



6th Annual KPMG Global Power & Utilities Conference

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2016 Conference Report

KPMG International

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Foreword

KPMG's annual Global Power & Utilities Conference is a premier event for executives in the energy industry. The 2016 conference, held in Brussels, Belgium, on 8 November 2016, provided a global view on a moving sector with keynote speaker presentations and detailed discussions by industry leaders from around the world.

Reflecting today's unprecedented changes across the energy industry, the conference provided an overview of the impact from the Paris Agreement on climate change, an informed assessment of the regulatory frameworks for low carbon energy systems, a survey of the potential of digital transformation for power and utilities and an in-depth analysis of international growth markets for the sector.

We are delighted to now present to you this report that summarizes and highlights the takeaways from each presentation and the insightful dialogue that took place.

We welcome any questions or requests to learn more.

Sincerely,



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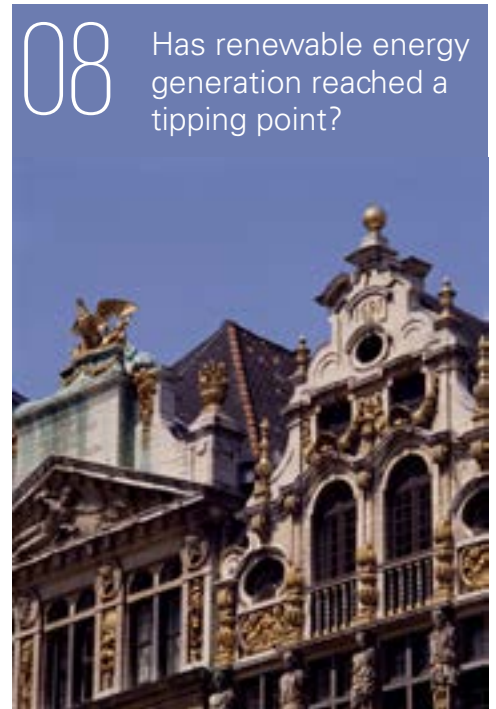
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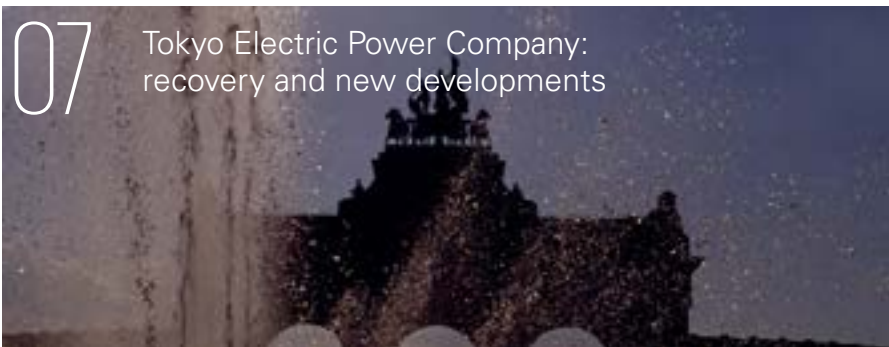
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Transforming the future, today

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People are wary of disruptive developments. To fully leverage the potential of data & analytics, it is key to overcome the trust deficit.”

Christian Rast

KPMG's Global Head of D&A



Christian Rast provided a fast-paced overview of the growing impact of data & analytics (D&A) in today's global economy. Sharing key findings from a recent KPMG survey of almost 1,300 CEOs,¹ he said that almost half of respondents expect to be running significantly transformed companies within 3 years. Close to 50 percent expect that they will improve performance significantly by using D&A; however, 77 percent are concerned about the speed of change and whether their organization is keeping up with new technologies.

Rast suggested that **in terms of business models, energy companies are transitioning from being pipelines to platforms.** Traditionally, energy companies act as a pipeline from source to consumer, and they used D&A to extend energy capacity and improve efficiency. However, today's businesses

are being disrupted based on the growing importance of renewables, the development of smart homes and technology used to monitor and enhance energy distribution. As a result, they serve more as a platform connected with a multitude of energy sources, customer segments and enabling technologies.

He also stressed that this development is not specific to the energy sector but includes almost every vertical industry. He cited examples from automotive, retail, banking and healthcare where D&A is creating massive changes.

For all of these industries, the key factor in using data is trust. Two years ago, Rast and his colleagues wanted to know whether data shortage was creating a bottleneck for companies. However, they found through surveys and discussions with clients, that the real bottleneck was a lack of trust in D&A.

Significantly, the KPMG survey shows that the majority of CEOs — close to 80 percent — do not trust the quality of their data. At the same time, they strongly believe that D&A can drive strategic change and improve the performance of their business. Nevertheless, one-third of CEOs still have very limited trust in the effectiveness of how their organization is using data.

Rast concluded by saying that KPMG is undertaking a number of “rich data” initiatives to help build trust in D&A by integrating data from various companies across platforms. In addition, KPMG data scientists and engineers are working with third-parties, such as Microsoft, to support a move from rule-based analytics to predictive analytics and build algorithms that deliver insights and provide value.

¹ Now or Never, 2016 Global CEO Outlook, KPMG



What are the implications of the Paris Agreement on climate change for power generation?

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Global transition to low emission economy comes with huge business opportunities, especially in the energy sector — if managed well.”

Artur Runge-Metzger
Director, DG, CLIMA
European Commission



The ratification of the Paris Agreement marks a milestone in addressing climate change. In his keynote speech, Runge-Metzger discussed the importance of global target models such as the Paris Agreement as well as other accords. He also stressed the importance of balancing the regulatory “pull” with the enabling “push” of new markets and business opportunities that are being created by low carbon energy development and consumption.

The Paris Agreement is based on pledges by 196 nations to limit global warming to 2 degrees Celsius or less by reducing greenhouse gas (GHG) emissions by each nation. “This is going to be very challenging,” Runge-Metzger conceded.

“We will need to come back every 5 years in order to see whether we are on track in order to reach our long-term goals.” He added that success at every stage will depend on every nation providing transparency and accountability in how they support the goals of the Agreement.

He also discussed other recent accords. In September of 2016, the International Civil Aviation Organization agreed that all international flights will be covered by a regime that is going to control emissions through carbon offsetting, with the regime becoming mandatory by 2027. “This is stunning,” he said, adding that the agreement was possible only through the combined push and pull of major global actors in the aviation market, including first and foremost the US, China and the EU. He also mentioned similar discussions by the International Maritime Organization involving the limitations of emissions from ships — a growing concern as global shipping continues to expand. Equally important was the recent meeting in Kigali of the Parties to the Montreal Protocol and the decision to reduce and then completely eliminate hydrofluorocarbon (HFC) gases worldwide by 2050.

Turning his attention to the EU, Runge-Metzger discussed the role of conventional power generation in the region’s energy mix and various interim solutions until fossil fuel and nuclear are phased out. Referring to regulations

involving the 2030 road map for carbon emission reductions, he argued that “there is more to be done, and that is to strengthen our targets in the different areas.” Emissions in the EU were reduced by 22 percent between 1990 and 2015, and the EU is putting in place legislation to reduce emissions by at least 40 percent in 2030 compared to 1990. “Doubling this reduction will help achieve the 40 percent goal by 2050.”

Stressing that **a trade-off is not required between reducing GHGs and supporting the economy**. In the same period between 1990 and 2015 when the EU reduced emissions by 22 percent, the economy grew by 50 percent. “I think that is a very important point,” he said. “If you look back 20 years in the discussion on climate change, the question was always put forward about whether you can either fight climate change or grow your economy. And I think the data so far shows that we can decouple green house gas emissions which is the bad thing from the good thing which is economic growth.”



View on regulatory frameworks for low carbon energy



Panel chair

Simon Virley CB

Partner, Head of Power & Utilities, KPMG in the UK

Panel

Julio Castro

EVP Regulation, Iberdrola Group

Holger Goetze

CEO, Chorus Clean Energy

Paul Massara

CEO, Northstar Solar

Konrad Purchala

Director, Energy Market Development, PSE Poland

Despite general agreement about the importance of environmental regulations to support low carbon energy, questions remain about how these regulations affect the financial strength of energy companies. Moderated by Simon Virley of KPMG, a panel of industry professionals representing investors and energy companies discussed the practical implications of strategies

such as the EU emissions trading system (ETS), the impact of auctioning, new capacity markets, and network regulations for encouraging a low-carbon energy mix, such as the RIIO model.

The panelists argued that the ETS is a very good idea and a good framework to start decarbonization. However, in practice it does not work as well as expected, so improvements should be initiated, especially considering the current prices for electricity. In the UK, for example, the ETS is less important than government directions on the phase-out of coal or how national policy determines the energy mix.

Until the ETS has realistic pricing, it will not actually create significant changes in the market place.

The panelists from several countries acknowledged the challenges of implementing schemes that are both effective and economically viable. One example cited was capacity markets where the utility is required to have enough resources to meet its customers'

demand plus a reserve amount. In some cases, this approach can provide an important market segment for investments in renewables.

Additional insights about distribution rounded out the conversation.

On the regulatory side, the industry needs to modernize the concept of the distribution company.

In the past, distribution companies operated under the paradigm of 'connect and forget.' In the future, however, distribution will be the most valuable asset because everybody will be connecting to everybody. For example, consumers with solar panels will send surplus energy to the utility, using their private assets as a backup or as half of their energy source. They might also sell their energy to their neighbors. As a result, **investments in distribution will be needed more than ever to support dynamic energy grids that are both centralized and distributed.**



Tokyo Electric Power Company: recovery and new developments

“

Fukushima Daiichi decommissioning is in progress. TEPCO restarted new challenges in terms of technologies and business models through the whole energy value chain on a global basis.”

Shinichiro Kengaku

Managing Executive Officer
Tokyo Electric Power Company Holdings, Inc.



Tokyo Electric Power Company Holdings, Inc. (TEPCO) is Japan's largest power company group, serving 29 million customers in the Tokyo and Yokohama area. The company boasts the highest reliability for electricity supply in the world and currently supports 600 consulting projects in 70 countries around the world.

Shinichiro Kengaku gave an update on recovery efforts at the Fukushima Nuclear Station, including the creative use of smartphone-enabled robotics and a fleet of drones that measure radiation levels from exhaust stacks in the area. Over 6,000 workers continue to remove spent fuel and debris from the reactors, and radiation has dropped to relatively safe levels.

Kengaku also gave an overview of other issues facing TEPCO, including declining sales as Japan's population ages and the deregulation of the retail energy markets. This **deregulation is leading to the unbundling of transmission and distribution networks and the formation of new alliances with various companies to offer new value to customers.**

Looking ahead to the future, Kengaku reported that **TEPCO intends to increase power generated from renewables from 11 percent to between 22 to 24 percent by 2030.**

Nuclear-based generation, now at zero, will be increased to between 20 and 22 percent. He was candid in admitting that these figures could be reached only by improving operations, learning from other entities in the marketplace, and recognizing that the tipping point has already been reached in the renewables sector. He also stressed the importance to TEPCO of new investments in power generation through strategic partnerships.



Has renewable energy generation reached a tipping point?



Panel chair

Nikolaus Kerssenbrock
Partner, Energy Advisory,
KPMG in Germany

Panel

Gunnar Groebler
CEO Unit RE, Vattenfall Germany

Steven De Gruyter
Head of Power Generation,
European Investment Bank

Shinichiro Kengaku
Managing Executive Officer, TEPCO

A panel discussion representing several countries in Europe and Asia weighed in on recent developments in power generation, starting with a current assessment of renewables in the global energy mix.

The consensus among panel members was that the growth in renewables was well established and will not stop.

Indeed, **the tipping point has already been reached in Europe and parts of Asia where wind and solar are the fastest growing segments of the energy industry.**

That said, the panelists noted differences among regions and countries. Purely on the basis of geography, some areas in Europe are more appropriate for offshore wind as in the UK and Germany, while countries to the south such as Spain are more suited for solar. Renewable development also depends on government policy, and in many cases, regulatory mandates can be the greatest determining factor in the growth of renewable energy. Government tax programs and incentives can significantly reduce development costs for wind farms or solar generation plants. Encouraged by government support as well as by declining costs for generation,

large infrastructure investors are leaving the fossil fuel sector and moving into renewables. In the future, this investment trend is expected to accelerate.

However, the panel agreed that in any particular country, the energy market remains fragmented in terms of both the type of energy and the number of energy providers. Smaller players are being absorbed by bigger ones to achieve greater scale and reduced costs. In Asia, coal-fired plants are still the main source of energy, especially in countries that lack domestic reserves of oil and gas. In Japan, efforts are being made to develop more efficient coal-fired power generation.

Both global and regional investment strategies will be supported by institutional investors, accompanied by a resurgence of cross-border M&A transactions and the consolidation of energy companies.



What are the key growth trends in international energy markets?



Panel chair

Alberto Martin Rivals, Partner,
Head of ENR, KPMG in Spain

Panel

Martin Neubert

Senior Vice President, Chief Strategy
Officer, Dong Energy

David Mesonero

Corporate Development Managing
Director, Gamesa

Gordon Parsons

Division Director, Macquarie

Divya Reddy

Director, Global Energy and Natural
Resources, Eurasia Group

Since the conference was held on the day when the US voted for a new president, it was only natural that the discussion touched on the possible effects of that election on global energy. Three drivers were noted for energy policy decisions, both in the US and internationally. First, demand influenced by macro trends like economic growth and population. Second, energy security which will have different implications for different markets. Third, climate change and how it influences the global regulatory landscape. The leadership of the US under the Obama administration was an important factor in the development and signing of the Paris Agreement.

However, the panelists also noted that a Trump administration would be more disruptive for international climate politics and possibly lead to a rollback of some of the policies that have facilitated the renewables' boom.

Taking a look at current growth prospects, **emerging economies offer huge opportunities in terms of both soaring energy demand and infrastructure development.** Plants need to be built and transmission networks need to be upgraded and expanded. In developed economies, markets are shifting to cleaner energy, requiring both greenfield and brownfield investments in assets. The right capital in terms of volume and debt structure exists for both areas, and what is needed now is an effective mix of investors, regulatory dynamics, and expected return on investments to ensure steady growth.

Much of the discussion centered on renewables, especially **wind which is now the fastest growing renewable technology in countries belonging to the Organization for Economic Co-operation and Development (OECD).** Startup and operational costs have come down significantly over the past

decade and wind turbine technology continues to improve. In Europe, the industry is reaching the point of being able to generate around three to four gigawatts. In the US, offshore development is booming, with projects moving forward in Massachusetts, Rhode Island, New Jersey and Maryland. Lease auctions are also expected in New York, North Carolina, California and Hawaii. Projects in Asia were also noted, including rapid progress made in Taiwan where the government has issued a target of three gigawatts in operation by 2025 and four gigawatts in 2030.

The panel also discussed the possibility of increased protectionism in the near future. Although panelists acknowledged the rise of populism and a sort of anti-globalization that might increase risks around openness, no one felt that governments would become adverse to foreign investments. In some markets, protectionism will play a major role, especially where the promotion of national champions is strongly supported by government policy, such as China. But other emerging markets in the power sector are excited by recent auctions around renewables, suggesting that wind and solar can be a source of investment in an otherwise lackluster economic and investment pipeline.



Systems of intelligence — an invisible revolution is coming

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The most interesting aspect of the Internet of Things is the world of humans that use it.”

Ulrich Homann

Distinguished Architect,
C&E Engineering, Microsoft



“What are we missing in our portfolio?” This is the question that companies should be asking themselves about information technology, said Ulrich Homann. In a wide-ranging address on enterprise excellence through digital innovation, he discussed how Microsoft and other partners can help utilities fix, add and improve the way they provide energy and energy-related services to their customers around the world.

Homann agreed with analysts who argue that in the future, every company will be a software company, moving from a physical value chain to a data-oriented value chain. This transition definitely includes energy companies, he said. “At the end of the day we need to figure out how we gather more data to collect more information and then utilize that data to really drive insights.” The result will be an intelligent infrastructure that enables energy companies to provide energy more efficiently and effectively to homes, buildings, and public infrastructure. This infrastructure will also enable customers to take a far more active role in understanding and addressing their energy needs.

For energy companies, the future will involve a growing involvement with the Internet of Things (IoT), fusing their physical and digital assets.

“Power companies and utilities have a lot of physical assets, and more and more these assets will be augmented by software,” Homann said. He provided a number of examples such as drones over utility lines, substations, and remote areas that are able to scan and collect data, helping to identify problems or areas needing maintenance. He also noted the development of smart buildings that can detect occupancy and then adjust temperatures or change lighting from room to room accordingly. Digital innovation will also have a profound impact on business models, he added. “We will see changes in business models that we haven’t seen before. When you look at solar, if you look at water, hydro and personal power generation, how does a company deal with all of that?”

Homann was candid in assessing challenges faced by energy companies, starting with the capital-intensive nature of the industry. “Power and energy is very expensive and updating anything takes a while.” He also noted that regulation and compliance is “not getting any easier,” adding, “I think it’s actually going to get more complicated and more intense.” Human resources is another issue. Power and utility companies have a large number

of employees, many of them with years of experience. Managing these employees and encouraging change can be a complex process. “Sometimes there is good inertia and sometimes there is not so good inertia. **Finding the right balance between keeping what works and thinking what is going to be a key part of the challenge moving forward.**”

In summing up how energy companies can use information technology to take their enterprise to the next level, Homann highlighted several key requirements. Companies need to engage their customers, using data and analytics to enhance sales, marketing and customer service. Employees need to be empowered with more information and authority to make decisions while maintaining security and regulatory compliance. In addition, connectivity, data and the IoT should be used to improve operations in terms of increased agility and optimized margins. Finally, energy companies need to use digital innovations to transform their products and services, helping them to manage a pipeline of ideas in alignment with their strategic priorities.



How will digitalization and new business models impact energy companies?



Panel chair

Michael Salcher, Global Power & Utilities Lead, Partner, Head of ENR, KPMG in Germany

Panel

Shamus Rae, Partner, Head of Innovation and Investments, KPMG in the UK

Javier Uriarte Monereo, General Manager of Market Iberia, Endesa

Johan Van Bragt, Head of Business Development and Innovation Officer, Engie Benelux

As noted during a detailed discussion about the impact of digitalization on business, our modern world is characterized by convergence. Business models and strategies increasingly need to incorporate opportunities from new technologies, and digitalization is now widely recognized as a way to do this. In the energy sector, utilities and grid operators need to become digital infrastructure companies, forming a common digital backbone of the industry to enable and optimize

production of electricity, cost efficient transmission, supported by a data product portfolio. However, some utilities fail to fulfill their role as digital interconnectors, and energy market players struggle with connecting business areas such as mobility, smart automation and energy efficiency.

Panelists agreed that continued **progress with digitalization in the energy sector depends on a consistent and unwavering focus on the customer.** Companies need to develop solutions like decentralized power generation or ways to increase energy efficiency in alignment with what customers need.

In using digitalization to support the highest levels of customer service, energy executives have to understand the importance of the pace of change. Technology has always been a fast-moving field, and companies need to adopt new solutions to remain competitive. Leaders also need to keep in mind that digitalization is not limited to hard cost savings or increases in production. Solutions can also represent an opportunity for much better

customer engagement or getting much more information from customers about their energy needs and consumption. This in turn can help energy companies to transform their marketing, improve their customer care and increase service sales.

The panelists said that in many ways, **the greatest disruption will be at the operational level** — how much energy do companies want to consume themselves and produce, when do they want to do this, how do they want to distribute energy, and what markets do they want to support? Data, analytics and digitized products such as sensors can help answer these questions with a level of speed and accuracy that was impossible even a few years ago. For customers, digital can generate and store energy and monitor energy consumption. Batteries can serve as a secondary source of energy, or the customer can sell this energy back to the grid. **In every case, the system has to be convenient, reliable, cost-effective and easy to operate.** Utilities backed by digitalization can help make this possible.



Making renewables fit for the market place

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We cannot have a situation in which 50 percent of the generated electricity is covered on the special support scheme.”

Mark Van Stiphout

Deputy Head of Unit, Directorate-General for Energy
European Commission



One of the overarching themes of the 2016 conference was the relationship between the goals of environmental commitments such as the Paris Agreement and how these goals can be achieved in the world's commercial energy markets. It was fitting, therefore, that the conference ended with an address by Mark Van Stiphout that covered recent initiatives for renewables, energy efficiency and market design as well as the practical challenges that remain for the energy industry.

Van Stiphout stressed that “making renewables fit for the market” is critical for success. “We cannot have a situation in which 50 percent of the generated electricity is covered on the special support scheme type of regimes forever,” he said. “It has to be really integrated into the market. What that means is that we also have to make the energy market fit for renewables and we have to get away from the current situation for balancing or managing the network.” In the past, he explained, a few power operators could meet increased power needs by simply putting another 10 or 20 megawatts into the system. Today, the situation is much more complex. “Operators have to anticipate what the energy system requires and then manage energy from multiple local renewable sources. That requires changes in operations and how the market is organized.”

Speaking of work now underway at the European Commission, Van Stiphout discussed the implications

of a large number of legislative proposals from the Directorate-General in support of regulatory targets for renewables and energy efficiency.

Current emission targets for 2030 require an EU energy mix of approximately 45 to 50 percent for renewables.

Van Stiphout argued that to meet this target, the energy industry needs to consider renewables as more than “something on the side, something that we need to take into account from time to time.” Instead, renewables will have to become “the new basis of the energy system.”

In addition, Van Stiphout highlighted a number of market design initiatives being developed that support the cost-effective and efficient generation, distribution and consumption of electricity. These initiatives involve new efficiency targets for 2030, the extension of energy savings obligations beyond 2020, and security of supply. Market flexibility is essential in these initiatives and the markets they influence. “We need to make sure that the price signal stays as the basis for improving how the short-term market functions. Also we need to balance intraday trading across borders and support stronger competences of the transmission system operators to decide things at a regional level across borders.”

As with other speakers and panelists at the conference, Van Stiphout emphasized the importance of the

customer in new market design initiatives. **“We need to trigger consumer’s response to the wholesale market and the key thing there is the smart meter** to help consumers better understand when, where and how much power they consume.” He pointed out that customers are incentivized to use energy more efficiently when they have more and better information. “Measuring things is becoming cheaper and the energy consumers should benefit from that.” With smart metering, customers can react to price signals, contribute to the stability of the system and participate in particular grid services.

Van Stiphout conceded that multiple unknowns remain for the future of energy. “When I talk about making renewables fit for the market and the market fit for renewables, there’s a lot of work that needs to be done ... We don’t really know where it’s going to go and how it’s going to look like in the future and what models will work best. But it’s clear that with decentralization, a much more active participation by customers is both required and made possible now by technology.” He added, “One of the key objectives of market design initiatives is making sure that we promote these new solutions and business models to allow new ways of involving the customers ... If we do that right, we will be promoting energy efficiency, we will be promoting renewables and we will be putting the customer at the center of the energy system.”





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