Itron

2018 EDITION

# ITRON RESOURCEFULNESS REPORT

An Analysis of International Energy and Water Trends

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An Analysis of International Energy and Water Trends


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Itron, Inc.

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Resourcefulness Report
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## WHAT IS
# RESOURCEFULNESS?

It's the wise and careful use of vital resources, particularly water and energy.

It's about managing those resources efficiently and using them thoughtfully.

And it's about delivering them reliably, safely and affordably.

Read on to learn how we're all doing with resourcefulness today, and how all of us can do better tomorrow.

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# CEO PERSPECTIVE

## Now is the Time to Take Action

It is my honor to share with you the 2018 Itron Resourcefulness Report. Six years ago, we began commissioning independent research to gain clear and timely insights into what utility executives and consumers around the world think about resourcefulness and the issues related to it. This latest report builds on the findings in our previous reports and offers a snapshot into opinions and perspectives today. In some cases, the report highlights how those perceptions are changing, for better or worse.

We believe this research is essential because of the vital nature of resourcefulness itself. The wise and careful use of energy and water is critical to the quality of life the world over. All human societies rely on these resources to operate safely and effectively, and most of all, to thrive. Reliable access to energy is essential for modern commerce, education, public safety, government and so much more. And as for clean, safe and affordable water—it is essential to life itself.

Around the world, those who provide electricity, gas and water are charged not only with safely and reliably delivering these resources, but also with acting as stewards for years to come. In the midst of change from technology, climate, consumer expectations and more, these providers have never done better in these dual roles.

And yet, we can do so much more. When people around the world struggle to provide drinking water for their families, how can we justify allowing a third of all pumped water to be lost to leaks?[1] When families are unable to pay their heating and cooling bills in an age of record temperature extremes, how can we tell them that the world wastes twice as much energy as it uses every year?[2]

The only worthy answers to these hard questions must be delivered not with words, but with action. By showing the world how modern, connected infrastructures can reduce waste and inefficiency. How consumers can become allies, and even advocates, in the building of a more resourceful world. How all of us have a stake in the outcome, at a time when the stakes may be higher than ever.

The 2018 Itron Resourcefulness Report examines issues like integrating renewable energy sources, reducing pollution, utilizing big data analytics to gain insights into consumption and to prevent problems before they arise, deploying smart city technologies to improve the way people live, and finding new ways to bring consumers along on the journey toward resourcefulness.

Resourcefulness is more than a set of technologies and practices. It is a mindset, a culture. And it appears increasingly clear that the sooner we adopt that mindset, the better our future will be.

This report offers some insights into how all of us—utilities and consumers alike—can answer the hard questions with action.

Sincerely,

President and CEO, Itron

1 International Energy Agency.
2 Lawrence Livermore Laboratory.

# ABOUT THIS STUDY

This report, the latest in a series of studies on resourcefulness that date back to 2013, consolidates insights from a survey of utility executives and informed consumers in 10 key countries on five continents.

The survey tracks perceptions of consumers and utility executives on an array of topics relating to how utilities deliver energy and water, and how consumers use them. It also peers into the resourcefulness priorities and aspirations of both groups. While previous reports tracked specific indices across 35 macro indicators, this year's report concentrates more on the resourcefulness of utilities as measured by the perception of utility industry executives and the customers they serve. The report also examines consumers' opinions of their own resourcefulness.

The 2018 survey captures responses from 1,013 informed consumers and 1,018 utility executives. The results of these surveys amount to a uniquely inclusive view of resourcefulness, and what it means to stakeholders on five continents.


**10 Countries Surveyed**

| | |
|---|---|
| Australia | India |
| Brazil | Malaysia |
| Canada | Mexico |
| France | Sweden |
| Germany | United States |

## THE THREE PILLARS OF RESOURCEFULNESS

Thoughtful and careful use of resources cuts across many dimensions. The 2016 edition of our research introduced the concept of three pillars of resourcefulness:

- **Effectiveness** in providing reliable and consistent water and energy services;
- **Efficiency** in providing energy and water services while minimizing waste; and
- **Sustainability** in minimizing the impact on the environment when providing water and energy services.

Many of the questions in the 2018 survey delve into issues relating to these three pillars.

# EXECUTIVE SUMMARY

# EXECUTIVE SUMMARY

This report looks closely at some of the most important issues surrounding resourcefulness by extracting insights from the surveys of two key stakeholders: *energy and water utilities*, and the *consumers* they serve. While these two groups often have starkly different views about responsibilities and priorities as they relate to improving resourcefulness, there is often common ground to be found in their responses. Where differences or commonalities appear meaningful, this report highlights them. From the 2018 survey results, certain insights stand out.

**Worried about inefficiency and waste, consumers think utilities can and must do a better job being resourceful**. Half of consumer respondents believe their utilities are wasteful (don't do a good job managing the delivery of energy and water) and these respondents are worried about the threats posed by waste and inefficiency. Only half of utility executives believe their utilities are running efficiently—a problem that risks damaging consumer satisfaction, threatens utilities' ability to meet demand and can lead to higher business costs. Consumers point to antiquated systems and a lack of renewable energy sources as the main culprits.

**Virtually everyone thinks resourcefulness is important, even if they disagree on who is best equipped to improve it**. Consumers recognize their own role, with 58 percent seriously concerned about their personal impact on the environment. Yet consumers say utilities are most suited to improve resourcefulness; conversely, utilities point to consumers. That disconnect has existed for years, but the gap is narrowing as each group has begun to envision a larger role for itself. On a country-by-country basis, consumers and utilities in Germany, Mexico and Singapore are aligned in their opinion that consumers are best poised to enable improvements. In Sweden, both groups point to utilities.

**Rates are too high and reducing pollution is a priority. Now more than ever, consumers and utilities want to do something about it**. Price concerns abound. The number of utility executives who say affordable electricity prices are the most important element of resourcefulness jumped 56 percent from 2015. Most consumers and utilities say both electricity and gas prices are too high; water is too expensive for most consumers. Saving money is the number one reason consumers want to modernize electricity services, though reducing pollution is a priority not just for consumers but utilities as well, particularly among gas and water industry executives. To address these concerns, consumers in all polled countries are taking action on several fronts, from using programmable thermostats (half of U.S. respondents have them) to using solar panels—particularly attractive to consumers in India, Mexico and Brazil.

**When they envision a resourceful future, consumers and utilities see more renewables, connected infrastructures, big data and smart cities**. Integrating renewables is a shared goal. It's the number one unmet need among utilities; for consumers, it's the number one goal they have for utilities. Connected infrastructures—crucial to an array of next-generation services—represent another shared priority. Seven out of 10 consumers say connected energy systems are a high priority in their country, while eight out of every 10 utility executives see a lack of infrastructure investment as a growing or urgent concern. Big data—the growing volumes of information gathered by sensors, smart devices and more—is also becoming a

touchstone for the future. Over the past four years, utilities have increased their big data use by 58 percent, and nine out of 10 consumers believe big data is important for improving efficiency (though many cite privacy concerns). Meanwhile, smart city deployments appear ready to take off. Consumers want them now, with 60 percent calling them a priority and four out of five believing they will be critical within five years. Among municipal utilities, smart city solutions represent a high priority for 70 percent of respondents. With automated meter reading (AMR), advanced metering infrastructure (AMI) and smart meter deployments no longer the priority they were three years ago, municipal utilities may well have already implemented some key building blocks of smart, citywide, multi-purpose networks.

**Utilities are working to build a resourceful future, but challenges exist**. Integrating renewables is a popular goal, but market and regulatory uncertainty is preventing many utilities from implementing the technology necessary to make it happen. At the same time, utilities find they're having a harder time keeping up with the pace of innovation; their biggest unmet needs are integrating renewables and investing in innovative infrastructure technologies. When it comes to big data, utilities will need to reassure consumers their information will be kept safe, and they'll have to do a better job managing the data they already have (63 percent of utilities aren't managing their data effectively or at all). To overcome all these obstacles, utilities must do a better job of engaging consumers. Utilities already know this: 77 percent of executives describe educating consumers on energy and water consumption and conservation as a growing or even urgent concern.

**Creating allies will be instrumental in building a more resourceful future**. One way to overcome these challenges is to invest in initiatives that both consumers and utilities believe in. For most consumers, the primary motivation for resourcefulness is to save money. This presents an opportunity for utilities to demonstrate that resourceful habits and investments can cut energy and water bills—a message that consumers respond to. (Nearly one in four say they would be more resourceful for savings of 5 to 10 percent, and 39 percent would conserve for savings of 11 to 20 percent.) The mutual attraction both groups have for renewables and related conservation practices offers additional common ground. Smart city technologies also hold promise, with 75 percent of consumers saying they would be willing to pay more for smart city benefits. In addition, everyone seems to want utilities to use innovative technology for greater efficiency and better service. Data analytics may offer another way to encourage more resourceful behaviors, with nearly a third of consumers saying they'd like to track their daily consumption. As for concerns about big data security, utilities can help allay consumer fears by reinforcing that cybersecurity investments are among their top investment priorities. And to create lasting partnerships with consumers, modern, dynamic engagement techniques—that go beyond bill inserts—can help build closer, more committed relationships with consumers. These strengthened relationships can foster consumer advocacy for new infrastructure initiatives, resourcefulness programs and more.

**The time is now to act**. Consumers and utilities both want to move in the same direction. They both want a resourceful world, to live in smart cities, and to make extensive use of renewable sources of energy. They want safer, less wasteful, more efficient and sustainable communities. For all the challenges outlined in this report, solutions already exist. Many utilities are implementing them based on their particular priorities. They're turning customers into partners to create the future they both want. This is fortunate because transformation can't wait. Above all, one thing is clear: Inaction is not an option.

# EXECUTIVE SUMMARY

## India, Mexico and Brazil: Statistical outliers, or a sign of things to come?

Between **91% and 98%** of consumers in these three countries believe personal actions are very or extremely important to *solving global energy challenges*

**100%** of utility executives in India say their industries must **be transformed**

**More than half** of consumers surveyed in India, Mexico and Brazil would use solar panels if the technology was available to them

**Smart city deployments** are a higher priority for utility executives in these countries than in **all other countries surveyed**

Across the 10 countries surveyed for the 2018 Resourcefulness Report, variations in results are common. Each country and culture has its own history with energy and water services, its own infrastructure to serve consumers, and its own societal expectations of individuals. In short, every country is different.

But in assessing the results of the 2018 survey, the responses of stakeholders in India, Mexico and Brazil stand out. Their desire for transformation is more universal, their hunger to use renewable energy sources is more acute and their perception of the systems that serve them is more concerning. Examples abound:

- Consumers in these countries believe their utilities are especially wasteful, with antiquated systems appearing as the top reason for wastefulness.
- Consumers here are significantly more concerned about the impact of their own resource use on the environment than consumers in other countries. In India, 95 percent of consumers say they are very or extremely concerned, well over twice the rate found in the U.S.
- Only these three countries show consumers prioritizing environmental concerns over saving money—in most cases, by a wide margin compared to other countries.
- India, Mexico and Brazil lead other surveyed countries in aspiring to use wind turbines as well, and they name connected energy as a priority.
- Most utilities in India, Mexico and Brazil acknowledge the need for transformation of their resource industries. In India, a unanimous 100 percent of utility executives say their industries must be transformed.

What does this data tell us? It may suggest that in countries where people more acutely experience the impact of resource scarcity (Mexico and India are among the world's most water stressed countries[3]), the need for improved resourcefulness is more pressing.

If that's the case, perhaps utilities, consumers and government agencies in all countries should closely examine the risks they also face in a resource-constrained world. Because while Brazil, Mexico and India may just be outliers, they also may also be a sign of things to come for everyone else.

[3] World Resources Institute

# 2018 INSIGHTS

# ASSESSING THE RISKS OF RESOURCEFULNESS

For utilities, inefficiency amplifies an array of threats:

1. Threatens utilities' ability to meet demand **(49%)**
2. Erodes customer satisfaction **(49%)**
3. Leads to higher business costs **(46%)**

**Worried about inefficiency and waste, consumers think utilities can and must do a better job being resourceful.**

Of all the threats to resourcefulness, inefficiency and waste are among the most vexing, simply because they're both so avoidable. Yet left unaddressed, they threaten the stability of our resource infrastructures, and by extension, the stability and safety of the communities those infrastructures serve. Both utility executives and informed consumers are concerned about these issues, with each group considering them from their unique vantage point.

**The risks of inefficiency.** It's perhaps telling that only half (50 percent) of utility executives across this year's international sampling believe their utilities are running efficiently—a suggestion that those closest to resource delivery networks acknowledge there is still much work to be done to improve efficiency. For utilities, inefficiency amplifies an array of threats, but the three to the left stand out.

## PRIVATE OR MUNICIPAL, CONSUMERS PAY FOR HIGHER UTILITY BUSINESS COSTS

Municipal and privately-owned utilities are equally concerned about the threat inefficiency poses to business costs, which in turn should be a concern for consumers. Private utilities facing higher costs will pass those expenses on to consumers in the form of higher rates, and municipally-owned utilities will seek a larger share of taxpayer funds to pay for operations. In either scenario, consumers shoulder the burden.

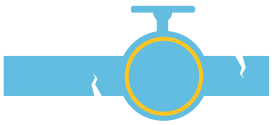
## ASSESSING THE RISKS OF RESOURCEFULNESS

**Nearly one out of two consumers thinks their utility is wasteful.** With the cost of water and energy rising, the last thing consumers want to see is waste—especially from the utilities that serve them. Nearly half (48 percent) of consumers believe their utilities are wasteful. That means they don't believe utilities are effectively managing how they deliver water, gas and electricity.

If the available data is any indication, consumers may be onto something. Aging, inefficient infrastructure contributes to 2.1 trillion gallons of water leaks every year in the U.S. alone.[4] Some 3.6 trillion cubic feet of natural gas is lost worldwide every year, amounting to approximately $30 billion in revenue losses and a global leakage rate of 3.2 percent.[5] In the U.S., enough natural gas is wasted every year to fuel 10 million homes.[6]

In what way is your utility wasteful?

We asked consumers. Here are their top three answers.



Anitquated systems causing gas or water leaks **(31%)**

**(23%)**

Too little use of renewable energy

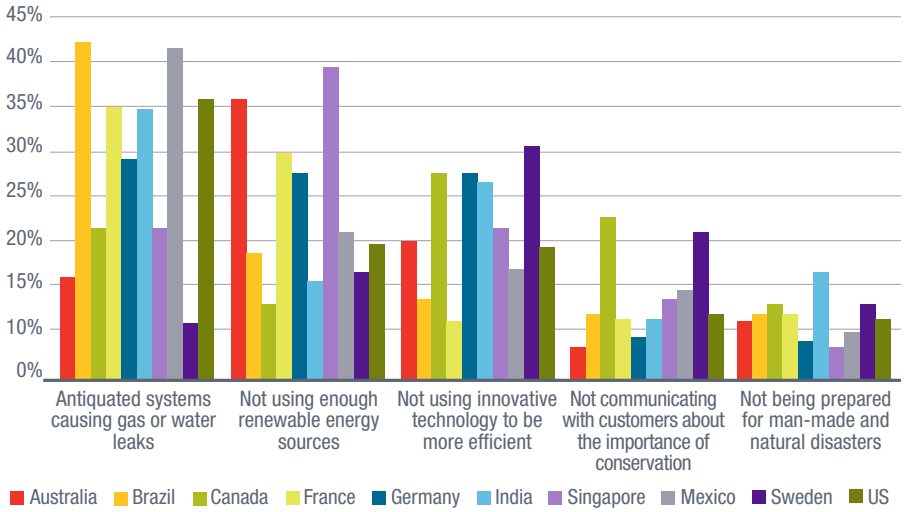
**(20%)**

Not using innovation technology to be more efficient

### INTERNATIONAL SNAPSHOT

**Consumers in Mexico, Brazil and India call out antiquated systems.**

When it comes to identifying the prime sources of waste, where you live matters. Among the 10 countries surveyed, antiquated systems get the blame in Brazil, Mexico and India–which may tie into the stresses already expressed in those countries—as well as the U.S. and France. Australia and Singapore point to lack of renewables available to consumers. For consumers in Sweden and Canada, the responsibility lies in a failure to use innovative technology.




[3] Center for Neighborhood Technology.
[4] Environmental Defense Fund.
[5] Study in the journal *Science*.

# WE ALL HAVE A ROLE IN RESOURCEFULNESS

Nearly six out of every 10 consumers **(58%)** are either **very** or **extremely concerned** about the environmental impact of their energy and water use

**85%** of consumers aged 18-34 rank **solving global resource challenges** as **extremely** or **very important**

Virtually everyone thinks it's important, even if they disagree on who is best equipped to improve it.

Viewing resourcefulness as critical isn't confined to one demographic. Consumers of all ages and utilities themselves believe they have a role to play, and it's likely this awareness has been spurred on by gains already made. According to the International Energy Agency (IEA), the world would have consumed 12 percent more energy in 2016 were it not for the energy efficiency improvements made in the past 15 years; those savings equal the entire European Union's share of the global energy market. These advances have also led to a stark reduction in per capita energy expense across several of the countries surveyed for this report. In Germany, for instance, consumers saw average savings of 30 percent on household energy bills—the equivalent of $580. Savings in the U.S., where resourcefulness is still an emerging priority, were 10 percent.[7]

**Most people are concerned about resourcefulness**. In the face of all the perceived waste and inefficiency noted earlier, consumers are willing to look at their own role in building a more resourceful world. Nearly six out of every 10 (58 percent) are either very or extremely concerned about the environmental impact of their energy and water use. Meanwhile, three out of four (74 percent) believe their personal actions are either very or extremely important for solving global challenges.

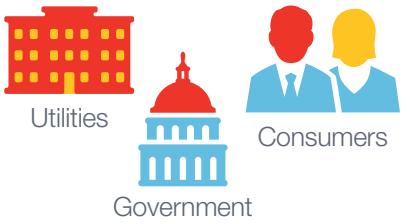
## WHO IS MOST SERIOUS ABOUT RESOURCEFULNESS? YOUNG PEOPLE.

Age-specific results from the 2018 report may offer the promise of an increased commitment to resourcefulness in the years to come. More than twice as many younger consumers (77 to 78 percent of those aged 18-34) say they are extremely or very concerned about the impact of their energy use on the environment, as compared to just 36 percent consumers aged 65 or older. Across all ages, a majority of consumers believe personal actions, such as turning off lights and conserving water, are important in solving global resource challenges, with 85 percent of those aged 18 to 34 ranking the issue as extremely or very important. And while older consumers may not be as worried about their impact of energy use on the environment, 59 percent still view their personal actions as very or extremely important to solving global resource issues.

7 International Energy Agency, Energy Efficiency 2017

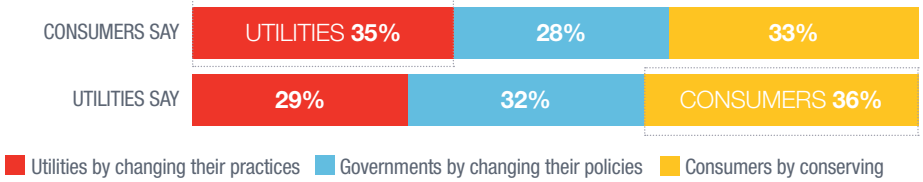
## WE ALL HAVE A ROLE IN RESOURCEFULNESS

Who is best equipped to make the largest difference in resourceful solutions?

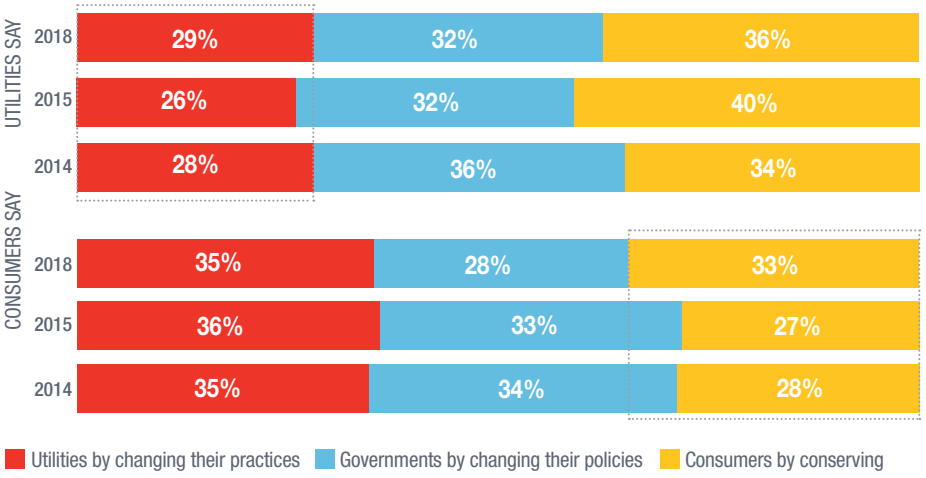



**You do it. No, you do it**. Clearly, resourcefulness is critical to many., but who is best equipped to make the largest difference? As in previous years, consumers and utilities both believe the other is better positioned to improve resourcefulness. For consumers, the difference is minimal: 33 percent say they're more able to improve resourcefulness, while 35 percent say utilities are. The difference is greater among utilities, with 29 percent of executives saying it's primarily up to them, and 36 percent looking to consumers.

**Less policy making, more action**. Interestingly, neither group views government policy as the primary driver of improvement, suggesting that both parties see actions and technologies as a greater influence on resourcefulness than waiting for policies to be enacted.




These perceptions have remained consistent over time. But lately, both groups (and consumers especially) see a larger role for themselves. This may signal that the success of efficiency and resourcefulness initiatives in turn creates a desire for even greater resourcefulness efforts.

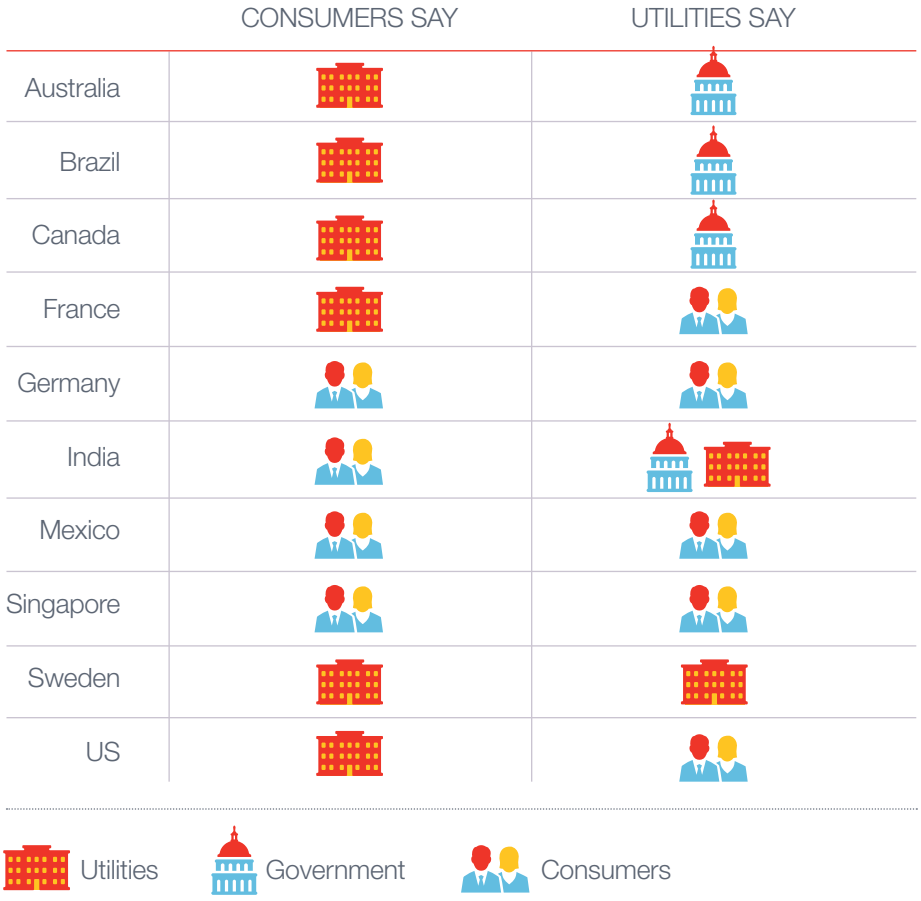


## WE ALL HAVE A ROLE IN RESOURCEFULNESS

### INTERNATIONAL SNAPSHOT

**Perceptions vary by country and culture.**

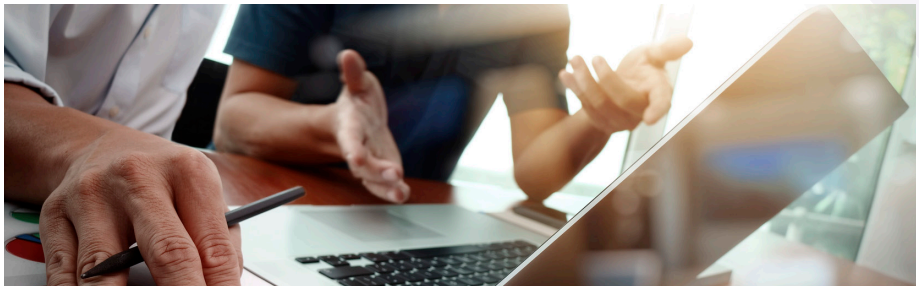
Notions of who is best suited to improve resourcefulness aren't homogenous. They vary by country and culture—and, of course, by audience.



# THE NEED FOR ACTION IS UNIVERSAL

**3 out of 4**
consumers say electricity is overpriced

**Up to 56%**
of utility executives surveyed say **affordable electricity prices** are the most important element of resourcefulness

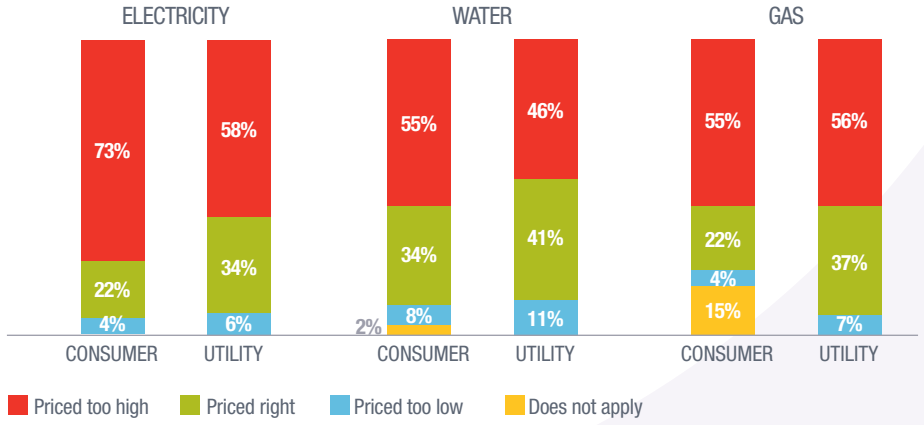


**Rates are too high and reducing pollution is a priority. Now more than ever, consumers and utilities want to do something about it.**

## "IT'S VERY STRESSFUL."

That's how Cindy, a customer service representative in Lawrence, Indiana, describes the experience of opening her utility bills, which usually amount to $500 a month for her 1,000-square-foot home. Those bills add up, typically consuming a quarter of Cindy's annual income.[8]

**Rising utility prices are a problem the world over**. For utility executives and consumers alike, affordable utility bills and resourcefulness increasingly go hand-in-hand. The number of utility executives surveyed who say affordable electricity prices are the most important element of resourcefulness jumped 56 percent from 2015, growing from 16 percent in 2015 to 25 percent in 2018. Meanwhile, a majority of utility execs and consumers think both electricity and gas are priced too high for the value they provide, with three out of four consumers saying electricity is overpriced. Water prices are the least contentious, with one in three consumers saying it's priced right.




[8] RTV6

## THE NEED FOR ACTION IS UNIVERSAL

**29%** consumers say **saving money** is the No. 1 benefit of modern utility services

**Mexico**, **India** and **Australia** are rated by the World Resources Institute as countries with high levels of water stress

**For consumers, modernizing electric services should help address price concerns—but that's not all.** Efficient, modern utility services offer many advantages, from shrinking greenhouse gas emissions, reducing power outages and gaining better insights into how people use resources.

But among consumers, saving money is the most popular, with 29 percent citing it as their top benefit. (Not surprisingly, cost savings is a common refrain for all stakeholders and appears again later in this report.) Following closely behind, at 27 percent, is the ability to integrate more renewables—another recurring priority for 2018.

**Utilities share similar priorities, particularly as they relate to the three pillars of resourcefulness.** When asked about the most important elements of resourcefulness, utilities cite lowering pollution, improving efficiency and lowering rates. These are all growing priorities.

### SUSTAINABILITY

Reducing pollution is a growing priority for gas & water utilities

| | 2015 | 2018 |
|---|---|---|
| **Gas Utilities:** Lower emissions of air pollutants | **21%** | **29%** |
| **Water Utilities:** Lower pollution from organic contaminants | **22%** | **27%** |

### EFFICIENCY

Gas utilities cite efficiency and better consumption measurement as priorities

| | 2015 | 2018 |
|---|---|---|
| **Gas Utilities:** Having regulatory standards to improve efficiency | **15%** | **20%** |
| **Gas Utilities:** Accurate measurement of gas consumption | **13%** | **18%** |

### EFFECTIVENESS

For electric utilities, affordable rates are the fastest-growing resourcefulness priority

| | 2015 | 2018 |
|---|---|---|
| **Electric Utilities:** Delivering electricity at affordable rates | **16%** | **25%** |

## THE NEED FOR ACTION IS UNIVERSAL

For consumers, the solution to waste and inefficiency is **transformation**. Overall, 7 in 10 consumers call for transformation of energy and water systems.

| Gas | Water | Electric |
|---|---|---|
| 63% | 70% | 78% |

**69%** of consumers are convinced that some kind of transformation will help **solve waste and inefficiency**

**Now more than ever, reducing water pollutants matters.** With fresh water supplies under increasing stress in many parts of the world, concerns about water quality may only continue to grow. Of the 10 countries surveyed for the 2018 Resourcefulness Report, Mexico, India and Australia are rated by the World Resources Institute as countries with high levels of water stress, meaning more water users are competing for limited supplies.[9]

**Intensifying attention on resourcefulness.**
Since 2015, these priorities have become more important:

| Electricity | Gas | Water |
|---|---|---|
| SAVING MONEY 56% | REDUCING POLLUTION 38% | CUTTING CONTAMINANTS 23% |

**Maintaining the status quo no longer is enough**. Improving resourcefulness requires change on some level. In some cases, it even requires transformation—something more than refinements or a few tweaks. And some may be surprised that utility executives are even more convinced of this than consumers. In fact, 92 percent of utility executives think their industry needs some transformation.

**What actions are consumers taking today to make a difference?** From programmable thermostats (most popular in the U.S. with half of all consumers surveyed using) to smart appliances (most popular in India with 49 percent participation among survey respondents) and itemized bills that track energy and water use (France leads the survey sample with 46 percent of surveyed consumers participating), consumers are engaged in an array of resourcefulness measures. Other actions include the use of customer portals, demand response programs, time-of-use rate plans, solar panels and wind turbines. No matter what consumers are doing today, they would like to do more. More than half of surveyed consumers in India, Mexico and Brazil would use solar panels if they were available to them. The same countries lead other surveyed countries in aspiring to use wind turbines as well.

[9] World Resources Institute

# WHAT DOES A MORE RESOURCEFUL FUTURE LOOK LIKE?

Nearly **1 in 3** consumers **would take advantage of demand response** programs

Utility executives **No. 1 unmet need** is the desire to **integrate renewables** into their resource mix

**More renewables. Connected infrastructures. Big data. Smart cities.**

**Consumers and utility executives both aspire to be more resourceful.** It's hardly surprising, given the increasingly dire warnings about what the future holds for the environment and what those forecasts could mean for the ability of people to access affordable, clean energy and water. Around the world, people at both ends of our energy and water infrastructure foresee a future that builds on resourcefulness efforts already underway. Their priorities also help pinpoint where they believe transformation is needed.

**Both utilities and consumers see renewable energy sources claiming a prominent role in their future**. Utility executives want to integrate renewables into their resource mix, so much so that it's their number one unmet need. Three of every four see a need to upgrade technology to make renewables happen. They appear to be making progress: Bloomberg New Energy Finance predicts that by 2050, global electricity supplies will be mostly fueled by carbon-free sources.[10]

**Consumers match utilities' sense of commitment**. On their wish list for utility transformation, integrating renewables tops all other measures. Nearly half say they would use solar panels if their utilities made them available—a more than 2X increase over the percentage of consumers currently using them. They're equally interested to using conservation features like customer portals to track daily water and energy usage. And nearly one in three consumers would take advantage of demand response programs if available to them, compared to just one in eight who are using them today.

[10] Bloomberg New Energy Finance, New Energy Outlook 2018

## CASE STUDY

On Reunion Island, **renewables** account for **30%** of the energy mix

**Integrating renewables, one island at a time.** Renewable energy sources—from solar and wind to biomass and sea energy—are sustainable, but they can also be unpredictable. On Reunion Island, a French overseas region in the Indian Ocean, renewables account for 30 percent of the energy mix. For utilities like EDF-SEI, the energy provider for Reunion Island, integrating renewables into an existing power distribution system requires careful planning. It also requires an intelligent, connected infrastructure built around technologies that allow the utility to precisely monitor energy production— and when necessary, cut producers from the mix to maintain balance across the grid.

EDF-SEI has also deployed similar technology across other overseas territories: Corsica, French Guiana, Mayotte, Martinique and Guadeloupe—to help integrate renewables, balance the energy mix and ensure grid stability.

[11] World Resources Institute

## WHAT DOES A MORE RESOURCEFUL FUTURE LOOK LIKE?

In **Australia** and **Singapore**, **36% to 40%** of respondents see a lack of renewables as the main reason for a lack of resourcefulness

Consumers name infrastructure spending as one of the **top three** threats to **energy and water delivery**

### INTERNATIONAL SNAPSHOT

**Around the world, consumers see renewables in their future.**

A core element of improving resourcefulness is simply consuming fewer resources to support daily life. In the energy sector, renewables offer a way to achieve this without forcing consumers and communities to sacrifice comfort, mobility, safety, connectivity, entertainment and commerce.

At least one in five consumers in all surveyed countries believe the lack of renewables in their energy services impedes their resourcefulness. That perception is most pronounced in Australia and Singapore, where 36 to 40 percent of respondents see a lack of renewables as the main reason for a lack of resourcefulness. And when assessing the primary benefit of modernizing electricity services, consumers in the U.S. and Germany care most about integrating renewables; in Germany and France, greenhouse gas reduction emerges as a top priority—a goal that use of renewables helps to achieve.

**Connected infrastructures will power a way forward**. Modern, connected infrastructures point the way to environments equipped with smart internet of things (IoT) devices that gather crucial data, identify problems and ensure more efficient operations. By virtually all accounts, connected infrastructures are the future. The World Resources Institute forecasts that over the next 15 years, the energy sector alone will account for nearly 30 percent of total core infrastructure investment, amounting to some $25 trillion USD[11]

This realization has surfaced among both consumers and utility executives. Consumers name infrastructure spending as one of the top three threats to energy and water delivery—with 73 percent of utilities agreeing that connected industry systems is a high priority in their country. Utilities also recognize they need to do a better job investing in infrastructure, with 37 percent of industry executives admitting that they are not equipped to keep up with infrastructure investments. The bottom line: Connected infrastructure is a priority on both sides.

[11] World Resources Institute

## WHAT DOES A MORE RESOURCEFUL FUTURE LOOK LIKE?

000100100111000
0100111001101O
01001110011010 **big data** is now a given of modern life

**9 out of 10** consumers believe it's important for utilities to use **big data** to improve efficiency

But **75%** of those consumers have concerns about hacking and privacy

**Big data analytics is becoming a touchstone for a resourceful future**. One byproduct of connected infrastructures is the ability to collect and analyze data on resource use and operational efficiency. By monitoring connected devices, utilities can sniff out waste and inefficiency, respond to problems as they occur (or even anticipate them as they are developing), and glean insights about resource usage across a range of categories, from location to household size. Those insights can help utilities deliver better, more reliable services; understand where and when resources are most stressed; deliver granular data to consumers about their own usage; and identify potential new services or enhancements.

It's little wonder, then, why big data analytics is already popular with utilities and consumers alike. For instance, in the past four years, utilities have increased their use of big data by 58 percent, with one in three executives saying their utilities are using big data analytics tools.

Consumers are on board, perhaps reflecting an awareness that big data is now a given of modern life. Nine out of 10 believe it's important for utilities to use big data to improve efficiency. But among those who view big data as important, 75 percent have concerns about hacking and privacy.

## INTERNATIONAL SNAPSHOT

**Connected energy is ready for its close-up.**

Consumers throughout the world don't see analog, disconnected energy systems as capable of standing up to a resource-strained future. Instead, they recognize a pressing need for connected energy systems that incorporate gas, solar, water and wind sources.

In Australia, Germany, Brazil, India and Mexico, consumers strongly agree that they want connected energy for their country. Another invitation for investment in connected networks comes from Australia, France and Singapore, where consumers see modernized and efficient electricity services as the answer to waste and high costs.

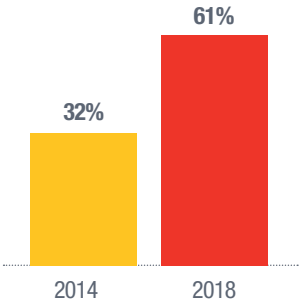
## WHAT DOES A MORE RESOURCEFUL FUTURE LOOK LIKE?

**61%** of utilitiy executives say they are ready to **leverage big data**

Today, **68%** of utilities say they have big data tools, and **34%** are using them

## AS BIG DATA WRANGLERS, UTILITIES ARE IMPROVING

How prepared is your company for managing big data?




**Four years ago, one in three utility executives said their organization was prepared to manage big data**. Today, that picture is twice as promising, with 61 percent saying they're ready to harness one of the most important advances of the digital age.

A closer look reveals that utilities haven't necessarily acquired more big data analytics solutions—they're just making use of the ones they have. In 2015, 69 percent of utilities reported they had big data tools, but only 24 percent were using them. Today, 68 percent say they have them, and 34 percent are using them.

Eventually, big data analytics will be a mainstay in virtually every utility In the 2018 report, results show that. 95 percent of utilities either have or intend to acquire big data analytics tools.

**Most consumers are ready for smart cities today, and utilities are right there with them**. If big data and multi-purpose, standards-based network infrastructures are pieces of a new, digital future, smart cities are almost certainly among the logical outcomes. Networked street lighting is the typical starting point for a smart city deployment because it creates a citywide network canopy that can accommodate a variety of applications. Modern smart city deployments make it possible for lighting departments, emergency responders and public health agencies to improve safety and quality of life throughout a community.

Consumers want all of these—and more—smart city applications now.

**Consumers want smart cities**

**64%** believe smart city deployments are critical TODAY

**79%** believe smart city deployments are critical IN 5 YEARS

## WHAT DOES A MORE RESOURCEFUL FUTURE LOOK LIKE?

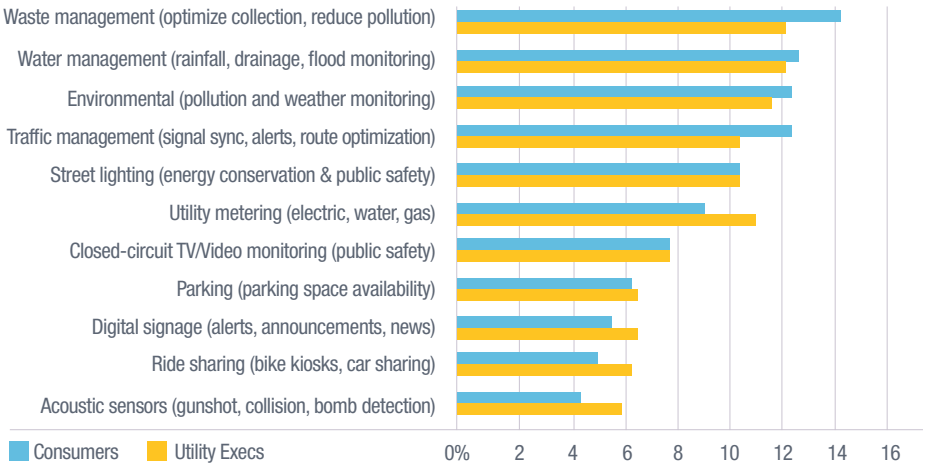
**Consumers & utility companies** agree that **efficiency** and **lower costs** are the most important smart city benefits

**Utilities are just as committed as consumers, if not more.** Implementing smart city solutions is a high priority for 70 percent of utility executives. In fact, electric utilities may be looking to take their connected infrastructures to the next level—a promising development for consumers hoping to see more smart city deployments. Infrastructure related to automated meter reading (AMR), advanced metering infrastructure (AMI) and smart metering deployments are no longer the priority they were three years ago, when twice as many executives named them as a priority as today (38 percent then versus 19 percent today). This suggests that since 2015, many utilities have already implemented key building blocks of smart, citywide, multi-purpose networks.

Consumers and utility companies also agree on which smart city benefits are most important: efficiency and lower costs, along with reduced environmental impacts. They even align on which solutions are most critical.

### What are the most important smart city solutions?

Consumers and utilities sound off.



## WHAT DOES A MORE RESOURCEFUL FUTURE LOOK LIKE?

**Prioritizing smart city initiatives** is favored by a majority ot utility executives

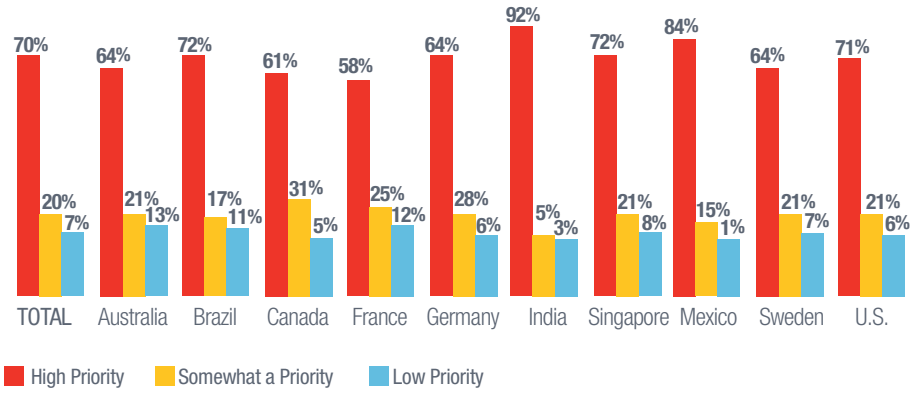
**Implementing smart city solutions** is a high priority for **70%** of utility executives

### INTERNATIONAL SNAPSHOT

**If the 2018 sampling is an indication, smart cities will be big.**

A majority of utility executives in every country surveyed in 2018 considers smart city solutions to be a high priority.

In half the countries, 70 percent or more executives prioritize smart cities, though the rest aren't far behind.



# THE CHALLENGES BEFORE US

**74%** of utility executives **recognize a need** to implement more technology to **integrate renewables**

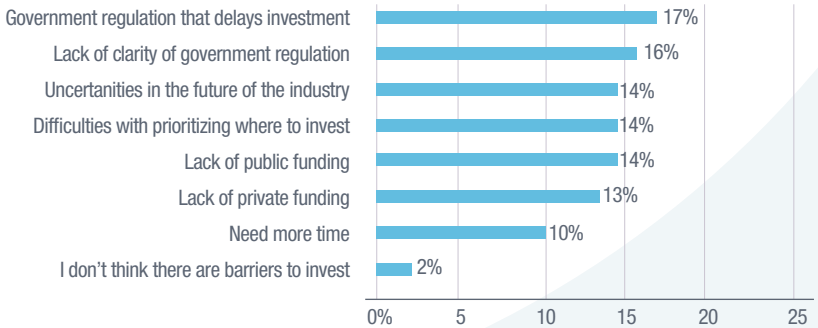
The **biggest unmet needs** for utilities: doing a better job integrating renewables and **investing in innovative technology-based infrastructure**

**Utilities are working to build a resourceful future, but obstacles exist.** It's one thing to possess the will to integrate renewables, create connected infrastructures, make broader use of big data and transform today's communities into smart cities. But achieving these things takes more than commitment. It requires significant resources; confidence in the stability of the technology, industry and regulations; and an engaged and enthusiastic customer base.

**Renewables are an opportunity—and an obstacle**. Renewable energy sources are an essential part of a resourceful future, say both consumers and utilities. But there is still much work to be done to make renewables a core element of energy systems everywhere. While 74 percent of utility executives recognize a need to implement more technology to implement renewables—suggesting it won't happen without those investments—61 percent are hesitant because they're uncertain about where the market is headed and the role government policies will play down the road.

**As the pace of innovation accelerates, it's harder for utilities to keep up**. New technologies, such as IoT devices, smart meters and sensors, offer a way for utilities to keep pace with demand and continually supply resources at a stable price, but executives say they feel less equipped to keep pace with technology changes than they did three years ago. Meanwhile, utilities recognize they need to do a better job integrating renewables and investing in innovative, technology-based infrastructure—in fact, these are their biggest unmet needs.

**What are the barriers to infrastructure investment?**



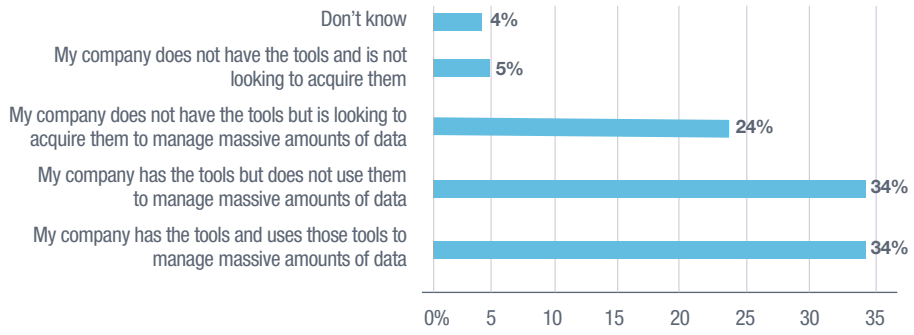
## THE CHALLENGES BEFORE US

**31%** of consumers worry that their data usage **won't be kept private**

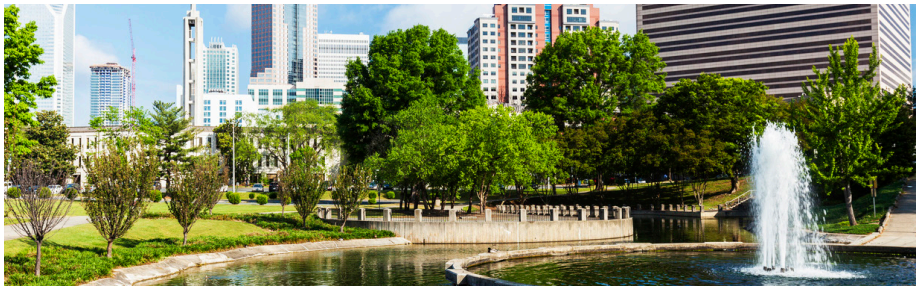
**63%** of utility companies **aren't managing their data** at all

**Consumers like the idea of big data helping efficiency and service delivery, but they're worried about digital age issues like privacy and hacking**. Four of every 10 consumers (41 percent) say they're concerned that utilities won't keep their data safe from hackers and cyber attacks, while 31 percent are worried that their usage won't be kept private.

**Utilities may be better equipped to glean insights from big data than they were three years ago, but actually managing it is a different matter**. Many utilities that have big data management tools aren't using them—yet. In fact, 63 percent of utility companies aren't managing their data at all either because they lack the management tools they need or they have them but aren't using them.



## CASE STUDY



### CHARLOTTE'S FORMULA FOR SUCCESS: GET PARTNERS, ANALYZE DATA, THEN CHANGE BEHAVIORS

**A public-private collaborative known as Envision Charlotte[12] (EC) has a vision for this North Carolina university town: one that's sustainable, efficient and engaged**. In a model that has served as a template for other communities[13], EC began with a Smart Energy Now program, which worked with the local utility, Duke Energy, to reduce energy consumption in the biggest users of energy in town—61 commercial buildings of more than 10,000 square feet in size.

In its first five years, the program saved $25.7 million in energy costs—equivalent to a year's worth of power for 10,000 homes. Carbon emissions also fell to levels equal to taking 11,000 cars off the road. Since then, EC has attracted more partners and more than doubled the number of participating buildings.

But for Charlotte, much of the success came from analyzing energy use data collected by engineering students and smart devices, and then providing classes, panel sessions, and ongoing feedback that kept building operators engaged and motivated them to conserve.

In its first five years, Charlotte's smart energy program saved **$25.7 million** in energy costs

[12] EnvisionCharlotte.com
[13] EnvisionAmerica.org

## THE CHALLENGES BEFORE US

**What does it take to convince consumers to conserve, take advantage of renewables and support smart city initiatives? Engaging them on the benefits**. Despite gains made on engagement, connecting with consumers has proven to be a struggle for many utilities. More than half of consumers (58 percent) confirm they need more advice on how to cut utility costs, and 50 percent confirm they need more education on energy efficiency programs and services from their utility so they can better manage their own water and energy use.

Utilities recognize the need. Despite 62 percent of utility executives saying they're extremely or very equipped to educate consumers on consumption and conservation, 77 percent still describe the lack of consumer education about their consumption and conservation programs as either a growing or even urgent concern. This may suggest that although utilities have the means to engage consumers, they could do a better job utilizing those means—or they may be unsure how to best engage consumers in a new way.

**58%** of consumers confirm they need more advice on how to **cut utility costs**

**77%** of utility executives cite **consumer education** as a growing or urgent concern

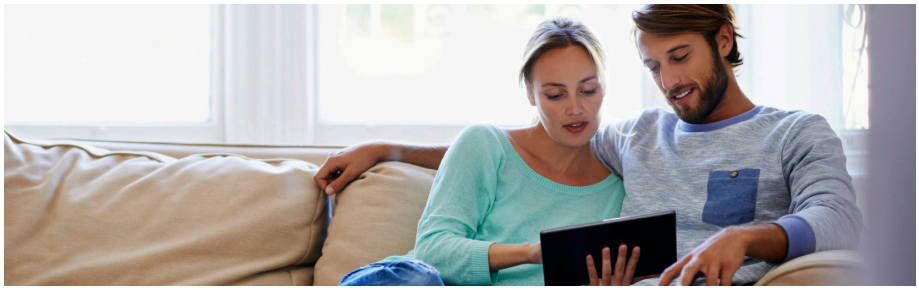
**Utilities consider consumer education a growing concern.** To what degree is the lack of consumer education about consumption and conservation a concern of the utility industry?

| It is an urgent concern | It is a growing concern | It is a low concern | It is no concern: there is not a lack of consumer education |
|---|---|---|---|
| 28% | 49% | 19% | 4% |

## THE CHALLENGES BEFORE US

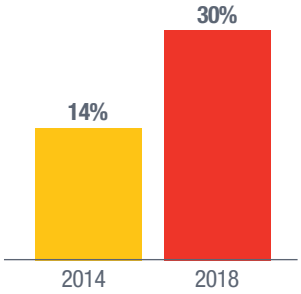
**56%** of executives believe they are successful in **engaging with consumers**

The percentage of **satisfied consumers** has **doubled** since 2014



**Consumers confirm that utilities have some work to do regarding engagement.** Utilities may think they are successful at engaging with consumers—as 56 percent of executives believe—but only 30 percent of consumers are satisfied with communication they get from utilities. Still, this is an improvement from previous years, with the percentage of satisfied consumers doubling since 2014. Perhaps signaling that they recognize how crucial consumer communication is to their success, 37 percent of execs say understanding customer needs/expectations is a top unmet need. In today's world, however, engaging consumers requires interacting with them, not simply engaging in one-way communications, such as inserting usage information into monthly bills (even though that's currently consumers' preferred method of receiving communications from their utilities).

**Since 2014, consumer satisfaction with utility communications has grown 2X**



# CREATING ALLIES

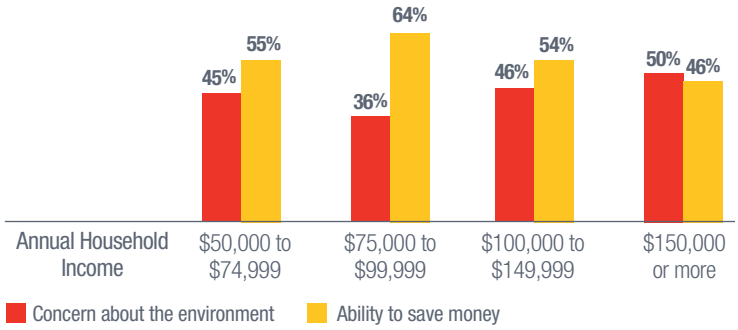
**61%** of consumers would **act more resourcefully** if they could **save 5-20%** on their utility bills

Young consumers (especially in India, Mexico and Brazil) are **concerned about the impact of their water and energy usage** on the environment

**How we'll build a more resourceful future.**
Virtually everyone surveyed for this report aspires to live in communities that are less wasteful, more efficient and smarter—in other words, they foresee a future that's more resourceful.

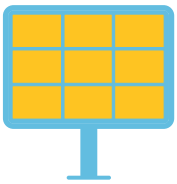
One way to overcome challenges is for utilities and consumers to invest in initiatives that they both believe in. And since most believe that some degree of transformation is necessary, pursuing shared interests (and the investments that support them) is likely to accelerate transformation efforts for utilities and conservation efforts for consumers.

**Consumers may see saving money as an incentive to be more resourceful**. Most consumers (especially younger ones and those who live in countries like India, Mexico and Brazil) are concerned about the impact of their water and energy usage on the environment and believe their personal actions make a difference. Yet most consumers around the world are more motivated by saving money than saving the environment. In households earning less than $150,000, it's the primary motivation for resourcefulness.



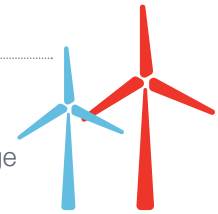

If utilities can demonstrate that more resourceful habits and investments can cut 5 to 10 percent off of monthly bills, nearly one in four consumers (22 percent) say they would take action to be more resourceful. That number grows to 39 percent for savings amounting to 11 to 20 percent a month. With consumers listing conservation incentive offers as their number three priority for utilities, the message seems clear: **To win over more consumers on resourcefulness, cost savings could be a powerful tool for utilities**.

## CREATING ALLIES



**47%** of consumers say they'd like to use **solar panels**

**25%** would like to take advantage of **wind energy**

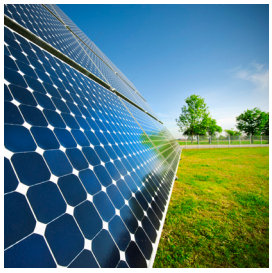


## INTERNATIONAL SNAPSHOT

**On environmental concern vs. money savings, Brazil, India and Mexico are outliers once again.**

In half of the countries surveyed, a majority of consumers prioritize money savings over concern for the environment. Consumers in France and Germany rate both concerns equally. Only consumers in Brazil, India and Mexico—by wide margins—put environmental issues at the top.

**Conserving via renewables is increasingly attractive to consumers.** Consumers may view renewables as a collaborative effort, but they naturally expect utilities to make the first move. When asked what they'd like utilities to focus on, consumers say integrating renewables is the top priority. Interest in conservation extends beyond renewables, however. Though nearly half (47 percent) say they'd like to use solar panels and one in four (25 percent) would like to take advantage of wind energy—more than twice the percentage currently using them—consumers want to increase their use of virtually every conservation practice or technology cited in the survey, from smart appliances (42 percent) and daily tracking of usage (32 percent) to demand response programs (29 percent).



**Consumers and utilities agree on the need to invest in smart city technologies.** The desire to deploy smart city technologies—including waste, water and traffic management; environmental monitoring; and street lighting—is virtually universal. Consumers want them, and so do utilities.

Consumers appear to see smart cities as the future. They cite increasing efficiency via smart city solutions as their number two priority for utilities. And as municipalities and their partners in the energy and water industries try to determine how to implement smart cities in their communities, they may take encouragement from another revelation from the 2018 resourcefulness survey: 75 percent of consumers are willing to pay more on their utility bills for smart city benefits.

And for 70 percent of utility executives, implementing smart city technologies is a high priority. This viewpoint is most prevalent in India (92 percent), Mexico (84 percent) and Brazil (72 percent)—the three countries that appear to have the most urgent desire to improve resourcefulness overall. For their part, utilities expect smart city technologies will help them improve efficiency and reduce pollution, which in turn aligns with the desires of consumers.

## CASE STUDY

Copenhagen is a city of **600,000**, where nearly **half of commutes take place on bicycles**

Copenhagen is building a **smart city network** canopy

### A SMART FUTURE FOR COPENHAGEN

**One of the world's most sustainable cities, Copenhagen aims to be carbon neutral by 2025**. A key element of achieving that goal is its commitment to smart city technology deployments. By starting with LED street lighting, Copenhagen is building a smart city network canopy that will ultimately accommodate multiple applications for efficiently managing energy use, traffic systems and emergency response.

Copenhagen's smart lighting system, ultimately reaching 20,000 networked streetlights lights, is designed to improve energy efficiency, lower operational costs, enable remote lighting management and control, and improve citizen safety in this active city of 600,000, where nearly half of commutes take place on bicycles. The city expects to achieve energy savings of 65 percent with the new lighting system, which instantly alerts lighting administrators to outages. The network also fuses intersection-based occupancy sensors and light controls to provide additional light at intersections when sensors detect a cyclist approaching.

Copenhagen's comprehensive, open-data hub means multiple applications can work together to optimize resource allocation across this smart city.

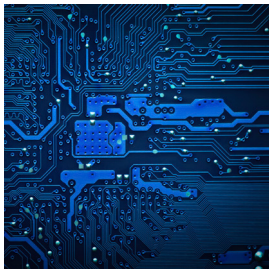
## CREATING ALLIES

For **water utilities**, leak detection is paramount to **reducing waste** in the water distribution system

**32%** of consumers would be willing to track their **daily resource usage**

**Innovative technology can be the engine of transformation.** Investing in technology upgrades will position utilities to transform by expanding the use of IoT and big data, of which are viewed as important by both consumers and utilities.

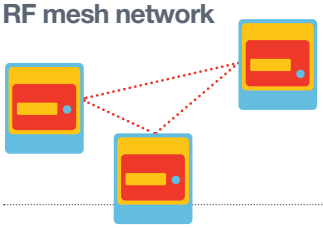
Utilities appear to recognize this now. Upgrade priorities in the electricity market cluster around integrating renewables, distributed energy resources (DER), electric vehicle (EV) infrastructure and storage. In the gas market, business intelligence and analytics top the priority list. For water utilities, leak detection is paramount, which is critical to reducing waste in the water distribution system. Expanding use of these technologies will help utilities operate with greater efficiency and to improve customer service.



**Data analytics, paired with better community education, can help build trust and transparency with consumers**. By setting expectations and enabling access to usage information (preferably in real time), utilities will have an opportunity to leverage the willingness of citizens to help pay for the cost of smarter and more resourceful cities. For instance, nearly a third (32 percent) of consumers would be willing to track their daily resource use via online portals—twice as many as are tracking usage this way today. By showing people how much they're consuming as they're consuming it, utilities may find it easier to encourage resourceful behaviors like turning off lights and fans in vacant rooms, converting to smart and resource-friendly appliances and being more thoughtful about water use.

# CASE STUDY

All **653,000** residential & small businesses are connected via an **RF mesh network**



## MAKING THE MOST OF BIG DATA

**In Australia, big data tells a big story.** From 2010 to 2015, Australia's United Energy (UE), in response to state mandates, installed AMI meters in all residential and small business electricity customers across its territory in east and southeast Melbourne—653,000 in all—and connected connected them via a smart RF mesh network. The initial intent was to report basic billing and outage information to UE's back-office systems.

**But that was just the beginning**. With those goals achieved, UE launched an advanced analytics initiative to improve grid performance by gaining more insights from smart meters. Data from thousands of devices feeds into an analytics platform that allows the utility to read and store data collected at one- to five-minute intervals, giving UE a near real-time, high-resolution snapshot of grid operations. The utility uses that data and connectivity to monitor neutral integrity of electric service points, keep track of service degradation, and locate distribution faults.

**The result?** UE now can proactively address service issues, defer capital investments in the network, drive new operational efficiencies and return cost savings.

## CREATING ALLIES

By demonstrating **efficiency gains**, utilities can help close the perception gap with consumers

Cybersecurity is the **No. 2 investment priority** for both electric and gas utility executives

**Cybersecurity measures should help allay consumers' privacy concerns**. Consumers may see big data analytics as a way to improve efficiency and services, but they worry that utilities aren't equipped to keep their data private. Utilities can counter this by investing in solutions that protect customer data and prevent security breaches—and in educating consumers about safeguards built into the systems being deployed. Utilities seem to be thinking along those lines, as cybersecurity is the number two investment priority for both electric and gas utility executives. (Water utilities prioritize cybersecurity as well, but just not as high on the list.) Communicating with consumers about these security measures will be essential as utilities rely more on big data.

**By investing in technologies and services that maximize insight and minimize uncertainty, utilities can demonstrate how they are improving efficiency and resourcefulness—another action that can help close the perception gap between utilities and their customers**. When back-office operations are more efficient, utilities can improve their return on capital investments. And smarter waste and theft detection—enabling faster responses to leaks—can reduce pressure on the rates charged to consumers. (After all, more than 30 percent of fresh water pumped daily is lost to leaks and theft.) When utilities can achieve these improvements and then effectively communicate them to consumers, they can improve the level of trust consumers have in the utilities that serve them.

## CASE STUDY

More demand-side load resource added to **increase grid reliability** for customers

Achieved 300 megawatts of capacity: **50% more than its goal**

### PEPCO'S CONNECTED INFRASTRUCTURE ENGAGES CONSUMERS—AND EVERYBODY WINS

**Increasing reliability through demand-side consumer engagement programs.**

Conservation legislation in Maryland prompted Pepco Holdings, a family of regulated utilities in Maryland, New Jersey and the District of Columbia, to create a demand response program called Energy Wise Rewards. The goal was to give Pepco 200 megawatts (MW) of demand-side load resource to increase grid reliability.

Program participation involves installing a web-programmable thermostat or load control switch at a residential or small business customer's premise that can remotely control a central air conditioning unit or heat pump. The utility then reduces electricity consumption at these sites by briefly cycling off these high-energy use appliances during peak use times. A mobile app also helps consumers better manage their energy use.

For a project like this, community engagement is essential. So Pepco mounted a multi-channel campaign to build awareness via personalized direct mail communications and television, radio print, online and outdoor advertising. Then they went door to door, launched outbound calling campaigns, and reached more customers through community outreach events.

**The result?** Pepco gained 300 MW of capacity—50 percent more than its original goal—to bolster reliability, monetize surplus capacity, and add to operating reserves. And consumers spend less on energy while sparing their communities from unnecessary infrastructure upgrades. Everybody wins.

## CREATING ALLIES

**67%** of utility executives are willing to invest in **consumer engagement**

Digital means are needed to successfully engage with **resource-aware customers** aged 25-34

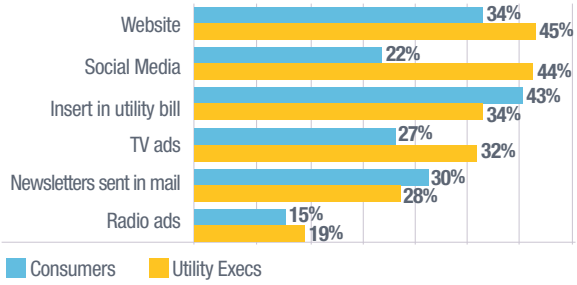
**To bring more consumers on board with resourcefulness efforts and to evangelize investments (and the possible costs involved), utilities should engage consumers in multiple, dynamic ways**. A solid majority (67 percent) of utility executives are willing to invest in consumer engagement. This is essential for any utility hoping to turn consumers into allies—and even advocates—for resourcefulness, smart cities and more.

But utilities should find new and better ways to engage their customers. An insert in the monthly bill is fine for some—in fact, it's still the most preferred choice by consumers—but even more are asking to be engaged via digital means. This includes email and social media (particularly important for resource-aware 25 to 34-year-olds). As those younger consumers become older consumers, they're not likely to become less digitally oriented.

Engagement is a two-way process. It's about interacting with consumers on the platforms they use and understand—a multichannel approach that varies by frequency, tone and content type. Modern engagement requires migrating from static, one-way communication (such as bill inserts and television ads) to more dynamic methods. As utility services themselves modernize, consumers will expect their engagement campaigns to do the same.

**How consumers want to be reached today—and how utilities plan to invest in reaching them**

**The good news**: Utilities plan to amplify their efforts to reach consumers via digital means, while placing less emphasis on static, printed communications.




**What about consumers who aren't informed**? This survey polled consumers who describe themselves as informed. But for every informed consumer, there are perhaps many more who could be accurately described as uninformed. It's reasonable to surmise that the disinterest of these uninformed consumers—unaware or incurious about how they can improve and effect resourcefulness—may pose a real threat to resourcefulness. Educating and engaging them is a vital first step.

# CONCLUSION

# CONCLUSION

## In the Face of Obstacles, Opportunitities for Action.

Utilities and consumers both want to move in the same direction. They both want a more resourceful world, to live in smart cities, and make extensive use of renewable sources of energy. They want safer, less wasteful, more efficient and sustainable communities. They want to embrace the efficiency and responsiveness benefits that big data analytics and connected infrastructures offer, but without the commensurate risk and costs of data breaches. Relatively few see governments as the solution to improving resourcefulness. Rather, consumers and utilities view themselves—and each other—as the catalysts for transformative change.

This future is not just possible; it's already under way. Many utilities have made strides in putting smart devices in place to provide a foundation for a connected, intelligent future that encourages and incentivizes resourcefulness. Utilities are making greater use of big data and are engaging with consumers at historically high rates. They're positioning themselves for a future in which consumers aren't just customers, but partners.

The outlying responses from India, Brazil and Mexico—the insistent need for transformation, the urgent concern over antiquated systems, the more intensely felt desire for the benefits of smart cities and renewable energy sources—may serve as a warning to other countries whose needs are, at this moment, not as keenly perceived. The potential message: **If we all don't improve resourcefulness, and quickly, other countries may find themselves not just wanting transformation, but demanding it**.

Transformation can start now. The technologies and solutions are available today. The tools exist to turn consumers and utilities into mutual allies in the quest to improve resourcefulness in communities around the world.

**Just ask consumers in Mexico City, Sao Paolo and Mumbai. Inaction may not be an option.**

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