



Innovative interconnections

Digitalization: energy, quo vadis?
Energy & Natural Resources

KPMG International

kpmg.com/energyema



Political guidelines, technological advancements and changing customer expectations have fundamentally altered the framework conditions for the energy sector in recent years. One of the core industries in Germany must now rapidly and radically adjust in order to remain successful. This means harnessing the opportunities provided by digitalization.



Michael Salcher
Head of Energy and
Natural Resources,
KPMG in Germany and
Chair, Global Energy
Institute EMA

Contents

The energy world of the future — digital and networked	3
Four trends in the energy industry drive digitalization	4
The impact of digitalization on the energy sector	6
Successful digitalization challenges and solutions	9
Your partner to achieve digital transformation	11

The energy world of the future — digital and networked

The energy industry in Germany is under pressure: while compliance with a significant number of social and political requirements is obligatory within the scope of the government's energy transition policy, companies are facing a wide range of technological (r)evolutions — primarily extensive digitalization. After end customer-driven industries like telecommunication, media and consumer goods were initially penetrated, this issue is now increasingly relevant for all other sectors.

This development comes at a very inopportune time for many suppliers: they are in a financially weak position and are facing uncertain political and legal requirements. The staff is somewhat outdated and there is a lack of interested new recruits. In addition, the traditional innovation culture is hardly developed and information and communication technologies (ICT) have previously performed functions of a more supportive nature, particularly for the optimization of existing business models and processes.

This must be changed in the age of digitalization: IT will also be a driver of development in the energy sector and will consequently carry out a central role in the company. On the one hand IT will be accountable for understanding the new technical opportunities and actively implementing these in cooperation with the business units to create new business models.

On the other hand, IT security aspects will increasingly move into the spotlight; growing digitalization of all processes and workflows will be more prone to attacks. In addition to energy industry-related know-how, the comprehension of (IT) technology and its secure handling will become the point of departure and core of new business models in the future.

Digitalization will also generate a completely new standard in networking systems. This requires seamless interfaces, consistent standards, new core competences and partnerships along with the development of new customer segments.

The potential that digitalization brings to the energy industry is vast. But not much time remains to develop them: competitors from outside the industry, who already have a technological lead in digitalization, are already surging onto the market.

Since these competitors frequently do not offer fully integrated services and only address sub-sectors, this provides considerable opportunities to the traditional players in the industry; in the future, the importance of the interdisciplinary know-how of the energy industry will grow.

Four trends in the energy industry drive digitalization



1. The new fragmentation

In the course of the energy transition and the development of renewable energies, the generation of energy is becoming increasingly decentralized and fragmented. In order to ensure security of supply, a new concept must be developed for the balance between generating and consuming energy, including its decentral organization. As a result, not only have energy producers established themselves on a decentralized level, the strategy has also been applied to a growing number of storage systems and other compensatory options.

2. Europeanization of energy transformation

The energy world is becoming more international. Generation, distribution and storage are transcending national borders. The German government has already announced that they will promote the energy transformation on a European level. In addition to the relatively small local producers, large regional production centres will evolve on the basis of renewable energies — like in Northern Europe with the growing number of offshore wind parks. Existing bulk storage systems in Norway and the Alpine region will be expanded. The fluctuating energy production from renewable energies must not only be distributed across a large area, the base load power must also be balanced.

- ▶ Smart meters, smart grids, cloud solutions and mobile applications support the coordination and communication.
- ▶ The digital, cross-border management and innovative storage technologies are mandatory for the success of European-wide energy transformation.

3. The fusion of system and market boundaries

The previously predominantly separate energy systems electricity, heat and traffic are continuing to grow together. Electricity will have an even more important role than it has today. In the mobility sector, electricity will be used increasingly directly (e-mobility).

Surplus energy can be transformed into heat (power to heat) or fuels (power to gas: hydrogen, methane). Parallel to this, market boundaries are vanishing: customers will regulate their heating via app on mobile end devices and digital power trading structures will set trends and draw new suppliers from other sectors.

4. The customer as partner

The classical energy customer, who only consumes electricity, and the provider, who mainly sells by the kilowatt hour, is an outdated model. Customers will become more self-sufficient and consequently more demanding. The focus will shift to services, because private and commercial customers will want to independently produce a major share of their own energy. Industrial production facilities will consequently be increasingly planned and optimized according to energy consumption.

In this context, energy management will become a new discipline for many companies.

▶ E-commerce, e-mobility, e-payment, etc.: digital technologies are increasingly establishing themselves on the market and sector convergence is growing.

▶ The future belongs to prosuming (producing with consumer input) and active energy management.

Can the digitalization of the energy industry be stopped?

No. The developments above depict this clearly: extensive digitalization and the associated networking systems are necessary for the management and communication with and between all actors in the “new” energy system. The goal is to organize the complex management processes and ensure communication between all actors. This is the only way to align production, distribution and consumption in the future, also in regard to cross-sectional use and growing internationalization. And all this in real-time, while maintaining security and regarding the new customer expectations.

The impact of digitalization on the energy sector

1. Data governance

The quality and particularly the quantity of data are rapidly growing. There is no doubt that data will be the most valuable raw material in the energy system of the future. Their evaluation presents the key to valuable information about suppliers, competitors and customer behavior. They also provide the foundation for managing increasingly complex systems. **Companies who draw the right conclusions for new products and offers will become market leaders.** This especially applies to the distributors in the energy industry, who can combine these insights with experience as a result of direct customer contact.

A qualified data analysis will also become increasingly important for other areas in the company. For example in infrastructure issues (predictive analytics to predict wear of parts) or in the field of asset management.

2. Virtual coordination of physical structures

Digitalization creates a virtual structure which more closely coordinates existing physical structures for:

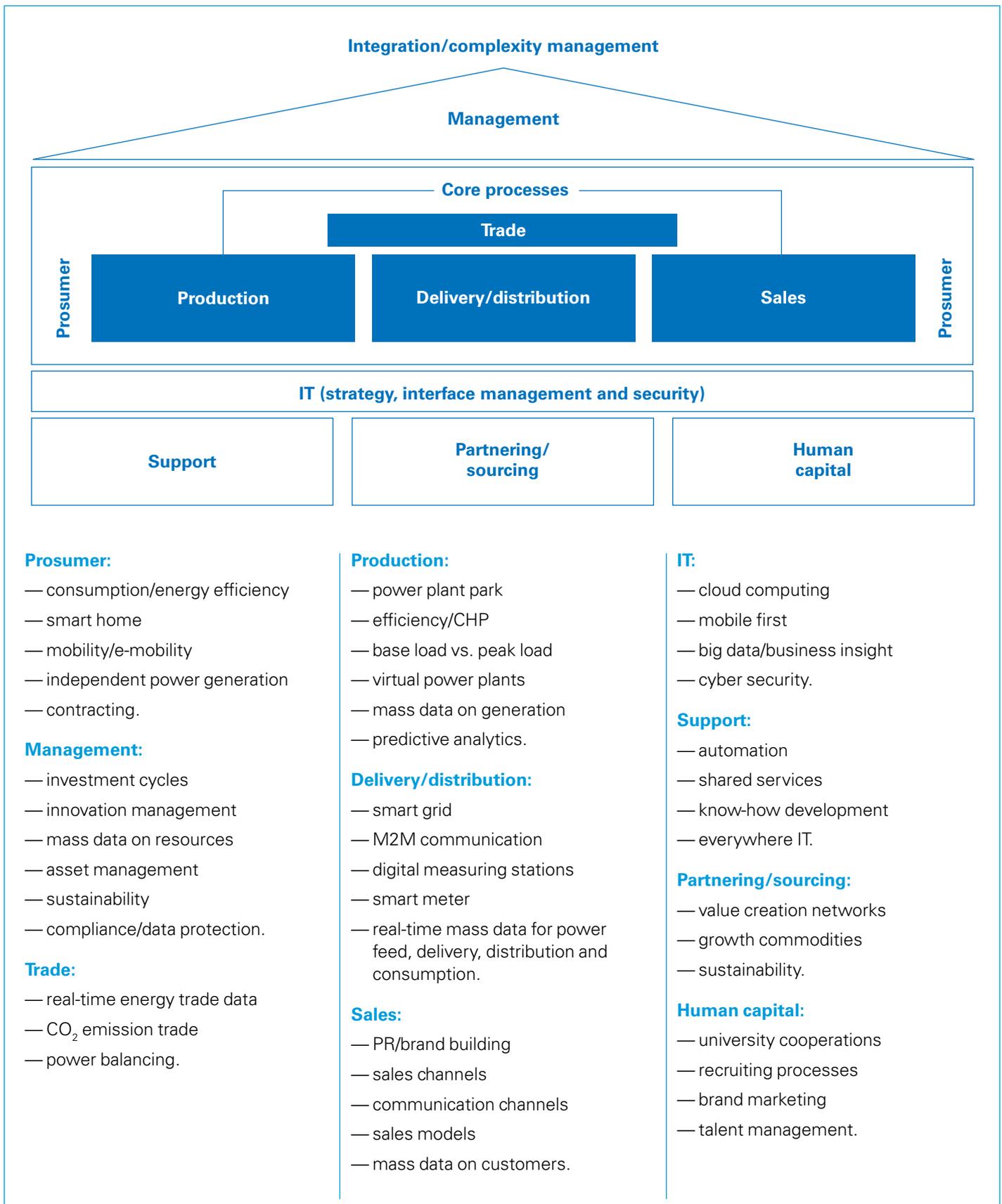
- production of energy resources (oil, gas)
- generation of energy (power plants) and
- energy distribution and energy equilibration (electricity and gas networks, heat and power storage systems).

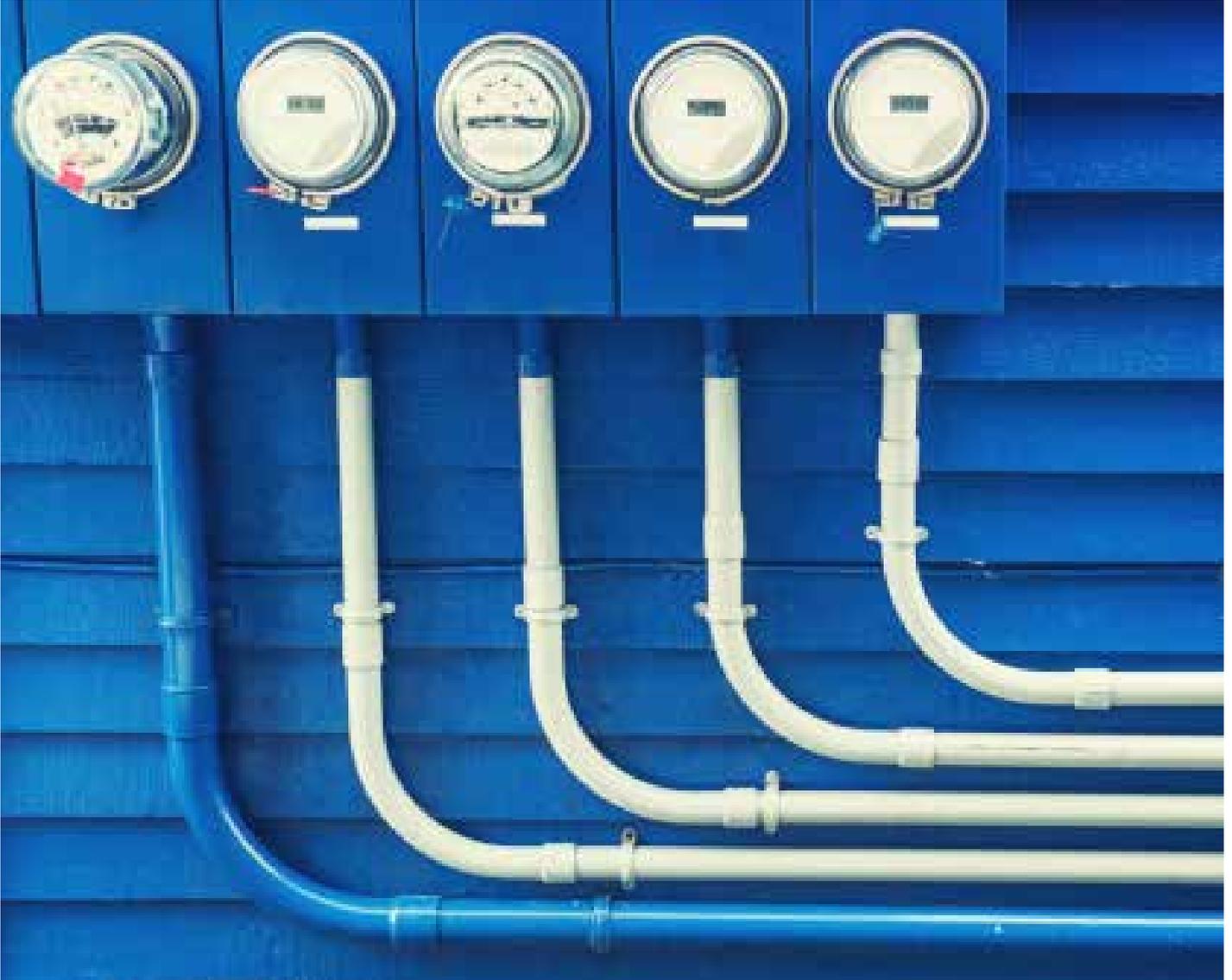
The structure is virtual, since it is primarily comprised of software and intelligent management instead of a predominantly hardware-based solution, as with existing systems. It establishes machine-to-machine communication and enables new connections on all system levels. The information obtained enables new products for distribution and optimization of the hardware: how many new production facilities are needed and where? Where is network expansion necessary? What kind of failures can we expect? This optimization via the virtual network will occur much faster and more dynamically than before.

3. Focusing on communication

During the course of energy transformation and digitalization, there is not only a significant increase in the number of system components and control elements, even communication changes: communication becomes multidimensional. Every actor communicates constantly and in real-time with many other actors in the system. **The goal is to achieve interaction between many producers, balance large-scale geographic regions, match up energy generation and consumption along with orchestrating changing customer requirements and considering the security aspects mandatory for this multi-level dialogue.** This complexity can only be mastered with new forms of communication and sophisticated interface management.

Overview digital transformation in energy supply companies (ESCs)





Transformation is not an option, it's an obligation*

No company can bypass transformation if they want to achieve long-term viability and ensure stable growth. Previous experiences in other industries indicate what is important:

- Intensive analysis with various scenarios, as preparation for all possible developments.
- Identification of enterprise USPs within the arising digital value creation chains, for positioning and presenting potential partners with a distinct profile.
- Flexible processes and systems to enable prompt adjustments in a dynamic environment.

*see also "CEO Outlook 2015"

Successful digitalization challenges and solutions

Companies must now decide which path they want to take:

- adaptation of the existing business model to meet digitalization requirements or
- development of a completely new business model.

As a central premise, these considerations should be based on the following: the digital coordination structure will be responsible for management across the entire energy infrastructure in the future. The German government's current legislative draft on digitalizing energy transformation presents the challenges that the industry will consequently be facing: those companies who are quick to identify, penetrate and develop the segments of the new environment in which their expertise provides added value for the digital energy market of the future, will be successful.

To achieve this, their focus must be placed correctly in the following five dimensions.

1. Value creation: shifted focus

Digitalization, technological advancement and the increasing implementation of artificial intelligence are changing the value creation chains in all industries.

Innovation cycles are becoming shorter, supply chains are more synchronized and the structure of the competitive environment has been transformed into a digital ecosystem. The demand will also be more strongly driven by customer wishes than it had been previously and highly individual products with lot size one will become reality. Digitalization will especially open up new opportunities for services and sales channels on the customer side and will also be a trendsetter for new business models and cost optimization in other value creation stages.

Driven by development in the market, society and technology, value creation in the energy industry is also changing radically and at a rapid pace. Previous centralized business models structured according to assets and raw materials on the basis of relatively few fixed partnerships has shifted to a decentralized,

service-oriented business model with complex cross-industry value creation networks, where the customer has top priority. Companies that structure this shift together with their customers will become the strong companies for energy supply in the future. Digitalization will significantly accelerate this development. It will also go hand in hand with new players conquering the market and boosting the urgency to act.

2. Customers: business and pleasure

Now that customer data is the element of value for the new digital business models, the relationship between companies and customers will be repositioned. As a result, customers now expect to receive added value for the permission of being able to use their data. This added value is usually directly connected to new digital services. For example, analyses of smart meters or digital automation provide each customer conclusive findings on how to optimize their energy consumption and user behavior. The digital energy world should be fun, appeal to customers on an emotional level and be easy to use. After all, many applications will become an inherent part of everyday life and must be easily integrated in routines. Customers also don't want to have to enter into a new agreement for each application.

This requires package solutions and seamless interfaces for the virtual network.

For individual consumers or facility operators, energy use merges with mobile communication technologies (smartphones, smart watches and tablets). This enables facility operators to control their production facilities from any location and intervene in ongoing operations. It also allows consumers to check the energy consumption of their home (smart home) or the energy production of their solar facility from anywhere. In the future, even an electric vehicle can be connected anywhere to be supplied with electricity or to supply stored power. The booking and accounting systems necessary to do this are either provided by the established service station operators, the energy industry or new specialized service providers.

3. New partners: B2B and B2C

The classical borders between customers, business partners and competitors will be blurred in the digital world. A business partner can be both supplier and customer if he feeds energy into the grid on one occasion and consumes it at another time. Today's competitor will be tomorrow's partner for a certain product. Cooperations across industry borders will become a matter of course.

The energy industry can supply a wide range of cooperation offers here: from digital services to marketing, optimization and operations and even financing through leasing and contracting. Because there will be some who do not want to own a production plant or has the necessary marketing resources.

To offer individual solutions for the various constellations, systems and processes must be extremely flexible. A special challenge lies in the delimitation and definition of protected (data) ranges, which are at the core of the new business models. At the same time, interfaces to all other systems and actors must function smoothly. This requires a combination of close cooperation and great transparency.

Each company must consequently define their own USP in the digital ecosystem and position themselves optimally in towards potential partners.

4. Innovation and systems: optimal combination of technology and energy know-how

Innovations and relevant technical systems can currently be supplied by start-ups, established software providers or globally operating web corporations. The energy industry must keep the pace. This can be achieved by the procurement of know-how, cooperations or the optimization of own

innovation processes. The energy industry still clearly has the competitive edge, because for the successful application or implementation of many technologies energy industry knowledge is mandatory. Although new customer processes, like online customer loyalty portals with social media components, real-time marketing or location-based services, supply certain data about the customer, they must first be combined with information from smart meters or automatic home applications before new insights on customer behavior can be gathered. This enables the development of new business models, sales and marketing options. This is where energy companies can apply customer data for value-added use to exploit their competitive advantage.

5. Security: around the clock and at reasonable cost

The virtual dimension, and consequently the dependency on technical systems, creates new dangers: a highly networked, digital energy system is at greater risk of being attacked, manipulated and misused than physical systems. Energy supply is no longer only endangered when there are malfunctions in the physical network, but also when the virtual coordination structure is disrupted. Efficient security solutions (what is necessary and possible at reasonable cost) and continuous monitoring are therefore main tasks. It is possible for the energy industry to apply its know-how and established routines here. This includes keeping track of facility security aspects as well as data security issues related to customer contact.

Lawmakers have already responded to the increased vulnerability with the IT Security Act. This includes more extensive reporting obligations for malfunctions, regular IT audits and the introduction of industry-specific IT security standards.

Your partner to achieve digital transformation

KPMG is a company network with more than 162,000 employees in 155 countries. KPMG is also one of the leading auditing and consulting companies in Germany with around 9,600 employees at over 20 locations.

We have performed cross-segment specialization for key industries in our economy, like the energy industry. In our **Energy & Natural Resources Network in Germany** we pool the industry knowledge of around **300 specialists** from the areas Auditing, Tax Consultancy, Consulting and Deal Advisory. As a result of the acquisition of the Corporate Transformation Group (CTG) in 2014, one of the largest energy consulting teams in Germany was established. This team supports you to identify new opportunities for growth and profitability and to consistently implement these as enterprise solutions.

The international integration is ensured through the **KPMG Global Energy Institute**, which recently opened its European location in Brussels. The goal of the institute is to network companies, trade associations and experts of the energy industry in Europe, the Near East and in Africa and to create a platform for professional exchange. In addition, here is where the expertise of our global specialists is united, which further contributes to the advisory quality of our team.

We will be happy to provide you with further information or answer your questions. Please contact us to speak about the digital future of your business.

Contacts

Michael Salcher

Head of Energy and Natural Resources

KPMG in Germany and

Chair, Global Energy Institute EMA

E: msalcher@kpmg.com

Mario Speck

Partner

Deal Advisory

Energy & Natural Resources

KPMG in Germany

E: mspeck@kpmg.com

Olaf Köppe

Partner

IT Compliance

Energy & Natural Resources

KPMG in Germany

E: okoeppe@kpmg.com

Marc Ennemann

Partner

Head of Telecommunications

KPMG in Germany

E: mennemann@kpmg.com

www.kpmg.com/energyema

kpmg.com/socialmedia



kpmg.com/app



The information contained herein is of a general nature and is not intended to address the circumstances of any particular individual or entity. Although we endeavor to provide accurate and timely information, there can be no guarantee that such information is accurate as of the date it is received or that it will continue to be accurate in the future. No one should act on such information without appropriate professional advice after a thorough examination of the particular situation.

© 2016 KPMG International Cooperative ("KPMG International"), a Swiss entity. Member firms of the KPMG network of independent firms are affiliated with KPMG International. KPMG International provides no client services. No member firm has any authority to obligate or bind KPMG International or any other member firm vis-à-vis third parties, nor does KPMG International have any such authority to obligate or bind any member firm. All rights reserved.

The KPMG name and logo are registered trademarks or trademarks of KPMG International.

Designed by Evalueserve.

Publication name: Innovative interconnections

Publication number: 133122-G

Publication date: January 2016