



2015 Edition

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A Global Perspective

This report contains results from a global survey of leading utility executives and informed consumers from around the world. We asked respondents in 16 countries, covering every region of the world, questions to help gauge their outlook on the utility industry as a whole. This year, we expanded the survey to include two new markets—Argentina and the United Arab Emirates—with 900 utility executives and 900 informed consumers responding, reaching 28 percent more respondents than last year.

We also added rigor to the research process by evaluating macro trends and economic data to create two new indices—the Energy Resourcefulness Index and the Water Resourcefulness Index—to reflect a broader assessment of the relationship between resourcefulness and economic competitiveness. Resourcefulness is defined as the ability of utilities to effectively manage the delivery and use of gas, water and electricity. These indices were built from 21 different indicators, or variables, such as a country's ranking in the International Energy Agency's statistics on electricity transmission and distribution losses as well as Global Water Intelligence's nonrevenue water data.

We believe this expanded view provides compelling insights into the ties between energy and water resourcefulness and economic growth for key global economies and the utilities that help power them.

16

Countries

9000 Informed Consumers

Utility Executives

900



An Introduction

Once again, Itron is pleased to release the results of the annual Itron Resourcefulness Index. The index is a global study of the utility industry, which serves as a benchmark for measuring how resourceful we are in managing and using energy and water. This report provides insights from utility executives and informed consumers from around the world. In this, our second edition, we are exploring the ties between energy and water resourcefulness and economic growth.

Why do we measure resourcefulness? Simply put, it is a necessity. With a booming population, aging infrastructure and workforce, a fixed utility asset base and looming government mandates, managing energy and water is critical to ongoing economic prosperity, resource conservation and social well-being. As an industry, we have work to do. We will get there through resourcefulness.

The numbers speak for themselves—the total annual cost of wasted resources is roughly \$40 billion in the United States alone. If even 1 percent of that loss can be recaptured on a global scale, utilities would be able to reinvest in the priority areas identified in this report to further reduce energy and water waste, revitalize infrastructure and enhance service reliability, all while providing their customers with the information they want to conserve resources and save money.

By increasing resourcefulness, utilities can lay the groundwork for a future-proof business model. With constant uncertainties—from the fluctuating market, shifting delivery models and government regulations—utilities can serve as a catalyst for change by engaging consumers, regulators and investors, while becoming greater drivers of innovation and progress.

With our in-depth evaluation of key markets around the world, we have uncovered many interesting insights and identified countries that demonstrate resourcefulness across three common pillars: fundamentals, efficiency and innovation. These findings bring greater awareness of the challenges the utility industry is facing with the goal of building a more resourceful future.

Join us in creating a more resourceful world.

Sincerely,

Philip Mezey President and CEO, Itron

Executive Summary

The Case for Resourcefulness

More than a century after the first public power station was built, the invention of the light bulb and the widespread move to indoor plumbing, utilities have become inextricably linked with the prosperity of nations, serving as an engine of commerce and enabling significant quality of life improvements.

Now more than ever, utilities—along with consumers, governments and other institutions—are being called upon to find ways to ensure that water and energy resources are used more effectively and efficiently. In some instances, this is viewed as a burden, or even as a drain on economic vitality. But, a growing body of evidence suggests that countries and utilities actually benefit economically from making the investments needed to achieve a higher level of resourcefulness.

Itron aims to add to that body of evidence by shedding light on how utilities can help contribute to national resourcefulness and economic growth. We start with a simple premise—that by more effectively managing the delivery and use of gas, water and electricity, utilities can play a central role in meeting rising energy and water demands and promoting economic stability.

To examine this premise, we have expanded last year's research to combine survey results with two new indices – the Energy Resourcefulness Index and the Water Resourcefulness Index.

This year's study marks the first step in exploring the ties between resourcefulness and economic growth. By combining survey results with economic data, this report provides a new view of the utility industry's role in national competitiveness, while at the same time capturing the consumer perspective on the state of the utility industry. These insights help drive a new dialog about the roles utilities, consumers and governments play in managing and conserving energy and water and how that will lead to greater social and economic opportunities that will shape the future of resourcefulness.

Key Insights

This study measures the opinions of global gas, water and electric utility executives, along with consumers, to gauge how resourceful they think the industry is today to: identify perceived barriers to progress and help envision solutions for a more resourceful future. Key perception study insights include:

Modernize our infrastructure.

Investments in utility infrastructure and business intelligence/ analytics are clear priorities for utility executives and are key to strengthening resourcefulness. The need for transformation is widely recognized. For example, 83 percent of utility executives feel transformation is needed, 55 percent believe the industry is not running efficiently and 21 percent believe the state of infrastructure will be worse in five years.

Educate the public.

There is a growing disconnect between utilities and consumers regarding consumer education and what information they want. Among consumers, 54 percent believe there is a lack of information about consumption and conservation. However, utility executives ranked consumer/educational programs as the first to go if they had to reduce their budgets by 10 percent.

Develop a future-proof business model.

Utilities are facing a changing landscape that includes: distributed generation, renewable energy integration, an aging workforce and Internet of Things (IoT) adoption. While these are top-of-mind for utilities, consumers are also changing the way they think about utilities. For example, the study indicated a strong interest from consumers in their utility investing in renewable technology. A total of 64 percent of surveyed consumers agree that they would like the utility industry to focus on renewable integration.

These insights are complemented by the Energy and Water Resourcefulness Indices, which serve as benchmarks of national performance as to how resourcefully countries are managing and using their energy and water resources to promote economic prosperity. For example, evaluated on fundamentals, efficiency and innovation, Germany and the United Arab Emirates performed well on energy, while Australia and Canada were strongest in water.

This report is intended to raise awareness of key global energy and water concerns, highlight the need for industry-wide transformation and send out the call for visionary leadership around the world to help usher us into a more resourceful age.

"...strengthening resourcefulness can help countries, and utilities, be more competitive and have a positive impact on global economies."





Source: U.S. Energy Information Administration

Utility services operate on a continuous cycle—while you live, work, play and sleep, utilities are humming in the background as a critical, always-on part of modern life. Billions of people and businesses rely on water and energy to meet their needs every day. The world's population is expected to grow to 9 billion by 2040, with future demand for energy and water expected to increase by more than a third.

And yet, 1.3 billion people still lack access to electricity and 3.5 billion have no access to clean water. Improving their standard of living and quality of life, while planning to meet the needs of future generations, brings our global resource needs into sharp focus. Successfully doing more with what we have will be among the defining accomplishments of this century. Historically, as societies have evolved from an agrarian to a modern industrial economy, increased efficiency and conservation measures led to a decoupling of consumption and GDP, as the diagram above shows.

As the global economy shifts from an "Age of Consumption" to an "Age of Resourcefulness," success will be determined by which countries are able to do more with each unit of resource. Utilities have a unique opportunity to deploy technologies and solutions to reduce waste, revitalize infrastructure and enhance service reliability—all of which will generate benefits to the overall economy.

By encouraging and achieving greater resourcefulness—defined as the ability of utilities to effectively manage the delivery and use of gas, water and electricity utilities can strengthen their role in promoting robust economic performance.

Each year, a mind-boggling \$40 billion is wasted in lost electricity, natural gas and water resources in the U.S. alone. To put that figure in context, that's enough to build more than 2,000 new public schools. Energy and water play a fundamental role in modern economic activities. By modernizing aging infrastructure and changing the way utilities do business, utilities can improve a country's competitiveness in the global economy by creating jobs and improving lives.



The Industry Must Continue Modernizing Infrastructure

Our survey found that regardless of where leadership responsibility falls, utility executives and consumers agree there is a need for transformation and infrastructure investment.

This need for transformation remains widely recognized. A total of 83 percent of utility executives feel transformation is needed, while 55 percent believe the industry is not running efficiently and 21 percent believe the state of the infrastructure will be worse in five years. Of note, utility executives' confidence in the industry's outlook has improved slightly from last year. Specifically, 11 percent fewer report a need for transformation and 26 percent fewer report infrastructure will be worse in five years. Utility executives are also more confident about the industry outlook than consumers.

Consumers' current concerns include lack of educational programs, personal information security and distribution leaks. For example, 54 percent of those surveyed agreed that education about consumption and conservation is low or lacking.

Compared with last year's results, this year we see a trend that both utility executives and consumers agree that modernization and access to information are necessary for continued reliable service at a time when resources are strained in some parts of the world and demand is on the rise.

B33% believe transformation is needed

Technology and Software Tools are Key to Transformation

Investments in business intelligence/analytics are a major focus. This year, we specifically asked utility executives what technology investments they would prioritize. Nearly one-third (29 percent) reported that business intelligence/analytics would be at the top of their investment wish list. Analytics deliver value by turning data into information utilities can use to improve smart grid and smart water distribution operations.

For example, in the U.S., there are currently about 150 million electricity meters, of which more than 40 percent are smart meters with more advanced functionalities that generate large amounts of data. For many utilities, fully analyzing the data to extract more value is a top priority.

Networks and IoT are driving investments in

big data tools. As utility systems become networked and interconnected, the management of big data is increasingly becoming more important. The vast majority of utility executives, 81 percent, will adopt big data processes. This is especially true for water executives, with 85 percent of respondents saying they need big data tools. Investing in tools to manage big data is crucial for modernizing infrastructure, according to 80 percent of all utility executives. In fact, 80 percent say "without big data, you can't have smart cities."

Many utilities are increasing investments in managing big data to improve resourcefulness, but they recognize they are still failing to fully utilize these technologies in a way that maximizes return on investment.

Utility Executives

How would you describe your company's ability to manage big data?



Educate the Public about Conservation and Consumption

Study results show that there is a growing disconnect between utilities and consumers regarding consumer education. Among consumers, 54 percent believe there is a lack of information about consumption and conservation. However, utility executives ranked consumer/ educational programs as the first to go if they had to reduce their budgets by 10 percent.

There is a disconnect in the dialog between utilities and

consumers. This year, 66 percent of utility executives believe they have been successful in consumer engagement, an increase from 55 percent last year, yet consumers feel less informed about the utility industry and are less satisfied with the information they are receiving. Only 14 percent of consumers are satisfied with the communication from their water providers. Consumer education is vital to spreading efficiency and conservation practices to end-users in order to achieve greater resourcefulness.

Consumers want more "news you can use" from their utilities. Nearly half of consumers continue to believe utilities should focus on educating consumers about consumption and conservation; however, utility executives surveyed put consumer education and conservation programs at the bottom of their investment wish list. Government, utilities and consumers need to work collaboratively to boost resourcefulness. Both consumers and utility executives

agree that national policy and regulation are large factors influencing resourcefulness. This creates a challenge as utilities make the case to invest in tools that empower consumers.

Consumers believe that government and utilities should take the lead, while utility executives view this as the role of government and consumers. This year, however, when specifically asked if all parties have the ability to improve resourcefulness, both utility executives and consumers agreed everyone has a role to play. Who has the greatest ability to improve the effectiveness of managing the delivery and use of electricity, gas and water in your country?

- Utilities by changing their practices.
- Consumers by being less wasteful with electricity, gas and water.
- Governments by changing the policy environment.





Resourcefulness in Action



City of Kalgoorlie, Australia

Promoting Conservation

In Western Australia, the city of Kalgoorlie is totally dependent on Perth, which is 600 km away, for its supplies of fresh water. As a result, the cost of water distribution is particularly high. A conservation program was put into place to manage distribution and wastage.

Thanks to the deployment of Itron's fixed network system, water supply to Kalgoorlie has been reduced by over 800,000 kiloliters (211 million gallons), a savings of approximately 10 percent. The availability of consumption profiles on a web portal, combined with leaks alerts, has helped to engage consumers in a more sustainable way of using water.



Titas Gas Transmission and Distribution Company Limited

Making the Most of What You Have

Titas Gas Transmission and Distribution Company Limited (TGTDCL), the largest natural gas distributor in Bangladesh, faces the possibility of running out of natural gas based on current usage. Most of Bangladesh's domestic gas supply is currently unmetered and paid for via a fixed monthly gas fee irrespective of the volume of the gas consumed. This is one of the factors that contributes to the wastage of gas, resulting in system loss.

As a part of its "Supply Efficiency Improvement" project, TGTDCL is using Itron's gas smart payment solution to improve the efficiency of natural gas consumption in the Dhaka metropolitan area of the country. The solution is helping TGTDCL decrease gas wastage, protect revenue and reduce apparent losses.



National Grid

Know More Save More

National Grid, supplier to approximately 3.4 million electric customers and 3.6 million gas customers in the Northeast U.S., implemented a pilot of the Smart Energy Solutions Program, which utilizes Itron's OpenWay[®] smart grid solution. This program gives approximately 15,000 customers in Worcester, Mass., better insights into their energy usage and costs, and utilizes home area network devices for demand response. Smart thermostats, smart plugs, and mobile and online energy use information are all connected through CEIVA's Homeview platform—a digital frame, phone app and web portal that allows customers to see power usage in real-time. The demand response technology allows customers to actively participate in load reduction and conservation events during peak event demand management.

Utilities Should Begin Laying the Groundwork for a Future-Proof Business Model

Utilities are facing a changing landscape that includes renewable energy integration, an aging workforce, and Internet of Things adoption.

Dealing with disruptive innovation.

Whether you look at the falling costs of solar or the rising political interest in renewable energy, it's clear that renewables will be a part of the energy mix. Our study indicated a strong interest from consumers in their utility investing in renewable technology. Specifically, 64 percent of all surveyed consumers agree that they would like the utility industry to focus on renewable integration. Utility executives agree that integrating renewables is an unmet need of the industry today.

Managing a changing workforce.

Our study reveals that 78 percent of consumers believe that the changing workforce and knowledge sharing gap is a growing or urgent concern for the industry right now. The majority of utility executives agree, with 61 percent believing this issue is a challenge moving forward.

Barriers to Achieving Resourcefulness Remain

Our research reveals that the challenges are well-known.

"New (or potentially new) government regulations" are listed as a concern by 70 percent of utility executives and 80 percent of consumers, closely followed by "the low rate of investment in infrastructure." In comparison, 70 percent of utility executives and 89 percent of informed consumers shared the same concern. Informed consumers are significantly more concerned than utility executives about these issues, indicating an opportunity for improved industry communication around achievements and innovations as well as a need for education surrounding its advanced capabilities and long-term investments.

As with last year, the top barriers remained related to government

regulation. However, we saw a significant increase in barriers that are less frequently cited—the lack of private funding and need for more time. Utility executives citing a lack of private funding as a barrier to infrastructure investment rose 17 percent from last year, and the need for more time rose 14 percent.

New (or the possibility of new) government regulations still threaten the industry. The risk

associated with new (or the possibility of new) regulations has decreased slightly from last year— 44 percent of utility executives saw it as a current threat last year, with 39 percent reporting it as a threat in five years. Despite this improved outlook, utilities have decreased confidence in their own preparedness if new regulations are introduced—58 percent feel equipped to deal with government regulations, compared to 62 percent last year.



Energy and Water Resourcefulness Indices

03



Energy and Water Resourcefulness Indices

A Deeper Look at the Economic Relevance of Resourcefulness

Resourcefulness Defined

For the purposes of this study, resourcefulness is defined as the ability to effectively manage the delivery and use of gas, water and electricity.

This year, to reflect a broader assessment of the relationship between resourcefulness, and social and economic health and competitiveness, we compiled macroeconomic data from third-party sources, including the World Bank, World Economic Forum and Global Water Intelligence, and others. We have combined their research data with our survey findings to create a national resourcefulness ranking for the countries we surveyed, resulting in two new indices: the Energy Resourcefulness Index and the Water Resourcefulness Index. The indices are organized into three pillars:

- **Fundamentals** reflect the ability of utilities to serve customers and the broader enabling environment;
- Efficiency measures the extent to which water and energy is wasted by utilities and consumers; and
- **Innovation** captures the extent to which utilities are embracing new and emerging technologies.

In both the Energy and Water Resourcefulness Indices, we found there are countries that are already achieving a high level of resourcefulness across the three pillars.

Energy Resourcefulness Index

We found that the top five scoring countries succeed in being resourceful by excelling in different ways, with Germany emerging as the strongest performer.

Germany's energy economy has a complex profile. Policy decisions made during the past 15 years have set Germany apart from many of its European and global peers. Our research shows that Germany scored well in the fundamental and efficiency pillars because of its high quality of electric supply and low electricity transmission and distribution (T&D) losses.

The United Arab Emirates also did well on fundamentals, as well as innovation, where it is ranked first. Particular strengths are in digital demand response investment, quality of electricity supply and its ability to accommodate new energy resources.

Australia performed well in the efficiency and innovation pillars due to low electricity transmission and distribution losses, as well as high levels of energy R&D investment, respectively.

Spain has a balanced performance across all three pillars and demonstrated strength in efficiency and adapting to the pace of technology innovation.

The U.S. performed well in fundamentals due to a high score in the quality of electricity supply as well as efficiency due to low electricity T&D losses.

Fundamentals Efficiency Fundamentals Efficiency Germany 68.8 United Arab Emirates 55.0 Australia 51.0 Spain 50.3 United States 48.5

Scoring formula for 16 countries surveyed: ((Fundamentals Pillar Score x Weighting) + (Efficiency Pillar Score x Weighting) + (Innovation Pillar Score x Weighting)) x 10

Germany / Resourcefulness in Action



Germany is leading the sustainable energy charge in Europe. In the past 12 years alone, Germany has replaced 31 percent of its nuclear and fossil fuel generated electricity with clean power, with the goal to cut 80 percent of the country's carbon emissions by 2050. For example, in Schwabisch Hall, a small town north of Stuttgart, the local utility uses 3,000 regional energy suppliers that include two wind parks, thousands of individually-owned solar photovalic installations and six small hydroelectric works to meet all local energy needs and provide power to an additional 90,000 customers throughout Germany.

The local experiment has proven that when it comes to Germany's renewable energy revolution, small can be big and growth can happen in a hurry.

Water Resourcefulness Index

Results from our research reveal that the top five countries in water resourcefulness tend to have high levels of water meter penetration and low levels of non-revenue water. Interestingly, while the top two countries, Australia and Canada, are comparable in population and landmass, they provide a stark contrast in water abundance—Australia is dominated by an arid interior, while Canada has one-fifth of the world's fresh water supply and almost 10 percent of its surface covered in water.

Australia performed strongly across all three pillars and was ranked the strongest in efficiency as a result of having the largest meter market per capita and low proportion of non-revenue water. It also ranked highest in innovation, given the high level of government investment in environmental R&D.

Canada also performed well in all three pillars, with the strongest fundamentals and the second strongest efficiency. Canada maximizes its ample water resources by harnessing hydropower to generate approximately 60 percent of its electricity.

Japan, the U.K. and Germany also ranked in the top five most water-resourceful countries. Japan excelled in efficiency, while the U.K. performed strongly in the fundamental and efficiency pillars, driven by waste and wastewater coverage rates.

Top Water Resourceful Countries



Scoring formula for 16 countries surveyed: ((Fundamentals Pillar Score x Weighting) + (Efficiency Pillar Score x Weighting) + (Innovation Pillar Score x Weighting)) \times 10



Australia / Resourcefulness in Action



As a water-poor country compared to the other top performers in the water index, Australia works hard to resourcefully manage its water supplies. Technology plays an important role in helping conserve precious water resources.

For example, in an effort to conserve water resources, the Water Corporation of Australia is implementing a water efficiency program aimed at saving one billion liters of water per year. By detecting leaks and spotting unusual increases in demand, the Water Corporation is making informed decisions about water conservation. Over time, the utility will map water usage to determine trends and pinpoint potential areas to target conservation. In Port Douglas, water demand management has become increasingly important due to high fluctuations in tourism. The local utility uses technology to track water consumption and optimize supply according to demand. By monitoring consumption in real-time, the utility has improved water resource management. ⁰⁴ The Path Forward

The Path Forward

Energy and water consumption have increased over the past 30 years—and will continue to do so. As such, resourcefulness will be one of the defining trends of this century. The insights from this report can help all stakeholders prioritize the need for investment in technology, infrastructure and education.

The opportunities and consequences of inaction are too great to ignore. To put this enormous potential waiting to be harnessed into perspective, consider the cost of current waste in the United States: \$13.1 billion in water, \$25 billion in electricity transmission and distribution and \$2 billion in unaccounted for natural gas. In total, almost \$40 billion is lost through wasted resources every year. That is no small sum considering in 2008 alone, state and local governments in the U.S. estimated their total expenditures at \$93 billion annually for wastewater and drinking water infrastructure. Worldwide, utility infrastructure spending is expected to total more than \$9 trillion by 2025, up from \$4 trillion in 2012.

As an industry, we're taking strides toward becoming more resourceful with the energy and water resources we have by applying technology and empowering consumers to manage energy and water use. But there is still more work to be done.

Our study indicates that to address the top concerns identified in this report, utilities need to take a leading role in a new era of resourcefulness. They can become the voice behind the need for transformation to address the following key themes:

- Modernizing infrastructure
- Educating the public
- Developing a future-proof business model

Utilities should to continue to invest in methods and technologies that enable the effective and efficient use of our resources. To do so, partnership will be key.

Together, we can create a more resourceful world.



Urgent Concerns of the Industry





Urgent Concerns of the Industry



Supplying / supporting new sources	40%) 44%
Ensuring the continual supply of gas, electricity, water to customers	42%) 42%)
Minimizing lost revenue that occurs through operational inefficiencies	31%
Keeping up with the needed rate of investment in infrastructure	42%) 41%)
Educating consumers about consumption and conservation	33%
Keeping customer data private and secure	33%) 34%
Dealing with new (or the possibility of new) government regulations in the industry	31%
regulations in the industry	33%) n/a
regulations in the industry Keeping pace with technology innovation	33% n/a 32%
regulations in the industry Keeping pace with technology innovation Preparing for man-made or natural disaster recovery	33% n/a 32% n/a 31%

Revenue Protection / Operational Inefficiencies

To what degree is lost revenue due to operational inefficiencies a concern of the utility industry?





Cyber Security / Physical Attacks

To what degree are physical and cyber attacks a concern of the utility industry?



Managing a Changing Workforce

To what degree is managing the changing workforce and knowledge sharing gap a concern of the utility industry?



Man-Made / Natural Disasters

To what degree are man-made or natural disasters a concern of the utility industry?



Changing Customer Expectations

To what degree is the inability to manage changing customer expectations a concern of the utility industry?



Emerging New Technology

To what degree is the increasing pace of technology innovation (e.g. Internet of Things, smart meters, sensors, data management systems, etc.) a concern of the utility industry?



Privacy and Security

To what degree is protecting private data about customers a concern of the utility industry?



Availability of Resources

To what degree is accommodating new sources of energy and water a concern of the utility industry?





Supply of Resources

To what degree is supplying customers with reliable energy and water a concern of the utility industry?



Infrastructure Investment

To what degree is the low rate of investment in infrastructure a concern of the utility industry?





Consumer Education

To what degree is the lack of consumer education about consumption and conservation a concern of the utility industry?



Government Regulation

To what degree are new (or potentially new) government regulations a concern of the utility industry?





The Biggest Issues that Threaten the Industry

A Five-Year Outlook





The Biggest Issues that Threaten the Industry

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