



Will disruption interrupt the flow or stimulate greater opportunity for power and utilities?

The future of Canadian utilities
in a hyper-connected sector

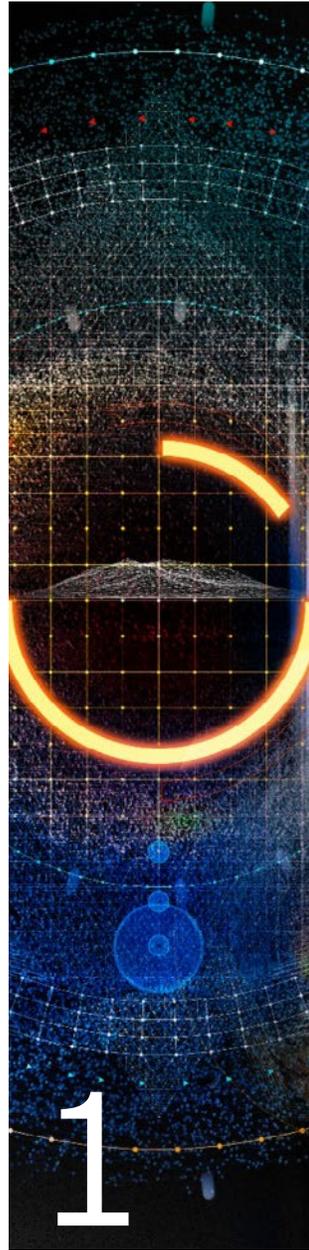


The better the question. The better the answer.
The better the world works.



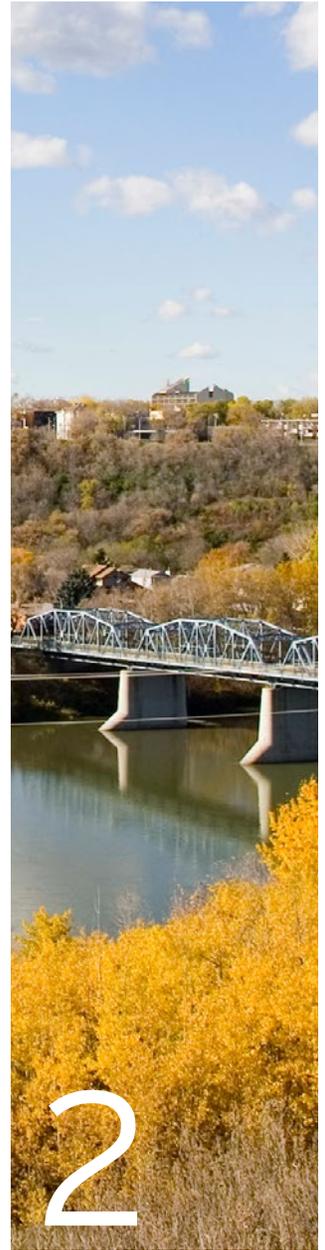
Building a better
working world

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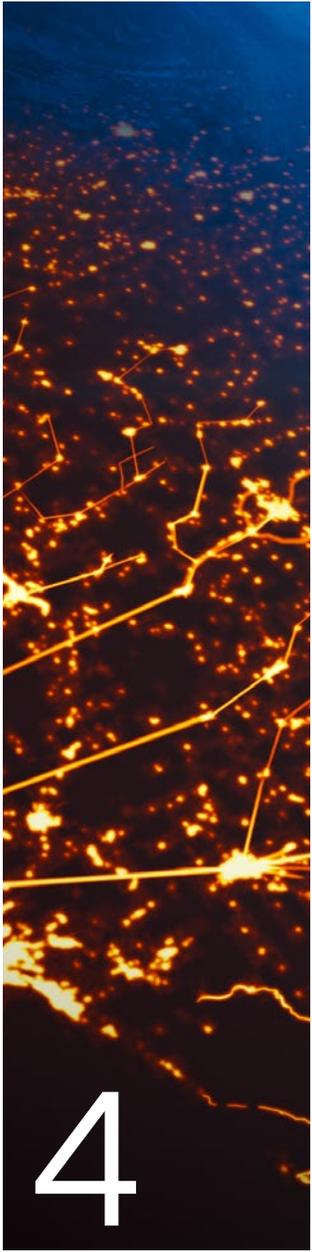
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The utility of
the future



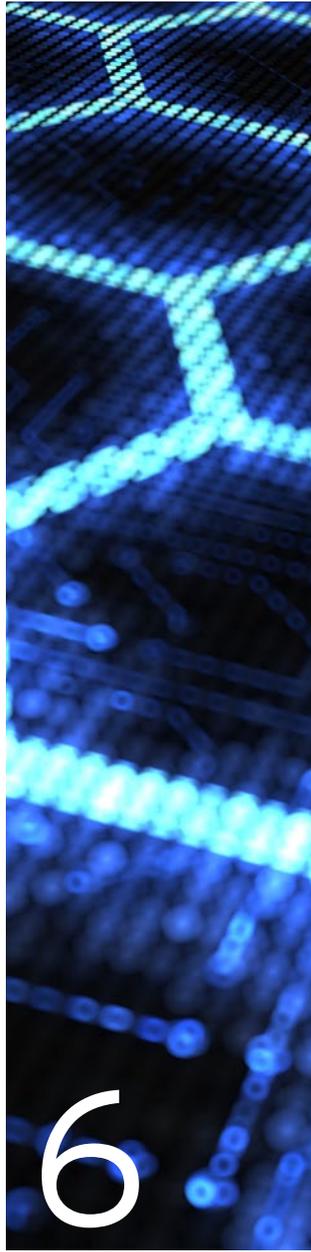
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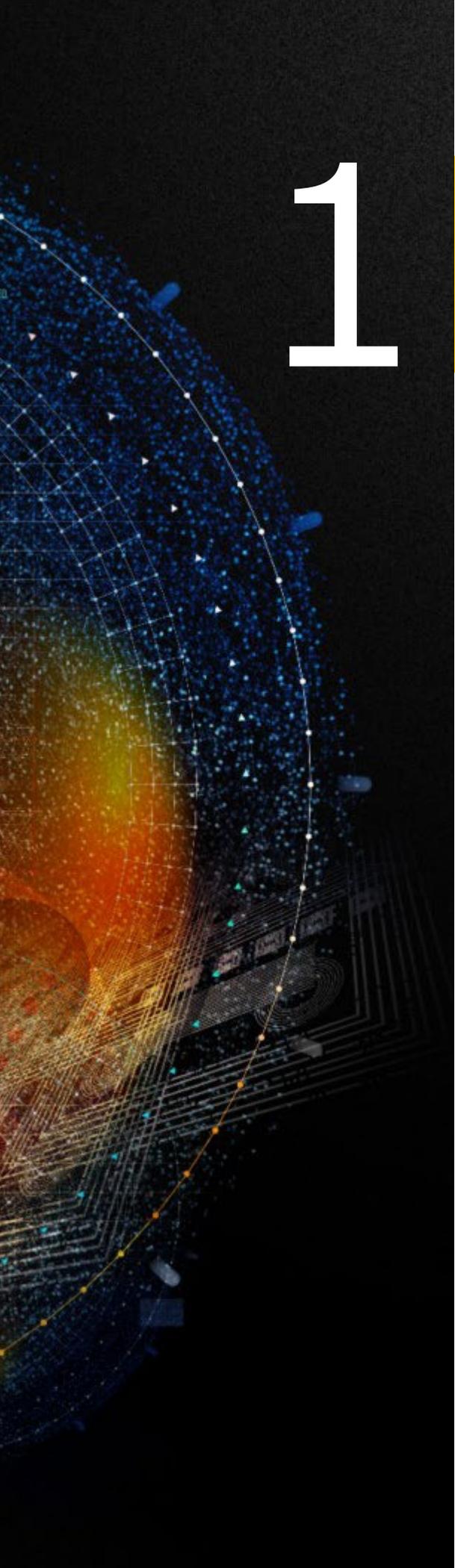
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The utility of the future

The power and utilities (P&U) industry is undergoing a period of significant disruption.

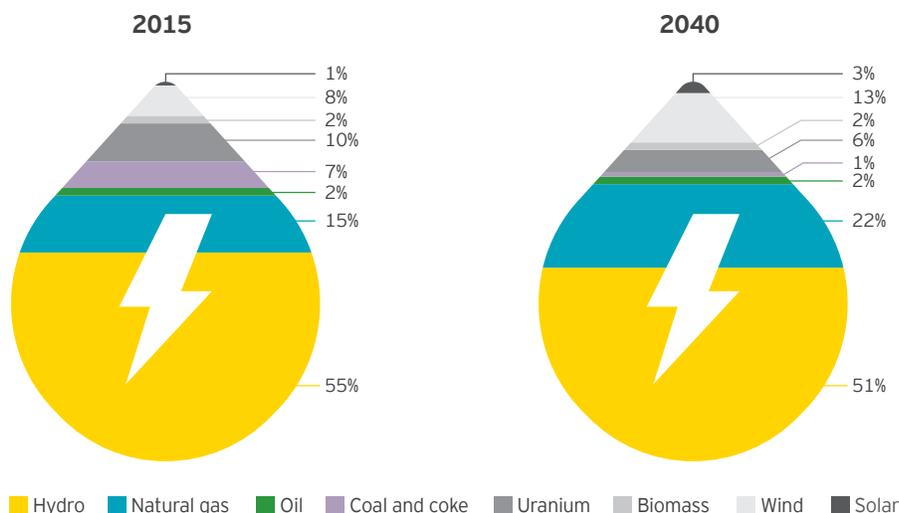
Current energy systems were designed more than 100 years ago and have been only incrementally modified since. They worked well in the time of vertically integrated, centrally supplied generation models, but that was when efficiency and resilience were less important than they are today.

Distributed renewable generation, new digital technologies and changing consumer expectations are turning the traditional industry model upside down. Market trends point to a structural shift in the sector and integration of new technologies is fundamentally changing the value chain. Companies that can get ahead by innovating above and beyond technology implementation will have a real first-mover advantage.

What might the Canadian P&U industry look like in the future? Will it be just a more efficient version of today's model? Or will radical disruption force energy players to reinvent themselves? In our view, the Canadian utility of the future will operate in a new value chain, augmented and interconnected by digital technologies, where power and information will flow in both directions.

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Canadian energy landscape



Capacity mix by primary fuel, 2015 and 2040

Source: National Energy Board.¹

In every market, choices are being made around the future energy mix.

The real challenge for the energy transition is that there is no consensus view on the future energy ecosystem. Our analysis of a range of global energy scenarios² found they could be grouped into three distinct trends that we believe will define the future: the first sees fossil fuels dominate the energy mix, with renewables only making gradual inroads – we call this “Hydrocarbon heavy”; second, “Electric evolution” reflects a faster progression toward low-carbon energy, based on advances in technology and consumer attitudes; and the final scenario, “Renewable Revolution”, represents the most balanced energy mix, with almost a 50:50 split between fossil fuels and renewables. In all three scenarios we continue to see a global shift from hydrocarbons to electrons.

Canada has a diverse mix of energy generation comprising hydro, nuclear, coal, gas, oil and renewables. A 2016 market study by the National Energy Board found that hydro is the dominant electricity source, accounting for 60% of installed capacity and generation in Canada. However, capacity from non-hydro renewables has grown significantly, from 2% a decade ago to 11% by 2015. Generation from non-hydro renewables was lower, at 7%, as solar and wind produce power intermittently.³ And of course, the balance of generation mix differs broadly from province to province.

Most of the provinces and territories have phased out, or started plans to phase out, coal-fired power plants by 2030, in line with Canada’s commitment to emission reduction targets in the Paris accord (COP21). Ontario’s first large renewable procurement (LRP) concluded in April 2016 with 454.885 megawatts (MW) of new wind, solar and water power contracts executed.⁴ Alberta’s Renewable Electricity Program is expected to add 5,000MW of clean capacity, while the Saskatchewan Government plans to move to 50% renewable energy generation. By 2030, hydro, nuclear, natural gas, wind, solar and other non-coal sources will contribute 90% of Canada’s electricity.⁵

The changing dynamics resulting from the focus on reducing carbon emissions and shifting toward clean energy also present market opportunities for small modular reactor (SMR) developers. It's still early stages for this emerging disrupter, but recent developments in Ontario and Saskatchewan signal growing interest in an alternative to large-scale nuclear plants.

Growth potential

New capacity additions have been limited due to the long operating life of existing facilities. Hydro and coal facilities have an operating life of 50 years or more, while nuclear plants can operate for 40 years or more.⁶ The Conference Board of Canada estimates that CA\$347.5 billion in new investment will be required by 2030 just to maintain existing electricity capacity. And most of Canada's non-hydro assets will need renewal or replacement by 2050.⁷ Work is already underway to renew existing infrastructure to meet the growing demand for electricity and to adapt to changing environmental policies and market structures by province.

While regulators across the country recognize the need for utilities to invest continually in grid maintenance, modernization, resiliency and security, the appetite for rate increases for these focus areas is low. Given the rapid transformation of the traditional utility business, diversification should be at the top of the agenda for more utility management teams. With the phasing out of coal, technology improvements and

91%

of the Americas' total deal value was inbound to the US, and the top five deals involved Canadian investment in the US, including three in renewables.

regulatory changes, investments should be made on the basis of long-term market outlook while staying flexible to respond to future opportunities.

Alberta's renewables auction provides one such opportunity, but there are others across Canada and beyond. EY *Power transactions and trends* analysis for the first quarter of 2017 showed that 91% of the Americas' total deal value was inbound to the US, and the top five deals involved Canadian investment in the US, including three in renewables.

Low-carbon economy

In December 2016, the Canadian Government launched the Pan-Canadian Framework on Clean Growth and Climate Change, which outlined critical actions that the federal, provincial and territorial governments, with the exception of Saskatchewan, will take to grow the economy while reducing greenhouse gas emissions.

The ultimate goal of Canada's climate change framework is to put a price on carbon in order to reduce emissions and spur investment into low-carbon products and services. The successful transition to a low-carbon economy will be measured by the real or perceived impact on the lives of Canadians in the short and long term.

Energy companies will need to adapt their business models, processes and corporate disclosures to comply with the Government's climate change framework in a manner that reduces their risk exposure and capitalizes on new opportunities, including those through technological innovation.

For companies that operate across multiple jurisdictions with differing carbon pricing mechanisms, carbon price sensitivities will need to be integrated into both operational and strategic planning. Capital investment decisions will also require thoughtful analysis of short-term opportunities vs. long-term value creation and the risks related to uncertainty of future policy changes.

With longer-term predictability on carbon policies, emitters can factor the price of each ton of greenhouse gas emissions into their investment analysis and make informed business decisions, including on the adoption of technology innovations. At the same time, emissions-reduction projects (e.g., offsets) or innovative technologies will also need stable, predictable market conditions that enable their long-term growth prospects.

¹ "Canada's Energy Future 2016: Update - Energy Supply and Demand Projections to 2040, fig 3.1.2 reference case" National Energy Board, October 2016. <https://www.neb-one.gc.ca/nrg/ntgrtd/ftr/2016updt/index-eng.html>. Reproduced with the permission of Public Works and Government Services, 2017.

² *What's the recipe for tomorrow's energy mix?* EY, 2017. <http://www.ey.com/gl/en/industries/ey-whats-the-recipe-for-tomorrows-energy-mix>.

³ "Canada's renewable power landscape: an energy market landscape," National Energy Board, 2016. <https://www.neb-one.gc.ca/nrg/sttstc/lctct/rprt/2016cndrnwblpwr/2016cndrnwblpwr-eng.pdf>.

⁴ "Energy procurement programs and contracts," IESO website. <http://www.ieso.ca/sector-participants/energy-procurement-programs-and-contracts/large-renewable-procurement>.

⁵ "Saskatchewan, Canada reach equivalency deal on coal-fired power plants," CBC, 28 November 2016. <http://www.cbc.ca/news/canada/saskatchewan/saskatchewan-canada-reach-equivalency-deal-on-coal-fired-power-plants-1.3870843>.

⁶ "Vision 2050 - The Future of Canada's Electricity System," Canadian Electricity Association, 2014.

⁷ "Shedding Light on the Economic Impact of Investing in Electricity Infrastructure," Conference Board of Canada, 2012. <http://www.conferenceboard.ca/e-library/abstract.aspx?did=4673>.

3

Sector in transformation

The North American electric power sector continues to face internal and external drivers that challenge the traditional operating model for incumbent companies.

The baseload, centralized and single directional grid design is quickly transitioning to a more intermittent, distributed and interactive model enhanced by two-way flows of electricity and data.

At the same time, far-reaching and disruptive change is transforming the global P&U sector, and Canadian companies aren't immune to this disruption.



There are five key internal and external drivers that are fundamentally changing the way business is conducted.



Aging infrastructure

In the face of rising energy prices, today's utilities are being challenged to increase performance and optimize capital expenditure by safely extending the life of older generation transmission and distribution assets. This requires a new and more innovative approach to drive asset performance – leveraging data and insights to make real-time optimization decisions.



A collision of technologies

A combination of new digital technologies – such as big data, mobility, the internet of things (IoT), smart meters and digital grids – is quickly transforming how assets and operational processes can be managed. In parallel, new energy technologies are enabling commercial adoption of distributed generation that is disrupting the traditional energy value chain.



A changing customer

Influenced by digital experiences in other industries, today's customer is informed, connected and accustomed to a high-quality, personalized and on-demand service. As a result, customers are demanding a radically new level of experience from their energy providers. Meeting these new expectations in a digital world will be critical if energy players are to survive and thrive.



Growing stakeholder expectations

Utilities need to meet higher demands from better-informed stakeholders. Regulatory scrutiny has increased, consumer pressure over rising retail prices is growing, environmental demands are tougher and shareholders expect better performance amid volatile economic conditions. Energy players must become increasingly commercially minded if they are to grow new sustainable revenue and fine-tune their business performance.



Shift to renewables

As previously discussed, environmental targets under federal and provincial climate change frameworks reflect more reliance on renewable and green energy, as regulators and governments pursue a low-carbon agenda in response to climate change concerns. Without the means to integrate renewables successfully into the grid, these targets are unlikely to be met.

These and other emerging drivers are raising questions for stakeholders across the entire P&U value chain, including generators, transmission operators, distributors, retailers and other service providers. Like their global counterparts, Canadian companies will find that these challenges are also opportunities that will help them become a hyper-connected utility of the future.

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A hyper-connected sector

The move to a digital economy is inevitable.

The first question companies must ask themselves is whether they have the means to develop a digital capability internally or inorganically. To succeed in this hyper-connected, digital economy, Canadian companies in the P&U space will need to be at the forefront of rapid innovation to gain first-mover competitiveness.

So how can Canadian companies power their way into the next generation of energy production and distribution?

Expand the value proposition

Varying provincial and cross-border jurisdictional approaches, low-carbon policies and emerging technologies are forcing utilities to look at new business models and revenue growth opportunities.

Traditionally, regulated utilities have offered predictable capital investment-based growth that translates into a low-risk business model – attracting investors through modest growth and consistent dividends. However, given the ongoing flat energy demand resulting from a weak economic recovery for energy-intensive businesses, improvements in energy efficiency and an increased adoption of distributed energy resources, the traditional investments that have typically been associated with expansion and redundancy are coming under greater regulatory scrutiny and are in competition with other, more customer-driven goals. The balance struck between these competing interests, in a rate-constrained world, will be made on a jurisdictional basis.

Another possible model, the diversified or hybrid business model, at its best spreads the risk of long-term earnings stagnancy by broadening the utilities portfolio to multiple businesses. With any portfolio, while the goal is diversification, there is no guarantee that it will be successful or enough to offset losses in other areas. Several companies have vacated the generation business line through asset sales or shutdown of capacity, while others are still evaluating the expected cash flows from these generation assets. Extreme caution overshadows the large-scale investment in a single asset in a single jurisdiction.



The North American industry is experiencing a convergence between traditional gas and electric business models. Recently, several new focus areas have emerged for electric utilities across the P&U value chain that have the potential to provide revenue growth opportunities, including:

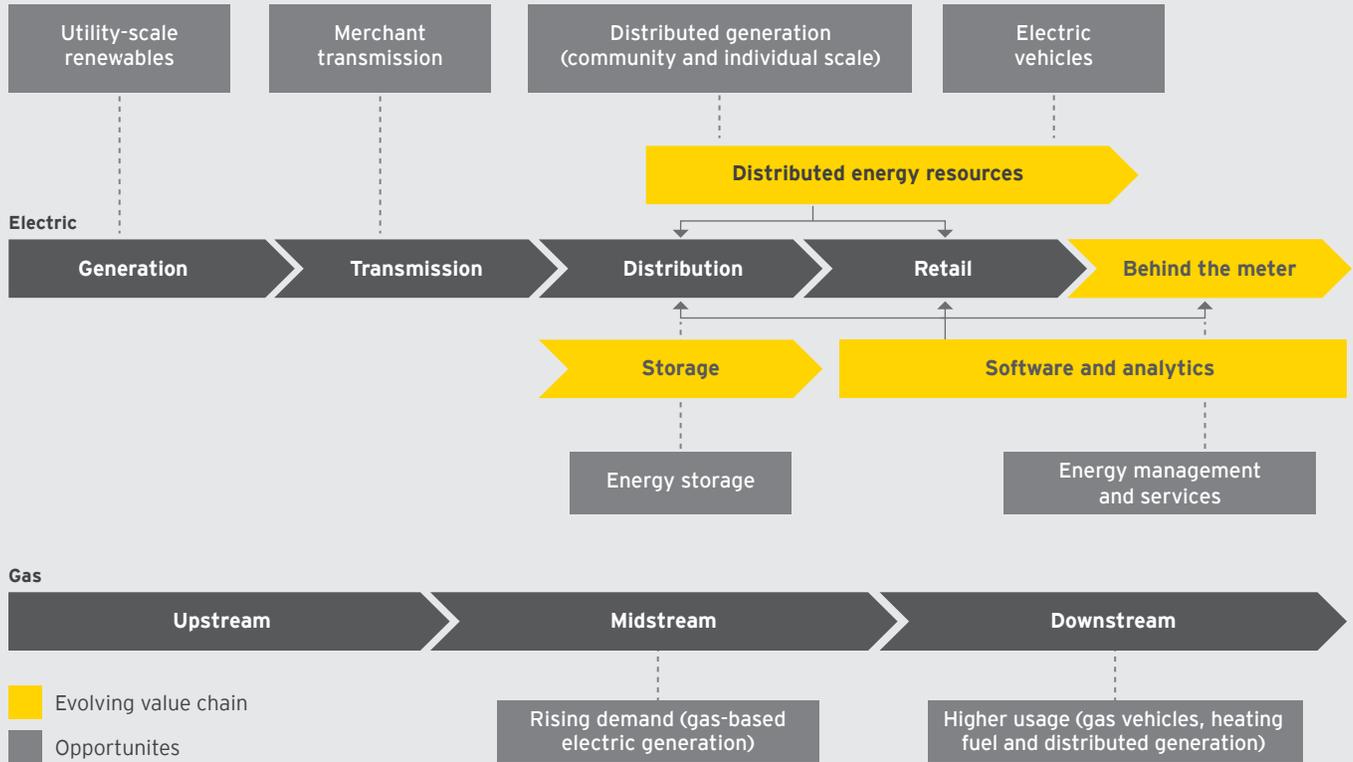
- ▶ **Investments in the gas value chain** – Driven by safety upgrades and supported by low gas prices, gas utilities have continued to accelerate the pace of investment in their assets. An additional attraction is that the upstream, midstream and transmission segments provide attractive returns.
- ▶ **Investments in utility-scale renewables** – Renewables economics have also been steadily improving, driven by technical improvements in solar and major economies of scale in wind power. Regulators are beginning to realize the advantages of utility-owned assets and are making adjustments accordingly.
- ▶ **Investments in merchant transmission** – Transmission CapEx in the next three to five years remains significantly above past cycles.

- ▶ **Investments in emerging options** – Although a small focus at this point, many emerging business opportunities – such as energy management, electric vehicle infrastructure, distributed energy resources and energy storage – have the potential to contribute significant earnings for these companies.

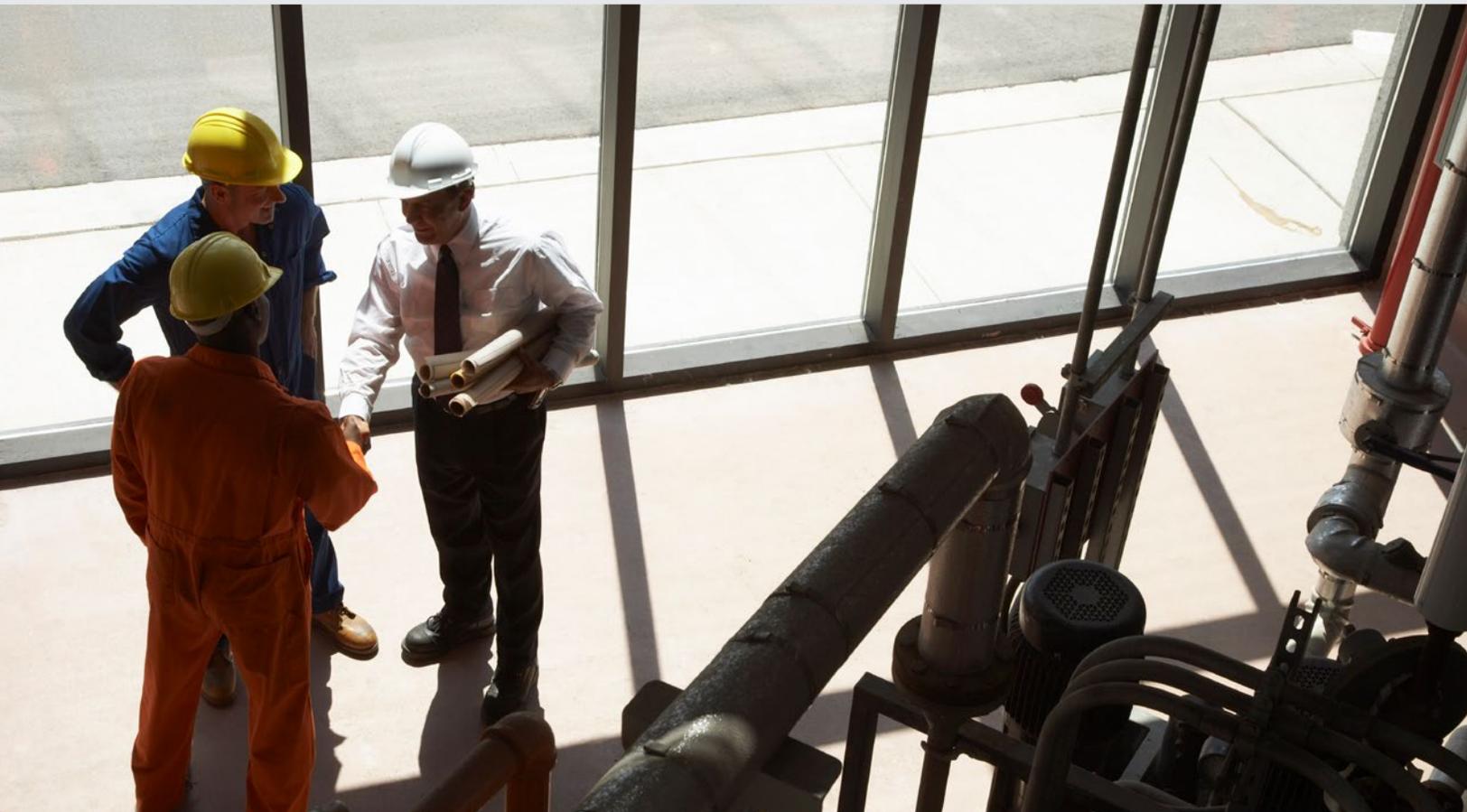
The traditional value chain for the Canadian P&U sector is rapidly evolving, largely driven by changing supply and demand fundamentals, rising customer expectations, and changing regulatory requirements across provinces and territories. The major trends shaping the industry value chain are not isolated to one area and will have a lasting effect moving forward. In the current environment, utility management teams will need to make increasingly complex decisions to identify and participate in the evolving business opportunities, which should help drive future growth and deliver on investor expectations.



P&U value chain and investment opportunities



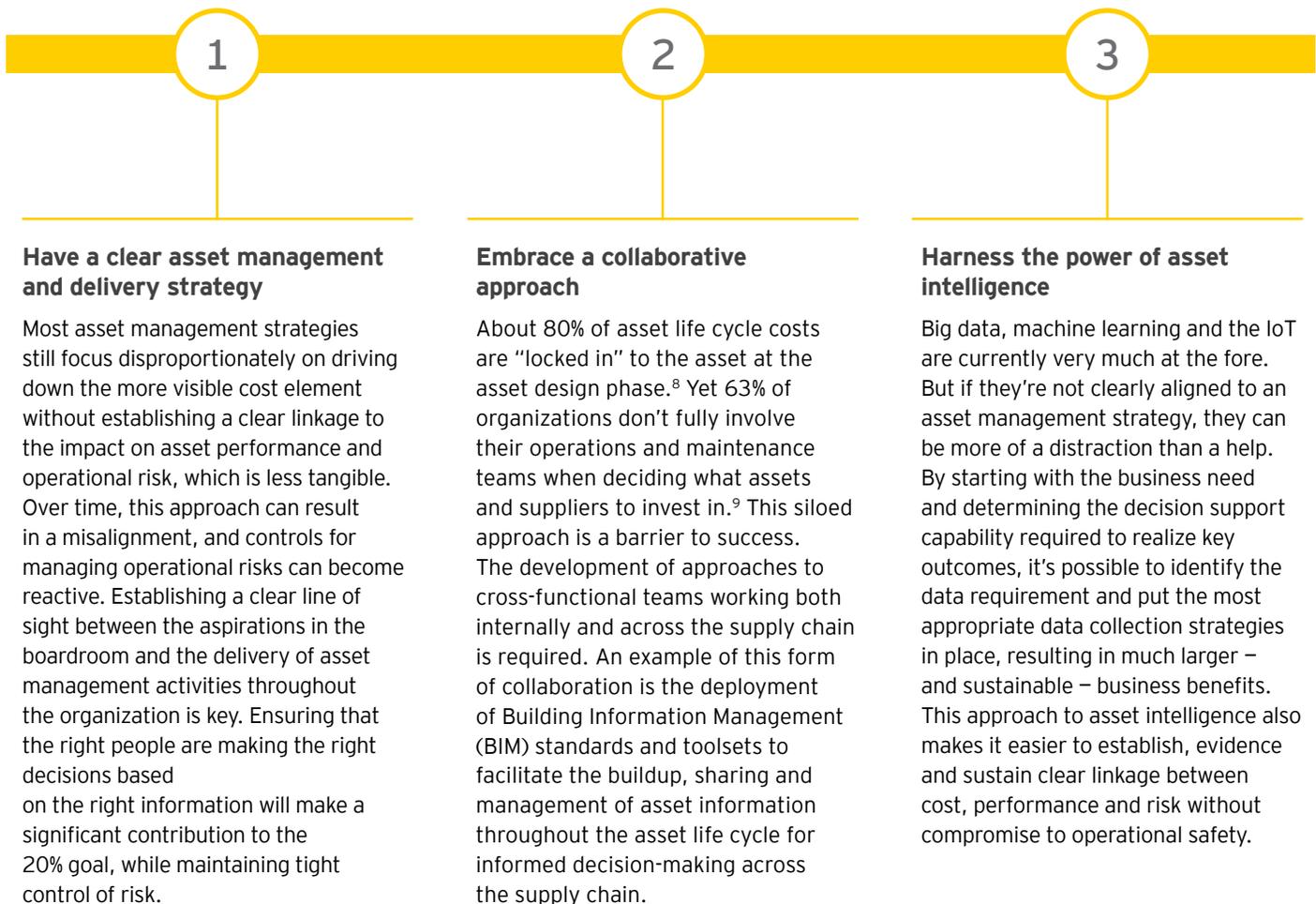
Source: As business fundamentals shift dramatically, how do utilities expand their value proposition? EY



Achieve asset excellence

In our hyper-connected world, the possibilities for the application of IT to make decisions and control assets seem endless. Research has shown that organizations that can adopt a leading approach to asset management can achieve financial benefits equivalent to 20% of their total spending portfolio over three to five years.⁷

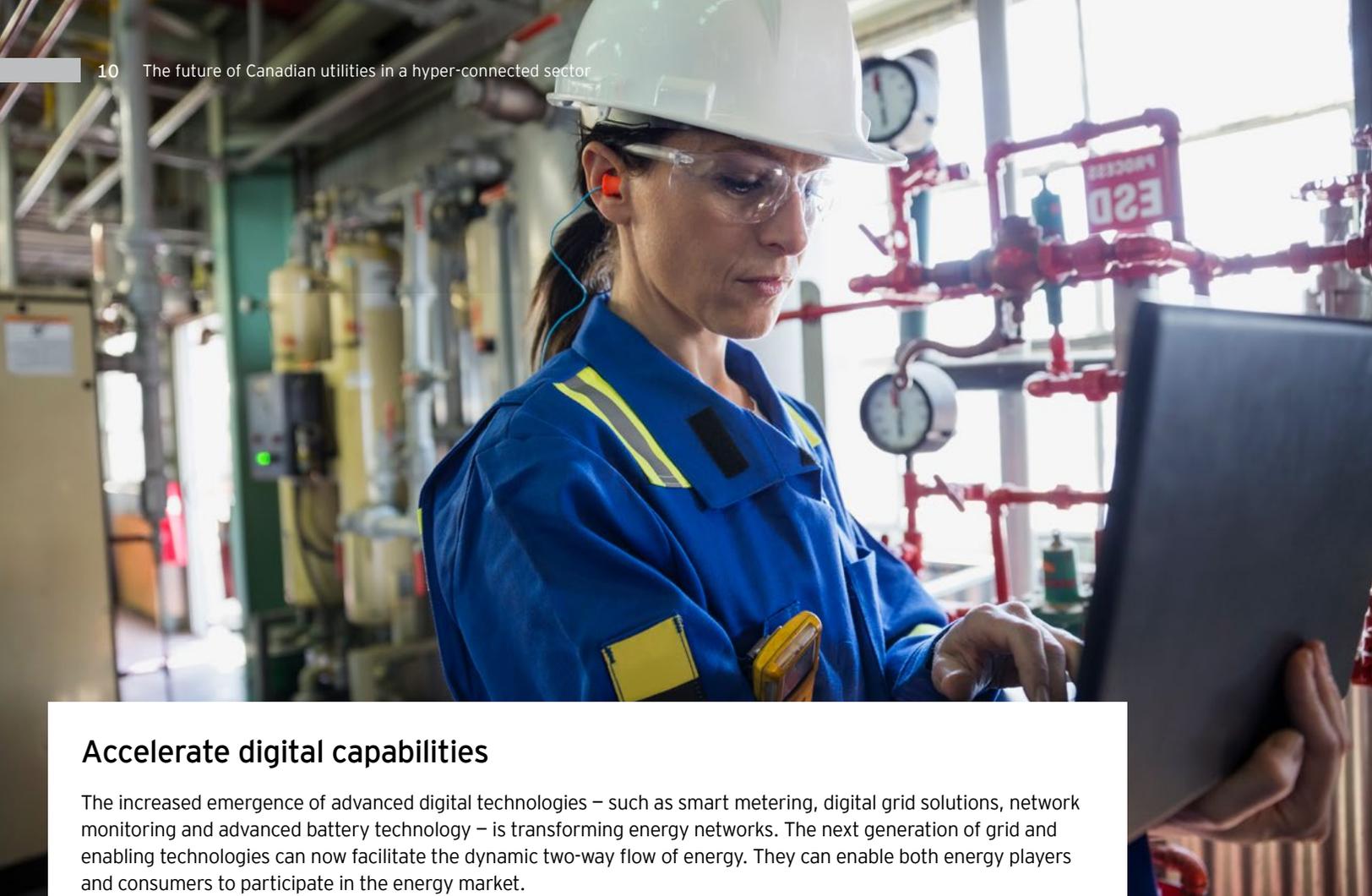
Faced with such a significant benefit opportunity, what pragmatic steps can asset owners take to perform more effectively within the scope of normal levels of cost and risk?



⁷ “The Business Case for PAS 55,” *Assets Magazine*, The Institute of Asset Management, February 2013.

⁸ *Asset Management. Whole-life management of physical assets*. ICE Publishing & Thomas Telford Press, 2012.

⁹ European National Federation of Maintenance Societies survey, 2011.



Accelerate digital capabilities

The increased emergence of advanced digital technologies – such as smart metering, digital grid solutions, network monitoring and advanced battery technology – is transforming energy networks. The next generation of grid and enabling technologies can now facilitate the dynamic two-way flow of energy. They can enable both energy players and consumers to participate in the energy market.

Newer technologies – such as geographic information systems (GISs), big data, the IoT, augmented reality, robotics and artificial intelligence – are game changers for the P&U industry. Digital intelligence driven by integrated data will be the key competitive differentiator, helping utilities optimize the way energy is delivered. For example:



Respond to outages more quickly

Remote asset monitoring, telemetry, smart sensors and predictive analytics can track network conditions and facilitate an outage response in real time. Advanced network systems can dynamically reroute electricity (self healing), while GIS tools can help better direct field workers to fix the problem.



Enhance productivity

Real-time information about the status of assets, field work and customer requirements can enable the accurate trade-off between different network spend decisions, and lower infrastructure and operating costs.



Maintain physical assets

Artificial intelligence, drones and machine learning can monitor physical asset conditions and optimize proactive maintenance.



Reduce losses

Smart meters and network sensors can detect theft and leakage while advanced processing software platforms can take real-time remedial measures to avoid technical losses.



Balance the grid

Digitally enabled demand-side management solutions – such as reflective pricing tariffs, energy storage and home energy management solutions – can help balance the grid and reduce long-term infrastructure investment.



Support the virtual grid

Technologies such as the internet of things and blockchain will support interoperability of network devices and peer-to-peer trading of energy. Digital asset monitoring can help create a comprehensive “cradle to grave” maintenance history that better manages risk and optimizes asset management.

Utilities will need to master many of these technologies and trends in parallel if they are to achieve real breakthroughs. This means developing new capabilities that will allow them to operate and compete in a digital world.

But the industry is challenged by an aging workforce. Nearly 60% of the global utility workforce is more than 40 years old.¹⁰ Utilities face an urgent need to acquire and retain digital-savvy talent with the right technological and customer skills, as well as an entrepreneurial mindset.

Energy companies will need to drive a culture of ambition, courage and agility if they are to attract staff with the right skills and then make the most of this potential to help become a utility of the future. They will also need to be mindful of bringing current long-term employees on the journey into this future as well, ensuring that their experience and knowledge is respected and transferred to the next generation of workers.

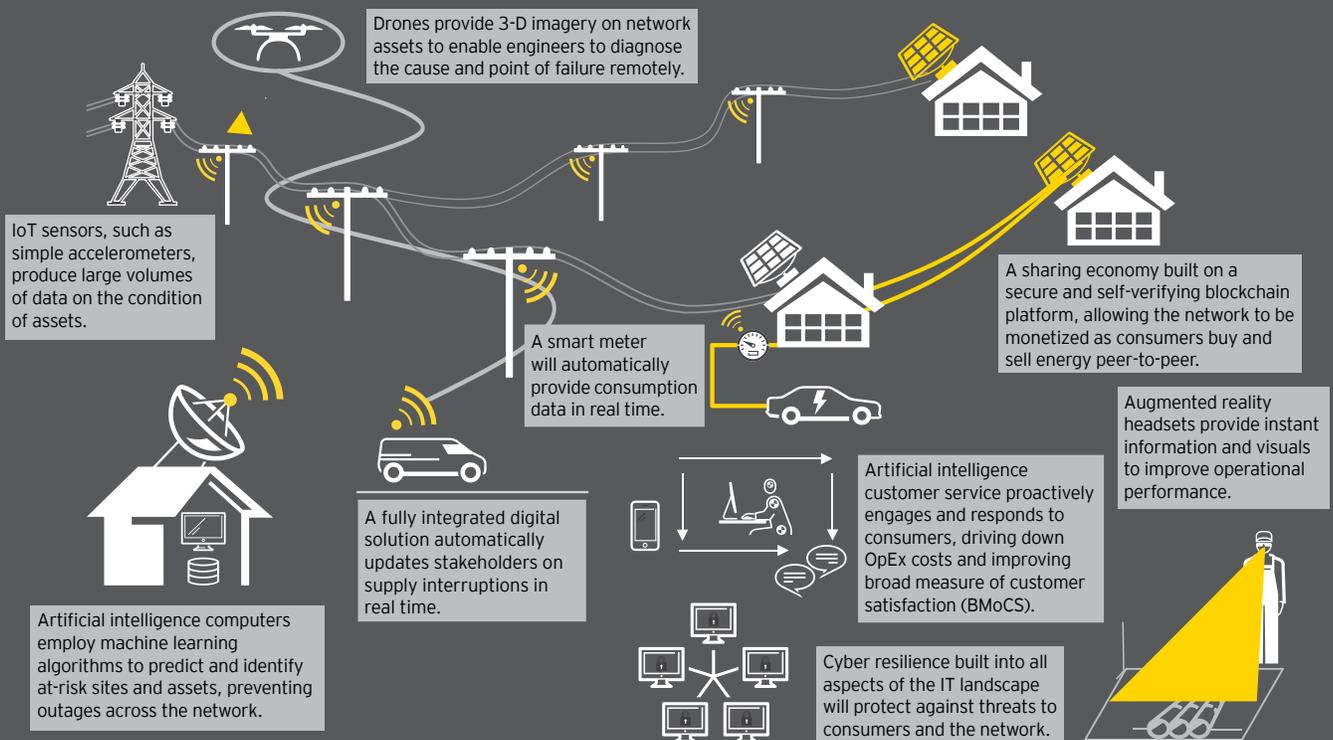
Nearly

60%

of the global utility workforce is more than 40 years old.

In the future, the IoT and digital technologies will improve operations and stakeholders' satisfaction.

They can support a truly distributed energy world and create an unprecedented multi-way flow of information, for example:



Some disruptive technologies will become the norm by 2020. Leading organizations are already exploring how these could be adopted in their business.

Source: *Building the digitally powered utility of the future*, EY

¹⁰ "Aging Utility Workforce: Business Impacts and Strategies," EnergyCentral, 26 November 2013. <http://content.energycentral.com/events/29010/Aging-Utility-Workforce-Business-Impacts-and-Strategies>

Power the digital grid

The digital transformation of the grid comes at the same time as other new game-changing technologies such as augmented reality, robotics and artificial intelligence are reaching maturity. The acceleration of renewables, connected devices, competition and other disruptive forces have compelled utilities to act and to prioritize digital grid in their capital programs. Investment in digital grid over the next five to seven years is expected to be in the region of US\$500 billion.

To identify the current state of digital grid, EY commissioned research with 50 utilities around the world that have large distribution networks. When asked to describe their investment plans, almost half (46%) said that digital grid is either one of their top three strategic programs or has been earmarked for investment in the next 12 months. Only 8% said they had no plans to invest in digital grid.

The reason for investment varied by utility. However, top drivers behind the adoption include growth of renewables, infrastructure or performance improvements, and cybersecurity.

When we asked utilities what concerns or risks they are currently facing as an organization, regulatory uncertainty was at the top of the list, followed by financial constraints, and reliability and performance issues. Perhaps the biggest challenge may be determining how best to connect elements of new network technology to the legacy systems that support them.

In our experience, there has been a tendency to view digital grid programs as primarily a technology or infrastructure implementation, with some change management added on as an afterthought. However, our survey showed that 66% of participants viewed digital grid initiatives as both business and technology programs. Only 12% saw digital grid as primarily a technology program.

Making the most of digital networks will require utilities to commit to investing in digital grid. In order to move forward, utilities should:

- ▶ Define a digital grid strategy and define it consistently within their own organizations
- ▶ Clarify the purpose and objective for their digital grid, taking into account the

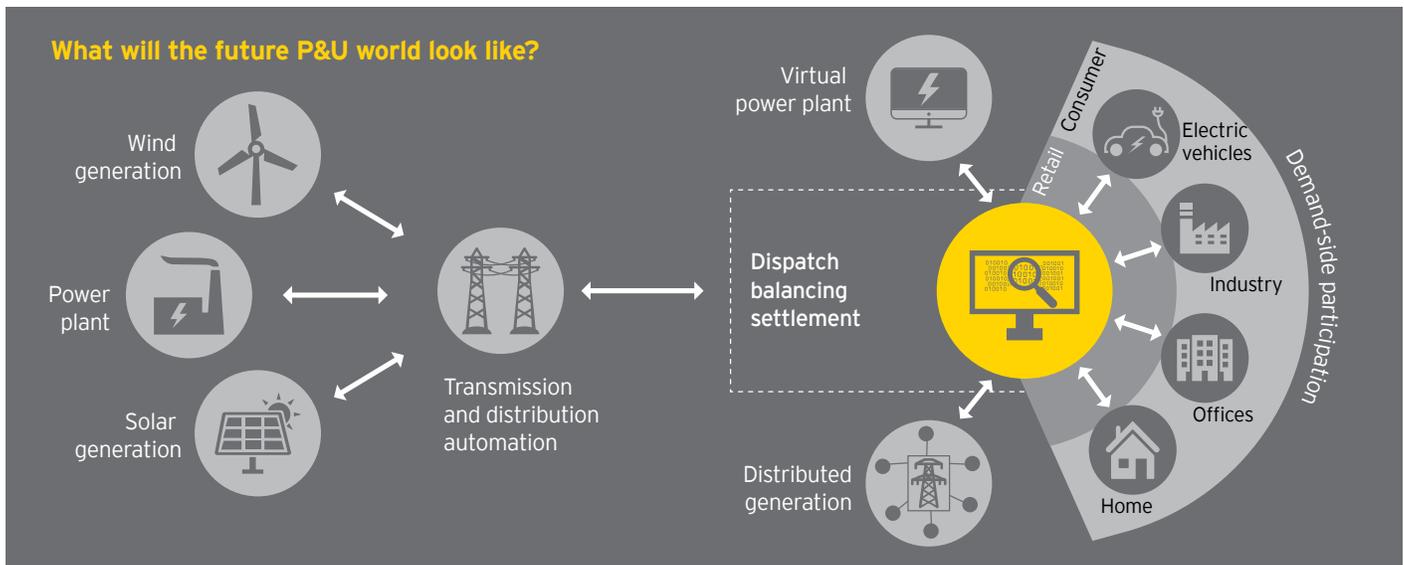
Defining the digital grid

Digital grid is the digitization of electricity, gas and water networks using advanced technology. It allows two-way communication between the utility and the network, including its customers, and enables insight, automation and control across the utilities' operations, empowering utilities to improve reliability, availability and efficiency of the grid.

short- and longer-term changes in their ecosystem, as well as charting their road map and portfolio of initiatives

- ▶ Identify the scope of IT and organizational change across the business – from operations to regulatory models to customers – and its risks
- ▶ Build a strong business case and investment plan
- ▶ Override departmental silos and drive central coordination for the portfolio of initiatives

Only then will utilities be able to unlock the true potential of digital grid, which will serve as the backbone of future energy systems.



Source: Digital grid: powering the future of utilities, EY.

Strengthen the network's security

The opportunities of advanced technology and connection of devices via IP addresses bring new challenges, including the increased risk of cybersecurity threats. The complexity and rapid pace of change of digital technology is exposing utilities to more sophisticated and frequent cyber attacks that have the potential to breach customer and employee privacy, incur regulatory action or even bring down generators and grids. Cyber attacks are now a matter of “when, not if” – the ability to prevent an attack needs to be supplemented with abilities to detect and respond to the inevitable attacks.

In the US, the National Cybersecurity and Communications Integration Center and the Industrial Control Systems Cyber Emergency Response Team (ICS-CERT) reported that the energy and water sectors accounted for nearly half of cybersecurity incidents in the first half of FY15.¹¹ Of the total of 295 cyber incidents that the ICS-CERT responded to in FY15, 46 were from the energy sector, and 25 from the water and wastewater systems sector.¹²

In Ukraine, in the first publicly acknowledged cyber attack to result in power outages, a quarter of a million people lost power when a control systems network was hacked in December 2015. Following the incident, many countries stepped up efforts on cybersecurity.

Over decades, utilities have learned to respond better to potentially catastrophic events. The convergence of operational technology (OT) and IT increases the already significant cybersecurity risks facing the utilities industry.

As critical infrastructure providers, all utilities are attractive targets for hackers and cyber extortion. IT and OT convergence exposes control systems to cyber threats. Findings from EY 19th Global Information Security Survey 2016-17 indicate the need for improved resilience in the ability of P&U companies to respond and recover from cyber incidents so that safe and reliable operations can be restored and maintained.

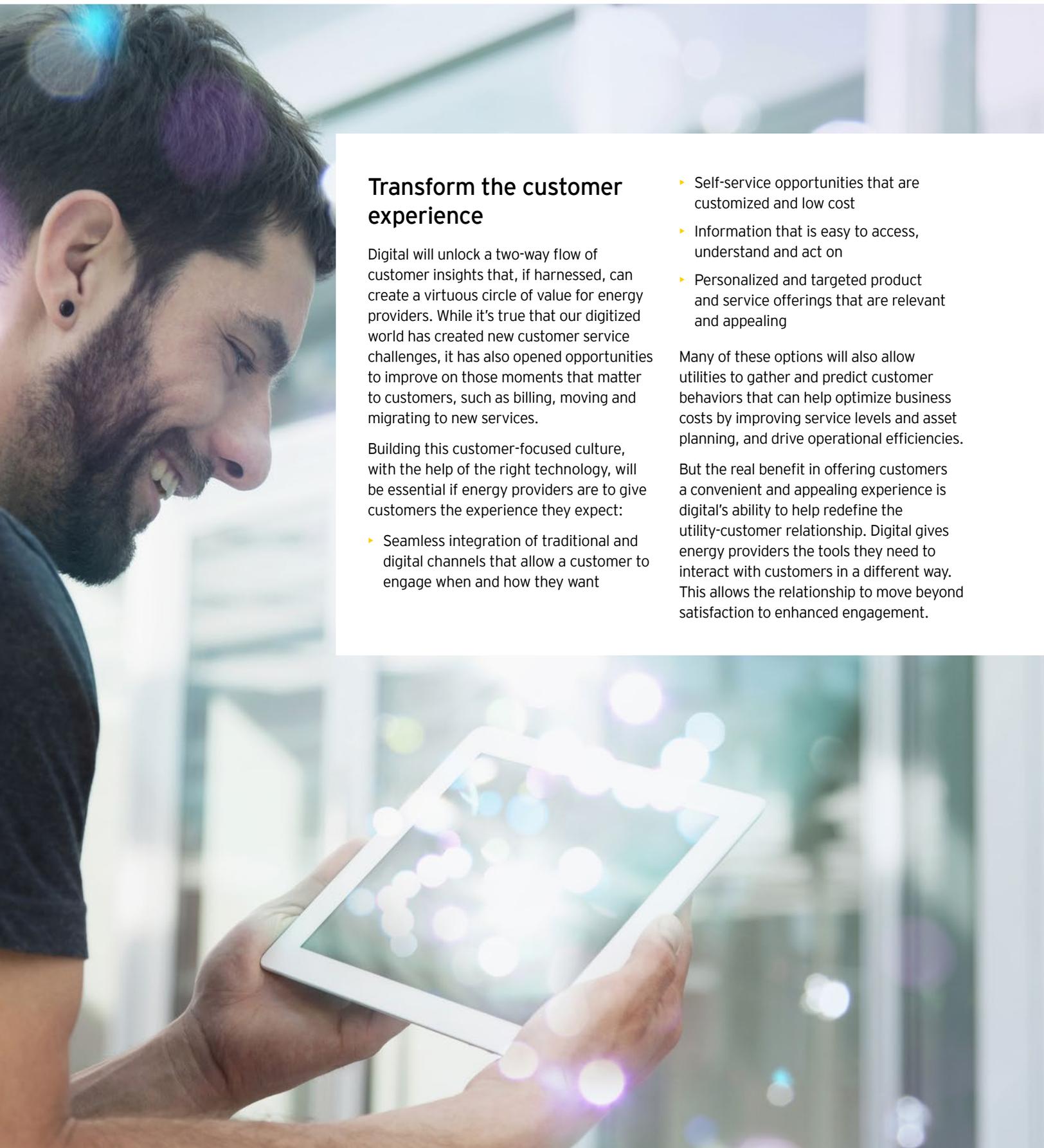
OT and process control systems can no longer be managed in a silo, separate from corporate IT and risk management. On the plus side, advanced digital technologies are also enabling increased security capability, including advanced security monitoring and analytics. The next generation of security operations centers are using big data algorithms to analyze patterns of traffic on both corporate IT and OT networks to identify possible indicators of compromise. This allows an enhanced capability to respond to a cyber attack in real time.

Security and privacy concerns should not be seen as impediments to innovation, but as a way to enable trust as a differentiator. Embedding risk management in innovation will ensure privacy and security risks are considered “by design.” To manage cybersecurity risks, utilities must continue to be vigilant and invest in cybersecurity skills.

¹¹ ICS-CERT Monitor, ICS-CERT, Department of Homeland Security. May/June 2015.

¹² Year in Review, ICS-CERT, Department of Homeland Security, 2015.





Transform the customer experience

Digital will unlock a two-way flow of customer insights that, if harnessed, can create a virtuous circle of value for energy providers. While it's true that our digitized world has created new customer service challenges, it has also opened opportunities to improve on those moments that matter to customers, such as billing, moving and migrating to new services.

Building this customer-focused culture, with the help of the right technology, will be essential if energy providers are to give customers the experience they expect:

- ▶ Seamless integration of traditional and digital channels that allow a customer to engage when and how they want

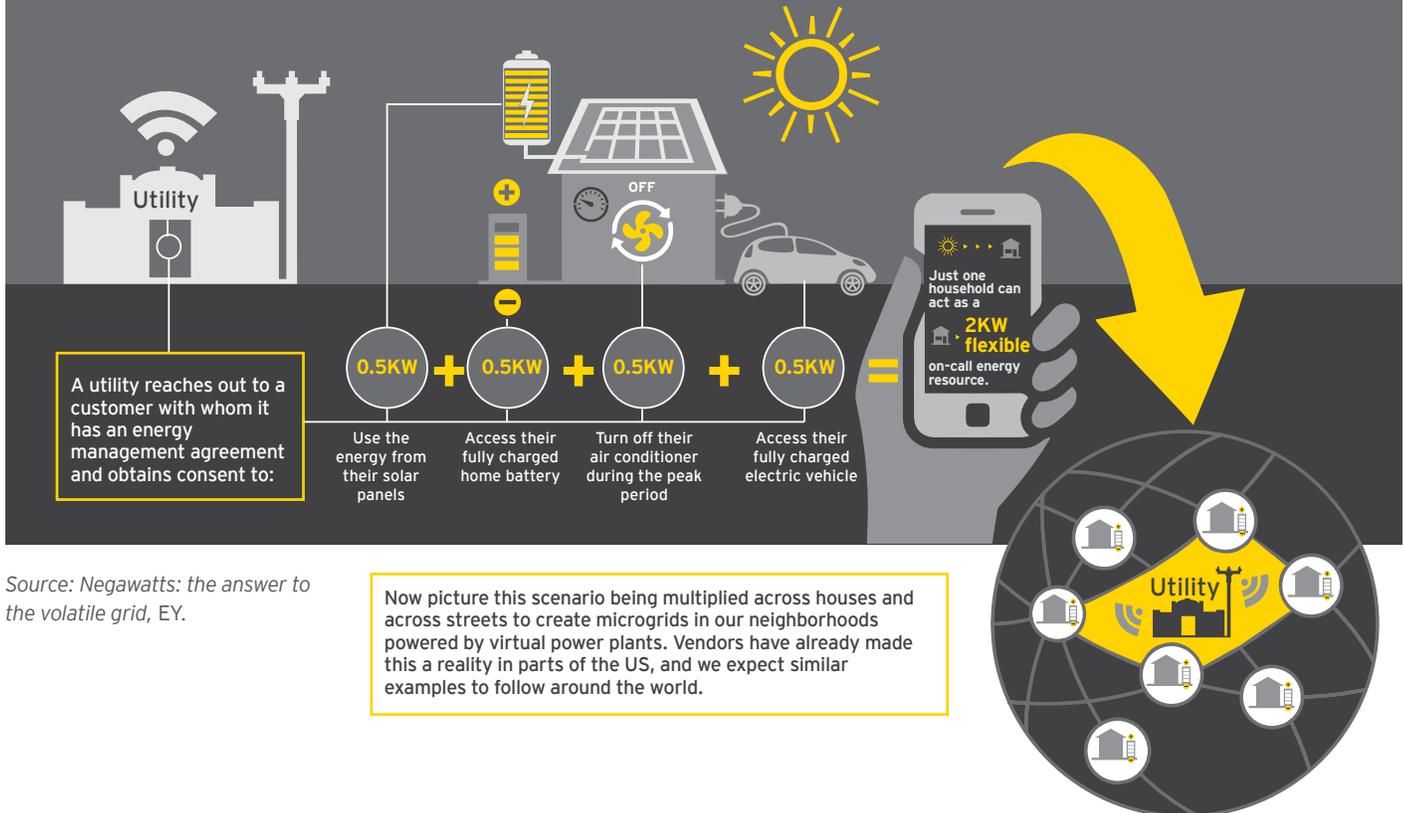
- ▶ Self-service opportunities that are customized and low cost
- ▶ Information that is easy to access, understand and act on
- ▶ Personalized and targeted product and service offerings that are relevant and appealing

Many of these options will also allow utilities to gather and predict customer behaviors that can help optimize business costs by improving service levels and asset planning, and drive operational efficiencies.

But the real benefit in offering customers a convenient and appealing experience is digital's ability to help redefine the utility-customer relationship. Digital gives energy providers the tools they need to interact with customers in a different way. This allows the relationship to move beyond satisfaction to enhanced engagement.

Demand response and the distributed virtual power plant

Demand response, paired with other distributed energy resources such as solar and battery storage, can turn the connected home into a potent tool for distribution management.



Source: Negawatts: the answer to the volatile grid, EY.

Some areas where digital will help transform the customer experience include:

- ▶ Supporting value-based pricing and innovative energy aggregation offerings
- ▶ Seamlessly facilitating customer service, including moves, billing and credit management
- ▶ Providing information and creating dialogue about new personalized energy offerings
- ▶ Enabling contestable metering services and energy solutions that help customers manage their demand
- ▶ Developing new beyond-the-meter products and services that transform the home

- ▶ Enabling new breakthrough services such as off-grid storage, solar generation services and new electric vehicle-charging services
- ▶ Better predicting and meeting the urgent needs of "at-risk" customers
- ▶ Providing customer and usage insights that can be used to sustain competitive prices and drive down the cost to manage assets and serve customers
- ▶ Supporting peer-to-peer trading

Creating an effective value proposition for customers will require a rethink of how utilities and regulators incentivize, reward and engage with them. One possible scenario could provide variable incentives for customers that adjust according to

real-time need. For example, if utilities must shut down load now, they could offer a reward of CA\$10 – if the issue is less urgent, the offer could be just CA\$1. Customers could be asked to participate via SMS messages or mobile applications, with the price increasing auction-style until there is sufficient engagement (aggregated load).

Or customers could nominate automatic price points – for example, if the price hits CA\$7 – to curtail load for one hour, which then gives consent to the utility to reduce service. Offering financial rewards to customers through interactive methods is likely to appeal to today's customer. And engaging customers to play a real-time role in balancing the grid could create a truly dynamic, flexible supply-and-demand system.





Align innovation and policy

Utilities are in a position where they need to innovate more than ever in the face of disruption. There used to be a clear balance of power, with the regulator at the top, followed by the utility and the customer at the bottom. Regulators used to set the agenda; in particular, by providing financial incentives. Now, they also need to provide policy that promotes innovation and allows utilities to thrive financially amid the rebalance of the marketplace.

As utilities face increasing pressure to reduce emissions, digital technology can help drive positive changes to energy supply practices while encouraging customers to do the same. Used in the right way, digital can help make energy efficiency an easy option for consumers while also helping change processes and operations to reduce their environmental impact.

For example:

- ▶ Smart appliances and meters can help customers manage energy usage and improve energy efficiency.
- ▶ Advanced grid technology and software can accelerate adoption of renewable energy, including distributed generation.
- ▶ New business models around ownership and charging are lowering the barriers to electric vehicle ownership.
- ▶ Better use of technology can reduce travel for field workers, improve their interactions with customers and limit the impact of field work on the environment.
- ▶ Advanced customer engagement can lead to incentivizing and gamifying good environmental practices.
- ▶ Smart cities can enable improved monitoring of air conditions, traffic flow and energy usage. Advanced analytics can enable real-time assessment of trade-offs for action with respect to cost, risk, performance and environmental impact.

A parallel process is taking place in energy storage: battery storage is set to jumpstart the clean energy transition while at the same time disrupting the traditional utility business model. The possibilities presented by electric vehicles have driven enormous investment in battery technology, enabling battery storage to insert itself into a growing number of niches in power generation, distribution and supply.

The sector has generally been able to adapt to new types of generation capacity such as renewables, but the rapid spread of battery technology will be much harder to integrate into legacy business models. By helping to smooth the intermittent supply from renewable resources, wider battery use will continue to reduce the peak power prices on which many natural gas-fired power plants depend. In addition, by reducing network utilization, batteries reduce the need for additional grid investment on which regulated network operators depend for their revenues. However, this also presents an enormous investment opportunity as utilities play the storage market through multiple channels, including M&A, and partnerships with battery and PV vendors for new customer acquisitions and innovative business models.

But while utilities and insurgents experiment with new battery storage business models, the actions of regulators are likely to dictate their success or failure. Right now, it's a case of innovation before policy.

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What's next for Canadian utilities?

The tide of disruptive forces in the P&U sector is rising at an increasing rate.

As traditional boundaries break down, the sector needs to embrace closer collaboration with innovators, disruptors and cybersecurity specialists. This can take many forms, including partnerships, alliances, joint ventures and other models that offer new ways of working and opportunities to build knowledge and fill skills gaps.

Navigating this terrain will take knowledge and confidence. Utilities need to accept the different role that regulators might play, the active role the customer is now playing in decision-making, and the fact their own role will require more leading and less following. Choosing the right path toward a new energy future will require strong leadership and a clear vision.

For Canadian utilities to make the most of digital, they must first accept that doing so goes far beyond IT. Instead, digitally enabled changes must be part of a greater strategy that is underpinned by a commitment to shift from a traditionally risk-averse mindset toward a more agile and innovative culture.

Utility companies hold the assets, network data and customer insights they need to succeed in a digital world, but they need to rethink their ways of working to leverage these inherent advantages successfully. By making significant changes to business models and rethinking investment priorities, Canadian utilities can seize the promise of digital to support their transition to the utility of the future.

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How EY can help

The P&U sector is one of our largest industries of focus.

Our Canadian teams of industry professionals work with many of the leading P&U companies across North America, including all of the top 10 utilities in Canada as ranked by *Report on Business*.

Drawing on our deep sector experience, industry-leading methodologies and insights, we can help you develop the right strategic approach, raise funding, control projects, manage risk, optimize customer interactions, enhance efficiency and accountability, and build data management and digital capabilities.

We have experience helping P&U organizations with:

Capital and infrastructure

- ▶ Construction and infrastructure advisory
- ▶ Asset management strategy
- ▶ Supply chain management
- ▶ Fixed asset accounting
- ▶ Work management
- ▶ Mobility enhancements

Digital grid

- ▶ OTs
- ▶ Smart grid and meter capabilities
- ▶ Business process design
- ▶ Grid modernization
- ▶ Resource optimization

Customer and billing transformation

- ▶ End-to-end, business-led approach
- ▶ Strategy, vision and business impact
- ▶ Implementation and transition
- ▶ Operational improvement
- ▶ Customer analytics and experience

Risk and cybersecurity

- ▶ Risk operating model
- ▶ Security operating model
- ▶ Major program risk and cost mitigation
- ▶ Enterprise regulatory compliance
- ▶ Regulatory recovery support

Finance and capital effectiveness

- ▶ Capital and portfolio management
- ▶ Strategic financial planning
- ▶ Financial systems optimization
- ▶ Post-merger integration
- ▶ Regulatory performance management model implementation

Contact us

To discuss the issues raised here or for further information on how EY can help, please contact our P&U Team:

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About EY's Global Power & Utilities Sector

In a world of uncertainty, changing regulatory frameworks and environmental challenges, utility companies need to maintain a secure and reliable supply, while anticipating change and reacting to it quickly. EY's Global Power & Utilities Sector brings together a worldwide team of professionals to help you succeed—a team with deep technical experience in providing assurance, tax, transaction and advisory services. The team works to anticipate market trends, identify their implications and develop points of view on relevant sector issues. Ultimately, this team enables us to help you meet your goals and compete more effectively.

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