are, and which factors make capital projects successful.

FEELING THE CRUNCH ON CAPITAL PROJECTS

Utility executives face constant pressures when making capital planning decisions. While eighty percent of executives are satisfied with project quality, satisfaction is with schedule and cost performance. In addition, the study pinpointed the top three critical factors

How satisfied are these utility leaders in meeting their own delivery targets and expectations regarding cost, schedule and quality?



contributing to the success of capital projects and infrastructure investments. Our findings show that utility executives are increasingly:

- reliant on end-to-end project management accountability;
- encouraging of community and stakeholder involvement; and
- investing in vendor relationships.

CAPITAL PROJECT DELIVERY RECORD

Projects today are complicated and subject to intense regulatory scrutiny. How successful are they in meeting their own delivery targets and expectations regarding cost, schedule and quality?

SOLID END-TO-END PROJECT MANAGEMENT MAKES A DIFFERENCE

The sixty-one percent of participants who rated end-to-end project management accountability as the top factor emphasized its criticality to the execution and success of capital projects.

Study participants agreed the success of a project starts with a skilled team leader coordinating and maintaining the schedule and communication throughout the entire project lifecycle. Having a solid project manager helps the utility reach its milestone and achieve the overall objectives.

Other critical factors for success in project management are clear and consistent design and engineering standards.

For that skilled team leader, it is about...

"Right experience, right attitude, and matching them with the right project. If you don't have proper planning, you will start seeing problems."

WAYS TO IMPROVE

Choose the right project manager with the right skillset to support the project schedule and the team. Rely on project managers to carry lessons learned from project to project. This reduces inefficiencies and gaps in meeting project requirements.

Find new methods and tools to improve communication over the traditional method of email.

Add more resources to the project management team improving the process by virtue of having more talent involved.

Scope what is going to be required out front and keep it consistent from project to project.

Efficient communication and project management is key particularly when it comes to various parties involved in the design aspect of a project. With multiple parties working within the same scope having design and engineering standards is essential to a project's progress.

INVOLVE STAKEHOLDERS ACROSS THE COMMUNITY

Forty-one percent of participants ranked community and stakeholder involvement as the second most important factor critical to the success of both capital projects and infrastructure investments. They placed high importance on engaging industry and community stakeholders to ensure the ongoing participation and support throughout the project.

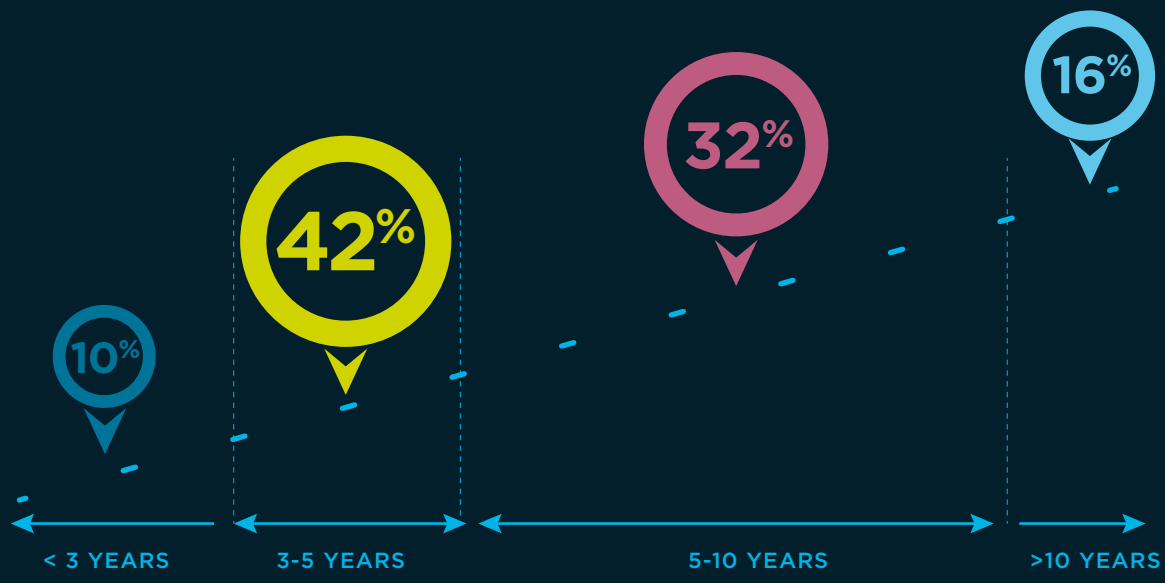
"For us, the most important piece is the upfront inclusion in the planning process of all of those team players – making it a parallel process as opposed to a serial process."

WAYS TO IMPROVE

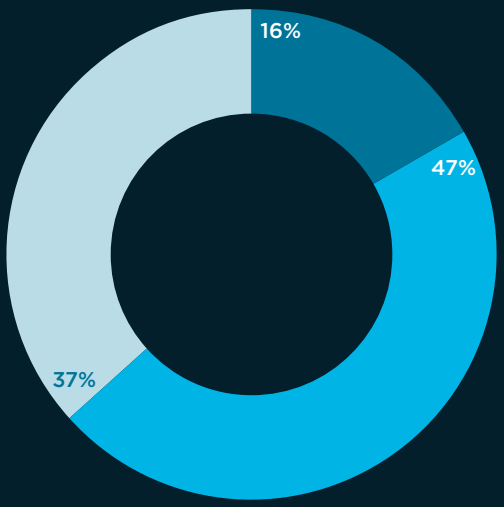
Education and communication. Prior to finalizing the design and project implementation, it is crucial to hold customer orientations, and involve and communicate with politicians and stakeholders to gain public acceptance.

Shift the approach to social media. Given today's highly connected world, continuing to make investments to mature the social media presence is one way utilities can improve outreach.

STRATEGIC PLANNING HORIZON

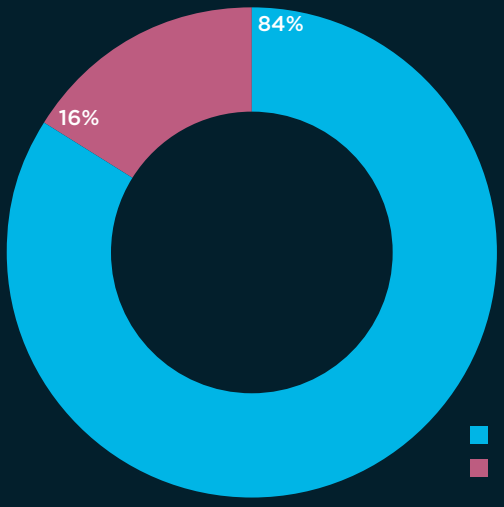


STRATEGIC PLANNING PROCESS



SUSTAINABLE COST REDUCTIONS

Possible to achieve ops/maintenance cost reduction without adversely impacting quality & reliability?

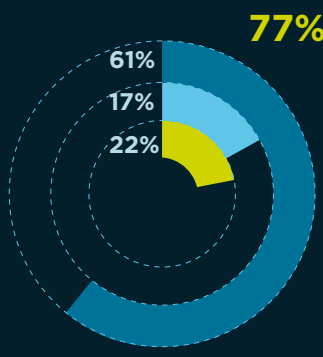


12%

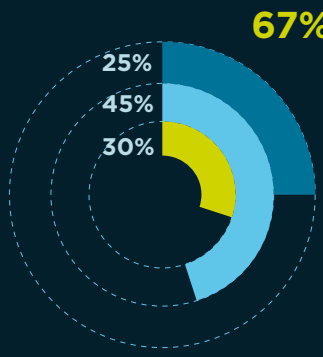
The mean reduction participants believe is possible before quality & reliability are affected.

CAPITAL PROJECT SUCCESS FACTORS

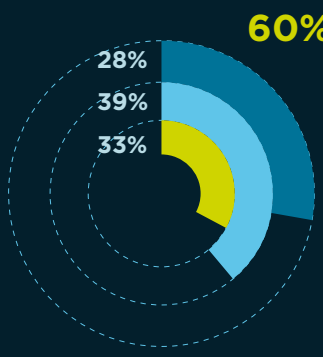
End-to-end project management accountability



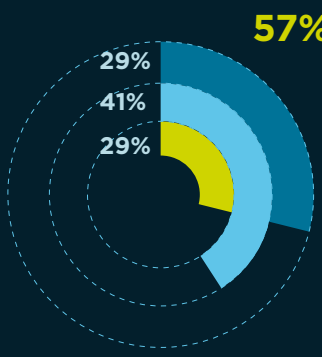
Depth of related team experience



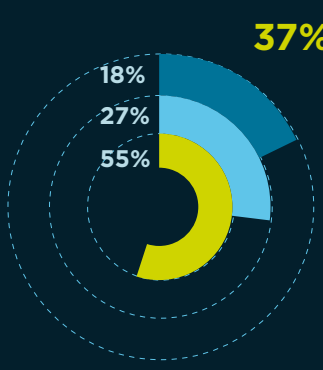
Design and engineering standards



Community and stakeholder involvement



Vendor relationships

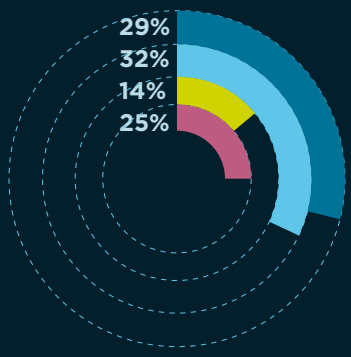


% PERCENT OF PARTICIPANTS WHO SELECTED FACTOR AS TOP 3

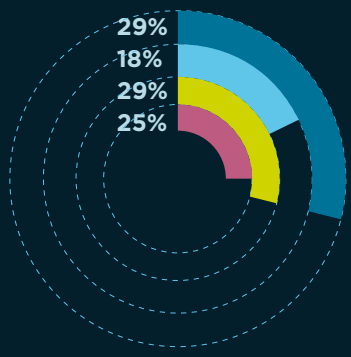
TOP FACTOR
2ND
3RD

REGULATORY PRIORITIES

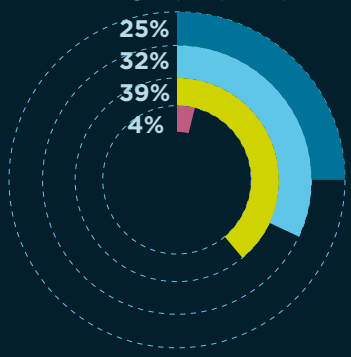
Funding for marketing & technology to change customer behavior



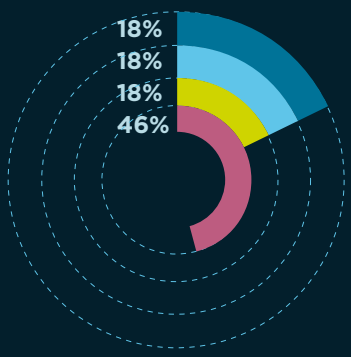
Ensure we are not hit with stranded cost penalties for mandates



Change rate setting process to enable smart grid, EE, DSM, etc.



Support our need to raise rates



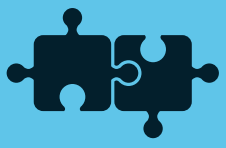
1ST PRIORITY
2ND PRIORITY
3RD PRIORITY
4TH PRIORITY

"Many of the projects are integrated into a broader network design; we are starting to view the vendors as much more of a partnership and moving away from the traditional supplier-customer relationship."

DEEPEN VENDOR RELATIONSHIPS

Fifty-five percent of participants ranked vendor relationships as the third most important factor critical to successful capital projects. Fostering relationships with vendors means alignment to utility objectives, regular two-way dialogue to improve processes and setting and raising standards throughout the entire supply chain. When asked, utility decision-makers stressed the value of protecting and managing vendor relations in order to aid the utility in moving forward and reaching timely project completion.

WAYS TO IMPROVE



Foster a culture of collaboration. Utility leaders are increasingly viewing vendors as partners and key players in helping them meet the challenges of the evolving energy system.

Educate. Supply chain managers and vendors must be forward thinking in how the utility system is going to evolve and in return help utilities predict and respond with technology solutions that apply to their network. The supply chain has historically been reactive; it is time to be proactive.

"Since the environment changes all the time, you really want to implement a strategy and select a vendor solution that is flexible enough and scalable enough to meet the ever changing demands of the customer or regulatory environment."

INFRASTRUCTURE COSTS

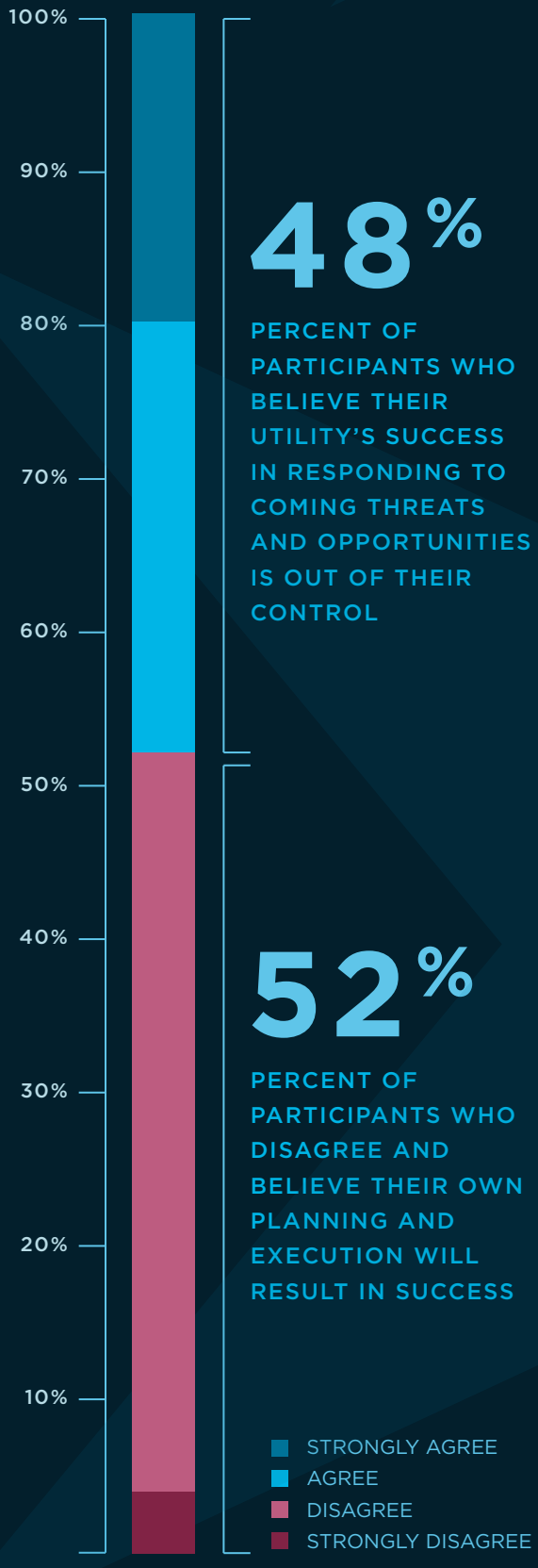
Eighty-four percent of respondents agreed there is opportunity for the utility industry at large to achieve sustainable reductions in energy delivery (transmission and distribution) non-capitalized annual operations/maintenance costs without adversely impacting reliability and quality. When asked what percentage of infrastructure operating cost savings is achievable, the majority of respondents stated between a five to ten percent reduction.

"It comes back to our use of technology and data to approach the issues of reliability and service in a smarter manner. There is a fear that I see within the establishment, and not embracing change and doing things the old way and a distrust of using new methods to bring about improvements."

As for the single most important action the industry could take to reduce infrastructure operating costs, most responses centered around automation through technology, reliable data management and a consolidation of facilities or physical infrastructure. Building information modeling (BIM) and information management is another way to reduce asset operational costs as it facilitates well informed decision-making resulting in better business outcomes, clarity, improved communication, de-risking and ultimately better efficiency. Utility leaders also shared their interest in a variety of diagnostic equipment to install on the electric transmission system and distribution grid to communicate whether equipment is at the end of its lifecycle or if it's showing signs of failing. Utilities are looking for ways to reduce truck rolls and yet get to the equipment in a timely fashion prior to it failing.

"When you talk about operating costs you have to look at whole process - engineering, designing, maintenance, etc. Also, data management --- a lot of what we do is based on data. It's all based on the data we initially generate. Data management is the key to a lot of it."

So even if you execute perfectly your response to key threats or opportunities, do you agree or disagree that your chance for success depends highly on factors outside of your direct control?



48%

PERCENT OF PARTICIPANTS WHO BELIEVE THEIR UTILITY'S SUCCESS IN RESPONDING TO COMING THREATS AND OPPORTUNITIES IS OUT OF THEIR CONTROL

52%

PERCENT OF PARTICIPANTS WHO DISAGREE AND BELIEVE THEIR OWN PLANNING AND EXECUTION WILL RESULT IN SUCCESS

"Regulators continue to try to apply traditional regulatory policies to an industry being rapidly reshaped by technological change."

REGULATORY PRIORITIES

Evolving regulations are another major risk that capital projects face. Utility leaders must anticipate and respond to where regulations are headed. Based on the study findings, utility decision-makers underscored the importance of partnering with regulators to educate consumers and communities in what it takes to operate and maintain an electric system, as well as in setting expectations around customer service.

Perhaps surprisingly, given the well-established pressures related to grid and system modernization investments, utility study participants identified regulator support in their need to raise rates as the lowest priority.

"A threat…the regulatory recovery structure associated with the environmental changes being driven into the industry for generation."

THE EVOLUTIONARY LANDSCAPE

The challenges to the utility industry are clear. A key objective of this research study is gauging how the industry is evolving strategy to meet today's demands and capitalize on tomorrow's innovation opportunities.

In the context of the realities and risks with access to capital and managing the regulatory environment, utility respondents were asked to identify their utility's progress in responding to 10 key industry trends. With these trends in play, such as demand side management, energy efficiency, and new business opportunities around home automation, the industry is looking at a shift in the traditional business model.

"The electric utility sector has not previously experienced a viable disruptive threat to its service offering due to customer reliance and the solid economic value of its product. However, a combination of technological innovation, public and regulatory policy, and changes in consumer objectives and preferences has resulted in distributed generation and other DER being on a path to becoming a viable alternative to the electric utility model." [2]

[2] January 2013, Edison Electrical Institute, *Disruptive Challenges: Financial Implications and Strategic Responses to a Changing Retail Electric Business*

THE TRANSFORMATIVE TRENDS FACING UTILITIES TODAY

Adjusting to a lower carbon emissions environment

Increasing Energy Efficiency (EE) at the point of consumption

Increasing demand side management

Adjusting to changes in access to capital and the cost of capital

Extending the useful life of aging assets beyond their originally expected lifecycle

Balancing real-time data access with cyber security vulnerabilities

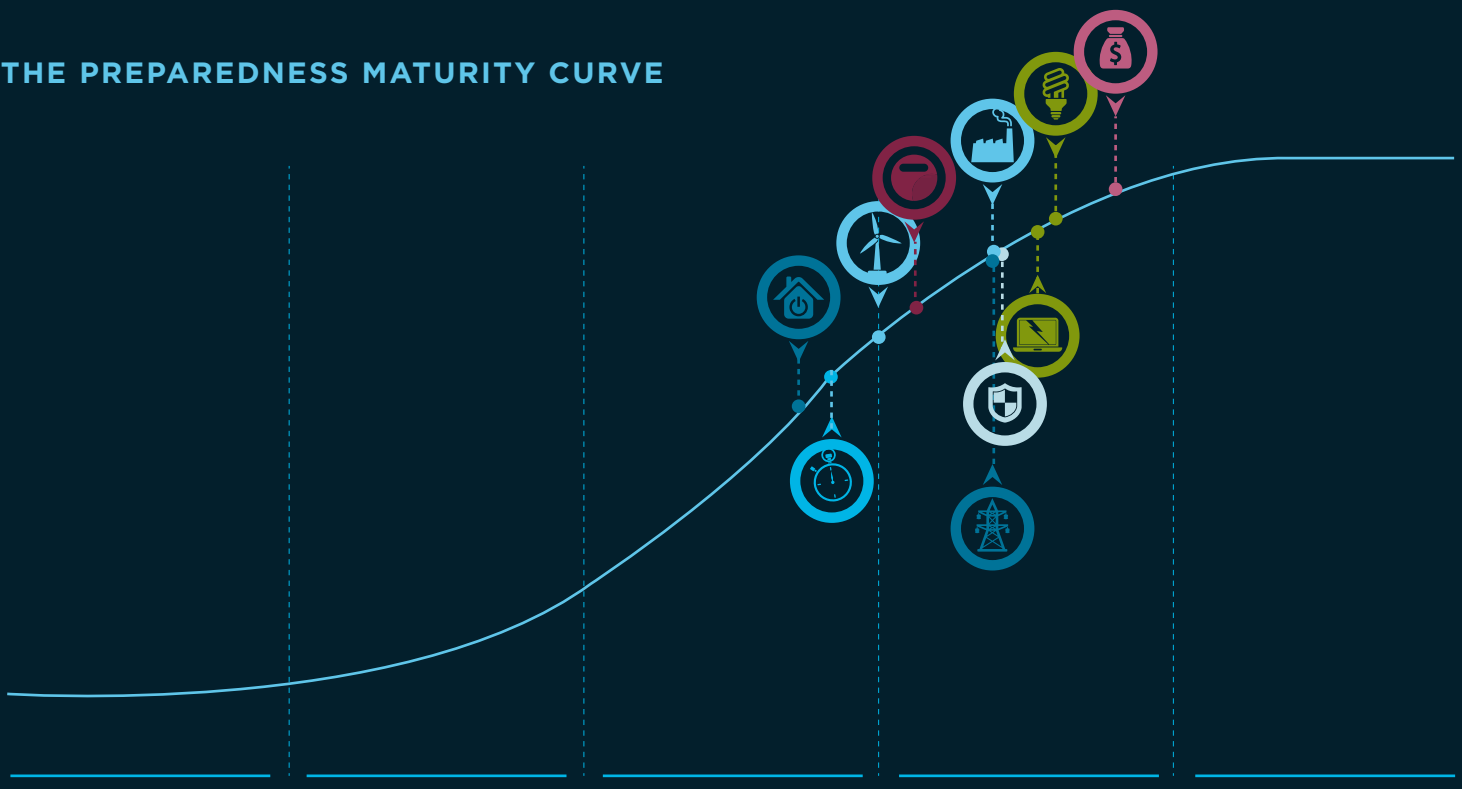
Increasing distributed generation and distributed energy resources

Responding to the aging workforce and impending retirements by capturing and transferring knowledge to a new generation of younger workers

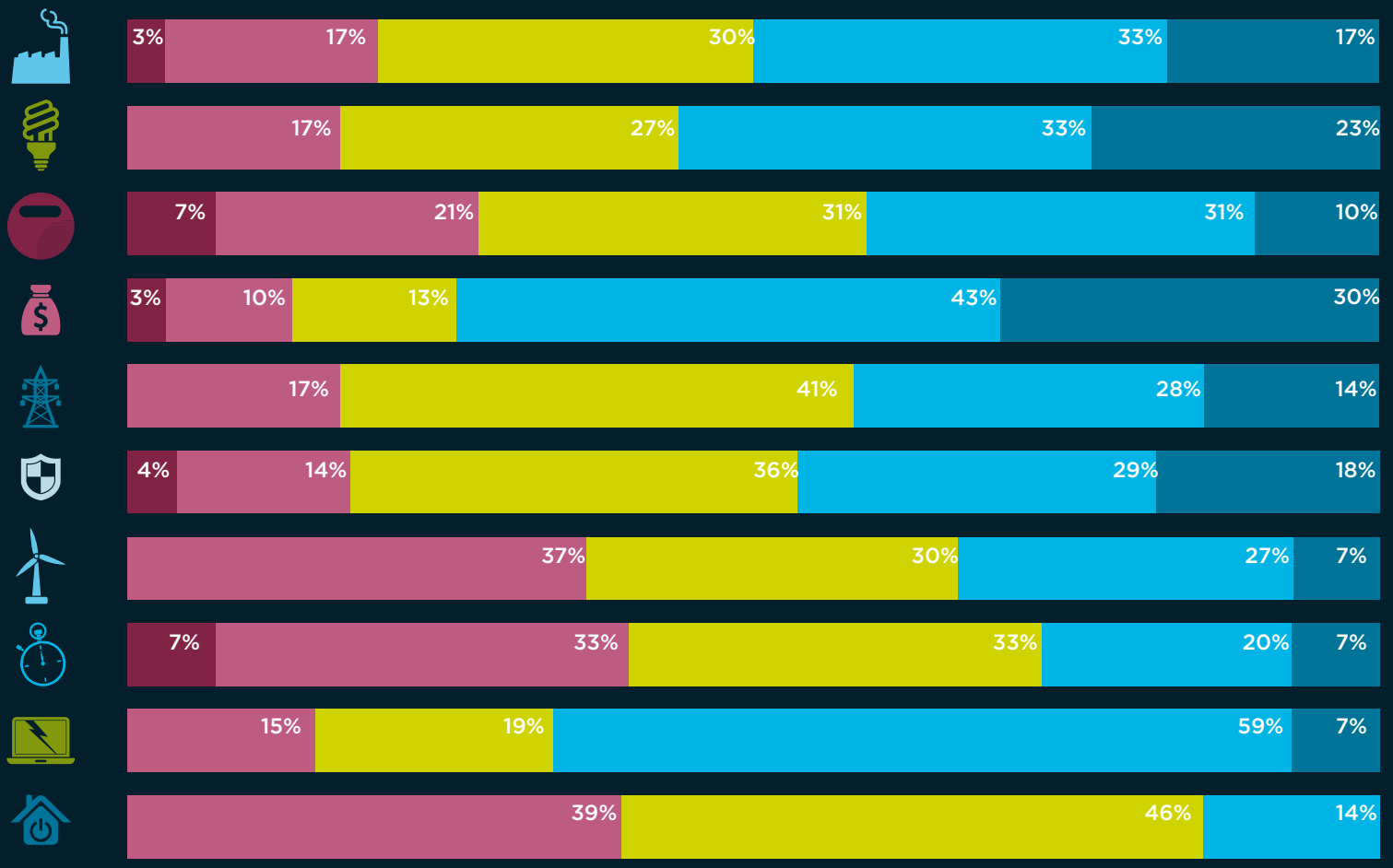
Responding to the increasing engagement and expectations of energy consumers

Exploiting new business opportunities around home automation, commercial energy management, and other services “beyond the meter”

THE PREPAREDNESS MATURITY CURVE



PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5
Not yet addressed the implications	Currently formulating strategy	Started implementing strategy	Optimizing strategy in place	Mature and fully deployed strategy



Of the transformative trends, which are seen as presenting the greatest threat?

DISTRIBUTED GENERATION AND DISTRIBUTED ENERGY RESOURCES

CUSTOMER EXPECTATIONS AND ENGAGEMENT

TALENT GAP AND THE AGING WORKFORCE

So what are the opportunities?

TECHNOLOGY ADOPTION AND INNOVATION

LESS CARBON FOOTPRINT AND MORE EFFICIENCY GAINS

EXPANSION AND MANAGEMENT OF THE MARCELLUS SHALE/NATURAL GAS

THREATS AND OPPORTUNITIES

When asked what the single most important thing utilities should do to respond to either the key threats or opportunities, there were many opinions.

"We need to have the breaking down of traditional organization and the courage to remake our company into one that is positioned to take advantage of our opportunities. The old model isn't going to work; we are going to have to rethink how we are going to run the business."

"We are focusing on what is next and what the future utility will look like – where the threat becomes an opportunity."

"We have to plan and help build a smarter workforce in the market not only to deal with the aging infrastructure but the growing amount of work we have to do."

"The evolution of the utility in the marketplace: the traditional utility model is dying as we are facing threats from distributed generation and other competitive sources. As the market shifts, we are facing pressure and trying to determine what the future will look like."

"We have created an internal dialogue at all levels of the company and by tapping into different levels of management, experience and responsibility that dialogue will help us transform our company and be able to be nimble to the change in the industry and to change in a way that we see our customers want."

"Be more nimble, agile and flexible to be able to respond to market conditions as well as opportunities."

EMERGING TECHNOLOGY PUSHING BOUNDARIES

In the midst of significant growth of distributed and renewable integration, it is now more important than ever to invest in smart technologies that allow the grid to remain stable and reliable yet dynamic leading to enhanced business performance and customer delivery. Utilities need regulator support and investment recovery for necessary investments to ensure system stability while integrating distributed energy resources and renewables on both high and low voltage systems. Utilities surveyed acknowledged this is foundational to the continued successful and reliable transition to generation sources.

Utilities are looking to and relying more on technology to enhance energy delivery for efficient energy distribution. Whether it be automating and enhancing distribution grids or improving security and compliance efforts, emerging technology solutions are reinventing the industry.

"We are in the advent of the digital technology [era] and we need to change our business to continue to thrive."

"Due to fluctuating market conditions and the entrance of new technologies, it's possible that we will be looking at a modified business model, particularly looking at regulatory uncertainty and shifting customer expectations. Historically, a vertical utility is a siloed institution, and customer loyalty with this new age of technology and the shift in what customers expect the utility to do, will require modification to our business."

HARNESS THE POWER OF ANALYTICS

Utilities have more data coming in about assets, customers and electric systems. It is increasingly important to transform the data into information that all the stakeholders can use. It can help lower customers' bills and uphold excellent customer service.

With the large amounts of new data from 'smart' devices and the potential for regulatory fines, there are a number of drivers for utilities to organize and analyze their data in a structured and strategic manner to ensure a reliable, resilient and efficient delivery of power. Insight is the key.

With the right set of analytics tools, utilities can monitor the inner workings of transmission and distribution networks and draw insights from the collected and stored grid data. In addition, building information modeling (BIM) is changing how buildings, infrastructure and utilities are planned, designed, built and managed to help deliver business value at every step in the process.

"The key: using the meter data and combining it with overall enterprise data to have a clear analytics strategy."

"One of the technologies we are looking into is building information modeling (BIM) and trying to adopt it for an electric utility. The building industry is migrating that way for a lot of the same reasons that we need to look into and stay conscious of."

TECHNOLOGY IMPACT

A Digital technologies will improve the efficiency of existing workflows

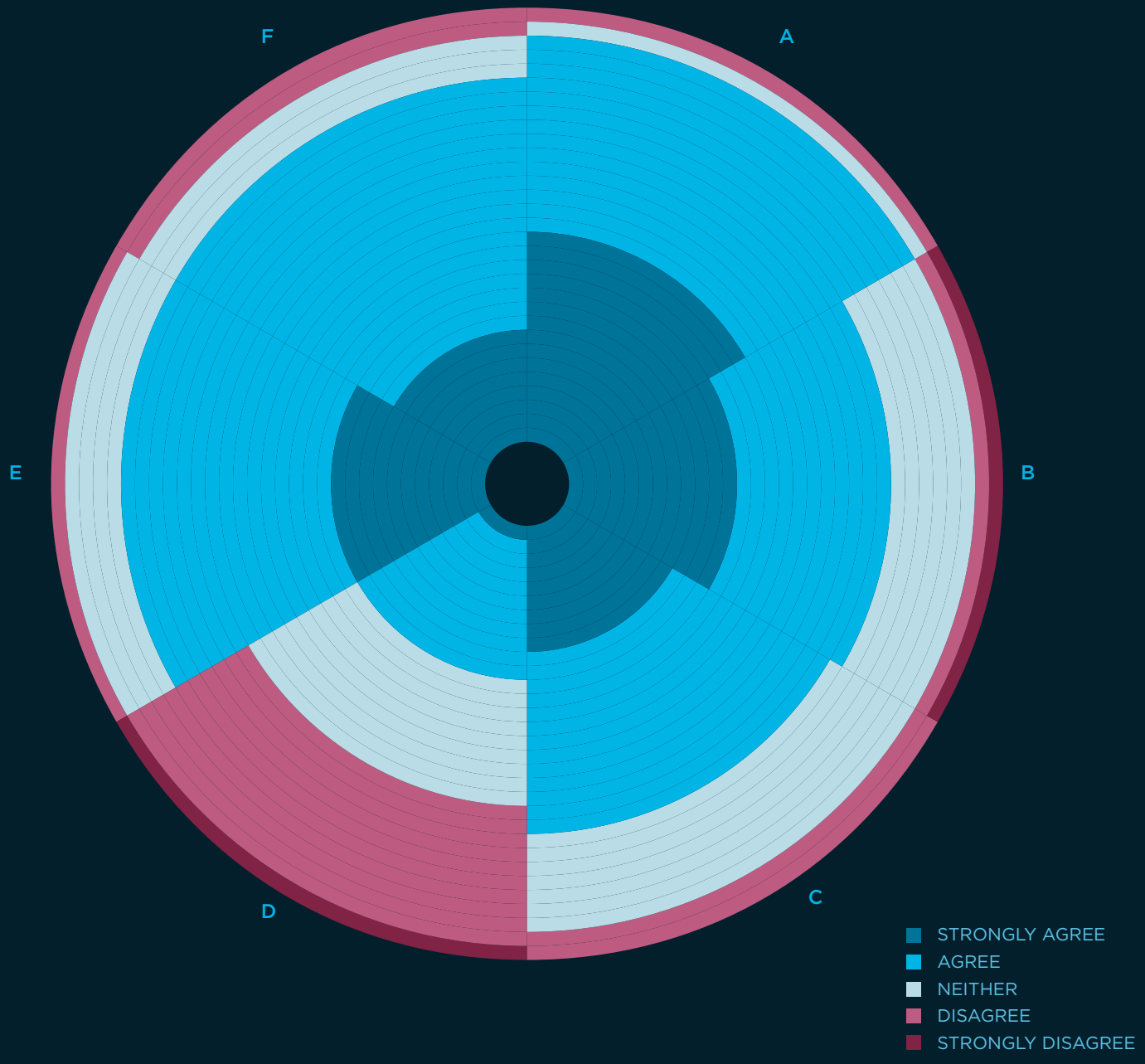
B Digital technologies will enable new forms of competition

C Digital technologies will radically transform the relationship between consumer and supplier

D Digital technologies will introduce significant risk and/or uncertainty to the industry

E Digital technologies will become central to the ongoing success of my company

F Digital technologies will enable my company to enter new markets or offer new services



93%

STRONGLY AGREE/AGREE THAT DIGITAL TECHNOLOGIES WILL IMPROVE THE EFFICIENCY OF EXISTING WORKFLOWS

74%

STRONGLY AGREE/AGREE THAT DIGITAL TECHNOLOGIES WILL ENABLE NEW COMPETITION

71%

STRONGLY AGREE/AGREE THAT DIGITAL TECHNOLOGIES WILL RADICALLY TRANSFORM THE RELATIONSHIP BETWEEN SUPPLIER AND CONSUMER

32%

DISAGREE THAT DIGITAL TECHNOLOGIES WILL INTRODUCE SIGNIFICANT RISK TO THE INDUSTRY

83%

STRONGLY AGREE/AGREE THAT DIGITAL TECHNOLOGIES WILL BECOME CENTRAL TO THE ONGOING SUCCESS OF UTILITIES

84%

STRONGLY AGREE/AGREE THAT DIGITAL TECHNOLOGIES WILL ENABLE UTILITIES TO ENTER NEW MARKETS OR OFFER NEW SERVICES

WHAT FUNCTIONAL AREA INSIDE THE UTILITY IS GOING TO SEE TECHNOLOGY PLAYING THE GREATEST ROLE?

ASSET ORIENTED

53%

PLANNING/POLICY/ STRATEGY

7%

CUSTOMER/MARKET

40%

FINANCE/ACCOUNTING

0%

WINNING TECHNOLOGIES

- AMI - NEXT LEVEL DIGITAL TECHNOLOGY
- SMART METERS
- ADVANCED BUILDING MANAGEMENT SYSTEMS
- HOMOGENIZATION OF IEDs
- REAL-TIME EQUIPMENT
- INTEGRATED DATA MANAGEMENT/ANALYTICS
- BUILDING INFORMATION MODELING (BIM)
- DISTRIBUTION SYSTEM SMART DEVICES
- DISTRIBUTION AUTOMATION
- BIG DATA & MEASUREMENT AND VERIFICATION
- CRM PLATFORMS

"Battery storage at both the grid level and the distributed generation level. Highest potential threat and if you anticipate and move ahead of it – it would be the highest benefit."

NEW EMPHASIS ON MEETING CUSTOMER EXPECTATIONS

People are more mobile and more socially and digitally connected than ever before. In fact, so much so that new terminology has emerged identifying Generation C. Now this generation is not a demographic, but instead a reference to the connected consumer. The connected consumer is an empowered one who has choice and access and therefore can demand transparency, price competitiveness, and new levels of service.

It is not surprising then to find that utilities are redefining customer service in response to rising customer expectations. But it is not just customer service in the traditional sense. It is customer engagement and the underlying capital assets and technologies that enable it. Participants accurately pointed out that technologies, such as smart meters, and enabling platforms sat at the top of list of most important things they could be doing to address this issue of rising customer expectations.

"The customer is going to be much more at the heart of the energy system. Understanding the technologies, the needs, the wants, of the customers and how they interact more with their energy systems is crucial. The key utilities, the successful ones, will help transition customers in the new energy world."

Utility leaders acknowledged the need to become proactive communicators with their customers, developing multiple communication channels to interact with and serve electric consumers. A 2014 Deloitte Energy Consumer Survey[3] conducted 1,500 online interviews and found that seventy-five percent of consumers are now committed to being informed and consider themselves aware of national energy issues. As one participant said, given that everyone is so connected all the time, expanding and maturing their approach to social media is a great "opportunity for us to improve."

But beyond pure communication, utilities are also are aware of the threat other customer-centric companies pose as they get closer and closer to offering consumer services that have in the past been the domain of the utility. As customers are central to a utility's success, then precisely meeting customers' service needs will become one of the most important success factors in the days to come.

"Less and less about viewing the customers as where we dump the kWh and more of a two way interaction; viewing them as a resource to use as demand response, efficiency."

Utilities are having to reshape their interaction with customers to be seen as more of a partner - to work more together and hand in hand. The challenge becomes if utilities don't offer customers what they want, competitors will.

The importance of this issue is underscored in the research as none of the utility leaders identified that they were not already addressing this, and only fifteen percent were still formulating a plan. But while a majority feel they are prepared to address customer engagement, they also understand that when it comes to customer expectations, the tide can turn swiftly and having the necessary technology base is critical to staying ahead of the curve.

"Decentralization: customers will become less users of energy and more producers of energy."

[3] 2014, Deloitte, Deloitte reSources 2014 Study

THE IMPENDING TALENT GAP

Significant additional investment in skills is necessary to refresh the workforce. With retirement on the rise and a broadening generation gap, the acquisition of talent within the utility organizations to be able to handle evolutions in the power industry is an ongoing challenge.

Attracting new workers will require a multi-pronged approach that addresses skills, pay and professional development concerns. Utility respondents cite the new generation of smarter energy technologies coupled with this up and coming workforce that is just as digitally savvy, will result in a more reliable grid.

"One of our threats, making sure we have the appropriate skill sets for the new system of the future."

"[We have] to be more inclusive; an ever broader and diverse workforce. Diversity meaning ethnicity, gender, generational, millennial, the whole nine yards."

READY OR NOT, DISTRIBUTED ENERGY RESOURCES ARE COMING

Though current deployment levels of distributed generation in the U.S. remain fairly low, utility leaders see its foreseeable threat to their traditional business model and the need to address, manage and integrate alternate forms of generation as they come on the grid. Electric power utilities driven by innovation and more accepting of advanced technology are better positioned to build their competitive advantage with distributed generation.

66%

RESPONDED THAT THEIR UTILITY HAS A STRATEGY UNDERWAY OR FULLY DEPLOYED TO ADDRESS THE INCREASING ENGAGEMENT AND EXPECTATIONS OF ENERGY CONSUMERS

7%

RESPONDED THAT THEIR UTILITY HAS A MATURE AND FULLY DEPLOYED STRATEGY TO ADDRESS THE AGING WORKFORCE

37%

SAID THAT DISTRIBUTED GENERATION AND DISTRIBUTED ENERGY IS AFFECTING THEM NOW AND THAT A STRATEGY MUST BE DEVELOPED--PARTICULARLY FOR SOLAR--IN THE NEXT 3-5 YEARS

30%

HAVE CREATED A STRATEGY AND ARE ALREADY RESPONDING TO THE DISTRIBUTED ENERGY TREND

70%

ARE REALIZING THEY NEED A DISTRIBUTED ENERGY STRATEGY

In DNV GL's "Utility of the Future Pulse Survey Report"[4] published earlier this year, forty percent of energy professionals surveyed believed increased interconnection of distributed generation to be the most significant challenge facing the utility industry over the next 5 years.

When interviewed for this report, decision-makers acknowledged concerns over revenue erosion as a result of distributed generation, yet they also mentioned its influence on the legislative process to change the regulatory construct. This could potentially allow utilities to earn money on value-added integration services as opposed to just earning money on utility installed and owned capital assets.

"DER – it's an opportunity for utility companies to embrace and partner with the customers in a way to help the environment for renewables, help with system resiliency during a minor or major event that could cause the system to go out, and help meet long-term political goals in our state."

Also discussed were opportunities to learn how to optimize the grid and cut down on large central asset installations by leveraging a growing range of demand side management options available. The industry has the technology today to manage and lower the demand curve and slow down the demand for newly constructed assets and this can play a role in keeping customer rate increases from accelerating.

"Opportunity to stay ahead rather than fighting it, so our customers can access it through us."

Traditionally, utilities have focused on reliable utility service – in this study for electricity and natural gas - but there are more and more end-customers implementing their own distributed generation, specifically solar, which presents an opportunity for utilities to provide options to their customers and look for revenue growth outside of traditionally integrated utility business models. The challenge is for utilities to balance their position while working to be perceived as partners rather than as obstacles to this change. For many utilities interviewed, this is precipitous moment that must be handled with focus and a long view on the future. There is a very fine line between an incumbent utility being seen by stakeholders as obstructing progress in distributed solar generation for selfish reasons, and being seen as pragmatically embracing new distributed solar resources in the shared interest of continued fuel source and renewable energy diversity.

"Distributed generation – we're getting involved in it rather than having it run us over."

[4] 2014, DNV GL, *Utility of the Future Pulse Survey Report*

THE IMPLICATIONS AND THE ROAD AHEAD

Thriving in an unpredictable environment is not easy, but utility companies that do so are more outward looking, they focus on the market, they respond smartly - and quickly - to change, and they engage closely with stakeholders. Digital technology, and the changes in consumer behavior and expectations which accompany it, coupled with increased regulatory pressures, are set to change the business in fundamental ways.

This report adds additional insight to a number of studies that have looked at utility industry perspectives on these transformative forces. DNV GL's "Utility of the Future Pulse Survey Report", an online survey of 200 industry participants published in June 2014, asked industry leaders to rank their biggest challenges and priorities. The 2014 8th annual Black & Veatch utility study, "Strategic Directions: U.S. Electric Industry," gathered online input from over 500 utility industry personnel to measure the annual rate of change in key industry metrics while tracking how U.S. electric utilities manage the accelerated pace of change. The ongoing work of Ernst & Young, among others, includes utility industry respondents in reports like the "2014 Power and Utilities Capital Confidence Barometer."

While there are more than 3,000 electric utilities in the United States alone and hundreds across the many deregulated markets of Europe, there is a fundamental truth repeated throughout these industry reports: the current business models are changing. A modern

utility will require a robust, forward view to be agile, innovative and adaptable; to be actively engaged at the regulatory level; and to build a smarter, stronger workforce.

To rise to the challenge, utilities are turning attention to the "big picture" and are more willing to adapt to changing circumstances. As for their preparedness for change, forty-two percent estimated their company's strategic planning horizon is between three to five years. Forty-seven percent rated their company's strategic planning processes above average in relation to other utilities.

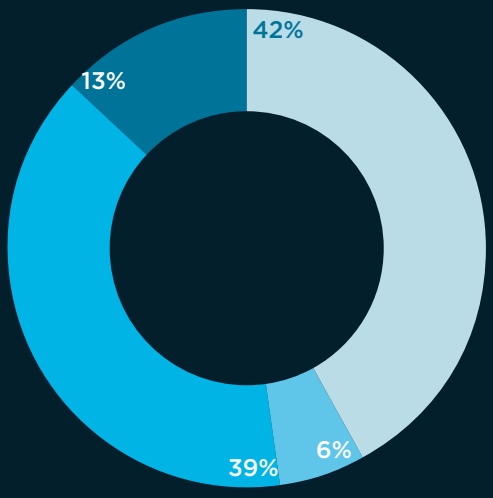
While the study confirmed the challenges are many and very similar across North America and Europe alike, the utility industry collectively has the opportunity to build an ever better world through the 21st century and beyond.

ABOUT THE STUDY

The Autodesk sponsored 2014 Global Utility Evolution Benchmarking Study focuses on the expected impacts of key trends on core business areas within utility companies. In October-November 2014, McDonnell Group conducted 20-minute phone interviews with forward-looking decision-makers at U.S. and European utilities with more than $500 million in annual revenue.

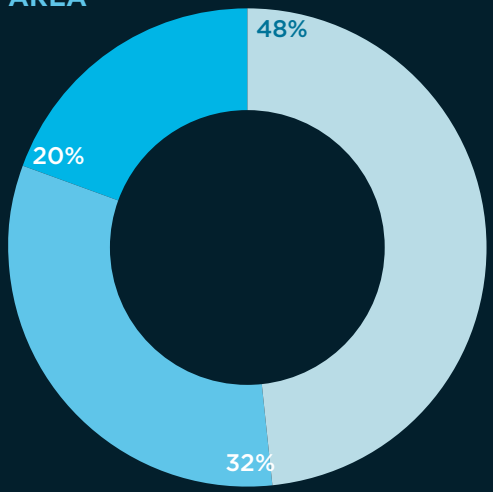
This report containing insights from over 30 utility leaders, managers on up to the C-suite, provides a brief analysis of emerging issues into the changing utility landscape over the next 10 years.

ROLE



- SVP, VP, DIRECTOR LEVEL OR HIGHER
- BUSINESS UNIT HEAD
- MANAGER OR DEPARTMENTAL HEAD
- STRATEGIC, OPERATIONS, OR ENGINEERING SPECIALIST

FUNCTIONAL AREA



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ACKNOWLEDGMENTS

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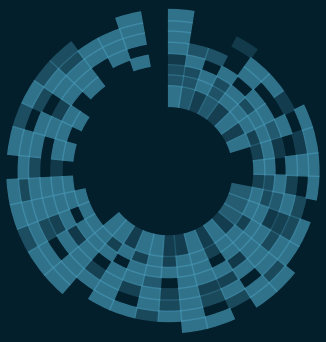

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