Utility analytics in 2017: Aligning data and analytics with business strategy

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Contents

Regulations, corporate drivers, leadership and market influences have combined to produce a patchwork of uneven progress on initiatives such as distributed generation, customer choice, asset optimization and the industrial Internet of Things. These initiatives rely on analytics to gain the most return on investment.

To better understand organizational readiness for analytics and key areas of analytic priority in this diverse business landscape, SAS conducted an industry survey. The survey explored the issues and trends that are shaping how utilities are deploying data and analytics to achieve their business goals. Our findings include:

- Utility business units have primary ownership for the selection and funding of specific applications and business strategy. This is readily apparent as utilities take an enterprise approach to how they are moving forward with analytics. IT participates to ensure that the proper infrastructure is in place to take full advantage of the analytics capabilities available today.
- IT departments are still critical to a utility's success in its analytics journey. This is especially true in the early stages, when the information architecture and data management set the table for future analytics successes. However, as utilities become more sophisticated in how they use their data, the business units are more in control in terms of aligning data and analytics with business strategy and creating value from all data.
- The most popular analytics applications and solutions are focused on improving customer relationships and engagement, along with those improving energy forecasting.
- Open source technologies are affecting how utilities deploy analytics. While not best suited for scalable, enterprisewide analytics endeavors, open source tools are becoming an important part of the mix as utilities move from basic data functions and reporting towards a more predictive and prescriptive environment.

Using data to answer new challenges

The upswing of big data and analytics use in the utility business in recent years has created some unique opportunities for operations, customer service and business leaders. The challenges in today's utility industry – many unheard of as recently as five or so years ago – point to the urgency inherent in these issues. For instance:

- **Declining load growth:** How can a utility stay financially viable in a prolonged (or permanent) era of shrinking or stagnant growth?
- **Business model transformation:** The traditional utility/customer relationship is under assault every day; how can a utility stay relevant in this fluid market?
- **Growth in distributed energy resources:** What is the best way for utilities to still be that century-old cornerstone in providing "safe, reliable and affordable energy" in an era where all the old operational assumptions are disappearing?
- **Increased cyberthreat activities:** What is the best way to prevent or combat cyberthreats that have the potential to leave thousands or even millions without power?
- **Aging assets:** What is the best way for utilities to manage massive, expensive infrastructure in the IoT era?

These industry challenges highlight the need for advanced analytics and to ensure that analytics and related big data efforts are aligned with corporate strategy to support or even lead these key initiatives.

The evolution to analytics centers of excellence

Starting in the mid 2000s, utilities rolled out massive smart grid and smart meter infra-structures. These intelligent systems generated unprecedented levels of data for utility IT and business leaders.

As the utility industry progressed from building the infrastructure to collecting the data to using that data for business value, it became clear that the challenges inherent in a big effort like this were not only technical, but also organizational.

Some would argue that the people side of successfully deploying analytics is a more difficult, and ultimately more important part of the overall effort. Our research explored the organizational design, leadership and skill sets that utilities are establishing around analytics.

The concept of the analytics center of excellence (ACoE) emerged as utilities moved past basic data infrastructure and management. It became clear that there was an entirely separate set of skills needed, so the goal became organizing these skills in the way to best capitalize on them.

According to our research, larger utilities with more than 1 million installed meters are more likely to have an ACoE. This points out the need for larger companies to establish a formal organizational structure – whether centralized or decentralized – to manage, accelerate and catalog analytic projects. However, smaller utilities are not far behind.

In addition, a formal program such as an ACoE is one way to consolidate budget requests for analytic resources, which has been a challenge in the past.

Of those companies with an ACoE, only 23 percent reside solely within IT. This place-ment is consistent with the collaborative hub-and-spoke model that we have observed emerging across many industries. Involvement of the lines of business are critical to making analytics relevant and in measuring ROI. For some, like Eandis in Belgium, the ACoE becomes a sandbox for innovation – a safe place to test new models before IT puts them into production.

"The energy business used to be an engi-neering business, all about managing pipes and wires. Now, it's increasingly about managing data."

Olivier Goethals,
Enterprise Architect
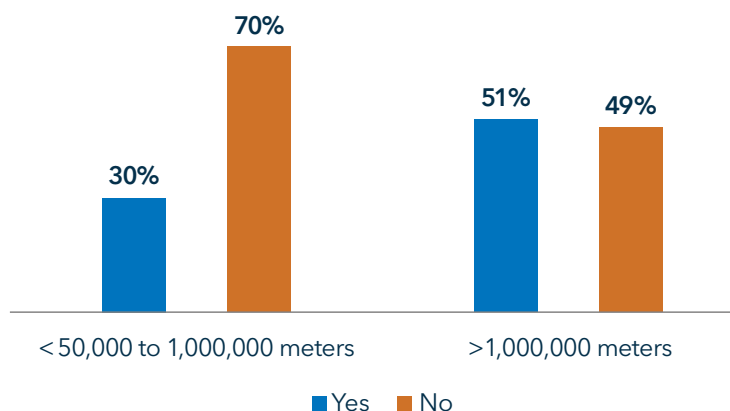and Manager of the
BI Competency Center

Figure 1: Existence of analytics centers of excellence by utility size.
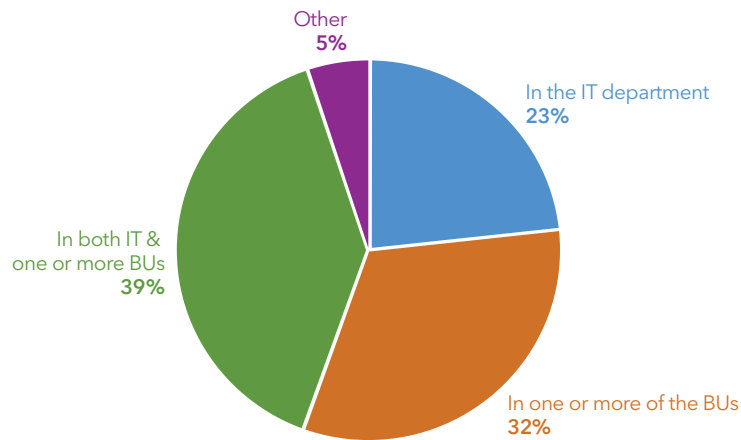
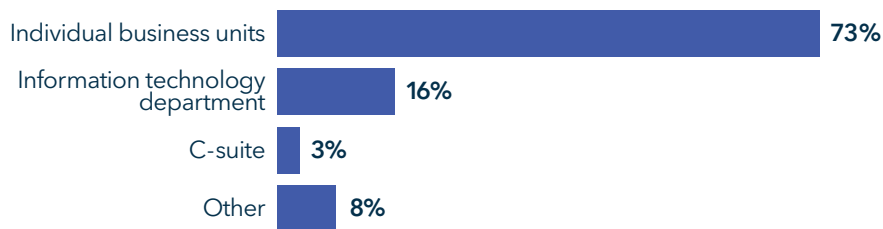Figure 2: Where does the Analytics Center of Excellence reside?

Figure 3: Which one of the following areas is primarily responsible for driving analytics initiatives in your utility?

Even with an increase in the number of ACoEs, 73 percent of utilities indicate that individual business units are the driving forces behind adoption of analytics. This demonstrates close alignment between the business challenge and the analytic solution. It also places responsibility for results with the line of business – a recipe for success.

Business leaders should take a lesson from history, however, and not let the pendulum swing too far away from IT. There is a key role for IT in deploying analytics applications and solutions and partnering with the business for ongoing maintenance and support. By working from a common platform, which IT needs to manage, you can create more value and prevent redundancies. Once this common platform is in place, the building of business-specific applications can commence.
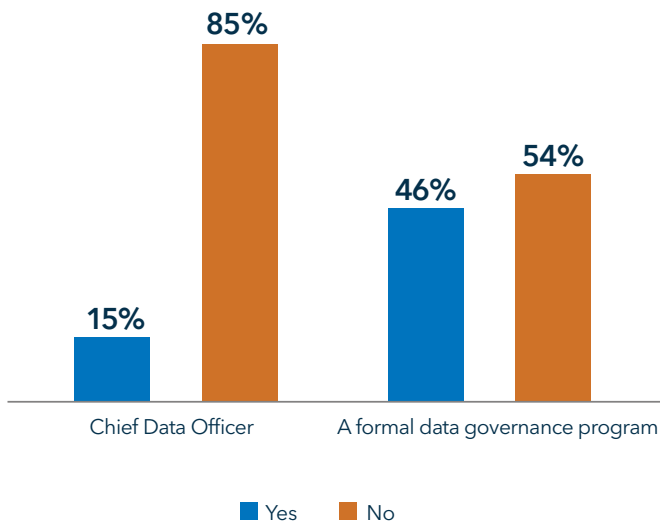
85%

54%

46%

15%

Chief Data Officer   A formal data governance program

■ Yes   ■ No

Figure 4: Does your organization currently have the following?

Because data and analytics go hand in hand (think "garbage in/garbage out"), the emergence of a chief data officer has been a critical element of analytic maturity for companies in other industries. While this has not yet taken hold in many utilities, watch for this role to become more common as leaders realize that treating data as a strategic asset requires someone to own and drive this function.

It is alarming that nearly half the utilities responding to this question do not have a data governance program in place. In today's data-rich and increasingly analytics-driven business environment, sound data governance can be the difference between order and chaos, success and failure. The discrepancy appears to correlate with the size of the business. Utilities with more than 1 million meters are nearly twice as likely to have a formal data governance program in place, yet even this result at 56% still tells us that data governance is a need and possibly a challenge even at the larger utilities.
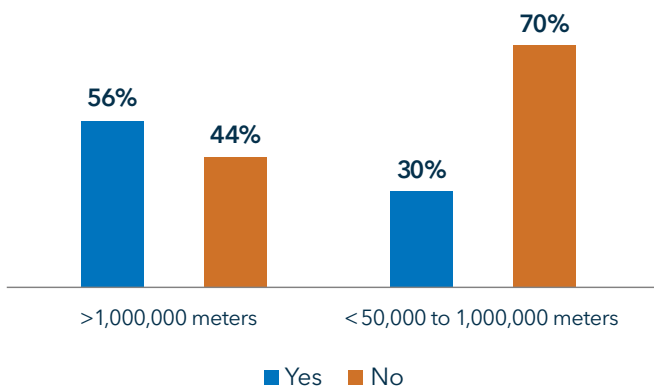
70%

56%

44%

30%

>1,000,000 meters   <50,000 to 1,000,000 meters

■ Yes   ■ No

Figure 5: Does your organization have a formal data governance program?
What size is your utility?

The pervasive impact of analytics

In a relatively short time, analytics has had a significant impact. From optimizing marketing campaigns to forecasting weather and storm response, most survey respondents indicated that analytics is becoming a core part of how they do business and is changing how they will do business in the future. Given the challenges noted before that threaten financial viability of all utilities, analytics will be critical to maintaining the safe and reliable delivery of power to customers in the most cost-effective manner.

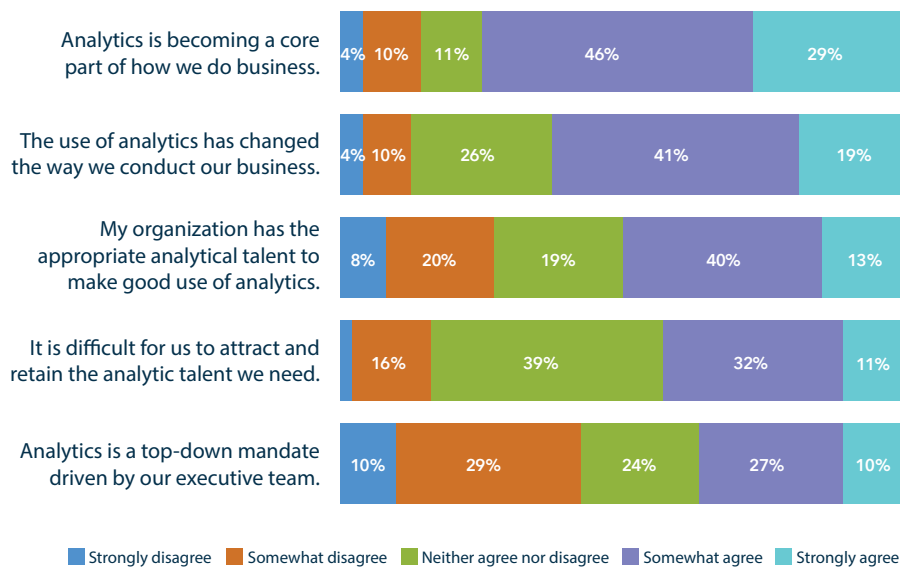| Statement	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Analytics is becoming a core part of how we do business.	4%	10%	11%	46%	29%
The use of analytics has changed the way we conduct our business.	4%	10%	26%	41%	19%
My organization has the appropriate analytical talent to make good use of analytics.	8%	20%	19%	40%	13%
It is difficult for us to attract and retain the analytic talent we need.		16%	39%	32%	11%
Analytics is a top-down mandate driven by our executive team.	10%	29%	24%	27%	10%

Figure 6: Please indicate your level of agreement with the following statements.

Analytics is not exclusively bottom-up or top-down. It must be pervasive and supported by leadership as well as management and analysts. Many utilities struggle to attract and retain analytical talent (43 percent, according to our survey). However, most these respondents indicated that they have appropriate talent to make good use of analytics (53 percent).

To explore this further, we looked at the various skillsets that are required – from data wranglers to data scientists. In particular, the data scientist role has emerged as one of the hot jobs of the decade, and for good reason. Utilities, like other industries, have invested billions of dollars in an intelligent infrastructure, and in many cases data scientists hold the keys to unlocking the value in these investments.

Analytics   Statistics/Math

Data expert

Programming

Domain/Business expertise

Information technology

Figure 7: What skill sets are most urgently needed in your organization to be able to be successful with analytics?

The analytics approach: Platforms and technologies

How an organization embarks on its analytics journey is not a simple matter. There are many variables in to how a utility can progress from basic data management to reporting to predictive operations.

In the research, we evaluated utilities' current approach to enterprise analytic platforms, adoption of cloud-based technology and use of open-source technologies. We found significant progress in all three areas, with a hybrid cloud and on-premises model emerging as a best-in-class approach. Just as today's "algorithm economy" has created the need for more data scientists, the open IT landscape signals a new day for the enterprise IT architect.

While there is now more of an emphasis on business units leading analytics initiatives, the importance of having a robust enterprise analytics platform is important. Roughly two-thirds of survey respondents either already have implemented their platform or are planning to within the next two years.

Don't know
17%

Fully implemented
13%

Currently being implemented
24%

No plans
18%

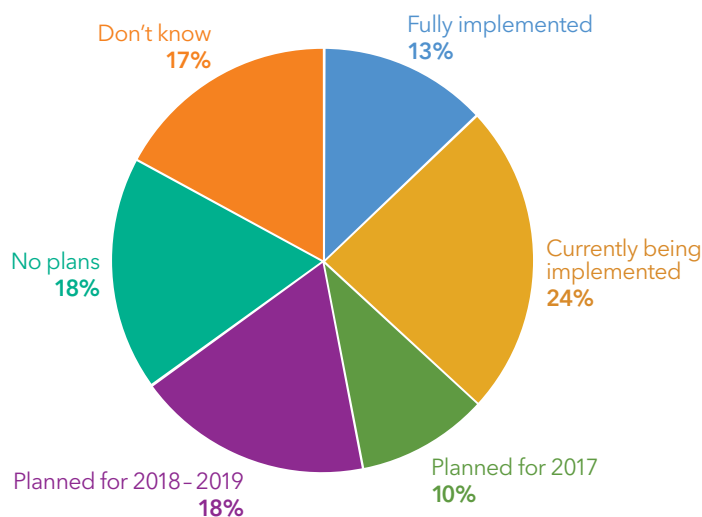Planned for 2018 – 2019
18%

Planned for 2017
10%

Figure 8: What is your current status regarding implementation of an enterprise analytics platform?

The utility industry is among the last to move to the cloud-based data and analytics operating environment. In an industry where reliability is most acute and where security concerns are most prominent, this more cautious approach to new technologies is merited.

But utilities are making that move now and, as our survey respondents indicate, are possibly at a tipping point for acceptance of cloud-based, or software-as-a-service (SaaS), applications. This appears to be true across multiple functional areas, with the exception of grid analytics. Given that this is where the need for system reliability is most acute, this more cautious approach makes sense, but watch for this to evolve during the next two or three years.
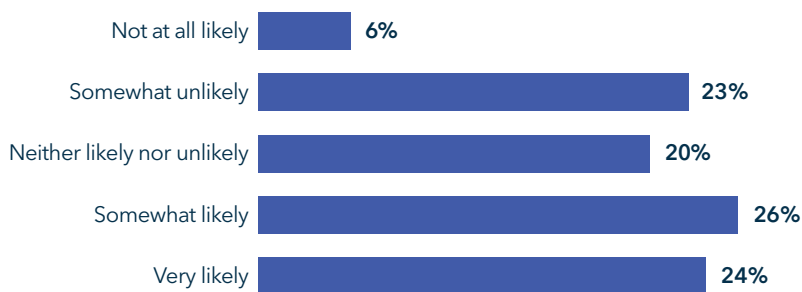
Not at all likely	6%
Somewhat unlikely	23%
Neither likely nor unlikely	20%
Somewhat likely	26%
Very likely	24%

Figure 9: How likely is your utility to consider using a SaaS approach to solve analytics challenges in your organization?

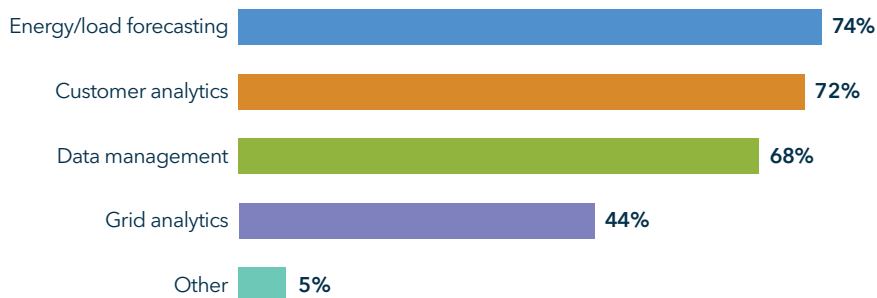|	
Energy/load forecasting	74%
Customer analytics	72%
Data management	68%
Grid analytics	44%
Other	5%

Figure 10: In what areas would you consider using SaaS? (Select all that apply)

The open source community has grown in a big way during the past five years. In a 2012 utility survey, more than half of respondents expected unstructured data (text, social, video, logs, etc.) to account for more than 40 percent (and up to 79 percent) of all data over the next five years.[1] The adoption of open source certainly catapulted Hadoop to the forefront of big data initiatives, and has positively affected the growth of open-source software.

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[1] *High-Performance Analytics for the Smart Grid*. SAS, 2012. https://www.sas.com/sv_se/whitepapers/gtm-research-high-performance-analytics-smart-grid-106115.html

Our research indicates that utilities depend (moderately or significantly) on open-source analytic software for their analytics initiatives up to 40 percent of the time. For utilities that have more than 1 million meters, use rises to 48 percent. These utilities probably have the resources to hire more open source experts. In addition, larger utilities are more likely to use third-party resources for consulting and/or implementation on analytic use cases as well as implementing analytic software. Both point to the larger relative budgets and business cases that come with the scale of larger utilities.
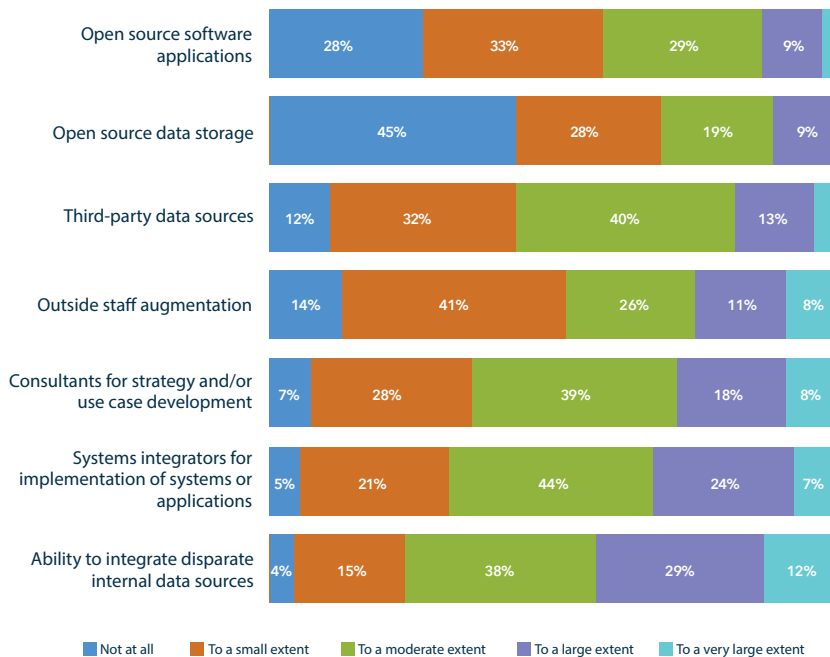

Figure 11: To what extent does your utility depend on the following for analytics initiatives?

Our research indicates that most utilities seek the advice of external consultants when developing their analytic strategy and use cases. The reliance on external vendors, particularly system integrators, continues into analytic system implementations. Only 26 percent indicate that they have low or no dependence on integrators for implementation.

The path to analytics success is a very different from the traditional IT and systems approach in recent decades. The openness to new ways of achieving business goals is reflected in the survey responses. A significant number of respondents are looking to the use of open-source applications and data storage. Half or more will be using Hadoop, R and Python by the end of this year. Third-party data sources and a variety of non-traditional/in-house staffing approaches are being used. There is no sign that these trends will reverse.

Only 26 percent of respondents indicate that they have little or no dependence on integrators for implementing analytics.

While the trend toward more open source technologies as part of a utility's analytics strategy exists across the board, there are some differences when looking at the use of open source in large utilities (over 1 million customers) versus small utilities (50,000 to 1 million customers). For instance, large utilities are more than three times as likely to depend on Hadoop data storage to a moderate, large or very large extent.

An additional dynamic is in the use of outside staffing to implement analytics initiatives. Large utilities are five times more likely to rely heavily on the use of outside staffing resources than their smaller utility colleagues. While smaller utilities would typically not have the depth of analytics staffing, this likely speaks to the complexity and scale of large utility analytics initiatives and the need to have fewer fixed costs in today's cost conscious operating environment..

One key dynamic in incorporating open-source tools into the enterprise is the effort required to combine open-source tools with utility-specific operational technology. As complexity increases and models proliferate around the organization, open source tools have their limits. Pairing these with scalable, enterprise-proven solutions enables utilities to incorporate open source technology while still accomplishing key strategic initiatives.
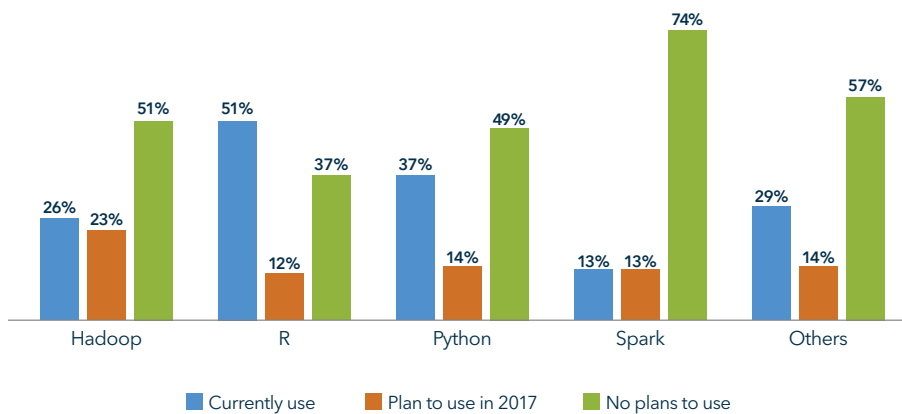

Figure 12: Which of the following open source tools does your utility currently use or plan to use by the end of 2017?

Open source technologies continue to evolve and grow in their use at utilities, as evidenced by the range of responses to this question. R is shown to have the heaviest use currently, with Python at second place. An example of how rapidly this is evolving is in the reported use of Spark. Developed just three years ago, Spark is already in use or planned for use this year at over one-quarter of the utilities surveyed.

Anticipated investments and returns

By responding to a survey hosted by SAS, the utilities that participated in this research may be already committed to the application of analytics within in their organization, either at the department or enterprise level. However, investments are not made lightly in regulated, tight-margin industries, so where do utilities believe that they can gain the most benefit?
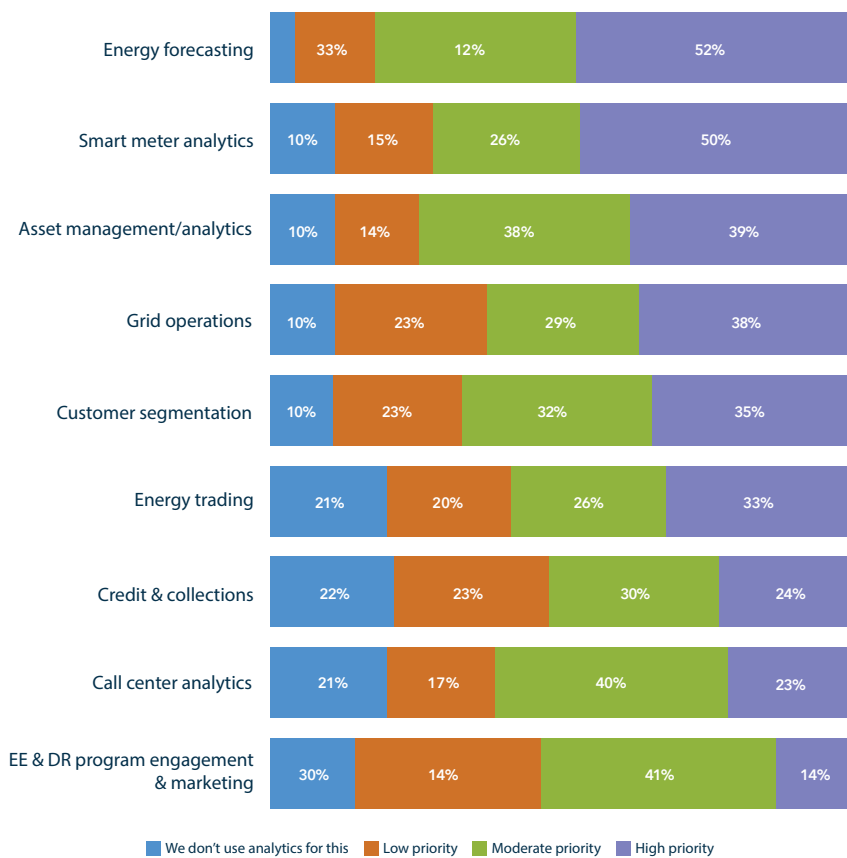
Figure 13: Please indicate the relative priority to your utility of each of the following analytics application areas.
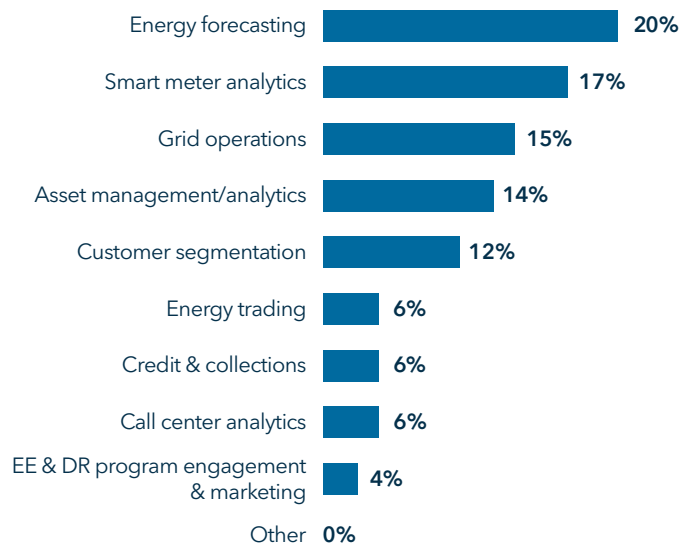

Figure 14: Of the following high-priority analytical application areas, which is the one most important to your utility?

Utilities responded that energy forecasting was the top area of importance, and they had high expectations for return on investment. For many utilities, load forecasting practices have been in place for years or decades and are viewed as being adequate. But with the arrival of more detailed smart meter data and weather data, along with sophisticated computing architectures, many utility leaders have turned to energy forecasting for improved bottom line results, particularly in today's era of flat utility revenues. Numerous studies have shown that energy forecast improvements as small as 1–2 percent can yield millions of dollars in savings. A similar, although not as dramatic, case can be made for grid and asset analytics use cases.

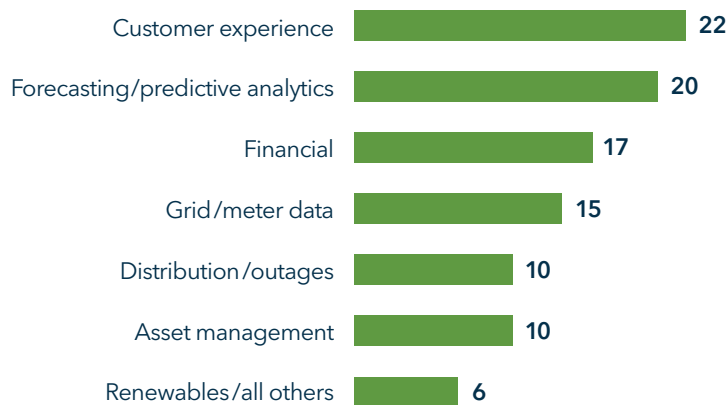| Category	Value
Customer experience	22
Forecasting/predictive analytics	20
Financial	17
Grid/meter data	15
Distribution/outages	10
Asset management	10
Renewables/all others	6

Figure 15: In your own words, in what areas do you think analytics can have (or is having) the biggest positive impact on your business, and why is this the case? (Summary of text comments)

Customer experience is the hottest topic among those surveyed – beating out grid-specific applications. And for good reason. As noted before, the disruption to the traditional customer relationship has created an urgency in reinventing it.

Retaining customers and adding new incremental revenue is critical for long-term financial health, and right at the heart of this challenge is the need for better segmentation of customers. With many new intermediaries merging on the residential and commercial and industrial end-user landscapes, utilities most improve their customer relationships to remain viable and prevent becoming a commoditized infrastructure service.

About the survey

The survey tallied responses from 136 utilities from 24 countries. More than half of the responses were from the US, with Australia, Canada, New Zealand and Denmark rounding out the top five.

The figures below provide a glimpse into the breakout of participants by geography and by utility type.
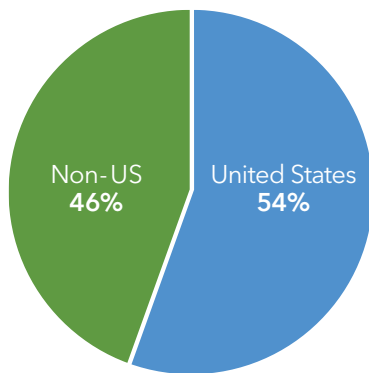

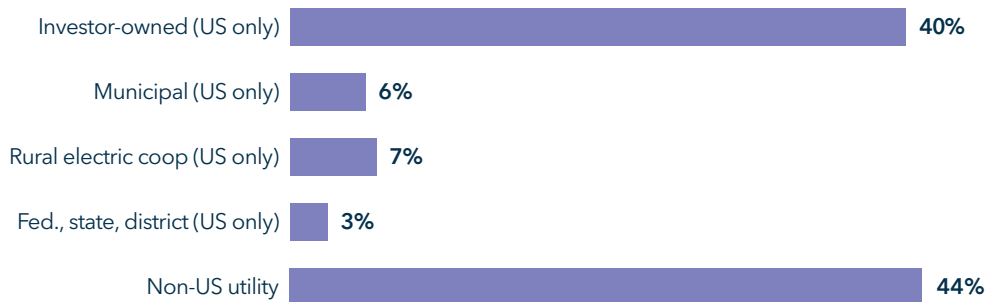Figure 16: Percentage of respondents by geographical region.

Figure 17: Utility participants by type.

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