Hungry for change
Investing in a smarter energy future
The global power industry is transforming; supply crunches, consumer demands for lower cost, regulatory pressures for green generation and a push to harness energy in the most efficient way are all driving a seismic shift for developers, utilities and investors active in the energy industry.

These shifts are the driving forces behind the rise of innovative technologies that aim to boost and safeguard supply as well as satisfy the increasingly tech-savvy consumer. Products such as smart meters and battery storage are becoming an everyday feature for the commercial and residential consumer, while global energy companies adapt their business models to create a more reliable, resilient and sustainable industry.

For these businesses and energy-focused investors, the opportunity is significant. Engaging with the smart energy revolution as it gathers pace offers a new era of energy provision that incorporates a fresh, technology-driven approach to generation and distribution.

As the industry changes, so does the role of its legal advisors. Standard contract and deal solutions are no longer sufficient to respond to the demands of the new energy landscape. At Pinsent Masons, innovation forms the backbone of our approach to our delivery of legal services. As such, we can help you navigate during this period of transformation through the complex web of consents and policy/regulatory pressures that go hand in hand with adapting any business.
Acknowledgements

We would like to thank all respondents for their participation in the survey, as well as the following interviewees for agreeing to be interviewed and providing in-depth insight:

Marco Sick, Director of Strategy and Governance, Vattenfall
Nigel McManus, Head of Eneco Energy Trade UK
Rachel Callaghan, Managing Counsel, Centrica Connected Home
Dr Jonas Danzeisen, Co-founder and CEO, Venios

About Pinsent Masons

With almost 3,000 people operating from 23 offices across four continents, Pinsent Masons is not just one of the world’s largest law firms, but also an organisation which puts excellence in the energy sector at the heart of its vision and strategy.

Our international team is renowned for its sector expertise, gleaned through decades of exposure to all facets of the industry, significant experience of cross-border transactions and project delivery, and the development of a global team which encompasses all legal disciplines.

We will help navigate the likely challenges an energy project may face, including: property, planning and environmental issues, grid connection, power purchase arrangements (PPAs) and participation in markets, corporate structuring, bankability, regulatory issues and taxation. We also advise extensively on construction, procurement, and operation and maintenance agreements.

This, combined with an innovative mindset, is what truly marks our firm out. Our clients use us because we are not afraid to do things differently. That’s just one of the reasons why we were recently named the Most Innovative Law Firm in Europe by the Financial Times.

• Winner – Law Firm of the Year, 2016 Legal Business Awards
• Winner – Law Firm of the Year, 2016 The British Legal Awards
• Winner – Energy and Infrastructure Team of the Year, 2016 Legal Business Awards
• Winner – Infrastructure Projects Team of the Year, 2016 Lawyer Awards
• Winner – Energy & Natural Resources Team of the Year Award, 2014 Legal Business Awards
Methodology

In H1 2017, Mergermarket surveyed 250 senior level executives drawn from 200 businesses (including both energy generation and distribution companies) with revenues over US$1bn, and 50 investment entities, including PE, investment banks, multilateral development banks and sovereign wealth funds. The respondent pool was split evenly between the EMEA and Asia-Pacific regions.

The survey included a combination of qualitative and quantitative questions, and all interviews were conducted over the telephone by appointment. Results were analysed and collated by Mergermarket and all responses are anonymised and presented in aggregate.

Glossary of terms

Utilities: a company that generates and distributes electricity for sale. For this survey, we interviewed utilities with revenues above US$1bn.

Power-to-X: the conversion technology involved in redirecting power surplus, eg. to cope with fluctuations in renewable energy generation. In the survey, respondents were also given the option to choose ‘battery storage’ on its own in order to avoid confusion.

Vehicle-to-grid (V2G): an exchange of energy in which plug-in electric vehicles either return electricity to the power grid or minimize the rate at which they recharge.

Which of the following best describes you?

Utilities

Investors

80%

20%

In which region is your company headquartered?

EMEA

Asia-Pacific

50%

50%

What is the most important industry segment your company/firm focuses on*?

Integrated utility

Electricity generation

Electricity transmission and distribution

29%

28%

24%

*Other 19%

Please specify your business’ main area of focus:

Nuclear

Renewable energy

Fossil fuel-fired generation

A combination of the above

5%

5%

35%

52%

These break down as follows:

Renewable energy

Hydroelectricity

Solar Photovoltaic

Offshore wind

Biomass/Waste-to-energy

75%

10%

6%

1%

Fossil fuel-fired generation

Gas

Hard coal

Combined Heat and Power (CHP)

Coal (ignite)

Fuel oil

70%

10%

13%
Executive summary

Smart energy technologies – which make it possible to generate, steer, store and aggregate disparate sources of power – hold the key to making sense of an increasingly chaotic energy system.

Key players in the energy sector understand that something needs to shift. Based on our survey of 250 executives from 200 electricity generation and distribution companies and 50 investment entities, they are pushing for change. Respondents are embracing technology to build an energy system that is resilient, sustainable and profitable.

Rolling out digitally enabled smart grids with direct end-user communication dominates near-term planning and investment for electricity companies and investors alike in both EMEA and Asia-Pacific. In the long term, respondents envisage the concentration of supply and demand management in the cloud through virtual power plants, particularly in EMEA.

Energy storage technologies – such as batteries, power-to-X and vehicle-to-grid – are also expected to play a decisive role. These technologies should make energy systems more efficient, paving the way to higher levels of end-customer engagement and the prospect of new service models.

Most utilities, however, do not currently have the skills in-house to implement major technological transformations. This is why most are looking for either a joint venture (49% in Asia-Pacific versus 33% in EMEA), an acquisition (28% in Asia-Pacific versus 42% in EMEA) or both to take the next step in smart energy. For 85% of respondents, M&A in the utilities sector is expected to increase over the next 12 months.

As the pace of change accelerates, utilities and investors will be under pressure to spread their investment, often beyond their comfort zone, but how and where varies. For many, legislation and government-led energy policies will be a factor in those investment decisions, either helping or hindering the roll-out of smart energy technologies. Respondents point to the Nordics for its growth potential, but say the Germany and US lead the way in terms of implementing smart energy innovation. Ultimately, smart energy’s evolution is being shaped by these investment decisions as energy businesses and investors search for competitive advantage in an increasingly charged atmosphere of change.
Key findings

**Investors**
- 24% are looking for market-driven price regimes
- 22% are looking for tax breaks
- 46% are looking for access to new technology in their smart energy investments

**Utilities**
- 30% are looking to put their money in smart meter technology/end-user communication (short-term 1-2 years)
- 31% are looking to put their money in cloud-based management systems/virtual power plant (long-term 6-10 years)

**Obstacles to investment in smart energy**
- 28% of investors cite a lack of cohesive energy policy and legislation
- 24% of utilities worry about monopolised electricity markets

**Investment drivers: what’s making them spend their money?**

**Investors**
- 24% ▶ market-driven price regimes
- 22% ▶ tax breaks

**Utilities**
- 18% ▶ feed-in tariffs
- 16% ▶ capacity markets

**Western Europe**
- is the top region for smart energy technology overall

**The Nordics**
- takes the top spot for financial attractiveness for implementation and is rated highest for existing grid infrastructure for implementation

**Germany**
- has the clearest smart energy technology policies and implementation, according to respondents. It is also the top target for investors (34%) and utilities (29%)

**South Asia**
- is rated highest for its growth potential in smart energy technology and R&D

**Top five target countries for smart energy investment**
- 30% Germany
- 20% China
- 14% UK
- 11% India
- 11% Australia
### Smart technology attracts investment

From data analytics to virtual power plants, smart energy technologies are sparking big changes in the way electricity is distributed and consumed. Why are investors and utilities so keen to get their hands on these technologies? And which technologies are attracting the most attention?

The survey shows that the biggest investment driver for investors (46%) and utilities (30%) is access to new technology, offering first-mover advantage, improved profitability, end-customer satisfaction and enhanced brand image.

“We strive to get our hands on such technologies first, which will help us generate solid value for our business and transmission activities, making us more effective and efficient in our dealings,” says the head of finance at a German utility.

Investors are equally enthusiastic: “Smart energy technologies are in solid demand across the globe. Gaining access to these technologies will help our energy portfolio gain significant efficiency, helping improve their performance and our returns simultaneously,” says the managing director of a Singapore-based investor.

Paul Rice, partner and energy sector head for Pinsent Masons’ energy sector team, agrees: “Smaller, more nimble, tech-savvy developers and investors are disrupting the market,” he says. “They see an opportunity to capture business in markets where customers can purchase energy from a variety of suppliers, such as smaller renewable generation paired with battery storage sold through a flexible grid system.”

#### Live wires
Access to new technology is the biggest attraction for both investors (46%) and utilities (30%).

#### Meter money
30% of utilities and 24% of investors are looking to invest in smart meter technology in the near term. Investors are also looking into data analytics over the next 1-2 years.

#### Connecting consumers
Over one third (34%) of respondents expect smart meters to see the biggest roll-out in the near term. Power-to-X comes second with 25%. Cloud-based management systems and virtual power plants are top choice to see the biggest roll-out within 6-10 years.

#### Keeping the lights on
Battery storage will have a strong influence on the UK’s security of supply in the long term according to 28% of respondents.

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some of these technologies – such as smart meters – can be deployed in isolation, the real power of smart technologies is only realised when capabilities are combined. For example, linking smart meters with data analytics and virtual power plants makes it possible to establish a friction-free chain from consumer to producer. The commercial and operational benefits are potentially huge.

“Utilities will look to use smart meter data in their downstream supply activity to understand consumers better, enhance the customer experience and enable new product and service lines,” says Chris Martin, Edinburgh-based technology partner at Pinsent Masons.

“The best ones will also use it in terms of upstream activity to optimise the efficient management of energy supply and demand.”

Smart ecosystems are built one step at a time. In the near term, the majority of respondents (30% of utilities and 24% of investors) are looking to invest in smart meter technology. Government-mandated roll-out programmes are one driver: the EU, for example, has an 80% penetration target by 2020.

“Demand for smart metering technologies across the world is significant. Through our acquisitions, we would be able to target this opportunity to drive returns on our investments,” says a UK-based investor.

Government initiatives are not the only factor driving this interest in smart metering. Consumerisation is also helping to shape the direction of travel.
“People are becoming quicker to adopt technology in different ways at home,” says Andrew Brydon, London-based technology legal director at Pinsent Masons. “Government policy will make smart meters widespread, but, increasingly, other consumer products are available, often linked to and operated from a smartphone. These already provide lots of information to help with usage and efficiency, and will aim to deliver lower energy bills to consumers in the long term.”

Driven by data and beyond
Many utilities see smart meters as a stepping stone for the next wave of tech investments: “Over the next few years, we want to invest in data management companies because we want to develop and use the data we have to improve our services,” says the M&A director of a UK utility.

The survey confirms this view: data analytics and management services are flagged as near-term investment targets by 26% of investors and 20% of utilities.

“We are investing in data analytic capabilities that will help us manage our energy supply investments and other activities more effectively through more insightful understanding of the grids and consumption levels,” explains an Australian investor. “It will also help us identify new opportunities to reduce the price and footprint of our energy generation and supply activity investments in light of controlling the emissions to protect the environment.”

Data analytics are pivotal in the transition to a smarter energy system, according to Britta Wißmann, Dusseldorf-based senior associate at Pinsent Masons: “Without data analytics, none of the other concepts will really help you. If you implement smart meters, for example, you then need data analytics to actually get the benefit out of that investment and to progress towards smart energy in total.”

What do you do with that data? It depends who owns it, according to Ian McCarlie, Edinburgh-based energy partner at Pinsent Masons: “The owner of that data may want to map and sell on that data.

“There is still a question over the ownership of the data in many jurisdictions,” he adds. “In some markets, the data is owned by the businesses that collect the data. Where the companies that own, install and operate smart meters on behalf of energy suppliers also own the data, they are looking for ways to monetise it.”

In the UK, where the energy supplier owns the data, McCarlie points out that energy companies will likely want to partner with data monitoring, management and sales agencies, as well as their smart meter suppliers, to monetise that data.

“There’s still some way to go, but I suspect that will happen quite quickly,” he says. “Can data analysis go so far as to generate targeted energy-saving solutions for customers? Could it produce detailed information, such as a customer using an inefficient boiler? And then suggest a replacement, perhaps a specific brand that would pay for itself in energy savings – and even include a web link to where it can be purchased? You can see how far it could go.

“There are routes to market that can be commercialised quickly if they can be rolled out. Detailed analysis of the efficiency and economy of individual energy usage would be incredibly effective.”
Which type of energy-related smart technology are you looking to invest in?

Utilities

- Battery storage: 10% near-term, 4% long-term
- Cloud-based management systems/Virtual power plants: 2% near-term, 2% long-term
- Mobile applications: 3% near-term, 3% long-term
- Other data analytics/management service: 20% near-term, 14% long-term
- Power-to-X technology: 25% near-term, 19% long-term
- Smart meter technology/End-user communication: 11% near-term, 12% long-term
- Vehicle-to-grid technology: 16% near-term, 12% long-term

Investors

- Battery storage: 14% near-term, 20% long-term
- Cloud-based management systems/Virtual power plants: 2% near-term, 26% long-term
- Mobile applications: 2% near-term, 2% long-term
- Other data analytics/management service: 16% near-term, 16% long-term
- Power-to-X technology: 20% near-term, 26% long-term
- Smart meter technology/End-user communication: 12% near-term, 24% long-term
- Vehicle-to-grid technology: 6% near-term, 8% long-term

“Can data analysis go so far as to generate targeted energy-saving solutions for customers? Could it produce detailed information, such as a customer using an inefficient boiler? And then suggest a replacement, perhaps a specific brand that would pay for itself in energy savings – and even include a web link to where it can be purchased? You can see how far it could go.”

Ian McCarlie
Pinsent Masons
As for other investments, ‘power-to-X’ technology – the conversion tech involved in redirecting surplus power to cope with fluctuations in renewable energy generation – is surprisingly popular.

A quarter of utilities and a fifth of investors say they are looking to invest in this area over the next one-to-two years. This model hinges on having a useful destination for surplus electricity. Electrolysis is one example, with electricity used to produce hydrogen. Surplus electricity can also be used to heat water.

District heating networks are another possible power store. These are widespread in northern Europe and have huge thermal storage potential, with capacities in millions of litres. However, some policy barriers – such as Germany’s Renewable Energy Sources Act (aka the EEG levy) – effectively rule out the systematic diversion of surplus green electricity for this purpose.

Battery storage scores particularly low among utilities in the short term, with just 4% looking to invest in the next couple of years. Investors are more enthusiastic: 14% say they are looking to invest in battery storage in the short term, rising to 20% in the long term.

Market and regulatory barriers may be a factor: in the EU, energy storage is typically treated in the same way as generation, which means some utilities can’t provide it as a separate service for additional revenue. Regional issues also play a part: in the UK, for example, where storage could improve security of supply, 19% of utilities and investors say they are considering an investment in the near future.

Long-term, cloud-based management systems and virtual power plants (VPPs) top the list as potential investments for both investors (26%) and utilities (31%). Respondents make it clear that cloud/VPP is a destination, not a starting point: of the respondents with cloud/VPPs as a long-term target, almost 90% had plans to invest in technologies such as smart metering, data analytics and mobile apps in earlier investment cycles.

**Tech talk**

Which smart energy technologies will see the biggest roll-out? Near-term findings are broadly in line with respondents’ investment plans: smart meter technology is the clear leader (34%), followed by power-to-X (25%).

“Power-to-X technologies will improve the way companies save electricity and use it later,” says the head of strategy at a German utility. “These, along with the development of efficient batteries, will allow the energy to be better used.”

Looking to the long-term, cloud-based management and VPPs also enjoy a decisive lead in our survey, with nearly a third (32%) of respondents believing these technologies will see the biggest roll-out over the next 6-to-10 years.

“Businesses have, over the years, spread their wings into new production and distribution units, which they are finding difficult to control individually,” says the head of strategy at a Spanish utility. “They are looking to develop virtual power plants that will enable them to effectively control the production, storage and distribution from various locations under one single roof and platform.”

Respondent opinions are mixed with regard to the long-term prospects for other smart energy technologies, all of which trail a long way behind VPPs. Battery storage comes second with 16%, closely followed by power-to-X (15%), vehicle-to-grid (12%) and data analytics (12%).
“In Germany, wind turbines are currently switched off when the grid is overloaded. One solution would be to locate battery storage close to wind farms and to use this energy to feed battery storage.”

Dr Torsten Wielsch
Pinsent Masons

While regulatory barriers remain, interest in battery storage is gaining momentum. Stand-alone battery energy storage systems (BESSs) meet two basic needs: First, maintaining power quality: batteries help balance grid output by ironing out any frequency changes caused by rapidly fluctuating renewables input. The second need is storage, as Dr Torsten Wielsch, Dusseldorf-based energy partner at Pinsent Masons, explains: “In Germany, wind turbines are currently switched off when the grid is overloaded. One solution would be to locate battery storage close to wind farms and to use this energy to feed battery storage. In the past, if you fed energy into batteries, you had to pay a renewable energy levy. This made it expensive to operate. Since the revision of the German Renewable Energy Act came into force on 1 January 2017, subject to certain conditions, the energy fed into batteries is exempt from the renewable energy levy. However, the exemption only applies to a part of the stored energy.”

Battery projects, based on lithium-ion technology similar to that used in mobile phones, are nevertheless gaining momentum. In May 2017, energy business Element Power completed the sale of its 25MW battery storage project in north-east England to Enel, the Italian utility. The system will initially provide enhanced frequency response services to National Grid. It is seen as an important pathfinder project by Enel, which plans to use the experience it gains to develop similar schemes in other markets.

In April 2017, Japan’s Mitsubishi Corporation and Netherlands-based Eneco Group announced a joint venture to provide services based on a large-scale BESS to be constructed in northern Germany. This will provide capacity reserve and balancing services for renewables.

Mitsubishi and Eneco also plan to use the giant battery to boost the value of jointly run offshore wind projects. The system has a capacity of more than 50MWh – equivalent to the energy stored in more than eight million smartphone batteries.
Could smart energy keep Britain's lights on?

Security of supply is a particular concern in the UK, due to ageing power stations, reliance on imported energy and the growth of intermittent renewable generation.

All of this is taking place in the midst of significant political uncertainty around Brexit, access to the European single energy market, Scottish independence, the relationship between Northern Ireland and the Republic of Ireland, as well as potential tariff and non-tariff barriers. These have the potential to complicate the energy market, not only between the UK and Europe, but also within the British Isles.

Mitigating these risks means finding ways to improve the resilience of the system. Smart energy technologies will play an important part by influencing demand and providing short-term energy storage.

Near-term, 38% of respondents see smart metering as the main measure for security, because of its power to influence consumption: “Smart metering not only increases consumer awareness of their energy usage, it also helps them control that usage,” notes a UK investor.

Power-to-X is also seen as a promising short-term candidate for 29% of respondents, followed by vehicle-to-grid (19%) – which has the potential to tap into the battery storage of the UK’s estimated 100,000 plug-in cars. Only 5% of respondents see stand-alone battery storage as a likely near-term solution.

Looking to the long term, virtual power plants (30%) top the list, with battery storage getting a similar vote of confidence (28%).

“If more storage facilities are developed within the UK itself, it will take care of both external imports and more security of supply since better technologies will efficiently take care of operational and security concerns,” says the M&A director of an Italian utility.

What smart energy technology/initiative will have the most significant impact on security of supply/reduce net imports of energy into the UK?

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<th>Technology/Initiative</th>
<th>1-2 years</th>
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INSIGHTS

Vattenfall is one of Europe’s largest generators of electricity and the largest producer of heat. Vattenfall AB, its parent company, is wholly owned by the Swedish state and employs 20,000 people. Here, Marco Sick, Director of Strategy and Governance at Vattenfall, explains how the company is responding to the changing energy landscape.

Q. What competitive pressures do you face?
The whole industry is in a bit of turmoil. Margins are shrinking and there’s a growing focus on customers and new technology. We are also seeing new players. On the one hand, it’s small companies – start-ups – coming in and setting trends. On the other, banks and insurance companies are moving in because onshore wind is now something you can do off the shelf – you don’t need utilities to do this anymore. You’re also seeing the Googles and Apples of this world coming in. And now we’re seeing oil majors looking for new value pools, especially in electricity.

Q. How do you respond to those pressures?
The first thing is putting the customer at the centre of what we do. The second is to test and experiment a lot more: power-to-heat is an example. We’ve also taken the decision to invest heavily in offshore wind – this is a high-risk activity with high-returns. As a large and experienced energy company, we are well adapted to dealing with complexity of this sort.

Q. How is Vattenfall using smart energy tech?
Most of our projects over the past few years have a component of data management and data analytics in them. To an extent, it’s getting away from pure infrastructure. In the case of offshore wind, a lot of it is about big data: you need massive data models to run wind farms efficiently and effectively.

We have gigantic volumes of data from smart meters and we’re starting to use that to make sense of patterns and to react to those patterns, and also to offer new products. Once you have smart data, you can steer households a bit more intelligently. The even bigger lever is that you can steer generation if you know customer behaviour better.
CHAPTER 2

Power map

The Nordics top the league for financial attractiveness, while Germany sets the standard for smart energy implementations in Western Europe.

The survey reveals marked differences in regional attractiveness when it comes to making smart energy investments. As Paul Rice at Pinsent Masons points out, “Many energy companies and investors are looking to new markets and opportunities for future growth and revenue for much lower capex.”

The Nordics take the top spot for financial attractiveness for implementation, due to strong support by domestic banks and a commitment by governments to promote renewables.

“The Nordics are not only ahead in the technology bit, but their policies are also the best,” notes the managing director of an Australian investor.

“They have gradually changed their energy consumption and have successfully achieved their transformation targets, which are just increasing year-on-year as their policies are in favour of consumers. Businesses are benefiting either way with growth and rising interests of new consumers.”

South Asia also ranks highly, drawn in part by the government’s commitment in India to expand renewables to more than 24% within ten years and the development of smart grid projects.

“The government of India is currently the most proactive in providing attractive investment benefits to international investors investing in renewable energy and smart energy initiatives. The government’s intentions are to drive the use of renewable energy to overcome the significant expenditures it makes on procuring energy from outside the country,” says the CFO of an Indian utility.

Western Europe overall – and Germany in particular – is seen as having solid growth potential for smart energy technology and R&D: “There have been new R&D facilities that have been set up in Germany where large utility businesses, power generators and technology businesses are getting together to plan and plot the future of the energy sector, and this platform is giving them significant growth scope in the smart energy technology testing and piloting.”

“The Nordic region has significant technological potential to fulfil its R&D requirements effectively,” says the MD of a UK-based investor. “Countries such as Norway and Finland have mastered this technology, which is being deployed across the European region. Business partnerships are emerging in this region to drive the level of development. I would say that significant growth potential for continued R&D exists in this region.”

Growth potential

The Nordics are also singled out as the region with the greatest growth potential for smart energy technology and R&D – a reflection of the region’s leadership in smart energy technology testing and piloting.

Northern lights

The Nordics take the top spot for financial attractiveness for implementation, with domestic banks giving strong support to smart energy schemes. It also ranks top among respondents for its existing grid infrastructure for technology implementation.

Bright sparks

Western Europe is the leading region for smart energy technology for 34% of respondents, followed by the Nordics (26%). Within Western Europe and globally, Germany stands out as a leader according to 21% of respondents.

Grids unlocked

Given the strong permeation of telecommunications infrastructure and the need for grid modernisation in South Asia, this region scores highest in its growth potential in smart energy technology and R&D.
energy technology business,” says the managing director of a Nordic investor.

Although Asia fares less well for R&D attractiveness according to our survey, the need – and opportunity – for smart energy deployments is likely to grow. Several Asian states now face an energy dilemma: on the one hand, they need to reduce their growing reliance on energy imports; on the other, they need to cater for rapidly growing domestic power demand. Smart energy tech is a potential lifeline.

“I would say there is significant potential for R&D in Asian countries,” says the MD of a Singapore-based investor, who points to the fact that many Asian states are struggling with energy procurement. “Their economies are being impacted negatively, which they are intending to control by making energy supply and demand more efficient through smart energy technology.”

Despite its modest ranking, the Middle East has potential for smart energy growth, though it’s a complex and sometimes volatile landscape. The lack of competitive markets for electricity acts as a brake on innovation but the region has huge renewable potential. GCC countries lie in the global sunbelt and governments are really waking up to the opportunity. Energy market reforms across the region, particularly the dismantling of subsidies, could spur smart energy initiatives.

Sachin Kerur, Head of Middle East and energy partner at Pinsent Masons, sees opportunities opening up in the region: “We’re seeing a clear steer from government, with

“Many energy companies and investors are looking to new markets and opportunities for future growth and revenue for much lower capex.”

Paul Rice
Pinsent Masons
policies such as the Dubai Clean Energy Strategy 2050. You also have drivers in terms of demographics, growing demand for energy and the fiscal challenge of falling oil prices. All of these factors are driving diversification across the energy sector and that’s where the opportunities arise.”

Asia lags behind the Nordics in terms of financial attractiveness and existing grid infrastructure but it ranks highly with respondents when it comes to R&D. South Asia tops the table, with ASEAN in third place for growth potential for smart energy technology/ R&D – ahead of both the Nordics and Western Europe. The strong permeation of telecommunications infrastructure is a key factor.

“The south Asian and ASEAN countries are looking promising to invest in,” says the managing director of a Singapore-based investor.

“Significant advancement in information and telecommunications have been achieved in recent years and these capabilities are now being utilised to make the energy sector dealings more effective.”

Asked to name the region they believe is leading the way in smart energy technology, 34% of respondents point to Western Europe, followed by the Nordics (26%).

“Technological advancement in [Western Europe] is significant and the sheer belief that this technology could help transform the energy industry has got many businesses involved in R&D,” says the finance director of an Italian utility. “This will increase the success rate of innovation being transformed into widely used technology solutions for the utility sector.”
Countries around the world are earning reputations as shining lights in smart energy technology.

Germany stands out as a smart energy leader, according to 21% of respondents. The government’s commitment to decarbonise power generation and phase out nuclear plants in the wake of the Fukushima nuclear disaster have led to a radical shake-up of the system, under the policy known as Energiewende (energy transition). This is the biggest programme of its sort yet seen in a developed nation.

“Germany’s energy policies are the main reason for transformation from traditional to smart energy technologies,” says the director of finance at a German utility. “They focus on making energy supply more efficient and cleaner by reducing the level of emissions through smart energy solutions. Their feed-in-tariffs are a big encouragement to the public to adopt new smart energy technologies sooner, which has been a big success so far.”

The United States is highlighted as a smart energy leader by 18% of respondents, followed by China – the world’s biggest market for electricity infrastructure and smart grid technologies – at 14%. China’s light-touch regulation and generous financial incentives are among the factors cited by respondents.

“Rules are not very strict and companies developing smart energy solutions and technologies have been getting tax incentives and help from the government in Switzerland,” observes the head of finance at a Swiss utility. “Subsidies have also been provided and loans are provided at lower rates to these companies to help increase the number of investments in smart technologies.”

Norway – where 99% of all power generation is hydropower – is regarded as a tech leader by 11% of respondents. “Norway’s utility service providers have already fulfilled their implementation targets across their domestic consumer markets and are now assisting other regions in their smart energy initiatives,” says the M&A director of a Nordic utility. “The level of development they have achieved in this space is considerable and widely recognised by utility businesses across the globe.”
Asia fares less well in the leadership stakes; monopolised markets in many countries mean there’s little incentive to invest in technology.

“The reforms we have seen in the electricity supply industry in Europe and elsewhere over the past 30 years have not really taken root in much of Asia, despite much discussion,” says John Yeap, partner at Pinsent Masons in Hong Kong. “The two key exceptions are Singapore and the Philippines. There are pockets of reform in Japan, Korea and China. Otherwise, markets are largely dominated by state-owned utilities. This limits the scope for private sector participation in the electricity supply industry.”

“Countries without sufficient existing generation, distribution and supply – and that could apply to a lot of Africa and south-east Asia – face a significant dilemma: how can they bring their entire energy industry up to spec while ensuring it is as nimble and flexible as it can be?

“Based on our survey, many in Asia-Pac are looking to add smart energy solutions to traditional energy generation and supply as and where they can. In other words, they’re looking to leapfrog the energy industry’s evolutionary stages, which the UK and northern Europe have already gone through.”

Paul Rice, Partner, Pinsent Masons
Eneco Group is a Rotterdam-based integrated energy business, with operations ranging from wind farms to energy trading. Eneco provides energy to more than two million customers and is active in the UK, Germany, France, the Netherlands and Belgium. **Nigel McManus, Head of Eneco Energy Trade UK**, explains why smart energy technology is so important for the company.

**Q. What compliance issues do you face? What role does energy trading play in driving the transition to renewables?**

Trading departments influence some of the decisions of its clients and we typically prefer to engage in open and competitive markets. This is essential for renewables where the market allows for product differentiation and between markets. Compliance issues abound, for instance, around the use of interconnectors and trade reporting.

**Q. What trading pressures are you dealing with?**

If you participate in certain sectors of this market, then you accept some pressure on your margins. We’ve seen margins reduce in both supply and generation – all trading businesses recognise this in free markets – so you reduce your costs and look for ways to become more efficient. We have outsourced some of our settlement processes and data management activities to specialist providers.

**Q. Which smart energy tech is relevant to the Eneco Group?**

We are seeking out and contracting with virtual power plants. We already have a mobile application: an electric vehicle charging service called Jedlix. I think we’ll see more mobile applications in due course. We’re investing in data analytics and we are also talking to developers and clients about battery storage.

**Q. Why does battery storage matter?**

A big growth area for Eneco is ‘flex’ markets – the ramping up and ramping down of assets. Batteries are a natural fit for this activity, not only in terms of flexing the energy at a site, but also by participating in ancillary service markets. One aspect of this is frequency response, making up for the grid being short of inertia because of coal-fired power stations leaving the network.

**Q. What are the group’s expansion plans?**

We have taken a 50% share in LichtBlick, which is Germany’s largest independent supplier of renewable energy. We have also taken a 34% stake in the German aggregator Next Kraftwerke. This is one of the biggest virtual power plants in Europe. And we have taken the Belgian power and gas supply part of Eni’s business. We are also partnering with Mitsubishi Corporation to construct EnspireME – the largest battery system in Europe.
Respondents were asked to rate the following on a scale from 1-10, where 10 was the most attractive:

- Financial attractiveness for implementation
- Growth potential for smart energy technology/R&D
- Existing grid infrastructure for technology implementation

Attractiveness for smart energy projects across various regions:

- **North America**: 8.26, 8.44, 8.37
- **Western Europe**: 7.50, 7.60, 8.34
- **Nordics**: 8.39, 8.18, 8.94
- **North Africa**: 5.76, 6.19, 5.21
- **Sub-Saharan Africa**: 6.17, 6.54, 5.00
- **Middle East**: 7.03, 7.35, 6.40
- **South Asia**: 8.33, 8.64, 7.38
- **Australia & New Zealand**: 7.66, 7.71, 7.71
- **ASEAN**: 8.17, 8.34, 7.78
- **CEE/SEE**: 6.45, 6.91, 6.11
- **Northern/Central Asia**: 6.01, 6.14, 5.39
- **Latin America**: 6.82, 7.00, 6.47
- **Southern Africa**: 5.90, 6.35, 5.40
- **South America**: 6.34, 6.71, 6.00
- **Southern Europe**: 6.07, 6.51, 5.30
- **New England**: 6.92, 7.11, 6.54
- **North Asia**: 5.82, 6.19, 5.21
Top 15 countries with clear smart energy policies (Respondents select all that apply)

- Germany: 71%
- UK: 65%
- Sweden: 63%
- Norway: 56%
- USA: 55%
- Denmark: 53%
- Switzerland: 47%
- France: 43%
- Finland: 40%
- Netherlands: 34%
- South Korea: 27%
- Singapore: 26%
- Canada: 26%
- Japan: 24%
- China: 22%

“The Nordics are not only ahead in the technology bit, but their policies are also the best. They have gradually changed their energy consumption and have successfully achieved their transformation targets, which are just increasing year-on-year as their policies are in favour of consumers. Businesses are benefiting either way with growth and rising interests of new consumers.”

Managing Director
Australian investment firm
CHAPTER 3

Smart money

Germany is the number one destination for investors in search of smart energy opportunities, with China not far behind.

Germany’s vast energy landscape is a powerful draw for investor respondents, with 34% looking to make an investment or acquisition in the country. However, global investors are also keen to explore opportunities in China (30%) and Australia (26%). For utilities, the preferred investment destinations are Germany (29%), China (17%) and the UK (12%).

Leading lights
Abundant opportunities and easy exits are among the factors that make Germany a favourite with investors, according to our survey: “There are buyers in the market, which will make exiting easy. And because of the stability of the market, investing in the German market will reduce risks,” says the managing director of a Belgium-based investor.

The collision of declining wholesale electricity prices and rising costs in many European markets, particularly Germany, has contributed to the deterioration in the financial position of utilities. This, in turn, is sharpening their appetite for tech deals as they race to develop new capabilities.

“Traditional utilities – including the big ones – are looking for new business areas,” says Dr Torsten Wielsch, partner at Pinsent Masons. “Declining returns from electricity sales means they are trying to expand into other business fields, and one of these is smart energy companies such as software developers.”

Technological innovation, lower market entry costs and high rates of return are named as China’s major draws by both investors and utilities.

“We are focusing on APAC as we see significant opportunities for investment through which we can drive innovation in smart energy technologies and facilitate more implementation with government support,” says the managing director of a Singapore-based investor. “We are looking to secure technological assets from China through effective minority and majority stake acquisitions. This will help us gain access to

Headlines

Top targets
34% of investors aim to make their next smart technology investment in Germany or are exploring acquisition options. Investors are also keen on China (30%) and Australia (26%). For utilities, the preferred investment destinations are Germany (29%), China (17%) and the UK (12%).

In the pipeline
Close to half of all investors in the survey are looking to make an investment in smart energy technology of between US$101m and US$250m over the next one-to-two years. 44% are looking to invest between US$251m and US$500m over the next three-to-five years.

Innovation appeal
The level of existing technological innovation in a country is the greatest attraction for both utilities (28%) and investors (26%). Notably, but not surprisingly, investors are looking for greenfield opportunities in energy infrastructure (28%).
In which country are you looking to make your next smart technology acquisition/investment? (All that apply)

- **Germany**: 29% (Utilities), 34% (Investors), 30% (Total)
- **China**: 17% (Utilities), 30% (Investors), 20% (Total)
- **United Kingdom**: 12% (Utilities), 22% (Investors), 20% (Total)
- **Australia**: 14% (Utilities), 22% (Investors), 26% (Total)
- **India**: 11% (Utilities), 11% (Investors), 12% (Total)
- **USA**: 11% (Utilities), 12% (Investors), 10% (Total)
- **Switzerland**: 8% (Utilities), 9% (Investors), 12% (Total)
- **Singapore**: 5% (Utilities), 9% (Investors), 16% (Total)
- **Japan**: 7% (Utilities), 7% (Investors), 10% (Total)
- **Italy**: 2% (Utilities), 8% (Investors), 7% (Total)

"Traditional utilities – including the big ones – are looking for new business areas. Declining returns from electricity sales means they are trying to expand into other business fields. And one of these is smart energy companies such as software developers."

**Dr Torsten Wielsch**
Pinson Masons
What makes a country attractive for investments in smart energy technology? (Select the most important)

- Existing technology
- Greenfield opportunities for energy infrastructure
- Favourable demographics/demand outlook
- Stable regulatory framework/cohesive national energy policy
- Stable subsidy regime
- Funding opportunities
- Favourable tax regime
- Robust outlook for electricity wholesale prices
- Market-driven wholesale electricity price mechanism

- Less than $100m
- $101m-250m
- $251m-500m
- $501m-1bn

- Next 1-2 years
- Next 3-5 years

What range of investment are you looking to make in smart energy technology over the next few years? (Investors only)

- $251m-500m: 48%
- $101m-250m: 44%
- Less than $100m: 32%
- $501m-1bn: 12%

- Next 1-2 years: 28%
- Next 3-5 years: 26%

Just over one-in-five investors (22%) is looking to make their next smart technology investment in the UK, although it’s a less popular target for utility investors (12%).

“We see tech investors and VCs – the classic high-risk, high-growth investors,” says McCarlie of Pinsent Masons. “Some of the utilities do have technology arms or they may have invested some money in technology ventures, but their risk appetite is less. You may find that people leave established businesses and set up on their own, get seed funding, get some IP protected and then they may attract a VC and then the VC will want an exit.

“The utility buyer is perhaps that route to market because, at that point, the utility looks to acquire a new and developing business to bolt on.”

Investment planning

Nearly half of all investors in the survey are looking to make an investment in smart energy technology between US$101m and US$250m over the next one-to-two years. 44% are looking to invest between US$251m and US$500m over the next three-to-five years.

Investment opportunities abound as start-ups race to gain market share on the back of technological breakthroughs.

“These businesses require significant capital investment to take their discoveries forward,” notes the managing director of a Nordic investor. “We are analysing these businesses more carefully and, based on their growth potential, are investing the required capital in their business to gain fruitful returns in the future.”
Among the capabilities attracting investor attention are connectivity and big data applications: “We see significant demand for effective communication and data analytics tools that will enable service providers to offer competitive tariffs and will also increase the level of efficiency in their supply activity through real time data analysis and actions,” says the managing director of a UK-based investor.

**Attractive targets**
The level of existing technological innovation in a country represents the greatest attraction for both utilities (28%) and investors (26%).

One investor points to the advantages of not having to start from scratch: “Existing technologies help in building new upgrades as it gives the innovators better clarity and understanding with regards to new requirements and possible improvement areas,” says the partner of a Singapore-based investor.

Respondents also highlight factors such as existing IT infrastructure, skills and technological support. As the finance director of a Polish utility points out, the availability of robust and cutting-edge technology in the target country would be a big attraction, giving access to new capabilities that would complement existing skills and add new functionality.

“In addition, we would also have a chance to grow a market share in a new region and benefit from a fresh customer base,” he adds. “This would help to increase the lifespan of our business and allow our firm to grow.”

Investors are also attracted by greenfield opportunities in energy infrastructure (28%): “Altering existing infrastructures is not only tedious but also very cost incurring,” says the head of strategy with a Nordic investor. “It does not serve the purpose of smart energy as it is unable to perform the way it is expected. Greenfield opportunities for energy infrastructures will help utility service providers gain more effectiveness in setting up smaller but new infrastructures in the start, and the developments can be upgraded with the rising demand.”

**Disruption in sight?**
Much of the debate around smart technology focuses on utilities acquiring new technological capabilities. Could tech giants seek to acquire incumbent energy suppliers to get access to customers and – more importantly – terabytes of smart meter data?

In Europe, the prospect of uber-fication seems remote for the time being. One reason for this is that supply licences restrict what can and cannot be done with smart meter data. Another is the increasing tendency of governments to intervene in market operations.

In Asia-Pacific, energy markets lag some way behind Europe and energy in many states remains the monopoly of state-controlled utilities. But there are signs of change.

“In Hong Kong, we have seen attempts by disrupters coming into the market and shaking up the existing utilities but they’ve generally found it difficult,” says John Yeap at Pinsent Masons. “I think the country to keep an eye on is Singapore, which is fully liberalising its electricity market. The other country driving most of this thought of ‘Uber-fication’ in Asia is – quite surprisingly – Japan. It has recently deregulated its power retail industry.”

John Yeap
Pinsent Masons

“I think the country to keep an eye on is Singapore, which is fully liberalising its electricity market. The other country driving most of this thought of ‘Uber-fication’ in Asia is – quite surprisingly – Japan. It has recently deregulated its power retail industry.”
Q. What compliance issues do you face?
We’re moving from being a product-based business to a service business. Moving to a subscription model puts us within the remit of the Consumer Credit Act and the Financial Conduct Authority in the UK. Other compliance issues relate to data protection and the need to protect our customers’ data, which is of paramount importance to us.

Q. How do you manage risk?
We have strict requirements in terms of how we protect our customers, because that’s the key risk for this business. All of our sensitive customer data is encrypted and stored securely, and our systems include multiple layers of protection. Encryption is not the only answer, of course – we also hire highly skilled security specialists in device and platform hacking. Everything is protected by device certificates and ongoing security improvement programmes. We are also members of a data security task force (the DCMS Security Expert Advisory Group).

We’ve found that when we use customer data to benefit them – for example, to suggest more efficient ways to heat their home or to link up products to communicate to each other to make a home more comfortable – customers are happy to share their information.

Our other risk is around IP. Patent trolls, which are very common in the US, are becoming more prevalent in the UK market. For Centrica, IP is a key group asset which we will actively register and protect.

Q. What approaches are you adopting to help drive expansion?
We see M&A playing an important role in our growth ambitions. For example, we acquired Flowgem in 2016 to bring a unique and patented leak device into our portfolio. We are proactively pursuing opportunities that will help us accelerate our capabilities across all areas of our business, including for new devices, commercial IP and services.

We will also continue to invest in our Internet of Things platform, known as Honeycomb, to support the shift to services-based features and subscriptions, as well as the increasing numbers of devices per customer and third-party integrations.

We will continue to invest in building our data analytics and machine-learning capabilities, to support data and insight productisation. We also think there are significant opportunities in home energy management (e.g. integration of home generation and storage solutions alongside demand response capability) and in extending our capabilities in peace of mind.

Q. Centrica’s subsidiary, British Gas, has a long relationship with UK customers. Does that help?
We’re used to being in people’s homes. One of the benefits when Centrica Connected Home started was having a trusted British Gas engineer going in and sorting out this new technology. It’s very helpful.

Centrica plc is a multinational utility with operations in the UK, Europe and North America. It’s also one of the leaders in connected home technology in the UK, marketed under the Hive brand by its subsidiary Centrica Connected Home. Hive products allow users to manage heating, lights, sensors, etc. from a smartphone or tablet. The Hive brand is already established in the UK, Ireland and North America and will shortly launch in Italy, as Rachel Callaghan, Managing Counsel, Centrica Connected Home, explains.
Eye on utilities

Utilities are hungry for technology deals, with 90% on the lookout for a joint venture, an acquisition or both as they adapt to the changing sector landscape.

Smart technologies not only allow utilities to get the most out of intermittent renewable energy, but also to capture new revenue streams through offerings such as home automation.

The opportunity is potentially huge: many utilities have the kind of longstanding relationships with customers that most businesses can only dream of, as well as a physical connection to people’s homes.

Team up or buy?
For most utilities, building new technological capabilities is achieved through partnerships or acquisitions, rather than in-house R&D.

Joint ventures find favour with 41% of utilities, due in part to a shortage of suitable acquisition targets in some territories. The onerous compliance requirements that go with M&A also play a part for some: “Joint ventures and strategic partnerships demand less compliance and provide both sides of the business with effective skills and capacity requirements required to facilitate growth,” says the head of finance at a German utility.

The appetite for JVs varies by region: almost half (49%) of utilities in Asia-Pacific are enthusiastic about partnerships, compared with a third (33%) in EMEA.

Are you planning to partner with or acquire a technology company to take the next step in smart energy grid technology? (Utilities only)

- Yes, we are planning a joint venture: 41%
- Yes, we are planning an acquisition: 35%
- Yes, we are planning both acquisitions and joint ventures: 14%
- No: 10%

“We are unlikely to make any acquisitions at this moment, but are looking to enter joint ventures with one of the largest and most effective digital technology businesses to help us with our transformation and provide suitable advisory to the strategies we execute,” says the strategy head of a Philippines-based utility.

Another, a Gulf-based utility, is looking to partner with a German technology service provider: “That will help us align our back-end infrastructure and IT communications to make our smart grids more effective in terms of
performance and data insights,” says the company’s smart grid strategy director. “These facilities would also help make our supply and production more efficient.”

Acquisitions are favoured by 35% of utilities. Of these, almost one in two of the firms (47%) envisage investing in assets in the US$50m-US$100m bracket, with 38% looking to spend US$101m-US$500m.

Even in niche markets, such as smart energy, there’s a perception that tech valuations are high – a point noted by several respondents.

“These technologies are not cheap and we are aware of this,” says the head of strategy at a Belgian utility, which expects to invest up to US$500m on smart technology. “For this reason, we would be willing to pay large amounts to acquire a few smart energy technologies to boost our growth.”

R&D divisions

Many utilities admit to being cautious about investing in smart energy R&D in-house. The majority (62%) say they will not be doing so, due to everything from high set-up costs to a scarcity of talent.

“We do not have sufficient capabilities to develop smart energy products in-house,” says the head of strategy at a Russian utility. “We are currently working with third-party vendors and technology solution providers to help us with all our requirements. Technical R&D is very time-consuming and expensive, so we do not plan to enter that market as it will increase the risk to our business.”

For the utilities that are opting for in-house R&D, 65% are looking to develop smart meter/end-user communications technology, with 38% planning investments in the complementary field of data analytics.

The CFO of an Indian utility points to the benefits of developing smart energy products in-house: “There are very few market players who are capable of doing this in our domestic market and we are taking the first steps that would have a positive impact on our business financials and position in this sector.

“With the help and support of the government we will innovate new, effective technological tools and gadgets that will help conserve energy and will also impact our economy positively to some extent.”

To survive in future markets, Andrew Brydon, London-based technology legal director, Pinsent Masons, says that utilities will have to adapt the way they operate and how they develop products.

“Companies are increasingly looking to attract or empower people with new and complementary skills – perhaps by launching a new division,” he says. “Alternatively, an acquisition could help shape their future plans.”
If you are investing in smart energy products in-house, which technologies are you focusing on? (Utilities only)

- Smart meter technology/End-user communication: 65%
- Other data analytics/management service: 38%
- Power-to-X technology: 30%
- Mobile applications: 29%
- Cloud-based management systems/Virtual power plants: 25%
- Battery storage: 23%
- Vehicle-to-grid technology: 14%

If planning an acquisition in smart energy technology, what asset size are you considering? (Utilities only)

- $10m-25m: 1%
- $26m-49m: 12%
- $50m-100m: 47%
- $101m-$500m: 38%
- $500m+: 2%

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Andrew Brydon
Pinsent Masons
Both volume and value in global energy and utilities M&A have grown steadily over the past four years, according to Mergermarket data, with annual deal values doubling to approximately US$300bn in 2016 from US$150bn in 2012. Deal volumes have also risen significantly, from 527 in 2012 to 763 in 2016, an increase of 45%.

Robust performance at the start of the year suggests that 2017 will likely see similarly high levels of deal activity. This view is confirmed by the survey findings: 85% of respondents expect M&A in the utilities sector to increase over the next 12 months. None of the 250 respondents expects a decline in deal activity.

“Utilities across the globe are looking to reduce their tariffs to the customer, expand their service offerings and engage in new production and distribution channels – and this is possible if they partner with the right businesses through M&A activity. We are likely to see a surge in the level of M&A activity in this sector,” says the finance head of a German utility.

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According to the CFO of one Asia-Pacific-based utility, there is no scope for growth in a monopolised electricity market, which makes investments in such markets less attractive: “Governments should offer public-private partnerships, which will provide sufficient growth opportunities for private sector businesses in public sector fields,” he adds.

Uncertainty and lack of legislation are highlighted as the biggest investment blocker for 13% of utilities. “Countries without a cohesive energy policy are usually in turmoil when it comes to issues around energy distribution and management,” says the CFO of an Australian utility. “For an investor looking to enter that market with smart energy solutions, it means a lot of uncertainty.”

Which countries have the clearest smart energy policies? The majority of respondents (71%) point to Germany, then the UK (65%), Sweden (63%) and Norway (56%).

“The UK, Netherlands, Norway, Sweden and Germany are all ahead in smart energy implementations,” says the finance head of a GCC utility. “These countries are certain about changing their energy distribution and generation to reduce carbon emissions, and are on the verge of completely shifting to renewable energy production and distribution.”

Challenges remain and falling foul of data protection rules is one of them. This is particularly important with regard to data analytics, which makes it possible to slice and dice customer data from millions of smart meters in new ways.
What do you consider to be the most significant obstacle to investment in the smart energy sector?

- **Monopolised electricity market**
  - Utilities: 24%
  - Investors: 22%

- **Uncertainty or lack of legislation/ cohesive energy policy**
  - Utilities: 13%
  - Investors: 28%

- **Lack of experience/ awareness among public officials**
  - Utilities: 12%
  - Investors: 14%

- **Guarantee of protection of investment**
  - Utilities: 11%
  - Investors: 10%

- **Uncertainty and duration of attaining necessary operational permits, licenses etc.**
  - Utilities: 12%
  - Investors: 6%

- **High cost of infrastructure upgrades**
  - Utilities: 12%
  - Investors: 6%

- **Availability of finance**
  - Utilities: 12%
  - Investors: 4%

- **Decrease or cessation of subsidies/ incentives**
  - Utilities: 4%
  - Investors: 10%

"In Germany, the protection of personal data is regulated by law quite strictly," says Britta Wißmann at Pinsent Masons. "To promote smart energy, the key thing will be to find a combination that enables both data analytics and the protection of personal data."

**Smart cities**

Given that more than half the world’s population is now urban, cities are a logical starting point for smart energy projects. The Internet of Things, supported by the evolution of mobile tech and the development of smart infrastructure projects on a global scale, is driving ‘smart city’ strategies.

Many cities, among them Amsterdam, Barcelona and Oslo, are already encouraging the adoption of smart energy technologies through the roll-out of smart city initiatives. And developing economies are watching these initiatives very closely, as a potential way to overcome their own lack of established infrastructure.

What type of support mechanism is most important to you when considering collaboration in smart city projects?

- **Legislative support (national or municipal policy plan, competitive energy market)**
  - Utilities: 44%
  - Investors: 22%

- **Financial support (tax benefits, loan guarantees, investment protection)**
  - Utilities: 36%
  - Investors: 50%

- **Organisational support (smart city initiatives, educational campaigns)**
  - Utilities: 20%
  - Investors: 28%
Turning smart city concepts into reality, however, is never straightforward. According to the survey findings, utilities and investors are somewhat split on the best way forward.

Utilities – which bear ultimate responsibility for delivering the smart energy portion of such initiatives – are clear about the support mechanisms needed for these projects to succeed. Top of the list is legislative support (44%), followed by financial support (36%).

“Policy changes in favour of the utility service providers will help them focus on developments, thus enabling faster completion of projects,” says the CFO of a German utility.

The group director finance and control in an Italian utility adds that smart city initiatives involve a huge implementation expense, with hidden costs that rise up during the process. A lack of suitable financial backing can produce significant losses and cause insurmountable delays.

Investors have a different perspective: financial support is seen as the most important mechanism by 50%, with organisational assistance favoured by 28%.

“Infrastructure and technological updates are very expensive and continuous capital investments are required to complete the projects successfully and on time,” notes the strategy head of a Danish investor.

Policy drivers
Respondents were asked what types of government policies they believe are most effective in driving investment in smart energy generation and transmission. Unsurprisingly, utilities and investors have different ideas on what works best.

Feed-in tariffs top the list for utilities (18%), followed closely by capacity markets (16%) and tax breaks (15%).

“Governments should roll out feed-in tariff policies if they want to increase the pace of technology deployment across their consumer markets,” argues the CFO of a German utility. “It has been very effective in all the countries that have deployed this policy, as it directly helps motivate the consumers to install these technologies in their households helping to largely achieve the statistics desired.”

Utilities are apparently lukewarm about the benefits of a market-driven price regime, with just 10% flagging this as an investment driver. But the figures at regional level reveal a different picture: of the utilities respondents who put this at the top of their lists, 65% have primary operations in Asia-Pacific – a region where monopolised markets largely continue to hinder technology uptake.

“Governments have to level the playing field to encourage investors in the smart energy domain, which will ultimately benefit its citizens financially and build a stronger economy for the governments overall,” says the finance head at a South Korean utility.

For investors, a market-driven price regime is seen as the most effective smart energy investment driver by 24% of respondents, followed by tax breaks (22%), with 18% pointing to opportunities for public-private partnerships.

“Increasing the number of public-private partnerships has helped develop and increase investments in smart energy generation and transmission,” says the MD of a Germany-based investor. “Germany has used this model with a lot of success and has been able to increase smart energy generation significantly because of this.”
Venios is a specialist IT firm that develops smart grid solutions for the energy sector. The company’s main products are the Venios Energy Solution, which is an active grid management tool, and Venios Energy Management, which allows energy utilities to choose the most cost-effective energy self-supply options for their customers and generates additional profits for themselves. Venios was set up in 2012 and is based in Frankfurt. Co-founder and CEO, Dr Jonas Danzeisen, explains the thinking behind Venios.

Q. Why are grid and energy management solutions becoming so important?
The main driver is the rising complexity in the low- and medium-voltage grid. We’re moving from a world with a small number of centralised power plants to one where the dominant factor is decentralised generation.

The problem is that the existing grid is structured from the top down – it’s not designed to handle a large number of feed-ins. Together with this, integrating renewables at the medium- and low-voltage level creates problems because their output is volatile. This makes it hard for Distribution Service Operators (DSOs) to predict what infrastructure will be needed in the coming years.

Q. How do your solutions address these challenges?
The Venios Energy Solution provides DSOs with analysis, predictions and live monitoring of the grid status. This allows them to get the most out of their existing infrastructure and also to ensure smarter use of new infrastructure. Right now, we’re working on projects in Germany, Austria, Belgium and the Netherlands. Our other solution, Venios Energy Management, takes care of everything behind the meter: it provides multi-asset, multi-site optimisation on the customer side. It works by considering all the available energy supply options and choosing the most appropriate for the customer to reduce costs.

Q. How important are your partnerships with technology and telecoms firms – such as Microsoft, Telefonica and Esri – in driving your business?
Partnerships are crucial to our market success as they enable us to jointly solve customer problems and meet their requirements. We need to stay flexible in fulfilling customer needs. Therefore, as a system integrator, we connect the relevant databases and platforms and make it usable for our clients in an innovative way.

Q. What is your vision for Venios?
We aim to be the main touchpoint for grid operations and planning in the low and medium-voltage sector. We want to make the energy transition happen and we will achieve this by helping our customers to deal with volatile feed-ins and by optimising their assets according to the requirements of the grid.
CONCLUSION

Where next for smart energy?

Electricity utilities are in the midst of a transformation unprecedented in the 130-year history of power generation. They are adapting to new ways of producing energy. They are embracing digital technologies and reaching out to their customers in ways that would have been unimaginable even a decade ago.

Utilities are embracing the smart energy opportunity and, as this survey shows, they are adopting a pragmatic approach to building new capabilities. Instead of pursuing R&D in-house, most are opting for joint ventures and acquisitions, which enable them to get projects off the ground in months instead of years.

The main challenge facing the sector is that legislation lags painfully far behind where the industry is now. In many countries, government subsidies have triggered an explosion of renewable generation. But policies for dealing with the growth of green energy are thin on the ground.

All this has left the industry struggling in a policy vacuum. With renewable output continuing to grow, there is now an urgent need to tackle the problem of storage. Two smart energy technologies – battery storage and power-to-X – mean that this is already possible. Yet regulatory constraints mean that neither of these options is being developed to anything like its true potential.

What this survey makes clear is that the utility sector is increasingly willing to change and actively seeking out opportunities. But it is equally clear that the industry continues to be hampered by regulatory restrictions, whether those be monopolised energy markets in Asia, or Europe’s rules on energy storage.

Given that it is utilities, investors and – ultimately – the public, who will foot the bill for energy transformation, governments have far more work to do in creating a stable and predictable regulatory landscape for investment.

Utilities and investors have demonstrated their hunger to innovate. What is needed now is regulatory innovation to help satisfy that hunger and take smart energy to the next level.

“Although governments and regulated utilities have sometimes been unable to keep pace with the extent of change within the energy sector, we are seeing smaller, more agile businesses take advantage of the regulatory gaps,” says Peter Feehan, partner at Pinsent Masons. “The market is now coming forward with its own innovations, increasingly using technology to complement existing utility infrastructure. Greater diversity and innovation in the energy market in future years now seems inevitable.”
Pinsent Masons’ recent experience includes advising:

- **Element Power** on the construction, procurement and sale of its 25MW EFR Tynemouth Energy Storage project to Italy’s ENEL.
- **Arenko** seeking to provide an EFR and FFR scale solution to the UK market by establishing 125MW of storage capacity within the next 24 months.
- **Tesla** in Australia on a number of tenders for Grid-Connected Battery Energy Storage Systems.
- **Shotwick Solar Park** Sponsors of the 72MW park on grid sharing and private wire offtake arrangements with industrial user UPM-Kymmene, plus the sale of the solar park.
- **Smart meters** A “big six” energy supplier on smart meter technology procurements and outsourcing.
- **North Star Solar** on a domestic solar photovoltaic, battery and virtual power grid solution through pay-as-you-save.
- **E.ON** on the regulatory regime in the UK for energy storage, including planning, licensing and procurement matters and available financial incentives.
- **NEC Energy Solutions** on a joint development agreement for a 100MW battery storage project in Ireland.
- **International battery storage manufacturer** on opportunities for deployment in the UK and regulatory issues tied to classification of storage under the Electricity Act.
- **E.ON** on the development of a contract suite for its electric vehicle charge point offering.
- **Electric vehicles** for all major German car manufacturers in relation to establishing a UK network of charging points for electric vehicles.
- **Asia’s utilities** on the first cross-border power wheeling agreement in the ASEAN power grid, a “power to x” transaction involving the transfer of power from Laos to Malaysia through Thailand.
- **US-based solar investor** on its Asian expansion, including investments into China and other parts of Asia.
- **Smart meters** a German municipal utility with respect to the design and set up of a service agreement regarding smart meter administration work.
- **KfW IPEX** as mandated lead arranger and sole lender on the 30MW Sanquhar Wind Farm in Scotland – the Sanquhar Project is unique as the power offtaker is Nestle UK.
- **E.ON UK** on its district heating and cooling projects with developers and city partners in the UK, including a 2,500 home scheme for Lend Lease at Elephant & Castle, London.
- **Peterborough City Council** on its strategy for smart utilities within the city.
- **Glasgow City Council** on the development of the Council’s energy supply company and strategy for a heat and power solution across the city.
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