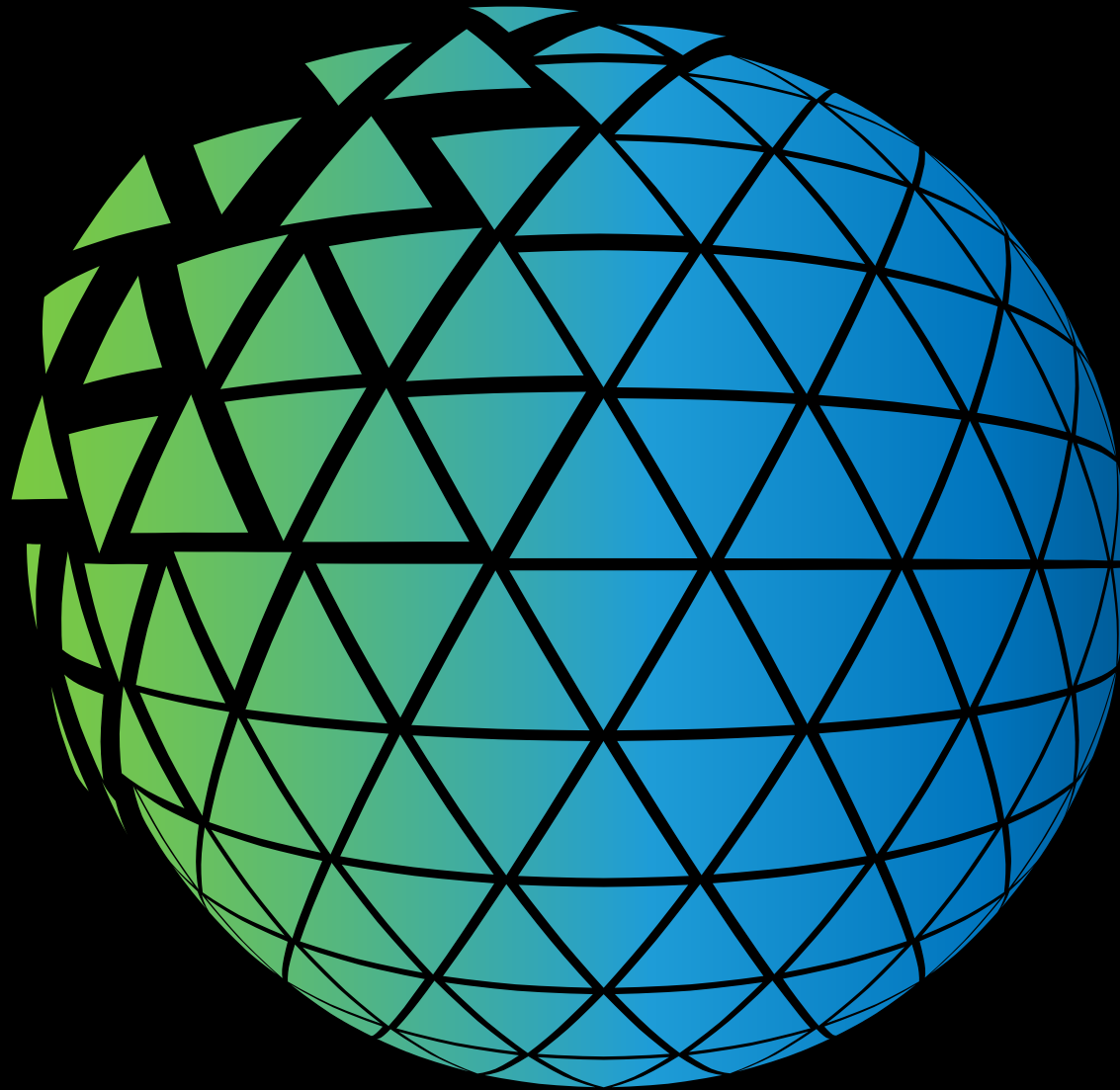


Deloitte.



Deloitte Resources 2017 Study

Energy management: Sustainability and progress

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About the study



Deloitte¹, with strategy and market research firm Harrison Group, a YouGov company, has completed its seventh annual nationwide Resources Study (the “2017 Study” or “Study”) to provide insights that can be useful in helping energy companies and businesses make energy-related investment and business decisions. The Study aims to answer questions such as:

- What are US residential consumers and businesses doing to manage their energy usage?
- Which energy issues matter most to them?
- What motivates them to reduce their energy consumption and what would impel them to take additional action?
- Are they receptive to clean technologies?
- How can electricity suppliers and energy service providers better meet their needs?

The 2017 Study was conducted in March 2017, and thus, largely reflects attitudes and practices related to the year 2016. The Study captures two views: a residential consumer perspective and a business perspective. The residential consumer portion is based on more than 1,500 demographically balanced online interviews with household decision-makers for utility services. The business portion of the Study is based on more than 700 online interviews with business decision-makers responsible for energy management practices at companies with more than 250 employees across all industries. To facilitate in-depth analysis, business survey respondents are segmented by industry sector and company size. Please see Figure 1 and Figure 2 for definitions of these segments. In addition, Deloitte interviewed several subject matter specialists and/or providers of energy management products and services in order to obtain greater context and potential clarity around key business findings.



Figure 1: Sectors



Consumer and industrial products

includes companies within aerospace and defense; automotive; consumer products; manufacturing; retail and distribution; and travel, hospitality, leisure, and services



Financial services

includes businesses within banking and securities, insurance, investment management, and real estate



Health care

includes health care providers, health plans, and life sciences organizations



Technology, media and telecommunications

includes technology, media and entertainment, and telecommunications companies

Figure 2: Company size



Small

less than \$100 million in global revenue



Mid-cap

\$100–\$500 million in global revenue



Enterprise

more than \$500 million in global revenue

Figure 3: Generations



Millennials

ages 21–34



Gen X

ages 35–48



Baby boomers

ages 49–67



Matures

ages 68+

Executive summary



The findings of the 2017 Study indicate that sustainability is not a fad. US residential consumers and businesses remain committed to reducing their energy consumption and expanding the use of renewables, even as federal policy backs away from environmental protections and climate change action.

Consider these residential consumer results from the 2017 Study:

- Residential consumers don't perceive affordability and renewables as being mutually exclusive. As in 2016, keeping total energy bills affordable (cited by 59 percent of respondents) and using clean energy sources are the most important energy issues to residential consumers.
- Support for renewables intensified among residential consumers, with 37 percent citing "increasing the use of solar power" as a top energy issue, rising four points over last year. Twenty-five percent pointed to increasing the use of wind power as a top energy issue, also trending upward four points year-over-year.

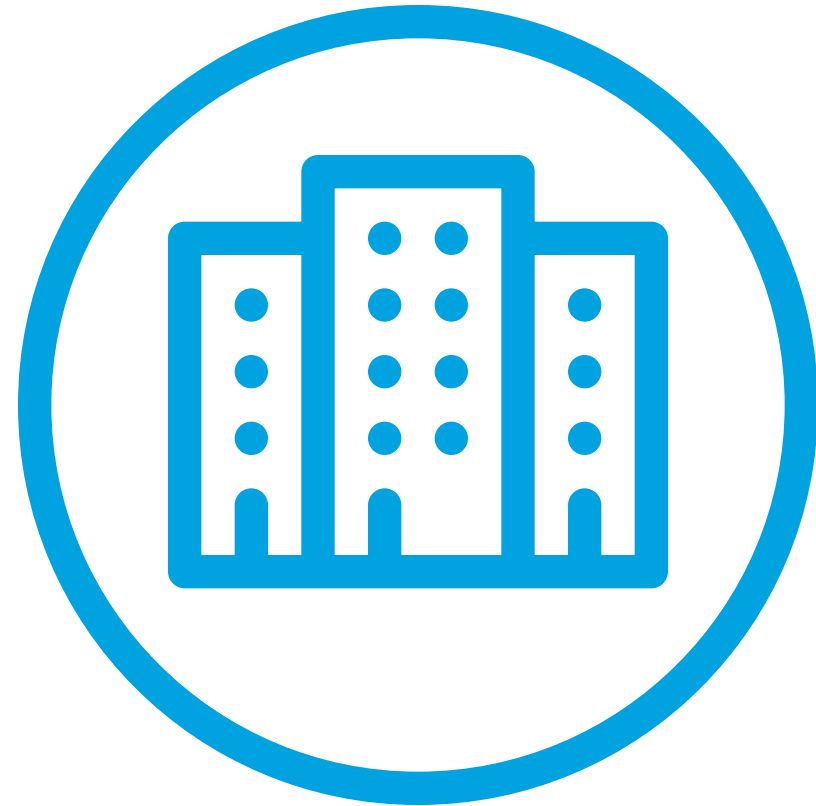


- Among those who are solar eligible, about two-thirds (64 percent) of millennial respondents say they are extremely/very interested in installing solar panels.² And more than half of millennial respondents (53 percent) say they are extremely/very interested in purchasing a share in a community or "shared" solar installation.³



Consider these key business results from the 2017 Study:

- Business respondents reduced their electricity consumption by 19 percent on average during calendar year 2016. This compares to 15 percent in calendar year 2015 and 14 percent in calendar year 2014.
- In 2017, more than eight in 10 agree that their company's view of energy procurement is shifting from merely a cost to an opportunity for reducing risk, improving resilience, and creating new value.
- About six in 10 businesses surveyed now have some form of onsite electricity generation. Of those that self-generate, 21 percent of their supply is coming from renewables.



As these findings suggest, businesses on the whole remain strongly focused on reducing their energy consumption and procuring energy from renewable resources—and they are becoming more mature and sophisticated in their practices. They are generally making good progress, feeling successful, and continuously improving. Meanwhile, residential consumers sustained their commitment to reduce their electricity consumption and, by proxy, their carbon emissions. They also expressed growing interest in technologies that would allow them to do more. While the

findings didn't reveal any wholesale shifts in how residential consumers approach energy management, they did indicate positive changes at the margin, with incremental, continuous growth in a preference for green products and services and a willingness to embrace technology, particularly among the millennial generation. This “inching up” at the edges represents growth opportunities for those who can catch this wave early.

Residential consumer views on energy management



Across multiple categories, the residential findings collectively indicate that the green movement is unstoppable. Respondents signaled little intention to increase their electricity consumption, even as the economy improved. While cost control remained a top concern, climate change and environmental awareness gained traction as motivations for continuing to contain household energy consumption. Generating electricity from renewables grew in perceived importance and favorability, while conventional oil drilling and hydraulic fracturing lost ground.

This year's survey also confirmed a gradual progression toward "cleaner, techier, and younger." These shifts at the edges suggest that environmental stewardship is an engrained value among millennials and to a somewhat lesser extent among Gen X. As these groups gain on

the baby boomers and matures in terms of purchasing power and influence, it has become clear that they are fueling a grassroots movement toward cleaner energy and environmental protection that will likely prevail in the long term, despite recent federal policy actions to the contrary. These younger age cohorts also perceive technology to be the answer to environmental and social woes, and they are ready to embrace new solutions—that is, if the value proposition is compelling. Opportunities abound for solution providers who can find the right mix of affordability and sustainability. But that still won't be enough. They will also need to communicate their offerings effectively. This implies adept use of digital media as well as deep understanding of what motivates these socially conscious consumers to act.

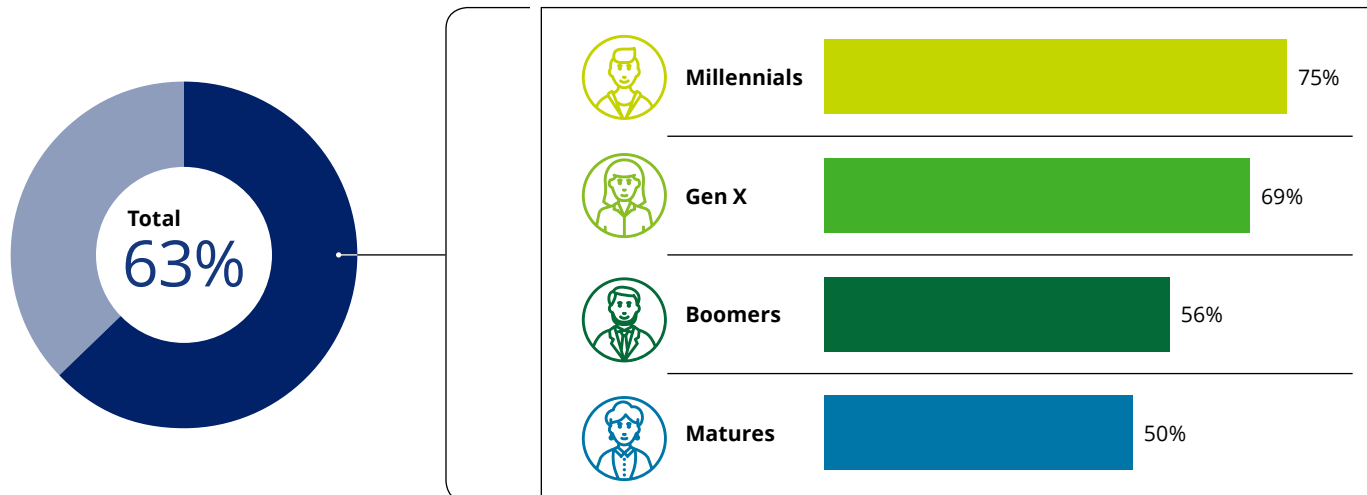
Detailed residential consumer findings

Concerns about climate change and personal carbon footprint remain pervasive, predominantly among millennials and Gen X.

Sixty-three percent of residential consumers are very concerned about climate change and their personal carbon footprints. But this rises to 75 percent among millennial respondents and 69 percent among Gen X. Similarly, millennials (80 percent) are much more likely to believe that

climate change is caused by human actions, followed by Gen X (74 percent). What's the reason for this age-related difference of opinion? Perhaps millennials and Gen Xers have studied the link between carbon emissions and climate change in school, or they've been exposed to media reports about it for their entire lives. Older generations, on the other hand, may not be as familiar with the scientific data, thus making them more skeptical of a connection between climate change and human activity.

Climate change concerns a clear majority of respondents, but worries younger people the most

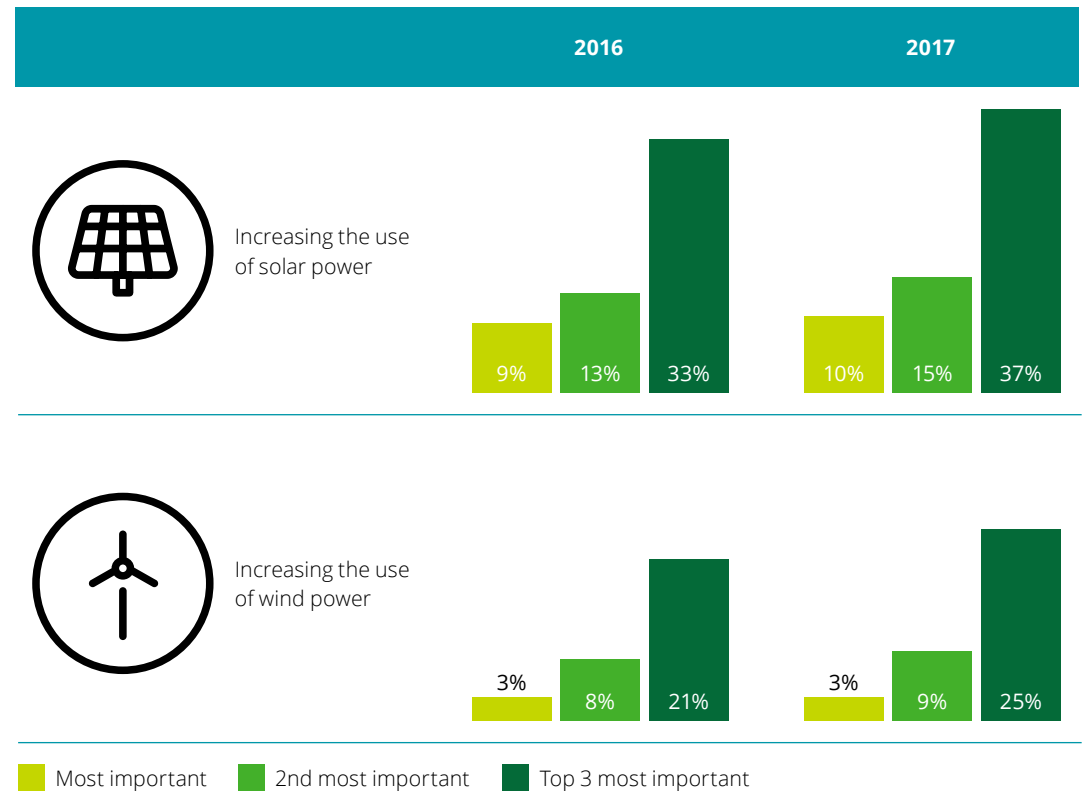




Renewables are increasingly seen as part of the solution.

Several findings in the 2017 Study indicate that residential consumers increasingly see renewables as essential components of a clean, affordable energy future. For instance, inching up slightly, half say that it is extremely or very important to them that part of their electricity supply comes from renewable sources. And this year's findings revealed a big year-over-year jump in the importance of increasing the use of solar power and, to a lesser extent, wind power. This may reflect general awareness of the environmental impact of greenhouse gas emissions and the generation sources needed to reduce them. But another finding suggests a larger perceptual shift may be underway. As in 2016, keeping total energy bills affordable and using clean energy sources are the most important energy issues to residential consumers. This suggests they are generally aware of a new market reality: in many instances, renewables are now cost-competitive with traditional forms of electricity generation due to the rapidly declining costs of solar and wind technologies.

Solar and wind rise to new heights

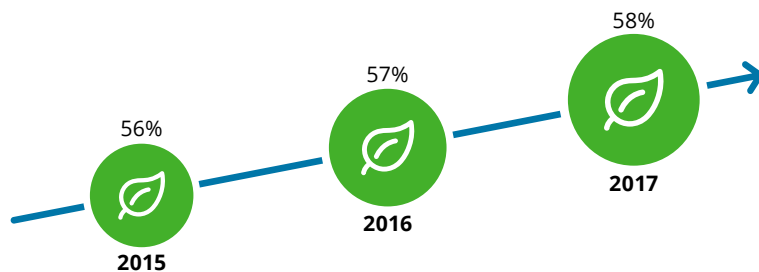




Renewables would drive choice, wherever available.

If they had a choice in electricity suppliers, almost six in 10 residential consumers cited electricity supply coming from renewable sources as a motivation for them to switch. And if they could get their electricity from a source other than their electric company, 60 percent said they would consider renewable energy providers as an option. This makes renewable providers the top alternative to electric companies. Collectively, these findings reinforce the notion that renewable energy has become mainstream as residential consumers increasingly accept renewables as a regular, if not preferred, part of the energy ecosystem.

Time to switch things up? In markets with choice, renewables motivate changing electricity suppliers

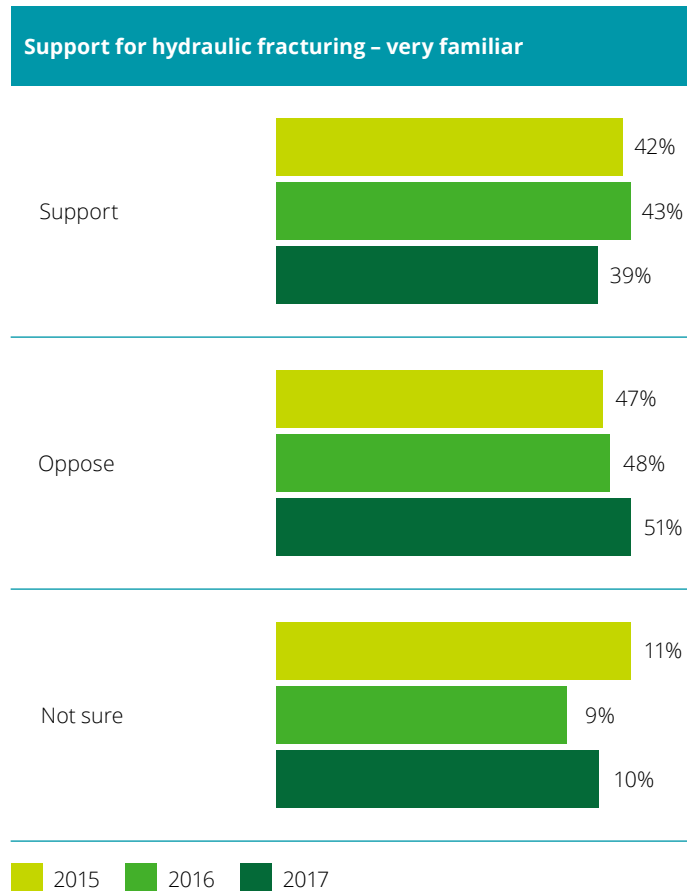


Perceptions of fossil fuels are more mixed.

Only about four in 10 see more drilling for oil and gas in the US as the answer to our energy challenges. Among those who state they are extremely/very familiar with hydraulic fracturing, support for this method of extraction has reached its lowest level since 2014. Opposition to hydraulic fracturing remains strongest in the West and is trending upward across the nation. These perceptions pose recruitment and retention challenges for energy and resources companies, since the millennial workforce is gravitating toward cleaner, greener career paths. But is this fair? It appears that younger generations may not be aware of the clean-burning characteristics of natural gas and its expanding role in the US power generation mix as a complement to renewables. Indeed, according to a recent report by the US Energy Information Administration (EIA), both carbon dioxide (CO₂) and sulfur dioxide (SO₂) emissions have declined partly because of natural gas replacing coal as a power-generation fuel.⁴ Natural gas emits about half as much CO₂ as coal, and it contains only trace amounts of SO₂, which can contribute to acid rain and cause respiratory difficulties.



Familiarity with hydraulic fracturing breeds skepticism, as more than half now oppose it



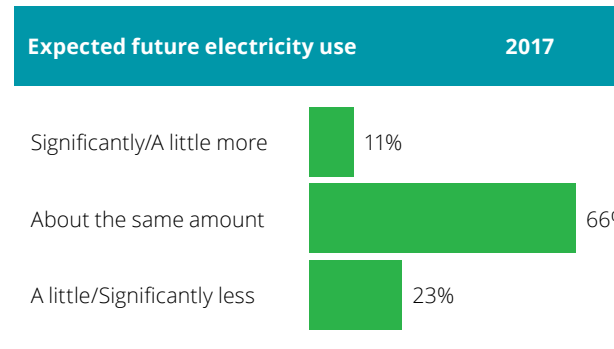
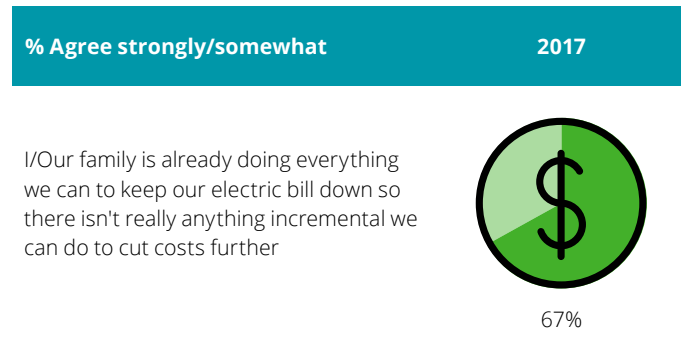
Consumers are still taking steps to contain their electricity use, but unsure about what else they can do.

About eight in 10 households continued to take steps to reduce their electric bills over the past year. What's more, these actions appear to be working: two thirds expect to use the same amount of electricity over the next year while just under one-quarter expect to use less.

Although consumers are continuing to take steps to reduce household electricity consumption, more than two-thirds (67 percent) believe they are doing all they can to reduce their bills even further. This proportion has remained about the same since 2014.



Residential consumers keep their belts tight on electricity usage, but struggle to take it up a notch



Similarly, more than three quarters (77 percent) still report it would be at least somewhat difficult to reduce their bills further. Interestingly, consumers remain unable or unwilling to take the next steps, even though about half (49 percent) indicated they're spending more on electricity today than two years ago. Most (61 percent) blame rate increases for their higher electric bills, not higher usage. But this perception of higher rates doesn't necessarily reflect reality. Our survey respondents' monthly bill estimates have been flat to trending downward since 2014, dropping from \$148 then to \$141 in this year's survey.

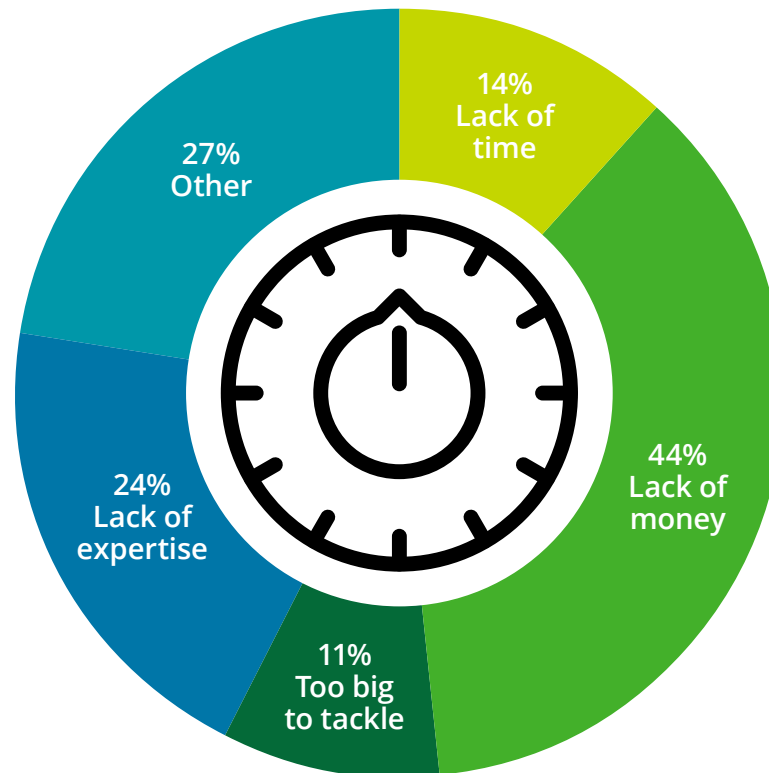
What's holding residential consumers back from cutting their consumption further?

Consistent with the 2016 Study, consumers remain committed to doing the basics to save electricity, including turning off the lights (cited by 82 percent of respondents); shutting down electronics when they are not in use (70 percent); setting their thermostats a few degrees lower in the winter and higher in the summer (62 percent); and replacing older incandescent bulbs when they burn out with compact fluorescents and LEDs (62 percent).



Residential consumers may not be aware of the help that's available, financial and otherwise

Barriers to purchasing a programmable thermostat



Residential consumers still have good intentions to go beyond the basics and invest in more capital-intensive tactics such as better insulating their homes, replacing old appliances, and installing energy efficient doors and windows. But as in the previous survey, they have not followed through. What's holding them back? Expense, lack of expertise, and concerns about projects being "too big to tackle" are mainly to blame. Of note, expense was also cited as the main reason residential consumers wouldn't follow through in installing a programmable thermostat even though about one quarter (24 percent) said it was one of the top five things they could see themselves doing to save even more electricity in the future. These findings may reflect a lack of awareness among residential consumers about the help that's available to them. For instance, many utilities and state governments offer free home energy audits and significant rebates on programmable thermostats and new energy efficient appliances. Plus, they frequently offer product information, technical support, and installation services to simplify the process of implementing energy saving upgrades.

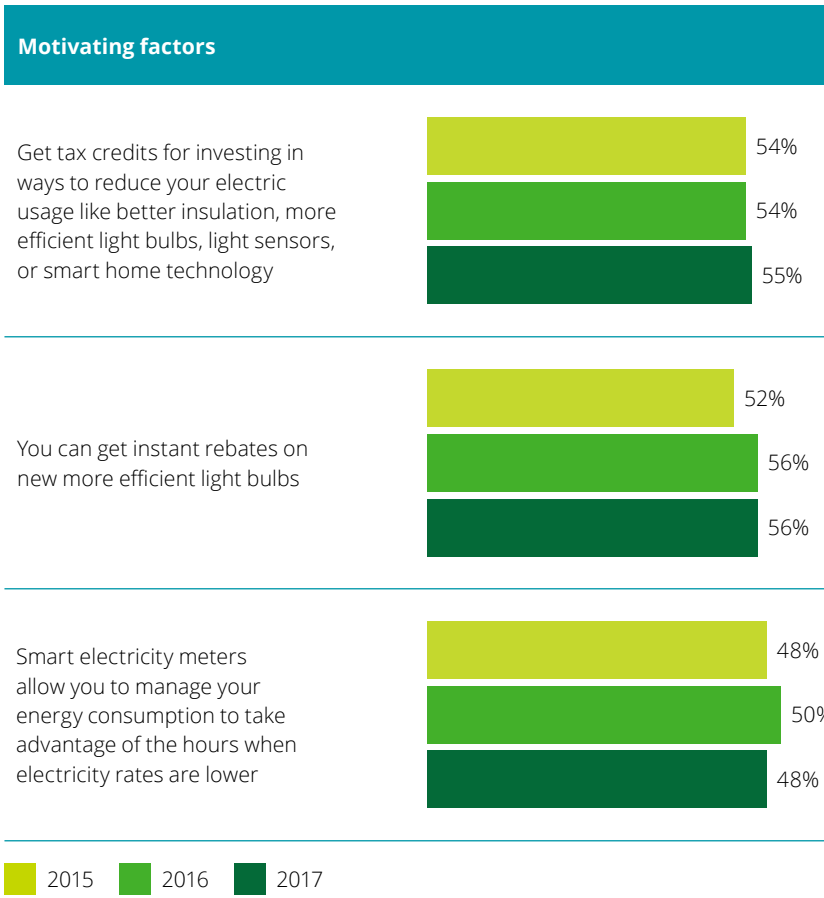


Give us a good reason! Residential consumers indicate the most effective ways to motivate them to save electricity.

Tax credits for making energy efficiency improvements, instant rebates on more efficient light bulbs, and the ability to manage their consumption via smart meters remain the top ways to motivate residential consumers to reduce their electricity usage.

Nearly half (45 percent) are willing to be occasionally “powered off” if they could save 15 percent on their annual electric bills (a new question in the 2017 survey). Meanwhile, interest in home audits is down, with only 38 percent naming them as a motivating factor in 2017, down five points from last year (2016). This is consistent with the pervasive belief that “I’ve done all I can to reduce my electricity bill.”

Could more information inspire residential consumers to act?



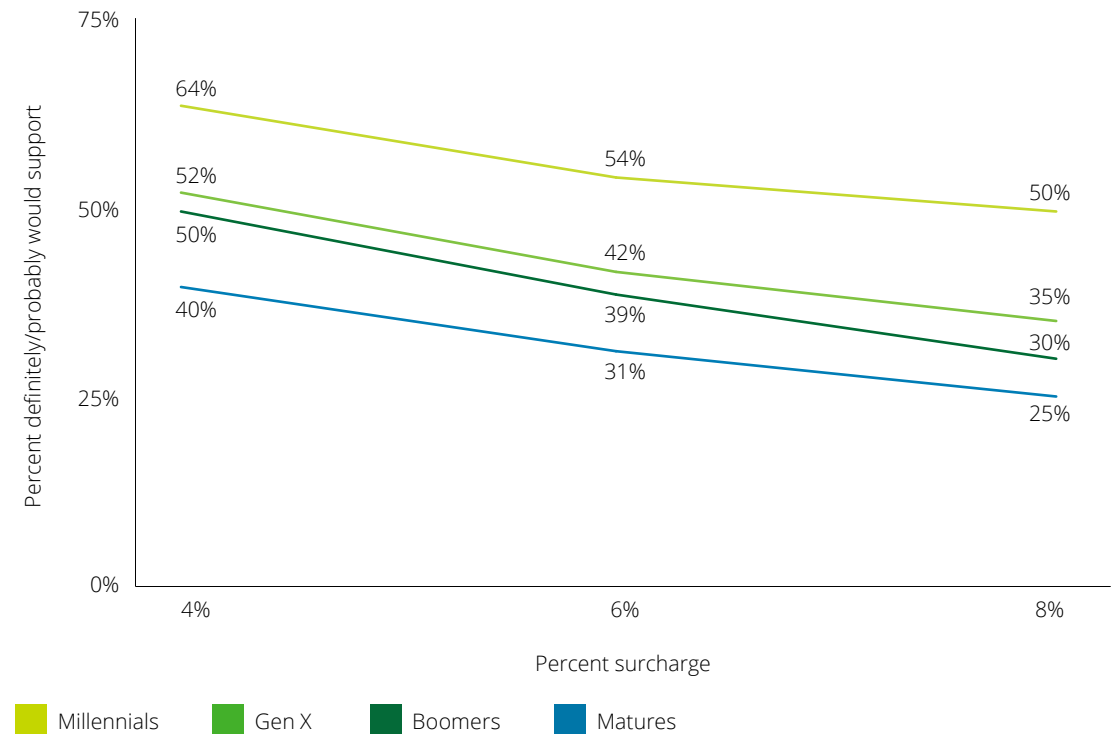


Residential consumers, especially millennials, are willing to put their money where their values are.

A willingness to pay a 4-to-8 percent surcharge on their electric bills for developing sources of renewable energy edged upward yet again in the 2017 Study. Consistent with prior years, support for the surcharge was highest among millennials and lowest among matures. Interestingly, residential consumers supported a mandatory versus voluntary surcharge for renewables just about equally. Do electricity providers have it backwards? If they've been worried about negative perceptions associated with charging a premium for renewables, perhaps they shouldn't be. With support for clean energy steadily increasing, it could potentially strengthen their customer relationships as opposed to harming them.

Nonetheless, another force is at play here: adding more renewables and keeping electricity costs affordable are increasingly not mutually exclusive. Very soon, the debate around charging a premium for renewables could be irrelevant.

Residential consumers willing to pay more for clean sources of electricity generation, but as renewable costs decline, it's less likely they'll need to





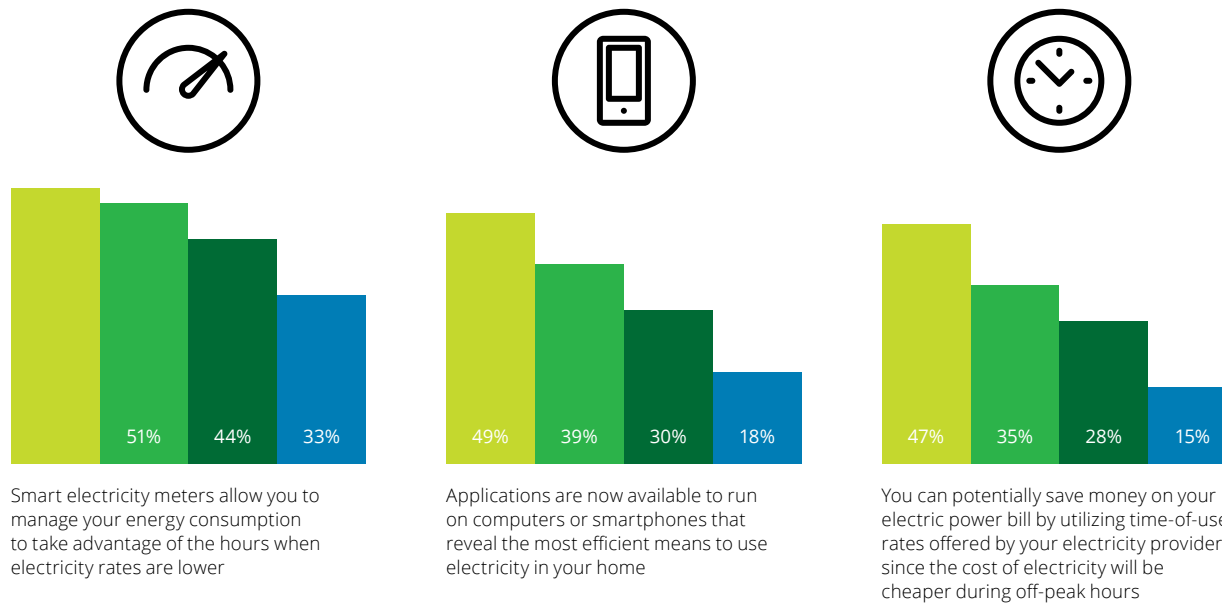
It's not your father's electric meter: high-tech energy management primarily appeals to younger consumers.

Millennials and Gen X are much more likely than baby boomers and matures to be extremely or very motivated

by offerings that incorporate cutting-edge technologies for managing energy consumption such as apps, smart meters, and time-of-use-rates.

Technology holds greater allure for younger generations

Motivations for reducing electricity consumption



% Very/extremely motivating

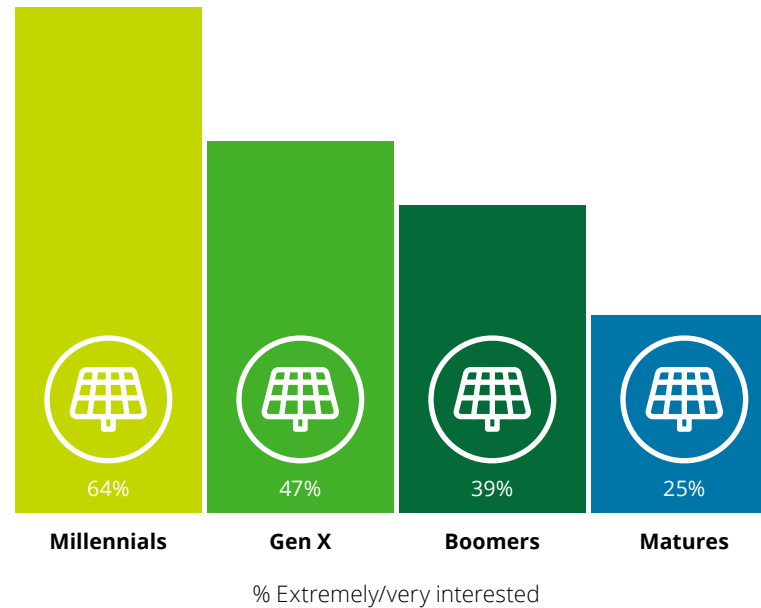
Millennials Gen X Boomers Matures



Interest in solar continues to rise, with prospects brightest among millennials.

Among those who are solar eligible, 44 percent say they are extremely/very interested in installing solar panels on their primary residences if they could do so through a financing or leasing arrangement with no out-of-pocket expense.⁵ This proportion has inched upward over the last two surveys. Interest is strongest in the West and weakest in the Northeast, although not considerably less. Nearly two-thirds (64 percent) of millennial respondents now say they are extremely/very interested in installing solar panels—up nine points over last year. Gen X was a distant second, with about half saying they are extremely/very interested.

Interest in solar intensifying the most among millennials





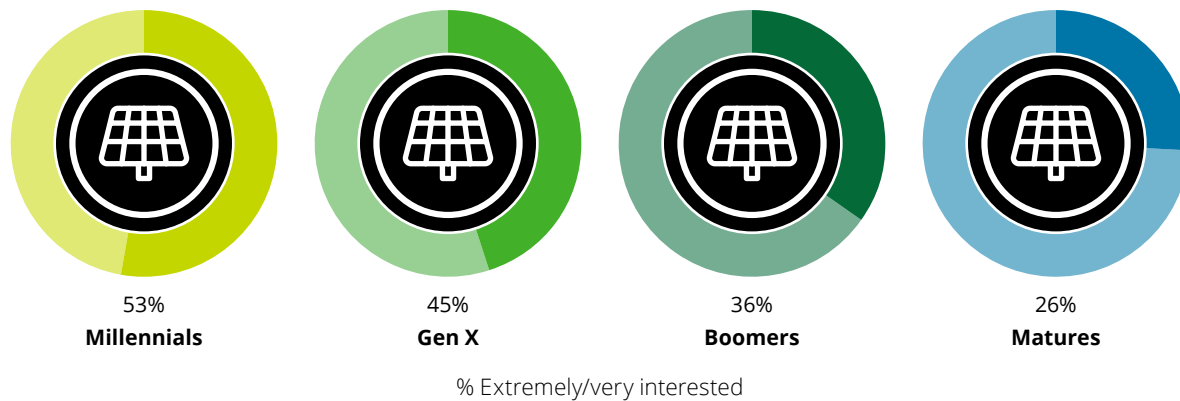
The appeal of community solar also remains strong.

Forty-one percent of residential consumers say they are extremely/very interested in purchasing a share in a community or shared solar installation.⁶ Again, this proportion rises significantly among millennials to well over half (53 percent).

This finding corroborates the trends explored in the Deloitte report, [“Unlocking the Value of Community Solar.”](#)

As explained in that report, shared solar has gained a foothold in the US in the last few years and its growth prospects remain strong because it generates value in each segment of the supply chain. It allows utilities to grow their solar generation portfolios, enables developers to expand their business offerings, and gives more customers the chance to buy solar power. As a result, it is fast becoming a growth engine for distributed solar resources.

As the founders of “the sharing economy,” millennials naturally like the idea of community solar





Savings motivate people to install solar panels, but so does clean energy.

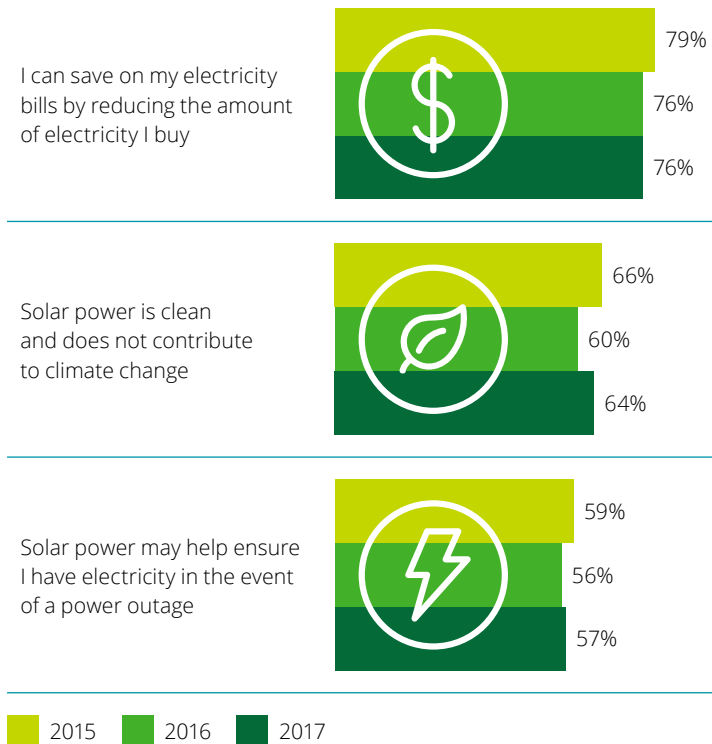
Among those who are solar eligible, residential solar penetration is at 7 percent. Among those with panels, 57 percent were motivated by saving on their electricity bills, down from 75 percent in 2016. At the same time, 48 percent of those with panels pointed to clean energy as a motivation, up from 39 percent in 2016.

Savings (76 percent) and clean energy (64 percent) are similarly driving interest among those who would consider installing panels. Meanwhile, 57 percent pointed to ensuring they have electricity during a power outage as a motivating factor.

Also of note, the appeal of financing packages is increasing. Twenty-eight percent of those with solar panels in the 2017 Study were motivated by the fact that their solar providers offered “financing that made it affordable,” compared to only 19 percent in last year’s survey. Similarly, 12 percent of those with panels pointed to affordable provider financing as their primary motivation in the 2017 Study, while fewer than one percent mentioned it as a primary motivation in 2016.

Savings and clean energy are a compelling combination

Drivers of interest





Expense is the other side of the coin in selling residential solar.

The perception of being too expensive remains the top barrier by far for those not interested in installing solar panels on their primary residences. This was followed by efficacy concerns and lack of familiarity. All of these hurdles have something in common: they could be softened by

educating consumers more thoroughly about how solar works and what it has to offer. Also, while still low, this year's findings saw an uptick in respondents who cited the unattractiveness of rooftop panels as a barrier to purchase. This concern, however, may eventually be rendered moot by new products coming on the market, such as thin-film panels and solar roofing tiles.

More education could be the key to overcoming solar barriers



42%

Installing solar panels is too expensive



26%

I'm not sure the panels would work as promised



20%

Rooftop solar panels are not attractive



19%

I don't know enough about solar power to make this decision



17%

I'm not interested in changing my electricity supply



16%

I don't plan to own my home for a long period of time



14%

There are too many trees on my property/not enough sun



14%

I'm waiting for prices of a residential solar system to come down further



13%

My homeowners' association does not allow it



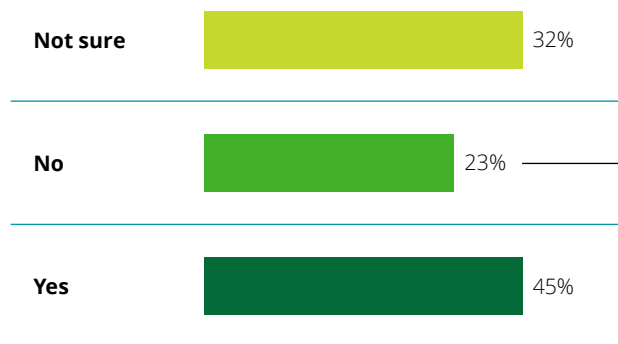
Batteries boost interest in residential solar.

In this year's Study, we explored the potential impact of battery storage on solar panel adoption for the first time. Forty-five percent of those who don't have solar panels on their primary residence said they would be more interested

in installing solar panels if they could combine them with a home battery storage unit. Thirty-two percent said they weren't sure.

Batteries could increase the appeal of rooftop solar

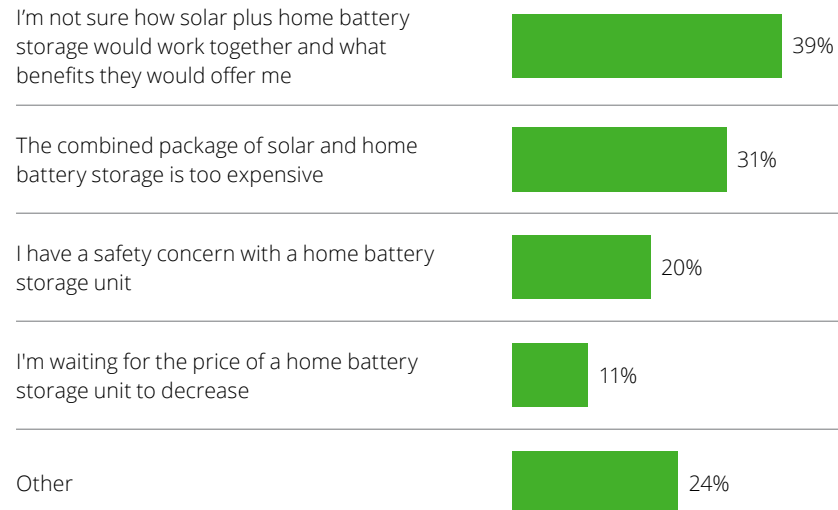
Interest in solar panels if combined with home battery storage unit*



*Among those who don't have solar panels on their primary residence

Reasons for not installing solar panel with home battery storage unit

(Among 23% not Interested in solar panel combined with battery storage unit)





Millennials are the most likely to use social media and apps to learn how to manage their energy consumption—and their techno-savviness is trending upward.

Residential consumers are most likely to get tips on saving energy from their electricity providers (66 percent of respondents), followed by relatives or friends (36 percent). Millennials are the most likely to get tips on saving energy through social media, with 47 percent saying they got some tips that way, up from 38 percent last year. In contrast, about 28 percent of the general population say they receive tips through social media.

As one might expect, millennials are also leading the way in using software apps to become smarter about energy consumption. Nearly four in 10 (39 percent) now say they use energy apps, up five points from last year's survey. This compares to only 22 percent of baby boomers and 19 percent of matures. Gen X is also more likely to use apps and social media than the general population. This contrast

between millennials and older age cohorts becomes even greater when examined in terms of what could impel them to change the way they use electricity. Here, 49 percent of millennials found applications that reveal the most efficient ways to use electricity to be very/extremely motivating, compared to only 18 percent of matures—a gaping differential of 30-plus points.

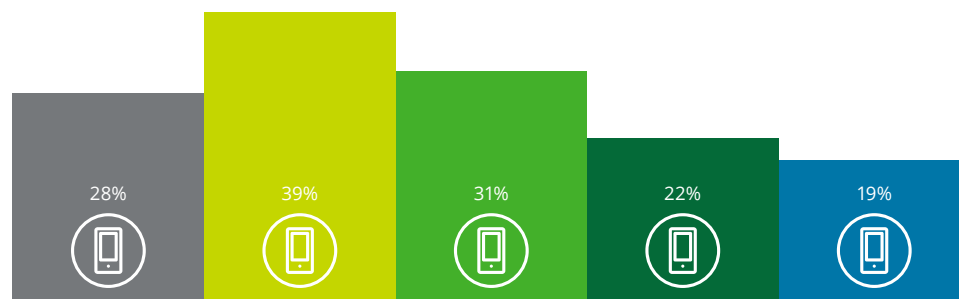
Millennials' comfort with technology, combined with their interest in managing their energy usage (and by proxy their costs and environmental impact) could bode well for utilities' smart meter programs and rate-restructuring efforts. Indeed, 2017 Study findings indicate that utilities would find a receptive audience among millennials for time-of-use rate offerings, with nearly half (47 percent) finding them to be extremely/very motivating. Once again, the differences between millennials and older age groups are stark: only 28 percent of baby boomers and 15 percent of matures find time-of-use rates to be compelling.



These findings suggest that electricity providers who avoid using social media to engage with their customers do so at their peril, and [Deloitte's Digital Democracy Survey](#) (11th edition) reinforces this supposition. According to the report, social media is now mainstream media, with 84 percent of all consumers—and more than 90 percent of millennials and Gen Z (ages 14-20)—on social networks. Today's consumers are using social media to discover new content, get news, and resolve customer service issues.

As millennials' use of digital technology and their purchasing influence rise in concert, so do the questions: what apps and social media sites are they using and what impact can apps and social media have on energy management and support for renewable energy in the future?

Technology is essential to connecting with and motivating millennials



I am using software apps to help me be smarter about energy consumptions

■ Total ■ Millennials ■ Gen X ■ Boomers ■ Matures



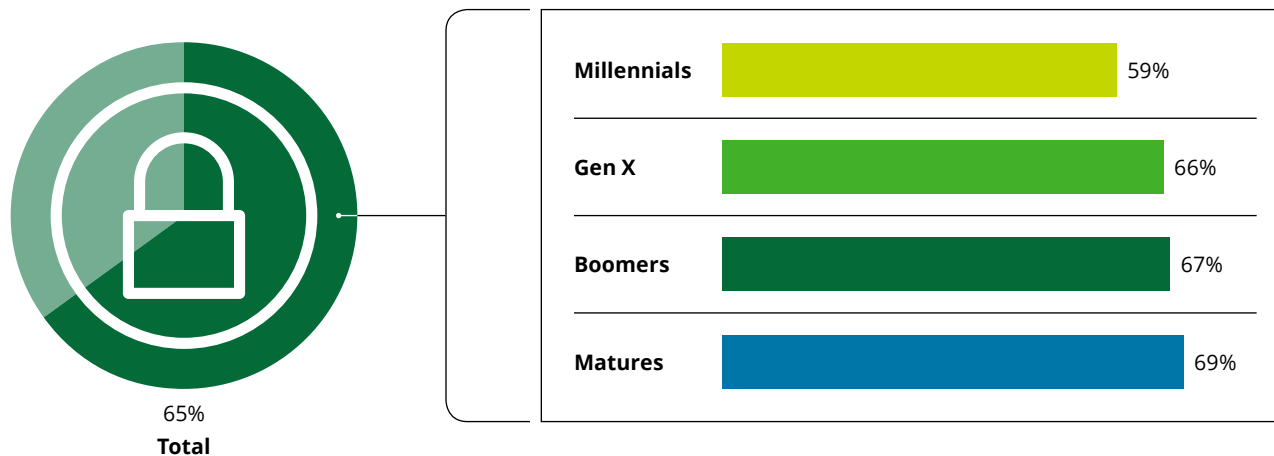
Potential purchasers of smart thermostats and home automation systems are increasingly concerned about hackers.

Penetration of smart thermostats or home control/automation systems remains low at 9 percent, up just two points from 2016. As in last year's survey, just over one in 10 (13 percent) with basic thermostats plan to upgrade to one that can be accessed or changed via a mobile device or to purchase a home automation system in the next year. However, this proportion rises to 20 percent among millennials and 16 percent among Gen X.

Why the lack of interest in smart thermostats and home automation systems? Most (57 percent) simply say, "My current device does its job," while 28 percent say, "It's too expensive." But amid growing reports of hacked home devices, privacy and security concerns are evident: 15 percent cited them as a barrier to upgrading their thermostats, while about two-thirds (65 percent) say they are increasingly worried about them as homes become more automated. Clearly, the industry will need to allay these fears if it is to make inroads with cyber-wary customers.

Cyber security concerns emerge as a barrier to smart-device adoption

Have increasing concern with privacy/security as homes get more automated



Business views on energy management



The findings of the Resources 2017 Study indicated an evolving maturity in companies' energy management practices. Businesses remain focused on sustaining the energy reductions they've made thus far, while charting a course for becoming even more energy efficient and environmentally responsible. As with consumers, renewables will likely be a big part of this equation, especially as companies get more comfortable with self-generating their electricity supplies and procuring renewable energy from third parties.

While the findings of the 2016 survey indicated that businesses were struggling to see the road ahead, this year's findings suggest they are back on course. Almost across the board, businesses reverted to 2015 levels or better in terms of their confidence and maturity levels. They are aligning their corporate energy missions with their

corporate visions and continuing to experiment with new solutions in addition to deploying standardized ones. After pausing to get their bearings last year, they now seem to have a much clearer vision of where to go from here.





Detailed business findings

Energy management has become table stakes for competitiveness.

Consistent with previous surveys, 80 percent of businesses view reducing electricity costs as essential to staying competitive from an image perspective, and 84 percent view reducing electricity consumption as essential to staying competitive from a financial perspective. Meanwhile, competitive advantage is declining in importance as a motivation for implementing resource management programs. The likely reason? Since so many businesses now have these programs in place, there is less advantage to be gained.

A recent interview with Intuit executives, Scott Beth, vice president of finance and workplace real estate, and Sean Kinghorn, senior program manager of global sustainability, underscored the importance of energy management to a company's overall competitiveness. The company's

energy management program originated as a grassroots movement among a small group of passionate employees. From this humble beginning, the program was embraced by senior management, who quickly saw the need to formalize the initiative by hiring a full-time sustainability leader. What was behind this decision?

Mr. Kinghorn explained that benchmarking revealed the company had a significant opportunity to pursue sustainability goals. The company's culture also played a role since current and future employees cared greatly about environmental and social responsibility. "Everyone at Intuit is focused on our mission—to power prosperity around the world. However, early career employees especially want to make a positive impact in the world around them and sustainability is part of their decision criteria for joining a company," said Mr. Kinghorn, and Mr. Beth concurred.

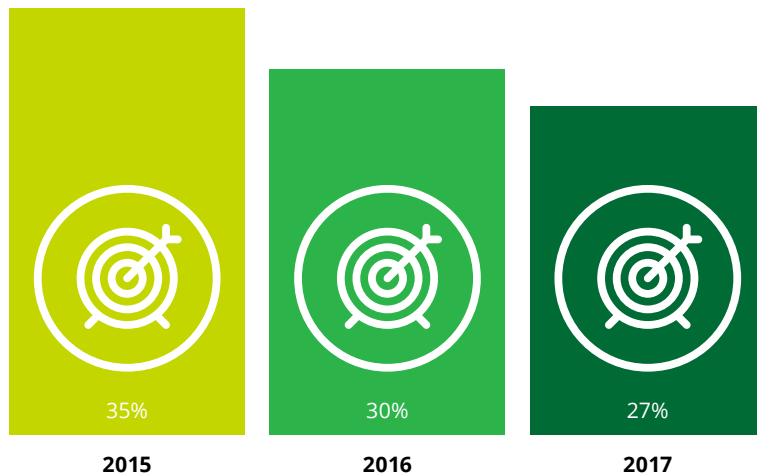
"It's a given that companies of choice are investing in sustainability and there is a collective consciousness and a desire to make a difference in the world."



In fact, they observed that in a recent college campus interview session, 100 percent of the candidates asked what Intuit is doing to make the world a better place. Driven by these motivations, as well as the prospect of good financial returns, Intuit's energy management program has evolved to incorporate innovative strategies, such as procuring renewable energy through customized power purchase agreements and tax equity arrangements, and collaborating with third-party providers to make attractive rooftop solar packages available to employees and customers.

Energy management is a must

Companies less motivated by competitive advantage as energy management become pervasive



The motivations for energy management go well beyond cost savings.

Cost cutting, cited by 54 percent of business respondents, is still the most important motivation behind companies' decisions to launch their resource management programs, but it has dropped to the lowest level since 2014. In 2017, more than eight in 10 agree that their company's view of energy procurement is shifting from merely a cost to an opportunity for reducing risk, improving resilience, and creating new value. Sixty-one percent said their customers are demanding that their companies procure a certain percentage of their electricity demand from renewable resources. In addition, almost two-thirds (65 percent) said that their companies actively publicize the percentage of their electricity demand that is met by sourcing renewable resources.

Digital Realty, one of the world's largest data center operators, provides an example of how the motivations for energy management go well beyond cost savings. Under its business model, the company procures power,



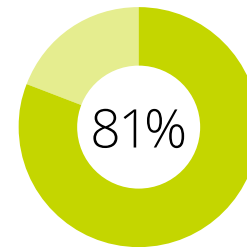
provisions it to customers, and typically passes through the costs. Because the cost of the electricity consumed by its customers is so high, Digital Realty is obviously concerned about efficiency and cost effectiveness in the procurement process. However, as Aaron Binkley, director of sustainability for Digital Realty explained, the company is also responsible for “procuring the power our customers want in terms of renewables or other characteristics.” In order to create value for its customers, Digital Realty pays attention to many aspects of energy management, including how it buys power (i.e., the spot market versus long-term contracts), hedging strategies, renewables procurement, participation in demand response programs, and efficiency initiatives. It also considers how it engages with customers to meet their specific energy objectives, such as cost cutting, price stability, transparency, renewables, etc. “It all rolls up into this notion that we have to be strategic and intentional about how we manage energy to best serve our customers,” said Mr. Binkley.

“There’s a shift underway strategically toward energy efficiency and renewables within our business and across the industry as a whole.”

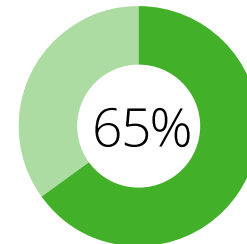
Views on energy procurement shifting from cost to opportunity

Agree/strongly agree

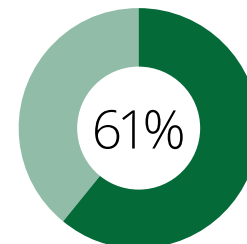
My company's view of energy procurement is changing from simply a cost to the firm to an opportunity to reduce risk, improve resilience, and create new value



My company actively publicizes the percentage of our electricity demand that is met by sourcing renewable resources



Our customers are demanding that we procure a certain percentage of our electricity demand from renewable resources





Businesses keep getting better and better at managing their resource usage and procurement.

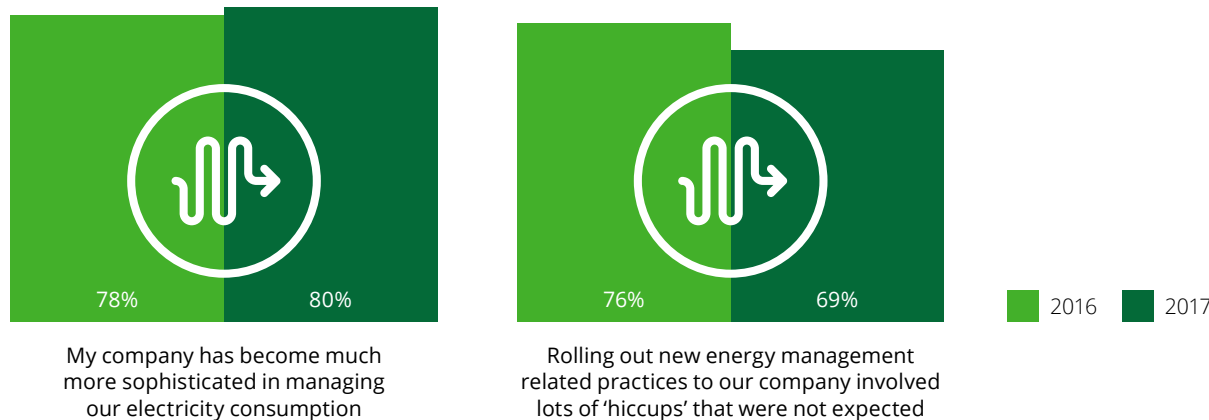
Consistent with the prior two surveys, eight in 10 businesses continue to believe that their energy management practices have become much more sophisticated. And, in comparison to last year’s survey fewer are encountering lots of “hiccups” in rolling out their programs. But perhaps most telling: over half (55 percent) still feel extremely/very successful at achieving their resource management goals. Even though much of the low-hanging fruit is gone, businesses are still making significant progress year after year.

The road ahead is getting clearer and more aligned with where the company is headed.

Half of business respondents report having a documented corporate energy vision/mission that fully aligns with the corporate vision. Forty-five percent report that energy management is a key element of corporate strategy. Moreover, four in 10 say that new/innovative solutions are actively encouraged, experimented with, and deployed.

After dipping last year, all three of these proportions have bounced back to 2015 levels. This may reflect a stabilization in corporate priorities as well as greater familiarity with how specific resource management practices can support them.

Continuous progress is the norm



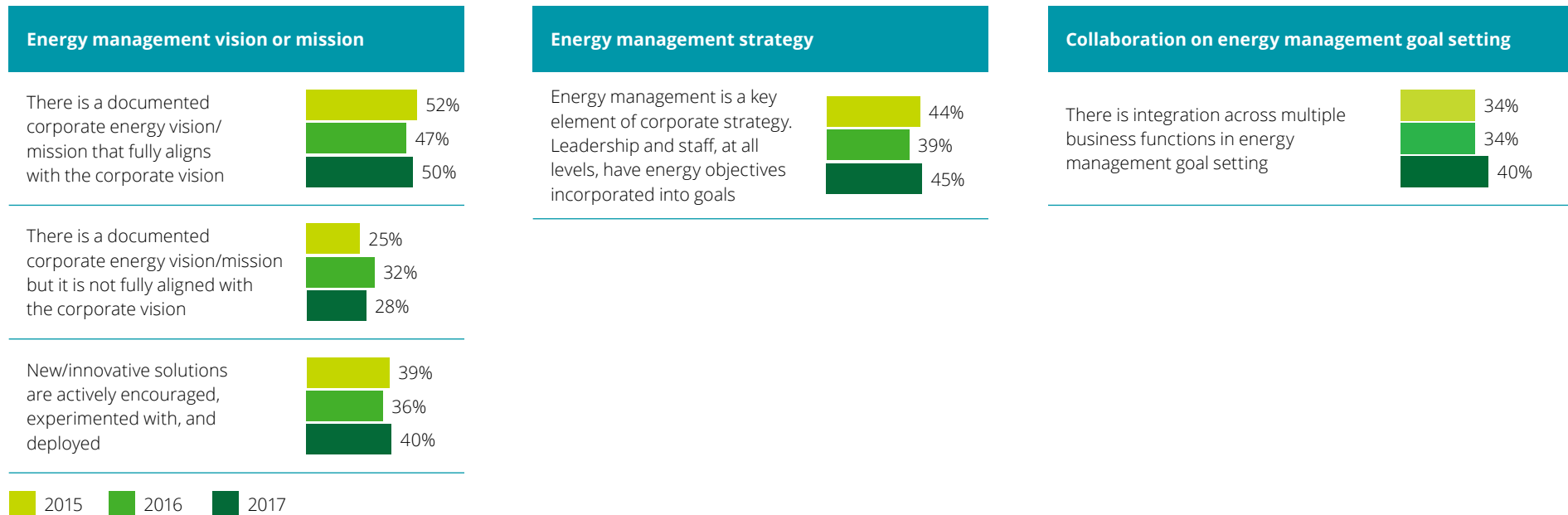


Higher levels of integration across business functions in energy management goal setting were seen in 2017 versus 2016, which further supports the aforementioned hypothesis.

Outdoor apparel maker, Patagonia, offers an excellent example of the innovation that can occur when a company's mission and its energy vision are aligned.

In a recent interview with Deloitte, Phil Graves, managing director of Patagonia's Tin Shed Ventures™, noted that Patagonia not only has a company-wide goal to get to 100 percent renewable energy, but it also seeks to inspire its stakeholders, as well as other companies, to improve their environmental footprints—all while enhancing its own financial performance.

Corporate missions and energy management visions align





To the uninitiated, this may seem like an impossible task, but the company has pioneered several innovative programs that are allowing it to make great gains toward achieving its “triple bottom-line” objective of environmental responsibility, social consciousness, and financial performance.

For instance, Tin Shed Ventures™ is Patagonia’s corporate venture capital fund, which it uses to invest in environmentally and socially responsible start-up companies. Recently, the fund has financed rooftop solar development. By leveraging federal investment tax credits for solar, the company has been able to generate a positive return for the fund, while successfully putting thousands of solar panels on people’s rooftops. Patagonia is also working to further the installation of community solar near its headquarters so its customers can participate in these programs.

There are many good reasons for Patagonia’s passionate commitment to developing clean energy, but as Mr. Graves commented, “Ultimately, it goes back to our mission statement, which is to use business to inspire and implement solutions to the environmental crisis.”

“Environmental responsibility has always been a part of our DNA, so these renewable energy investments help us carry out our mission while also benefitting the bottom line.”



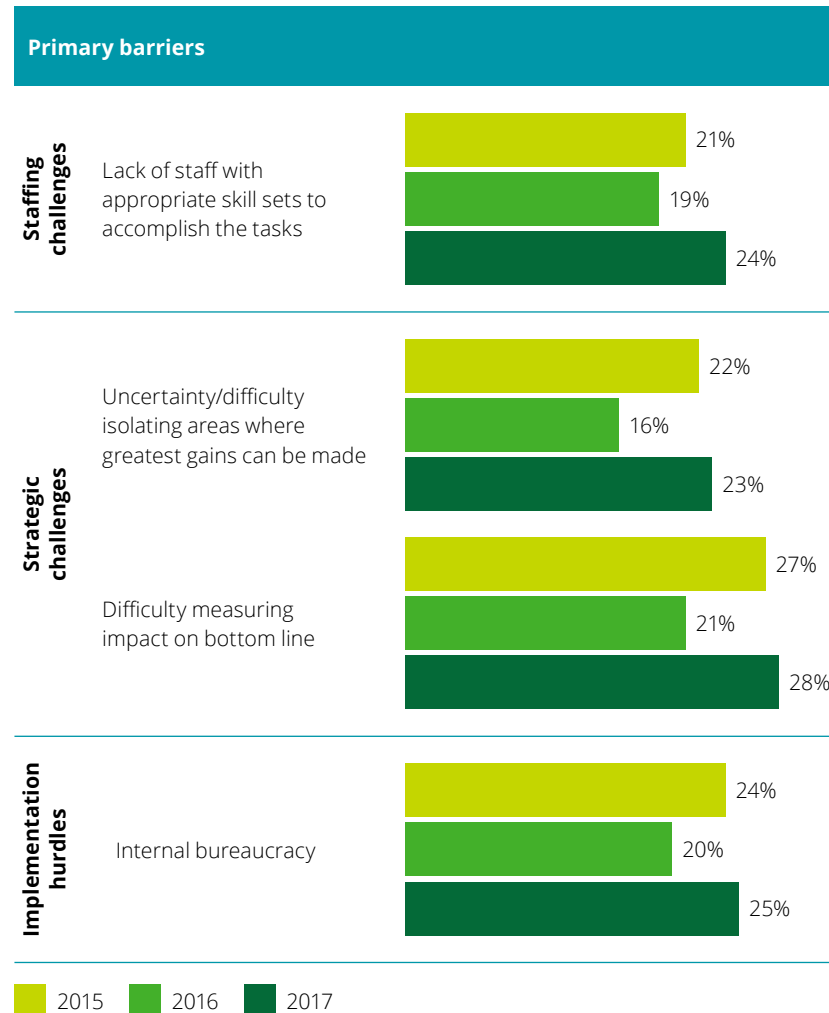
Of course, anything worthwhile has its challenges, but no major roadblocks to energy management progress are on the horizon.

No single barrier to achieving companies' resource management goals stood out. This year, more business respondents cited strategic challenges, staffing, and internal bureaucracy as primary barriers to success than in 2016. Despite more citing staffing challenges as a barrier, fewer (61 percent) are finding it difficult to engage the broader organization in their electricity management efforts, dropping eight points from 2016.

Energy management is a one-way trip, with companies traveling farther each year.

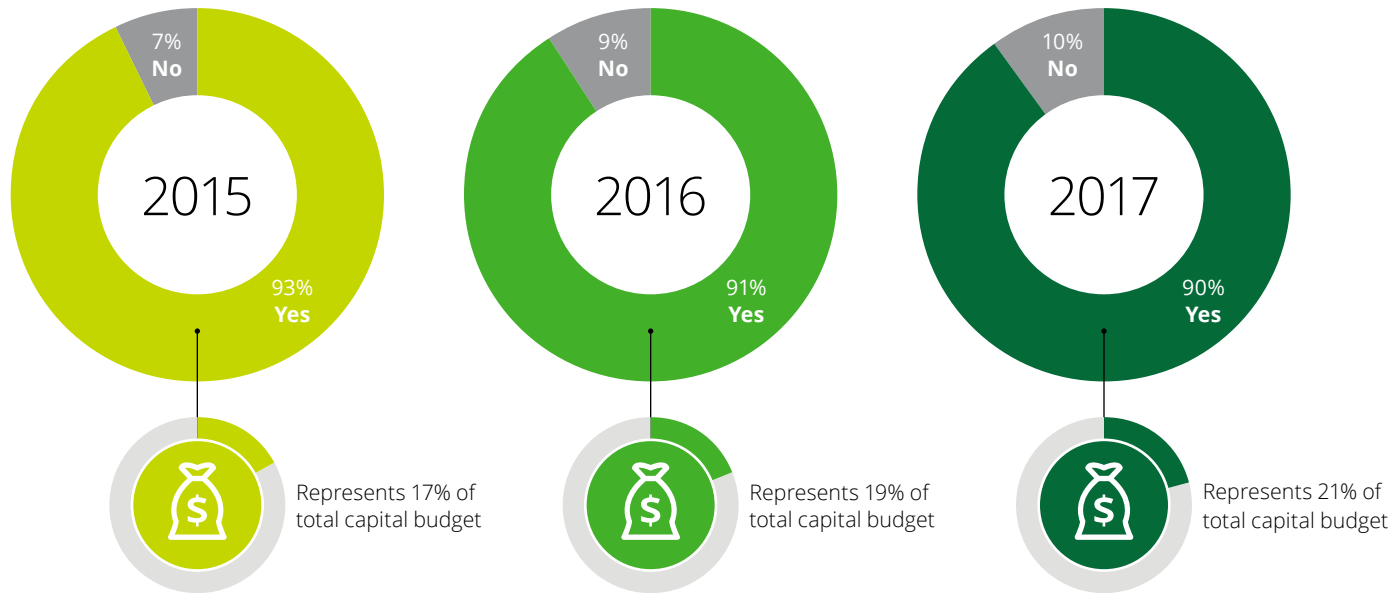
Companies allocated progressively more effort/resources to their energy management programs over the last three years as they exhausted the easier opportunities. Targeted reduction levels are in line with prior years at roughly 25 percent on average, but companies once again gave themselves a little more time to accomplish what they've set out to do. In 2017, the average time horizon edged up to approximately five years.

Hurdles exist but seem manageable



Companies get down to business with energy management funding

Invested funds in energy management over the past three years



Companies are putting more capital to work in more effective ways.

Consistent with prior surveys, nine in 10 companies say they have invested funds in energy management programs over the last three years. These funds represented about

21 percent of their total capital budgets, which is a higher proportion than in the 2015 and 2016 surveys. Even small companies, which often have more funding constraints, increased the proportion of their capital budgets allocated to energy management.



Businesses point to a handful of tactics as “gifts that keep on giving.”

The energy management tactics being employed were largely the same this year, although there was some drop off year-over-year in the number of different tactics being used. This suggests that companies may be focusing their efforts in certain areas.

New this year, the survey inquired about time-of-use rates. Twenty-eight percent said they are participating in an electric utility time-of-use pricing program and 22 percent said they have hired a third-party provider for energy management services.

When asked to identify the three tactics that had the most positive impact on their companies’ electricity consumption, businesses pointed to a handful of basic tactics including installing motion occupancy sensors (39 percent), using timers/sensors to control when equipment is powered on (37 percent), and installing building energy management systems (35 percent). A quarter said that participating in a utility-sponsored demand-reduction program was among the most important tactics for accomplishing their goals, while 22 percent pointed to installing electricity generation solutions. And, although they weren’t at the top of the list, batteries were mentioned by more respondents this year (15 percent) than last (12 percent), suggesting they

Basic tactics still benefit businesses



47%

Installing motion/occupancy sensors



42%

Using timers/sensors to control when equipment is powered on



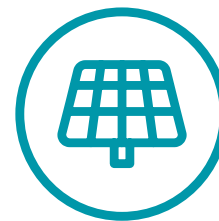
40%

Installing building energy management system



31%

Participating in a utility sponsored demand reduction program



27%

Installing electricity generation solutions (e.g., solar panels) on our facilities



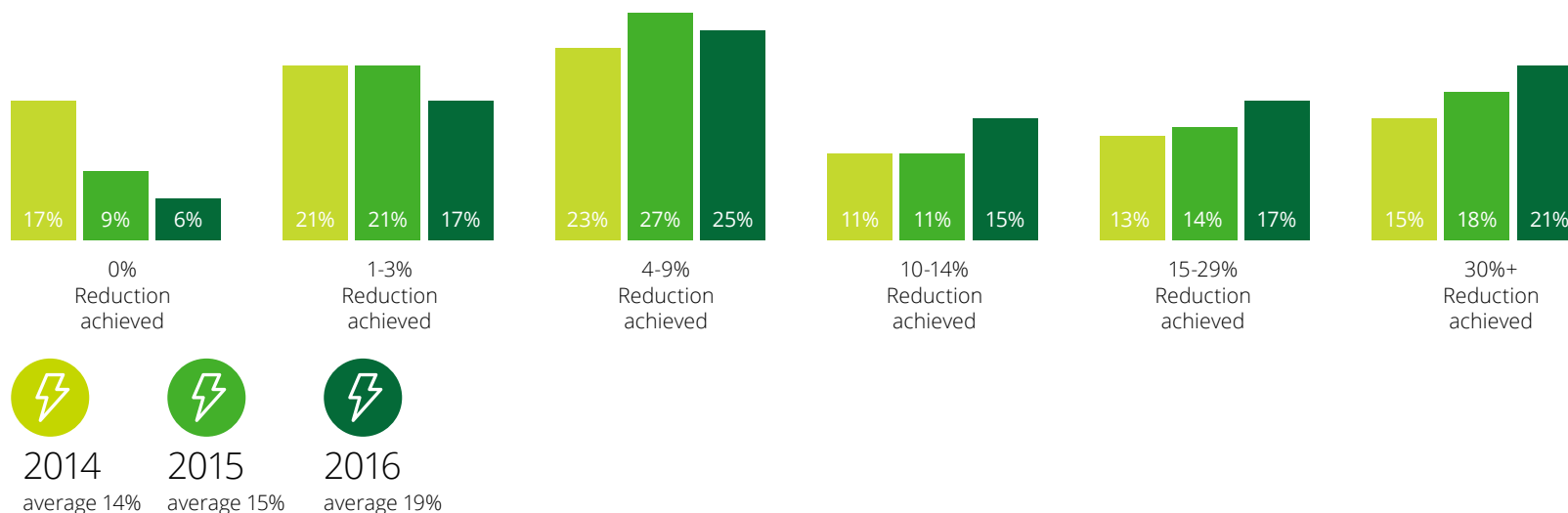
are becoming more prominent as an effective energy management tactic.

Companies still appear to be getting significant benefits from implementing basic energy management solutions, such as deploying timers and sensors and participating in demand-response programs—even though steps such as these could be considered low-hanging fruit and may have been taken some time ago.

Strategies and tactics are working: businesses achieved larger reductions in electricity usage.

Year after year, businesses are using less and less electricity, which offers evidence that they are making good progress toward their goals, even as those goals remain ambitious. In this year’s Study, businesses reported reducing their electricity consumption by 19 percent on average during calendar year 2016. This compares to 14 percent in calendar year 2014 and 15 percent in calendar year 2015. Similar patterns emerged in other energy/resource management areas.

Businesses once again reduced electricity consumption year-over-year





Businesses seek to control their own destinies.

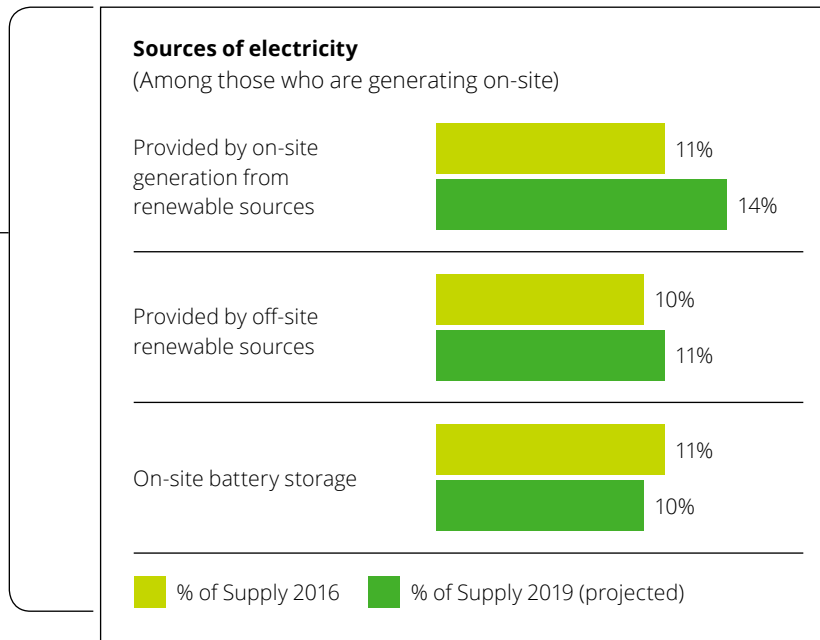
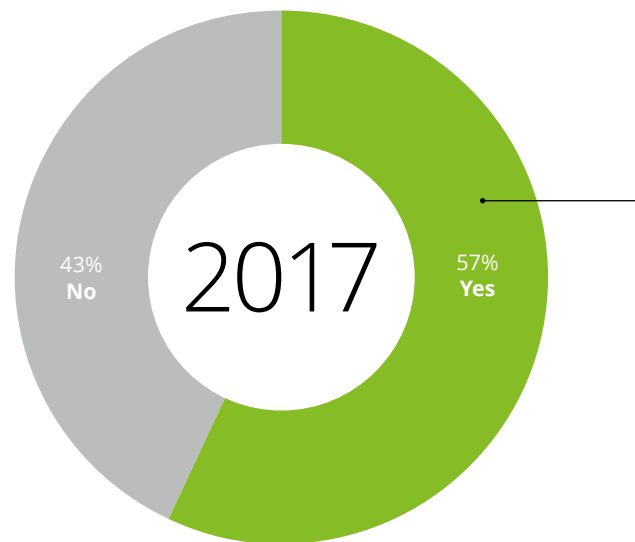
About six in 10 businesses now have some form of onsite electricity generation. Of those that self-generate, 21 percent of their electricity supply is coming from renewables.

Among those that are generating their own electricity, diversification of energy supply (44 percent) was cited as

a major motivation, up eight points from 2016. Resilience (43 percent) was also cited as a top driver this year, up 14 points from 2016. These two major motivators were followed by price certainty (40 percent), cost savings (40 percent), and meeting their sustainability goals (22 percent). These motivations tend to emphasize “taking control of one’s destiny” in the event of price fluctuations, supply chain disruptions, and/or outages.

Businesses take control with renewables

Have on-site electricity generation





Nonetheless, fewer companies in this year's study (24 percent) reported increased outages, down eight points from the 2016 study. Utilities have made progress in the areas of resilience and reliability likely due to grid modernization programs. Businesses are still generally moving toward more self-reliance and control, preferring to avoid the risk of any disruption and reduce exposure to high utility demand charges during peak periods. This could be why those business respondents who reported experiencing an increase in electric outages are taking things into their own hands. In response to the increase, 26 percent are intending to develop self-generation capabilities, 33 percent are planning to increase the amount of electricity they self-generate, and 32 percent are aiming to purchase battery storage.

This propensity to take control was further corroborated by companies' interest in microgrids, with over one-third (35 percent) indicating they have considered implementing or participating in one.



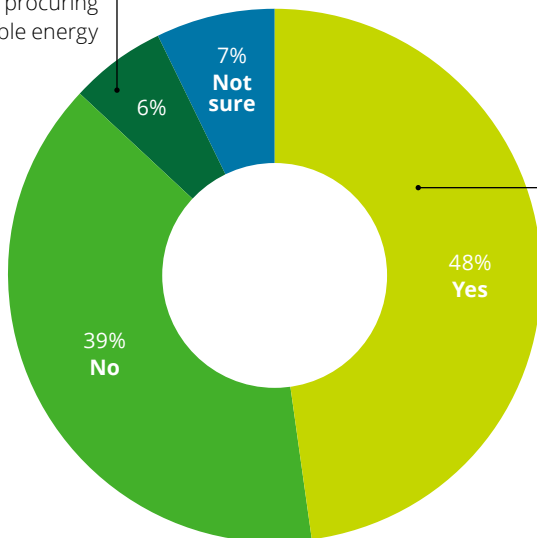
Combining battery storage with renewables sweetens the deal.

Consistent with 2016, about half (48 percent) of business respondents are working to procure more electricity from renewables. Six percent say they purchase renewable

energy credits in lieu of directly procuring renewable energy. Of the 39 percent who are not working to procure more renewable electricity from renewables, 58 percent say combining renewable energy sources with battery storage could motivate them to do more.

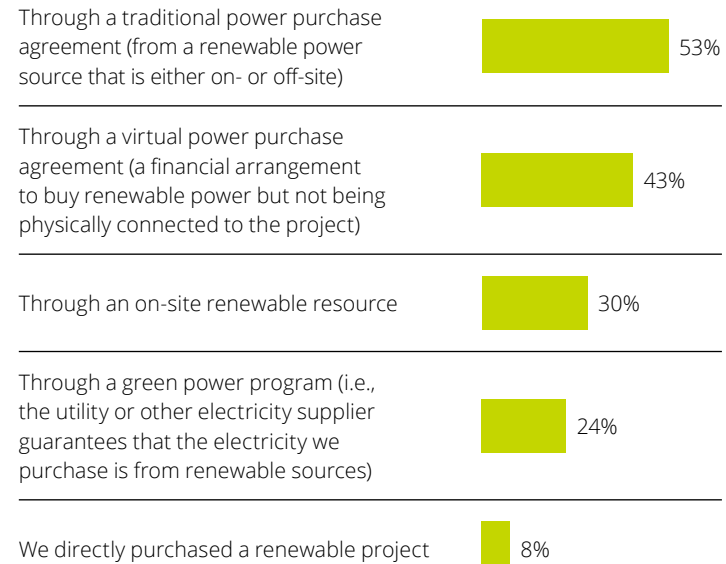
Companies buy green power in several ways

We purchase renewable energy credits (RECs) in lieu of directly procuring renewable energy



Methods for procuring

(Among those procuring electricity from renewables)

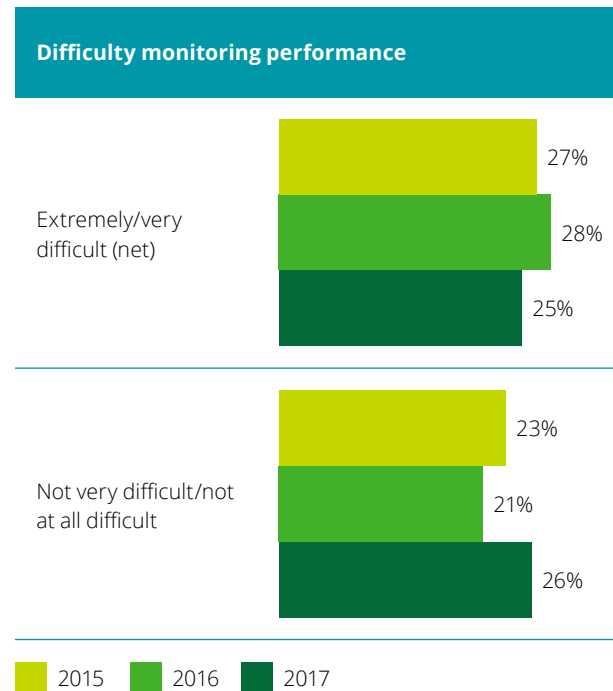




It's getting easier to monitor performance against goals as companies evolve their energy management practices.

While the changes weren't large in comparison to last year, the numbers are all going in the right direction, with fewer companies saying it's extremely/very difficult to monitor performance against goals, and more saying it's not very difficult to do so. The reasons for difficulty in monitoring remain consistent with the 2016 survey and are generally related to lack of resources and inadequate systems and data.

Performance monitoring capabilities are maturing





Businesses are becoming more sophisticated in accessing and analyzing high-quality data to inform their energy management decisions.

One-third of companies this year indicated they use a variety of external market intelligence sources to develop their energy forecasts, up five points over 2016. The proportions of those who focus on high-quality energy

data and data management—and of those who say that advanced analytical tools are deployed widely across the company—are inching upward. Forty-two percent report that their executives have online access to energy information across the organization with drill-down capability. This proportion has risen steadily over the last two surveys.

Companies making more informed decisions

Focus on quality of data



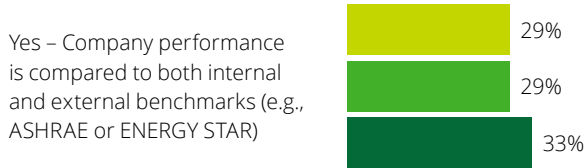
Data extract/analytical tools to support energy management



Executive access to energy information



Energy performance comparisons to benchmarks



2015 2016 2017



In a recent interview with Deloitte, the director of energy and environmental management for a big-box retailer, emphasized that access to high-quality energy data is key to effective energy management. He explained that his company, like many others, is under pressure every year to raise the bar higher in terms of reducing expenses and meeting sustainability goals. Accordingly, continuous progress is really about building a comprehensive energy management program, which begins with knowing how energy is being used. To gain this understanding, the company has used a hybrid approach over the years, both working with third-party providers (as in the case of consolidating bill data) and building customized systems in-house (as the organization did with its control systems). The retailer has also developed a robust energy audit program to identify energy reduction opportunities in its stores and distribution centers, focusing on lighting, battery chargers, conveyors, HVAC, and its energy management system.

However, pinpointing how energy is being used is only part of the equation. The company additionally incorporates operational and behavioral change into its comprehensive energy management program. Our interview subject further noted that being a good energy manager also implies being a

good educator, which involves increasing energy awareness across the organization and articulating what people need to do to help the company improve its energy performance.

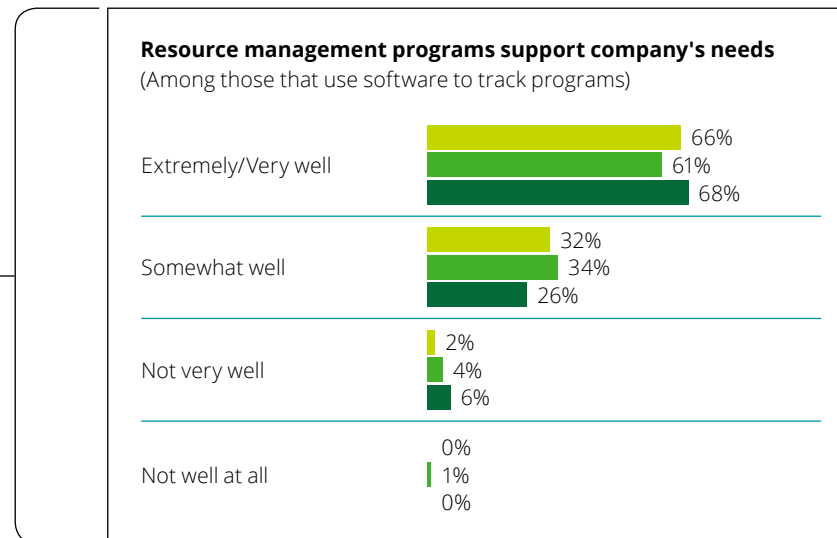
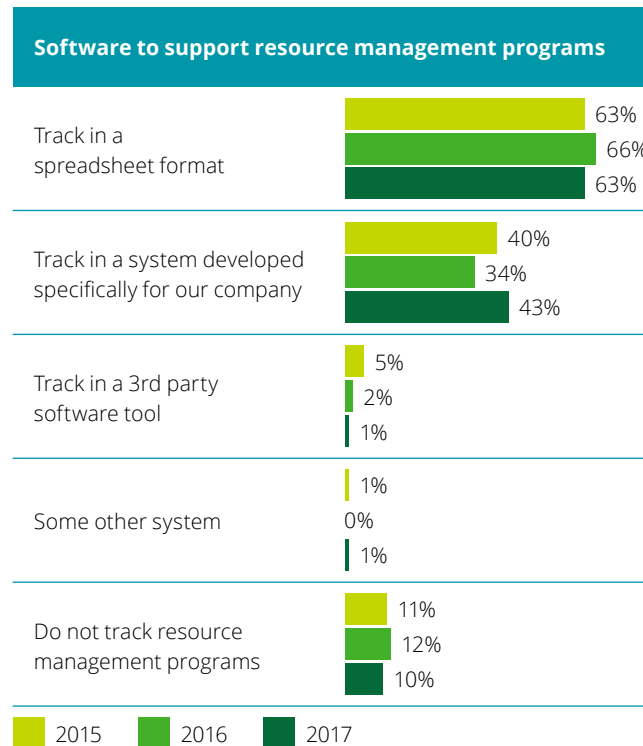
Available systems and tools are not keeping pace with the growing sophistication of companies' energy management capabilities.

Availability of good technology designed to support managing electricity consumption remains a challenge. About seven-in-10 continue to agree that the smart technology designed to reduce electricity consumption is not that effective for their companies' circumstances. Meanwhile, the number tracking performance of their resource management programs through spreadsheets versus systems developed specifically for their companies has remained relatively unchanged since 2014.

Like self-generation, this appears to be another area where companies are taking control and doing it themselves. This time, they are being motivated, at least in part, by a lack of adequate third-party software tools, with a negligible one percent saying they track performance with off-the-shelf software.



Unable to address specificity and complexity of energy management, third-party software still disappoints



Could an electric vehicle boom be around the corner?

Barriers diminish as millennial interest grows.

Overall interest in electric vehicles (EVs) remained flat year-over-year with just two in 10 residential consumers in the 2017 Study indicating they are extremely/very interested in purchasing one. However, regional and generational views tell a different story.

EV appeal is much stronger in the West: a full seven points above the national average. This is likely due to several factors. For instance, the public charging ecosystem is more robust and there are generally more models of EVs available in the West, particularly in California, which has been driving EV adoption as part of its Zero Emission Vehicle (ZEV) Program. This initiative requires automakers to earn credits by selling alternative fueled vehicles—mainly pure battery-electric vehicles, plug-in hybrid electric vehicles, and hydrogen fuel cell electric vehicles.¹ The required credits are calculated as a percentage of an automaker's conventional light-duty vehicle sales in the state.² Connecticut, Maryland, Massachusetts, New York, Oregon, Rhode Island, and Vermont have joined this initiative as well, signing a

memorandum of understanding to coordinate their efforts.³ Collectively, these eight states have committed to putting at least 3.3 million ZEVs on the road by 2025.⁴

From a generational perspective, EV appeal remains strongest among millennials. Nearly one-third of millennials (32 percent) say they are extremely/very interested in purchasing an EV, compared to 24 percent of Gen X and only 16 percent of baby boomers and 10 percent of matures. At the same time, the 2017 findings showed signs that traditional barriers to EV acceptance such as price and mileage range are diminishing. Forty-seven percent of residential consumer respondents pointed to lower prices as among the top two ways to increase their interest in purchasing an EV, down 10 points from last year. Similarly, fewer residential consumers indicated increased mileage range as being among the top two ways to increase their interest, reaching its lowest point since 2014. These findings make sense, considering that newer models of EVs are generally less expensive and have greater mileage ranges than earlier models.

1. US Energy Information Administration, Today in Energy, "California program encourages adoption of zero-emissions vehicles," October 3, 2016.

2. Ibid.

3. [Multi-state ZEV Task Force](#) web site, accessed May 18, 2017

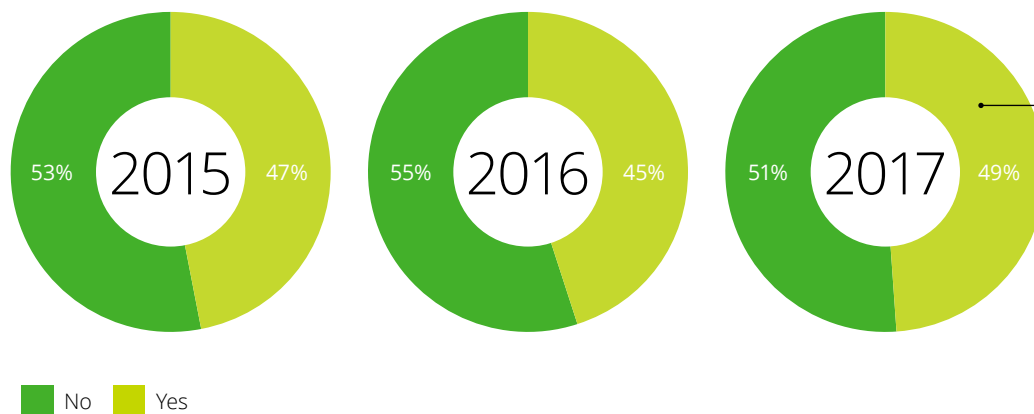
4. Ibid.

Could an electric vehicle boom be around the corner?

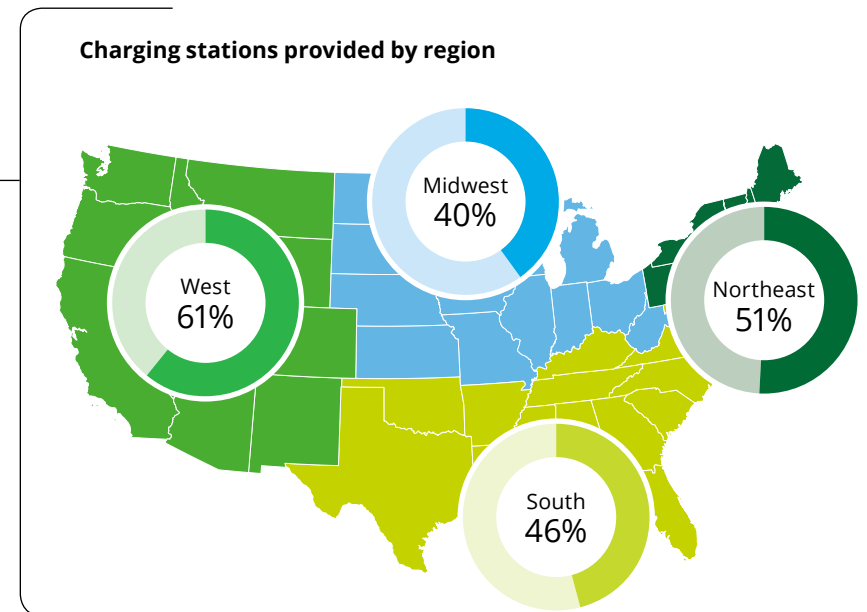
These findings, along with rapidly declining prices of lithium ion batteries, suggest that EV sales may be poised to pick up strongly in the next few years, especially since businesses are also driving EV momentum. Nearly half (49 percent) of EV respondents in this year's study say they provide electric vehicle charging stations—up from 37 percent in 2014. Sixty-four percent of these businesses own the charging stations themselves and offer them as a perk to employees and not to the general public.

Almost half of business respondents now offering electric vehicle charging stations

Provide electric vehicle charging stations



Of course, EVs will have to overcome some challenges in order for sales to surge. These obstacles include the anticipated phase-out of federal tax credits for EV purchases, legal challenges to state-level EV incentives, and the imposition of fees on EVs to replace lost gasoline tax revenue in some states.



Does demand response need a better public relations plan?

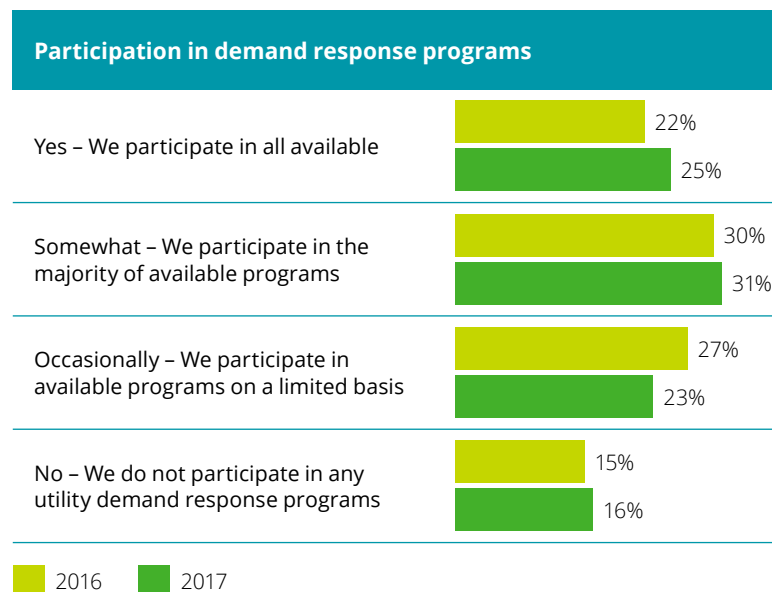
Businesses are getting the message about demand response, but residential consumers remain largely unaware.

Based on Deloitte's field experience, we have observed that utilities are keen on getting residential consumers to sign up for their demand response programs. This is particularly the case when expanding such programs helps utilities to meet state-level mandates such as Energy Efficiency Resource Standards. Yet, the participation rate hasn't budged in several surveys—and, once again, it was primarily due to lack of awareness. Like last year, more than half (52 percent) of those who haven't participated said it's because their utilities don't offer demand response programs. This suggests utilities need to up their games and refine their messaging if they want to gain traction with demand response. Promoting these programs through social media may be part of the answer, especially since residential consumers in general, and particularly younger generations, increasingly indicate they are getting energy-saving tips there.

In comparison, businesses are much more likely to be aware of demand response programs and to see the value in them. The vast majority (79 percent) have participated in demand response programs to some degree. This year's findings suggest that some occasional

participants have tried out these programs and have been satisfied. As a result, they now participate more regularly. And, the value propositions of these programs seem to be apparent: a quarter of business respondents rated demand response programs as being among the top three most important tactics for achieving their energy management goals. This implies the pump has been primed. Utilities could build upon this strong track record of satisfaction and impact to increase business participation even further.

Businesses trying, and liking, demand response programs



Concluding insights



The findings of the 2017 Study underscored the sustainability of energy management as a mindset among consumers and the progress companies are making in evolving their energy management practices.

For residential consumers, energy management has become a way of life. The growing influence of millennials and Gen X indicates that their preference for clean technology and renewable energy—driven by environmental concerns and growing affordability—is getting stronger. This is particularly the case since millennials tend to be more homogenous in their values and thinking, and are acting as more of a collective than baby boomers and matures on many issues. And because they behave as a collective, communicating through social media is essential to reaching them.

For businesses, energy management has become table stakes for competitiveness. Companies are acknowledging this new reality by upping their games in terms of capital allocation and strategic commitment. They are generally achieving their goals and realizing the benefits.

Simultaneously, they are becoming more sophisticated and confident with their tactics, technologies, and use of data. Overall, it is a story of ongoing progress and continuous improvement with many chapters yet to be written. To that end, we plan to further explore these trends and more in future editions of this annual survey.

What does this mean for electricity providers?

The 2017 Study findings highlighted the growing gap between millennials and older age cohorts in terms of their values, preferences, and motivations. This gap is most apparent concerning technology, with millennials being innately receptive to Internet-connected home devices, electric vehicles, rooftop solar, community solar, and smart meters and time-of-use rates. Moreover, this receptivity, which is largely motivated by environmental concerns, social consciousness, and technical sophistication, is likely to grow not only among millennials but also among the soon-to-be electricity customers within Generation Z.



This opens up a whole new realm of possibilities for electricity providers, suggesting that the days may soon be over where they have to expend time and resources “selling” the concept of energy efficiency and clean energy. With a pre-disposition toward high-tech devices and an entrenched belief that “renewable” and “affordable” are not mutually exclusive concepts, millennials are ready to learn about what their electricity providers have to offer, and social media will be increasingly important in reaching them. Indeed, some utilities are already using social media channels to disseminate information about options they offer such as programmable thermostats, green energy programs, free home energy audits, and on-bill financing for energy efficiency improvements.

This is not to say that older residential consumers are not important with their large numbers and vast purchasing power. The 2017 Study findings simply imply that generational differences in communication styles and values are significant, and that in order to be successful, electricity providers must approach these groups differently. This means maintaining a strong focus on listening to and understanding evolving customer needs and aspirations, tailoring service offerings to customer

preferences, and clearly communicating their commitment to a customer-first service culture.

The ability to meet specific needs and to customize offerings is also becoming more critical for serving business customers. With so many businesses acting to “control their own destinies,” electricity providers have an opportunity to add value by helping them to resolve their distinct challenges on their journeys toward procuring more renewable energy and attaining their energy management objectives and corporate sustainability goals.

What does this mean for businesses?

Although cost remained the top motivation for companies’ energy management programs, it is rapidly losing its supremacy. More and more businesses are pursuing energy management because it has become the baseline for competitiveness and the core of their sustainability goals—and because their customers, employees, suppliers, investors, and business partners are demanding it. Businesses that haven’t yet jumped on the energy management train are running out of time to make the leap. Those that are already on board have an opportunity

to accelerate their progress by sharing best practices and partnering with other stakeholders in the clean energy value chain (i.e., utilities, renewable developers, state regulatory commissions, battery manufacturers, technology providers, etc.). Together, they can work toward simpler, mutually beneficial solutions for procuring and/or producing more green power and enhancing corporate sustainability.

What's next?

The 2017 Resources Study indicated that energy management marches on, undeterred by federal policy uncertainty. Residential consumers sustained their commitment to reducing their electricity consumption and to supporting the development of green power. Businesses too maintained their commitment to procuring more energy from renewable sources while simultaneously reducing their energy costs. They reported not only continued progress against their energy management goals but also greater investment toward future efforts.

How can you leverage the Deloitte Resources 2017 Study?

Deloitte has designed this Study to be a living tool to assist companies with their business decision-making. The expansive database developed through the Study allows Deloitte to guide companies in examining the findings in much greater depth and from many vantage points. This Study can be used to help build the business case necessary to establish priorities and gain support for proposed initiatives, or it can provide solid data for new directions that are under evaluation. For more information, please email us at DeloitteResourcesStudy@deloitte.com.

Endnotes



1. Deloitte refers to one or more of Deloitte Touche Tohmatsu Limited, a UK private company limited by guarantee (“DTTL”), its network of member firms, and their related entities. DTTL and each of its member firms are legally separate and independent entities. DTTL (also referred to as “Deloitte Global”) does not provide services to clients. In the United States, Deloitte refers to one or more of the US member firms of DTTL, their related entities that operate using the “Deloitte” name in the United States and their respective affiliates. Certain services may not be available to attest clients under the rules and regulations of public accounting. Please see www.deloitte.com/about to learn more about our global network of member firms.
2. “Solar eligible” is defined as residential consumers who own their own homes and live in states with at least one MW of photovoltaic (PV) installations per quarter over the last year.
3. Community solar presents an opportunity for residential or commercial utility customers to invest in a solar array or receive credits on their electricity bills for solar power not located at their homes or businesses.
4. US Energy Information Association, Today in Energy, “Sulphur Dioxide Emissions from US Power Plants have fallen faster than coal generation,” February 3, 2017
5. “Solar eligible” is defined as residential consumers who own their own homes and live in states with at least one MW of photovoltaic (PV) installations per quarter over the last year.
6. Community solar presents an opportunity for residential or commercial utility customers to invest in a solar array or receive credits on their electricity bills for solar power not located at their homes or businesses.

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Through the Center, Deloitte’s Energy & Resources group leads the debate on critical topics on the minds of executives—from the impact of legislative and regulatory policy, to operational efficiency, to sustainable and profitable growth. We provide comprehensive solutions through a global network of specialists and thought leaders.

With locations in Houston and Washington, DC, the Center offers interaction through seminars, roundtables and other forms of engagement, where established and growing companies can come together to learn, discuss, and debate.

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