

THE STATE OF THE POWER INDUSTRY: THE LOST ERA OF REGULATORY CERTAINTY

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■ INTRODUCTION

Marsh has undertaken an in-depth study into the state of the European power industry, the impact of a changing landscape, and the drivers behind the latest developments.

The objective of the survey is to gather data on which to base insights into the current circumstances around the power sector, to examine the barriers to the prosperity and the stability of the industry both internally and toward the electricity clients, to consider the ways in which the industry is adapting to the new challenges, and to investigate the impact on investor appetite. The survey also attempts to describe the technological challenges and barriers, to identify the risks that threaten the technical and commercial environment, and to consider attitudes to the treatment of those risks.

The main recurrent theme to emerge from Marsh's 2014 power survey concerns the challenges arising from a reluctance to invest in the development of the power infrastructure due to a persistent and diffused diffidence in the long-term stability of regulatory regimes. Starved of the necessary investment, the power system in many countries across Europe faces grave challenges in its attempt to deliver on the three facets of the policymaker's objective: Supply security, an equitable and sustainable pricing model, and an acceptable environmental impact, principally in terms of greenhouse gas emissions.

For most of the 20th century, the regulator in the developed world focused on two main tasks: The continuity of supply and price stability. However, at the beginning of the new millennium, the importance of defending the environment became a pressing third objective, and a regulatory system that had learnt to reliably manage the first two elements found that balancing three added unexpected complexity. The World Energy Council, together with Marsh's sister company Oliver Wyman, calls this the "Trilemma".

Pervasive economic uncertainty adds further stress to the system, and the incompatibility of some of the new technologies with the existing infrastructure further complicates the delicate balance that the regulator strives to maintain. As a consequence, the long-term regulatory stability on which investors, operators, equipment manufacturers, and all the players who contribute to the power system rely can no longer be taken for granted.

The results of this survey depict an uneasy environment; one in which investors are following a strategy of "wait and see" or, at the most, making short-term investments. However, there is a significant minority that views the current challenges as an opportunity for the industry to redefine itself — to rethink business models, use emerging technologies, and develop new strategies that rely less on the comfortable, centrally regulated power system which has characterised the last 100 years.

As the industry seeks its future equilibrium, we ask what will drive the changes needed, and how those changes will manifest themselves?





THE STATE OF THE POWER MARKET IN EUROPE: CURRENT ISSUES AND CHALLENGES

The majority of respondents are concerned with the state of the industry across Europe, with more than one-fifth (20.4%) considering it to be "stagnant", and more than one-third (35.2%) believing it to be in an "unhealthy" state [SEE FIGURE 1]. Power investors are particularly pessimistic, with 83.4% expressing the view that the market is in an unhealthy state [SEE FIGURE 2].

Only in the Nordic region (Norway, Sweden, Denmark, and Finland) and Turkey do the majority of survey participants consider the state of the market to be healthy.

REGULATORY UNCERTAINTY A MAJOR CONCERN ACROSS THE INDUSTRY

Almost two-thirds of respondents to the survey believe that regulatory/political risk has increased significantly in the past five years.

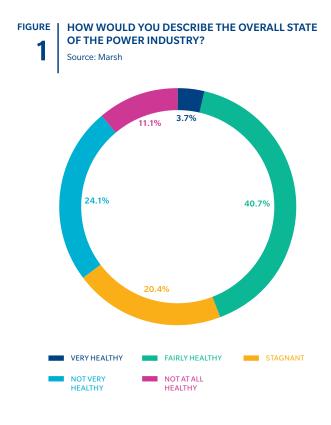
Regulatory uncertainty is considered to be the main barrier to the stability of the power system. More than three quarters (79.6%) of respondents identify it as a "major" barrier, and just 3.7% believe it to present no obstacle whatsoever [SEE FIGURE 3].

Once again, the situation is less acute in Nordic countries, where 63% describe regulatory uncertainty as a major barrier to stability, but still substantially more than for any other option that was selected.

Predictably, respondents also highlight risks arising from regulatory issues as being the greatest barrier to investment: "regulatory uncertainty", "political risk", and "cost/price/margin uncertainty" were seen to be the biggest barriers to investor confidence [SEE FIGURE 4].

Just under half (46.3%) of respondents believe that regulatory stability and transparent, long-term policy-making would improve investment in the industry.

*Result arrived at from a set of open-ended responses.

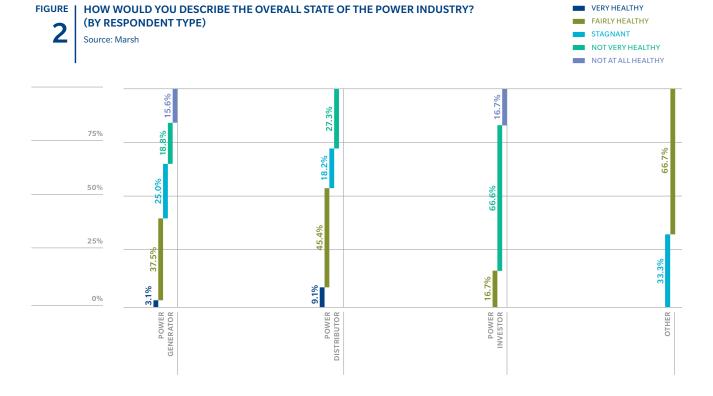


Desirables include firmer policy objectives, greater certainty that legislation will not change for the duration of a suitable investment period, transparency surrounding decisions on tariffs and investment frameworks, and clearer policies on what types of energy governments will promote.

"Investors need to be able to look at a 30-year investment period, whereas now they cannot look beyond about five years." – Power distributor, Finland

Power investors and distributors are the most sensitive to the impact of unpredictable regulatory change on the stability of, and investment in, the industry.

In terms of subsectors, those respondents operating in nuclear and conventional energy express the greatest concern over regulation.





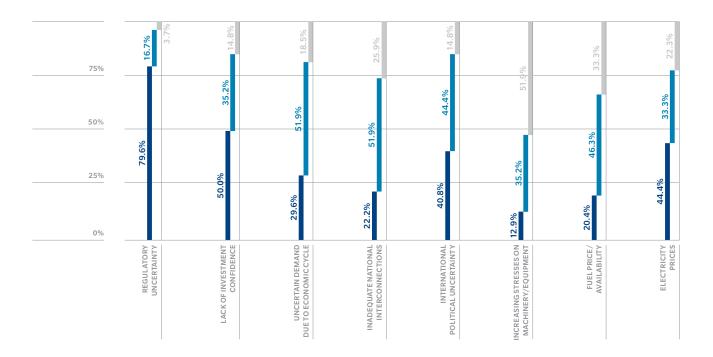
FIGURE

WHICH OF THE FOLLOWING DO YOU THINK ARE POTENTIAL BARRIERS TO THE STABILITY OF THE POWER SYSTEM?

MINOR BARRIER

Source: Marsh

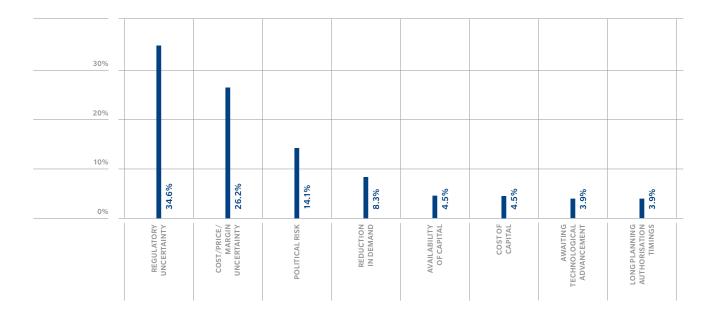
MAJOR BARRIER NO BARRIER AT ALL



FIGURE

WHAT ARE THE MOST IMPORTANT BARRIERS TO INVESTMENT?

Source: Marsh



Respondents in Turkey, meanwhile, are particularly worried about uncertain demand due to the economic cycle: A total of 71.4% of those professionals surveyed in Turkey identify this as a "major barrier" to stability, compared to a European average of just 29.6%.

"The economics of programmes are hurting the investment climate. We have to live with economics, which we can do little or nothing about; however, regulatory risk has increased massively."

- Power investor*

*Power investors have not been listed by geography due to the multinational nature of their work

"It was completely unforeseeable that governments would support renewables to the level that has taken place, given the very high costs for society. Rather than concentrating on the three basic goals (cost, environment, and security), additional layers of regulation are continuously introduced, further adding to costs and uncertainty." – Power generator, Germany

"My perception [of regulatory risk] has lowered because there has been an intense debate and struggle within our framework (in Sweden), but this is something that is specific to Sweden."

- Power generator, Sweden

MITIGATING SYSTEMIC RISK GOING FORWARD

How should the industry adapt to the systemic changes? No strong consensus emerges from the survey, with some responses indicating a "wait and see" attitude.

Just under a fifth (17%) of respondents indicate there will be a need to redefine the technological focus of the industry in order for the market to adapt to systemic change, with the adoption of renewable energy seen as a key strategy [SEE FIGURE 5].

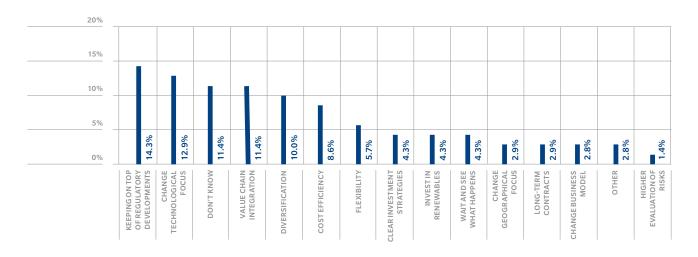
Lobbying is identified by just under a third (31.5%*) of respondents as the tool of choice with which to mitigate the impact of regulatory/political risk, while being proactive in anticipating regulatory changes also scores highly.

 ${}^{*}\mathsf{Result}\,\mathsf{arrived}\,\mathsf{at}\,\mathsf{from}\,\mathsf{a}\,\mathsf{set}\,\mathsf{of}\,\mathsf{open-ended}\,\mathsf{responses}.$

FIGURE 5

THE POWER SECTOR IS INCREASINGLY CHALLENGED BY SYSTEMIC CHANGES IN THE REGULATORY, TECHNOLOGICAL, AND ECONOMIC CONTEXT, WHAT STRATEGIES DO YOU THINK POWER OPERATORS WILL ADOPT TO ADAPT TO THE CHANGING SYSTEM?

Source: Marsh





"Meet relevant stakeholders and discuss key issues. Inform, get information, and influence. We need to bring stability to long-term investments and understand that the power business is becoming more international." – Power generator, Denmark

"Be proactive, don't take risks, don't invest based on feed in tariffs, and avoid dealing with government."

– Power investor

"Become a front runner in developing the asset base to get a high degree of renewable production facilities in the portfolio" – Power generator, Sweden

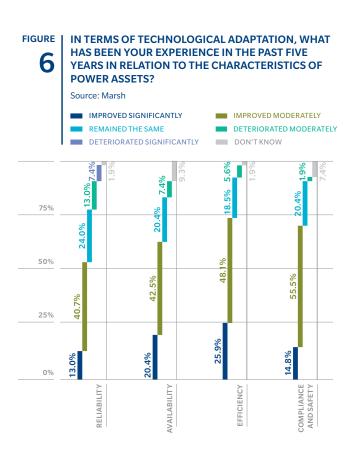
"Review cost structure and find where we can do things more efficiently; find areas of greatest potential" – Power generator, Finland

TECHNOLOGY CHALLENGE

THE ROLE OF TECHNOLOGY IN THE SECURITY OF THE POWER SUPPLY

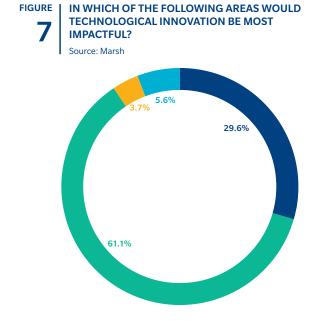
Technological advances have improved the security and efficiency of the industry over the past five years, according to survey respondents. Not surprisingly, technology is seen to have contributed positively to all of the following four criteria: reliability, availability, efficiency, and compliance/safety. The weakest area is reliability, for which 44.4% of respondents believe that no improvement has occurred; indeed, 20.4% consider there has been a deterioration in reliability [SEE FIGURE 6].

Respondents are not very concerned about the impact of increasing mechanical stress on equipment; just 12.9% consider this to be a major barrier to the stability of the power system [SEE FIGURE 3]. In many countries, plants that are designed to operate as base load are being used only for peak periods, or to fill gaps in the availability of renewable sources "when the wind doesn't blow and the sun doesn't shine". This is surprising in the light of numerous losses attributed — at least in part — to the additional stresses caused by repeated restarts of power equipment.



The Marsh Power Forum in October 2013 (<u>www.marsh.</u> <u>com/powerforum2013</u>) highlighted the risks to turbines, generators, and transformers in these situations.

The integration of ever more intermittent renewable energy to the grid, together with the increase in distributed power generation, creates challenges to transmission and distribution grids: They need to be "smarter" to cope with the changes and to optimise grid security and efficiency. Most respondents prioritise developments in generation and storage technologies to achieve this, with only 3.7% thinking transmission and distribution technologies are the most important [SEE FIGURE 7]. The cost of implementing smart grids, together with an expectation that consumers would be reluctant to allow distributors to take control of their appliances are some of the concerns; amongst power distribution respondents, many think that a lack of standardised control and communication protocols is holding back progress. One German power generator thinks the industry is waiting for the "next technology" and is afraid of committing to making a big investment in something which would soon be obsolete.



GENERATION

ELECTRICITY

STORAGE

NONE OF

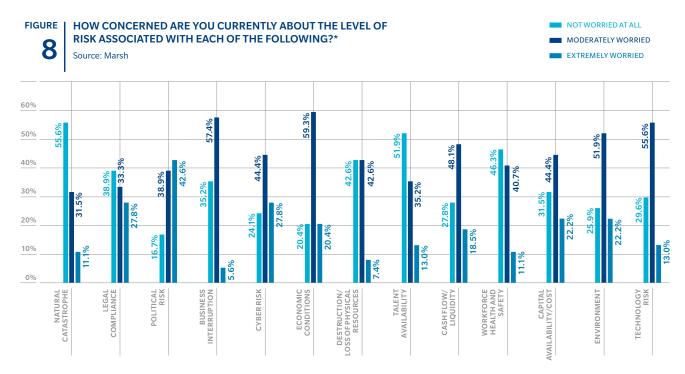
THE ABOVE

CURRENT RISKS FACING THE SECTOR

Not surprisingly, political risk and cyber risk dominate the concerns of respondents, with 81% and 72%, respectively, saying they are worried about these risks to some extent [SEE FIGURE 8]. However, cyber risk is of less concern to power generators, with 31% not considering it to be a problem at all.

Economic conditions are considered to be of great concern in Southern Europe—half of Italian respondents and two-thirds of participants from Spain say they are "extremely worried" about the impact of the economy; by contrast more than one-third (35%) of UK respondents and two-thirds of German respondents say they are "not worried at all" by economic conditions.

The diffidence of investors caused mainly by worries about regulatory inconsistency is demonstrated by the fact that 83% of respondents worry about capital availability. Perhaps understandably, however, two-thirds of investors don't think this is an issue [SEE FIGURE 9].



^{*}SOME SURVEY PARTICIPANTS DID NOT RESPOND TO THIS QUESTION IN ITS ENTIRETY.





Cash flow concerns are greater among nuclear generators and power transmission/distribution operators (60% and 55%, respectively, are "extremely worried"), and lower among renewable energy and conventional power operators (21% and 25%, respectively). [SEE FIGURE 10]. While distributors probably fear the consequences of economic uncertainty on the ability of their clients to pay their electricity bills, and renewable operators are — for the moment at least — comfortable with the tariffs they enjoy in many countries, the distinction between nuclear and conventional generators is less clear: Maybe nuclear takes a more cautious, precautionary attitude to risks in general?

RISK DATA ANALYTICS

Data abounds in the middle of the second decade of the 21st century: Do we have access to more data than we know how to use? Our survey shows that 63% of respondents are already using risk data analytics, or have firm plans to do so [SEE FIGURE 11]. Italy and Finland stand out from the crowd — in both cases, more than 80% of respondents are already using risk data analytics to enhance their businesses. Paradoxically, the other Nordic countries don't see the same advantage: 54% believe that their organisation cannot benefit from deeper analysis. The UK stands in the middle, with half the respondents confirming that they are already investigating the opportunities given by big data for risk management purposes.

Just under a quarter (23.7%) of respondents say the primary advantage of data and analytics comes from optimisation of technology and of maintenance programmes; 21% see risk management investment planning as an objective, while just under a fifth consider the value to lie in assessing probability and severity from given event scenarios [SEE FIGURE 12].

Surprisingly, using data to optimise the structuring of insurance placements doesn't appear to be a major objective. Marsh believes that risk data analytics can have a big impact on the efficiency of transactional insurance solutions and better align these solutions with the financial context and objectives of the company by optimising retention/self-financing strategies with placement structures and alternative risk financing options.

FIGURE IS DEEPER ANALYSIS OF THE RISKS REQUIRED? 1 1

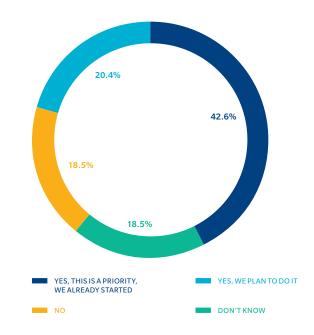
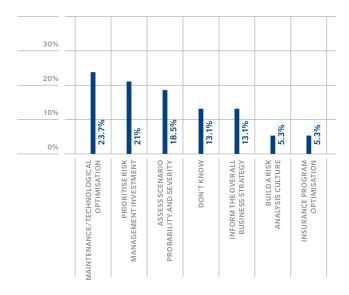




figure 12

HOW DO YOU USE OR PLAN TO USE RISK DATA AND ANALYTICS?

Source: Marsh



Apart from risk data analytics, some companies are focussing on the following to improve their risk management capabilities:

"We are actually taking this one step further down in our organisation; previously, it was top-down but now it is becoming more bottom-up."

- Power generator, Sweden

"Increasing risk awareness of all people in the organisation." – Power distributor, Finland

"Adapting to regulatory changes."

– Power generator, Spain

PERSPECTIVES FOR THE FUTURE: THE OPPORTUNITY FOR THE POWER INDUSTRY TO RETHINK ITSELF

The World Energy Council, in collaboration with Marsh's sister company, Oliver Wyman, has coined the term "Trilemma" to describe the difficulty in balancing the three objectives a regulator needs to consider in the era of climate awareness: The security of the electricity supply, the affordability of electricity to consumers and to power industry and commerce, and the safeguarding of environmental sustainability.

While the concern around regulatory uncertainty which arises from this Trilemma is a recurring theme throughout the survey, respondents do not share a clear consensus on what would help achieve the balance which regulators strive to provide. The holy grail of electricity storage is identified as a key solution by only 11.3% of respondents [SEE FIGURE 13]; however, more than twice that percentage of renewable energy generators and large hydro operators — the two generator groups that suffer (or occasionally in the field of large hydro,

benefit) from the challenges of intermittency — are of the same opinion. Optimising the power mix is another strong contender, with nearly a fifth (18.9%) of responses suggesting it should be a priority.

The comments provided by respondents tend to emphasise the need for coordinated regulatory solutions across countries and regions:

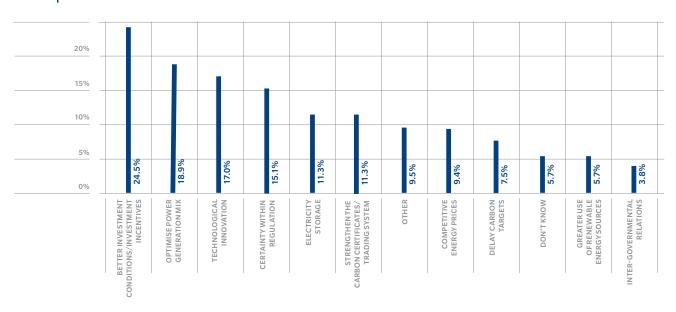
"Coordinated strategy between countries, intergovernmental relations" – Power investor

"[... the] formation of an international body along [the] lines of [the] World Trade Organisation to solve issues like global warming, carbon emissions, and distribution." – Power generator, Turkey

figure 13

WHAT WOULD HELP IN FINDING THE BALANCE BETWEEN SECURITY OF SUPPLY, ENVIRONMENTAL SUSTAINABILITY AND ENERGY AFFORDABILITY?*

Source: Marsh



^{*}RESULTS DISPLAYED ILLUSTRATE THE PERCENTAGE OF RESPONDENTS, NOT THE PERCENTAGE OF RESPONSES.



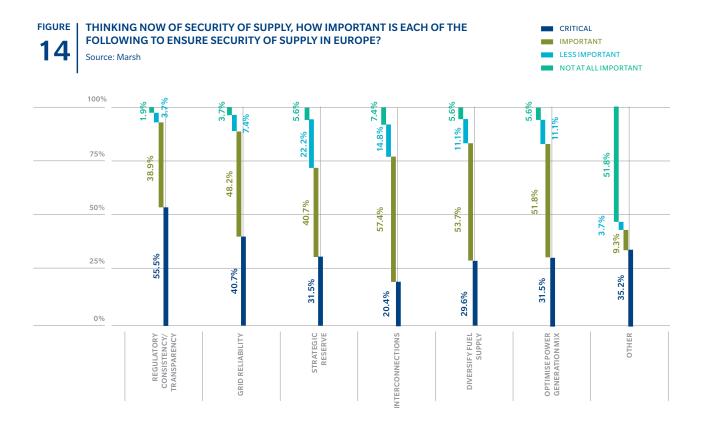
"Good, consistent (across countries) regulations in Europe making it easier to build nuclear plants to get rid of oil, gas and coal. Also using sun and wind to buy time to create nuclear." – Power generator, Finland

Meanwhile, a few respondents stress the need for a stable carbon price:

"Concentrating primarily on the carbon reduction through the Emissions Trading Scheme. Allowing the market to find the best solutions rather than subsidising renewables (or nuclear) at a high volume level. Reducing risk so that the cost of capital will be lower and therefore the production costs for the consumer. This is particularly important given the rising role of capital-intensive, fixed-cost plant. In addition the issue of governance is very important." – Power generator, Germany

The complexity of the Trilemma is an underlying theme from the whole survey; one candid response from a respondent sums it up:

"I don't know, this is a very complicated question." – Power distributor, Nordic region



SECURING ELECTRICITY SUPPLY

Unsurprisingly, regulatory consistency is considered to be the most important factor in securing electricity supply, closely followed by grid reliability and power mix optimisation. Just under three quarters (72.2%) of respondents consider that maintaining an adequate strategic reserve is critical or important [FIGURE 14]. Of these, the majority (59%*) feel that some form of capacity market mechanism is the best way to achieve this.

"The introduction of capacity markets on [a] technologically neutral, decentralised basis. This will ensure that the level of capacity will be available which consumers (not a central administrator) deem necessary and at the lowest cost."

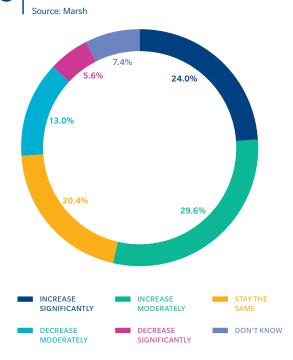
- Power generator, Germany

Some respondents, however, are not in favour of capacity markets (which pay for generation capacity being available, whether that capacity is actually dispatched or not), believing they can distort the market and increase the cost to end users:

"A capacity market keeps old power stations going, this is very silly as it keeps prices to customers high. I would prefer [a] full market method with ... the market allowing the right price to be charged." – Power distributor, Finland

At the time of writing (November 2014), the UK is contemplating the possible need for planned load shedding during the winter. A series of machinery and fire losses at key power generation facilities, coupled with a reduced strategic reserve as a result of old coal-fired stations going into retirement and a lack of investment in new generation plants, could lead to the first UK power deficit for more than a generation—and this time from systemic deficiencies, as opposed to strained labour relations.

15 DO YOU THINK THE RISK OF BLACKOUTS WILL INCREASE OR DECREASE IN EUROPE IN THE NEXT 10 YEARS?



POWER SHORTAGES

More than half (53.7%) of survey respondents think that the possibility of blackouts will increase in the future [SEE FIGURE 15]. Of those countries represented in the survey, the Finns are most pessimistic, with 83% expecting the risk to worsen. An overwhelming four out of five power investors have the same opinion. Respondents in Italy, meanwhile, are the most optimistic, where reduced demand resulting from the economic downturn means they expect the available supply to be adequate.

Optimising the power mix emerges as an important driver of future supply stability. The decisions taken by the policymaker need to consider the long term: Power generation, transmission, and distribution investments taken now will shape the market 30 years into the future and beyond. The tools to bring about the "optimised mix" are indirect, and principally consisting in investment signals and price signals to stimulate investment in the right direction, and occasionally using regulatory intervention (for example, emissions legislation) to guide the markets. This is a complex but vital exercise, which introduces a series of strategic and operational risks to investors, operators of all the elements of the system, plant manufacturers, and to the regulatory system itself.

^{*}Result arrived at from a set of open-ended responses.



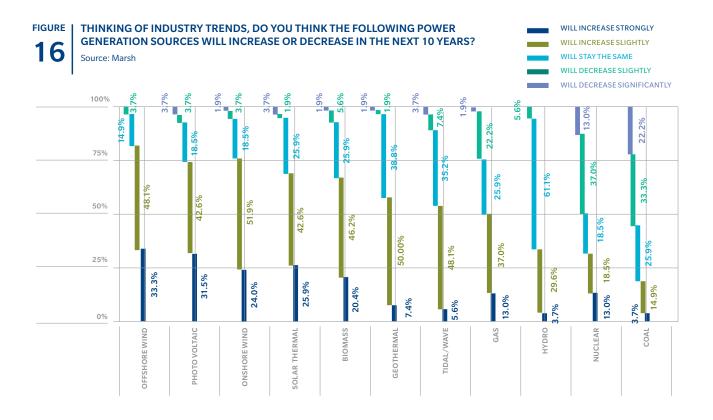
THE FUTURE POWER MIX

Renewable energy will increase in importance according to respondents. Offshore wind gets the highest score (81.4% think it will increase over the next decade), followed by onshore wind (76%) [SEE FIGURE 16]. Both solar photovoltaic and solar thermal are considered growing technologies — in each case, more than two-thirds of those surveyed think they will increase — in a similar way to biomass combustion. More than half of respondents think that geothermal (57.4%) and tidal/ wave generation (53.7%) are destined to increase.

Hydroelectric power scores lower, with 33.3% predicting an increase — the majority expect it to stay more or less the same. This is not the case with nuclear and coal, with 50% and 55.5%, respectively, anticipating their importance to decrease.

Gas sits in the middle: Half the respondents expect its importance to increase, just a quarter expect the importance to decrease, with the remainder anticipating no change.

Respondents in Turkey are bullish for both nuclear (57% think its importance will increase — perhaps explained by Turkey's plans to build its first two nuclear plants within a decade) and coal (more than 70% expect the role of coal-fired power to increase).



PUBLIC OPINION AND THE POTENTIAL IMPACT

Last year, the Bulgarian energy minister, Delyan Dobrev, was pelted with snowballs in a protest against electricity prices; in Germany, *Der Spiegel* published an edition with a cover featuring a gold electrical cable accompanied by the headline: "Luxury electricity–Why energy is becoming more expensive and what politicians must do about it".

Overall, just over a fifth (22%*) of respondents think that the impact of public opinion could contribute significantly to market instability. However, respondents from Germany are much more pessimistic, with two-thirds (67%*) anticipating that consumer backlash could have a material impact.

*Results arrived at from a set of open-ended responses.

TECHNOLOGY

The majority of respondents agree that technology may hold the answer: 61.1% believe that the most important technological advance would be in electricity storage, and 29.6% look to the area of generation for a technology solution [SEE FIGURE 7]. Just 3.7% believe that transmission and distribution advances hold the key, probably because the smart grid technology referred to previously exists already and barriers to implementation lie elsewhere.

CHANGING THE BUSINESS MODEL

Survey respondents aren't in agreement at all on the matter of how the power industry business model needs to change in the next decade. A number identify more distributed power generation, but two respondents (one from Germany and another from Italy) think the answer lies in greater centralisation. Flexibility is another commonly held answer, while technological development is thought to be a solution by a handful of respondents.

"The industry must try to be more transparent by liaising with the government so the public has a common understanding of why price increases are made. Do not leave this to the industry; government and industry must give a common position to ensure security of supply. Considerable investment is needed and government and industry need to get together to explain it." – Power investor

"Change the market design, introduce capacity market, accelerate CO2 caps, and force coal to retire." – Power generator, UK

"The age of large, centred power stations is coming to [an] end. It is time to adapt to smaller models."

- Power investor

Der Spiegel, Issue 36, Germany, 2013.



I CONCLUSION

The survey findings paint a complex picture, where technology, environmental pressures, and economic context combine to undermine the systemic stability that most countries in the developed world have enjoyed for many decades. The fragility of the equilibrium was probably underestimated in the past; the new expedient of environmental responsibility has led to a series of unexpected consequences. The survey points to regulatory uncertainty as the greatest problem. Sometimes this appears as regulatory risk, sometimes as political risk, sometimes as cost/price/ margin uncertainty, but the underlying issue is the same. The consequence? Investors are diffident about the regulatory context and investments in the power system are slowing, leading to a lack of necessary infrastructural development.

No easy answers emerge from the survey. Lobbying the regulator will merely put the wellbeing of one interest group ahead of others and is unlikely to solve the systemic Trilemma. New technologies in grid, storage, and generation can be expected, and will help to mitigate the impact. Power mix optimisation will certainly be a big component, but risks abound between the theory and the implementation.

Will the comfortable era of regulatory certainty return? We doubt whether we shall see the same level of security in the foreseeable future. Investors, operators, manufacturers, and the regulators themselves will need to manage the new context, while finding solutions, managing risks, and creating new opportunities for growth.

■ ABOUT THIS REPORT

This report was compiled by Marsh's Power Practice following a comprehensive survey of 54 power industry professionals from across Europe. Respondents included "C-level" executives and senior risk/insurance, finance, and operational managers from investors, manufacturers, distributors, and generators. Participants came from companies operating in the conventional, renewable, nuclear, and large hydro sectors, with operations active in Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Norway, Poland, Spain, Sweden, Switzerland, Turkey, and the United Kingdom.

Marsh's Power Practice is dedicated to providing industry consultation and risk management services for the global power industry. We specialise in identifying events, issues, trends, and regulations that impact the global management of power risk, and the ability of organisations to compete profitably.

Our global team of specialists prides itself on understanding the unique risk management needs associated with the electricity, coal, gas, nuclear, and green energy industries. Our knowledge, expertise, and strong insurance market relationships are reflected by the fact that we offer risk transfer solutions, risk analysis (benchmarking), and claims consultancy to power clients around the world, including vertically integrated, nationalised, regulated, de-regulated, and independent power producers.

In addition, the power team is familiar with issues that impact the provision of insurance, including new technology, regulatory constraints, and environmental and economic considerations. We utilise this knowledge in the design and placement of insurance programmes.

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