

VIBRANT POTENTIAL

**Uncovering
opportunities for the
utilities distribution
business**



From business pressure to growth engine

Recent years have been tough for many distribution businesses. A combination of regulatory pressure, disruptive energy technologies, increasingly complex operations, shifting consumer dynamics and weak demand—particularly in higher-income markets—has squeezed profits and stymied earnings growth.

The rise in distributed renewables is not only impacting total electricity demand but also requires massive investments in new connections and grid reinforcement. Traditional distribution efforts are also shifting as distributed energy resources (DER) proliferate, changing demand profiles including total demand reduction or stagnation, but without a commensurate decline in peak demand. Growing customer expectations mean distribution businesses must actively manage participation, such as in demand response, and provide network access to prosumers. Mass adoption of electric vehicles (EVs) is poised to alter demand growth and put pressure on grid stability. Meanwhile, technology is now being built into every asset, operation and interaction, transforming businesses into intelligent enterprises with on-demand insight.



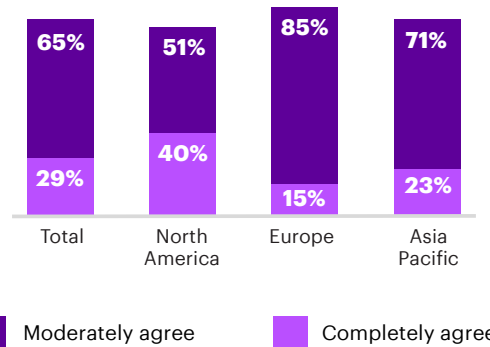
This challenging environment is likely to continue in the near term, a point of view shared by as many as 94 percent of the global industry executives surveyed in our 2018 Digitally Enabled Grid research program. Respondents acknowledge that distribution business earnings growth will remain under severe pressure until around 2025 (see Figure 1).

This widespread lack of profit growth optimism has a host of causes (see Figure 2). Regulated rate base is decreasing, with network capital investment in some companies falling below depreciation, driven by lower demand growth, regulator pressure to reduce capital spend, or simply being at the wrong point in the capital spend life cycle. In some cases, demand is even eroding, impacting both capital spend and company revenues. In other cases, more demanding service targets are requiring additional investment or operational expenditure without any corresponding positive impact on revenues.

New technologies, new challenges

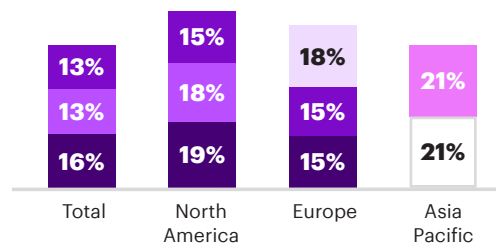
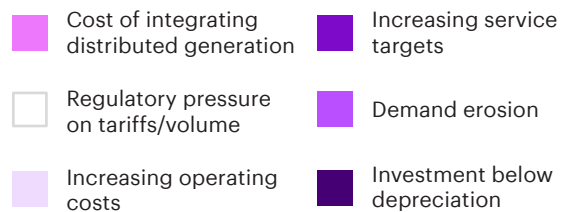
But this backdrop only tells part of the story. The proliferation of DERs is a key factor. Providing network access to customers and maintaining operational performance in relation to DERs is continuing to stretch distribution businesses. In particular, distributed generation deployment is placing greater pressure on networks while simultaneously increasing operational complexity.

Figure 1.
Distribution business earnings growth will be severely pressured (until approximately 2025).



Base: All respondents.
Source: Accenture Digitally Enabled Grid research program, executive survey 2018.

Figure 2.
Why do you believe your organization's distribution business earnings growth will be severely pressured until approximately 2025? Rank top one reason



Base: All respondents.
Source: Accenture Digitally Enabled Grid research program, executive survey 2018.

Distributed generation deployment: A key driver of distribution investment

On the surface it would seem that increases in distributed generation would reduce the need for distribution network capacity by increasing generation closer to demand locations. But in practice it is more complex. Current power networks were built with the assumption that power would flow from large centralized generation sources to homes and businesses. Modernizing that network to support greater levels of distributed generation requires new types of investments to sustain the same level of reliability and safety and secure operations.

The distribution business needs to manage a number of technical constraints to successfully host distributed generation on its network. First, the network voltage must be maintained across all voltage levels of the system, so that when distributed generation exports to the grid, the voltage does not vary beyond set limits that could damage customer equipment and send network assets beyond their thermal limits. This is often a key limitation in current network hosting capacity.

Second, distributed generation can cause many challenges in the existing protection systems that prevent damage to expensive distribution network assets when the system operates outside of its correct limits. Some of the challenges include

feeders incorrectly tripping, blocking or desynchronizing reclosing protection and unwanted islanding of parts of the network. Newer protection devices, often with enhanced communication capabilities, are commonly required to ensure that distributed generation does not cause significant damage to the host distribution network.

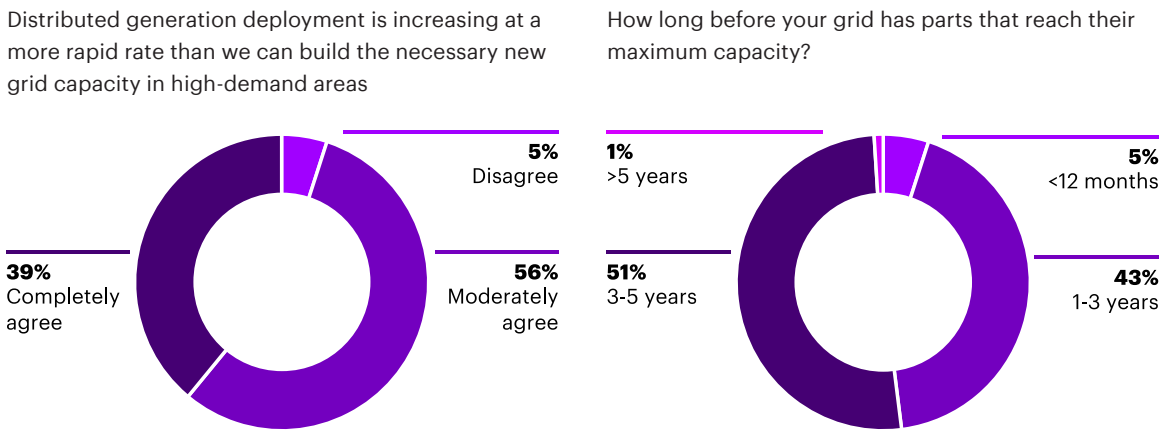
Third, the system must be capable of providing the network capacity to allow distributed generation owners to export excess generation to the system without causing reliability or quality issues to other customers. Distributed generation can substantially alter the scale and timing of demand on the system, with decreased net demand at times of high output, such as summer afternoons and steeper demand peaks in early evening as output declines and residential consumer demand increases. At times of high exports, significant amounts of electricity may need to be moved away from low-voltage residential areas to higher voltages, reversing the normal flow of electricity on the system. In addition, the distributed generation power electronics and rapidly varying exports due to passing clouds can cause quality issues, such as harmonics and flicker.

These challenges are reflected in our Digitally Enabled Grid research. The vast majority of executives clearly see a risk of distributed generation deployment increasing faster than they can build the necessary capacity (95 percent agree) with nearly half of respondents believing their grids might reach maximum capacity within three years (see Figure 3).

In some major markets, the number of small-scale solar installations is rising with daunting speed. For example, in Australia, as many as 15 percent of residential households owned a small-scale PV system in 2017. And, according to Accenture modeling, prosumer distributed generation has the potential to grow with equal rapidity in other countries, as seen by the nearly doubling of households with rooftop solar PV in Germany over 20 years; in California, the number of households could triple over the same period (see Figure 4).

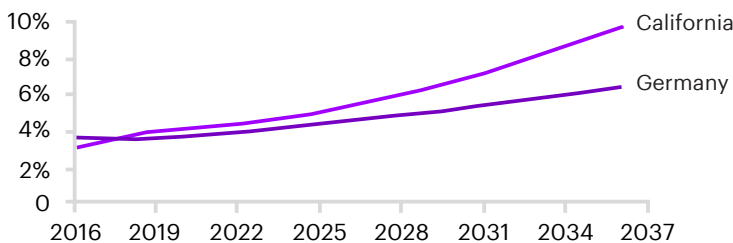
In some cases, the regulatory environment is set to further accelerate this growth. California, for example, has adopted new standards requiring mandatory PV installation on new homes from 2020. Such a move could create major technical challenges for distribution utilities, with new PV-enabled suburbs likely to be significant exporters of electricity to the surrounding network.

Figure 3.
Operational complexity is expected to grow.



Base: All respondents.
Source: Accenture Digitally Enabled Grid research program, executive survey 2018.

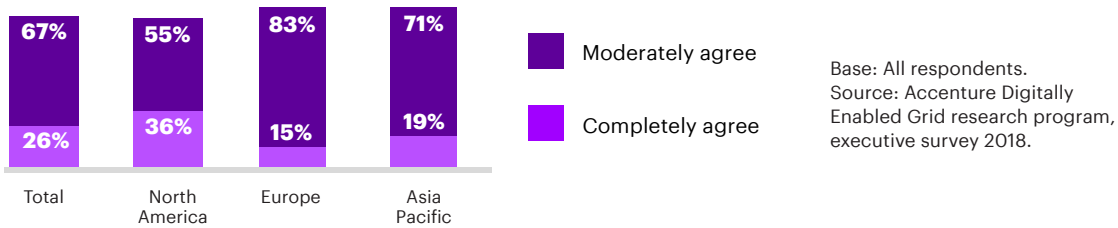
Figure 4.
Percentage of households with rooftop solar PV in Germany and California.*



*Reference scenario
Source: Accenture Digitally Enabled Grid research program, modeling 2018.

What’s more, while digital plays a pivotal role in transforming core efficiency for distribution, many executives seem to struggle to deliver the benefits of digital transformation (See Figure 5). This might indicate that distribution businesses are still in the early stages of their digital transformation.

Figure 5.
The struggle to deliver benefits of digital transformation.

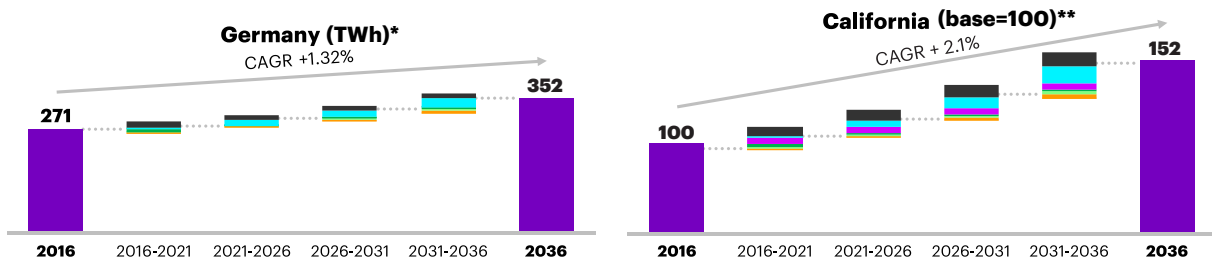
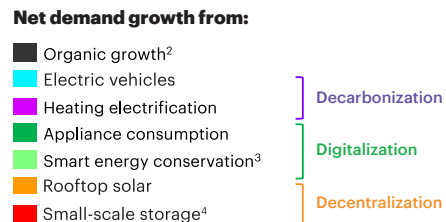


Time for a demand turnaround?

Is there good news for utility distributors? Accenture’s latest modeling of residential and commercial electricity demand suggests the answer is yes. The stagnation in demand growth of the past 10 years seems to be easing in many geographies (see Figure 6). Economic growth is returning, fueled in significant part by changes in population demographics. In some countries, the rate of prosumer rooftop solar deployment is slowing, although it remains a major contributor to demand reduction in many territories. So too is the rate of residential and commercial energy-efficiency gains, with many of the lower-cost and more easily deployed solutions already in place, with some variances by geographies. In Europe, efficient lighting such as LEDs has already been widely deployed, whereas in the United States potential still exists from LED lighting and other energy-efficiency measures over the next 10 years. And demand for new appliances and heating electrification is also showing an uptick.

Figure 6.
Net demand growth modeling for selected geographies.

Residential and commercial electricity demand
Select drivers¹

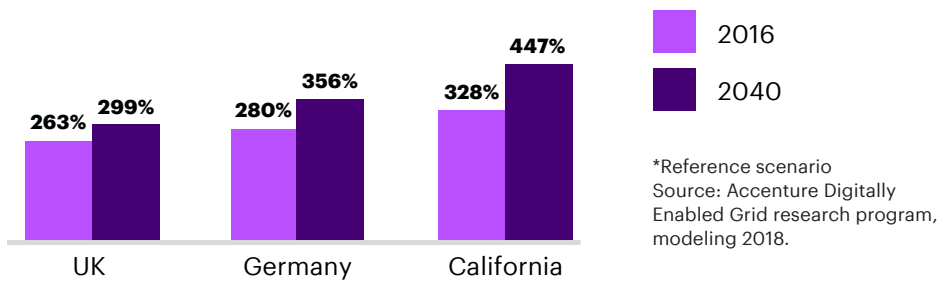


*Reference scenario; **demand dystopia scenario; ¹Select distributed energy resources (DERs) including electric vehicles, rooftop solar, (behind the meter) small-scale storage, appliance consumption (energy efficiency), excludes demand response and front-of-the-meter storage ²Includes growth in GDP and number of households ³Includes smart thermostats, smart monitoring ⁴Excludes effects with ToU tariffs. Source: Accenture Digitally Enabled Grid research program, modeling 2018.

Over the longer term, Accenture modeling suggests high growth potential for utility distributors through the electrification of transportation and building heating. Demand could be driven up and load shape altered significantly, particularly through the use of EV chargers and space/water heating and cooling, such as heat pumps, during periods of peak demand, such as winter evenings (see Figure 7).

Figure 7.
The combined effects of electrification of transport and heating could significantly drive up peak demand.

Peak load as a % of the average load (Ratio: MW/MW*)



Electrified transportation: Electric vehicles (EVs) moving mainstream

Forecasts for EV penetration are becoming much more aggressive. Within the next 20 years, the global EV fleet could increase by 530 million cars (with a CAGR of more than 26 percent) eventually comprising as much as a third of the installed fleet by 2040.¹ The pace of this growth will vary by region, but falling battery costs, pollution/greenhouse gas (GHG) targets and major investments from automotive manufacturers could push EVs into mainstream use within 10 years in some territories.

While the long life of the vast global stock of internal combustion engines means petrol- and diesel-powered vehicles will remain dominant in the medium term, over time EVs will form an ever-larger percentage of electricity demand. In some places, this could be realized remarkably soon. For example, Accenture’s latest modeling shows EVs set to have a meaningful effect on total electricity demand in California and France from as early as the mid-2020s (see Figure 8), as well as significant local impacts on the distribution due to pockets of higher adoption.

Furthermore, some forms of EV adoption could be surprisingly rapid due to a combination of usage need and pollution concerns. So, for public transportation vehicles such as municipal buses (high annual mileage, rapid turnover of vehicles, sensitivity to local pollution concerns) or for scooters, small motorbikes and light commercial vans (relatively small daily mileage, also subject to local pollution concerns), electrification could take hold much more quickly.

Figure 8.
Electricity demand due to EVs will become material between 2025 and 2040.

EV consumption as a % of peak demand*

Geo	By 2025	By 2040
Netherlands	<1%	5.9%
United Kingdom	<1%	6.9%
France	1.2%	10.2%
California	1.0%	8.2%

* Reference scenario
Source: Accenture Digitally Enabled Grid research program, modeling 2018.

¹© OECD World Energy Outlook 2017, International Energy Agency—used by permission,“ All forecasts signal accelerating demand for electric cars,” Bloomberg New Energy Finance, July 19, 2017, <https://about.bnef.com/blog>; Accenture analysis.

Electrification of space heating: Decarbonization of buildings

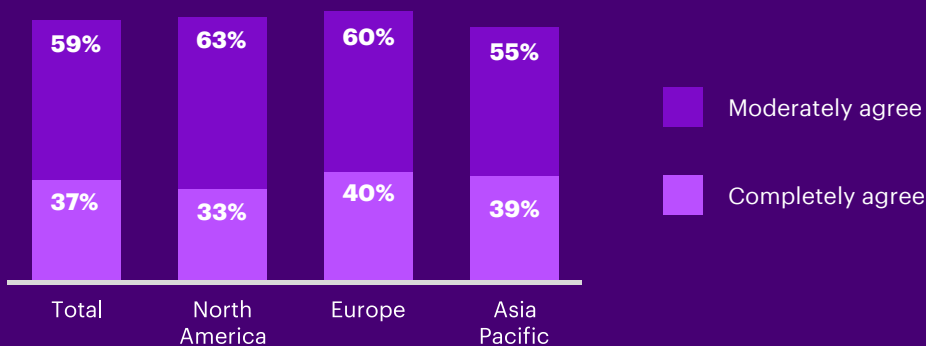
Over the long term, the push to decarbonize buildings could cement electricity as the key energy source for both residential and commercial customers. The reality is, GHG targets are unlikely to be attainable if natural gas, coal and heating oil continue to be burned in large quantities to power buildings as they are today. Indeed, the demand for natural gas for heating both spaces and water currently dwarfs even the total demand for electricity in buildings. For example, in the United Kingdom, total residential demand is 311 TWh for gas versus 108 TWh for electricity.*

However, to date there is no clear, practical plan for a transition to decarbonized buildings. In the short term, efforts will need to focus on energy-efficiency and conservation programs, using more efficient boilers and furnaces, improving building insulation, educating businesses and the public, and driving up the use of smart thermostats. Further ahead, more radical decarbonization will be needed, including the use of solar thermal and electric space and water heating that leverages renewables.

The scale of this transition will be vast. Respondents to our Digitally Enabled Grid survey said they expected to see a substantial decrease in natural gas usage in buildings by 2040 (see Figure 9).

*UK residential demand 2016 data, from UK Government gas demand and electricity demand, <https://assets.publishing.service.gov.uk>.

Figure 9.
Decarbonization efforts will substantially reduce residential and commercial natural gas demand by 2040.



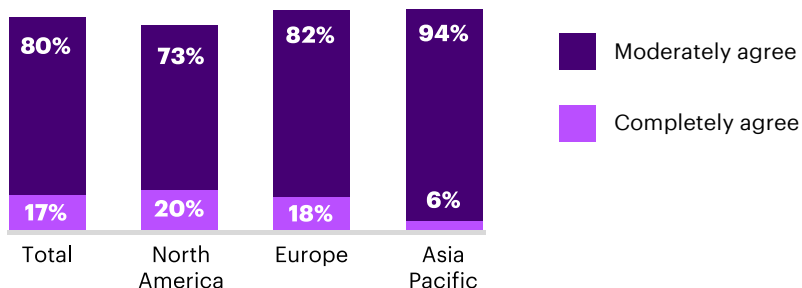
Base: All respondents.

Source: Accenture Digitally Enabled Grid research program, executive survey 2018.

A bright future, but a crucial transition ahead

The industry is generally optimistic about the coming years. Executives expect earnings growth to improve over time (see Figure 10). Improvements in process efficiency and network performance, together with revenue opportunities from new products and services, are set to offer a high growth potential to distribution businesses over the long term.

Figure 10.
Distribution earnings are expected to grow beyond 2025.

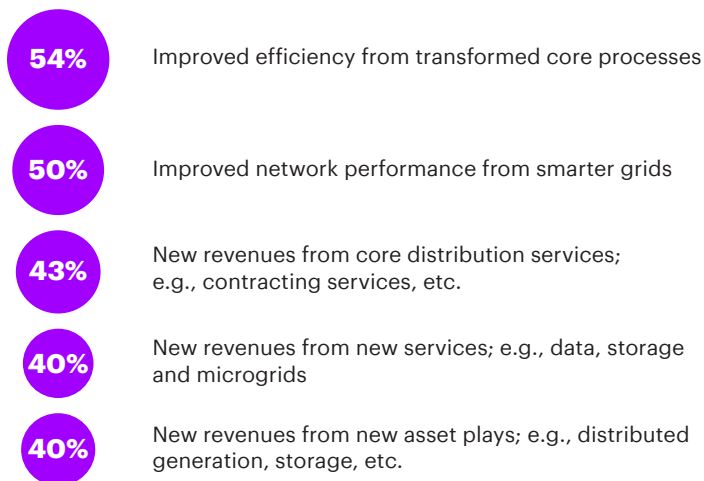


Base: All respondents.

Source: Accenture Digitally Enabled Grid research program, executive survey 2018.

In particular, earnings growth is expected to be driven by efficiency boosts from the transformation of core processes, improvements in network performance through smart grids, and new revenues from engineering and data services (see Figure 11). In a currently regulated asset-based model, it will require regulation to evolve to allow distribution companies to gain compensation for efficiency improvements and new services.

Figure 11.
Top drivers of earnings growth beyond 2025.

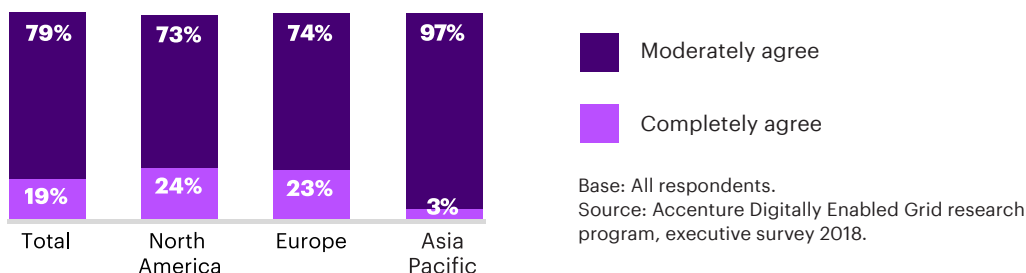


Base: All respondents.

Source: Accenture Digitally Enabled Grid research program, executive survey 2018.

However, the transition from utility distributors’ current position will be crucial. Increasingly, financial returns will be tied to operational performance—with no hiding places for lower performers, potentially resulting in lower returns or becoming takeover targets. Indeed, performance-based regulation (i.e., financial returns based on performance against predefined targets) will become the dominant distribution model by 2025 (see Figure 12).

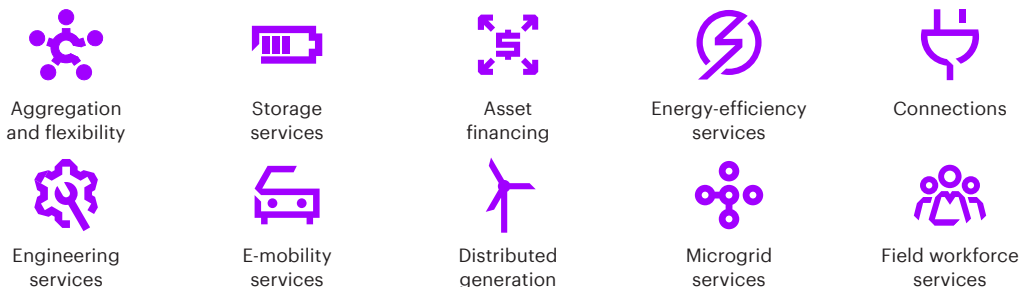
Figure 12.
Performance-based regulation will be the dominant model for most distribution businesses by 2025.



This model will create an opportunity for some companies to outperform while others may underachieve, especially as regulators in some geographies will likely adopt forms of comparative regulation, which will increase visibility of high- and low-performing distributors.

At the same time, despite being a regulated business, distributors must adapt to a new competitive environment, including incumbent players, digital giants and startup companies looking into entering new areas such as microgrid services, network-connected storage, among others. (see Figure 13). This is a new competitive landscape for distribution companies. To adapt and thrive, distributors must be ready to transition to new technologies and new business models with speed and agility. Each company in each territory will face its own particular set of challenges in moving forward. But those that fail to acquire a new and complex set of digital capabilities and make them mainstream by around 2025 will be in danger of falling ever further behind, as digitally savvy counterparts accelerate away in the race for future growth.

Figure 13.
Incumbents and new players will challenge distribution core and potential future business.



Source: Accenture analysis.

The smart utility of the future: intelligent grid optimizer

In our report, “Positively charged: Creating a future of value and growth for utilities in a multifaceted energy system,” we set out why, in the face of current game-changing shifts, the time is now to pivot to “the New” and create a different kind of utility—one skilled in targeting, releasing and monetizing trapped value sustainably.

For distributors, this will lead to the rise of intelligent grid operators. As distribution is optimized to accommodate DERs, intelligent grid optimizers will develop and scale advanced grid operations capabilities to help accommodate, operate and navigate a fast-changing ecosystem of energy devices and support an extension into new commercial models.

As those distributors collaborate with regulators and other stakeholders to develop a performance-based distribution model, they will have the potential to increase profits beyond the limits of regulated asset growth. In addition, they will have an opportunity to serve as network arbiters and as a data/transactional clearinghouse.

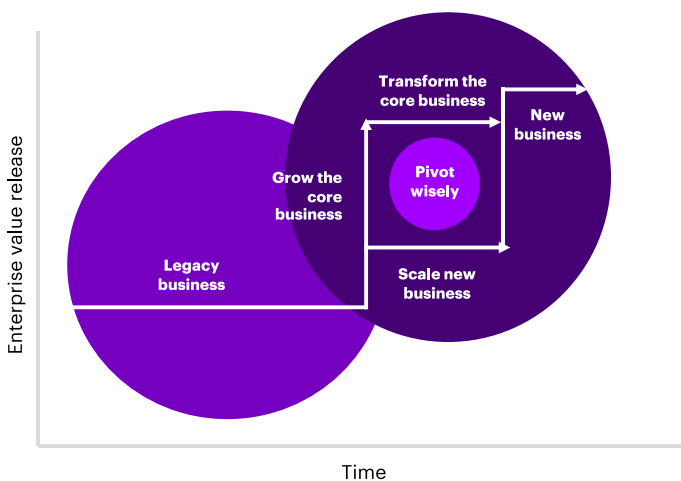
This model will require them to adopt a more customer-centric approach so that evolving customer expectations on areas such as service quality, distributed generation deployment opportunities, EV charging capacity and tariff structures are satisfied. As a result, intelligent grid optimizers will need to master customer-led scenario planning capabilities along with data-driven and predictive analytics capabilities. These capabilities will help them develop customer adoption scenarios, determine relevant local investment options and optimize investment decisions across the various levels of the energy system.



New opportunities at the core and beyond

For utility distributors, the future rests on rotating to innovative, high-value, high-potential business models that will drive fresh growth. It means leveraging new technologies and digital innovation to identify and release the value trapped in their core businesses, and using that value to scale and lead in the New. But doing so means committing to much more than a single, one-off transformation—it means embarking on a journey of fundamental change (see Figure 14).

Figure 14.
Accenture's view of leading in the New: A perpetual change journey.



Source: "Leading in the NEW: Harness the power of disruption," Accenture, 2017, www.accenture.com.

On this journey, it is vital to understand how and when disruptive forces will transform the distribution business. Companies must be ready to assess factors like their regulatory environment, government policies in areas like climate change and the unbundling of the distribution industry. Equipped with this understanding of industry disruption, they can embark on a three-stage journey (see Figure 15).

- 1. Transform the core business.** The distributor finds and unlocks value trapped within its core business, optimizing processes to create next-level efficient operations.
- 2. Grow the core business.** The distributor focuses on growing revenues and profits within the core business, increasing the regulatory asset base, maximizing income from incentive mechanisms and positioning to benefit from any industry consolidation or extension into new geographies.
- 3. Scale the new business.** The distributor scales up its new business models, choosing the appropriate moment to pivot wisely and focus on and lead in the New.

Figure 15.
Extracting performance and growth in the New for the intelligent grid optimizer.

TRANSFORM THE CORE



Expand Industry X.O initiatives in intelligent asset planning and management to drive capital and operating efficiencies



Enhance smart infrastructure to increase network availability and power quality and grow profitability through optimization of new flexibility and incentive mechanisms



Optimize field workforce productivity through connected worker solutions to drive safety, asset availability and maintenance efficiency

GROW THE CORE



Expansion of grids to support organic demand growth and electrification

- New connections, network extension (market expansion)
- Reinforcement to support new grid-connected assets (e.g., EVs, microgrids, storage)



Replacement and reinforcement to improve reliability and quality power supply i.e., aging infrastructure and undergrounding



Extend core engineering services offerings to third parties (design, build and/or run)



Strengthen business position for potential consolidation of distribution industry (M&A)

SCALE THE NEW



Develop new solutions and asset ownership within the regulatory fence

- data hubs/platforms, EV infrastructure and services, microgrids and storage for distribution operations



Develop spin-off businesses outside the regulatory fence—microgrid ownership, EV charging assets, grid-connected storage, etc.

NOT EXHAUSTIVE
 Source: Accenture analysis.

Industry X.O defined

To achieve real digital transformation and unlock lasting value, companies must carefully select the right combinations of advanced technologies. That's Industry X.O—the digital reinvention of industry.

An approach that embraces and profit from smart, connected, living and learning technologies that encourage innovation, improve operational efficiency, and use new ecosystems.








Transforming the core

Growth of the intelligent grid optimizer will hinge on improving efficiency of core processes and developing and scaling advanced grid operations capabilities to accommodate, operate and navigate a fast-changing ecosystem of energy devices. In Accenture's survey it is clear executives are looking across the breadth of their businesses for cost optimization initiatives, including reducing asset unit cost by improving forecasting (61 percent), implementing smart integration of distributed generation to reduce reinforcement spend (59 percent), optimizing asset maintenance through improved asset risk insights (49 percent), and improving grid operations efficiency (47 percent). While there is no single approach, the key point is to improve visibility and control to drive better decision making.

Investments in asset optimization and Industry X.0 to enable smart infrastructures, digitization of operations and a connected workforce will be crucial (see Figure 16). Accenture experience suggests distribution utilities could potentially see 10 to 15 percent reduction in capital spend and 10 to 20 percent reduction in operations and maintenance costs through these types of initiatives.

Figure 16.

Transform the core: Unfolding the opportunities

AREAS OF FOCUS	OPPORTUNITY	SELECTED POTENTIAL OUTCOMES
 <p>Expand Industry X.O initiatives in intelligent asset planning and management to drive capital and operating efficiencies</p>	<p>Real-time solutions to connect and monitor assets to manage resource planning, forecasting and scheduling</p> <p>61% of executives see reducing unit costs through improved forecasting as a prime cost optimization opportunity</p>	<ul style="list-style-type: none">• 10 to 15 percent decrease in capital spend through targeted investments• 10 to 20 percent reduction in operations and maintenance costs
 <p>Enhance smart infrastructure to increase network availability and power quality and grow profitability through optimization of new flexibility and incentive mechanisms</p>	<p>Modernizing the network and deploying new technologies that enable capabilities such as distribution flexibility, resiliency, enhanced security, storage and other DER</p> <p>59% of executives identify smart distributed generation integration as a prime cost optimization opportunity</p>	<ul style="list-style-type: none">• 25 percent decrease in equipment-related outages• Theft reduced by 50 percent• Large-scale deployment of DER enablement
 <p>Optimize field workforce productivity through connected worker solutions to drive safety, asset availability and maintenance efficiency</p>	<p>Leveraging mobile, sensor, asset tracking, analytics and wearable technology to more effectively schedule, dispatch and execute the work activities of a utilities field worker</p> <p>41% of executives identify field workforce productivity and performance through digital solutions as a prime cost optimization opportunity</p>	<ul style="list-style-type: none">• 15 to 20 percent decrease in maintenance service costs• 1 to 5 percent reduction in asset downtime

Source: Accenture Digitally Enabled Grid research program, executive survey 2018; Accenture analysis.

Digital plays a key role in all these transformation initiatives. In fact, respondents to our survey overwhelmingly expect digital technologies to have a major impact on their core businesses in the near term, from autonomous vehicles and robots, to digital twins, artificial intelligence (AI) and blockchain. New levels of efficiency will be unlocked through the combinatorial power of digital technologies.

47% of North America utility executives consider digital twin technology as the top technology with potential to drive cost efficiency.²

²"Industry X.O: Combine and Conquer, Unlocking the power of digital," Accenture Research, www.accenture.com.

Digital twins: improving real-world decision making

The concept of the digital twin offers an immersive virtual environment that merges short-, medium- and long-term planning horizons to help network operators and planners to make value-driven decisions across a range of operations—from boardroom to system operations:

- Virtual “what-if” scenario planning makes it possible to test the implications of changes such as distributed generation deployment or EV-driven demand growth, and to better determine appropriate levels of spend on new network capital and operational projects.
- Virtual and augmented reality environments can perfectly mimic network locations, giving employees immersive learning and development experiences.
- Simulations enable deeper insights into network assets, making it possible to predict and prevent failures to achieve greater performance as well as supporting the troubleshooting of real-time system outages.

Drones and AI: revolutionizing asset inspection

Distribution utilities have always faced a cost-versus-coverage challenge with respect to inspection of linear assets in the field. With an aging infrastructure, the risks associated with this challenge have been rising significantly. Fortunately, advances in technology have ushered in a better, much more cost-effective option. In this new paradigm, helicopters and on-foot inspection are replaced with drones, which are not only highly economical, but also eliminate risks to crew safety. When coupled with AI, this drone-based approach to visual surveillance and data gathering revolutionizes the inspection process.

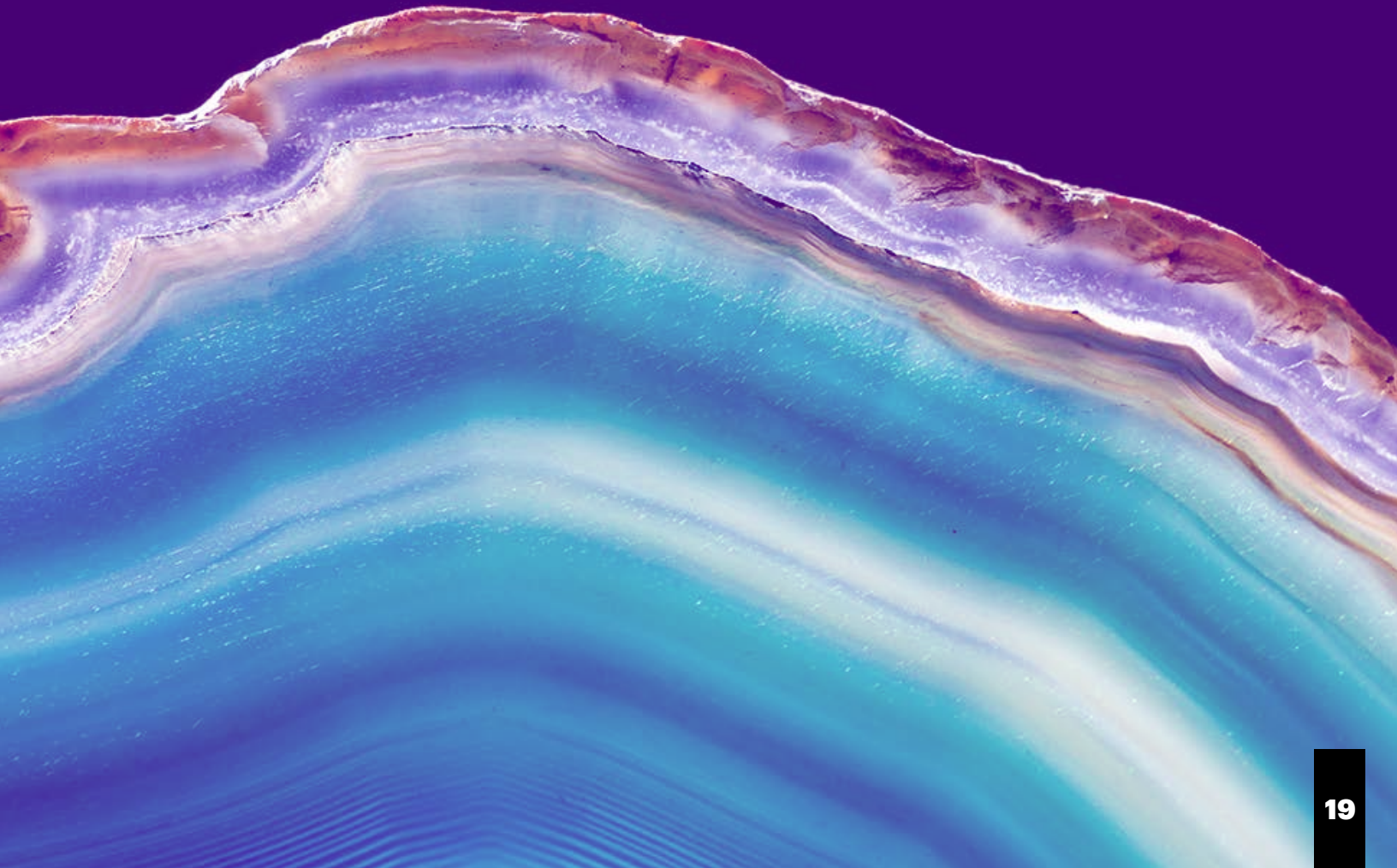
Some forward-thinking utilities are eager to take advantage of the drone-AI combination. Accenture has worked with one utility that previously could only inspect 5 percent of its transmission lines every year. We replaced their helicopters with drones and equipped them with cameras and ultrasound devices that would not only visually inspect the company's lines for defects, but also identify specific problems, such as the corona effect that indicates energy leakage.

Drones and cameras are certainly an integral part of this new approach to inspection. But equally critical are the AI algorithms and technologies that convert imagery into actionable insights. For the previously mentioned utility, we taught the AI algorithm to recognize patterns in the video feed that streamed from the drone cameras to the server. We also taught it to get smarter over time. With machine learning, the algorithm became more precise in its interpretation of data each time it was used. Pretty soon, the algorithm became so intelligent that it could capture data an engineer manually inspecting lines might have missed. Finally, we tied AI into the utility's work management system. That meant any AI-detected problem automatically issued a defect alert, GPS location and work order—all of which was sent to field crews' mobile devices in real time.

Using drones and AI to transform the process of inspecting transmission lines represents an exciting opportunity for utilities looking to contain costs and improve system reliability. But line inspections are just the tip of the iceberg in terms of how utilities can apply drone-AI technologies. Other opportunities include:

- **Identify meter-to-transformer connections.** This is a serious issue for many utilities, since the inability to understand the connections diminishes the effectiveness of transformer load management analyses and other grid analytics.
- **Assess remote storm damage.** Many utilities already use predictive analytics to estimate where a storm is likely to impact the T&D network. Drones could be used to gather actual damage-assessment data after a storm has passed to quickly confirm or adjust this storm recovery plan based on actual data.

There are still challenges associated with using drones and AI in the utility industry. Chief among them is the uncertainty about how government regulations might affect the viability of certain drone use cases. Despite some challenges, there are compelling use cases that can be explored now with a great potential to help more effectively manage operations and workforce productivity.



Connected worker: Improving productivity while striving for safety

Equipping field workers with mobile IoT sensors, analytics and wearable technology could facilitate a more effective execution of work activities, achieving new levels of operational performance and safety.

- **Improve worker productivity:** Digital identification of assets, locations/spaces/zones and other site workers. For example, in maintenance work-order execution in field asset data management and the capture of actual versus planned activity.
- **Improve site logistics and awareness:** More effectively managed site access via entry gate check and site logistics via virtual site boundary such as for substations.
- **Real-time field decision-making support:** Smart workers' vision could be shared with remote supervisors or technical experts to allow "over-the-shoulder" coaching and instructions.
- **Hands-free work orders and instructions:** Improved worker productivity by allowing voice-controlled interaction with system.
- **Enhanced worker capability via drones:** Drones can augment smart worker capabilities by allowing faster asset inspection (e.g., pylons and poles, confined space, vegetation detection).
- **Enhanced health and safety:** Sensors automatically collect field data on external conditions and worker health; alerts are sent to workers and management about potential risks in operations, such as energization status of circuits.

Growing the core

To grow the core, the distribution business should focus on growing revenues and optimizing profits within the core business services. We see four main areas for growth:

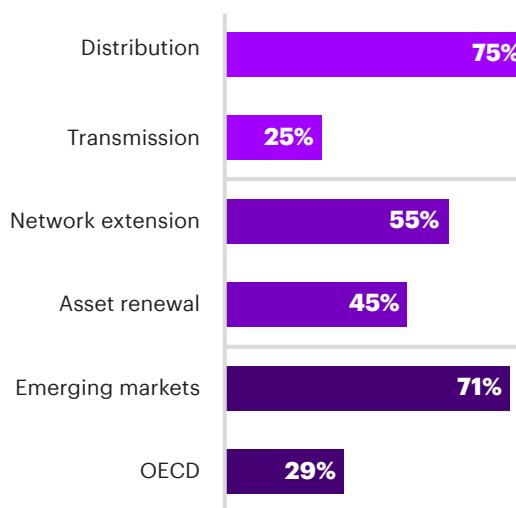
- Expansion and reinforcement of grids to support demand growth and new grid connected assets, such as storage, EVs and microgrids.
- Replacement and reinforcement of assets to maintain and improve reliability and quality.
- Extension of core engineering and field services to third parties where competition is being introduced e.g., connections, vegetation management and network design.
- Inorganic growth through acquisition of distribution companies.

Expansion and reinforcement of grids

Despite the recent demand stagnation in mature economies, electricity demand will play an increasing role in the energy mix, particularly as local pollution and GHG emissions become a greater consideration. Along with global population growth, electrification of transportation and heating as well as extension of networks to communities without electricity access, this implies significant long-term growth opportunities for distribution services.

Emerging markets offer interesting opportunities to grow the core distribution business through grid expansion. As much as 71 percent of total network investments are likely to take place in these markets (see Figure 17). However, in mature markets, despite the presence of consolidated grids, many aging networks also require modernization and reinforcement. Investments in these assets increase the grid availability, allow greater amounts of distributed energy and reduce penalties from a poor supply quality.

Figure 17.
Total network investments split (2016-2040).



Source: © OECD World Energy Outlook 2014, 2015, 2016, International Energy Agency—used by permission; Accenture analysis.

Additional grid expansion opportunities will also emerge as new renewable capacity is added, such as adding connection points for new wind farms. Unlike conventional centralized capacity, wind energy is often generated in remote or dispersed locations, requiring investment in the grid to make connections with the network.

Replacement and reinforcement of assets

For distribution businesses with sophisticated incentive models, distribution businesses are likely to be well compensated for using innovative solutions to delay reinforcement or asset replacement. This could include using DER as an alternative for traditional distribution infrastructure reinforcement, as well as market-based solutions such as demand response to manage local congestion. High-performing distribution companies will optimize their approach, integrating decision making around capital replacement and reinforcement with non-capital, smart solution decisions to optimize long-term network performance and business profits. For example, the UK regulator has recently implemented a broad incentive regime and the distribution companies are already benefiting from incentive payments, with £220 million earned in 2017 for meeting targets such as customer service quality, interruption targets, network risk level and environmental standards.³

Extension of core engineering and field services

Distributors can also grow by extending core services to third parties on the basis of current assets. Leveraging their new efficiencies, they could create opportunities to provide competitive services to other utilities and municipalities. Some countries have already moved to make some services like new connections a competitive market. Also, with the growth of non-traditional ownership of networks, such as by pension and infrastructure funds, there are likely to be opportunities for being third-party providers of services. Our Digitally Enabled Grid executive survey indicates that B2B field workforce contracting and connection services constitute high-value growth opportunities for distributors.

Inorganic growth via acquisitions

Finally, the increased clarity on the future role of distribution, in tandem with performance-based revenue models, is likely to foster a wave of consolidation in the industry as companies seek out revenue growth, scale-based efficiencies and access to technologies and new solutions. Distribution companies should seek to stake out a strong position as such consolidation takes place.

³RIO-ED1 annual report 2016-2017, Ofgem, <https://www.ofgem.gov.uk>.

88% of utility executives expect that standalone distribution businesses will need to merge to create the scale required to compete effectively.⁴

⁴Accenture's Digitally Enabled Grid research program, 2018 executive survey.



Scaling the new

Unlocking investment capacity by transforming and growing the core business will enable distribution businesses to pursue opportunities at scale beyond their traditional boundaries. The precise nature of those opportunities, and the new services they capitalize on, will vary significantly by geography, reflecting the relative maturity of the market in question as well as socio-economic context. Working effectively with regulators will be particularly vital, as new commercial models will need to support and incentivize expansion into new services.

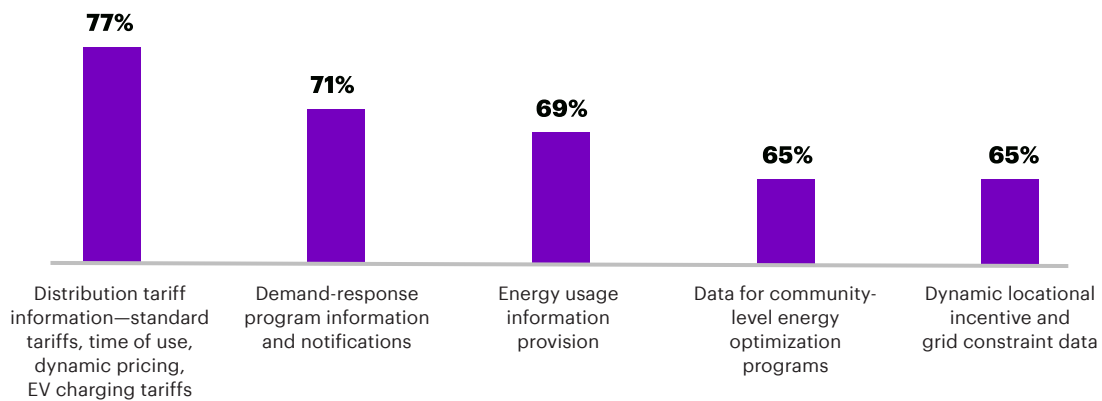
And what of these new opportunities? One is the prospect for distribution businesses to serve as a data/transactional clearinghouse at the center of new markets and ecosystems. As a data hub, distributors could support other players to launch new services over the network. Our survey shows that executives see opportunities in new platform plays. For example, a distributed generation/renewables platform could allow participants to trade power and ancillary services.

A smart building platform could help building operators and owners optimize demand in response to tariffs and demand-response signals. Again, these would require close collaboration with regulators for an adequate recognition of these services in the distribution incentive schemes.

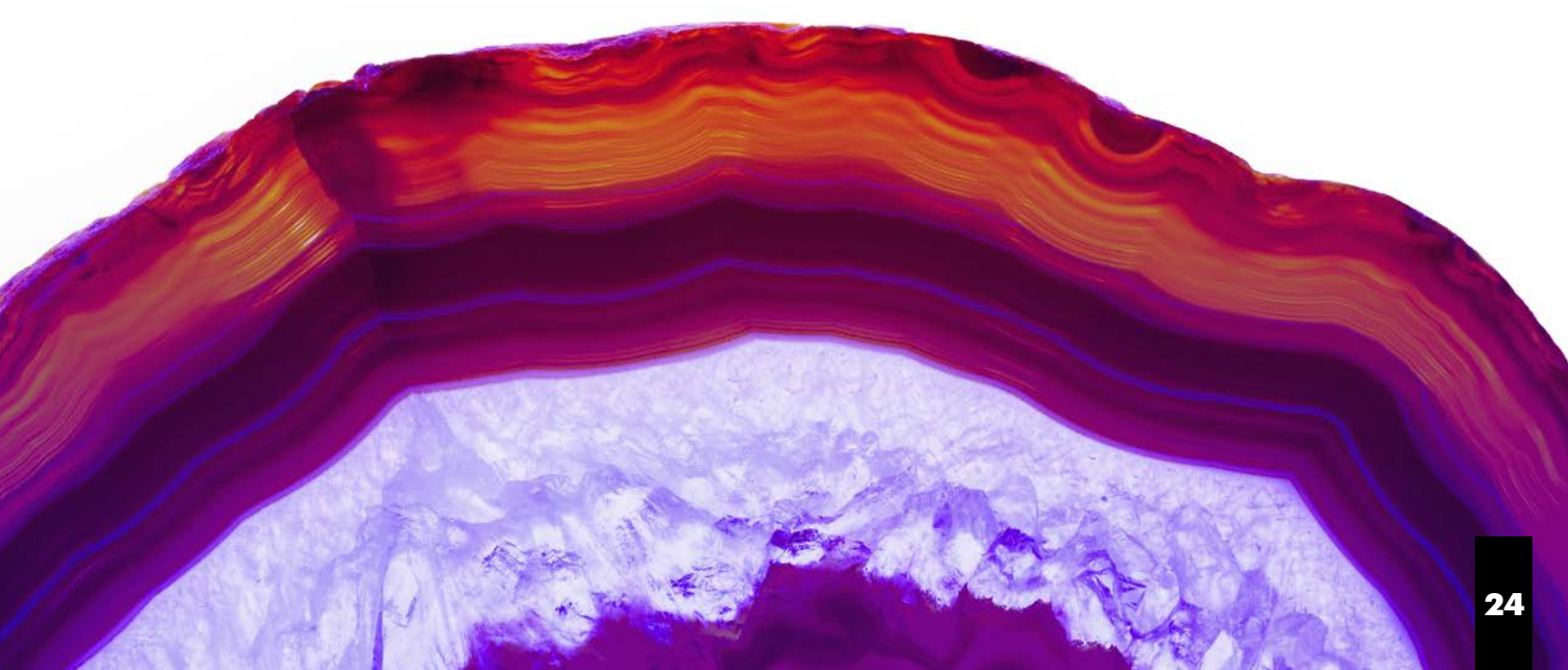
Looking beyond the platform roles, distribution companies could also create specific value propositions for consumers, businesses, governments as well as business-to-business-to-customer (B2B2C).

One example: The smart city or urban energy system. There would be significant value to be realized from utilizing smart grid and smart meter investments to provide additional flexibility to DER owners and electricity customers to manage scarce network capacity, support EV deployment and reduce city emissions. Distribution companies could also build and operate microgrids as part of smart city solutions.

Figure 18.
Growth opportunities as providers of energy-related data services to consumers.



Base: All respondents.
Source: Accenture Digitally Enabled Grid research program, executive survey 2018.



Foster new market and regulatory models

A fundamental prerequisite for distribution businesses to reap these opportunities will be transforming the regulatory model to provide effective direction and incentives. Distribution businesses should confirm an adequate, fair reimbursement for assets to attract the investments needed over the coming decades to modernize and enhance the grid. In the United States, several states are aggressively pursuing grid expansion, emphasizing consumer choice and expanding the visibility and control of grid devices. For example, New York is engaging stakeholders and negotiating a regulatory vision to enable greater consumer adoption of DERs, with a direct focus on energy infrastructure expansion.

Distribution businesses need to collaborate with regulators, consumers and the broader energy system to develop a sustainable long-term model for distribution. For example:

- Clarity on distribution's role in enabling the future electricity system and alignment of roles with other participants.
- Mechanisms to align network performance, sustainability and customer service to financial performance and mechanisms to help support innovation.
- New methods and tools available to distribution to actively manage an increasingly distributed system.
- Agreements on how distribution can support roll out of new technologies, such as EVs, storage and electrification of space and water heating, either within or outside the regulatory fence.

Conclusion: Strategic imperatives for distribution businesses energy providers in the New.

To pivot wisely to the New, distribution businesses must maintain balance between their legacy and new businesses. They must carefully select the timing of bold moves into new products and services to maintain stability. In short, the core and new businesses need to coexist. The challenge: Scaling the new while driving the growth and efficiency of the core.

We see several strategic imperatives distribution companies should consider as they seek to lead in the new:

Drive cost optimization

Creating value in the core requires new methods to manage costs and challenge assumptions about the limits of efficiency. New technologies such as advanced analytics, process simplification, automation, and the application of AI, robotics and drones will be critical to transform costs.

Build a path to a new business model

Business model innovation truly occurs when distribution businesses challenge the status quo of their value proposition, the consistency of their revenue models or the effectiveness of their value chain. Achieving this shift requires a new mindset as well as a new business model. That means moving

away from the focus on providing assets, and putting services and customers at the heart of improving financial and operational performance.

Build an innovation architecture

Developing new services and products has not been a core capability for distribution businesses. To launch and sustain those new ventures will require a very different approach. The first step: Designing the appropriate innovation architecture that includes digital hubs and innovation hubs, research labs and ecosystem partnerships.

Become relentlessly customer-centric

In the digital era, customers expect more and their demands can change rapidly. While energy retailers have traditionally been at the forefront of customer interactions, distribution businesses will also need to confirm their services are relevant, timely and more directly meet customer needs.

Invest in digital from periphery to core

Aging assets, greater operational complexity and growing customer participation through DERs require a step-change in network visibility and control. What's more, these are strengths that distribution businesses will need to play to as digital lowers barriers to entry and other players seek to take advantage of platform-based digital business models across a wide range of areas including distributed generation, smart buildings and microgrids.



Fuel the rise of the responsive workforce

Digital technology is reinventing how work gets done, and the overall experience for all employees. The industry’s aging workforce and the need for new digital talent require new ways to drive innovation, focusing particularly on engineering, technology and digital, as well as finding ways to optimize the successful collaboration between people and machines.

Foster new market and regulatory models

Distribution companies have the opportunity to lead the debate about the most effective model to support the electricity system. The model should foster innovation, expand customer choice and deliver efficiency while providing the opportunity for the highest-performing businesses to reap financial rewards accordingly. Distribution companies are well-placed to help accelerate the transformation process to create a more-distributed, low-carbon and customer-centric electricity system.

Digitally enabled grid research program: 2018 methodology.

Modeling

Net demand drivers

Residential and commercial demand profiles, electric vehicles, heating electrification, energy efficiency (appliance consumption), smart energy conservation, rooftop solar, small-scale storage, organic growth (GDP).

Timeline: 2016 – 2036

Assumptions

The modeling focuses on the impact on the low-/medium voltage grid, assuming no impact from the industrial sectors, or assets connected directly in the high-voltage grid such as onshore/offshore wind, utility-scale solar, data centers, industrial-scale additive printing facilities. The modeling excludes the impact of time-of-use tariffs, as well as implications from demand response.

Geo-level demand impact modeling

The modeling leverages five scenarios (reference, demand dystopia, old economy, green democracy, new era of demand) , each providing different levels of decentralization and decarbonization hypothesis.

Geographies and US states represented

Australia, Belgium, Brazil, California, Canada, China, Florida, France, Germany, Illinois, India, Italy, Japan, Mexico, New York, South Korea, the Netherlands, Poland, Spain, Sweden, Switzerland, Texas, United Kingdom.

Executive survey

Data collection

150 utility executives from 25+ geographies surveyed through a global quantitative online survey.

Fieldwork

February and March 2018

Geographies represented

Argentina, Australia, Brazil, Canada, China (including Hong Kong and Macau), Denmark, France, Germany, Indonesia, Ireland, Italy, Japan, Malaysia, the Netherlands, Norway, Philippines, Poland, Portugal, Singapore, Spain, Sweden, Switzerland, Thailand, United Kingdom, United States of America.

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