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# Global power strategies

## The future of the utilities industry and the players that are driving market success

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**Acknowledgments**

We'd like to thank the following chief executives who sat down with us for interviews. AGL Energy: Brett Redman; American Electric Power (AEP): Nick Akins; CenterPoint Energy: Scott Prochazka; Enel: Francesco Starace; E.ON: Johannes Teyssen; and Fortis: Barry V. Perry.

# Introduction

In the past 30 years, electricity and gas markets around the world have been radically transformed as market forces played an increasing role in energy supply and distribution. Markets opened, competitors emerged, businesses rationalized, incumbents combined, technologies advanced, and customers experimented.

The reshaped industry, while retaining its heritage of reliability, is now forging a vastly different future for itself and its stakeholders. Some global utilities have evolved into entities that dramatically diverge from their legacies.

Traditional strategies centered on regulatory policy, capital investment, and customer service. These strategies typically reflected regulatory accommodation rather than market intention. Consequently, utilities acted cautiously rather than accepting unfamiliar risk. But advances in the structure of the power and gas markets, and the acceleration in the pace of change, mean that conservative approaches to strategy design are unable to position the utilities sector effectively for a future still being mapped.

Tomorrow's strategies need to be intentional, aggressive, and consequential, even in the face of uncertainty. They need to recognize that imperfect knowledge about direction and outcome does not limit the ability to embrace the challenges that the sector's future evolution will pose.

Successful market strategies are not the domain of only the largest utilities; plenty of smaller utilities are strategically well positioned. But the actions of these largest peers provide a glimpse into how the utilities sector may evolve and the levers available to ensure valuable and enduring market and financial outcomes.

In this report, we review the strategies and positioning of the Global Top 40 (GT40) listed utilities by market capitalization — what this peer group has accomplished and what its members are positioning themselves to pursue.

We address the range of strategies employed, as well as the rationales for adoption, as a backdrop to the future dynamics of the sector. These strategies typify how utilities view market opportunities and where concentration occurs across a broad spectrum of archetypes.

We complemented our analyses with two additional sources of insights and perspectives: interviews with the chief executive officers of seven GT40 companies and a global survey of more than 100 utilities. The results illuminate the ways utilities are navigating the road ahead and forging a new industry, and they provide a valuable adjunct to the quantitative and qualitative analyses conducted.

This report is part of a series of publications by PwC and Strategy&, PwC's strategy consulting business, about energy transformation. We began our assessment with *The road ahead: Gaining momentum from energy transformation,* which discussed the various market and business models that could emerge. *Customer engagement in an era of energy transformation* examined how the energy ecosystem is evolving and the implications for customer strategy. *Capturing value from disruption: Technology and innovation in an era of transformation* looked at scenarios that could arise from technology evolution and specific technology attractiveness, sketched out how five possible future scenarios could unfold, and defined what it will take to win in tomorrow's markets.

This report looks into how the largest players in the sector are responding to the challenges we identified in our previous reports. These strategies indicate that utilities around the globe are extending the parameters of their business into natural adjacencies. The analysis suggests that future strategies will continue to expand as utilities prepare for a more complex and less predictable energy marketplace.

This marketplace will become increasingly contestable, both for new entrants — either those that are crossing over from adjacent industries (such as telecom, or oil and gas) or startups disrupting incumbents — and for consumers as they seek more control over their energy consumption and move toward active market participation.

## Policy influences

Strategies in place today naturally follow country- or regional-level policies and are defined by political and regulatory aims. These externalities have a significant influence on the strategies the GT40 utilities have adopted.

These externalities typically take the form of major policy shifts, e.g., toward controlling carbon emissions or increasing customer choice. In many cases, these shifts cause a sea change in industry structure, competitive philosophy, and financial outcomes. Although these strategy drivers differ by global region to reflect local circumstances, they have commonalities.

In Europe, the energy industry has generally operated under a policy regime that aims to address the energy trilemma of decarbonization, security, and affordability. Utilities' strategies are adapting to carbon emissions pricing, increasing interconnectivity among national markets, and securing new power supplies to replace aging or environmentally unfriendly sources. Many country-specific policy interventions are aggressive and result in a rapidly changing landscape, including the German nuclear phaseout and the adoption of an energy price cap for domestic retail customers in the U.K.

North American energy policy is in the midst of changing sentiment in a way that blends global and domestic perspectives — i.e., serving offshore supply markets while protecting domestic interests — with a clear focus on energy security and affordability. This has resulted in a focus on exploiting domestic resources, such as shale gas.

In parallel, active support remains for renewable energy sources in North America. But the support is led by states (or provinces), with California, New Jersey, and other states offering tax or other financial benefits and enacting renewable portfolio standards. Peer strategies, therefore, have to be sufficiently flexible to address both national and local objectives.

Across Asia-Pacific, policy is driving transition in developing countries such as China and India, which are simultaneously pursuing efforts to address rising pollution levels in cities and enable dramatic growth. The result is demand for liquefied natural gas (LNG) and investment in associated infrastructure alongside a rapidly increasing focus on renewable energy investment. In Australia, policy is concentrated on consumers and grid stability as the sector decarbonizes and continues to evolve.

# The Strategy Index

**Utilities employ a wide range of strategies to fulfill their growth, performance, and positioning goals, whether they are directed at global or local markets. The Strategy Index provides a view into how the GT40 utilities are shaping their strategies and approaches to ensure success in a market where the ultimate destination is still being mapped.**

Utilities around the globe employ targeted strategies designed to fit the needs of their current businesses as they migrate from today's market environment toward a future in which the market environment is robust and there are opportunities to create significant value. Each strategy reflects a specific set of conditions, perspectives, and actions about the future — such as global economics, market model, regulatory framework, technology innovation, customer preferences, and competitor encroachment — that relate to where and how a utility sees itself competing tomorrow.

Most utilities remain localized, focused on existing service territories. Others prioritize a broader presence across multiple territories, countries, or continents. This dichotomy in market presence can limit an executive team's perspective to a narrower view of strategy than is appropriate. Consequently, some utilities have little awareness or appreciation of the strategies of peers they don't regard as their neighbors or natural competitors. Creating a view into the strategic actions of the world's largest utilities provides insight into the paths chosen by peers and a glimpse of the art of the possible. It also provides a useful prism through which to compare and assess the relative speed of strategic shifts in response to market and policy changes across companies and economies.

### Peer group

The Strategy Index is a targeted study of the strategies employed by the world's 40 largest utilities. It provides both a snapshot of strategies currently adopted by the peer group and a baseline from which to conduct ongoing comparison of strategy design and execution.

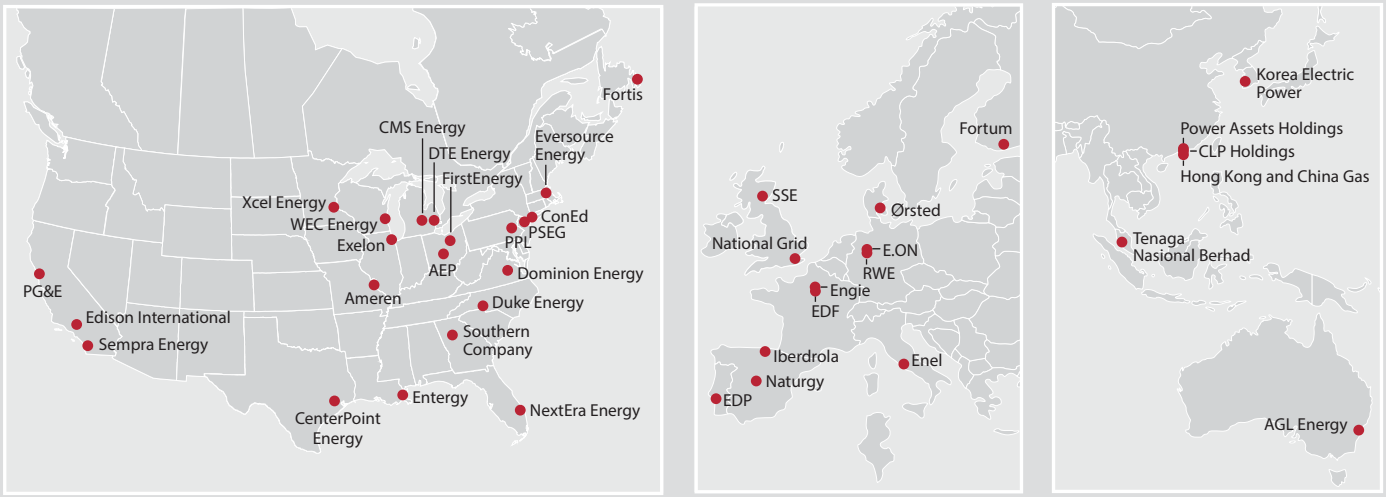
The GT40 utilities are in North America, Europe, and Asia-Pacific, but the reach of some of these peers extends across a much wider geographic footprint, covering both developed and developing areas (*see Exhibit 1, next page*).

Although a number of approaches are available to define a peer set, such as scale, reputation, or presence, we chose market capitalization as of December 2017. This metric indicates a scale range of US$12 billion to $73 billion for the peer group and reflects a similar relative ranking of the GT40 that is generally consistent with other measures of scale (*see Exhibit 2, page 6*).

This attribute provides an investor-driven view of how the nature of the assets owned and revenues captured by a utility are valued in the stock markets. We recognize that certain markets, or players from certain markets, are excluded, such as China, Russia, and the Middle East and Africa, owing to data or transparency limits, e.g., high levels of state ownership.

**EXHIBIT 1**

## Global peer set




***North America*** ***Europe*** ***Asia-Pacific***

Note: Locations reflect company headquarters location.

Source: Company information

Some of the utilities in the aforementioned countries are among the largest in the world by assets, revenues, and customers. Although they are not included in this study, many of the conditions and market trends these utilities face will be similar over time — even though the starting point and degree and pace of change could differ significantly.

The focus on a GT40 peer set by market cap is a matter of convenience rather than bias. Globally, many different types of players exist — large and small; privately owned and publicly owned; integrated and unbundled; local, regional, national, and international. For the distribution segment alone, more than 7,000 entities exist in 175 countries.

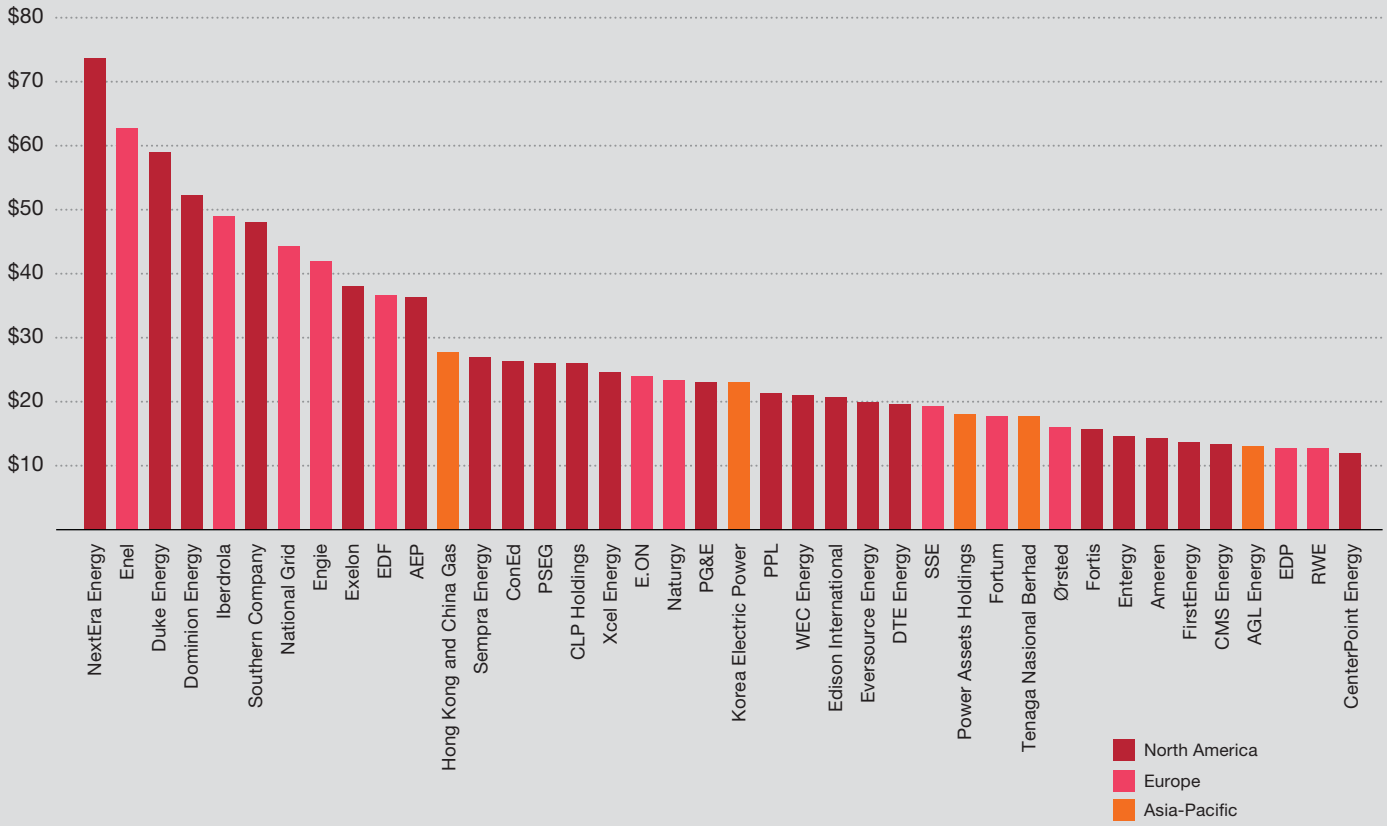
But neither size nor geography are constraints to a distinctive strategy. Constructing the GT40 reflects a desire to illustrate a broad and highly visible peer set across dimensions that apply in contested or traditional markets.

**EXHIBIT 2**

## GT40 market capitalization

**Market values of the members range from $12 billion to $73 billion**

In US$ billions




Note: End of 2017 market capitalization, before E.ON / RWE / Innogy asset swap

Sources: Bloomberg, PwC's Strategy&

> Creating a view into the strategic actions of the world's largest utilities provides insight into the paths chosen by peers and a glimpse of the art of the possible."

## Strategy assessment

The GT40 members vary widely. Some are fully integrated, some are unbundled into wires or pipes only, some have diversified into related sectors, and some operate on multiple continents. Diversity in value chain presence is increasingly common, particularly as utilities seek new growth avenues.

Five primary positioning elements guided the study and assessment. These elements capture both internal and external dimensions of utility strategies and outcomes. They reflect what utilities have emphasized in building current market positions and what they are pursuing to fortify or reposition themselves to differentiate themselves from the competition.

***Growth levers.*** Utilities have a wide range of options regarding where and how to grow. The levers employed must address the evolution of relevant markets and be in keeping with the organization's capabilities. An examination of the sustained investments companies make in their core business, as well as in emerging adjacencies, provides a view of how the GT40 companies are pursuing strategic positions.

***Financial capacity.*** A company cannot be strategically successful if it is not first financially successful. The ability to execute a strategy depends on the utility's financial fundamentals. Several metrics provide a glimpse into the financial positioning of the peer group and the level of financial performance.

***Organizational adaptability.*** Utilities adapt operating models and organizational structures to enable market participation. These models allow them to deploy resources effectively according to the chosen strategy. Key elements of GT40 models offer insights into how utility executives decide on and design company objectives.

***Innovation adoption.*** In the past, embedding innovation within the business has been a challenge for utilities. Some have focused on applied research and development activities, which differs from the intent of innovation today. Prior research often focused on technology evaluation and application rather than the development of innovation models that could create breakthrough strategies and new sources of value. Commitment to sustained innovation in multiple dimensions is an indicator of a utility's ability to pursue its strategies.

***Market resiliency.*** The number and significance of market uncertainties tax the ability of utilities to maintain strategic progress. These uncertainties can impede how utilities go to market. Flexibility is necessary to ensure stability and enable the execution of core business strategies.

## Sector engagement

In addition to the empirical and evaluative analyses of individual utilities in the GT40, direct interaction with utility company executive leadership gave us both broader and more targeted insights.

As mentioned earlier, two supplemental methods were used to capture specific sector or company insights: a survey of leaders and managers at more than 100 utilities covering almost 60 territories, and face-to-face interviews with several CEOs. The interviews — which spanned a cross-section of company types, geographic footprint, and overall company scale — focused on obtaining insights on future challenges and strategic responses.

The survey focused on gaining insights into factors influencing strategy design, organizational understanding of disruptive technologies, the “perishability” of windows of opportunity, priorities for company positioning, capabilities gaps in strategy readiness, partnering for strategy execution, and alignment of innovation with strategy.

## Study application

This study enhances executives’ understanding of the range of strategies in place. It also illustrates how peers are approaching strategy design and rationale for adoption. For utilities uncertain about the pace of change, the study describes the influence of utility sector transformation on the strategic landscape. For utilities struggling with decisions on whether to participate in emerging business areas, the study illuminates the breadth of options that their peers are pursuing.

The study is, however, a point-in-time view of the strategies of the largest utilities across the globe. Strategies are dynamic and evolving to meet the requirements of markets, customers, and policymakers. This point-in-time view provides a glimpse into the strategies that utilities think best fit today’s view of tomorrow’s needs.

Managements are still in the early days of understanding market shifts and crafting exactly how to position themselves in the future. Even with good intentions to design sustainable strategies, these utilities recognize that external drivers are causing continual reevaluation and refinement of business strategies.

The Strategy Index intends to evolve in future studies as the GT40 peers continually adjust their strategies to their market challenges. Assessing the nature and impact of these changes over time necessitates a starting point or baseline with which to gauge progress against current strategies, as well as shifts in direction or emphasis.

# Strategy in context

**Utilities find themselves buffeted by several concurrent factors that influence the nature and direction of responsive strategies. These factors reflect global shifts in societal and economic norms. Utility strategies are also influenced by stakeholders such as boards, investors, customers, policymakers, and competitors.**

Strategy is a response to the environment in which a company operates and a by-product of the challenges and opportunities it faces. It is important to understand the influences that shape strategy design and motivate utilities to craft strategies that take advantage of market trends, shifts, and constraints.

For several years, *transformation* has been a byword influencing utilities and other sector entities as they rethink their future strategies. The imperative of transformation creates a fundamental shift in the global utilities sector's dynamics and opens new business opportunities that expand the role of utilities and their value to customers.

In the global utilities sector, one can see what peers are doing to position themselves in the marketplace by looking at several major influences on strategy development: boards of directors' interests, market sentiments, customer behaviors, and competitor pressures.

### Board interests

Board directors typically represent leadership across a broad set of industries, companies, and other entities. They know what it takes to keep their organization successfully positioned where they compete. And they know that strategies are temporal and can easily be replicated by competitors if not distinctive and well-designed.

In today's market environment, utilities' board directors are engaging executive teams on responding to public policy, regulatory mandates, disruptive technology, slow growth in consumption, and nontraditional entrants, among other areas that affect strategy development.

Directors are challenging executive teams on how the strategies they are devising address market direction, growth potential, infrastructure modernization, and business models. The directors' role is fundamental in establishing appropriate context for the boundaries, priorities, and efficacy of strategy design.

Directors seek to ensure that utilities direct sufficient executive leadership attention to thoughtful dialogue that leads to effective and sustainable strategies. They are less interested in the elegance of the strategy and more in the rationale and outcomes, i.e., growth objectives, market position, platform sustainability, and financial integrity.

### Market sentiments

The considerations that board directors address are similar to those the investment community — analysts, ratings agencies, and investors — finds important. These groups focus on strategy relevance, rationale, priorities, and coherence as they formulate their own perspectives on the quality of the strategy.

The investment community looks for answers to two primary questions about the strategy. First, is it differentiated? And second, is it sustainable?

Investors and analysts are aware of the strategies of multiple utilities — more so than utilities themselves — and need to dissect these strategies to understand consistency or uniqueness. They understand that industry strategies can appear similar, with little daylight between them.

Utilities need to be able to communicate that their strategies are not perishable, that they can sustain themselves beyond the near term. The investment community knows that strategies are designed to meet currently anticipated requirements in the future. It also recognizes that industry unpredictability is high and strategies regularly come under stress.

Detecting differentiation among utility strategies is difficult when industry trends tend to obscure unique actions. Determining whether strategies are sustainable requires even greater acuity on the part of investors. Challenges from investors or analysts cause utilities to continually sharpen their strategies so that they can realize a premium for the quality they create.

## Customer behaviors

The emergence of disruptive technologies captures market attention and fuels heightened expectations for dramatic changes in supply, grid, and network delivery. However, less attention is given to how these new technologies can affect the customer's energy options and patterns.

Utilities customers have been slow adopters. But behaviors are changing as they recognize new ways to think about the factors that drive energy consumption, such as choice, control, comfort, convenience, and communication. These behaviors are enabled by the greater availability of information about supply, equipment, and energy management options.

Generationally driven behavioral shifts signal that customers are more demanding in their preferences and expectations than they were in the past. Customers are learning how emerging technologies are creating new choices and opportunities for facility management, equipment monitoring, consumption control, sustainability, billing simplicity, and, ultimately, overall energy cost control.

Utility strategies need to respond to this increased level of customer awareness and expectations by developing offerings and advancing goals relating to the environment, costs, flexibility, and simplicity. Strategies need to embrace a move from passive interaction to responsive engagement that anticipates rather than reacts to customer needs.

## Competitor pressures

The nexus of disruptive technologies and changing customer behaviors creates an opportunity for nontraditional entrants to the utility marketplace to displace incumbents.

Whether they are technology original equipment manufacturers (OEMs), software developers, solutions providers, platform companies, or players from adjacent markets that incorporate energy into their market proposition, these competitors recognize that fundamental changes to markets open doors to opportunities at the expense of incumbents.

Technology OEMs are well placed to compete because they produce assets or equipment that customers seek to install. Software developers are well positioned because they offer an expertise-based product that utilities can't replicate. Solutions providers fill the gap between technology and software and act as integrators and optimizers.

Platform companies, such as the FAANGs — Facebook, Apple, Amazon, Netflix, and Google — have taken positions in energy markets and have built capabilities in energy procurement and trading. They clearly have customer innovation capabilities of the highest order. And players from adjacent markets, such as communications providers, infotainment vendors, oil companies, and electric vehicle manufacturers can easily integrate energy as part of a larger customer value proposition.

Building thoughtful strategies to preserve and extend a utility's competitive position requires consideration of how competitors view future utility markets for penetration. And it necessitates understanding how nontraditional competitors approach competing in contested or emergent markets.

An appreciation for the dichotomy in utility perspectives on the pace of market engagement underlies strategy design and execution. Utilities tend to think about action and commercialization in three- to five-year windows, whereas industrial and consumer companies think about one- to two-year horizons as a maximum.

With customers thinking in terms of now, not tomorrow, strategy development needs to emphasize near-term readiness and offerings over long-term preparation and piloting.

The above influences on strategy design suggest that multiple drivers shape the contours of a strategy. Context for strategy development emanates from each influence separately and from the confluence of many factors.

“With customers thinking in terms of now, not tomorrow, strategy development needs to emphasize near-term readiness and offerings over long-term preparation and piloting.”

# Strategy elements

**Utilities articulate their strategies in a way that makes it clear where and how they intend to focus their market and internal efforts. The strategies reflect priorities for the business and the integration of the elements that enable successful market positioning. They define the specific actions needed to design and implement the strategy successfully.**

The optimal model for strategy design and execution is not externally derived and portable across utilities. Rather, the optimal strategy model is tailored to fit the philosophies of the executive leadership team, the aptitude of the organization, and the personality of the utility. In short, it is unique and forged in the DNA of the business.

A utility's strategy targets multiple audiences: investors, rating agencies, regulators, customers, employees, suppliers, and the broad public. Its messaging is intended to communicate direction and priorities, fortify market perceptions, galvanize internal resources, and signal intentions to customers.

These strategies shape investments, commitments, and actions over multiple years and leverage several building blocks in their development and design, particularly the value chain, growth options, and business models.

### Value chain presence

Strategy design starts with understanding the context in which the business operates and how it may be impacted by trends and challenges. This context is overlaid against the existing composition and structure of the business — i.e., the current value chain position.

A value chain is an end-to-end depiction of the components of the utility business from fuels and supply through retail commodity and services. Although prior restructuring left some utilities fully integrated, others have devolved into targeted businesses, e.g., supply, pipes and wires, or supply with retail (*see Exhibit 3, next page*).

Utilities have evolved to these value chain positions as a result of public policy decisions, executive leadership evaluation of competitiveness, and market recognition of relative competencies.

Three fundamental value chain segments illustrate how the utilities industry has evolved to enable integration of natural business activities: upstream, midstream, and downstream.

The upstream segment consists of activities related to the initial provision of energy and includes fuel supply, generation, marketing, and trading. This segment reflects a role focused on conversion of fuel sources into outputs and engagement with markets where energy can be sold, contracted, or traded. Utilities that participate solely in this segment constitute narrow businesses that operate in a commodity-driven market with unique competitive conditions.

The midstream segment starts with the transfer of supply output to the grid and network, but also includes supply-related sources that are decentralized or distributed. This is the broadest segment in the value chain and the most highly valued from end to end. Most utilities

**EXHIBIT 3**

## GT40 value chain presence

| | Fuel supply | Core generation | Marketing and trading | Electric transmission | Gas transmission | Gas storage/LNG | Distributed generation | Distribution network | Customer experience | Energy services | Retail services |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***North America*** | | | | | | | | | | | |
| Eversource Energy | | | | ● | | | ● | ● | ● | | |
| FirstEnergy | | ● | ● | ● | | | | ● | ● | | ● |
| Dominion Energy | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| DTE Energy | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ● |
| PG&E | | | | ● | | | ● | ● | ● | | |
| Entergy | | ● | ● | ● | | | | ● | ● | ● | |
| Ameren | | ● | | ● | | ● | | ● | ● | | |
| Edison International | | | | ● | | | ● | ● | ● | ● | |
| Sempra Energy | | ● | ● | ● | ● | ● | ● | ● | ● | | |
| WEC Energy | | ● | | ● | ● | ● | | ● | ● | | |
| Xcel Energy | ● | ● | | ● | ● | ● | ● | ● | ● | | |
| CenterPoint Energy | | ● | | ● | ● | ● | | ● | ● | ● | ● |
| Southern Company | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Exelon | | ● | ● | ● | | | ● | ● | ● | ● | ● |
| AEP | | ● | ● | ● | | | ● | ● | ● | ● | ● |
| Duke Energy | | ● | | ● | ● | ● | ● | ● | ● | | |
| PPL | | ● | | ● | | | ● | ● | ● | | |
| PSEG | | ● | ● | ● | | ● | ● | ● | ● | | ● |
| ConEdison | | | ● | ● | ● | ● | ● | ● | ● | ● | |
| NextEra Energy | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● |
| CMS Energy | | ● | ● | ● | | | ● | ● | ● | | |
| Fortis | | ● | | ● | ● | ● | | ● | ● | ● | |
| ***Europe*** | | | | | | | | | | | |
| SSE | | ● | ● | | | ● | ● | ● | ● | ● | ● |
| National Grid | | | | ● | ● | | ● | ● | ● | ● | |
| Ørsted | | ● | ● | | | | ● | | ● | | ● |
| Engie | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| EDF | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● |
| Fortum | | ● | ● | ● | | | ● | ● | ● | ● | ● |
| Enel | ● | ● | ● | ● | | | ● | ● | ● | ● | ● |
| EDP | | ● | | ● | | | ● | ● | ● | ● | ● |
| RWE | ● | ● | ● | | | ● | ● | ● | ● | ● | ● |
| E.ON | | ● | ● | | | ● | ● | ● | ● | ● | ● |
| Iberdrola | | ● | ● | ● | | | ● | ● | ● | ● | ● |
| Naturgy | ● | | | | ● | ● | | ● | ● | | ● |
| ***Asia-Pacific*** | | | | | | | | | | | |
| Tenaga Nasional | ● | ● | | ● | | | ● | ● | ● | ● | ● |
| Korea Electric Power | | ● | ● | ● | | | | ● | ● | ● | ● |
| CLP Holdings | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● |
| Power Assets Holdings | | ● | | ● | ● | ● | ● | ● | ● | | |
| Hong Kong and China Gas | | ● | | ● | ● | ● | ● | ● | ● | ● | ● |
| AGL Energy | | ● | ● | | | ● | ● | | ● | ● | ● |

Source: PwC's Strategy&

maintain a presence in this segment because it reflects a natural monopoly in activities such as transmission and distribution, which typically feature long-term, stable cash flows. However, it also includes activities, such as distributed energy resources, that bridge the upstream and midstream segments with characteristics and use cases that relate to both.

The final segment is downstream, which includes customer-facing activities such as contact centers, commodity supply, and product and service offerings. This segment commands substantial interest from utilities because it is where direct customer engagement occurs. This segment is also where utilities can participate in the market as either regulated or nonregulated companies. Although this segment has historically focused on commodity sales, it has now turned to broader products and services that meet customer-specific needs.

The GT40 utilities extend across the value chain. Many remain integrated, and others reflect prior functional unbundling and focus on the grid or network. A growing few are beginning to emphasize downstream activities that enhance the ability to expand products and services and increase value to the customer.

## Growth options

For utilities seeking to devise growth strategies, the options can be broad, depending on their positioning objectives and risk tolerance. Growth strategies typically follow four waves of activity over time (*see Exhibit 4, next page*). A useful framework to assess potential growth paths aligns available options across primary paths. This type of model facilitates evaluation across types of complementary choices.

Four strategic choices are inherent in a growth options model: expand, enhance, extend, or exit. The underlying business strategy could reflect one or all of these choices, taking into consideration the business's starting point, external challenges, and management's aspirations.

***Expand the business.*** The simplest path to growing a utilities business is to pursue the organic path and build out the current business. Creating new sources of load through technologies that appeal to customers, e.g., electric vehicles, is fundamental to growth and does not need to sacrifice energy efficiency.

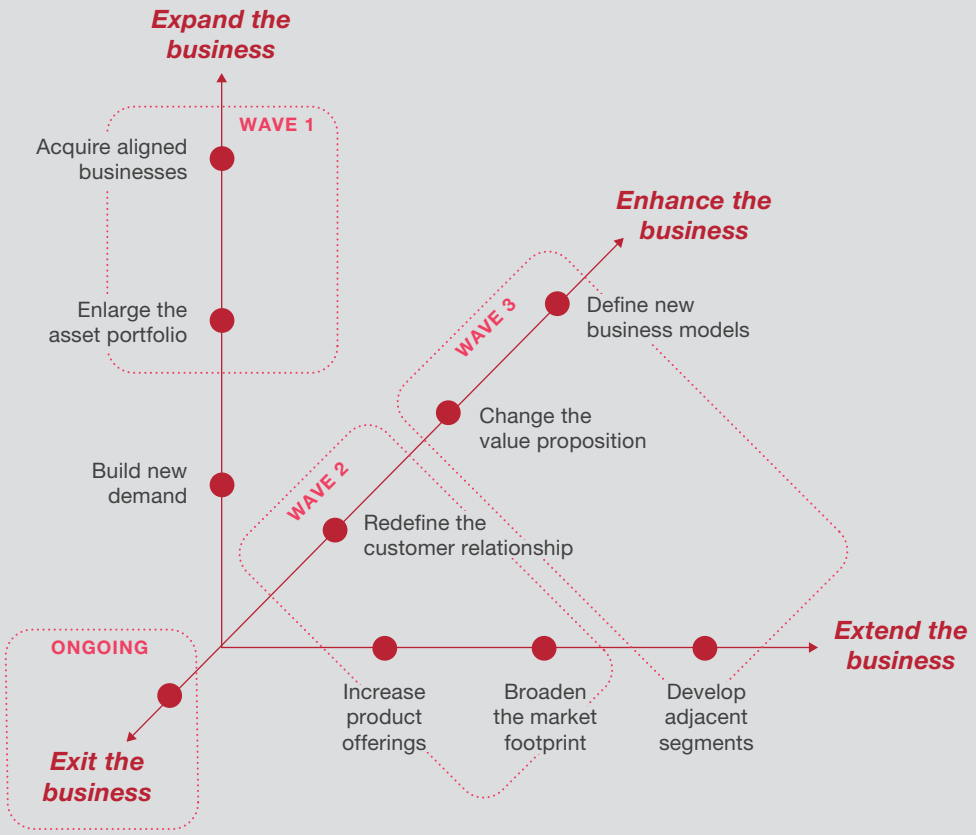
Investing in assets — existing or new — emphasizes the core business and minimizes risk associated with unfamiliar areas. Seeking options to scale up the business through inorganic actions, e.g., equity investment, enables utilities to grow from the core with which they are most familiar.

***Enhance the business.*** To complement natural business growth, utilities need to focus on improving their go-to-market models. Building or reinforcing the customer relationship through a better experience is a clear pathway to revenue preservation and growth.

An improved customer position allows utilities to rethink how value is created and delivered through engagement, e.g., simplification, or offerings, e.g., products and services bundling. Coherent approaches to market participation and commercialization require that utilities think differently about their portfolio, penetration, and margins.

**EXHIBIT 4**

**Strategic options for growth**




Source: PwC's Strategy&

***Extend the business.*** Building and improving the core business do not address all of the growth choices that utilities have; composition of the business portfolio is also important. Utilities need to reshape how customers see their role as the incumbent energy provider and give them more reasons to engage in broader offering areas.

A broader portfolio also allows utilities to refine the traditional customer base geographically or competitively. Core business parameters can be extended into related businesses that further enhance customer value, e.g., energy services. These choices create a services or solutions portfolio to open up new margin sources.

***Exit the business.*** When certain businesses or assets no longer fit the strategy or perform at desired levels, monetization may be the right move. This path recognizes that a better purpose for capital allocation can be served by rationalizing what utilities do or own that a different owner could manage or operate more capably, e.g., types of assets.

GT40 peers are taking advantage of many of these growth options. Specific purpose underlies these actions, but all of them reflect strategies intended to build scale, deliver more to customers, and create new margin streams.

Since these growth paths reflect options, they also inherently reflect how utilities think and act on them. Utilities can pursue all paths simultaneously. But more frequently they select a path to follow first and then take advantage of additional opportunities in waves as they gain experience and opportunities become clearer.

## Business models

The strategic paths utilities elect to follow establish the competitive model for the business. This then requires a choice of a commercial approach to the market, i.e., a business model, which is the linking mechanism between a strategy and its economic outcomes.

Business models are a form of art, since no true blueprint exists for how to design, construct, or execute them. The business model establishes the basis for how an entity will compete once it defines where it chooses to participate, and involves where to play, how to play, and how to win.

These key positioning elements frame the market responses related to the roles a utility could perform, the portfolio composition to align, the capabilities to leverage, the partners to engage, the market channels to adopt, and the profit models to employ.

The utilities sector has little experience with nontraditional business models and has employed simple models — e.g., integrated and regulated, or separate and nonregulated, depending on the value chain segment. No need existed to refine these models in order to address non-uniform emerging markets or unbundling of roles and offerings. “Fortis does not seek exemptions from regulation but does seek to control its own destiny. Our approach is to work collaboratively with regulators for the benefit of customers, to honor the process, and to be transparent,” said Barry Perry, chief executive officer of Fortis.

Business models are a form of art, since no true blueprint exists for how to design, construct, or execute them.”

Nonetheless, utilities have conceived and adopted different business models to drive participation along the value chain and within discrete segments or activities. However, these business models typically have been traditionally role-based, e.g., an asset owner, or broadly defined, e.g., a pipes and wires company.

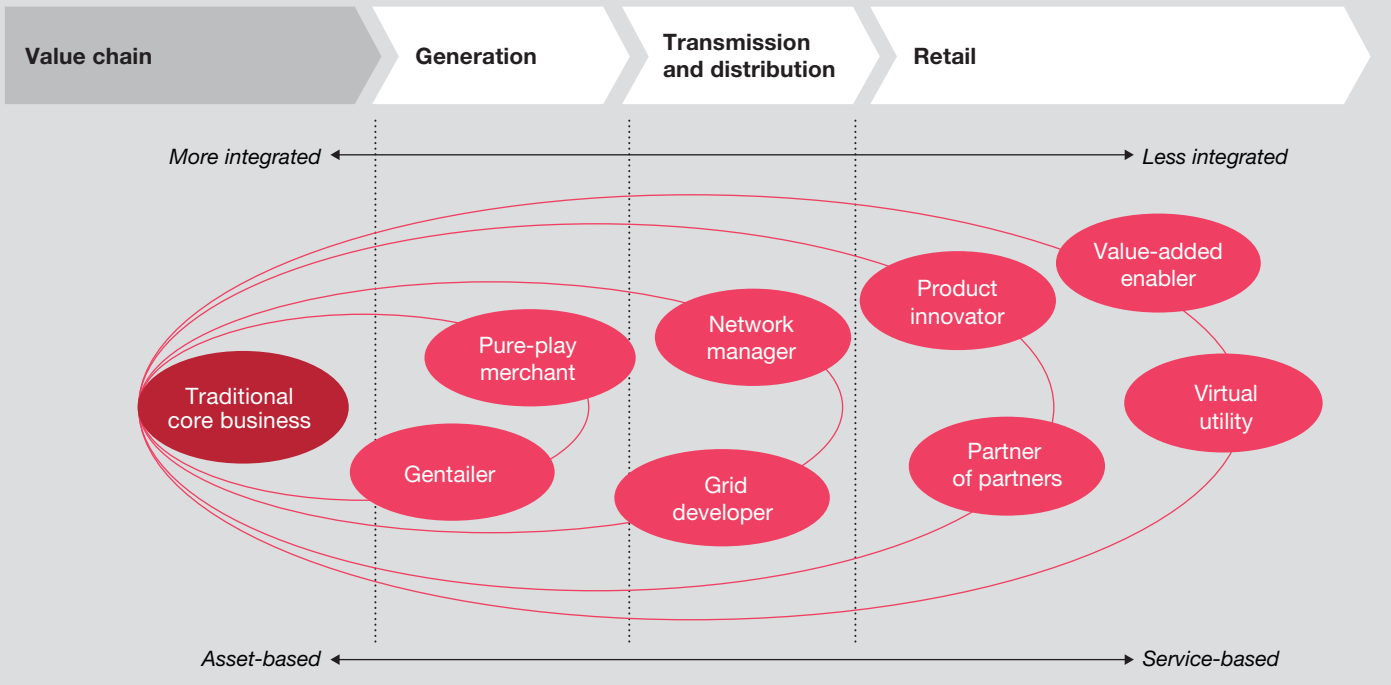
Business model redesign is accelerating with the increasing speed of energy technology advancement and the introduction of nontraditional competitors into the sector around the globe. The range of potential business models offers an expanded view of the nature of future utilities roles, and challenges conventional norms for value chain participation. At least eight models could emerge, although not all apply to traditional utilities (*see Exhibit 5*).

A single business model is not likely to be sufficient to succeed in future markets. It is more likely that utilities will maintain multiple business models tailored to the needs of where they elect to compete.

Accordingly, utilities will need to be adept in managing across multiple value chain segments, each of which could adopt one or more business models to meet discrete market requirements.

**EXHIBIT 5**

**Business model choices**




Source: PwC's Strategy&

## The eight types of business models

***"Gentailer."*** A gentailer operates at both ends of the value chain by owning generation assets and selling retail energy to customers in a competitive market. The gentailer model provides a natural hedge for the business, i.e., a sink for capacity when the generator is long and a source for the retail business when it is short.

***Pure-play merchant.*** A pure-play merchant owns and operates generation assets and sells power into competitive wholesale markets at market clearing prices or under negotiated bilateral contracts. Merchants traditionally leverage gas plants on the margin, although wind and solar plants have increased in popularity.

***Grid developer.*** Utilities in this model acquire, develop, construct, own, and maintain transmission assets that connect decentralized generators to local distribution system operators. Grid developers constantly assess the system's ability to meet current and future needs and seek new asset and asset renewal opportunities.

***Network manager.*** The network manager operates distribution assets and provides access to its networks to generators, interconnectors, and retail service providers. A potential new role could be platform optimizer, providing data and services such as the integration of distributed energy resources.

***Product innovator.*** A product innovator offers electricity and gas, as well as behind-the-meter products, and expands the role of the incumbent. Behind-the-meter products could mix retail supply packages, such as green energy, with service and pricing packages for flexibility. This model could further evolve to smart devices, e.g., energy hubs.

***Partner of partners.*** The partner of partners utility offers products and energy services, such as life-cycle electric vehicle support and home-related convenience services. The utility could be the sole provider of these services, but they are more likely to gain customer acceptance when bundled in conjunction with branded providers.

***Value-added enabler.*** A utility that positions itself as a value-added enabler leverages its core capabilities, e.g., data collection and analytics, to enhance its role and value to the customer. The utility becomes a value-added energy manager given the knowledge it possesses and the customer's lack of expertise in core energy management activities.

***Virtual utility.*** A virtual utility aggregates the generation from various distributed systems and acts as the intermediary with energy markets. A virtual utility also acts as an integrator of nontraditional assets and services that third parties provide to customers, e.g., distributed energy resources outside its traditional service territory.

Business models are difficult to conceive, frame, and implement because they force utilities away from decades of operations through standard models. But design and adoption of new business models is fundamental to enabling traditional utilities to participate in emerging markets not encumbered by legacy constraints or norms.

GT40 utilities cannot look to their peers for new business model concepts and design; rather, they will need to scan the competitive marketplace for successful models and emerging ideas. The models of potential future competitors from outside the utilities sector are relevant and can illustrate how a disruptor will approach disintermediation.

Importantly, the business models adopted are more than a definition of role. They also help determine how the GT40 will actually make money, because pricing models will radically change. Tariffed prices will give way to value-based pricing, fees for service, asset charges, subscription fees, click-through payments, and performance pricing, among other models.

The elements of the strategy model described above link external market context to internal strategy design. These elements create an options framework in which GT40 utilities can understand choices and design responsive strategies to help them fulfill their growth and performance aspirations.

# GT40 positioning

**The global utilities sector has continued to expand its presence and financial scale through sustained capital investment and operating performance. The sector has capitalized on external megatrends driving the industry's direction, particularly technology advancement. This growth has led to broader growth opportunities and market participation to support future positioning.**

The energy sector is in a state of fundamental transition. Decarbonization, decentralization, and digitization are creating challenges for industry participants, including increased conventional production costs and future market uncertainty.

At the same time, opportunities are emerging. Regulated network activities are claiming an increasing level of investment as utilities rotate away from large-scale power supply and into network investment for modernization, which has inherently more stable revenues. "We have stopped thinking about growth investments that take more than three years to go live," said Francesco Starace, chief executive officer of Enel. "In light of the technological transformation, three years seemed to be a time length long enough to observe a drastic change in the surrounding circumstances."

A global increase in renewables commitment has provided a sustainable growth platform for the GT40 utilities, as subsidies reduce operating costs and low marginal costs improve margins.

New value pools are also emerging in areas such as energy management, home and building automation, e-mobility, and microscale energy solutions. These are increasingly behind the meter as customers take more control of their energy usage. Some of the GT40 have already placed large bets on the energy services market to create new revenue streams as customers seek expanded solutions to their energy challenges.

A snapshot of GT40 utilities strategies provides a glimpse into how the sector is performing and where and how these utilities have been positioning themselves for the future. More importantly, understanding the scope of activities these utilities have undertaken to date provides insight into what they may elect to pursue in the future.

"The energy sector is in a state of fundamental transition. Decarbonization, decentralization, and digitization are creating challenges for industry participants."

## Global presence

GT40 utilities have pursued geographic expansion, particularly those in Europe, where operations extend across multiple geographies. European GT40 utilities typically are active in six or more geographies. Engie, Naturgy Energy, and Enel SPA are by far the most geographically diversified players; each is active in more than 25 countries (*see Exhibit 6*).

Some of this country presence reflects nascent investment, such as for generation in small, developing countries. This presence also includes participation in adjacent energy sectors, such as LNG or gas pipelines.

## Relative scale

The GT40 represent a total market capitalization of $1.1 trillion, with 55 percent made up of North American utilities, 34 percent European utilities, and 11 percent Asia-Pacific utilities. Although the average European and North American utilities in the GT40 are similar in size in terms of market capitalization, their Asia-Pacific peers are smaller on average (*see Exhibit 7, next page*).

European utilities are significantly larger in terms of annual revenues because of customer scale. On average, European players have a turnover of $37 billion, compared with $13 billion in North America. The customer base is also typically much larger on average in Europe: about 20 million, compared with about 5 million in North America.

**EXHIBIT 6**

**GT40 global presence**

1 — 2 — 6 — 11 — 25 — 51+

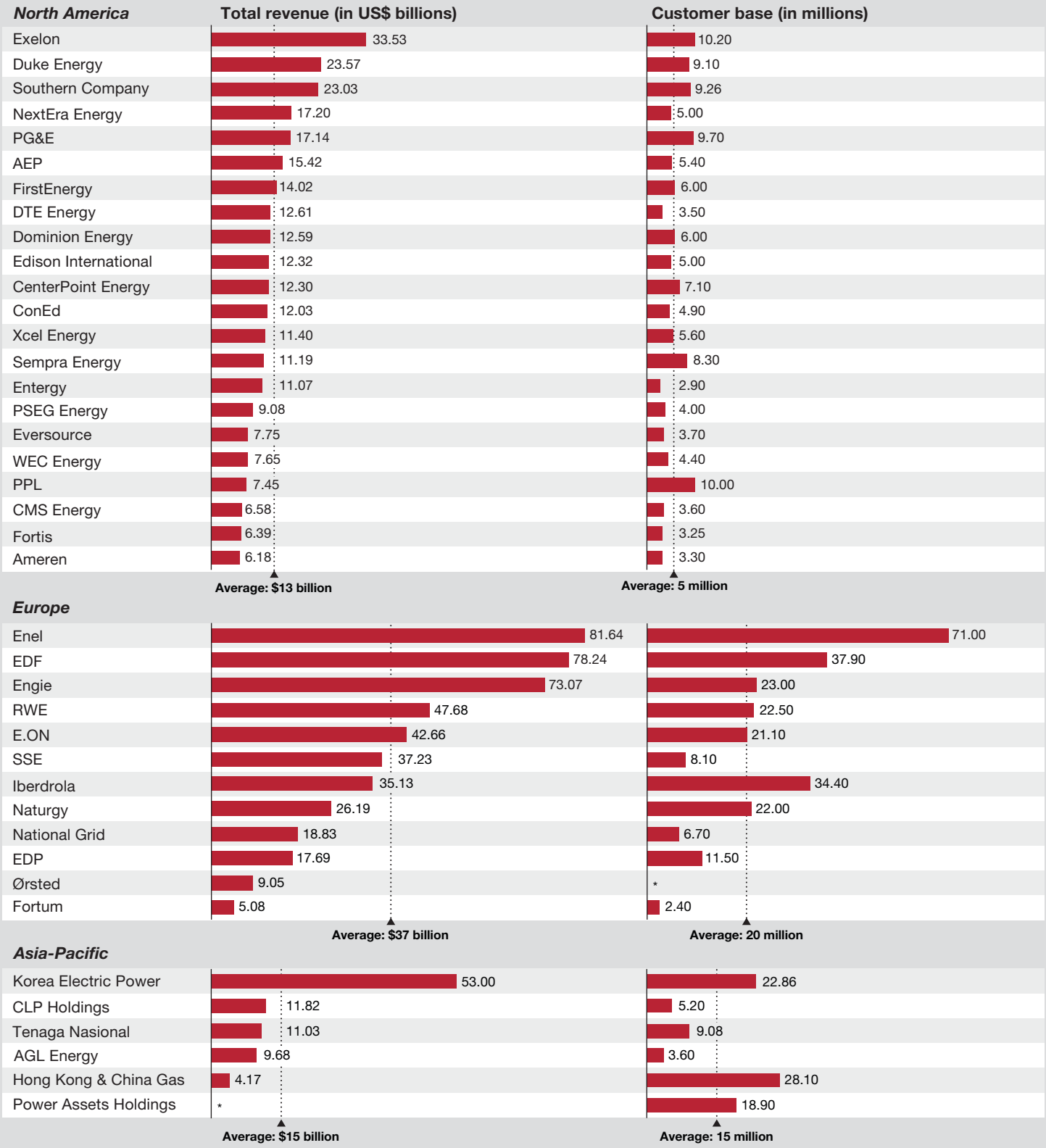
| In 1 market | | In 2–5 markets | In 6–10 markets | In 11–24 markets | In 25–50 markets | In 51+ markets |
|---|---|---|---|---|---|---|
| AEP | Entergy | Fortis | CLP | EDF | Enel | Engie |
| AGL Energy | Eversource | Hong Kong and China Gas | E.ON | EDP | Naturgy | |
| Ameren | Exelon | National Grid | Iberdrola | Fortum | | |
| CenterPoint | FirstEnergy | PPL | Power Assets | KEPCO | | |
| CMS | NextEra | SSE | RWE | Ørsted | | |
| ConEdison | PG&E | | Tenaga | | | |
| Dominion | PSEG | | | | | |
| DTE | Sempra | | | | | |
| Duke | Southern | | | | | |
| Edison International | WEC | | | | | |
| | Xcel | | | | | |

Note: Number of markets indicates publicly advertised activity in the market.

Source: Company information

**EXHIBIT 7**

## GT40 peer scale




Notes: Data as of Q2 2018; revenues include fuel and purchased power due to global region reporting inconsistency.

*Ørsted customers reflect a small number of large B2B customers; Power Assets Holdings business investments not reflected as revenues.

Sources: Capital IQ, company information, PwC's Strategy&

In Asia-Pacific, turnover is similar to that in North America, but Korea Electric Power Corp. (KEPCO) skews the comparison with turnover of $53 billion. The average customer base — about 15 million — is smaller than in Europe and larger than in North America, but is skewed by Hong Kong and China Gas, which has about 28 million, and KEPCO, which has about 23 million. These companies are increasingly focusing growth on China, the Middle East and North Africa, and Southeast Asia, and they are growing rapidly.

Many vertically integrated utilities have long been active in mergers and acquisitions in order to maintain and grow their customer base. And other leading players are building scale and enabling efficiencies through investment, automation, and digitization.

The customer base has grown in all GT40 regions, doing so at a compound annual growth rate (CAGR) of 3 percent per year in Europe and North America and of 6 percent in Asia-Pacific. European utilities have built on their existing scale, with average customer growth of 2 million in the five years since 2013, largely from M&A.

The largest European organic and inorganic additions were achieved by Iberdrola, with 6 million customers and National Grid, with about 3 million. In North America, Southern Company added about 5 million customers, and Exelon and WEC Energy Group about 2 million each since 2013. In Asia-Pacific, Power Assets Holdings added about 4 million customers.

## Market archetypes

GT40 utilities traditionally have been active across the entire value chain, from conventional generation through transmission, distribution, and retail. Full vertical integration contributed to significant scale and control of power markets within their territories. And some, including Dominion Energy, DTE Energy, Sempra Energy, and Engie, conduct business in adjacent energy sectors such as oil and gas.

As the utilities sector has evolved through a combination of increasing deregulation, decreasing individual asset scale, growing competition, and the growth of intermittent resources, the need for and value of full vertical integration has become less apparent.

Some GT40 utilities have reorganized or are reorganizing themselves around specific value chain segments, and in some cases specific generation technologies, i.e., renewable versus conventional. These utilities seek business model clarity and more certain returns.

Where full vertical integration and scale can offer market benefits, a more focused value chain positioning allows utilities to build and optimize a smaller set of key capabilities, value propositions, and cost positions.

Many of the GT40 remain vertically integrated, particularly in North America and Asia-Pacific. More specific value chain focus has occurred in Europe with recent restructuring by RWE, E.ON, SSE, and Ørsted designed to realign their business models around specific market archetypes.

## Sector performance

The market capitalization of $1.1 trillion for the GT40 utilities has increased since 2010 at a CAGR of 3 percent.

The highest market value CAGR occurred in North America, where the largest utilities grew by more than 10 percent annually. Conversely, the market value of the GT40 European utilities declined on average by 1 percent per year since 2014 amid increasing costs for conventional power production and intensifying retail competition.

Market capitalization for the leading utilities in the U.S. is generally much higher today than for European and Asia-Pacific players because of generally larger asset bases (after some European utility restructuring), more stable market structures, constructive policies, and dividend payouts, all of which have driven stock prices and sector stability.

Major change and rapid transition in the European market appear to have damaged investor sentiment, resulting in poor share price performance and volatile market multiples over the past decade (*see Exhibit 8, next page*).

Price–earnings (P/E) ratios for GT40 utilities have not always paralleled local exchange levels, with diverse performance across the regions. The ratios for European utilities generally have increased since 2010, exceeding local exchange levels through 2017 and indicating an improved outlook, increased earnings, and market acceptance of strategic restructurings.

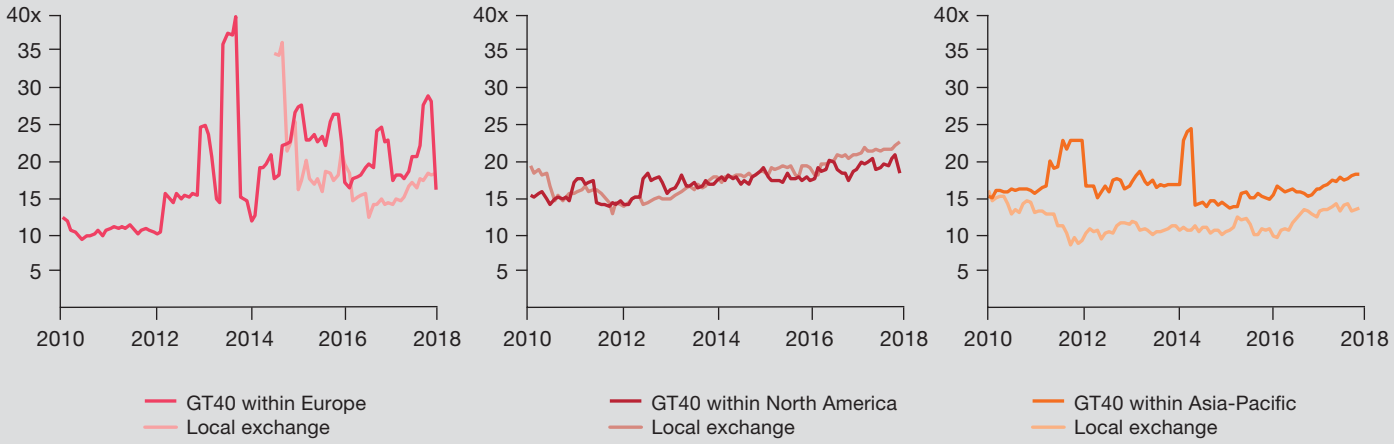
In North America, P/E ratios for GT40 utilities have increased, albeit at a slightly lower rate than the overall local exchange. In the period, these P/E ratios have been historically high but lower than the S&P 500, suggesting some concerns over the ability to sustain earnings levels and natural trade-out of investments with rising interest rates. Company P/E ratios in Asia-Pacific have consistently exceeded local exchange levels.

> “Some GT40 utilities have reorganized or are reorganizing themselves around specific value chain segments, and in some cases specific generation technologies. These utilities seek business model clarity and more certain returns.”

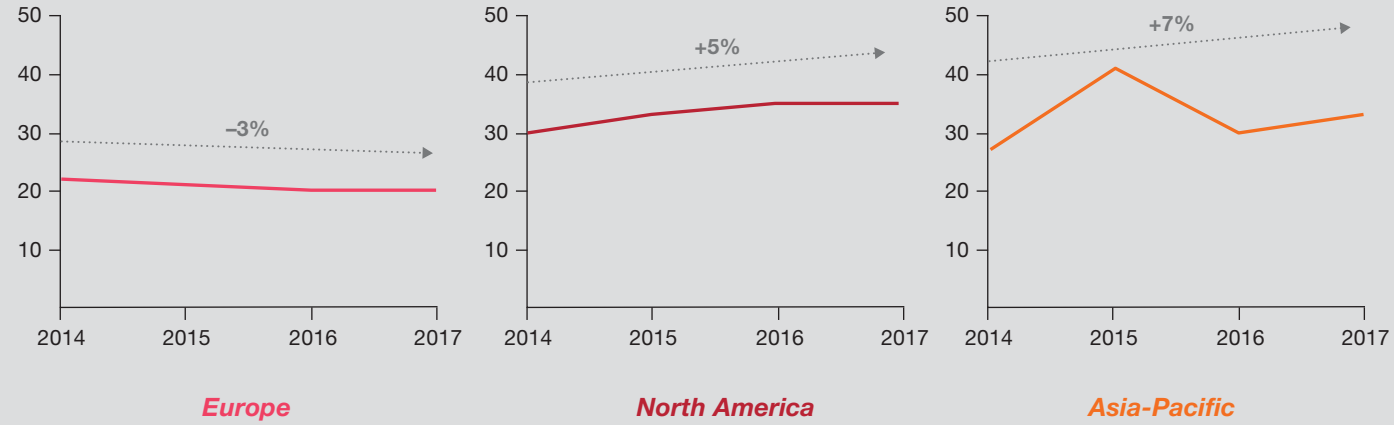
EXHIBIT 8

## Market and financial factors

***Relative P/E ratio***




***EBITDA margin over time****




*Overall change in aggregate EBITDA margin, 2014–17

Source: PwC's Strategy&

GT40 utilities generated annual revenues of $850 billion in 2017, a decline from $965 billion in 2014, which reflects highly stressed energy markets and restructuring. European utilities generate more than half of the GT40's total revenue. EDF, Engie, and Enel generate the largest annual revenue levels, with more than $70 billion each.

Since 2014, most leading European utilities have experienced revenue decline at a CAGR of –7 percent annually, primarily due to divestments and lower dispatch of conventional production capacity.

In North America, revenue has remained generally stable because of low price variability. Most leading North American utilities are seeing revenue growth because of sustained capital expenditures exceeding $100 billion for the past several years.

Revenues have risen across Asia-Pacific during the past five years, because of both expansion into new geographic markets and high levels of organic customer growth in this rapidly developing economic region.

North American and Asia-Pacific utilities appear to be more profitable, with average earnings before interest, taxes, depreciation, and amortization (EBITDA) margins of 35 percent and 32 percent, respectively, compared with about 20 percent for European players. Asia-Pacific rebounded well in 2016 from a major correction in 2015.

Low costs of capital in North America and Europe have encouraged increased lending and shifting capital structure ratios. Leverage ratios for North American GT40 utilities, in particular, have followed an upward trend as equity levels have increased slightly to recognize increased business risk and lower returns on equity. Several GT40 utilities have been able to work with their regulators to achieve a more balanced capital structure.

Leverage at leading European GT40 utilities is higher than at other regional peers, with equity ratios typically well lower in some countries because of asset write-downs. Asia-Pacific utilities, which often face higher capital costs, are less leveraged, with equity ratios substantially above those of other markets.

## Model shifts

The GT40 utilities have been making clear and tangible changes to manage risk, capture additional value, and modify their business models to position themselves for a more coherent future.

These actions address what they have identified as key decisions to date for market positioning. Five key trends related to GT40 utilities have been observed:

- Merchant market and upstream risk reduction
- Investment redirected to networks and renewables
- Entry into energy services
- Increased innovation capacity and capabilities
- Rationalization to support strategy adoption

***Merchant market and upstream risk reduction.*** The merchant power market has swung toward even more unpredictability, and future oil and gas commodity markets remain equally uncertain. This appears unlikely to stabilize soon. Consequently, GT40 utilities have sought to reduce their exposure to conventional power generation, particularly coal.

Five years ago, coal represented 47 percent of the utilities' power generation mix in North America, 37 percent in Asia-Pacific, and 18 percent in Europe. But government policies, alternative technologies, and life-cycle risks have caused a dramatic shift. In Europe, coal now represents only 12 percent of the generation mix. The trend in North America and Asia-Pacific has been less pronounced, declining to 41 percent and 35 percent, respectively.

North American GT40 utilities are expected to further shrink reliance on coal-fired generation. Most have already defined clear strategic ambitions to shift their generation mix away from coal technologies.

With less baseload production capacity left in the system and an unrelenting social disdain for heavy carbon emitters, some North American and Asia-Pacific utilities are turning to gas-fired production capacity as a bridge to the future while they also pursue large- and small-scale renewables development or acquisition.

The share of gas in the generation mix has increased from 15 percent to 20 percent in North America and from 31 percent to 39 percent in Asia-Pacific. In Europe, the share of gas power production has declined from 31 percent to 26 percent as government policies and improved performance of new technologies have combined to make gas less attractive than expected.

Some North American GT40 utilities expect to continue to build gas production capacity, at least in the short term. In Europe, RWE has announced capacity additions, but production from coal replacement is uncertain. Several utilities globally plan to use renewable sources entirely as soon as it is practical.

Renewables are making major inroads in the generation footprint at a global level. The International Energy Agency reported that global investment in renewable generation in 2017 was more than double the investment in fossil fuel generation — $303 billion versus $132 billion — with nuclear additions of $44 billion that same year.

GT40 utilities in all regions are expected to maintain much of their nuclear power generating capacity. But little growth will occur in North America or Europe. Non-GT40 Asia-Pacific utilities in China and Russia will see the largest additions of nuclear power. However, new local capacity build-out does not appear to be a high priority for GT40 Asia-Pacific utilities, although some companies are seeking to export their nuclear expertise as advisors, builders, or investors.

> "The GT40 utilities have been making clear and tangible changes to manage risk, capture additional value, and modify their business models to position themselves for a more coherent future."

Plant life extension programs are generally completed within North America, with new construction programs at risk and nuclear plant uprates used for new capacity. GT40 European and Asia-Pacific utilities are also less active in nuclear build-out amid societal concerns and phaseouts in some markets.

***Investment redirected to networks and renewables.*** As the GT40 utilities seek to reduce risk in their asset positions amid uncertain market conditions and declining revenues from power generation, investments in regulated networks and subsidy-protected renewables have gradually increased. In a number of markets, subsidies are no longer required.

GT40 utilities have been ratcheting up their investment in the network business, as well as the grid, in recent years. This increased investment reflects a shift away from capital-intensive fossil fuel generation projects and into alternatives that are less capital-intensive.

More importantly, this increased investment represents a pronounced change in utilities' capital destination priorities. The need for sustained spend for system resiliency, grid modernization, and distributed energy resources (DERs) is heavily influencing GT40 capital allocation priorities and resulting in high levels of recurring network capital deployment. Much of this increased investment is directed into smart technologies and digitization.

A growing share of GT40 capital spend is now allocated to grid and network activities in North America and Europe. In North America, this amounts to 78 percent of total capital expenditures, up from 72 percent in 2012. In Europe, transmission and distribution attracts 38 percent of total capital expenditures, up from 29 percent in 2012 (*see Exhibit 9, next page*).

Sustainable energy targets create attractive opportunities in renewable energy build-out, because they are often supported by subsidies and guaranteed revenues over the asset's operational lifetime. European utilities are far more active in renewables investment, deploying 30 percent of capital investment into renewables, compared with only 7 percent in North America.

Continued growth in renewables capacity is expected over the next five years. In Europe, leading utilities will add up to about 120 gigawatts of capacity, with almost 60 percent from renewables. Additions of five gigawatts or more are expected from EDF, Iberdrola, Naturgy, Ørsted, and others. Similar addition levels are expected in North America.

Asia-Pacific utilities have made it clear their future will rely on increased proportions of renewables. For example, AGL Energy has announced it will replace its coal-fired generation within two decades, and has already announced plans to replace an aging coal plant in 2022 with a hybrid facility comprising renewable and gas units, plus utility-scale battery storage.

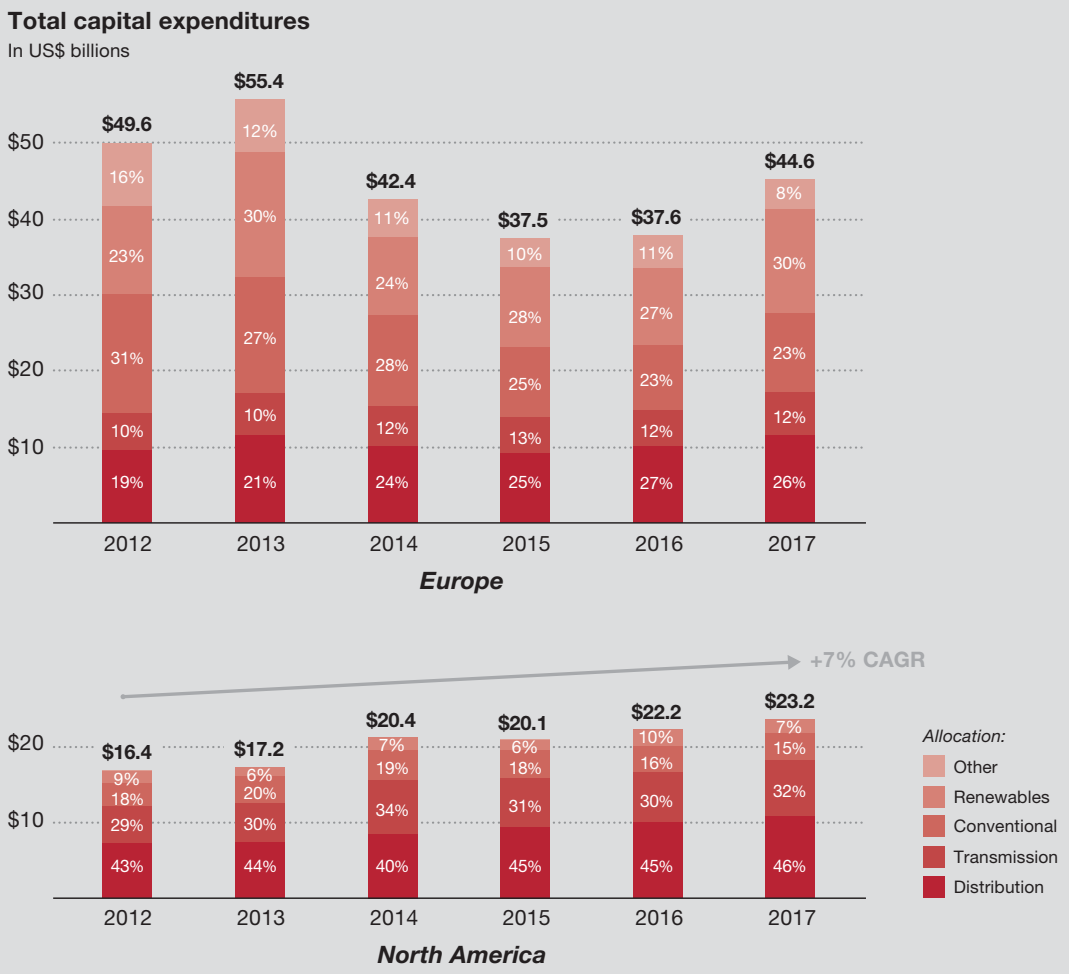
***Entry into energy services.*** Significant activity has occurred in the energy retail segment, with aggressive growth of new players entering the market, quickly building local customer portfolios, and slowly capturing share from incumbent utilities.

Across all regions, GT40 utilities are actively building out their go-to-market positions with behind-the-meter B2B and B2C products and services in an attempt to deliver growth in a stable market segment and improve customer stickiness.

Products and services typically extend across four value pools: DERs, e-mobility, smart home, and commercial and industrial energy services (CIES).

**EXHIBIT 9**

## Shifts in capital investment




Notes: Due to data limitations, this analysis contains an indicative sample of 17 companies from the GT40. (Consistent capital investment data for Asia-Pacific utilities is difficult to access.)
Not all percentages total 100 due to rounding.

Sources: Capital IQ, PwC's Strategy&

European utilities are well along in developing their market offerings, often through major investments in third-party acquisitions, including Engie's acquisition of EV-Box and Enel's acquisition of EnerNoc, both in 2017.

More than half of European GT40 utilities offer products and services across the defined value pools through owned businesses or as incumbent providers. The large number of capabilities-based acquisitions has enabled these European — and, to a lesser extent, North American — utilities to rapidly enter the market with a broader portfolio.

North American GT40 utilities with fully regulated customer bases face a different competitive dynamic than do European utilities and generally believe they have more time to prepare to offer value-adding products and services to meet competitors. “We believe CenterPoint Energy will lead the way by distinguishing ourselves among our peers through offerings and services that reinforce our reputation as a trusted energy delivery company and advisor to our customers,” said Scott Prochazka, president and chief executive officer of CenterPoint Energy.

Asia-Pacific has a similar tale of regulated and unregulated retail markets, although many are progressively deregulating, and doing so, on average, more quickly than in North America but slower than in Europe.

Behind-the-meter product and service offerings are typically less developed for leading U.S. utilities. Limited or moderate offerings of third-party products and services are more common for U.S. utilities with limited investment in acquisition or internal product development (*see Exhibit 10, next page*).

“North American GT40 utilities with fully regulated customer bases face a different competitive dynamic than do European utilities.”

***Increased innovation capacity and capabilities.*** Innovation has been a common strategic theme for most GT40 European utilities. Seven of the top 10 GT40 utilities most committed to innovation and R&D are European players, whereas North American utilities are still establishing their innovation capabilities (*see Exhibit 11, page 31*).

GT40 European utilities in particular clearly state their ambitions to be the recognized innovation leaders in the global energy sector and have ambitious investment plans and growth expectations. European utilities are active in establishing innovation labs, R&D centers, and startup incubators.

EDF has the strongest physical presence, with 10 regional innovation hubs, followed by Enel, Energias de Portugal, and E.ON with eight each, and RWE and Engie with five each. These innovation centers collectively address microgrids, smart cities, e-mobility, digitization, and batteries, among other specialized technologies and applications.

North American and Asia-Pacific players typically have a single dedicated innovation capability supporting business operations. Several utilities, such as Southern Company, Ameren, and Exelon, have stand-alone innovation centers or hubs to work with external solutions providers. As noted by Scott Prochazka, president and chief executive officer of CenterPoint Energy, “The company is aggressively working to embed a culture of innovation to expand and accelerate product development and enhance the value of the customer experience. It is enhancing its focus on high-quality execution and adopting a value-delivery mind-set related to the work performed and relationships maintained with customers.”

In Asia-Pacific, KEPCO has created an “Energy Valley” with a $1 billion investment, where it is expected that hundreds of energy innovators can collaborate. And CLP Holdings has a stated strategy of using its Energy Australia gentailer business as an innovation incubator for the company, a strategy that distinguishes it from the other members of the GT40.

EXHIBIT 10

## GT40 value chain presence

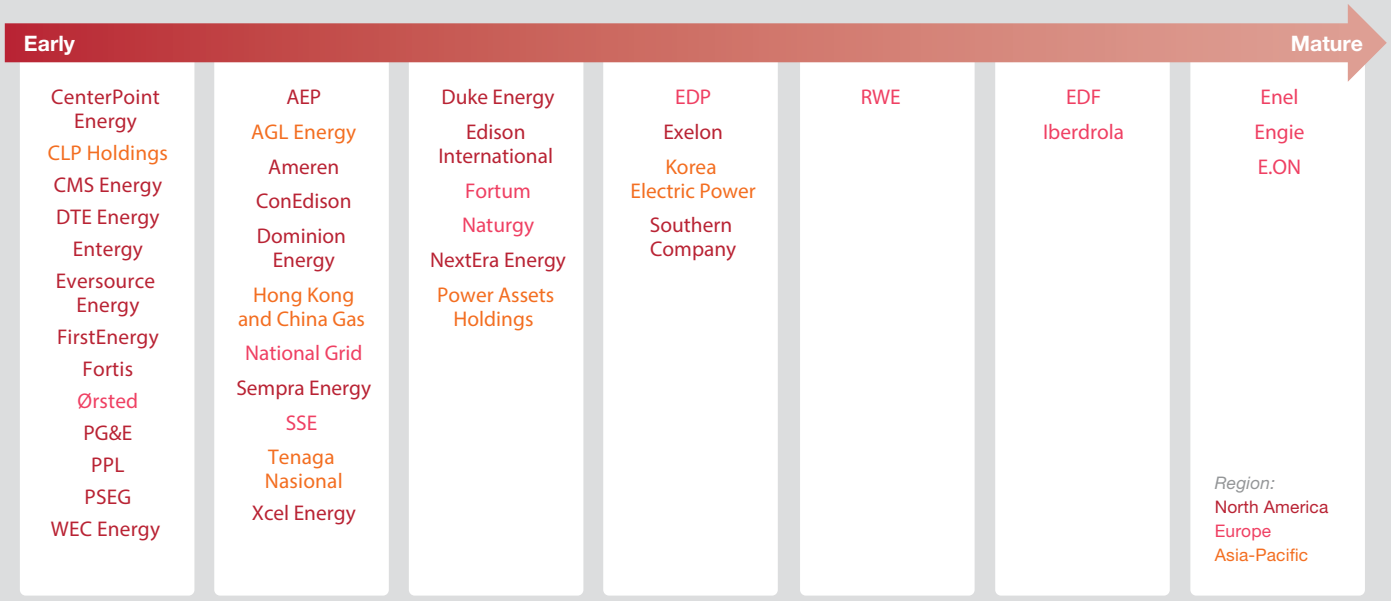
| *North America* | DER | E-mobility | Smart home | CIES |
|---|---|---|---|---|
| Ameren | ● | ● | ● | ● |
| AEP | ● | ● | ● | ● |
| CenterPoint Energy | ● | ● | ● | ● |
| CMS Energy | ● | ● | ● | ● |
| ConEdison | ● | ● | ● | ● |
| Dominion Energy | ● | ● | ● | ● |
| DTE Energy | ● | ● | ● | ● |
| Duke Energy | ● | ● | ● | ● |
| Edison International | ● | ● | ● | ● |
| Entergy | ● | ● | ● | ● |
| Eversource Energy | ● | ● | ● | ● |
| Exelon | ● | ● | ● | ● |
| FirstEnergy | ● | ● | ● | ● |
| Fortis | ● | ● | ● | ● |
| NextEra Energy | ● | ● | ● | ● |
| PG&E | ● | ● | ● | ● |
| PPL | ● | ● | ● | ● |
| PSEG | ● | ● | ● | ● |
| Sempra Energy | ● | ● | ● | ● |
| Southern Company | ● | ● | ● | ● |
| WEC Energy | ● | ● | ● | ● |
| Xcel Energy | ● | ● | ● | ● |
| ***Europe*** | | | | |
| RWE | ● | ● | ● | ● |
| E.ON | ● | ● | ● | ● |
| EDP | ● | ● | ● | ● |
| EDF | ● | ● | ● | ● |
| Enel | ● | ● | ● | ● |
| Engie | ● | ● | ● | ● |
| Fortum | ● | ● | ● | ● |
| Iberdrola | ● | ● | ● | ● |
| National Grid | ● | ● | ● | ● |
| Naturgy | ● | ● | ● | ● |
| Ørsted | ● | ● | ● | ● |
| SSE | ● | ● | ● | ● |
| ***Asia-Pacific*** | | | | |
| AGL Energy | ● | ● | ● | ● |
| CLP Holdings | ● | ● | ● | ● |
| Hong Kong and China Gas | ● | ● | ● | ● |
| Korea Electric Power | ● | ● | ● | ● |
| Power Assets Holdings | ● | ● | ● | ● |
| Tenaga Nasional | ● | ● | ● | ● |

● High activity ● Moderate activity ● Limited activity

Sources: Company information, PwC's Strategy&

**EXHIBIT 11**

**Innovation progress**




Note: Innovation score based on number of innovation hubs, R&D efforts, and presence in four innovation areas: DERs, e-mobility, smart home, and CIES

Sources: Company information, PwC's Strategy&

Although profitability from energy services remains unclear and questionable in the short term, these utilities expect to see slowly improving valuation multiples over time from the launch of their energy services and solutions entities.

In addition to energy services, GT40 utilities are responding to the market need for energy efficiency and developing CIES business models with a broad range of product and service offerings, including energy efficiency, asset management, and on-site generation. These offerings and capabilities will be complemented by acquisitions among the dozens of companies entering this space.

A number of North American utilities, including Southern Company and DTE Energy, have well-developed CIES offerings addressing customer needs such as energy management. In Europe, most utilities are still developing their CIES offerings, with some exceptions — for example, E.ON's Connecting Energies has a maturing offering.

***Rationalization to support strategy adoption.*** Aggressive business model restructuring has been essential in allowing several GT40 utilities in Europe to achieve strategic priorities and future-proof their market positions. Other global utilities have not been faced with similar strategic challenges and have not changed their business composition.

Business model restructuring has helped European GT40 utilities clarify their business purpose to generation, supply, or energy services and to develop differentiating capabilities.

European utilities have been more active in the past 24 months in repositioning their business models to reflect strategic challenges and position themselves for market opportunities, with several major restructuring programs in progress.

- **Germany: E.ON**'s and **RWE**'s asset swap transaction, agreed to in principle in 2018, has been perhaps the largest restructuring in the power sector this decade. As part of this transaction, E.ON would acquire RWE's grid and retail businesses in exchange for its renewable and other power generating assets.

  The transaction will allow both entities to build scale and focused capabilities in their specific areas, including energy services through E.ON Connecting Energies. This restructuring follows an earlier one that split E.ON's generation and network businesses.

- **United Kingdom: SSE** attempted to merge its retail division with npower (RWE) and spin it off as a separate entity. However, market conditions deteriorated in the U.K. because of the imposition of a tariff price cap and increasing competition from smaller independent players, and the restructuring was canceled.

  SSE continues to search for a home for its energy retail business and has engaged in further reorganization, including the divestment of its water business and a significant share of its telecom arm.

- **Italy: Enel-X** has been established as a global solutions entity to offer energy services in home, industrial, city, and e-mobility value pools across its customer base of about 70 million. This business unit operates as part of Enel's matrixed global business but maintains a distinctive market positioning across multiple business lines. It was created as an innovative, entrepreneurial organization to capture emerging opportunities in areas including energy services and customer solutions.

- **France: Engie**'s strategic focus on low-carbon activities, global networks, and client solutions is facilitated through its far-reaching $17 billion asset disposal program, which includes exploration and production activities and conventional coal-fired power plants. Engie is operating its multiple businesses and labs globally and aggressively seeking to enter technology-based markets in breakthrough ways.

- **Denmark: Ørsted** is undertaking an asset disposal program to focus its business activities on building a global portfolio of renewable generation capacity. In 2018, the company divested conventional generation assets and indicated plans to sell its Danish distribution and customer business to improve focus on growing the renewables business.

The paths and moves identified above indicate that a select number of strategic themes have emerged over the past several years, with some degree of commonality across the North America, Europe, and Asia-Pacific regions.

This snapshot of the GT40 reveals that the mix of capital investment has likely permanently shifted away from generation and into networks. Innovation is moving from concept to practice with dedicated centers or hubs, and energy services are quickly becoming a clear focus of most utilities.

# Strategy execution

**Utilities across the globe are at different stages of market action. But a number are starting to differentiate themselves. From redirected investment to breakthrough innovation, these utilities are positioning themselves to be very different entities in the future. Nontheless, creating a distinctive strategic market position takes time, and the industry is still early in its evolution.**

Utilities are immersed in strategy design for future market success while still defining the most appropriate paths to pursue. However, market direction is uncertain and requires a thoughtful view of how the future may evolve and utilities may thrive.

In a number of cases, customers are still not at the forefront of strategy design. Improvements in technology and responding to changes in government policy are still predominant strategic drivers for the GT40 utilities.

There are some notable exceptions in Europe, for E.ON, Engie, and Enel, and in Asia-Pacific for Tenaga Nasional Berhad in Malaysia and CLP Holdings and AGL Energy in Australia. Time will tell whether the strategic pivots and investments in these areas will pay dividends.

Five elements of how these utilities are seeking to position themselves to compete and win emerged from the GT40 study: differentiated strategy, inorganic growth, organization adaptability, innovation advancement, and business model agility. These elements address immediate needs and create differentiation in the market. Achieving market distinction offers the potential to convert early market positioning into discernible financial market recognition.

***Differentiated strategy.*** Utilities strategies across the industry often read very much alike, given the similarities of the integrated and segmented businesses. In the past, utilities generally tended to move at the same pace and in the same direction regarding strategy definition.

In today's environment, utilities must dispense with the historical slow-adopter norm because policy framing unfortunately often follows real market transformation, and technology availability outpaces actual company adoption.

Most utilities are leveraging several common strategies in their current plans, seeking to increase renewables generation, customer engagement, innovation, modernization, and resiliency. All of these are relevant, but none is truly distinctive.

Strategy separation among the GT40 utilities reflects management's foresight and an ability to act rapidly and aggressively. These strategies manifest in the range of businesses that utilities are entering, the expanding channels to market, and the willingness to be early adopters of emerging technologies.

These drivers have created a distinct movement and separation among utilities making up the GT40. Although the majority of global utilities retain an integrated model in the absence of policy-induced restructuring, many have chosen — or been forced — to select parts of the value chain for participation and emphasis.

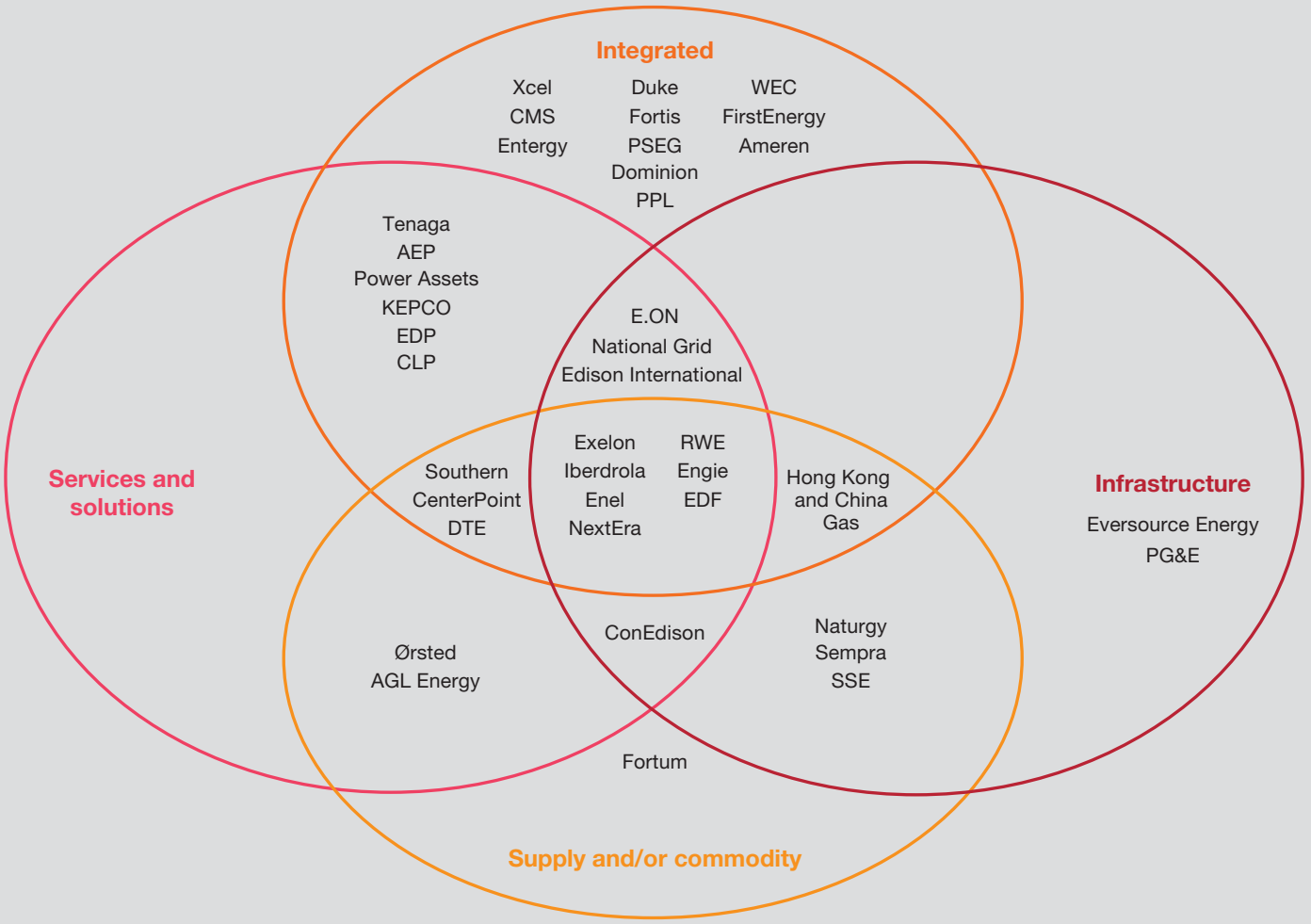
GT40 utility models now range from heritage integrated models to restructured infrastructure (grid and network) models to adjacent focus in either services and solutions or supply and commodity, or both (*see Exhibit 12*).

Thus far, several European utilities are outpacing their North American and Asia-Pacific peers. Iberdrola, EDF, and RWE are in the vanguard of aggressive entities seeking to reshape the utilities services marketplace and their unique position. They are thinking big and earmarking investment capital to jump-start market positioning.

These peers don't think of themselves as traditional utilities. Rather, they view themselves as energy services providers and customer partners with a broad portfolio of offerings. Each of these utilities views the market as global, rather than native, and as knowledge- and technology-based products or services, rather than energy commodities.

**EXHIBIT 12**

**Market positioning**




Source: PwC's Strategy&

Differentiation occurs in how these utilities segment the value chain into addressable elements such as backup supply, energy services, electric transportation, distributed energy services, and behind-the-meter offerings. The product and service portfolio is customer-back and informed by robust end-user research.

European utilities address customers globally, even as local market factors create a need for tailored delivery solutions. Consequently, they are becoming more innovative in product design and placement and more agile in shaping go-to-market strategies for development, origination, pricing, and channels.

North American utilities are also engaging in these markets, albeit more cautiously and narrowly than their global peers. Southern Company, Edison International, National Grid USA, and AEP are pursuing new energy services markets and enhancing their customer value. North American utilities such as Sempra Energy, Dominion Energy, DTE Energy, NextEra Energy, and Duke Energy are active in the natural gas sector, including midstream pipeline and storage and natural gas facility development.

Certain Asia-Pacific utilities, such as the Hong Kong and China Gas Company, also play in natural resource activities such as natural and liquefied gas, and others have increased their natural gas footprints.

The strategies the GT40 employ are still formative but have common elements woven through them, e.g., the value of the customer and the leveraging of natural local assets such as wind or sun. These strategies can create distinctive positioning — and therefore value — but only when executed to fulfill clear outcomes.

Utilities historically received a multiple premium for the quality of their regulatory environment, management reputation, or financial acumen. Tomorrow, it may be how shareholders perceive the quality of these strategies that enables utilities to monetize their strategies into a higher valuation.

“The strategies the GT40 employ are still formative but have common elements woven through them. These strategies can create distinctive positioning — and therefore value — but only when executed to fulfill clear outcomes.”

***Inorganic growth.*** The global utilities industry has been consolidating since the early 1990s, when country, province, and state policies dictated functional unbundling and separation of certain assets and customers. This consolidation resulted in a shrinkage of the number of industry players and the scaling of individual utilities.

The number of electric and gas utilities in North America has declined by about 65 percent since 1995, as a result of market policy design and the perceived need for market readiness. The number of major European utilities has declined for similar reasons and created even larger national champions.

Utilities pursue inorganic growth for several reasons: A buying opportunity presents itself, the current asset portfolio needs rebalancing, or gaps exist in resources to successfully go to market and satisfy customer expectations. Dominion Energy, Exelon, Fortis, and Duke Energy in North America and Power Assets Holdings in Asia-Pacific have been serial utility acquirers through opportunities that enabled scale and strength.

The utilities sector is now in another stage of inorganic activity, with a focus on growth in new business areas, e.g., energy services and renewables, and the transfer of certain assets, e.g., conventional supply, to more natural owners.

GT40 peers, such as Xcel Energy, Eversource Energy, Entergy, PSEG, and NextEra Energy in North America; Iberdrola, SSE, and EDP in Europe; and KEPCO, Tenaga Nasional Berhad, and CLP Holdings in Asia-Pacific, have been building their portfolios by building or buying renewables supply to meet mandates, revamp supply sources, or satisfy their largest customers' sustainability commitments.

The next stage of growth will not be a function of consolidation but of capabilities expansion to enable successful market participation and scale in market areas believed to be critical to long-term positioning, i.e., building new products and services offerings.

“The next stage of growth will not be a function of consolidation but of capabilities expansion to enable successful market participation and scale in market areas believed to be critical to long-term positioning.”

Beyond these simpler and smaller transactions related to supply assets, the utilities sector is already acquiring new capabilities to meet customers' emerging needs. These capabilities-based strategic moves address new technology, offering, and channel requirements. They occur through a mix of partnering relationships, equity investment, and outright acquisition. And they often are pursued in combination with established venture capital players that are seeking the next home-run investment.

Again, several European utilities are out in front of their North American and Asia-Pacific peers, having committed more financial resources and conducted transactions aimed at building a capabilities portfolio in new energy services. Enel and Engie in particular have been aggressive in their pursuit of inorganic growth outside the utilities core business.

In North America, Edison International, Southern Company, and National Grid USA have been early movers in acquiring startup companies and solutions providers that bring capabilities to the energy services space.

A dozen utilities in North America, Asia-Pacific, and Europe have also committed funding to Energy Impact Partners (EIP), an energy-focused venture fund that finds and nurtures early-stage technology-based companies to market scale. This has led to investment in emerging disruptors such as Ring, Ecobee, Greenlots, and Tendril. Other members of the GT40 engage with similar private venture funds.

Utilities recognize they cannot organically stand up the capabilities necessary to build these kinds of service and solutions providers within the observed market window. Expansion of these types of inorganic actions will occur simply because the need for technology and digital capabilities is fundamental to the future offering portfolio.

***Organization adaptability.*** Traditional utilities models were designed to meet operating rather than market needs and centered on natural segments such as supply or transmission, rather than on markets such as customer types or verticals.

These models served a historical need to ensure that utilities achieved objectives such as system reliability and asset performance. These models also matched the natural experience and strengths of utilities developed over decades of operational experience.

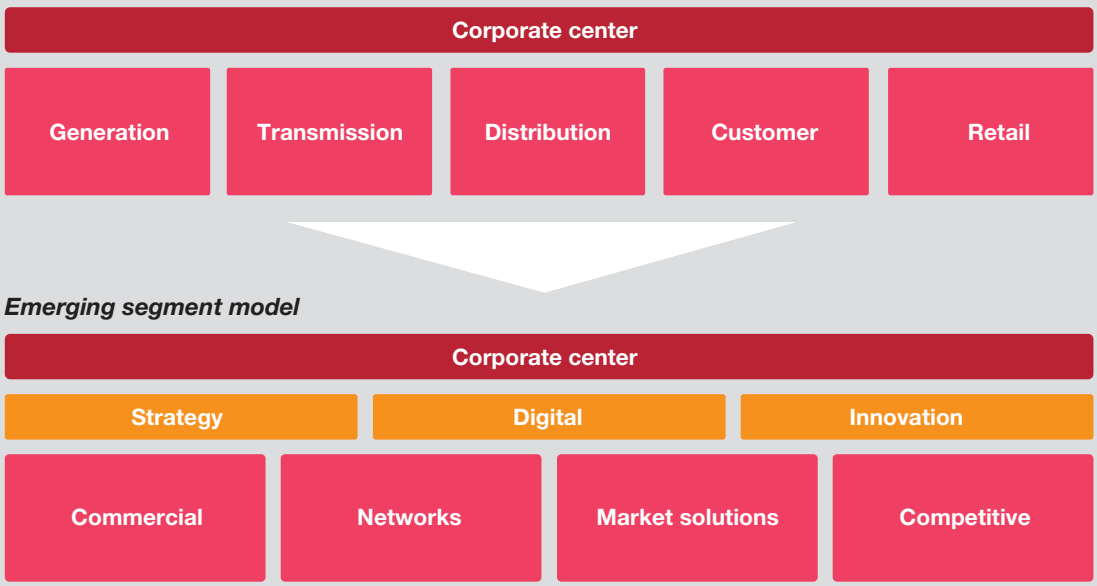
The use of organization modeling as an element of strategy is an uncommon lever for utilities. But the ability to adapt the organization to support strategic objectives and market positioning can be beneficial.

Today these historical objectives are shifting away from traditional segment delivery and performance units. Legacy models are beginning to evolve from asset segments to repurposed positioning, elevated visibility, and market attention. Only a few GT40 utilities have embraced these organizational shifts, but they offer a glimpse into the future of how resources and capabilities may be realigning.

Five fundamental areas are emerging where utilities are realigning their resources to meet new market requirements: strategy, innovation, digital, networks, and customers (*see Exhibit 13, next page*).

EXHIBIT 13

**Organization evolution**




Source: PwC's Strategy&

Several utilities, among them AGL Energy, EDF, Sempra Energy, Exelon, and Engie, include the strategy function as a direct report to the CEO to signal the importance of its role to enterprise growth. The same is true for innovation, where senior officers at Dominion Energy, Xcel Energy, and Enel are responsible for instilling an enterprise view in the operating businesses.

Most utilities are pursuing digitization to recast their positioning from standard information technology deployment to the repurposed deployment of leading-edge technologies in support of operating and customer applications. Utilities such as Exelon, E.ON, and Engie exemplify this realignment.

European utilities such as E.ON are shifting away from a traditional segment focus combining related operating assets toward diverse infrastructure models focused on transport and delivery. These utilities view the business from a network perspective that prioritizes connectivity and value from asset operations, not just deployment.

Similarly, European utilities such as RWE and EDF have shifted their thinking from a customer service–based model to one that emphasizes customer solutions, the customer experience, and the creation and offering of services to meet customer needs. In the U.K., National Grid is exploring plans to build a countrywide network of direct-current fast charging hubs for electric vehicles, bringing it much closer to the end customer than was previously the case.

Several utilities in North America also are rethinking these legacy segments. Duke Energy and PG&E are evolving to an emphasis on grid and infrastructure value. AEP, Xcel Energy, and CenterPoint Energy elevate the visibility of the customer beyond simple meter-to-cash and contact center roles to solutions delivery.

Asia-Pacific GT40 utilities also have elevated the focus on infrastructure modernization (Power Assets Holdings) and customer engagement (AGL Energy) to enhance enterprise visibility and market emphasis.

These enhancements to traditional utilities' organization models signal a different degree of importance placed on the value available from future strategic, delivery, and market-based views of the current asset and capabilities base.

Structural shifts are just now beginning within the peer group and reinforce the organization model as a valuable element of enhancing go-to-market strategies. Organization evolution and adaptability will likely become key strategic enablers for how utilities succeed and change employee thinking in the future.

***Innovation advancement.*** Most, if not all, of the GT40 utilities have created messaging focused on how they intend to become innovative competitors. But there is a chasm between simple statements and achieving the objective.

Innovation comes in several flavors and, ultimately, is in the eye of the beholder — who should be the customer. Most utilities focus on operational innovation through technology adoption. Others frame the challenge as new revenue creation, a broader value proposition to the customer, or clear market positioning.

Innovation is directed at incremental, radical, or breakthrough accomplishment. In fact, the business may pursue all three at the same time. Achieving a culture of innovation takes time, and utilities often don't have the patience for the multiyear education, demonstration, and platform development that typically follow piloting and slow experimentation.

European and North American utilities have been active with innovation programs. These programs have ranged from one-time executive officer–led initiatives intended to galvanize employees to sustained efforts to engage the organization through visible innovation continuity.

In North America, utilities have realized that innovation success does not come from establishing programs that dissipate over time. Rather, they acknowledge that building a robust innovation platform requires sustained commitment and constant executive leadership visibility.

Several peers in North America, such as Southern Company, Duke Energy, NextEra Energy, and Exelon, have used formal events to engage their employees in ideation and showcase the intellectual capacity inherent in their organizations.

In Asia-Pacific, KEPCO is the standout innovation player. It has clearly stated objectives for innovation and has commenced investment in an Energy Valley.

Innovation as a capability is still gaining traction among utilities and will take years to fulfill its promise. Savvy managements are already finding ways to set their companies apart through adoption of various models and techniques to embed innovation deep within their organizational DNA.

> Members of the GT40 peer group have already been realigning their businesses to match their decisions about where and how to play."

***Business model agility.*** The range of business models that pure-play utilities have adopted has historically been narrow, given the nature of how they chose to organize and compete. However, the applicability of new and broader models is increasing as utilities see themselves positioned differently in the future marketplace.

Members of the GT40 peer group have already been realigning their businesses to match their decisions about where and how to play. Several business divestments, asset swaps, and new startups have occurred recently in Europe and reflect changed attitudes about segment viability and the ability to compete. This may be a leading indicator for the continued rationalization of existing businesses in other global regions to match market directions and asset and capabilities priorities.

Even without structural modifications, global utilities will adopt new business models to enable their market positioning and enhance their value proposition to customers. Business model design will leverage market positioning as a foundation and focus on go-to-market options that create economic value through offering bundling and pricing.

Business model design is slowly advancing as utilities gain experience with new businesses, offerings, channels, and customers. The roles that utilities play in these businesses will define how to play, and the offering mix will then extend into nontraditional options for pricing to customers.

To date, the utilities sector has not been required to undertake massive shifts in how it will create future value for customers and shareholders. Broadening the product and service portfolio, however, will cause disruption to where value can be created and how it will be captured.

As the sector rethinks its where-to-play choices by moving up and down the energy value chain, it is finding that there are natural roles for it to fulfill, and consequently there are related economic rents for it to capture.

Whether participating in natural gas, large- or small-scale DERs, storage, electric transport, energy services, or behind-the-meter value chains, utilities have the potential to create new sources of value and capture additional profitability.

Pricing options, which have historically centered on shared value from performance, are now expanding to include more negotiated value-for-service and fee-for-service approaches that can be tailored to match roles, activities, outcomes, and risks.

Electric transport provides an opportunity for utilities to redefine how to think about value chain participation and the role a company should play in advancing the market and supporting customers, particularly at the commercial fleet level.

For instance, the electric transport value chain can be thought of as consisting of nine elements: promotion, financing, infrastructure, fleet services, mobile charging, grid exchange, energy services, aftermarket services, and information management.

Business model options exist for all elements, and pricing models can vary across all value chain elements, excluding promotion. Utilities can create customer, OEM, dealer, and supplier relationships that leverage their infrastructure management, customer knowledge, energy management, and capital skills.

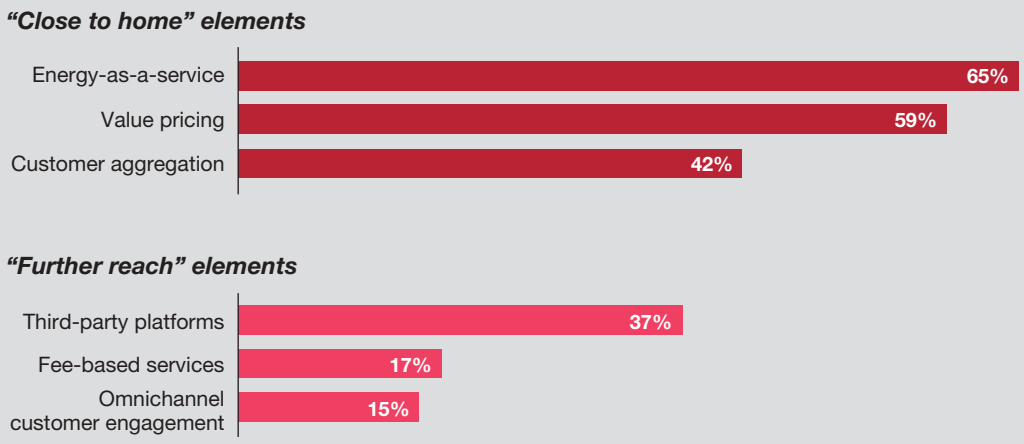
Pricing options, such as service contracts, click-through charges, fixed fees, variable prices, leasing rates, and value-based rates, can all provide unique forms of value for utilities to capture.

In PwC's 15th Global Power and Utilities Survey, participants responded to questions about the specific business model needs that they deemed important for successful market execution (*see Exhibit 14*).

Respondents highlighted several key elements for effective business model design and adoption, such as energy-as-a-service, value pricing, and third-party platforms. These and other factors will be important determinants of utility strategies and related go-to-market business models.

**EXHIBIT 14**

**Most important elements for the new business model***




*Percentage of survey respondents ranking these in their top three of new business model elements

Source: PwC Global Power & Utility Survey 2018

Utility business models historically have been extremely stable. But the new market dynamics require the creation of new business models — some of which may succeed and some of which undoubtedly will fail. An entrepreneurial mind-set will take time to become universal across the GT40, let alone the broader industry. Barry Perry, chief executive officer of Fortis, believes "the utility model has a long way to go. Innovation, growth, and risk appetite are important and need to become part of the core culture of the business. A new way of thinking, commercial and tech-savvy attributes, and openness will be required across the workforce. Creating opportunities for advancement for the new generation is a focus."

Finding the optimal approach to capturing future value sources will necessitate applying innovation to pricing — an area in which utilities applied little imagination in the past. Recognizing that macro-business models (where to play) are complemented at the micro-level (how to win) will make the difference in securing available value.

### Strategic positioning

Policy and government pressures in Europe have caused GT40 utilities to undertake strategic repositioning, structural change, or both. As a result, European utilities have outpaced their North American and Asia-Pacific counterparts.

The utilities sector's move to de-emphasize large central generation sources as the economics and performance of renewables have improved has already dramatically changed the face of utility power sources and reinforced the continuing advance of small-scale and micro-technologies. "Costs for renewables and storage are falling rapidly, and in general it looks like technological progress is accelerating," said Johannes Teyssen, CEO of E.ON. "These developments will enable a new energy world."

As power sourcing shifts from centralized to distributed, more attention is being focused on the network, where batteries and storage are similarly advancing in economics and performance to offer a compatible virtual power plant offering in operating applications.

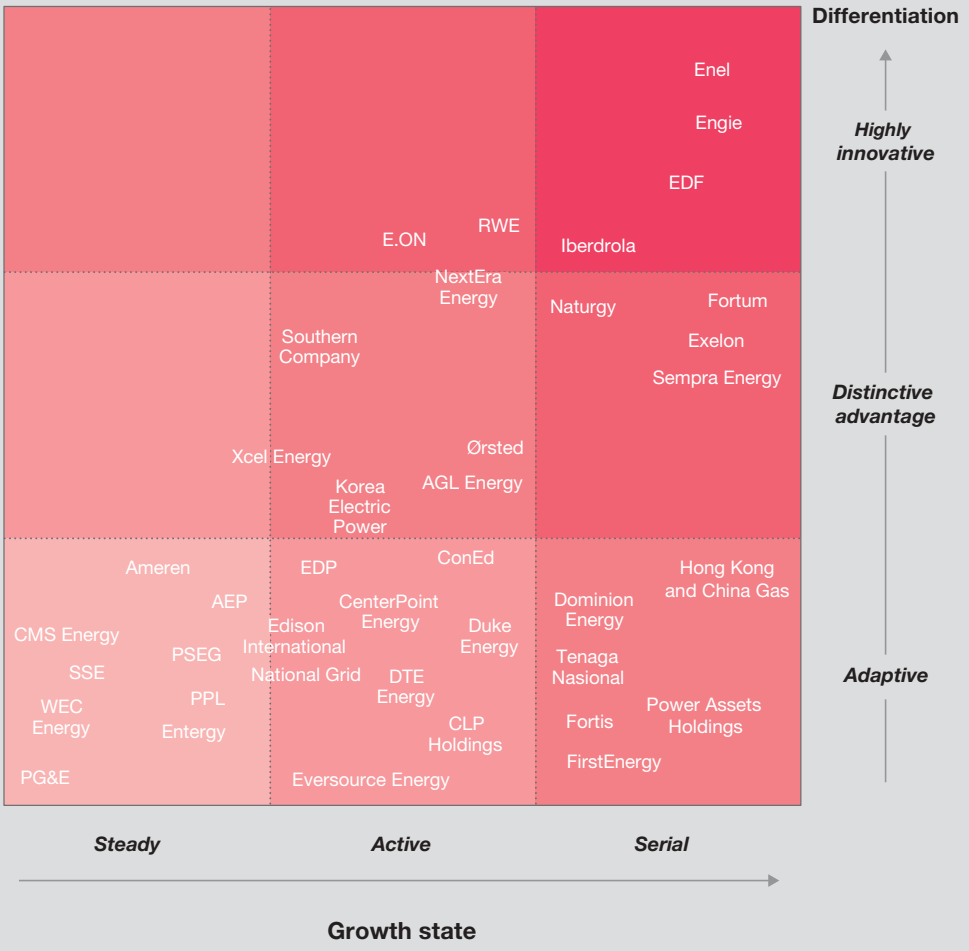
With the availability of customer-side technologies such as software, sensors, and controllers, utilities are recognizing that their role in energy intelligence and management is expanding. Similarly, customers are searching for partners to support their energy decision making, and utilities are stepping into this role more aggressively.

> "The new market dynamic driving utilities in the future requires creation of new business models — some of which may succeed and some of which undoubtedly will fail."

These strategic shifts are impacting the ways in which utilities see themselves competing in the future and how they have positioned themselves for growth (*see Exhibit 15*).

When measured against dimensions of differentiation and growth, the GT40 utilities are widely arrayed. The European utilities hold the high ground, with selected North American peers moving in a similar direction related to services and solutions, albeit more slowly, and on a different path related to natural gas.

**EXHIBIT 15**
**Strategy positioning**




Source: PwC's Strategy&

GT40 utilities are actively pursuing high growth opportunities. But many North American peers are content to emphasize traditional asset growth and network modernization through sustained capital investment. Consolidation still offers more opportunities for scale building in this fragmented sector than in Europe or Asia-Pacific.

Many utilities are still fully integrated, but are paying growing attention to services and solutions through competitive businesses. Others are infrastructure utilities that may own competitive businesses in retail or provide residential or CIES services in some form. Few utilities are pure asset operators without adjacent business components.

In Europe, some utilities have emphasized the creation of revenue streams from services and solutions businesses. Iberdrola invested about $7 billion in the U.K. with a focus on innovative, technology-enabled customer solutions. Ørsted, Fortum, and SSE have emphasized supply and/or traditional network-based models.

Most integrated utilities in North America are forging some form of a services and solutions model. Among infrastructure utilities, CenterPoint Energy, Edison International, Consolidated Edison, and National Grid USA are pursuing services and solutions for customers in various classes.

Asia-Pacific utilities are generally similar to integrated North American utilities, with a focus on services and solutions as part of the core business. AGL Energy in Australia specifically focuses on supply and commodity, with attention now directed toward services and solutions that can enhance value to customers.

As the macro drivers of policy and technology push utilities away from their heritage business models and customer behavior pulls them toward a services and solutions culture, the GT40 are positioned to leverage unique capabilities to enhance their value as incumbents.

# Global paths

**The GT40 study provides a snapshot of where utilities sector leaders are laying their markers for future growth. Achieving this planned growth is not simply a matter of having the right intent. Rather, it requires navigating a host of market pressures and executing strategies with precision. Some lessons have already been learned, but other complexities are still to be defined and overcome.**

The utilities sector has gradually shifted course over the past three decades. What started with privatization of state-owned enterprises in the early 1990s in the U.K. ultimately created liberalized but organized markets across portions of Europe, Latin America, North America, and Asia-Pacific.

Legacy supply models were disrupted, and new retail models emerged. These models broke the stereotype of integrated utilities and created new entrants upstream in power supply and downstream in commodity sales. Customer choice was born, and the economics of supply was the beneficiary of competition.

Now, technology evolution and customer preferences are creating a second era of disruptive models. These new models are characterized by the emergence of micromarkets within the sector — storage, rooftop solar, e-mobility — and the awakening of individual customers to the control of energy sources and consumption through advanced technology.

With this sea change in technology, economics, and customer-side energy decision making, existing nontraditional providers and new disruptive entrants are finding the sector an attractive market to access. GT40 utilities will need to align their strategies and business models with the realities of the evolving marketplace. Institutional perspectives will evolve to match financial market priorities, and the integration of technology with customer preferences will define the expectations for value to and from incumbents.

In particular, new capabilities will need to be introduced, enhanced, or obtained to support a new market paradigm centered on platforms, services, and solutions. Our recent global survey asked respondents to rank the capabilities believed to be most important to their ability to compete (*see Exhibit 16, next page*).

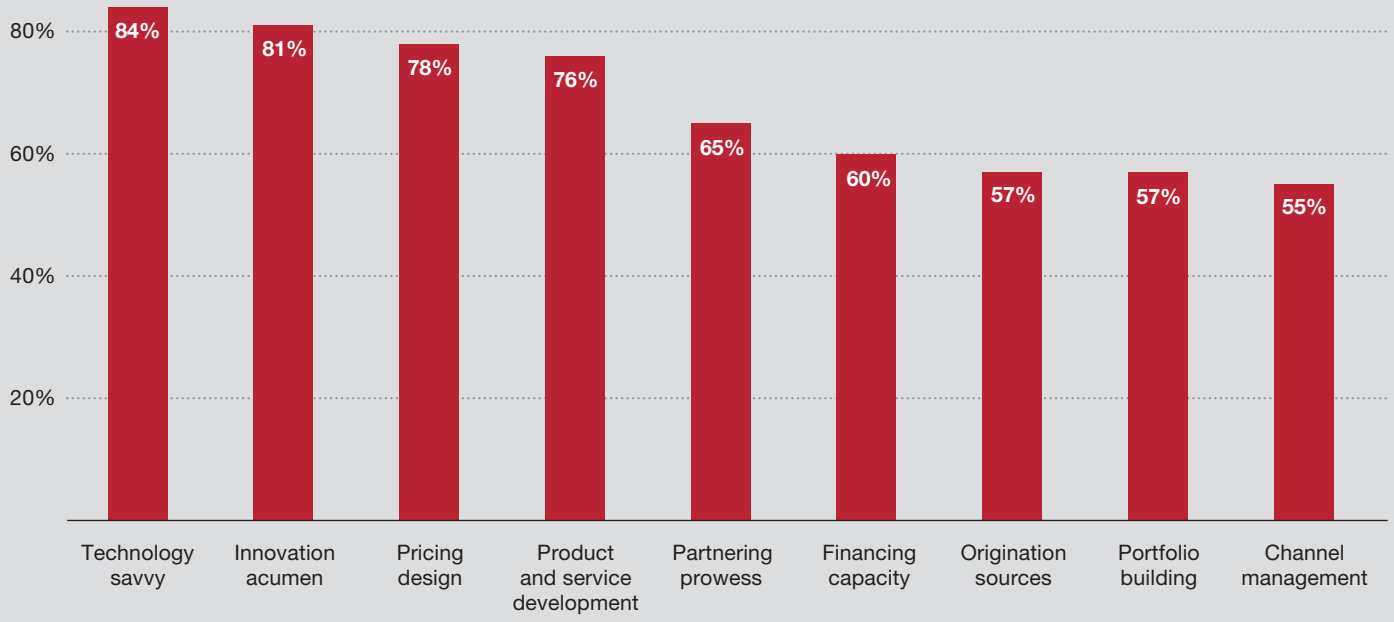
Respondents identified capabilities they believe will be core to their success to meet a future built around emerging technologies and sophisticated customers. These capabilities are not prevalent in legacy utilities and are centered on providing go-to-market and business skills that will become essential for success, such as becoming technology-savvy, mastering innovation, and building a product development and pricing engine.

The future strategic priorities of GT40 utilities will reflect these influences and be defined within this overall external context. Several cornerstones will influence the GT40 strategies going forward and move GT40 utilities further in the direction of innovative offerings and go-to-market positioning.

EXHIBIT 16

## Most important capabilities for competing

**Survey respondents identifying capabilities as important for competing**




Source: PwC Global Power & Utility Survey 2018

## Sharper externalities

The traditional external influences of government policy, regulatory mandates, upstart competitors, financial markets, technology evolution, and customer behaviors have guided the GT40 toward the growth and positioning strategies described earlier. Now these influences are also evolving and further shaping how utilities respond.

Emerging capital market influences, continued technology advancement, accelerating customer actions, and nontraditional competitive brands are further disrupting the global utilities sector. These influences create risks and opportunities for utilities and those that are looking to intrude into traditional utility markets. All these externalities create more instability in traditionally stable markets.

Successful GT40 members will leverage their recent strategic actions to position themselves to meet further market challenges. Yet these emerging challenges will demand even more tailored responses to enable future success.

***Capital markets.*** Over the past several years, new market issues have appeared that affect how utilities will respond in the near and longer terms. These issues emanate from government fiscal policies and market participants.

Costs of investor capital have remained abnormally low as governments have constrained interest rates to encourage economic growth. These historically low interest rates are not permanently sustainable and are rising slowly as monetary policies begin to focus on managing inflation and market risks.

A number of utilities in North America, such as Sempra Energy and FirstEnergy, have recently experienced targeted acquisition of shares by market funds seeking to influence management's strategies and boost shareholder value. These investors are disruptive by design, and they can radically alter asset bases and management growth plans and actions.

“Successful GT40 members will leverage their recent strategic actions to position themselves to meet further market challenges. Yet these emerging challenges will demand even more tailored responses to enable future success.”

When capital costs increase, so too will the costs of investment and, ultimately, prices to customers. As activist investors seek to capture greater shareholder value, utilities will need to recognize that future growth is not enabled just by the elegance of a strategy, but through an unrelenting focus on shareholder financial outcomes.

***Technology advancement.*** GT40 utilities have closely watched the development and introduction of disruptive technologies over the past five years. They understand that this technology revolution is not abating and is a natural product of unmet customer needs meeting targeted provider imagination.

The technology landscape is moving from one that is analog, centralized, and standardized to one that is digital, distributed, and personalized. Technologies are rapidly becoming miniaturized and deployed to meet specific needs of the utilities sector and its customer base. These technologies are also becoming more versatile, allowing utilities to deploy them to meet multiple operating requirements.

As these emerging technologies proliferate, utilities will need to become more adept at deployment and configuration. The value of technology adoption will become a particularly critical metric that enables utilities to understand how technology is optimized.

***Customer actions.*** The global utilities sector finds itself outpaced by both its customers and its competitors. Customers seek new solutions, whether from incumbent providers or other sources, and competitors see market opportunities to exploit where traditional providers leave unfulfilled needs. “Customers expect reliability, quality, and consistent service. But they are now looking for stronger relationships with their incumbents, and AEP is focused on changing how it is perceived in the market,” said Nick Akins, chief executive officer of American Electric Power.

Customers have shifted from being slow market adopters to becoming rapid market initiators and are no longer satisfied with waiting for their traditional utilities to offer the products or services they desire. As customers change — for example, from digital adopters (baby boomers) to digital natives (millennials) — their impatience will increase to demand real-time solutions to their challenges. Traditional responses that do not offer timely satisfaction will be seen as indicators of low innovation.

The GT40 need to understand that customers are becoming aware of solutions options that exist and who best provides them. They are finding this information from open Internet sources and a constant barrage of new entrant marketing and social media. The utilities sector will need to consider this accelerated market pace so that its future strategies do not become perishable.

***Unnatural competitors.*** The competitors of the future are not the same as those the GT40 has come to understand over the past 20-plus years, and they are not limited by the historical rules of engagement. Some of these new competitors are globally branded, ubiquitous, and highly admired. And they thrive on creating or exploiting new markets.

Established brands such as Shell, BP, Chevron, and AT&T recognize the scale of the global utilities sector. And other brands such as Nest, Tesla, and Bloom, although new, have powerful market recognition and have become active niche players or more in just a few years.

Utilities will need to understand how these players are shaping markets and whether they are market enablers, suppliers, competitors, or partners in the future marketplace.

## Directional headings

The paths the GT40 will take in the coming years will naturally vary and match the policies, requirements, and potential of the localities where they operate. Numerous countries have already paved a road for open markets, technology substitution, and more competition. These policies will further evolve, leading other countries to follow.

Because many of the GT40 operate in multiple countries or service territories, market solutions they offer and opportunities they capture in one location will quickly travel to others where comparable conditions exist. Unique strategic moves will become more common, and broad market presence will become more attractive.

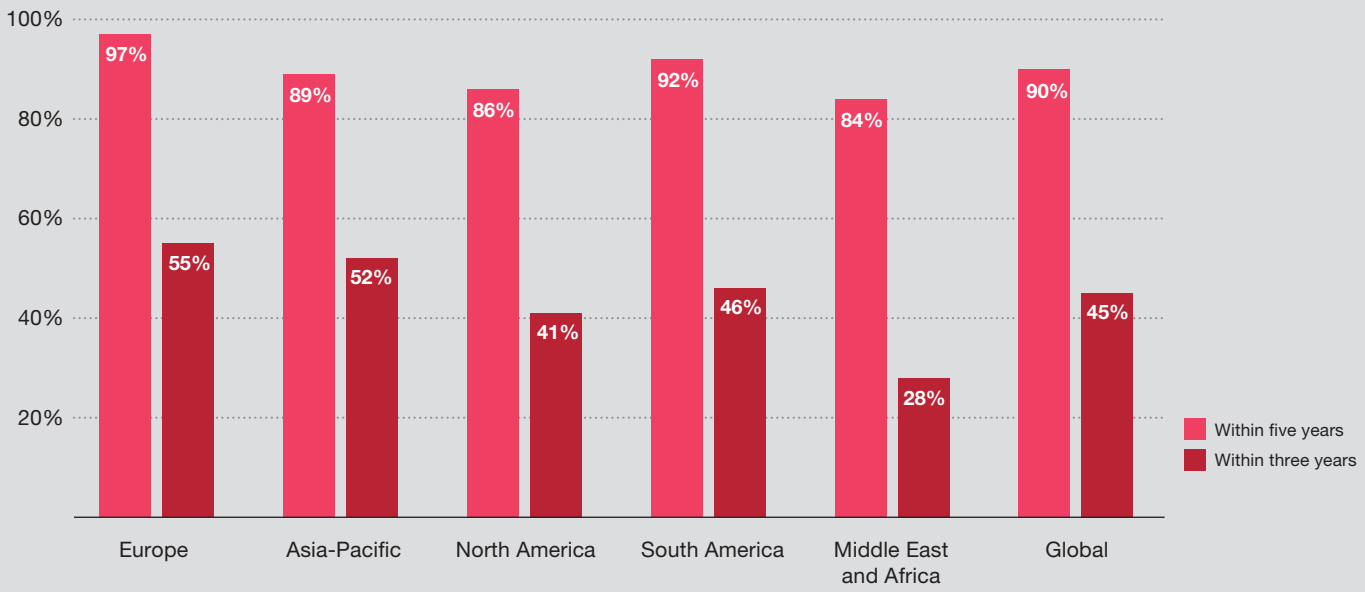
The utilities sector has spent the better part of the past decade reducing the risks associated with heritage decisions or government policies. This will continue as disruptive technologies and stringent policies continue to proliferate and force incumbent asset owners to restructure portfolios and move away from once-favored supply sources.

The future global utilities marketplace offers GT40 utilities a range of attractive growth options. Although individual utilities find themselves at different starting points, strong tailwinds point the sector in several clear future directions to drive desired positioning (*see Exhibit 17*).

**EXHIBIT 17**

**Getting ready for the energy transition**

***When do industry participants think the window of opportunity for readiness will close?***




Source: PwC Global Power & Utility Survey 2018

In PwC's 15th Global Power and Utilities Survey, one response in particular stood out regarding the window of opportunity for utilities. Almost half of the respondents believe that the window of opportunity may last for only three years, yet 82 percent are not ready now, and 44 percent won't be ready by 2020. An opportunity for natural growth could easily be squandered or be too complicated to capitalize upon. "AGL is a fast follower, not a product developer," said Brett Redman, chief executive officer of AGL Energy. "We have strong capabilities in helping our customers make good choices and are putting in place the supporting systems and processes."

The GT40 utilities' future strategies and priorities can be expected to accelerate and evolve toward a few key market opportunities even faster than market observers anticipate, including market shaping, virtual supply, platforms and solutions, home hubs, and value models.

***Market shaping.*** Utilities typically follow, rather than lead, the market since they tend to respond to, rather than anticipate, policy. And their risk aversion constrains opportunities to simpler, safer ideas, rather than aggressive, unproven ones.

As noted, the variety of future GT40 competitors will expand well beyond traditional utilities. These new competitors will be unconstrained in their approaches to market penetration and will employ go-to-market techniques and channels that utilities have never explored.

It will be strategically inadequate to respond passively to markets, as the sector has done historically. Rather, it will be critical to consider how companies such as the FAANGs and their very different approach to creating markets and building enterprise value could be applied in the utilities sector.

To develop great ideas and take them to the commercial market, utilities will have to think more like the FAANGs. They will need to engage in continual market sensing and constant innovation, adopt a commercial mind-set, pursue aggressive branding, and make decisions speedily. Utilities generally possess none of these traits now. "Establishing technology-based companies as 'go-to-market' partners has advantages as a new channel to customers and a means to enhance market-offering value — to partners and AEP. The company is focusing on how to position itself in a different manner with customers so that it becomes a more embedded advisor and influencer about options and future value sources," said Nick Akins, chief executive officer of AEP.

Utilities can develop these capabilities to compete if they visualize future technologies, markets, and customers the same way as the FAANGs. Utilities such as Enel and Engie are already acting like the FAANGs in anticipation of someday possibly competing directly with them.

The GT40 utilities' future strategies and priorities can be expected to accelerate and evolve toward a few key market opportunities even faster than market observers anticipate."

***Virtual supply.*** Many utilities have determined that the generation capacity stack of the past does not fit a market environment where sustainability is paramount at the political, financial, and social levels.

Nuclear power is in the midst of rationalization. Depending on the country, nuclear plant operators are extending operating lives, retiring economically unsatisfactory units, or investing in expensive new plants with first-of-a-kind engineering (FOAKE) technologies.

While exceptions exist in Asia, most utilities are moving further away from fossil fuels as a primary or even secondary fuel source. Many utilities have decommissioned coal plants, and new gas plants are already under economic stress. These decisions leave global utilities heavily investing in all forms of renewables.

Some elements of traditional generation sources will continue to have a meaningful role in power supply for several decades. But the economic and political viability of these fossil fuel sources over the mid- and long terms is perishable.

The near-term bridge — and a potential long-term solution — to conventional and unconventional supply sources will be storage in combination with renewables as a virtual power plant that fulfills power supply, resiliency, and security needs.

The Big Battery in South Australia combines Tesla battery technology with Neoen wind farm performance to deliver a supply security solution while allowing the asset to invigorate an emerging frequency control market in Australia.

The virtual power plant harnesses the power of distributed generation and creates a new frontier aggressively pursued around the world. Traditional players such as E.ON, AGL Energy, and NextEra Energy all are investing in this space.

These utilities are partnering with other companies including Tesla, Sunverge, and Next Kraftwerke. More utilities will enter this space as storage technologies and required data management solutions become more common and sophisticated.

***Platforms and solutions.*** The utilities sector traditionally has focused on distribution assets as a system to deliver power, with little value added. This conventional thinking is changing rapidly as the concept of network value is now ascribed to this system.

For years, the utilities sector considered its network assets to be a mosaic of discrete but connected equipment rather than an intelligent, integrated network. The assets enabled service to be provided, but not as a source of services themselves.

This is all changing as integrating technologies are introduced to the network and fundamentally change the role of and expectations for these assets and components. Now the network is being configured to interconnect with multiple devices and equipment that did not previously exist, e.g., sensors, controls, and software.

Although digital asset development is now fundamental to enabling this network value, the network value is not optimized through this activity alone. Optimization is accomplished through the deployment and application of software in the network — i.e., full digitization.

New suppliers — both traditional OEMs and startups — are bringing their products to the network to enhance its value through equipment monitoring, data extraction and analysis, predictive analytics, and intelligent control.

The integration of software into a platform that provides critical technology-based services enables solutions to be created that match customer needs for operating insights.

Digitization platforms will enable energy brokers, aggregators, demand managers, and price comparison services to proliferate and provide services that customers value. Enel's 2017 acquisition of EnerNoc's demand response business for about $300 million further globalizes a platform for advanced offers for customers, such as flexibility services.

***Home hubs.*** A significant technological shift will occur in the home as new players focus on creating ubiquitous market positions in a large and underserved customer group: residential customers.

Residential customers include individuals and families with different energy and services needs. Both groups can be served through technology application in the form of home hubs where a sophisticated platform can integrate multiple utility applications across commodities and specialized services. E.ON Home is an offering directed at monitoring and controlling energy use and informing consumer decision making.

This platform would allow utilities to offer services that address fundamental customer needs of comfort, convenience, communication, choice, and control — and not just for power and gas, but potentially for telecommunications, entertainment, information, security, domotics, and other areas.

Many homes already have the latent capability to start this movement through digital assistants or concierges from companies such as Apple, Amazon, and Google.

“The integration of software into a platform that provides critical technology-based services enables solutions to be created that match customer needs for operating insights.”

Behind-the-meter technologies and related services are the next frontier enabled by digitization, and the home is the next domain to benefit from this evolution. However, this area will not be the domain of the utility alone.

The FAANGs already serve millions of residential customers daily with convenience services that meet basic individual needs, such as information. Beyond the FAANGs, AT&T and Comcast in the U.S., and other global telecom and infotainment companies in Europe and Asia-Pacific, are also engaged in elements of this market space.

The pure size of the global utility marketplace suggests that it will be attractive to companies that already know the mass market space. Their ability to apply existing platform ecosystems and customer capture strategies will create formidable competition. This suggests that GT40 utilities need to create attractive partnerships with these competitors soon to secure a viable market position.

***Value models.*** As GT40 utilities learn to compete in what looks to be a broad products and services marketplace, they will find that many products and services that customers need do not fit in a traditional regulated business.

Nonregulated offerings will dominate, and GT40 utilities can benefit from flexible pricing approaches different from those that have underpinned the sector for decades.

New competitors are well-versed in non-formulaic pricing, i.e., non-tariffed or outcomes-based. These competitors are experienced in creative pricing approaches and in aligning revenues, costs, and value into tailored pricing models. And their pricing models are already embedded in their business models.

Prior to determining pricing protocols, utilities need to determine where and how to make money on competitive offerings. Not all elements of an offering's value chain will be available for participation, and each element may have one or more pricing approaches.

GT40 utilities will need to learn to price based on a market-back sense of how customers think about value produced. Utilities never had to consider this perspective in the past, but in the future it will be at the heart of how competitive markets work and fundamental to pricing non-tariffed offerings.

As a practical matter, utilities will not just offer products and services but will bring a portfolio of offerings to customers. This means they will need to become adept at packaging multiple offerings and pricing as a bundle, where beneficial.

With bundles, utilities will need to develop pricing approaches that recognize and incorporate risks into the pricing model. Risk-adjusted return determination will become a critical skill. This will enable utilities to create business models that link the prices of their offerings to customer value requirements.

In the future, product and service pricing will need to be a core capability of utilities. This aligns with how utilities will need to dramatically elevate their thinking about how to act commercially, rather than as unsophisticated regulated market incumbents. This mind-set is fundamental to meeting customer expectations for demonstrated value.

## Future actions

This Strategy Index report describes some of the differences in strategic market focus and the range of actions that the GT40 utilities have executed to date. Unsurprisingly, strategic actions pursued have high degrees of similarity, as often happens in the utilities sector. But the degree of strategic shift and relative investment levels vary greatly.

Over the next several years, it is likely that a degree of separation will occur between the most aggressive and innovative GT40 utilities and the rest of their peers. And the degree of separation will likely enable investors to value utilities differently on the basis of their strategies and market accomplishments.

At present, the European GT40 utilities have a head start on their North American and Asia-Pacific counterparts, primarily because of earlier policy shifts and restructuring.

But the North American and Asia-Pacific GT40 utilities are following the same general path as their European peers. Pursuit of new lines of business, e.g., services and solutions, renewables, gas (and sometimes water) infrastructure, and DERs are becoming logical avenues for growth.

Over the next several years, the GT40 will likely advance their strategic initiatives to include more capabilities-based acquisitions; more partnering with OEMs, platform builders, and solutions providers; and more innovation in business model agility.

The GT40 utilities' strategies offer deep insight into where the sector is heading. Although directional headings seem clear, the possibilities of unexpected policy changes, accelerated technology availability, and customer-driven market evolution will refine these strategies — sometimes as planned and sometimes quite unexpectedly.

# Strategy&

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