

# *Energy transformation*

## The impact on the power sector business model



**94%**

predict complete transformation or important changes to the power utility business model.

**67%**

expect technology and new supply sources to dramatically reduce dependence on oil and gas-rich countries.

**82%**

see distributed power generation as an 'opportunity' versus only 18% rating it as a 'threat'.

worldwide industry viewpoints

**53** power and utilities companies

**35** countries

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Argentina  
Australia  
Austria  
Brazil  
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Canada  
Chile  
China  
Egypt  
France  
Germany  
Greece  
India  
Indonesia  
Israel  
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South Africa  
South Korea  
Sri Lanka  
Sweden  
Thailand  
Turkey  
UAE  
UK  
USA

## About the survey

The 13th PwC Annual Global Power & Utilities Survey is based on research conducted between April and July 2013 with senior executives from power and utility companies in countries across Europe, the Americas, Asia Pacific, Middle East and Africa. The Europe survey includes Russia. The majority of participants were senior vice-presidents, senior general managers, directors or other department heads from power and gas utilities, with interests covering supply, transmission, generation and trading.

## Acknowledgements

PwC thanks all the participants who took time to participate in the survey. We take this opportunity to also thank everyone who has participated in the 13 year period we have been conducting the survey, both within PwC and in the power and utilities sector.

Published October 2013

# Introduction

*Today's power utilities market is facing major disruption. The magnitude of near and mid-term challenges is immense. Power companies are pulling the plug on conventional generation. Utility commodity businesses face continued strong headwinds. Carbon markets are not functioning. Regulation is often failing to produce the outcomes intended and is adding to uncertainty. The traditional utility business model is coming into question.*

In Europe, the move towards renewable and distributed power generation is advanced furthest. But it is having challenging market consequences. Highly efficient and flexible generation that could complement intermittent renewables sources is being mothballed. Gas storage levels are coming close to critical reserve levels but it is uneconomic for companies to develop storage capacity. Blackout risks are increasing and subsidies for renewable generation are pushing up costs for customers. Integrated power utilities are facing massive challenges.

But while Europe provides the focus for what is close to a current crisis, the issues that lie at the heart of it are present in other regions. Where is the balance, often contradictory, between security, affordability and cleaner energy leading us? What is the role of subsidies and how are they best designed to avoid unintended outcomes? Crucially, what will be the impact of distributed generation on centralised grids and the traditional utility business model?

The extent of current disruption to the business model is perhaps only now becoming clear. Where it will lead and what it will mean for the future utilities' business model remains unknown. We'd be wrong to say it can be predicted but the direction of some of the forces shaping it can be mapped out. And it is this ambitious territory that we make the focus of this year's PwC Annual Global Power & Utilities Survey.

We look at these big issues through the viewpoint of a survey that is extensive in scope as well as intensive in its depth. We have talked to senior power and utility company executives in 53 companies and 35 different countries around the world. The survey is supplemented by the 'on the record' perspectives of a number of CEOs that are also included in the report. We report their findings on a range of questions and also, in a series of future scenarios, their assessment of how particular aspects of the world of electricity will look like in the future.



**Norbert Schwieters**  
Global Power & Utilities Leader

## *Changes in technology and cost*

The growth of distributed generation and its threat to the power utility business model depends on technological developments and cost. Its rise in Europe has been subsidy-driven. Cost barriers remain in the way of it being truly market-driven. But, if these barriers can be overcome, they could set the scene for widespread global industry transformation. Many believe that point is within reach. Energy efficiency, falling solar prices, demand-side management and smart grid technology head the list of technological developments that the industry believes will have the biggest impact on their power markets.

But new sources of fossil fuel supply will also have a major impact on the power market. The advent of shale gas and tight oil are changing the economics of the energy landscape. Peak oil forecasts are fast being revised. The prospect of North American energy independence is within reach and the geopolitics of world energy flows are in flux. Industry opinion is far from ruling out the possibility that a new abundant energy era might open up. But alongside this, there is a significant degree of societal concern about extractive activities and a feeling that renewable energy can bring benefits and is here to stay.

# *Executive summary*

*The PwC Annual Global Power & Utilities Survey goes to the heart of boardroom thinking in utility companies across the globe. In this, our 13th edition, we look at the pressures building up on the traditional power utility business model and the industry's viewpoint on the transformative changes that lie ahead.*

## *Disruption and transformation*

Many in the industry expect the existing power utility business model in their market to transform or even be unrecognisable in the period between now and 2030. 94% predict complete transformation or important changes to the power utility business model. But there are big regional differences and the industry is split on the extent of change and transformation ahead.

The prospect of transformation of the industry business model arises from a number of potentially disruptive changes. Decentralised generation is already eating into revenues and partly marginalising conventional generation. Ultimately it could shrink the role of unwary power utility companies to operators of back-up infrastructure. Across the main markets of Asia, Europe and North America, only a minority of our survey participants expect centralised generation and transmission to play the lead role in meeting future demand growth.



# *94%*

*predict complete transformation or important changes to the power utility business model.*

## How should companies respond?

How companies respond to these changes will determine whether they will be part of the future or join the ranks of companies from other industries whose business models have been eclipsed by technological and market change. Strategies are needed that identify the best revenue opportunities in a changed and, potentially, transformed future market landscape.

Key elements in this will be a strategic view on just how far and at what pace distributed generation will take hold in their markets, together with a view on the role and opportunity afforded by gas. The impact of shale gas will be heavily determined by how the environmental and community concerns about it are played out in different territories. Vast amounts of distributed power generation will change the nature of the distribution network, making it much more complex. The roles of transmission system operators and distribution system operators will need to be re-defined in an era of self-generation, smart grids and demand-side management.

Efficiency savings and performance improvements can buy power utility companies considerable defensive headroom in responding to the changing industry environment. Nearly a third (31%) of all survey participants worldwide say there is scope for power and utility companies to achieve cost base and efficiency improvements of more than 20%. Nearly three-quarters (73%) see big scope for improvement in asset performance management.

But also critical will be how companies respond to the rise of the 'energy saving', 'energy generating' active consumers. A significant proportion (41%) of our global survey participants see their market in one or more of these terms in ten years' time compared to just 9% today. This includes 60% of survey participants in Europe, 50% of those in North America and 46% of those in Asia.

## How can regulators respond?

Governments and policy-makers have the difficult task of grappling with the big issues of supply availability, affordability and environmental impact. The tensions between these goals are coming to the fore more and more. Affordability has risen up the agenda in many countries. Concerns about blackouts are increasing as reserve capacity gets stretched. And the advent of shale gas is introducing a new environmental battleground which governments will need to police.

The sentiment from many of the participants in our survey suggests that regulation is facing something of a crisis. On balance, the industry viewpoint is that, in many places, current developments in companies' power markets are increasing rather than decreasing the risk of blackouts. There is a feeling that regulation is at a crossroads, with the era of liberalisation fading and a new era of greater certainty needed.

The issue of what policy design features are needed to enable system operators to balance a system with high levels of intermittent generation is an urgent one for regulators. Capacity schemes are one answer to this. Together with measures to introduce demand response and demand-side management markets and the ability to curtail intermittent generation during low demand periods, they top the list of measures that survey participants think policy-makers should introduce to balance intermittent generation sources.



# 73%

*see big scope for improvement in asset performance management.*

### **PwC viewpoint: Reaching a tipping point**

*"In Germany the industry is at a tipping point. Baseload power generation from gas and nuclear no longer makes economic sense for utilities. Companies are literally asking 'what will stop the bleeding?' It was a question posed by a leading company CEO in a recent conference call to analysts. Unless a market model is agreed that puts profitability back into traditional generation, many of the power stations will be shut down. The feasibility of dismantling gas-fired stations and moving them to other parts of the world is even being examined."*

Norbert Schwieters, PwC Global Power & Utilities Leader



# Big issues

## Transformation

*Many in the industry expect the existing power utility business model in their market to transform or even be unrecognisable in the period between now and 2030. But there are big regional differences and the industry is split on the extent of change and transformation ahead.*

The power utility sector worldwide is characterised by a range of business model sub-sets – independent power producers, merchant generators, unbundled operators of network assets, and others – but at its heart is the core traditional power utility business model of companies delivering profit from a mix of generation, distribution and retailing activities across centralised grids. Companies have been used to high investment credit ratings enabling them to develop capital-intensive asset bases with predictable long-term cost recovery from a mix of regulated and unregulated returns.

This paradigm has been well established at the heart of many markets worldwide for many decades. Underpinning it, greater reliance on electricity by more devices has led to an expanding electricity requirement even in mature markets. Global demand for electricity is set to continue to grow faster than demand for any other final form of energy in the coming decades. The electrification of vehicles and greater use of electricity for heating could add significantly to already growing demand from the ever-increasing volume of electronic devices, machinery, communications and data uses for electricity.

## Business model change

In most contexts, this demand growth would present a rosy picture for companies already established in the market and well positioned to profit from further expansion. But the industry is increasingly coming to recognise that to stay profitable and to succeed in the period ahead, companies will need to adapt their business models to respond to a power environment that could be transformed by changes such as decentralised power, technological changes and a very different customer outlook.

Indeed, our survey shows that many in the industry expect the existing power utility business model in their market to transform or even be unrecognisable in the period between now and 2030. Four in every ten (41%) of our survey participants anticipate business model transformation and, of the rest, a further 53% expect existing business models to undergo ‘important changes’. Very few (6% of participants worldwide) expect the business model to remain ‘more or less the same’.

## Business model terminology

*The term “business model” is used in connection with a range of formal and informal descriptions of the core elements of a business. We have used the term in the following sense:*

*“A company’s business model is the means by which it makes a profit – how it addresses its marketplace, the offerings it develops and the business relationships it deploys to do so.”*

## Europe is where the current environment for power utilities is proving most disruptive but the anticipation of transformation is more widely felt.

Given the changes in industries such as telecommunications, retailing, airlines and many other sectors, it might be construed as surprising if the power utility business model wasn't transformed over a period of nearly two decades ahead. On the other hand, the current power utility business model is deeply entrenched and the geopolitical context of the industry means that the environment for change is less dynamic than sectors more exposed to pure market forces.



# 69%

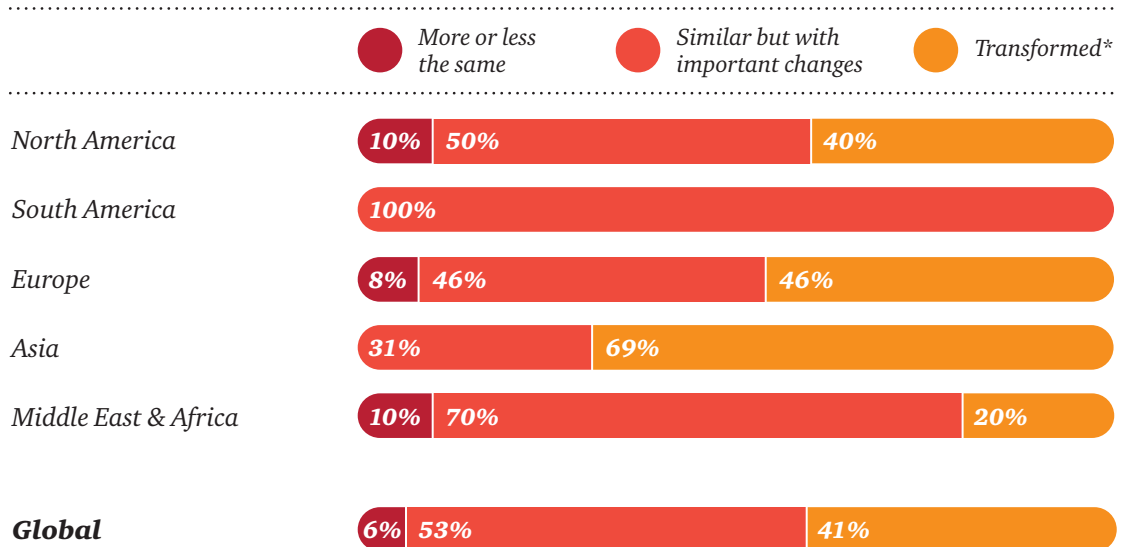
of respondents from Asia anticipate business model transformation compared with 46% of European and 40% of North American survey participants.

### Industry sights set on transformation

In such a context, nearly half of the industry expecting transformation is significant. And perhaps more significant is that, although Europe is where the current environment for power utilities is proving most disruptive, the anticipation of transformation is more widely felt (figure 1). Indeed, the strongest anticipation of transformation is from power utility companies in Asia. It's a significant indicator of the extent to which the industry is set to change radically, given that Asia is not as fully electrified and renewables are not as subsidised as Europe. Asian change and technology development could reinforce and quicken the pace of change elsewhere.

In Asia, 69% anticipate business model transformation compared with 46% of European and 40% of North American survey participants. Eight per cent of those in Asia go so far as to say the future business model will be 'completely transformed and unrecognisable from today.' In contrast with other regions, few participants in the Middle East and Africa (MEA) and South America (SA) anticipate business model transformation. Instead, most or all expect it to be similar to today but with "some important changes" (70% of MEA and 100% of SA participants) – see later 'around the world' chapter for full breakdown.

**Figure 1:** How do you expect utility business models to be in 2030 compared to today in your market?



\* of which 'unrecognisable transformation' – North America 0%, Europe 8%, Asia 8% and Global 4%.  
Source: 13th PwC Annual Global Power & Utilities Survey

## Disruption

*The prospect of transformation of the industry business model arises from a number of potentially disruptive changes. Decentralised generation is already eating into revenues and partly marginalising conventional generation. Ultimately it could shrink the role of unwary power utility companies to operators of back-up infrastructure.*

It's a dramatic scenario and one that may seem remote. But the threat to the business model doesn't depend on its wholesale realisation. As the current German experience shows, if the impact of decentralised generation shaves peak demand then much conventional generation is rendered unprofitable. The leading European power utility companies have not shrunk from using the terms 'crisis' and 'strategic transformation' to describe the changes underway. They are moving decisively to accelerate the shift of their business focus.

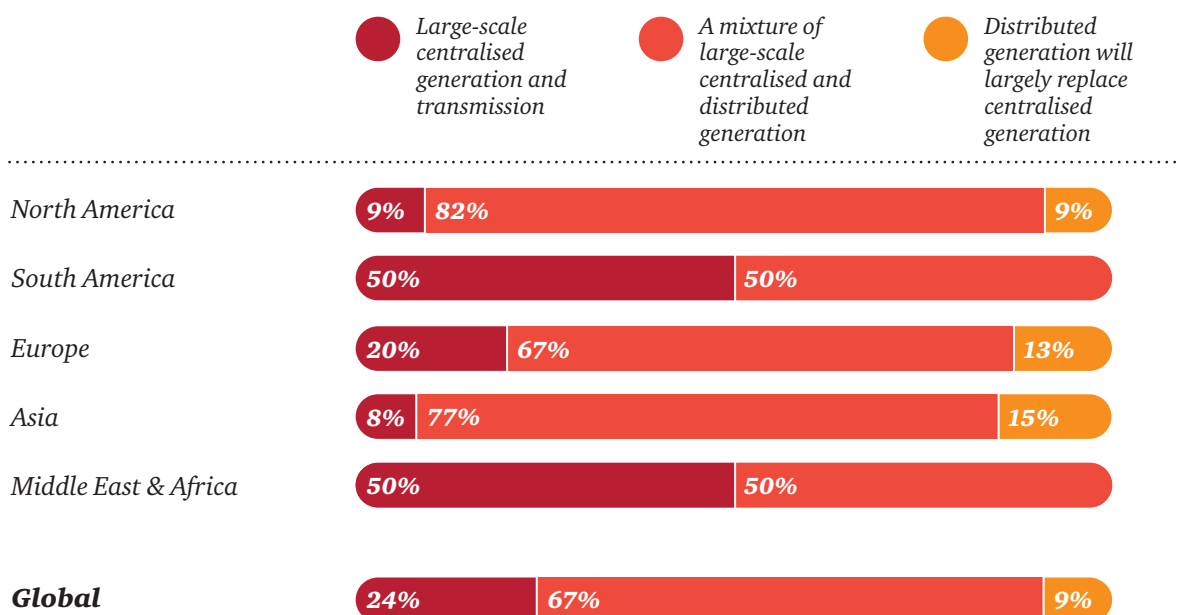
### The impact of distributed power generation

Across the Atlantic, a paper produced for the Edison Electric Institute, an association that represents all US investor-owned electric companies, notes: "Today, a variety of disruptive technologies are emerging that may compete with utility-provided services. Such technologies include solar photovoltaics (PV), battery storage, fuel cells, geothermal energy systems, wind, micro turbines, and electric vehicle (EV) enhanced storage. As the cost curve for these technologies improves, they could directly threaten the centralised utility model."<sup>1</sup>

Indeed, across the main markets of Asia, Europe and North America, only a minority of our survey participants expect centralised generation and transmission to play the lead role in meeting future demand growth (figure 2). In both Asia and North America, less than one in ten have such an expectation and in Europe just one in five. Instead, most envisage a future where demand growth will be met by a mixture of centralised and distributed generation. And there are some in the industry that even go as far as expecting distributed generation to replace centralised generation in meeting future growth. Again a full regional breakdown is given in the 'around the world' section.

In a separate question, we asked survey participants to estimate the extent of the inroads likely to be made by distributed generation. Nearly two thirds (64%) believe there is a medium to high probability that it will deliver more than a 20% share of worldwide generation by 2030. But this, in turn, poses significant wider system challenges on a technical and revenue level.

**Figure 2:** Which energy market transformation vision most closely matches your expectation for your market?



Source: 13th PwC Annual Global Power & Utilities Survey

1 Disruptive Challenges: Financial Implications and Strategic Responses to a Changing Retail Electric Business, Edison Electric Institute, January 2013.



## The cost impacts of decentralised generation could open up a potentially very destructive scenario.

### Physical and revenue impacts

On a technical level, the intermittent nature of distributed generation increases the difficulty of physically balancing the system and ensuring adequate power supply. On a revenue level, managing these extra challenges pushes more costs back onto the system. There is the danger of increased centralised costs to be borne by those customers who are more grid-dependent. The cost impact is further exacerbated by any cross-subsidisation mechanisms to recover payments used to promote renewable sources and demand side measures, as these are also typically borne by the wider customer base.

For power utility companies, this opens up a potentially very destructive scenario. As well as the decline in revenues to decentralised sources, there is the impact of cost pressures on the centralised system which, in turn, reinforces the movement to decentralisation. In our survey 57% say the increased difficulty and expense of balancing will have a high or very high impact on their market.

On the revenue side, half (50%) give a high or very high rating of distributed generation pushing up the price consumers pay for transmission and distribution. It will increase the proportion of fixed costs in the price of electricity. Only 20% of participants report fixed costs above 50% now but a third (33%) expect fixed costs to have risen above 50% of the electricity price in ten years' time. On the physical balancing side, 43% give the same high or very high rating for an increased risk of blackouts or grid instability.



# 50%

give a high or very high rating of distributed generation pushing up the price consumers pay for transmission and distribution.

### 57% in our global industry survey

say there is a high or very high likelihood that distributed generation will force utilities to significantly change their business models. The strongest such sentiment came from North America with 90% of respondents saying this. In Asia, it is 62% and, surprisingly, just 33% in Europe. Perhaps some European participants see such changes as already underway.

### PwC viewpoint: Are current incumbents nimble enough?

*“Technology changes, particularly in IT and the potential that arises from smart grids and demand-side management, are going to change the business model in the power utilities sector. The big question is whether existing players are capable of driving that change or will the momentum come from other entrants? If it’s the latter, the role of existing utilities could shift to the low margin business of providing back-up capacity.”*

Jeroen van Hoof, PwC Global Power & Utilities Assurance Leader

## Technology

*The growth of distributed generation and its threat to the power utility business model depends on technological developments and cost. Its rise in Europe has been subsidy-driven. Cost barriers remain in the way of it being truly market-driven. But if these barriers can be overcome they could set the scene for widespread global industry transformation.*

Many believe we are close to that point. At the beginning of 2013, UBS Investment Research published a research paper that declared “unsubsidised solar era begins – utilities’ customers turn into competitors.” The authors say: “Sharply decreasing costs for solar panels and batteries, combined with rising electricity tariffs, make solar viable without any subsidies in several key European markets, such as Germany, Spain and Italy.”

The view that renewables are ready to compete without subsidies is reinforced by a study by Citi Research which found that: “Residential solar PV has already reached ‘grid parity’ in regions of high solar insolation, with much of the world set to follow by 2020. Our view is that utility-scale renewables will be competitive with gas-fired power in the short to medium term, with the exact ‘crossover’ points varying from country to country. In many regions, we believe competitiveness will be achieved by 2020.”<sup>3</sup>

### Fast-changing economics

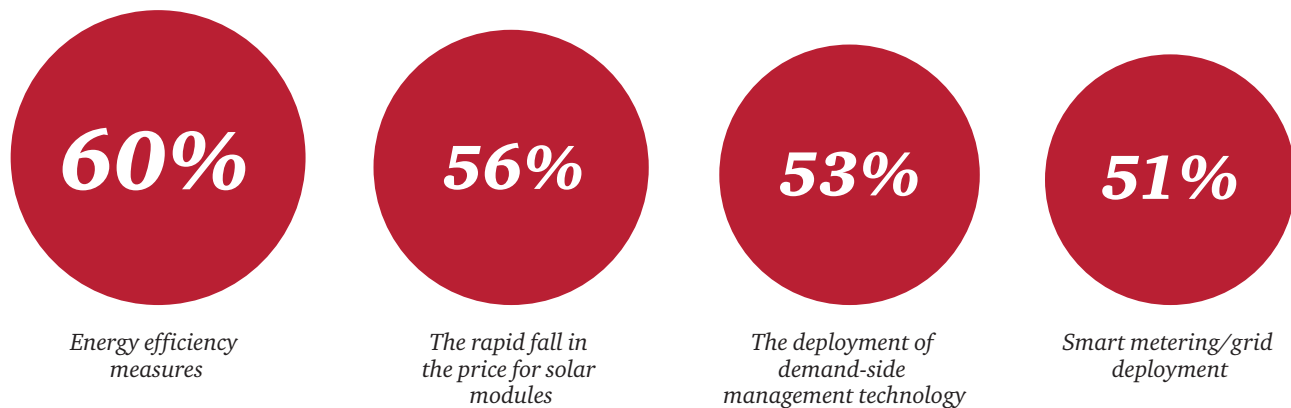
The UBS research estimates 43GW of unsubsidised solar in these markets by 2020, reducing demand for grid-supplied power by 6–9%, on top of shrinking demand due to energy efficiency and subsidised renewables. It talks about “a vast opportunity for unsubsidised solar, even though certain financial and technical limitations will leave some potential untapped.”<sup>2</sup>

### A technology-driven future

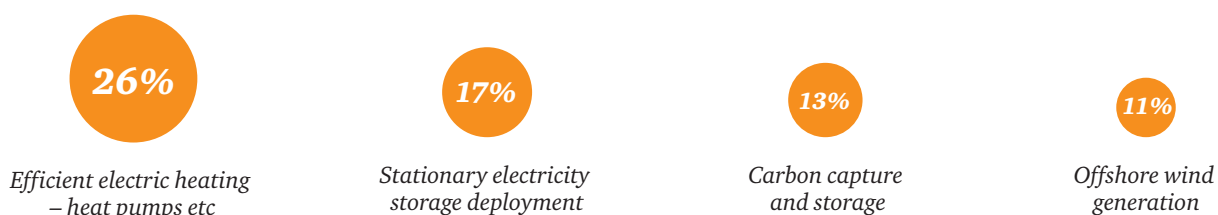
The impact of the changing economics of solar power, as well as the potential of energy efficiency and other demand-side management innovations, is reflected in our survey participants’ views on which technological development they expect to have the most impact in their power markets. Energy efficiency, falling solar prices, demand-side management and smart grid technology head the impact list (figure 3).

**Figure 3:** Percentage of respondents saying the following technology developments will have a high or very high impact on their market

#### Most impact



#### Least impact



Source: 13th PwC Annual Global Power & Utilities Survey

<sup>2</sup> UBS Investment Research, European Utilities, The Unsubsidised Solar Revolution, 15 January 2013.

<sup>3</sup> Citi Research, Shale & renewables: a symbiotic relationship, 12 September 2012.

## Energy efficiency, falling solar prices, demand-side management and smart grids head the list of technologies expected to have the biggest impact on the power sector.

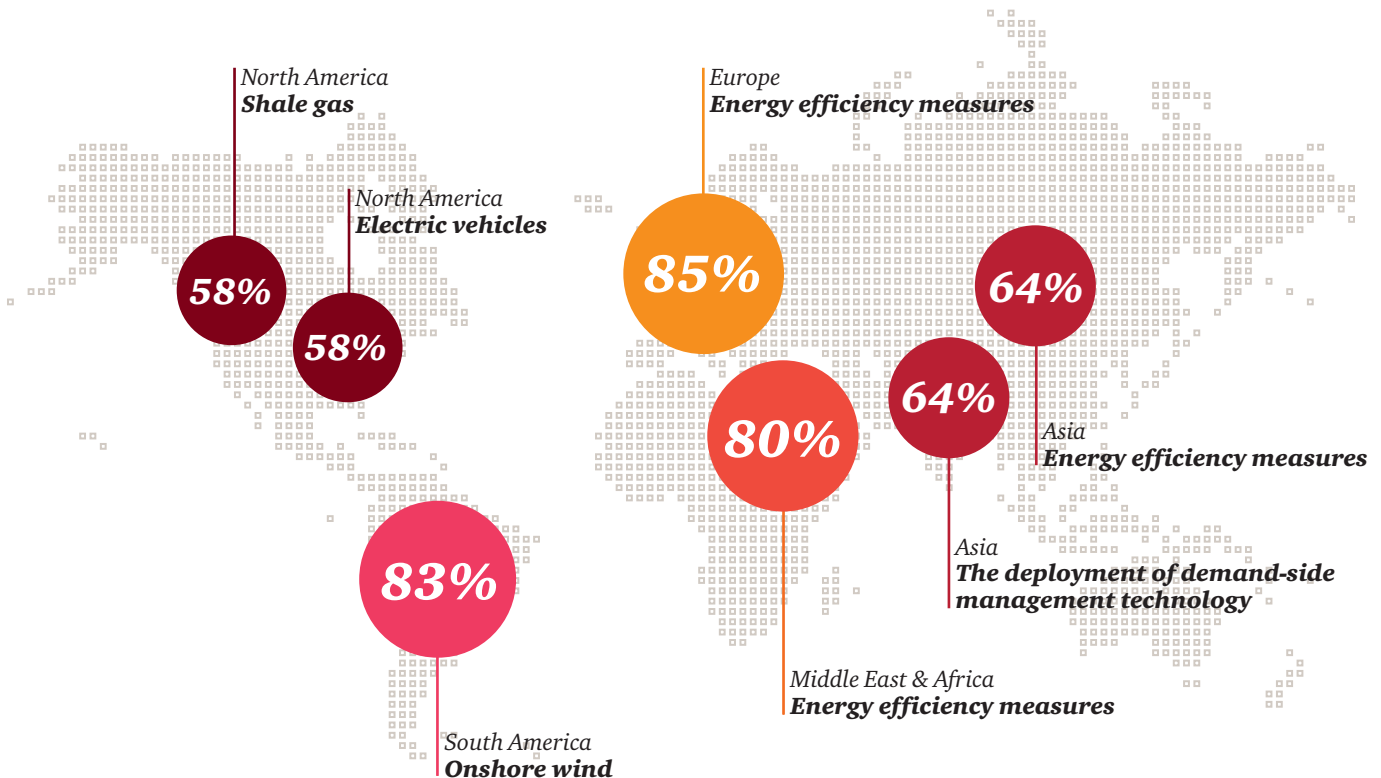
Least impact is expected from offshore wind (except in Europe where it is rated as of greater significance) and from carbon capture and storage technology which remains hindered by feasibility and development problems. And, interestingly, the crucial breakthroughs needed in stationary battery storage that would be needed for self-generation customers to break free from dependence on the grid, appear too far off for most survey participants to foresee any significant market impact for the time being.

Some technology impacts get a middling score when aggregated on a global level but head the list of impacts at a regional level (figure 4). For example, shale gas heads the list of technology impacts in North America alongside the development of electric cars.

Clearly many survey participants feel that the era of the electric car is coming much closer. Indeed, the California New Car Dealers Association report that Tesla all-electric sedan car electric sedan outsold all models from other luxury brands such as Porsche, Volvo, Lincoln, Land Rover and Jaguar based on new-vehicle registrations in the first half of 2013.

Onshore wind generation gets the highest impact rating in South America with countries such as Uruguay giving wind generation a prominent role in their energy policies. Elsewhere in the world, energy efficiency heads the impact list of technological developments in Europe, Asia and the Middle East and Africa.

Figure 4: Top technological impacts by region\*



\* % of respondents rating it as high or very high impact.  
Source: 13th PwC Annual Global Power & Utilities Survey

## Supply

*New sources of fossil fuel supply will have a major impact on the power market. The advent of shale gas and tight oil are changing the economics of the energy landscape. Peak oil forecasts are fast being revised. The prospect of North American energy independence is within reach and the geopolitics of world energy flows are in flux.*

Already, the impact of shale gas on the power market is reaching far beyond North America. Declining US gas prices have increased the volume of exported coal. The effect on lower European coal prices has made coal a higher margin fuel source than gas. As a result, coal has been preferred as a power source with the 'dark spread' (a measure of gross margin of coal-fired power stations) much wider than the 'spark spread' (the equivalent measure for gas-fired plant). This has added to the economic pressures leading to the closure of gas-fired generation in Europe.

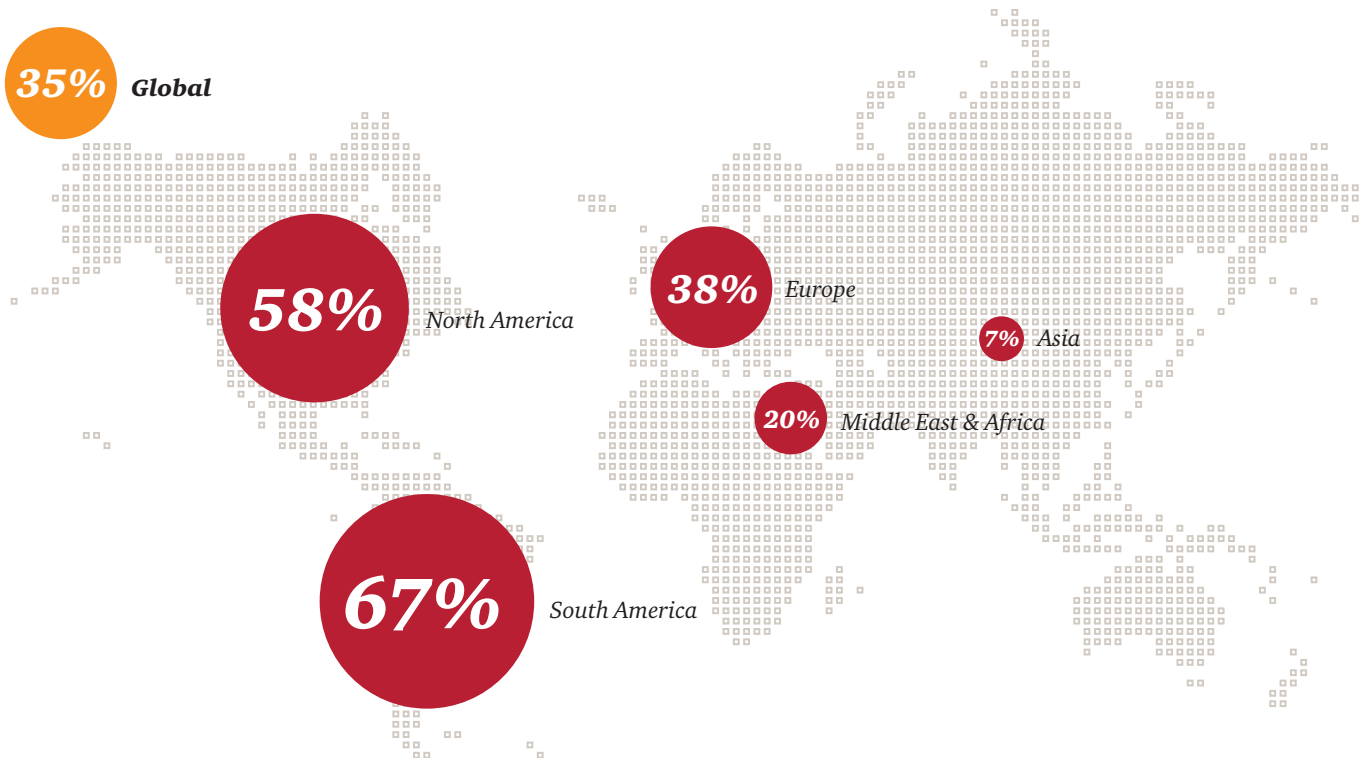
### Shale gas impact

The impact of shale gas on the power market is scored highest by survey participants in the Americas (figure 5). Of course, the US is now well advanced down the shale gas road. But South America is also set to be a major producing region. Argentina holds the third largest technically recoverable shale gas reserves in the world after the US and China. Brazil and Mexico are also in the world top ten for shale gas reserves.<sup>4</sup>

Important quantities of shale gas also exist in countries, such as South Africa, Jordan and Chile, which have limited conventional oil and gas or in regions such as Europe where conventional own supplies are becoming depleted. But national energy policies, 'above ground' economics and local community politics as well as geology will be key factors determining the pattern of shale gas exploitation. In Europe, for example, UK policy is encouraging shale gas exploitation but France has so far ruled out exploration on environmental grounds.

It is doubtful that shale gas production will come into play in other countries as rapidly as it has done in the US. This is a key factor in any assessment of its eventual impact outside North America. But the market-changing potential is there and the responses to two 'future scenarios' related to shale gas presented to our survey participants indicate that the industry is anticipating significant change ahead (see panels on p13 and p20).

**Figure 5:** Percentage of respondents saying shale gas will have a high or very high impact on their market



Source: 13th PwC Annual Global Power & Utilities Survey

<sup>4</sup> US Energy Information Association, Technically Recoverable Shale Oil and Shale Gas Resources: An Assessment of 137 Shale Formations in 41 Countries Outside the United States, June 2013.

*Industry opinion is far from ruling out the possibility that a new abundant energy era might open up.*



## **Future scenario**

*“Technological advances and new sources such as shale gas will dramatically reduce dependence on oil and gas-rich countries and change the power balance between buyers and sellers.”*

Out of all our scenarios, this one had most responses in the medium probability range and fewest low probability responses. So clearly the industry does expect a shift in the balance of power away from sources such as Russia for gas and OPEC countries for oil and gas. But less than a fifth of survey participants are bold enough to assign it a high probability. It seems that most see a shift in the balance of power happening but don't expect it to be decisive.

Probability scoring system is:  
Low (probability rating of less than 40%).  
Medium (rating between 40–59%).  
High (60% or above).



**33%**

*attach a low probability score to this scenario.*



**67%**

*give it a medium or high probability score.*



# Big responses

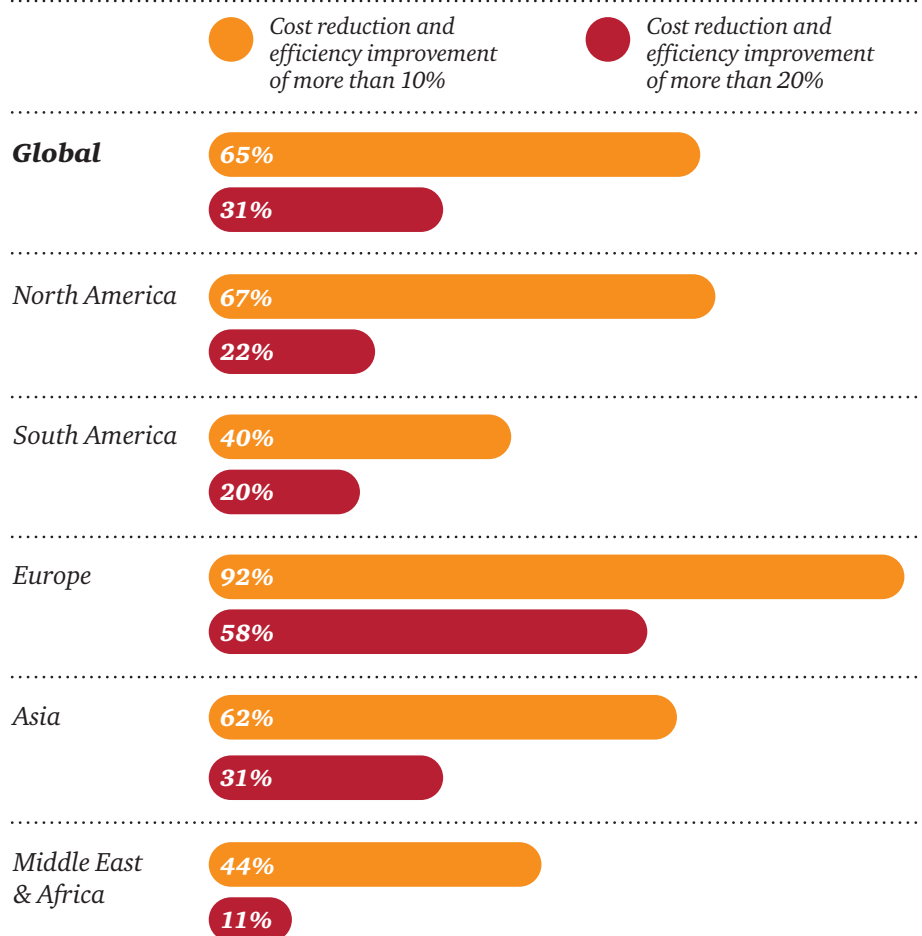
## Companies

*How companies respond to these changes will determine whether they will be part of the future or join the ranks of companies from other industries whose business models have been eclipsed by technological and market change. They will need to be clear-sighted about where their best revenue opportunities lie, act fast to reduce costs or exit unprofitable areas, improve customer service and appeal to a new type of actively engaged customer.*

Companies in Europe are already moving decisively to respond to the current market environment, mindful that the full impact has still to hit them. As RWE's CEO Peter Terium observes: "We are still benefiting from the fact that we sell forward most of our electricity generation up to three years in advance... Sooner or later, the crisis will hit us with full force."<sup>5</sup>

The response of companies like RWE and its rival E.ON has been to embark on significant restructuring of portfolios, cost reduction and pursuit of higher margin growth opportunities. E.ON, for example, has accelerated the implementation of its 'E.ON 2.0' cost saving programme which aims to reduce controllable costs from around €10.9bn to €9.5bn, including the shedding of 11,000 full time equivalent jobs<sup>6</sup>.

**Figure 6:** What is the scope for power utility companies to reduce the cost base and improve efficiency?\*



\* % of respondents.

Source: 13th PwC Annual Global Power & Utilities Survey

<sup>5</sup> RWE, Report on the First Half of 2013, August 2013.

<sup>6</sup> E.ON Debt Investor Update Call, September 3 2012.

## Efficiency and performance improvement

In the opinion of our survey participants, the industry as a whole has the potential to deliver substantial cost base and efficiency improvement (figure 6). Nearly a third (31%) of all participants worldwide say there is scope for power and utility companies to achieve cost base and efficiency improvements of more than 20%. In Europe, 58% and, in Asia, 31% say this level of cost saving is possible. In North America and South America, 22% and 20% view this as possible and 11% say the same in the Middle East and Africa.

It is clear that the industry itself recognises the scope for major efficiency improvement. And when it comes to areas of improvement it is the core activities of asset operations, capital project management and customer relations that are singled out (figure 7).

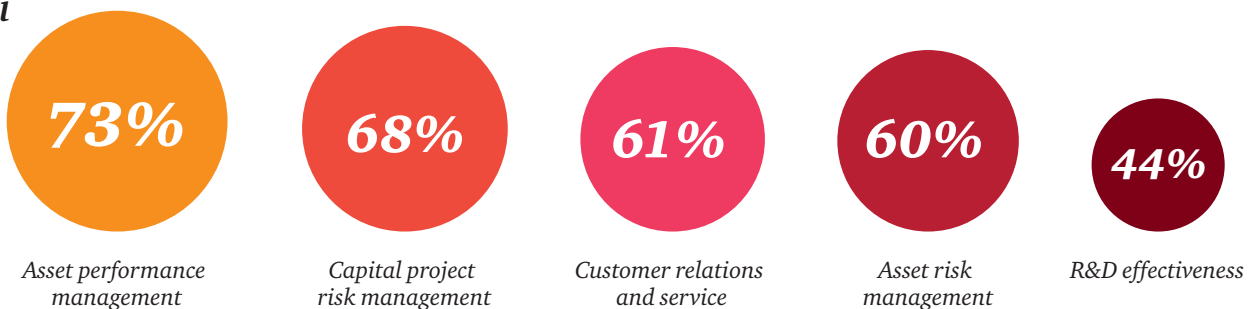
More than six out of ten of all survey participants see high or very high scope for performance improvement in asset risk management, customer relations and capital project management. And nearly three-quarters (73%) see the same big scope for improvement in asset performance management. In Europe this percentage was even higher – at 82%. Given that assets are the lifeblood of the power and utilities industry, this self-recognition of the potential for improvement is a striking finding.

# 31%

*of all participants worldwide say there is scope for power and utility companies to achieve cost base and efficiency improvements of more than 20%.*

**Figure 7:** Percentage of respondents saying there is high or very high scope for improvement in the following areas of power utility company operations

### Global



Source: 13th PwC Annual Global Power & Utilities Survey

## PwC viewpoint: A springboard to greater efficiency

*“The scope to take 10–20% out of the cost base of companies in the sector is definitely there. It would provide some room for the longer-term sustainability of companies as they adjust their strategies. Looking hard at asset performance is vital. And the accelerating pace of development in things like geospatial technology, mobility tools, smart grids and sophisticated scheduling and warehousing can all provide a springboard for major cost savings.”*

David Etheridge, PwC Global Power & Utilities Advisory Leader



## Future scenario

*“Power utility companies need to become much more tariff-clever, perhaps learning some bundling and ‘free allowance’ tricks from mobile telephony.”*

A future where power utility companies offer ‘free power’ similar to the ‘free call’ bundles of some telephone companies is clearly not being ruled out by survey respondents. Just under two thirds see a medium or high probability of this becoming part of a more interactive relationship with customers.

Probability scoring system is:  
Low (probability rating of less than 40%).  
Medium (rating between 40–59%).  
High (60% or above).



**36%**  
attach a low  
probability score  
to this scenario.



**64%**  
give it a medium or  
high probability score.

## 82% see distributed power generation as ‘an opportunity’ versus only 18% rating it as a ‘threat’.

### Strategy

Efficiency savings and performance improvements can buy power utility companies considerable defensive headroom in responding to the changing industry environment. But defense needs to be accompanied by offense. Strategies are needed that identify the best revenue opportunities in a changed and, potentially, transformed future market landscape.

Two key elements in this will be a strategic view on just how far and at what pace distributed generation will take hold in their markets, together with a view on the role and opportunity afforded by gas. Different national energy policies, fossil fuel supply and cost situations will mean that take-up will continue to vary from country to country and the interplay between different generation types will remain complex.

At the moment we are beginning to come to the end of a phase where the spread of distributed generation has been policy and subsidy-led. With the economics of distributed generation fast changing, we are likely to move into a phase where take-up is commercially and market-led. Companies will need to take a view about their positioning and product offer in this market. They will need to judge the extent to which their customers will want to come to them for new innovative products and added value service offerings.

Shale gas exploration could be an enabler of gas-fired generation and price-competitive grid electricity. Coal is also likely to be in a similar position if energy policies allow. As a flexible source of balancing generation to smooth out imbalances arising from intermittent renewable generation, both would complement distributed generation. But they would also rival it and be a factor in limiting distributed generation deployment in countries where policies favour fossil fuels.

The majority of companies in our survey seem ready to go on the front foot. 82% of participants see distributed power generation as “an opportunity” versus only 18% rating it as a “threat”. In a conference call to analysts, the CEO of a leading European power utility company observed that “big rivers start with small drops” in outlining his company’s expansion into distributed energy. The same company is expanding its position in large-scale solar and onshore wind in the US as well as growth markets worldwide.

### Changing technology ...changing business models

*More than a third (35.8%) of US households don’t have a landline telephone and use mobile telephony instead’. In many parts of Africa, mobile telephony has leapfrogged fixed line infrastructure.*

*Disruption of the telecoms business model has been profound. Many telecommunications companies, for example, are now more akin to broadcasters as they seek to retain and expand remaining landline relationships through online sports and entertainment content.*

*The need for back-up electricity and other differences between the sectors make us cautious about drawing exact parallels with the power utility industry. But a changing self-generation cost base and any future breakthroughs in electricity storage suggests power utility companies would be wise to keep the telecoms experience in mind.*

## Customers

Companies are likely to face stiff competition with each other as they seek to ensure distributed power generation becomes an opportunity rather than a threat. Becoming a provider of distributed generation services to customers tops the list of strategies that our survey participants identify as most likely to succeed in a more decentralised power landscape (figure 8).

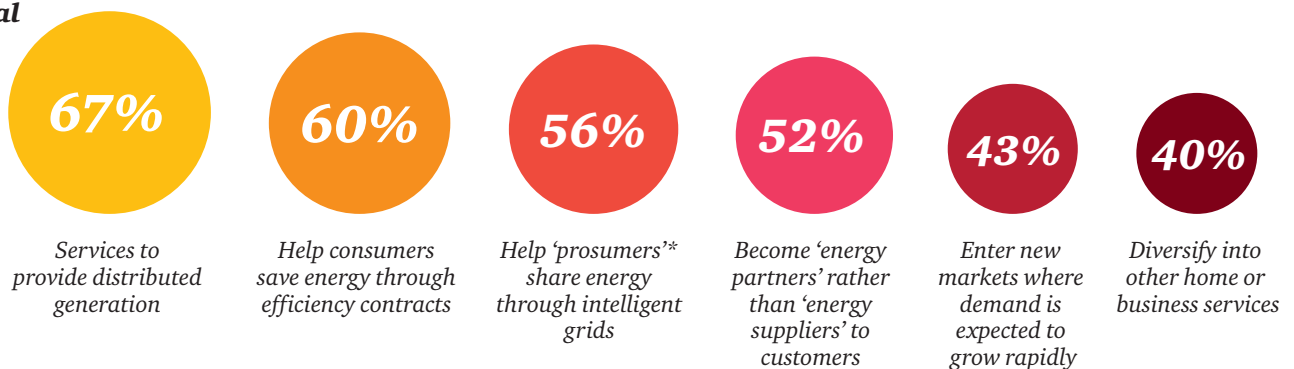
Companies will also need to address the barriers that are likely to stand in the way of them being well positioned to compete for customers in this new market landscape. Survey participants already feel they fall short in their customer strategies. Three fifths (61%) say there is 'high' or 'very high' scope for improvement in customer relations and service.

# 61%

say there is 'high' or 'very high' scope for improvement in customer relations and service.

**Figure 8:** Percentage of respondents rating the following strategies as likely or highly likely to be successful in a distributed generation market

### Global



\* 'prosumers' refers to customers that generate their own electricity.  
Source: 13th PwC Annual Global Power & Utilities Survey

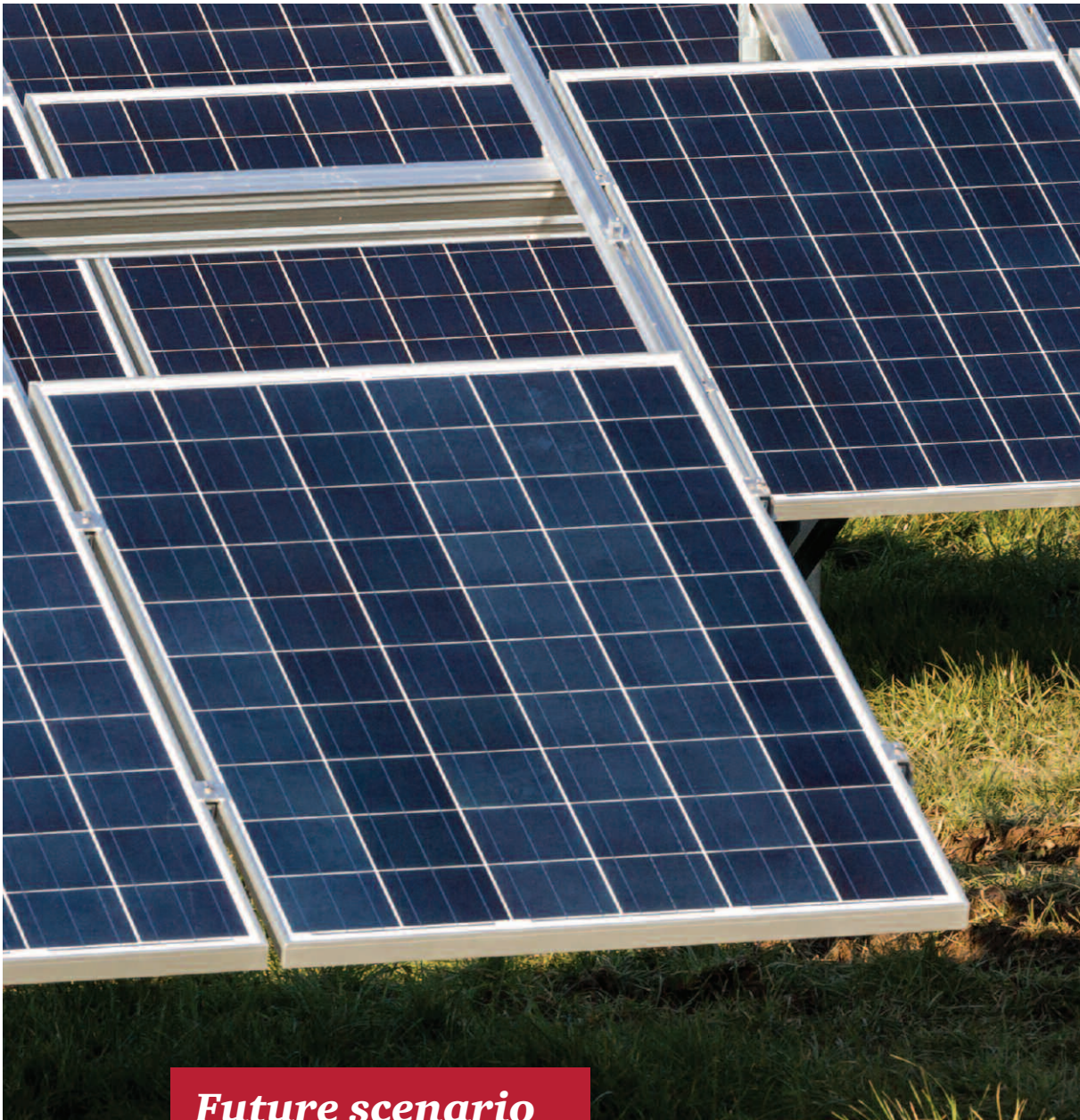
## Becoming an 'energy partner' rather than an 'energy supplier'

In Russia and Germany, stores with their own micro gas-fired combined heat and power (CHP) unit are being rolled out by METRO Cash & Carry as part of a partnership with E.ON for distributed energy solutions.

The units will be used to produce heating and hot water for the stores and will also cover a portion of the stores' electricity needs. The CHP units allow remote control, which makes it possible to respond flexibly to price and demand peaks on the market. E.ON is installing the units and METRO will operate them.

A future option would be to supplement the on-site CHP units with solar power. Already at the Düsseldorf site, a photovoltaic system has been in operation since late 2007.





## Future scenario

*“In the coming decades, we could see the death of the current energy retailing business model in some major world markets because of the rise of distributed generation.”*

Although it's the scenario that gets the highest number of 'low probability' responses, nearly half of survey participants see it as sufficiently possible to give it a 'medium' or 'high probability' score.

Probability scoring system is:  
Low (probability rating of less than 40%).  
Medium (rating between 40–59%).  
High (60% or above).



**52%**

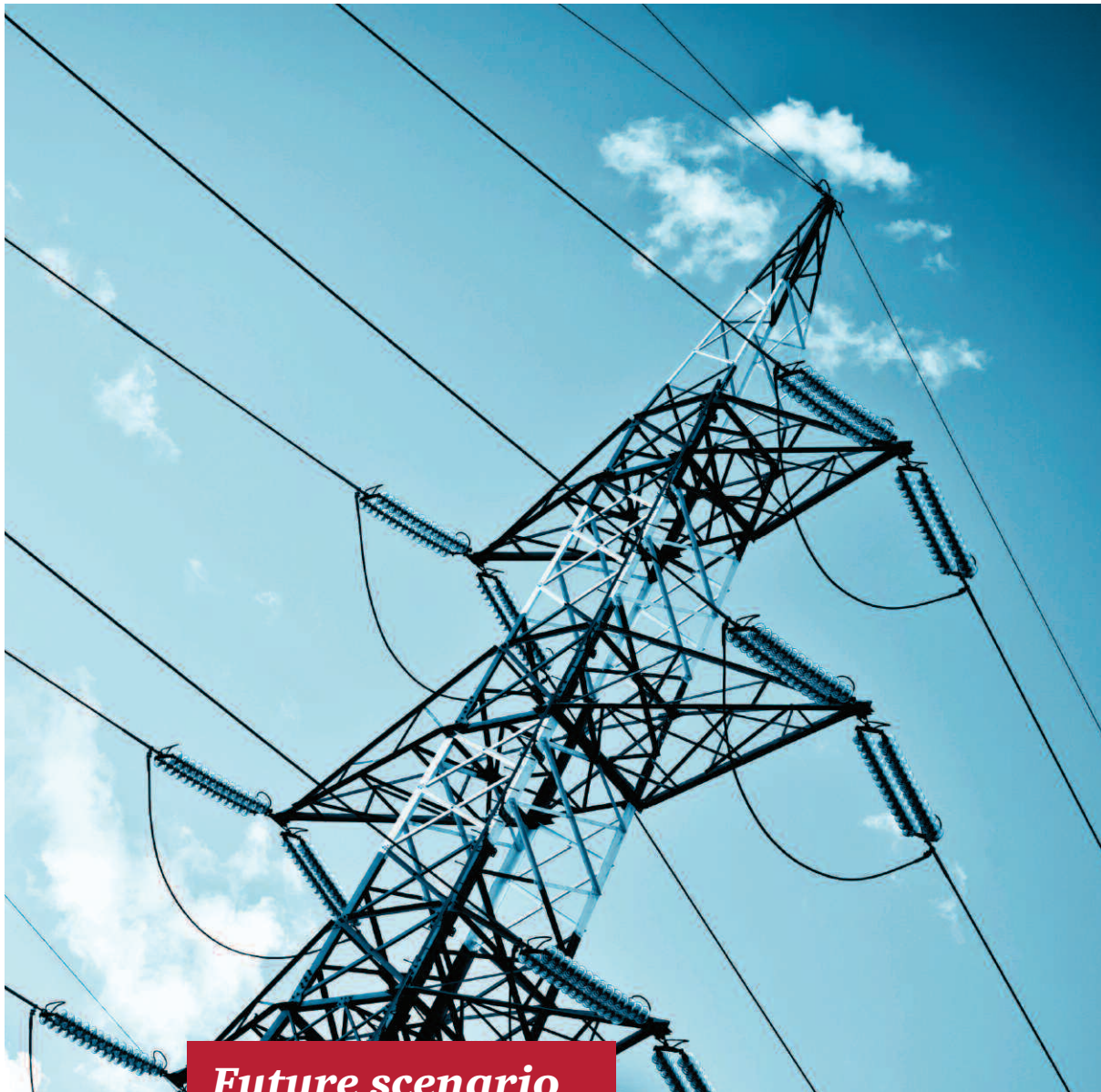
attach a low probability score to this scenario.



**48%**

give it a medium or high probability score.





## Future scenario

*“In the future concerns about energy security will become a thing of the past due to technological changes and new sources of energy.”*

Although a substantial minority of survey participants are sceptical about this ‘breakthrough’ scenario, a majority are more positive on it. Clearly the promise of lower cost and more widespread renewable technology allied with developments such as shale gas on the fossil fuel front is leading many to look favourably on the possibility that a new abundant energy era might open up.

Probability scoring system is:  
Low (probability rating of less than 40%).  
Medium (rating between 40–59%).  
High (60% or above).



**45%**  
attach a low probability score to this scenario.



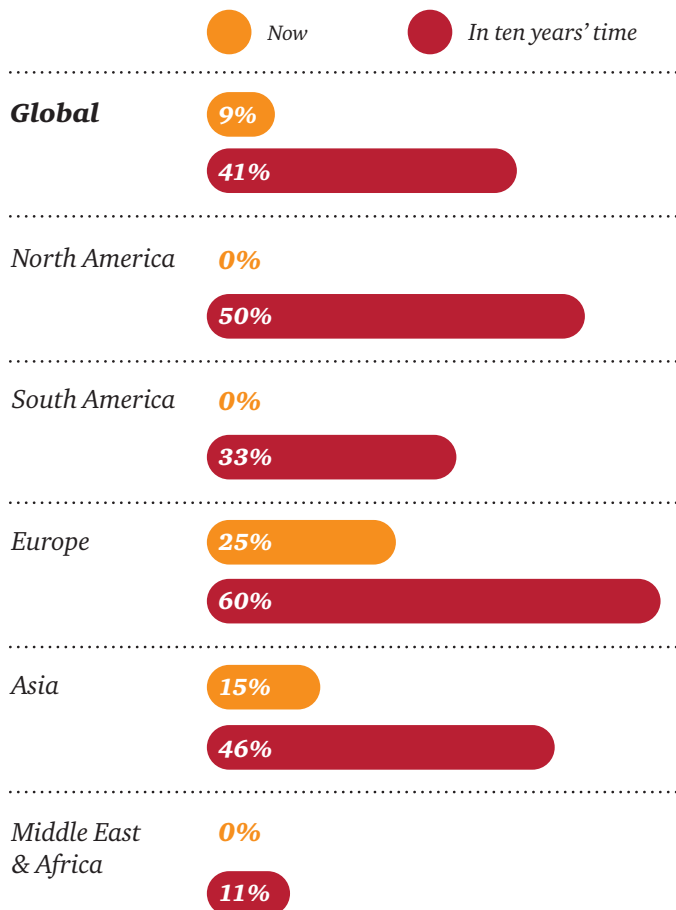
**54%**  
give it a medium or high probability score.

## Time is running out on customer relations shortcomings as we enter an era of more engaged ‘energy-saving’ and, increasingly, ‘energy generating’ customers.

Time may be running out on companies being able to get away with shortfalls in customer relations. At present, nearly two thirds (65%) of survey participants characterise their customers as ‘passive customers that take what they are given’. But only 39% expect this to be the case in ten years’ time.

Instead, they foresee a rise of active ‘energy-saving’ and, increasingly, ‘energy generating’ customers (figure 9). A significant proportion (41%) of our global survey participants see their market in these terms in ten years’ time compared to just 9% today, including 60% of those in Europe, 50% of those in North America and 46% of those in Asia.

**Figure 9:** The growth of a new type of active energy customer (energy-saving and/or energy-generating customer)\*



\* % of survey participants giving ‘strong’ or ‘very strong’ scores to one of the following descriptions of customers in their market – ‘actively engaged seeking to minimise consumption’/customers that generate their own electricity/customers generating own electricity and interacting with the market via a smart grid.

Source: 13th PwC Annual Global Power & Utilities Survey

# 41%

see the emergence of a new breed of customer in their markets in ten years’ time compared to just 9% today.

Affordability has risen up the agenda in many countries. Concerns about blackouts are increasing as reserve capacity gets stretched. And the advent of shale gas is introducing a new environmental battleground which governments will need to police.

The sentiment from many of the participants in our survey suggests that regulation is facing something of a crisis. More than half (55%) of survey participants say that energy policy-makers “have produced a significant amount of policy uncertainty that is undermining investment” (figure 10).

The sentiment is particularly strongly felt in North America (67%), South America (67%) and Europe (50%) but less so in other parts of the world. But only in the Middle East and Africa do a significant proportion of our survey participants feel that policy-makers are working well with the industry to promote investment and protect customers.



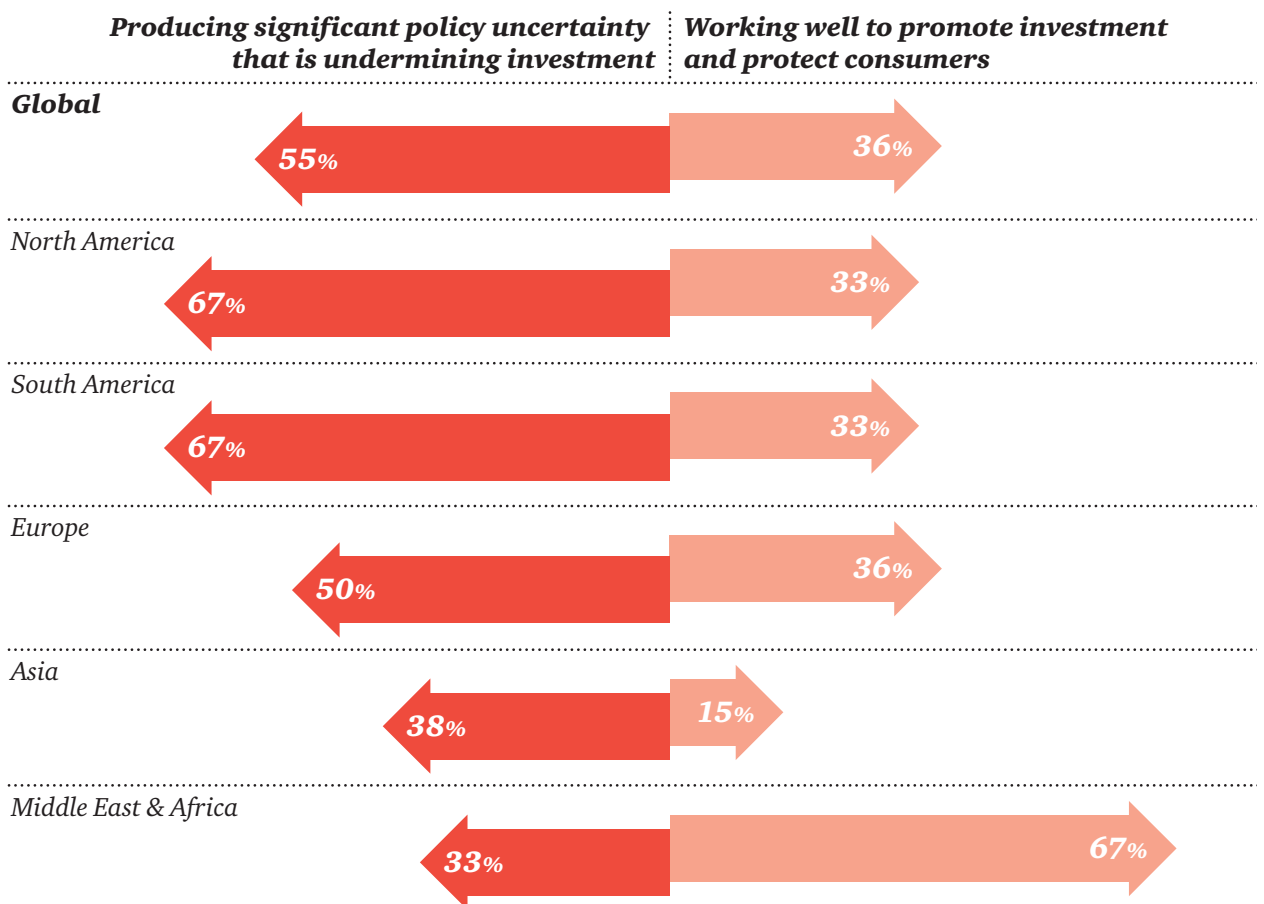
**55%**

*of survey participants say that energy policy-makers “have produced a significant amount of policy uncertainty that is undermining investment.”*

## Regulators

*Policy-makers have the difficult task of grappling with the big issues of supply availability, affordability and environmental impact. The tensions between these goals are coming to the fore more and more.*

**Figure 10:** How would you describe energy policy makers in your market?



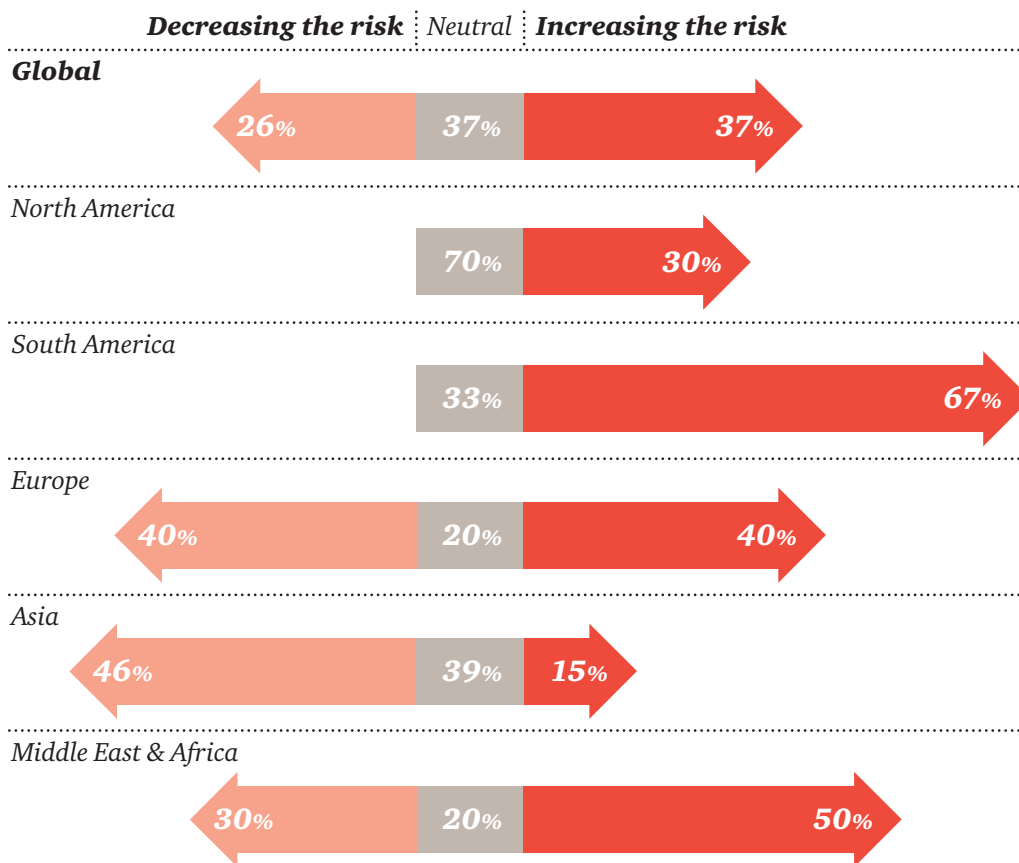
% of survey participants selecting each statement in a longer list of statements. More than one statement could be selected.  
Source: 13th PwC Annual Global Power & Utilities Survey

## Keeping the lights on

On balance, the industry viewpoint is that, in many places, current developments in companies' power markets are increasing rather than decreasing the risk of blackouts (37% increasing versus 26% decreasing globally) (figure 11). Many survey participants are neutral on this topic. But, of those expressing a view, the worry that current developments are tilting the balance towards blackouts is particularly felt in South America (67% versus 0%), North America (30% versus 0%) and the Middle East and Africa (50% versus 30%). In Europe, opinion is much less likely to be neutral but is divided with 40% feeling the risk of blackouts is increasing and 40% saying it is decreasing.

Certainty and clear planning are the things that the sector most needs according to survey participants. There is a feeling that regulation is at a crossroads, with the era of liberalisation fading and a new era of greater certainty needed. There are immense infrastructure requirements associated with just the renewal and maintenance of existing infrastructure but there are also new demands such as how back-up capacity is going to be provided for a system with renewable and distributed generation.

**Figure 11:** How are current developments in your power market influencing the risk of blackouts?



Source: 13th PwC Annual Global Power & Utilities Survey



## Meeting and balancing demand

Asked what the most important policy levers are to help meet demand in the coming decades, it is a regulatory environment that encourages network investment (scored strongly by 81% of survey participants), increased interconnection (also 81%) and fast-track planning and permitting for strategic infrastructure (67%) that tops the list. Things like market liberalisation (40%) and unbundling (35%) come at the bottom of the list.

On the generation side, nearly three-quarters (73%) of our survey participants report that obtaining finance is a major barrier to new investment. Regulatory barriers and uncertainty are an element in this. Just over two thirds (68%) say they are unable to recover the cost of new generation via regulated energy tariffs and 62% say regulatory and political uncertainty is a deterrent to the development of new large-scale generation. In North America and Europe, the issue of capacity payments is at the top of the company agenda. Three-quarters (75%) of survey participants in Europe and two thirds (67%) in North America say the lack of capacity payments is a major barrier to the development of new generation.

The issue of what policy design features are needed to enable system operators to balance a system with high levels of intermittent generation is an urgent one for regulators. Capacity payments are one answer to this. Together with measures to introduce demand response and demand-side management markets and the ability to curtail intermittent generation during low demand periods, they top the list of measures that survey participants think policy-makers should introduce to balance intermittent generation sources (see figure 16 in ‘around the world’ section).

# 81%

*of survey participants say a regulatory environment that encourages network investment is an important policy lever*

## European utilities warn EU over energy risks

*...was the headline on the front page of the Financial Times' companies and markets section on 16 September 2013. Nine companies – Enel, Eni, E.ON, RWE, GasTerra, GDF Suez, Iberdrola, Gas Natural and Vattenfall – were reported to be joining forces in dialogue with the European Parliament. Among their proposals are for policy-makers “to work quickly to introduce a system of capacity payments, which would incentivise gas-fired generators to remain online and prevent more plants being shut down.”*

(Financial Times, 10 September 2013)



## ***Future scenario***

*“The nuclear/renewable investments needed to avoid significant global warming (2 degrees or less) will prove too costly for governments to support.”*

Leading scientific assessments indicate that time is running out fast in the race to avoid significant and problematic global warming. No doubt survey participants will have been mindful of this in their responses to this scenario. It got the highest number of ‘high probability’ responses of all the scenario questions. But, perhaps what is most significant is the fact that it is the cost of reducing emissions that is the key factor as much as the race against time.

Probability scoring system is:  
Low (probability rating of less than 40%).  
Medium (rating between 40–59%).  
High (60% or above).



**32%**

*attach a low probability score to this scenario.*



**68%**

*give it a medium or high probability score.*

# CEO perspectives

*With so many survey respondents putting an emphasis on business model transformation, we decided to show the early results of the survey to leading CEOs from different parts of the power utilities sector around the world. Here we present their perspectives on the changes ahead.*

Dr. Johannes Teyssen  
Chairman and CEO  
E.ON SE



***Do you expect the power utility business model to be transformed and how would you characterise future model(s)?***

“It is not very likely that the current transformation of the industry will lead to one specific global utility business model. Rather, we will see different options, mainly based on the available choices on the customer side, in combination with IT and energy technology changes. Regarding customers, the future utility business will be characterised by the digitalisation of the customer relationship.

“This means more and faster communication with the customers about their actual demand or, in some cases, also about their auto-generation. Demand-side management will play a more active role and the integration of more PV and wind, i.e. more volatile generation, and of more decentralised generation, will determine future business models. In regions and countries with less of an established energy system, decentralised generation could play an even larger role.”

***Will the boundaries of the sector change as business models evolve?***

“More players will enter the energy business, hence naturally reducing the footprint of companies already in the sector. Additionally, the use of power will also increase in transport and in heating applications so that stronger competition between fuels will gradually develop. The increasing need for communication, IT, internet and telecommunications, means these types of companies will show increased interest in the energy segment – also driven by their own electricity consumption. IT/Server hosting companies placing their servers in buildings where the waste heat can be used while they save on building cost themselves is an interesting example.

“Last but certainly not least, consumers will become more actively involved in the whole energy system and have a higher footprint in the system as ‘prosumers’. This requires the ability of the incumbent companies to enter into a new dialogue with their customers and increases the pressure to deliver tailor-made solutions.”

***What will be the strategic choices that companies will have to face up to?***

“The bigger diversity of potential utility business models will influence the number and type of strategic choices. Some utilities will partially become geographically more diverse, in order to find new opportunities and to reduce regulatory risk. Others will re-focus on their traditional home market and search for their niche.

“The focus on customer services and distributed generation will also present options for new business fields. New and more partnerships are likely, either to share financial risk or to profit from different knowledge.”

***What’s your reaction to some of the ‘future scenarios’?***

“Scenarios are food for thought. One should not rely on them too much, but use them as a tool to think about possible future developments and how a consistent picture of the future could look like. Particularly interesting is the (shale gas) scenario (p13), because it does not follow the route of the often used assumption that mankind is running out of fossil fuels. It is thus an important scenario to find out how robust the renewable energy development will be – and it also puts more competitive pressure on renewables right now.”

On the ‘death of the current energy retailing business model’ scenario (p19): “This is an additional challenge in the future that has the potential to drastically change the whole value chain: generation – because of distributed ways to produce electricity, transmission and distribution – since energy transport would then happen in a much more bi-directional manner, sales – since the products relevant for customers will change. It’s an excellent starting point to find out what kind of modifications will possibly affect the power sector. It is also a good example of disruptive thinking. Since many scenarios

only extrapolate an observed trend in a linear manner these scenarios describe ‘game changers’ and therefore serve as a robust test for our industries current strategy.”

On the energy security scenario (p20): “It’s a famous saying – ‘some things are so unexpected that no one is prepared for them’. No one knows where the breakthroughs will happen and when. But the art is really to find out that a breakthrough is just about to take place. The only fact that is for sure is that our industry cannot rely anymore on an unchanged investment and operational environment in the future.

“Energy security will most likely stay a concern. It might be that in the future, technological development will help to achieve this goal more easily. However, it is also not unlikely that the global energy demand rises in a way that leads to energy security becoming an even bigger concern. Furthermore due to the high importance for energy for any society politics will always pay closer attention to our industry and will focus on security of supply for its society.

“One important issue for a transformation process – and we see this currently in Germany – is affordability. Scenarios mainly concentrate on technological and environmental aspects, a few also on the growing importance of public acceptance of our industry in general and certain technology in special. But between now and the future scenario is always the transformation process – and this means changes, leaving some old ideas behind and heading to something new, that is only vaguely known. And this transformation process costs money – money for new development, for new assets, for inevitable errors and for inevitably stranded investments. These costs have to be borne by someone – and in the end this is usually the end-customer. Keeping the acceptance of the transformation high throughout the whole process requires affordable bills for the end-customers.”

#### **Is regulation facing a crisis?**

“In many European countries at least, the energy costs for the customers consist of a regulated and a non-regulated share. In the non-regulated share, competition drove cost-savings and was hence successful in finding the most efficient solution for the customers. However, in some jurisdictions regulators defined an unfair competition between subsidised and privileged renewables and traditional conventional generation. We need a sustainable regulation for linked markets that fosters market-based solutions by simultaneously being open to technological progress.”

Brian A. Dames  
Chief Executive  
Eskom



#### **Do you expect the power utility business model to be transformed and how would you characterise future model(s)?**

“The power and utilities business is where banking and landline telephony were a decade or two ago, with new technologies the main driving force. Technology advancements, especially in distributed generation and energy efficiency, will have a definite impact on existing business models. This, together with a more informed and empowered customer, will shift the business model.

“The timing of these changes will be different across regions. Within the African continent, the transformation of the business model will be influenced by changes in the economic position of the poorer sectors of the population. Should no major improvement in their position occur, government policy is likely to require provision of electricity to them thereby requiring a central dominant utility. This could prevent choice by industry and perpetuate cross subsidies. However, with the rapid advances in technology development and reduction in prices of technologies, utilities could be negatively impacted by reduced demand from the sectors that are currently carrying the cross subsidy.

“Technology and electricity policy reforms will be the major determinants of future models. In South Africa, deregulation could mean a significant increase in the number of IPPs in the sector. Smaller, more efficient plant with shorter lead times could result in decentralisation within the African continent. There could be more partnerships with the customer and more strategic alliances in the sector. ‘Self-reliance’ in reaction to rising prices and unserved areas together with developments in energy efficiency will also have a major impact.”

#### **What will be the strategic choices that companies will have to face up to?**

“In South Africa and Africa, you are constantly on a tightrope and balancing act to find a sustainable business model. The three A’s (access, affordability, availability) will continue to drive the strategic choices companies make. The difficulty is trying to find a balance between the three, within the given resource constraints. These aspects influence the next area of choice, namely

technology choice which includes the technology mix and needs to be balanced with environmental impacts and required investment.”

#### **Will the boundaries of the sector change as business models evolve?**

“The collaboration between banks, financial institutions and telephony is another facet that could spill over to the utility sector. Partnerships across industry could affect the resource intensive nature of the business, with efficiency improvements and self-generation resulting in reduced demand. Boundaries between sectors and industry are likely to become diluted.

“New players and entrants into the sector could transform and expand the service offerings with a probable merging of related services. Policy will be a major determinant on the choice by these players. However this may all result in an electricity price that is a barrier to the sustainability of the industry.”

#### **What’s your reaction to some of the ‘future scenarios’?**

“New energy sources, such as gas from fracking, will be a game changer as will technology ‘behind the meter’. With current advances this is likely to materialise in five to ten years. In developing countries affordability and access to energy, together with other socio-economic challenges, the timeframe will probably move closer to ten years.

“Other important scenarios that could be considered include a scenario of a significant gap between supply options and demand; water becoming increasingly critical in Africa (investment in desalination plants); and regulation becoming location instead of price specific.”

#### **Is regulation facing a crisis?**

“There is always a potential to operate more efficiently and reduce costs without compromising significantly on plant reliability. In South Africa, current tariffs are sufficient to cover costs. But fuel costs remain a challenge. The true challenge of regulation is to provide a sufficient return to facilitate new investment and replace plant that is nearing the end of its design life. This is due to the significant cost of new investments relative to the size and wealth of African countries. Regulation will need to evolve as the electricity sector evolves into new products/technologies and the electricity value chain extends ‘beyond the meter’.”



Liu Guoyue  
Director and President

Huaneng Power  
International, Inc.



**Do you expect the power utility business model to be transformed and how would you characterise future model(s)?**

“With the deregulation of power market, under the impact of project approval, tariff mechanism and government regulations, the power utility business model will change gradually but a fundamental change is not expected.

“The possible characteristics of future power utility business models include: continuous increase in distributed energy sources; coexistence of mega size centralised power source and distributed energy sources; continuous enhancement in power companies’ information system, integration and globalisation.”

**What will be the strategic choices that companies will have to face up to?**

“The strategic choice our company is facing up to is to increase investment in clean energy, enhance integration of fuel coal and power generation business, globalisation of operation.”

**Will the boundaries of the sector change as business models evolve?**

“Our company’s future development in the power sector is to improve the management of thermal power generation, optimise business structures, keep the leading position of domestic power sector development and strengthen cooperation with other sectors. Regarding the boundaries between the power sector and other sectors, our focus is to stick with our core power generation business, and grow into relevant sectors based on this focus. I am not expecting these boundaries will have significant changes. Coal companies and private funds will gradually increase their investments into power sector.”

**What’s your reaction to some of the ‘future scenarios’?**

On the potential for concerns about energy security to become a thing of the past due to technological changes and new sources of energy (p20): “I agree with this view. I think the main breakthrough will be in wide utilisation of energies such as wind power, solar, shale gas and gas hydrate. And the breakthrough may happen in ten to 20 years.”

On the ‘shale gas’ scenario (p13): “I think the possibility of changing the supply-demand condition is increasing gradually with more types of energy supply emerging.” On the death of the current retailing mode (p19): “I think a new retail model will emerge but the current energy retailing business model will not fade away.”

**Is regulation facing a crisis?**

“No crisis. There is room for improvement for both regulation and the power sector itself.”

Dr. Omar Kittaneh  
Chairman  
Minister for Energy  
Palestinian Energy  
and Natural Resources  
Authority



**Do you expect the power utility business model to be transformed and how would you characterise future model(s)?**

“From my point of view, the market will enforce a change and transformation in the power utility business. But it may be a long time before it becomes unrecognisable transformation. The key to this change will be the penetration of renewable energy and its associated technology, in particular in storage.

“It may change dramatically, but the extent of change depends on the share and penetration of renewable energy and when each consumer will be a producer. This may create a new power utilities model with different infrastructure, investment and regulations.”

**What will be the strategic choices that companies will have to face up to?**

“The choice (for companies) is ‘to be or not to be’ depending on the evolving renewable technology. But the question of when will need a few more years to be answered.”

**Will the boundaries of the sector change as business models evolve?**

“New players will come in and mostly they will be the renewable energy producers which will mean that some boundaries and companies may disappear.”

**What’s your reaction to some of the ‘future scenarios’?**

“I would like to start by commenting on the question whether ‘the number of customers having difficulty affording power will cause governments to intervene more dramatically in the next ten years’. For the next ten years, this might be the case in many of the growing economies around the world, although government intervention is not expected to last for the long run. Technologies will evolve and develop with higher efficiencies getting lower costs, making electricity prices more affordable to people.”

On the nuclear/renewable investments needed to avoid significant global warming will prove too costly for governments to support (p25): “I think this is of low probability taking into consideration the technological advancements occurring in the sector, and the constant improvements taking place in areas such as energy storing technologies which will highly impact the sector on the long run.

“Another point to take into consideration are the regulations that are being imposed around the world to protect the earth’s environment, which would make the current ordinary methods of generating electricity less attractive, simultaneously making renewable energy more attractive and feasible while maintaining the feasibility of the power generation business.”

**Is regulation facing a crisis?**

“The room for improvement is within the industry and the regulation. The efficiency of the industry and the regulation should cooperate together.”



# Around the world

## Regional survey highlights

*Power markets around the world differ in many ways, not least the stage of their development and their natural resource context. Different energy policies have also played a key role with the result that the inroads made by new forms of renewable and distributed power generation vary considerably.*

The fossil fuel context will be an important continuing factor in the generation mix. The balance between centralised grid generation and distributed generation will also be influenced by factors such as access and affordability.

These factors are likely to play a large part in the nature of transformation that lies ahead. In general, expectations of transformation are strongest in the more mature markets of Europe, North America and Asia. We report on many of the key regional similarities and differences in the main report. In this chapter, we highlight some of the other main regional findings.

## Business model transformation

Although Europe is where the current environment for power utilities is proving most disruptive, the anticipation of transformation is more widely felt. Indeed, the strongest anticipation of transformation is from power utility companies in Asia. It is weakest in South America, the Middle East and Africa (see main figure 1 at front of report). Some of the factors at work in explaining these difference are the strong role of hydropower and the potential of shale gas in South America, the fossil-fuel-rich context of the Middle East and the importance of widening access to grid power in Africa.

## Future scenario

*“In the coming decades, we could see the death of the current energy retailing business model in some major world markets because of the rise of distributed generation.”*

Nearly half of all survey participants worldwide and exactly half in North America and Europe give this a medium or high probability rating. But Asia is the stand-out region with over two thirds seeing this as medium or highly likely prospect.

North America	50%
South America	20%
Europe	50%
Asia	69%
Middle East & Africa	30%

Percentage of survey ranking this scenario as a medium or high probability. Probability scoring system is: Low (probability rating of less than 40%), Medium (rating between 40–59%), High (60% or above).

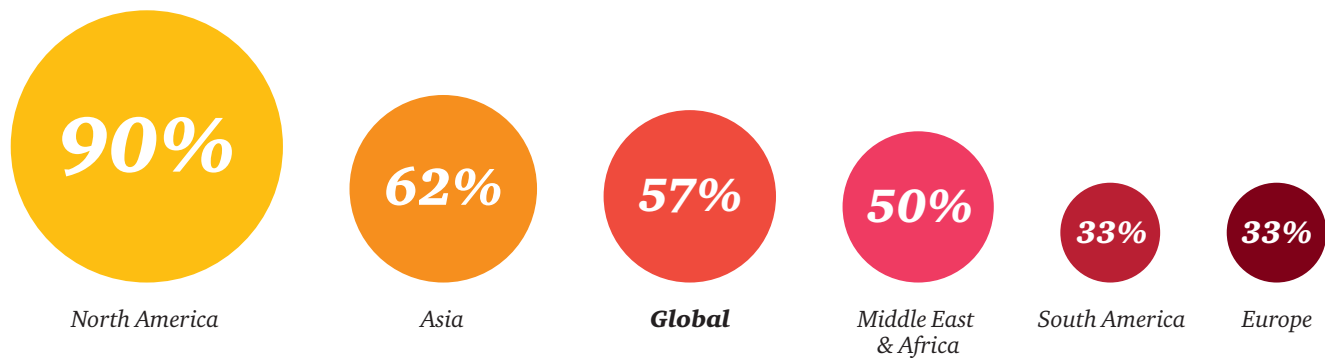
## 90% of North American survey participants say there is a high or very high likelihood that distributed generation will force utilities to significantly change their business models.

### The impact of distributed power generation

Across the main markets of Asia, Europe and North America, only a minority of our survey participants expect centralised generation and transmission to play the lead role in meeting future demand growth (figure 2). Indeed, in all regions at least half of our survey expect the rise of distributed generation to be such that it plays a role alongside centralised generation.

But there are big regional differences when it comes to whether distributed generation will force utilities to significantly change their business models. North American and Asian respondents are most likely to expect such change with those in South America and, surprisingly, Europe least convinced (figure 12).

**Figure 12:** Percentage of respondents saying it is likely or highly likely that increasing levels of distributed generation will force utilities to significantly change their business models



Source: 13th PwC Annual Global Power & Utilities Survey

### Future scenario

*“In the future concerns about energy security will become a thing of the past due to technological changes and new sources of energy.”*

Perhaps the current fragility of European power markets explains why European survey participants are least optimistic about prospects for a new era of abundant energy in the future. Away from Europe a majority give this scenario a medium or high probability rating.

North America	58%
South America	67%
Europe	29%
Asia	69%
Middle East & Africa	60%

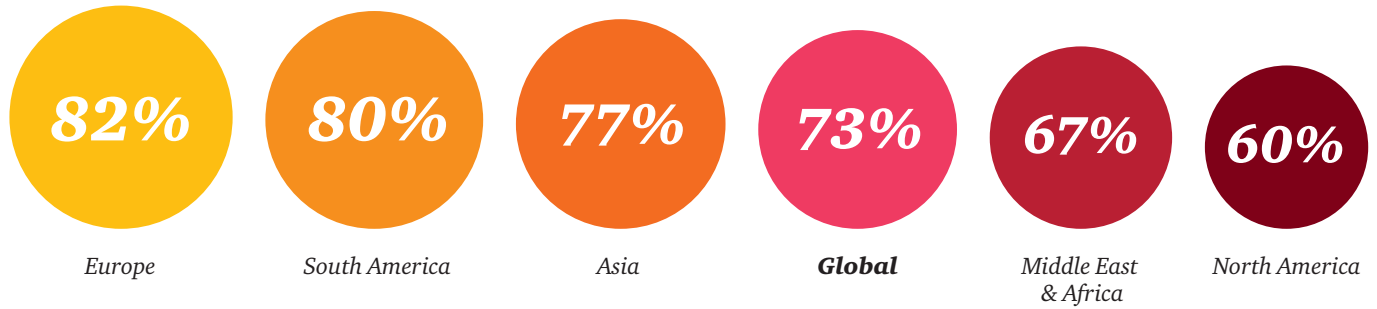
Percentage of survey ranking this scenario as a medium or high probability. Probability scoring system is: Low (probability rating of less than 40%). Medium (rating between 40–59%). High (60% or above).

## Companies

We reported earlier on the widespread view in the industry that the sector has the potential to deliver substantial cost base and efficiency improvement (figure 6). There are some variations in opinion across regions about just how far the cost base can be reduced.

But there is worldwide consensus that the number one opportunity for the biggest performance improvement is in ‘asset performance management’ (figure 13). It is the top scored selection in a list of improvement measures.

**Figure 13:** Percentage of respondents reporting strong or very strong scope for improvements in asset performance management



Source: 13th PwC Annual Global Power & Utilities Survey

## Future scenario

*“Technological advances and new sources such as shale gas will dramatically reduce dependence on oil and gas-rich countries and change the power balance between buyers and sellers.”*

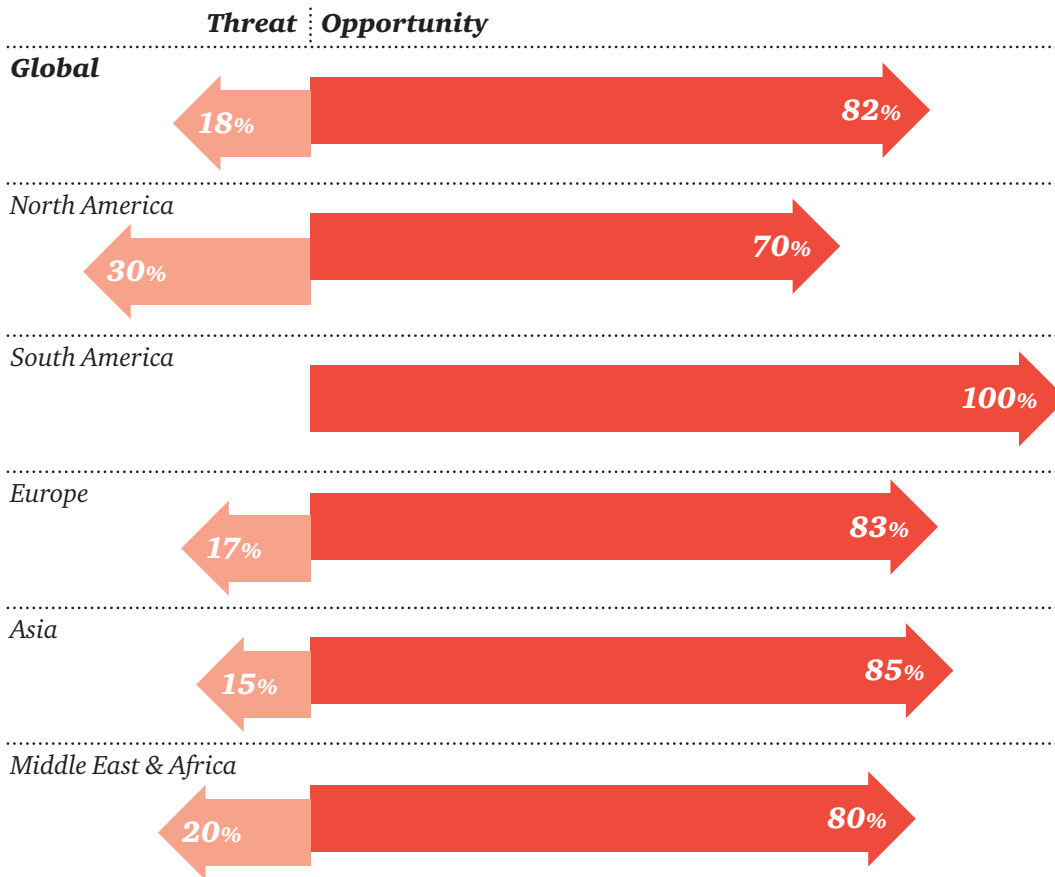
It’s the scenario that attracts the most bullish responses. Across all regions, a majority of survey participants anticipate a shift in the balance of power away from traditional oil and gas producing areas.

North America	67%
South America	100%
Europe	57%
Asia	69%
Middle East & Africa	60%

Percentage of survey ranking this scenario as a medium or high probability. Probability scoring system is: Low (probability rating of less than 40%). Medium (rating between 40–59%). High (60% or above).

There is also a consensus across regions that, when it comes to distributed generation, companies in our survey are ready to go on the front foot. In every region, a clear majority see it as an “opportunity” rather than a “threat”.

**Figure 14:** Distributed generation – opportunity or threat?



Source: 13th PwC Annual Global Power & Utilities Survey

### Future scenario

*“Power utility companies need to become much more tariff-clever, perhaps learning some bundling and ‘free allowance’ tricks from mobile telephony.”*

The possibility of the power sector following some of the customer tariff routes followed in the telephony sector gets a boost from particularly strong probability scores from survey participants in Europe and South America.

North America	<b>50%</b>
South America	<b>80%</b>
Europe	<b>83%</b>
Asia	<b>62%</b>
Middle East & Africa	<b>50%</b>

Percentage of survey ranking this scenario as a medium or high probability. Probability scoring system is: Low (probability rating of less than 40%). Medium (rating between 40–59%). High (60% or above).

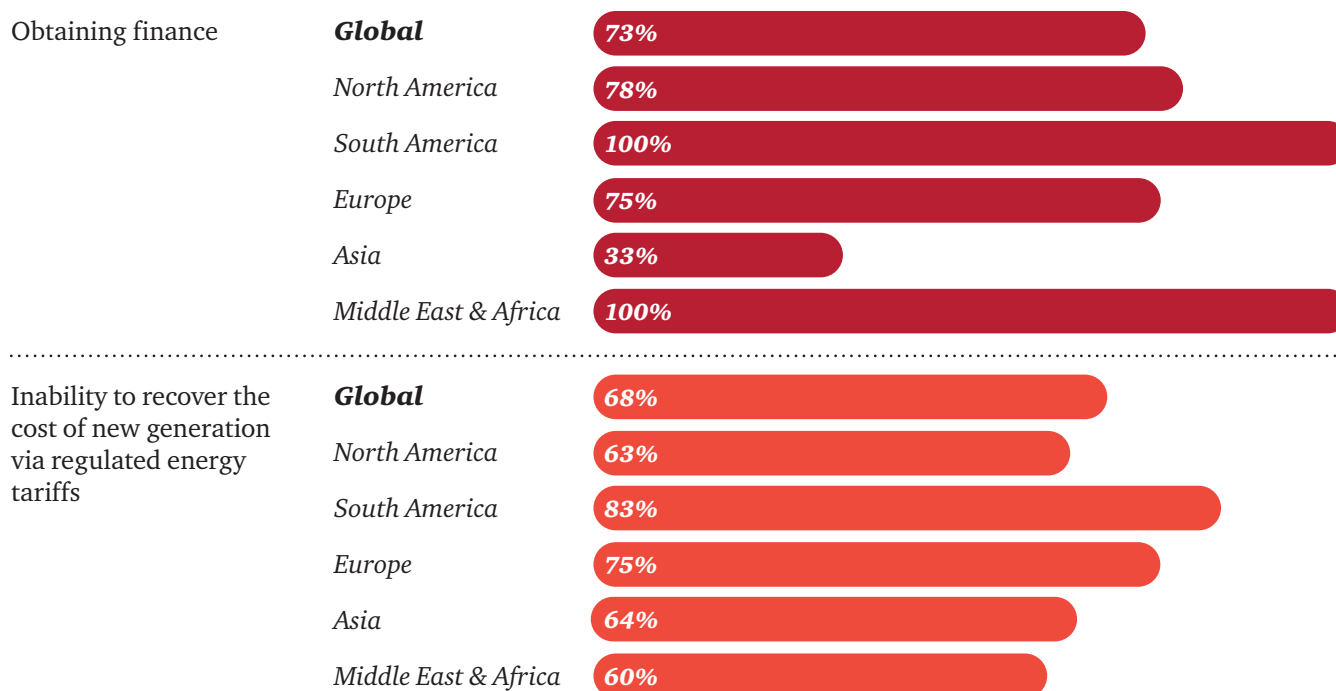
## Regulators

On the generation side, regulatory barriers are reinforcing the problem of access to finance for new generation. Consistently, in every region, companies report the ‘inability to recover the cost of new generation via regulated energy tariffs’ as a disincentive to developing new generation.

This is going hand in hand with difficulties in obtaining finance. Only in Asia was access to finance not seen as a widespread issue. Instead in Asia, ‘regulatory and political uncertainty’ was seen as more of a problem alongside the difficulty of tariffs being insufficient to recover costs.

**Figure 15:** Percentage of respondents rating the following barriers for their company investing in new large-scale generation as ‘important’ or ‘very important’

### Top two barriers



Source: 13th PwC Annual Global Power & Utilities Survey

### Future scenario

**“The nuclear/renewable investments needed to avoid significant global warming (2 degrees or less) will prove too costly for governments to support.”**

Concerns about the cost of investments and time running out to avoid significant global warming are expressed most strongly by survey participants in South America and Europe.

North America	50%
South America	100%
Europe	75%
Asia	62%
Middle East & Africa	70%

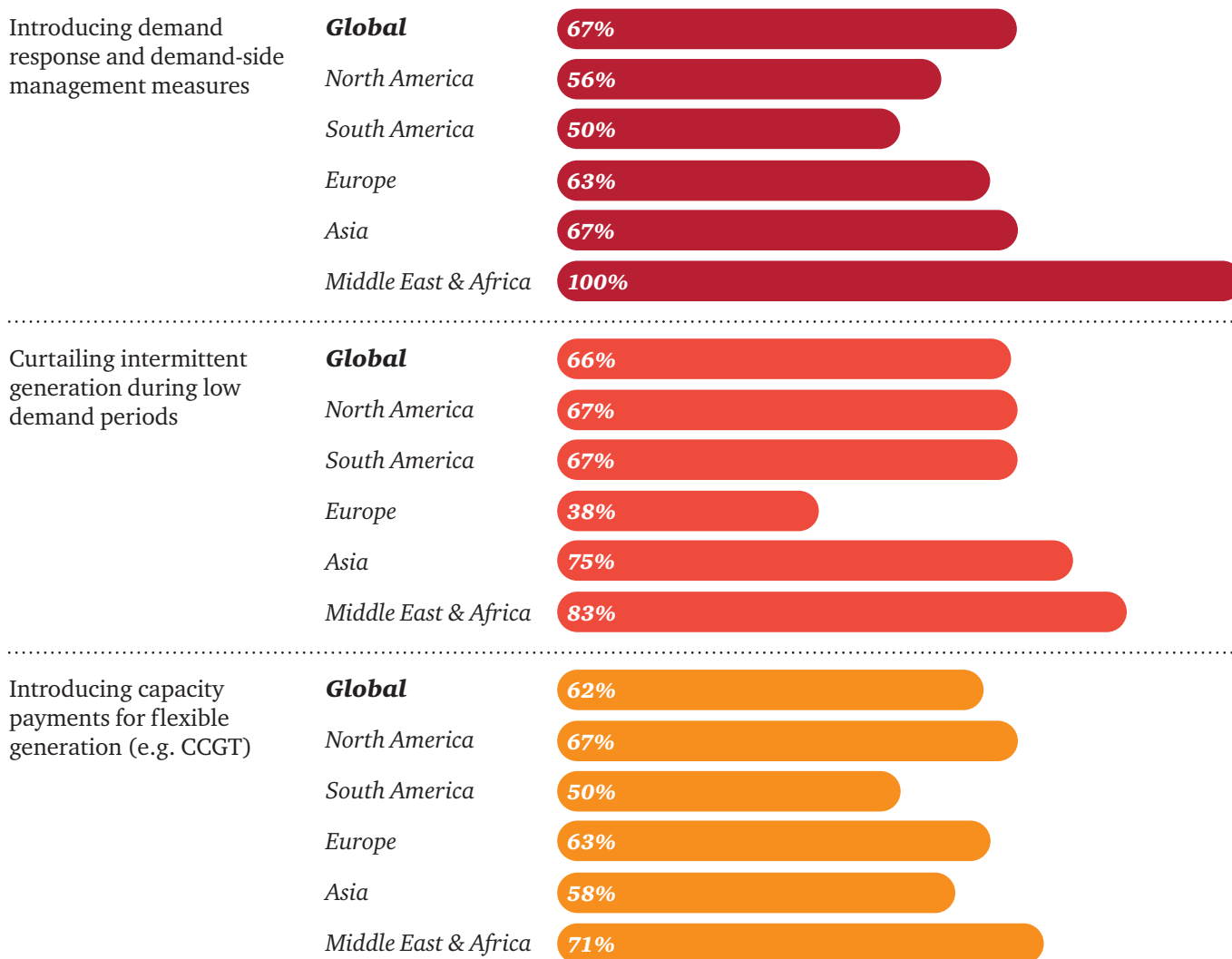
Percentage of survey ranking this scenario as a medium or high probability. Probability scoring system is: Low (probability rating of less than 40%). Medium (rating between 40–59%). High (60% or above).



Regulators will need to take urgent decisions on what measures are needed to enable system operators to balance a system with high levels of intermittent generation. Our survey participants favour three responses – demand response market mechanisms, curtailing intermittent generation and capacity payments – with the some regional variation as to which is the most favoured (figure 16).

**Figure 16:** How can system operators respond most effectively to the problem of balancing high levels of intermittent generation?

**Top three responses**



% of respondents rating it as effective or very effective.  
Source: 13th PwC Annual Global Power & Utilities Survey

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