

Energy, Utilities & Mining  
Utilities global survey 2007

# Energy and efficiency\*

The changing power climate

\*connectedthinking

PRICEWATERHOUSECOOPERS 

A photograph of a long row of wind turbines against a clear blue sky, receding into the distance.

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A close-up photograph of two men in business suits and glasses, looking at each other in conversation.

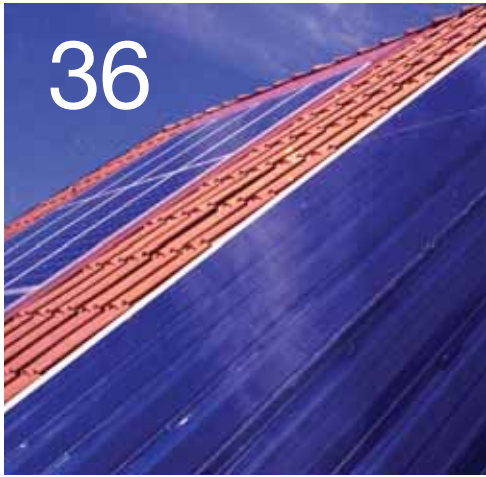
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An abstract graphic design featuring a grid of green and yellow lines, creating a complex, wavy pattern.

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# Utilities global survey 2007

“It is often more cost-effective to invest in end-use energy efficiency improvement than in increasing energy supply to satisfy demand for energy services”



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Namibia  
Qatar  
South Africa  
United Arab Emirates

This year's survey interviewed **119** senior power utility executives from **114** utility companies in **44** countries from **4** major regions.

Each year PricewaterhouseCoopers goes to the heart of boardroom thinking in utility companies across the globe. Last year we examined the sector's thinking about the 'big leap' forward that needs to be made if the sector is to address the immense challenges posed by security of supply and climate change. We found a sector that recognised the need for change but remained hesitant about when and how it could be achieved against a background of continuing regulatory uncertainty.

In 2007 we see a power utilities sector that appears much more ready to make the changes that arise from the threat of climate change. In *Energy and efficiency: the changing power climate* we report on a sea change in the sector's thinking. We find huge increases in the extent to which renewable and nuclear power are at the top of company agendas. We find an industry that believes that technological advances can take us into a new era of energy efficiency. Although the sector believes that governments and end-users must set a lead on energy efficiency, we also find that companies are ready to invest in efficiency, not just in their own production and transmission but also to help their customers become more energy efficient.

Such investment will be welcome news to large users of energy in particular. For the first time in our annual survey, we also speak to top executives in energy-intensive companies. We include a review of developments in the metals, chemicals, and paper industries.

We find that companies in these sectors are making major changes in how they do business in order to manage energy effectively. High power prices and price volatility are having a significant effect and we look at how energy-intensive companies are adjusting to life in a new high price and energy-uncertain world as well as the trends that they see ahead.

The report includes a series of regional and country reviews that examine the specific issues affecting individual country and regional markets. We include, for the first time, a series of additional 'snapshots' of each of the BRIC countries (Brazil, The Russian Federation, India and China), all of whom face immense energy challenges.

Finally, we look ahead at the implications of this increased focus on cleaner power and energy efficiency. We look at what will determine the pace and extent of change. An effective carbon price will need to exist across all regions, including countries not covered at present. We also note the gap between the current and near-term price of carbon and the future level that will be needed if price signals are to have an impact.



**Manfred Wiegand**  
Global Utilities Leader

## Waking up to climate change

2007 looks set to be the year when utility companies worldwide gear up to seize the sustainability agenda. There are big jumps in the prominence of renewables, nuclear power and energy efficiency in the plans of utility companies. Companies expect wind and nuclear power to provide an increasing share of their market's energy consumption in the next five years. Last year, only 17% and 19% were looking toward these two fuel sources. By 2007, in the space of just 12 months, they were being mentioned by 48% and 45%. Climate change appears to have cemented its place on the agenda of utility companies.

## Are we entering the era of energy efficiency?

Companies expect that technological advances will have a major impact on energy efficiency. The focus of utility companies on this has again shot up over the last 12 months – from 22% to 81% among American respondents, for example, and from 33% to 43% in Europe. Utility companies believe that the greatest gains could come from end-users, of all kinds – industrial, commercial and, especially, residential customers and, indeed, 72% of respondents from companies with supply businesses are making some investment in demand-side efficiency measures. Clearly, utility companies are ready to step up to the plate but, with the exception of companies in Asia Pacific and the Middle East, only a quarter of total respondents around the world believe the main responsibility should be on their shoulders.

## Concerns about security of supply intensify

Concerns about security of supply have intensified across the globe since last year's survey. Seventy-one per cent of utility company survey respondents expect to have to deal with conditions that are 'significantly' or 'immensely' challenging in the next five years. Anxiety about security of supply is by no means confined to developing country markets. They are voiced by 62% of North American respondents, 70% in Europe and 76% in Australia and New Zealand.

## Energy-intensive customers chart their own course

Companies in energy intensive industries, such as metals, chemicals and paper, are increasingly seeking to be in control of their own energy production and reduce dependence on utility companies. Investment in energy efficiency is a priority for all companies. In some instances, companies are considering moving production to lower price energy territories and many companies are stepping up investment in their own generation, often from renewable sources. There is also a feeling that utility companies could do more to structure their tariffs around the needs of their big energy consumers.

## HR shortages become a deal driver

Skills and knowledge shortages are becoming an increasingly important factor in M&A activity. They were mentioned by just a third of respondents as a deal driver in 2006 but, by 2007, this had increased to half. Shortages of knowledge and skills are becoming a crunch issue for utility companies worldwide. Investment in infrastructure, new generation and technology is driving up the demand for expertise. However, this is against a background of an ageing workforce and, in some countries, fewer graduates studying relevant engineering subjects. The effect on M&A is reported especially by companies in the Americas where its impact has doubled – from 26% in 2006 to 54% in 2007.

## Significant repositioning along the value chain

Forty-eight per cent of utility company executives say they expect regulatory moves to unbundle transport and transmission distribution from vertically integrated businesses will have a strong or very strong impact on their power and gas market in the period ahead. Indeed, 32% of respondents say they will reposition their company in the value chain in the next five years. A similar proportion of respondents say that they also intend to reposition by country. In the Americas there is a net exit from generation. In Europe, in contrast, there is an expected net increase in generation arising from repositioning.





“There is a massively heightened focus on renewables and energy efficiency”

## Inside the boardroom

2007 marks a sea change in the mindset of the global utilities industry. For the first time, in the nine-year history of our annual survey, sustainability is foremost in the minds of utility company leaders. Companies across the world expect that renewable energy and the need to gain increased energy efficiency will head the list of major developments in their power markets over the coming five-year period. Companies are placing a significantly increased emphasis on a range of ‘climate change related’ measures.

## The rise of renewables and energy efficiency

Renewable energy and energy efficiency have been moving up the list of key issues for the industry (figure 1). Together with continuing concerns about security of energy supply, they now head the list. Indeed, renewable energy leads the agenda of major developments identified by utility companies in all three of the major power markets – North America, Europe and Asia Pacific (figure 2).

The sea change in utility industry outlook is strongly influenced by reactions to climate change and a watershed in the mood for action in the US. Out of the three major regions, it is the responses from American companies that are strongest in their expectation that sustainability initiatives will feature prominently in the coming years.

The public and political environment in the US around climate change has altered significantly in the recent past, both at the state and national level. Developments such as legislation in California, the change in political control of Congress and President Bush's decision to highlight the "serious challenge of global climate change" in his 2007 State of the Union address have reinforced expectations that sustainability will play a more prominent part in the US regulatory landscape in future years. In Europe, the Stern report has focused attention on the economic costs of not addressing climate change more effectively and, in Asia, President Abdul Kalam of India told a conference in 2006 that a shift "from fossil to renewable energy sources is mandated." On a wider public and political level, former US vice president Al Gore's Oscar-winning Best Documentary, *An Inconvenient Truth*, has also played a part in changing the climate of thinking.

Figure 1: **The rise of renewables and efficiency – Top six ranking of the most important major developments in your power market over the next five years**

2007		Last year: 2006		Three years ago: 2004	
1	Encouragement of renewable energy	1	Concerns over security of supply	1	Increasing transmission capacity
=2	Increasing efficiency of conventional technologies	2	Encouragement of renewable energy	2	Concerns over security of supply
=2	Concerns about security of supply	3	Increasing regulation and obligation	3	Increased JV activity from oil majors/financial institutions
4	Increasing regulation and obligation	4	Increasing efficiency of conventional technologies	4	Continuing wholesale price volatility
5	Regulation of emissions	5	Continuing wholesale price volatility	5	Increasing regulation and obligation
6	Continuing wholesale price volatility	6	Regulation of emissions	6	Encouragement of renewable energy

Note: Global responses only

Source: PricewaterhouseCoopers, *Utilities global survey 2007*

Figure 2: **Major likely developments in the main regions**

The Americas		Europe		Asia Pacific	
1	Encouragement of renewable energy	1	Encouragement of renewable energy	1	Encouragement of renewable energy
2	Increasing efficiency of conventional technology	2	Security of supply	2	Increasing regulation and obligation
3	Regulation of emissions	=3	Increasing efficiency of conventional technology	3	Increasing JV activity from oil majors/financial institutions
		=3	Regulation of emissions		

Note: Regional responses only

Source: PricewaterhouseCoopers, *Utilities global survey 2007*

## Wind and nuclear power move to the forefront

The extent of the change in industry outlook is reflected in the fuels that utility companies expect will account for an increasing share of their market's energy consumption in the next five years. There are big increases in the proportion of companies mentioning wind and nuclear power. Last year, only 17% and 19% mentioned wind and nuclear power. By 2007, in the space of just 12 months, they were being mentioned by 48% and 45%. Indeed, wind has moved ahead of both piped gas and coal in terms of its expected rise in significance and nuclear has moved up alongside these two mainstay sources (see figure 3).

Virtually across the board, respondents to this year's survey place an increased emphasis, compared to last year, on the importance of technological developments of many different kinds (figure 4). The balance of what will be important has changed slightly with expectations of the impact of technology in coal-fired plants slipping slightly year-on-year. A heightened focus on wind and nuclear power is matched by an expectation that technological advances will boost the role of these power supply sources in the energy mix. Increasingly, of course, many of these supply-side technological developments are also reflected in product development on the demand-side with green tariffs and packages to promote energy efficiency.

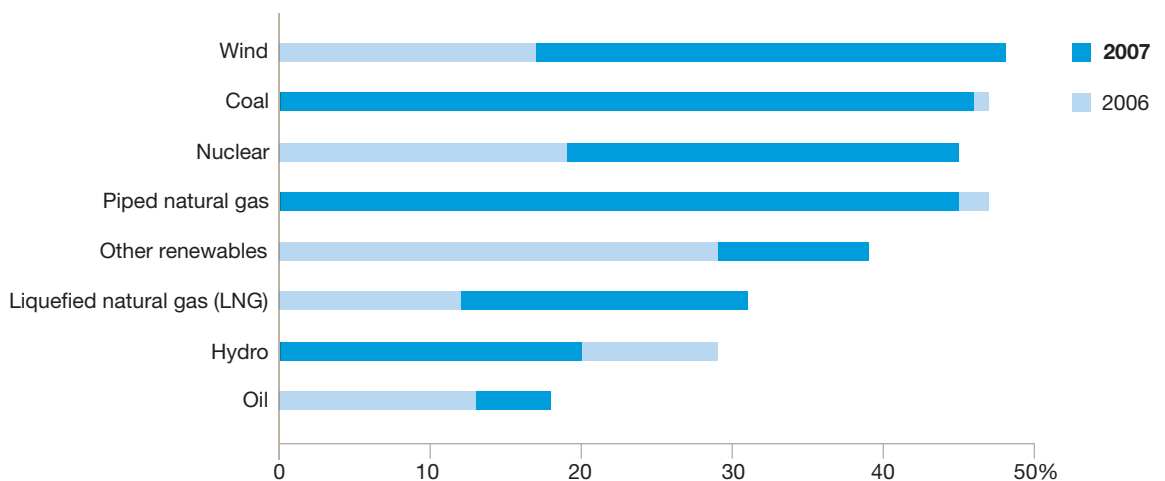
Again, energy efficiency, wind and nuclear have risen in prominence in terms of their expected impact in the coming ten-year period. This change is particularly marked in Europe and, most especially, in responses from American respondents who emphasise the role of technology in energy efficiency (see later regional chapters). The policy emphasis in the US on investment in technological answers to climate change is likely to be a key factor influencing North American utility company responses.

## Cleaner coal waits for the long term

When it comes to the specific impact of technological advances on greenhouse gas emissions, companies again single out the trio of nuclear power, renewables and energy efficiency as having the biggest effect (figure 5). Survey respondents are surprisingly optimistic about the impact of nuclear power in the immediate next ten year period given the length of time it takes to build and commission new nuclear plant. Nuclear is ranked above renewable generation, even though much of the latter is already in the process of being developed. Cleaner coal technologies are further off but companies expect these to be playing their part by the midpoint of the current century, albeit still secondary to the nuclear, renewables and efficiency trio. In some respects, this is surprising.

Currently, some 64% of global power is generated from fossil fuels and, therefore, improving conventional power plant technology has enormous potential to reduce CO<sub>2</sub> emissions. It is no surprise, however, that survey respondents see this as a medium-to long-term strategy since the technological and cost hurdles remain significant. For example, Professor Kurt Häge, Chairman of the European Technology Platform on Zero Emission Fossil Fuel Power Plants, has estimated that avoiding CO<sub>2</sub> emissions via carbon capture and storage might in the future cost "in the region of €35-40/tonne" (presentation to the 2006 Eurelectric Annual Conference).

Figure 3: : What type of primary energy supply is expected to account for an increasing proportion of your market's energy consumption over the next five years?

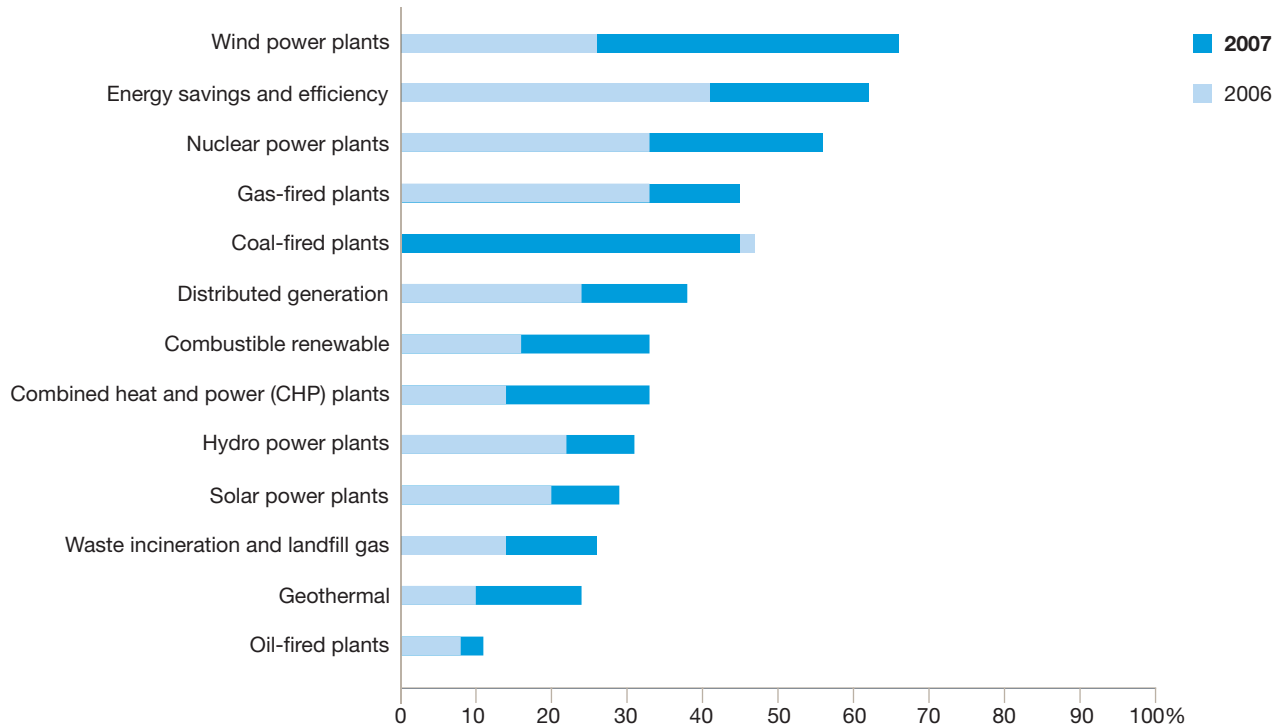


**Note:** Global responses only. % share of respondents ranking fuel source in their top 3  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

The overall survey findings on efficiency, renewables and clean coal reinforce the conclusions of a macro-economic modelling analysis conducted by PricewaterhouseCoopers. This examined the implications of a range of alternative illustrative scenarios for the future evolution of global energy consumption and global carbon emissions (*The World in 2050: implications of global growth for carbon emissions and climate change policy*, PwC, 2006).

The study concluded that a range of initiatives – a shift to a much less carbon-intensive fuel mix, reductions in energy intensity, significant investment in carbon capture and storage (CCS) – will be necessary to achieve CO<sub>2</sub> stabilisation at or close to a level of 450ppm by 2050. Faster development of energy efficiency and more nuclear and renewable power will be needed to reduce carbon emissions by just over two-thirds relative to a baseline ‘business as usual’ scenario. CCS could provide the vital extra push required to achieve stabilisation.

Figure 4: In which areas of generation and supply do you expect technological developments to have the greatest impact over the next ten years?



Note: Global responses only. % share of responses  
Source: PricewaterhouseCoopers, *Utilities global survey 2007*

Figure 5: Which technologies do you expect to make the biggest impact on the level of greenhouse gas emissions from the supply of electricity?

By 2017		By 2050	
1	Nuclear	1	Nuclear
2	Renewables	2	Renewables
3	Energy efficiency	3	Energy efficiency
4	Gas-fired generation	4	Carbon capture
5	Carbon capture	5	Coal gasification
6	Coal gasification	6	Gas-fired generation

Note: Global responses only  
Source: PricewaterhouseCoopers, *Utilities global survey 2007*

## Has the energy efficiency era finally arrived?

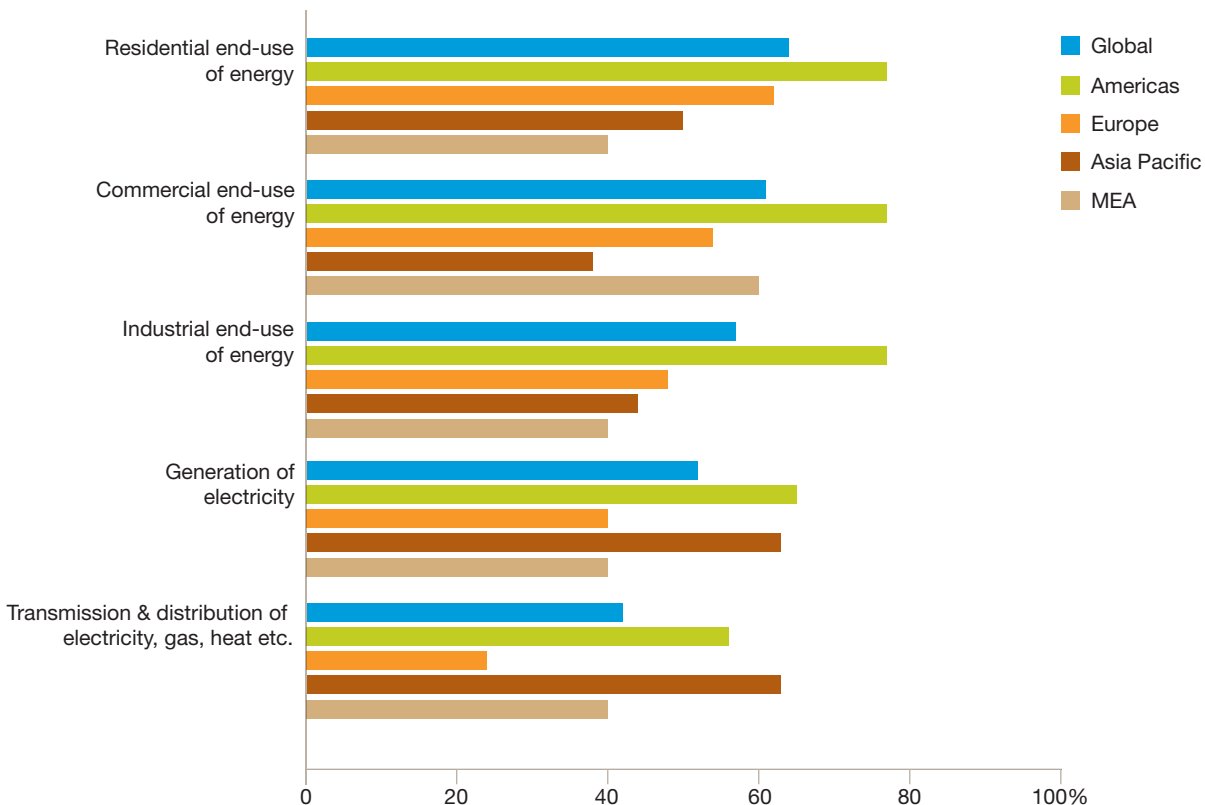
Energy efficiency has been on the agenda of power utilities and government for many years. However, our survey suggests that climate change concerns are bringing new urgency and priority to energy efficiency initiatives. As we saw in figure 1, it has risen from outside the top six to be a major concern for power utilities in the coming years. Where are savings going to come from? Utility company executives point to the potential in all parts of the value chain (figure 6). However, they believe that the greatest gains could come from end-users, of all kinds – industrial, commercial and, especially, residential customers.

The scope for energy saving and efficiency is particularly emphasised by respondents from the Americas. Many US utilities have been heavily focusing on overall demand side management for the past ten years or so in lieu of increasing generation capacity. Rebate programmes for energy efficiency improvements, a/c cycling programmes and different rate mechanisms such as time of use rates to reduce peak loads are among the measures in place in the US.

On 16 April, 2007, the chairman of the US Senate Energy and Natural Resources Committee introduced a bill called the 2007 Energy Efficiency Promotion Act (S. 1115), which is working its way through Congress. This bill would give legislative backing to efficiency standards and targets that have the goal of saving substantial amounts of power.

In the US, and in other markets, advanced metering technology is likely to be a key part of the efficiency saving effort by companies and governments. However, there is no consensus on who should pay for this and other future demand-side investment. Utility companies are ready to step up to the plate but, with the exception of companies in Asia Pacific and the Middle East where many utility companies are state controlled, only a quarter of total respondents around the world believe the main responsibility should be on their shoulders (figure 7). A similar proportion feel that governments, or a mix of governments and utilities, should take the lead. European utilities are the most likely to expect a bigger role from government and least from the utility sector itself.

Figure 6: What value chain areas have the greatest energy savings and efficiency potential in your region over the next ten years?

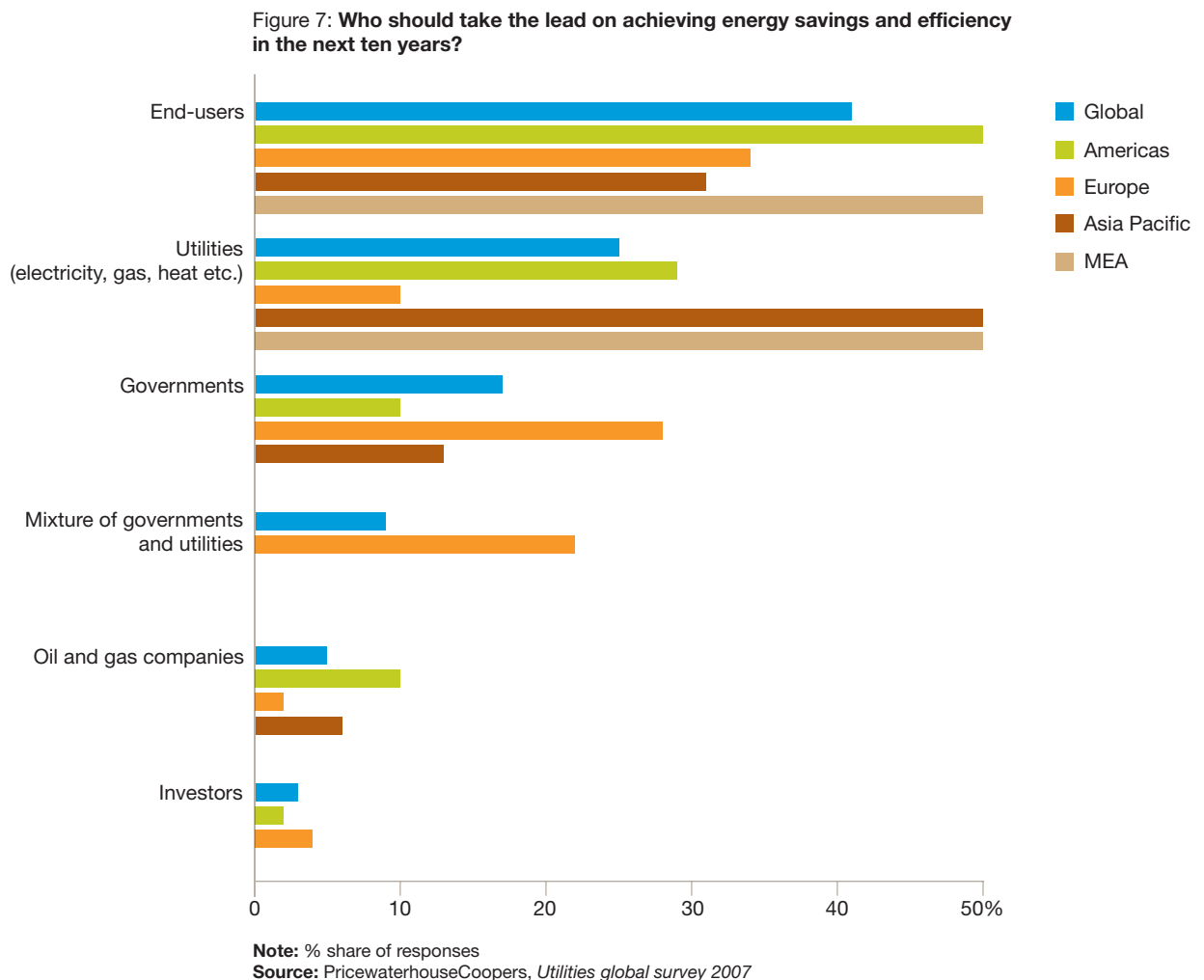


Note: % share of responses

Source: PricewaterhouseCoopers, Utilities global survey 2007

The largest number of all respondents single out end-users as having key responsibility for achieving energy savings. This reflects the fact that it is customers themselves that have most to gain from such savings. Indeed, utility companies can face a conflict of interest when it comes to end-customer energy efficiency. Put simply, they make more money by selling more electricity and less if customers save on their consumption. Such a fundamental conflict poses challenges for regulatory authorities who, increasingly, will be seeking to ensure that utility companies do not face a disincentive to promote energy efficiency. One such approach, used in California for example, is 'decoupling' which breaks the link between electricity sales, on the one hand, and utility profits and fixed-cost recovery, on the other hand. Section 1115 of the Energy Efficiency Promotion Act (see earlier in this section) includes a provision that addresses this issue by calling for rate design modifications that would promote end-user energy efficiency investments by utilities. It is a controversial provision so its survival to the final legislation is by no means assured.

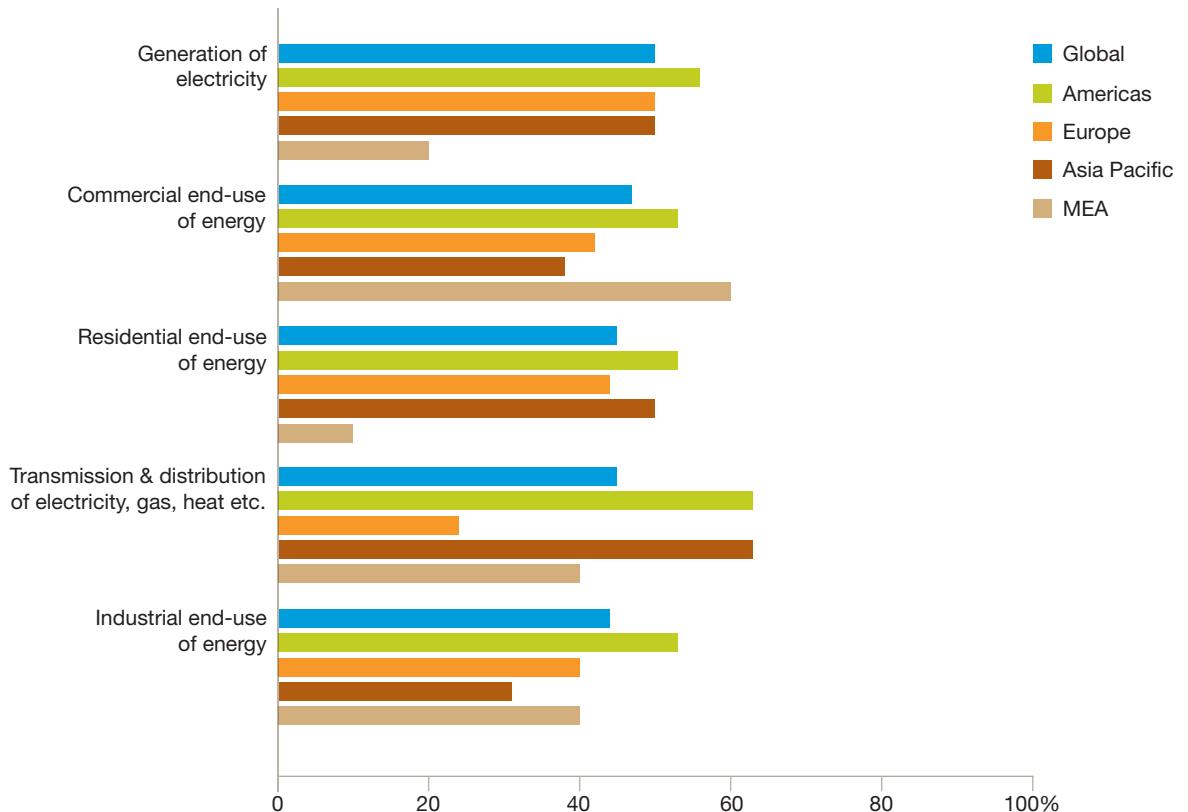
There are real dilemmas with 'decoupling'. Such an approach can create its own inefficiencies and runs counter to a more deregulated market framework. In Europe, several countries have implemented a White Certificate scheme or are seriously considering doing so. Italy started a scheme in January 2005; France, a year later. Great Britain has combined its obligation system for energy savings with the possibility to trade obligations and savings. Alongside this, Energy Service Companies (ESCOs) are independent players investing in parts of the end-use sector and collect White Certificates in relation to savings achieved. However, preliminary findings indicate that, although the introduction of new technology can be achieved, there are concerns about the cost efficiency of the White Certificate system. The impact of ESCOs appears so far to be lower than expectations.



The issues for networks are slightly different. Here, much existing regulation, for example total price frameworks in the UK, focuses on the cost side and efficiencies over time rather than the amount of electricity running through the grid. In addition, companies are incentivised to reduce losses on the network. Nonetheless, National Grid recently called for a change in the way energy markets are regulated to encourage suppliers to sell less gas and electricity. In the US, the company said it is having detailed discussions about how to change the regulatory framework to incentivise companies to be proponents of energy efficiency and the company called for similar incentives to be introduced in the UK (*Financial Times*, 8 May 2007).

Although utility companies believe it should be end-users who take the lead on efficiency, most utility companies are investing to improve efficiency (figure 8). Only 12% said that they would not be making such investment and the striking point is that many plan to invest in all areas of the value chain and end-markets to boost efficiency. Utility companies appear ready to match their belief that the greatest gains could come from end-users (figure 6) with investment in all three segments of their customer marketplace – industrial, commercial and residential customers. Indeed, 72% of respondents from companies with supply businesses are making some investment in demand-side efficiency measures. Again, the propensity to invest is highest in the US, reflecting the heightened public and political profile of energy saving and where, perhaps, the scope to reduce energy consumption is seen as highest.

Figure 8: What energy savings and efficiency areas will you invest in over the next ten years?



Note: % share of responses

Source: PricewaterhouseCoopers, *Utilities global survey 2007*

## Future development of emission trading schemes

In the 2006 Utilities Global Survey, a majority of utility leaders expected to see a continuation and expansion of the ‘cap and trade’ market-based approach to emission controls, as first pioneered in the US in respect of SO<sub>2</sub> and, more recently, in the EU in respect of CO<sub>2</sub>. In 2007, we asked respondents to identify the characteristics they believe will be important in the development of such schemes. Not surprisingly, the key concern of utility companies is their extension to embrace other industries so that the burden of emissions reduction does not fall disproportionately on the power sector. This was rated as ‘important’ or ‘highly important’ by 60% and 55% of European and American respondents respectively and, indeed, is a feature of Phase 2 of the European Union Emissions Trading Scheme.

With carbon now a key factor in investment decisions, companies also emphasise the importance of longer term trading periods to allow greater certainty in planning – rated as ‘important’ or ‘highly important’ by 56% and 54% of European and American respondents respectively. In terms of the allocation mechanism for allowances, there was rather more support for auctioning than benchmarking as a process. In Europe, for example, where companies have experience of the EU carbon trading scheme, 48% respondents scored auctioning strongly compared to 40% favouring benchmarking for future schemes. The EU Emissions Trading Scheme allows for up to 10% of the allowances to be auctioned in Phase 2 of the EU ETS, against 5% in Phase 1.

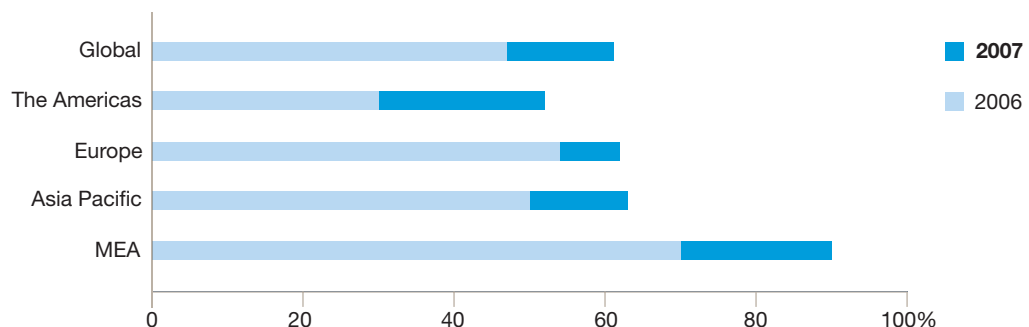
As emissions trading schemes develop, either with individual but linked schemes or with a global scheme, greater harmonisation of systems and processes, and the development and implementation of a generally accepted approach to monitoring, reporting and compliance will be important. This would reduce risks in carbon markets for all involved – for the regulators, the scheme participants, financial investors and intermediaries. Standardisation will also facilitate the effective linking of disparate schemes and help to keep linked schemes in balance. Linkage will involve substantial data flows and mutual reliance on systems, procedures and information.

PricewaterhouseCoopers believes that a new ‘Global Emissions Compliance Language’ is required to achieve these goals (see *Building Trust in Emissions Reporting*, PwC, 2007). This could be modelled on the world’s financial reporting frameworks. This compliance language should include: the establishment of new global institutional leadership to sustain trust in emissions trading and carbon markets; adherence to a consistent terminology; the development and implementation of generally accepted standards for monitoring, reporting, verification and other compliance processes; and, potentially, the adoption of standard enabling technologies.

## Supply and demand challenges

Concerns about security of supply are intensifying. The proportion of utility companies anticipating that security of supply will have a high impact on their power and gas markets in the coming five years has increased significantly since last year’s survey (figure 9). The increase is across all regions but is particularly marked among American respondents.

Figure 9: How big an impact will security of supply concerns have on your power and gas market over the next five years?



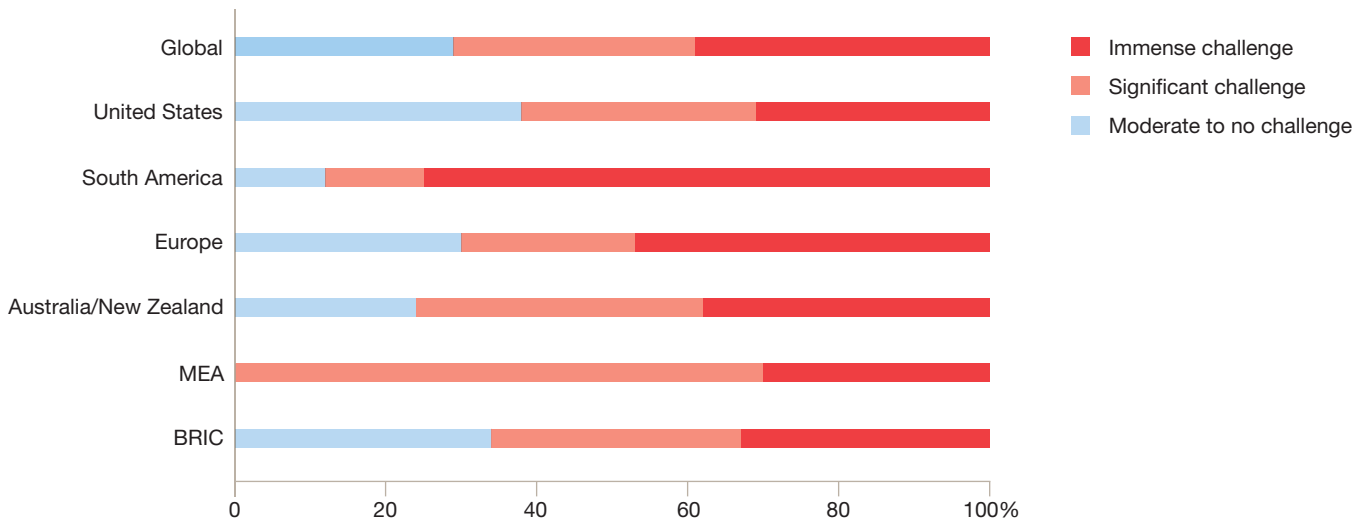
Note: % share of respondents rating securing of supply concerns as having high or very high impact  
 Source: PricewaterhouseCoopers, *Utilities global survey 2007*

Utility companies across the world report that they expect to have to deal with supply and demand conditions that are significantly or, indeed, ‘immensely’ challenging (figure 10). Seventy-one per cent of respondents rated the outlook in these terms – a major rise from 51% in 2006. This includes 62% of North American respondents, 88% in South America, 70% in Europe, 76% in Australia and New Zealand, 66% in the BRIC countries and all respondents in the Middle East and Africa.

Companies are responding to upstream fuel challenges and supply security concerns in different ways (figure 11). The most common response is to step up the emphasis on long-term contracts and improve procurement. A third of respondents report that they are looking to move upstream through asset acquisitions and a quarter of respondents report that they are sourcing fuel from new regions. This is especially the case among American respondents with 30% to 40% of respondents looking to new sources. In the latter instance, there is a renewed focus on previously marginal sources closer to home, such as coal steam gas.

The two strategies of upstream moves and new fuel sources come together in the case of liquefied natural gas (LNG) where, in response to tight market conditions, some downstream players are moving up the value chain by taking equity positions upstream to secure supply. Utility companies such as Centrica, GdF and Mitsui, for example, have taken equity positions in gas production, dealing directly with national oil and gas companies. Typically, such companies have also invested in the midstream part of the LNG chain such as in regasification and shipping.

Figure 10: What is the extent of the supply and demand challenge over the next five years?



Note: Average response.

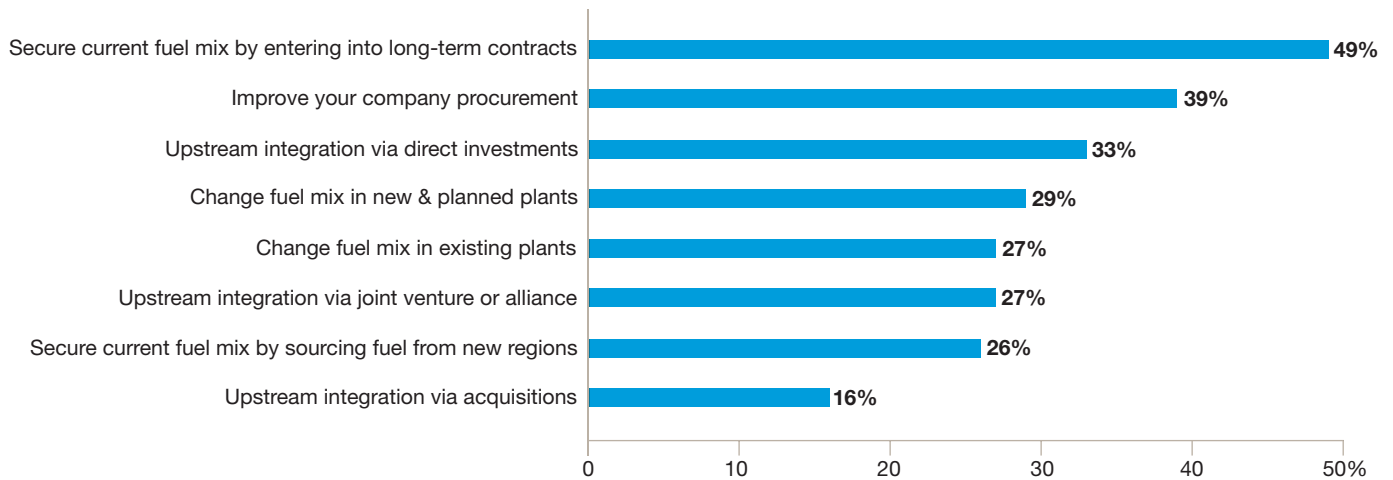
Source: PricewaterhouseCoopers, Utilities global survey 2007

## New M&A highs

M&A activity in the sector continues to scale new heights. Our Power Deals 2006 survey reported that the total value of power utility deals soared to US\$298.8bn in 2006, up by 52% on the 2005 level which itself was a record. The majority of the deal activity was in Europe. In contrast, only two years earlier, North American total power deal activity outstripped Europe. By 2006 a chasm of US\$136.1bn had opened up between the European bid totals and those of their North American counterparts. European utilities have been active, striving to achieve super-regional scale ahead of full liberalisation of EU markets in July 2007. In North America, deal activity slowed as companies weighed up the implications of intervention by the state-level public service commissions in certain key deals.

A more integrated and fully liberalised EU power market is likely to ultimately feature a handful of players. M&A moves by existing 'super-regionals' are part of the quest to be at the top of a select pack. The biggest move has been E.ON's for Endesa, which was finally pipped at the post by Enel in concert with Acciona. Others, such as Iberdrola's bid for Scottish Power, are motivated by the need of companies to get among the leading pack, put themselves beyond the reach of potential predators and establish a leading position in wind generation which is becoming an important component of global electricity generation.

Figure 11: How are you responding to upstream fuel challenges now and in the next five years?



Note: Global responses only. % share of responses

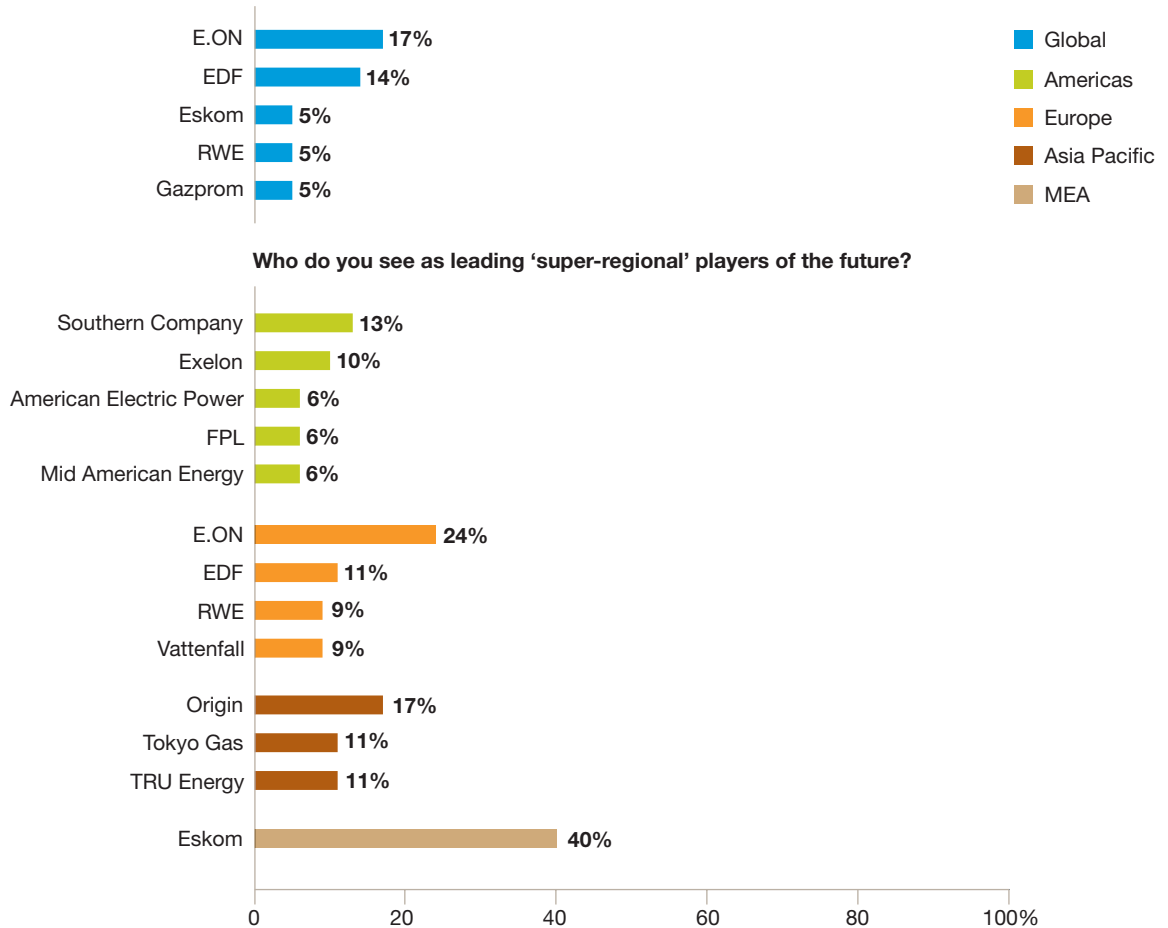
Source: PricewaterhouseCoopers, *Utilities global survey 2007*

It is not just in Europe that the race is on to develop 'super-regional' scale. In the US and elsewhere, utilities are similarly jostling for position. We asked utility executives which of their peers they expected to emerge as the leading company globally and to be the 'super-utility' company of the future in their home market (figure 12). Both globally and in Europe, E.ON is the company that stands out most in the eyes of its peers, replacing EDF which had topped the list in previous years. The survey interviews took place before E.ON's announcement that it was withdrawing its bid challenge for Endesa and, instead, picking up asset positions in France, Spain and Italy. It will be interesting to see what the period ahead brings for the company. Also, in the table for the first time, is Gazprom, reflecting the importance of its position in gas supply and expectations that it will make further moves downstream into end-customer markets. In Africa, South African power utility Eskom is viewed as leading in the region. The company operates across all aspects of electricity generation, transport, trading and retail, and is a key player in developing and building a regional integrated energy system in the wider southern Africa area.

### HR shortages become a deal driver

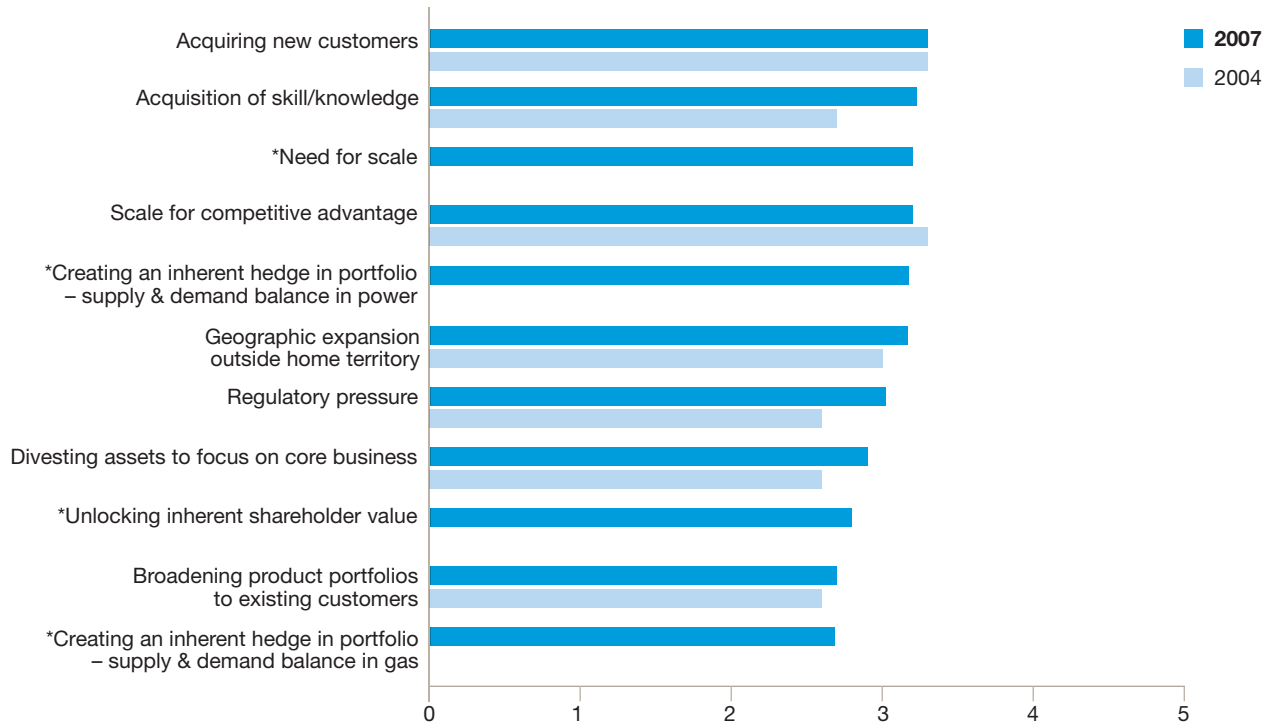
The quest to build scale, develop a balanced portfolio and extend the customer base is driving M&A activity worldwide. These goals are all key factors driving acquisition activity (figure 13) and were joined, in 2007, by an additional important motivation – the acquisition of skills and knowledge. The influence of this human resource factor on deals has grown considerably. It was mentioned by just a third of respondents as an important or major driver on deal activity in 2006 but, by 2007, this had increased to half (figure 14). The influence of skills and knowledge acquisition as a deal driver has grown in all regions but especially in the Americas where its impact has doubled – from 26% in 2006 to 54% in 2007.

Figure 12: Who do you see as the leading utility players globally and in your home region?



Note: % share of responses  
 Source: PricewaterhouseCoopers, Utilities global survey 2007

Figure 13: What is driving your M&A activity?



**Note:** Average response. Rate where 5 = major driver; 1 = not a driver

\*Question not asked in 2004

**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

Figure 14: Growth of 'acquisition of skills and knowledge' as a deal driver

	2007	2006
Global	51%	33%
Americas	54%	26%
Europe	35%	25%
Asia Pacific	69%	50%
MEA	70%	60%

**Note:** % share of responses saying it is an 'important' or 'major' driver

**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

Shortages of knowledge and skills are becoming a crunch issue for utility companies worldwide. Investment in infrastructure, new generation and technology is driving up the demand for expertise. However, this is against a background of an ageing workforce and, in some countries, fewer graduates studying relevant engineering subjects. Research conducted in the US found that, by 2010, 50% of all current utility workers will be eligible to retire (source: Carnegie Mellon University Electricity Industry Center). Companies are looking hard at their recruitment and retention strategies and, according to our survey, the importance of skills and knowledge acquisition is now a major factor for utility companies in assessing M&A deals.

### Expansionist intent

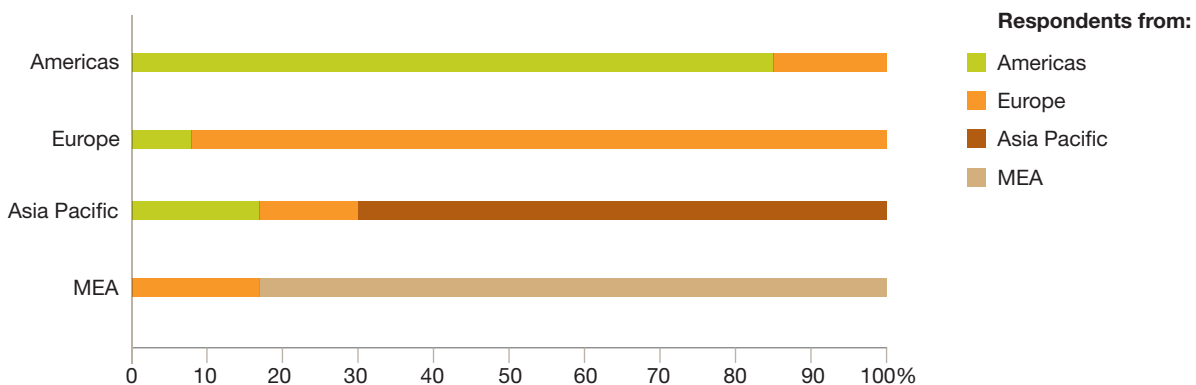
In general, companies rate the competitive threat to them in their home market on a par with our surveys in previous years. The slight exception to this is a small increase in the rating of the competitive threat to utility companies posed by companies in the oil and petroleum sector. The prospect of M&A activity involving players from other parts of the energy sector has always been a possibility but is, perhaps, becoming more real in the minds of utility company executives in the light of the rise of national oil and gas companies such as Gazprom. We have also noted earlier how the boundaries between utilities and the oil and gas sector are being blurred as utility companies move upstream in a bid to secure supplies.

Certainly, a slight shift to a wider geographic expansionist intent is reflected in company identification of territories that are priorities for expansion (figure 15). While the greatest priority is on home markets, there are a small minority of companies with clear, wider, pan-regional plans. European companies harbour the most widespread geographical ambitions, accounting for 17%, 15% and 13% of those targeting the Middle East and Africa, the Americas and Asia Pacific regions. American companies do not rule out ventures into Europe and, also, account for the largest number of expressions of interest in Asia Pacific targets from non-Asian Pacific companies. Overall, with the exception of Asian Pacific respondents whose focus is solely within their region, the survey indicates a slight increase in pan-regional expansionist activity.

### Repositioning along the value chain

Regulation, as always, is a key factor determining utility company strategy. In the five-year period ahead, for example, 48% of the respondents to our survey say they expect the unbundling of transport and transmission distribution from vertically integrated businesses will have a strong or very strong impact on their power and gas market. Companies are responding to both existing and anticipated regulatory moves in different ways (figure 16). Four-fifths are taking or expect to take operational actions, covering a wide spectrum of measures such as improving business operations, cutting costs and unbundling. They are also taking part in industry-wide initiatives to influence and improve the future shape of regulatory frameworks. In addition, though, a third (32%) of utility executives we interviewed say their companies are reviewing their position along the value chain as well as their presence in individual countries (31%).

Figure 15: Which geographical markets are your priorities for expansion in the next five years?



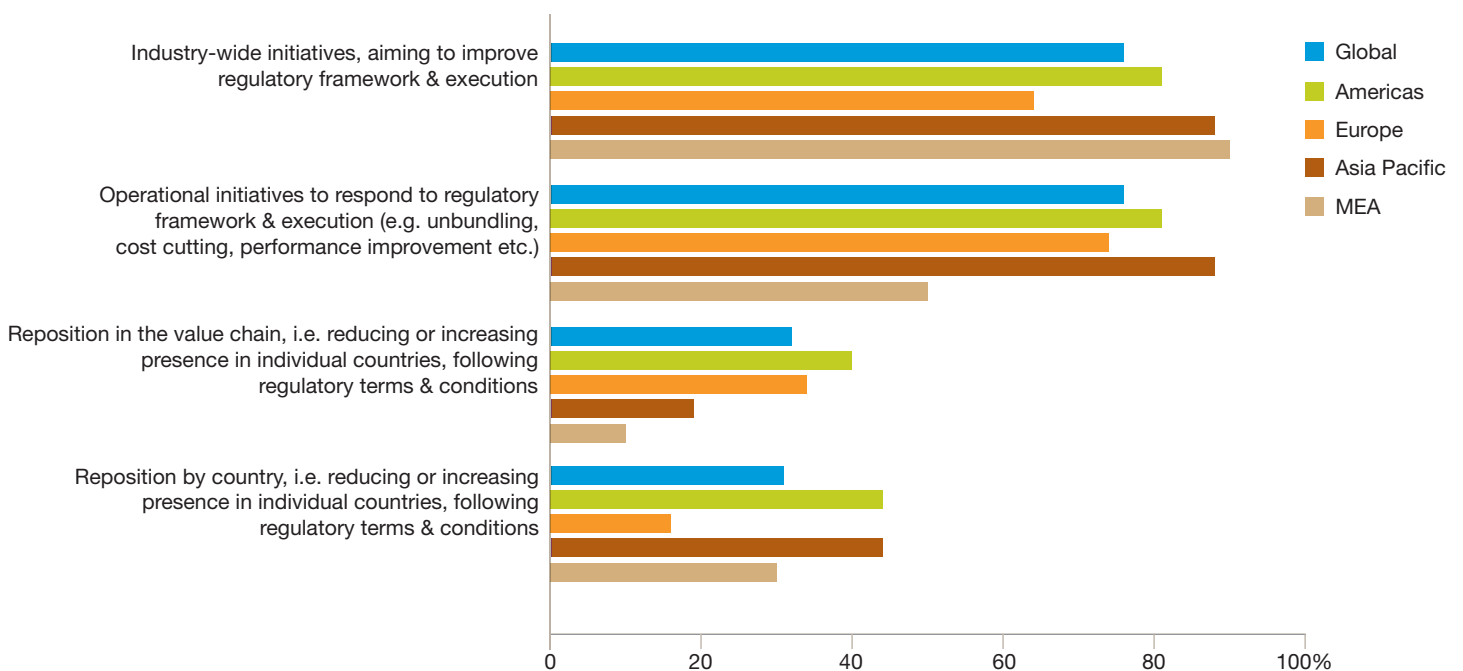
Note: Total % share of responses

Source: PricewaterhouseCoopers, Utilities global survey 2007

We drilled deeper with the 32% respondents who intend to reposition in the value chain to discover the nature of such repositioning. Respondents from America (40% of the American respondents) and Europe (34% of European respondents) are the ones that are most prepared to reposition. There are significant contrasts between the two regions. A significant shift is taking place in Europe where there are clear signs of a move away from transmission in favour of generation. In total, 71% of the 34% of European respondents who said they intend to reposition plan to increase their generation and 47% of the 34% are reducing their position in transmission. There is overlap between the two. Indeed, two thirds of the EU respondents who say they are exiting transmission, or are intending to exit, report that they are bulking up in generation. If this is the case, the ground may be being paved for a move towards specialist network operators on the one hand, in some cases backed with infrastructure fund money, and generation and supply companies on the other that focus on the more trading-oriented upstream generation and downstream supply sectors.

Utilities are attracted by the substantial need for generation investment in Europe in the coming years, as well as open access to end-use markets from July 2007. But some companies are reassessing the commercial viability of an open access transmission business in the light of unbundling requirements and increasingly tighter price regulation. In America, in contrast, 47% of the repositioning utilities intend to increase their presence in transmission and distribution, whereas 47% of them will decrease in generation. Infrastructure investments top the list of opportunities among our respondents in the US. The attractiveness of generation has been impeded by higher costs in combination with regulatory limits on end-use prices.

Figure 16: How are you responding to regulatory changes now and in the next five years?



Note: % share of responses

Source: PricewaterhouseCoopers, Utilities global survey 2007

## 18 Viewpoint: energy intensive industries

When a Swedish pulp maker announced plans to move production from Sweden to South Africa because of “unreasonably high electricity prices”, it focused attention on the impact high energy costs can have on energy-intensive companies. The Rottneros Group is evaluating the plan during 2007. By closing its Utansjö high yield pulp mill and opening in South Africa, it says it hopes to benefit from “a country with lower and more stable energy prices.” No doubt, the 2007 evaluation period will also be used by the company to negotiate the most favourable electricity pricing if it decides to maintain the plant in Sweden.

Companies in sectors such as metals, chemicals and paper are no strangers to energy challenges. Many of them are energy players in their own right, running their own energy generation facilities. In some cases this is from fuel sourced as part of their industrial production process or from renewable sources such as hydropower. In these instances, companies are less affected by energy price rises and volatility and can even benefit from rising prices in cases where they sell power. However, in many other cases, companies are exposed to higher costs and volatility, either because of the need to buy natural gas for their own cogeneration (combined heat and power) or because they do not have their own energy generation facility and buy electricity from utility companies.

### Shifting production

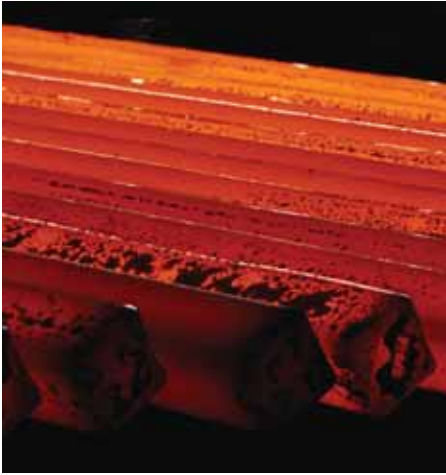
In recent years, energy input prices have risen substantially. In the five-year period to 2005, for example, oil prices rose from 28.50 to 54.52 Brent US\$/bbl (Source: Bloomberg); natural gas prices rose from 3.25 to 6.28 US\$/million Btu (Source: Argus *Global LNG*, August 2006) and the north-west European market price for coal went from 35.99 to 61.07 US\$/t (Source: McCloskey Coal Report). However, a move like Rottneros' should not be seen in the context of energy prices alone.

Electricity prices in territories such as South Africa and China may be lower but differences between energy markets are, of course, only one factor in energy intensive company calculations. As well as cheaper energy, the attraction of South Africa for Rottneros, for example, is also the “very good supply of eucalyptus wood and other raw materials at competitive prices.”

The reality is that energy prices are unlikely to be a sole reason to move existing production. The aluminium industry, for example, is increasingly looking east. China has risen to be the largest aluminium producer in the world, as it has done in steel, from being the fourth-largest producer ten years ago. Power is cheaper in China with coal prices being below world prices and government interventions to keep prices lower. But, the dominant factor in changing patterns of production is the prospect of superior growth in China and the wider region. Lower energy prices are a bonus rather than the primary imperative. In any case, companies in sectors such as metals have to take the long term view and simply shifting existing production is not generally feasible.

### Global convergence

The long term view is emphasised by steelmaker Nucor. Variable energy costs are partly the product of different regulatory environments and companies need to assess the sustainability of these different environments. Nucor Corporation's chairman, president and chief executive officer, Daniel R. DiMicco, observes: “you see steel makers in Europe wanting to move their high-carbon-emission operations to areas of the world that aren't subject to Kyoto.” Nucor Corporation is in the top ten of the world's steelmakers and DiMicco emphasises the importance of a level playing field when it comes to environmental action: “all the global warming issues that are taking centre stage in Washington and with governments around the world will be for nil if the whole world doesn't participate in it and is held accountable for participating in it.”



Nucor's viewpoint is echoed by India's largest paper maker, Ballarpur Industries. The company's chief executive, Guatam Thapar, observes; "if you look at the West, a huge part of their energy is gas or oil-based and in India it is predominantly coal-based. For industrial purposes, this is likely to remain a more efficient form of energy production. Also I think the technology to allow clean coal-burning is improving." The critical long term issue, though, for companies considering as major a move as international relocation, is how long the relative price advantage can continue. Thapar points out: "Coal India cannot continue to provide subsidised coal – it will be subject to market forces in due course."

In the long run Michel Jacques, president of Alcan Primary Metal Group, an aluminium, metals and packaging company with more than US\$20bn revenues, believes a more level playing field is inevitable: "I think we will see a convergence of energy prices, between coal, gas and oil. Not only will they all be at the same price but they'll all be priced on the same basis." A key factor in such a trend will be the future development of environmental regulation and emission trading which, if it is extended to countries such as China and India, will reduce the price competitiveness of coal. Michel Jacques is in no doubt that "CO<sub>2</sub> emission trading, cap-and-trade systems, or carbon taxes, are going to gain more and more importance, and influence more and more energy markets."

## Changing energy management

The pulp and paper sector currently generates around 50% of its energy needs from renewable sources and is probably the biggest user of renewable energy of any industry sector. In the metals and chemicals industries there has been an increase in the amount of cogeneration and self-production in the past five-to-ten-year period. Energy is also emerging as a new business area for some companies. They have always had energy as a cost centre, through their own power generation and also third party procurement. Now some are seeing energy production evolve into a profit centre, especially where companies can generate from renewable sources and gain from a renewable energy premium.

In deregulated markets, energy price volatility has become a major concern for large energy users. In the UK, for example, energy-intensive companies, faced with very high forward wholesale electricity prices, have increasingly bought electricity on the spot market rather than lock-in high prices by renewing long-term contracts. However, this has brought exposure to price spikes. Companies have had to become adept at cutting back production or even mothballing plants. But this is not possible for many industrial processes.

## Companies in metals, chemicals and paper are no strangers to energy challenges

## 20 Viewpoint: energy intensive industries



Ineos Chlor is one of the major chlor-alkali producers in Europe and a global leader in chlorine derivatives. The company's chief executive, Tom Crotty, points out: "the problem with large-scale chemicals plants is that they do not lend themselves to being turned on and off." A chlorine plant, for example, has to be kept warm and has to operate in a certain sequence. Chlorine is difficult to store so companies cannot just make more of it at times of lower gas prices and build up stockpiles.

Brazil-based Gerdau Group is the 14th largest steelmaker in the world with plants in South America, North America and Europe. Energy accounts for about 12% of production costs for the company. Erico Sommer, Gerdau's energy, environment and engineering director, highlights its importance in a high energy price environment: "we manufacture mainly from scrap and so our plants are less energy intensive. Even so, electricity is critical. We are very worried about the cost especially in some locations where we have seen big increases."

Erico Sommer emphasises the importance of energy management: "we are improving our knowledge about utilisation of energy. We are really working harder than in the past for control and good energy management. It is especially important, where you have a deregulated market where prices can go high, to have good contract and utilisation control. The contracts today and the situations are so complex that you must have good intelligence and knowledge in your plant, not just in your company. It is vital that all your plants understand how critical energy price volatility can be and are ready to make hour by hour decisions."

### Increases in self-generation

A key part of Gerdau's response is to increase the amount of self-generation. The company already has one hydro plant in Brazil and is constructing two more. This in itself poses challenges says Sommer: "the first challenge is to find good opportunities, especially in hydro. There is strong competition to find the best projects. The second challenge is financing. Until recently the banking environment for CAPEX was not so favourable in Brazil but that is changing."

The company also seeks to maximise energy from its own processes as well as alternative energy sources. At Gerdau Açominas in the Brazilian state of Minas Gerais, 98% of the energy from the gases produced in the steelmaking process is currently recovered, providing an internal energy source that meets around 75% of the mill's operational needs. Gerdau's rolling mill reheating furnace at the Ameristeel Cambridge steel mill in Ontario, Canada is powered by a different kind of energy: methane gas, which is produced from decomposing organic waste in the city's landfill rubbish dump. Used in place of natural gas, it provides 45% of the energy required to operate the furnace. The mill has specialised technology to extract, pressurise, clean and transport the gas through a pipeline to the equipment. The use of the gas represents significant savings and the amount invested was recovered in just one year after the system started operating in 1999. Over 3,000 cubic metres of methane gas are supplied per hour.

## Energy saving

The focus on energy saving is receiving top priority in energy-intensive companies but Nucor's Daniel R. DiMicco points out that a key constraint is the availability of cleaner renewable energy options: "We are focusing on things to reduce our dependence on the amount of energy it takes per unit of production. Since 2002, we've reduced that by 16 percent. We employ technologies that are 60 per cent less energy-intensive than the equivalent steel-producing facilities using other technologies and we would be happy to buy all of our power from hydro, nuclear or wind sources. The problem is, it hasn't been built in a way that it can be sold to you at a cost that doesn't put you out of business."

The importance of making energy saving integral to a company's processes is reinforced by Michel Jacques, president of Alcan Primary Metal Group: "energy saving has great potential. We are working hard to save energy, both in our processes and in the buildings and materials we use. We're dedicating some considerable R&D effort to the goal of developing some significantly more energy-efficient processes than the ones we're using today." Elsewhere in the metals sector, Corus, the UK's biggest steelmaker and a bulk buyer of both electricity and gas, reports that the group is on track to meet targets to cut energy consumption by 11.5 per cent from 1997 levels by 2010.

## Can utilities do more?

Could power utilities themselves do more to help their big industrial customers? A viewpoint that found echo with many companies came from a senior executive of a leading US-headquartered multinational company: "One area where utilities could be more innovative is in the rates offered to encourage cost effective load management. Many utilities have been resistant to such rate offerings and have been overly slow to go to regulators with offerings that would allow the customers to manage their load, reduce their cost as a result of it and still allow the utility to earn a fair return on allocated investment. Basically I would say that the rate offerings themselves have become stale". Certainly there seems scope for greater innovation and joint thinking between utility companies and their customers and for that to translate into regulatory dialogue. "Unfortunately, many utilities appear to view load acting as a resource and similar load management opportunities as competition to their generation assets and therefore have resisted (and in many cases actively opposed) innovative rate offerings."

In deregulated markets, energy price volatility has become a major concern for large energy users



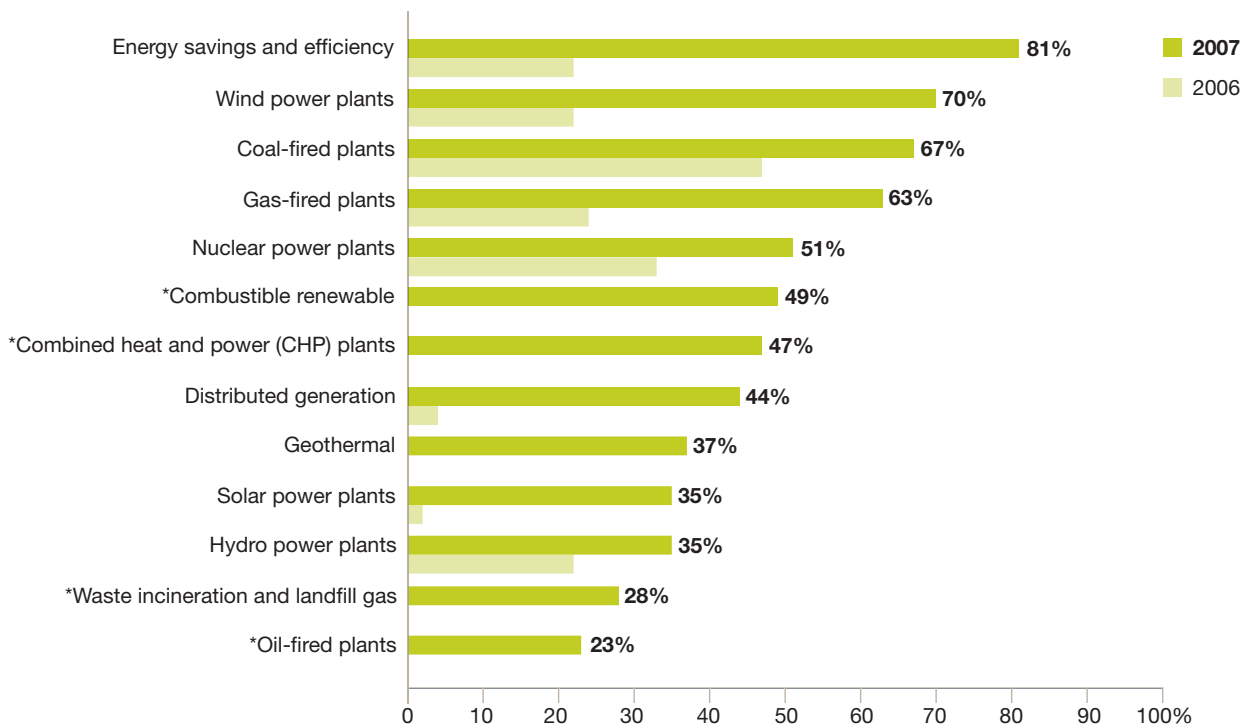
“The public and political environment in the US around climate change has altered significantly”

## The Americas

The big increase in the utility sector’s focus on energy efficiency, renewable and nuclear power is strongly evident in American responses. The emphasis of the US Government on technological responses to climate change has spurred expectations that technology will have a big impact in the decade ahead. Technology is expected to have the biggest effect in the fields of energy efficiency and wind power although it is also evident that American respondents anticipate that technology will play a major part in improving efficiency and cleanliness of gas and coal as well.

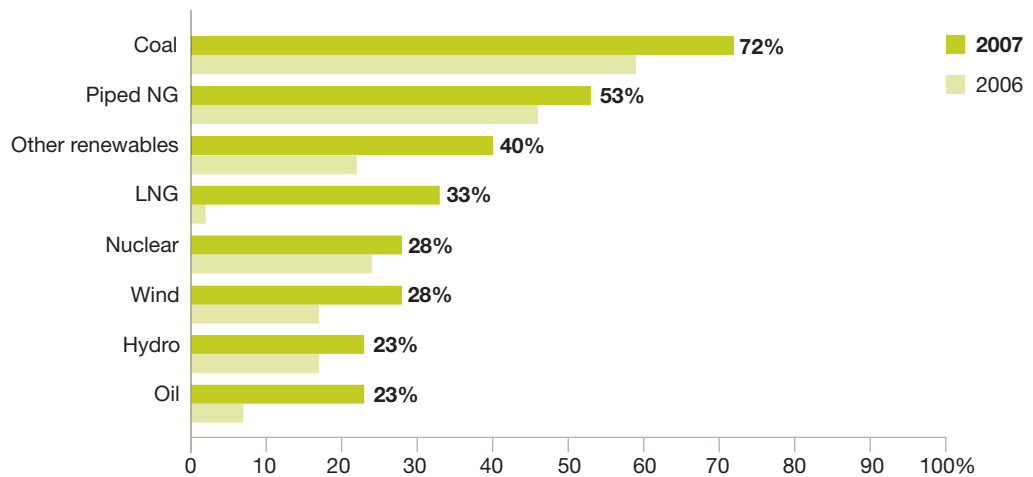
However, while American respondents are very positive on the potential impact of technology, they are not anticipating such major shifts as European and Asian Pacific respondents in the fuel mix. Coal remains the fuel that is most expected to meet growing demand in the next five years and, indeed, rather more respondents expect this to be the case than in last year’s survey. However, there are also considerable year-on-year increases in the growth expected from LNG, wind, hydro and ‘other renewables’.

Americas Figure 1: In which areas of generation and supply do you expect technological developments to have the greatest impact over the next ten years in your market?



Note: Average responses only. % share of respondents  
 \*Question not asked in 2006  
 Source: PricewaterhouseCoopers, Utilities global survey 2007

Americas Figure 2: What type of primary energy supply is expected to account for an increasing proportion of your market's energy consumption over the next five years?



Note: Average responses only. % share of respondents  
 Source: PricewaterhouseCoopers, Utilities global survey 2007

# United States

2006 was expected to be a year of consolidation as a result of the 2005 Energy Policy Act (the Act). This repealed the Public Utility Holding Company Act (PUHCA) of 1935, thus eliminating a key merger impediment. However, while certain mergers were successfully completed, others met resistance at the state level and were called off. The Act also encouraged investment in new generation and infrastructure. Increased construction activity was announced in 2006 with the Federal Energy Regulatory Commission (FERC) and the Internal Revenue Code providing incentives.

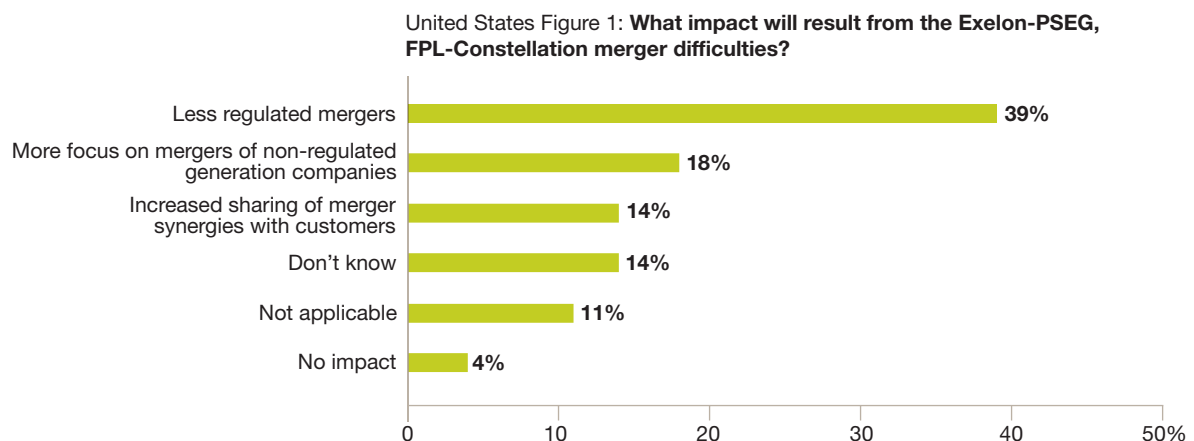
Volatility continued in fuel commodity markets. Both construction activity and fuel volatility are expected to have major impacts on the structure and operation of the sector for many years to come. Rate case activity increased, with mixed results. After years of rate freezes, not all regulators were willing to face the outrage of ratepayers having to absorb rate increases and companies found themselves contending with the political nature of the rate process. Despite the difficulties with regulators and rate requests, 2006 was another year of strong earnings and shareholders' returns.

## Mergers

The mega-mergers of Duke-Cinergy and Pacificorp-MidAmerican Energy were completed in 2006. However, while the path to mergers now appears less burdensome at the federal level following the PUHCA repeal, several large mergers (Exelon-PSEG, FPL-Constellation) could not get past state hurdles.

In both failed mergers, the majority of synergies related to the non-regulated operations and state regulators appeared determined to bring such synergy savings to ratepayers. Such hurdles might be expected to lead companies to possibly restructure so that they separate utility holding companies into regulated (transmission and distribution) and non-regulated (generation) to avoid this issue. The merger of non-regulated companies without market power issues would then be much easier to complete.

Utility executives, however, were divided about the likelihood of restructuring to separate out non-regulated activities. While 28% thought it 'likely' or 'highly likely', many more (43%) did not expect to see such restructuring in the industry. Instead, most respondents anticipate that the phenomenon of state-level intervention in the absence of PUHCA will be a temporary one and that the future will bring less merger regulation (figure 1).



**Note:** Average responses only. % share of respondents

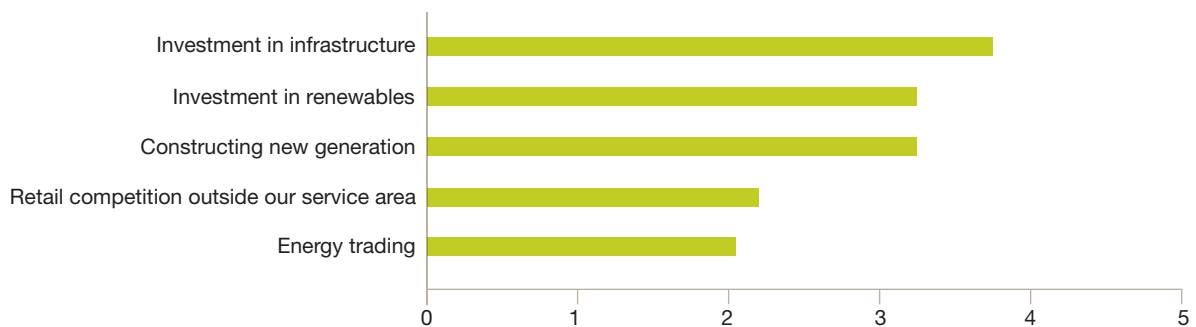
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

## Growth and construction

Investment in infrastructure, electric reliability, and a diverse mix of fuels to generate electricity are encouraged by the Act. The new legislative climate is reflected in the opportunities identified by US companies for growth and shareholder value. Investment in infrastructure, investment in renewables and increased construction activities topped the list of growth opportunities (see figure 2). Two-thirds of companies gave high scores (of four or five) to infrastructure investment, 56% to construction of new generation and 46% to investment in renewables. In answer to a separate question, respondents ranked increased fuel diversity as the most important opportunity to increase shareholder value with nearly half giving it scores of four or five.

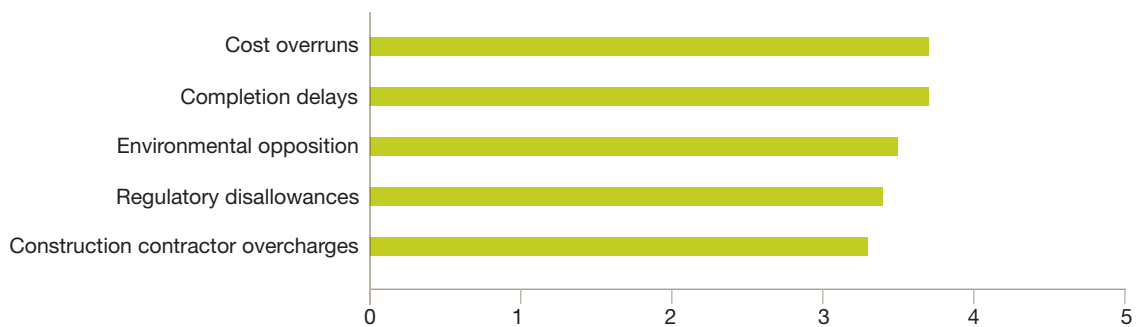
Growth is necessitating a considerable number of large construction programmes involving new generating plants and additional investment in the transmission grid. The difficulties associated with such projects are highlighted by the strong scores given in figure 3 to a range of construction challenges. Only a minority of respondents were relatively unconcerned about construction risks. In contrast, 65% thought completion delays were a high risk (scores of four or five), 62% were concerned about cost overruns and 61% identified environmental opposition as a threat to projects.

United States Figure 2: **What are your company's strategic growth opportunities?**



**Note:** Average response. Rate where: 5 = most important; 1 = least important  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

United States Figure 3: **Please rank the risks associated with renewed construction activity**



**Note:** Average response. Rate where: 5 = high risk; 1 = low risk  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

Regulation and rate reviews

Many companies are facing rate reviews. Not surprisingly, utility company executives expect to place a major emphasis over the next year on securing appropriate new rates in traditional state rate cases (see figure 4).

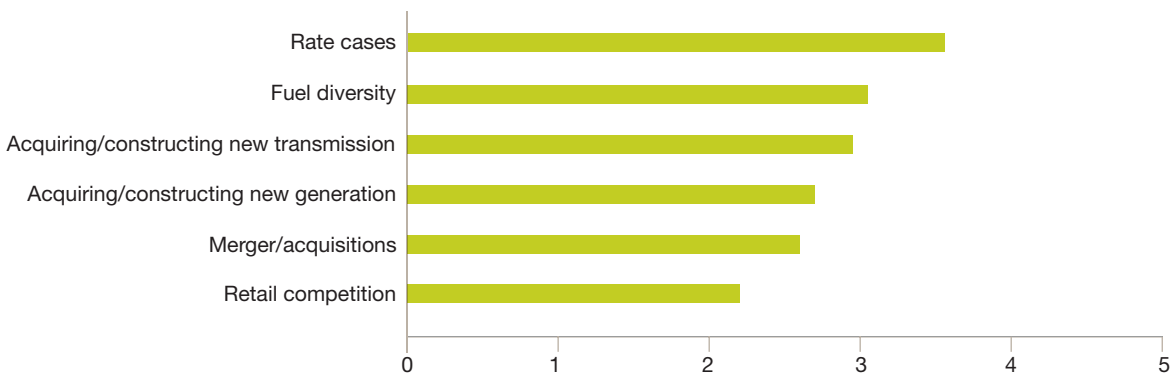
Two-thirds of respondents in our survey will be focusing on rate cases. The rate case process brings with it several regulatory challenges, especially the reluctance of regulators (commissions or legislators) to permit higher rates to be passed on the 'voting' customers.

Greater scrutiny of cost allocation methodologies, prudence reviews and deferrals of rate increases were cited by respondents as the likely response by regulators facing new rate requests (see figure 5). In some respects, utility companies are faced with an anomalous situation. They face possible penalties when their regulated companies pass on costs to ratepayers but, if their non-regulated businesses produce benefits, this is not taken into account.

Stock price/shareholder returns

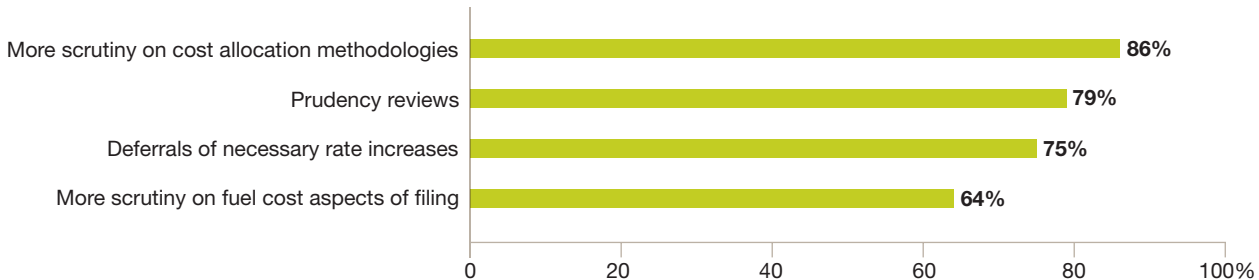
The Dow Jones Utility Index increased in excess of 20% in 2006, exceeding increases in the Dow Jones Industrial Average, S&P 500 Index and the NASDAQ composite index. In the three years ended December 31, 2006, the Utility Index has increased over 70% compared to increases in the other indices mentioned above in the 20%-30% range. Forty-one per cent of respondents felt their company's stock was appropriately valued, 37% believed it to be undervalued while 22% did not know. The outlook for utility stocks is optimistic among utility companies with 59% expecting prices to rise over the next twelve months (see figure 6).

United States Figure 4: **Over the next year, what areas will the company be focusing on?**



**Note:** Average response. Rate where: 5 = high focus; 1 = no focus  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

United States Figure 5: **How will state regulators deal with renewed rate requests to recover higher costs?**

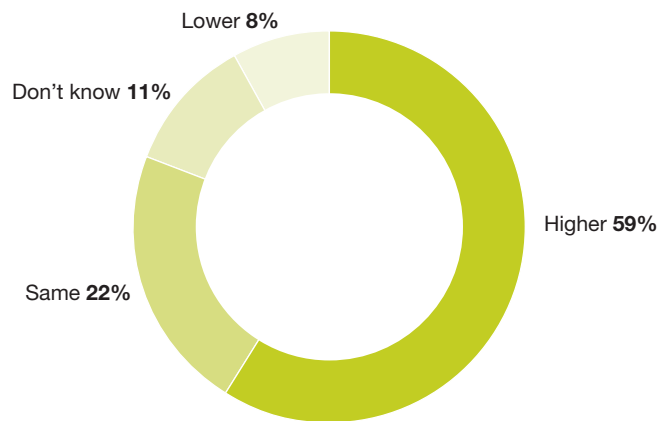


**Note:** Average responses only. % share of respondents  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

## Looking ahead

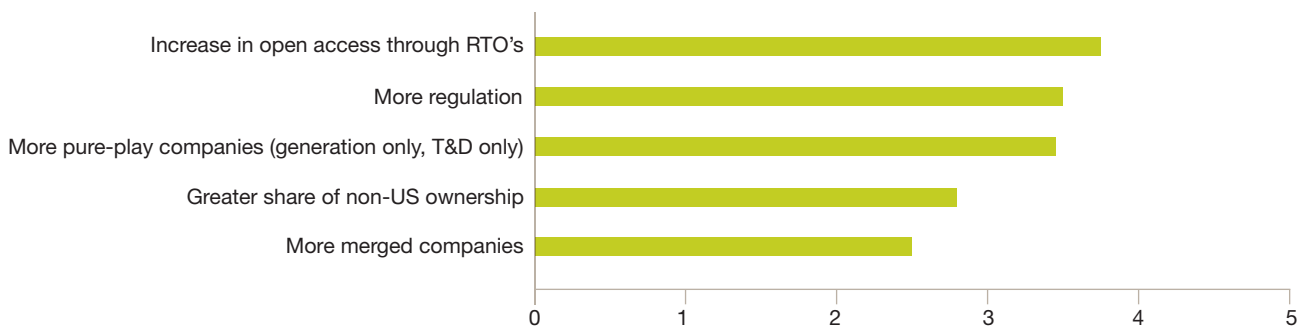
We asked respondents to rank the industry changes they anticipate in the next five years. Open access through Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs) and more regulation were cited as the biggest areas where change will occur. Not far behind was the belief that more pure-play generation only companies would result.

United States Figure 6: **What movement do you expect in utility stocks over the next twelve months?**



**Note:** Average responses only. % share of respondents  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

United States Figure 7: **What will be the biggest change in the US utility industry over the next five years?**



**Note:** Average response. Rate where: 5 = big change; 1 = little or no change  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

# Canada

The Canadian utility sector is characterised by its diversity. Some parts of the sector are almost fully deregulated, others are fully regulated. Ownership varies from full investor ownership to full public ownership. Some provinces are almost wholly dependent on hydroelectric while others are dependent on coal or nuclear. Some provinces are major power exporters, others are deficient in generating capacity. Even the economic environment and outlook varies widely from booming Alberta to the depressed Maritime Provinces.

## Environmental moves

The global climate change and greenhouse gas debate has had a significant impact on the Canadian power utility sector. Since mid-2006, there has been a remarkable evolution in public opinion and a related and consequent political evolution. Fifty-seven per cent of Canadian utility company respondents in our survey supported the current Canadian Government's environmental proposals. Since the interviews were conducted, the government has defined these proposals further with a commitment to cut greenhouse gas emissions by 20% by 2020.

At the provincial level, the British Columbia Energy plan, for example, commits British Columbia to some of the most aggressive targets for green power anywhere in the world, including commitments to:

- make the province energy self-sufficient by 2016;
- acquire 50% of BC Hydro's incremental resource needs through conservation by 2020;
- make clean or renewable power account for more than 90% of generating capacity.

The Alberta utility sector relies on coal-fired generation. It includes some of the largest point source GHG emissions in the country and is being challenged to reduce absolute emissions and emissions intensity. The Alberta Government has introduced what is effectively a carbon tax and strict monitoring and reporting standards with surprisingly little political opposition. The newest large generating facilities being constructed are using the world's most sophisticated clean coal technology.

Ontario faces, perhaps, the most difficult position. It has announced its intention to reduce reliance on coal at the same time as its nuclear plants are reaching the end of their planned lives. This creates an immense challenge to manage and fund the major capital investment that will be required over the next 20 years. Furthermore, Ontario still has the challenge of managing the stranded liabilities built up by the former Ontario Hydro. This in turn has created opportunities for Quebec to significantly expand its substantial hydro resources. Even Newfoundland is planning to develop some of its massive hydro resource in Labrador.

## Growth opportunities

The main growth in the sector will come from investment in transmission, closely followed by generation. Few companies in our survey are attaching any priority to M&A, retail or trading routes to growth. Eighty-three per cent of survey participants believe that, within the next ten years, Canada will commence the planning of one or more major nuclear facilities.

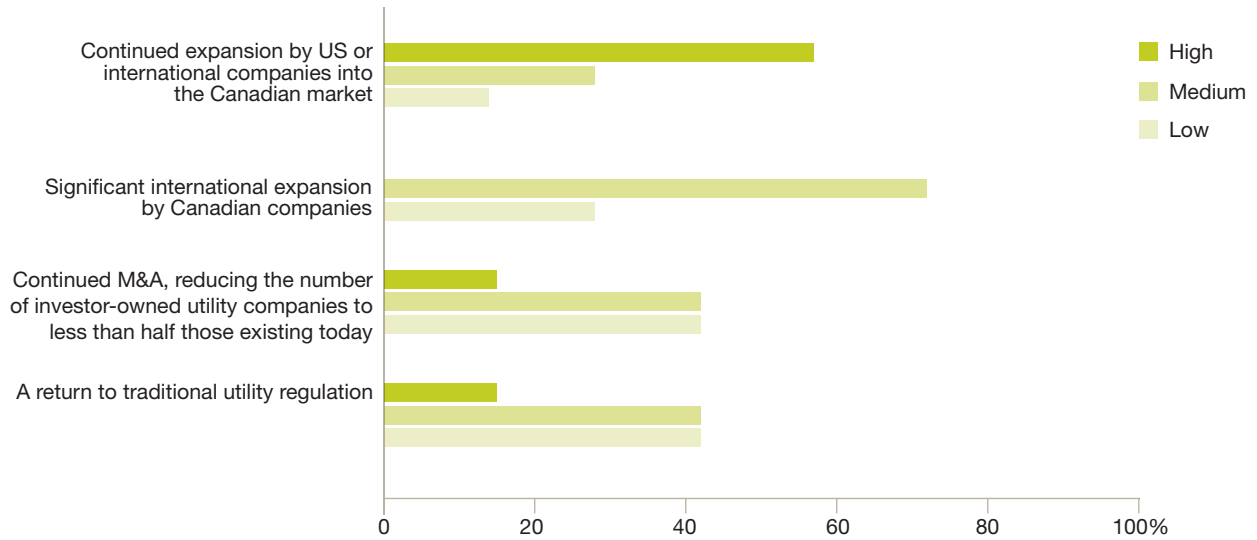
Respondents have a strong focus on performance improvement with 71% planning to implement performance improvement initiatives in operational activities in the next 12 months and 56% implementing performance improvement initiatives in the finance area.

Few participants reported any intention to invest outside their traditional operating areas or to invest internationally. However, there was a strong belief that organisations headquartered outside of Canada would enter the Canadian market (figure 1). Fifty-seven per cent assigned a 'high' rating to the likelihood of continued expansion by US or international companies into the Canadian market.

## Regulatory effectiveness

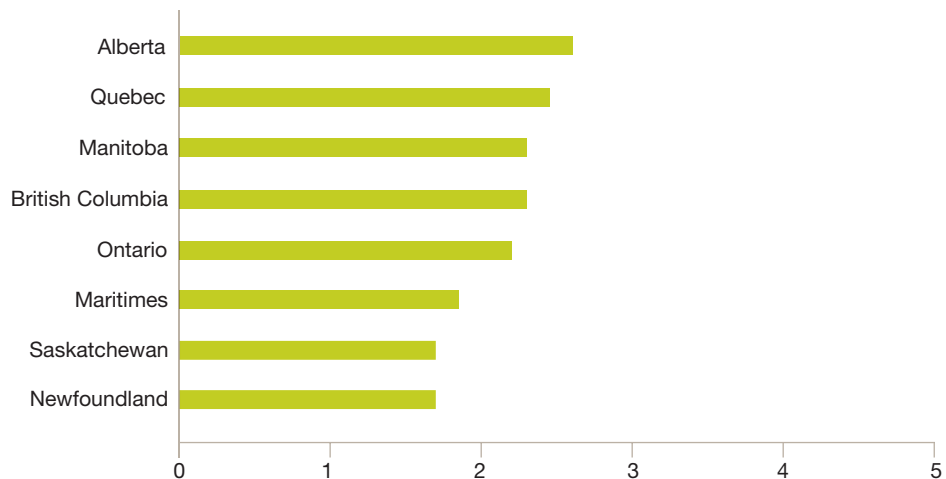
Although Canada has a very diverse range of market structures from fully regulated public ownership to substantially deregulated investor ownership, participants gave all provinces a low rating for effectiveness and efficiency of policy making and market planning processes. Only Alberta reached a 50% satisfaction rating among survey respondents (figure 2).

Canada Figure 1: Canadian market outlook over the next ten years



**Note:** Average responses only. % share of respondents  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

Canada Figure 2: Rate the effectiveness and efficiency of electricity policy making and market planning processes with regard to existing circumstances and anticipated requirements in and over the next ten years



**Note:** Average response. Rate where: 5 = highly effective and efficient; 1 = not effective or efficient  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

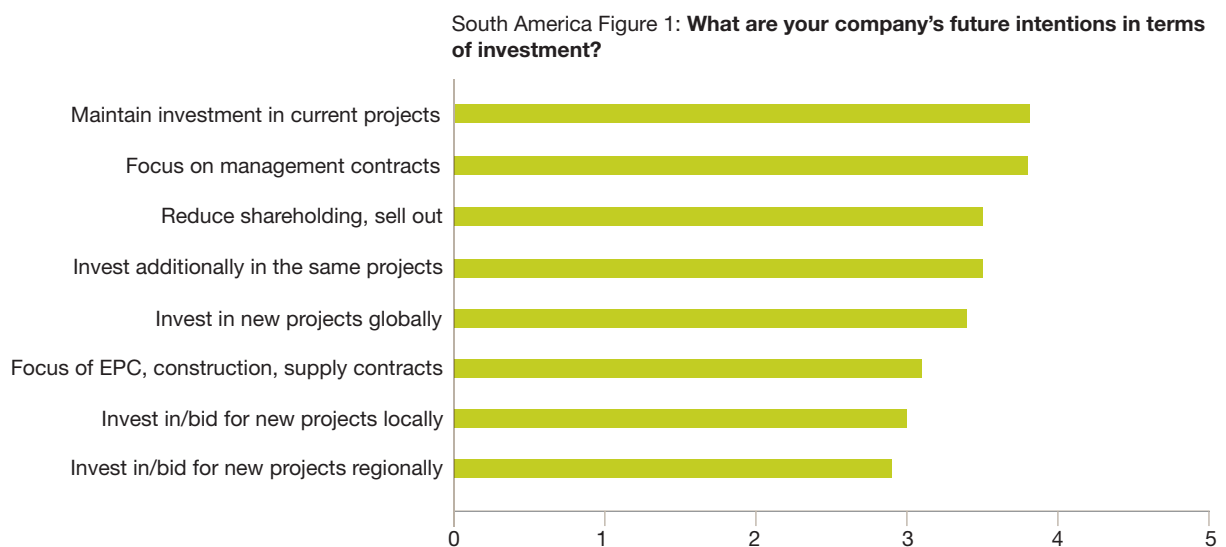
# South America

High real GDP growth, averaging five per cent in the last 12 months, in South American economies is creating a significant need for investment in energy infrastructure. The region is experiencing the most vigorous three-year-period GDP growth since the 1970s. The pattern of growth varies across the region. While some countries are growing at 8% to 10%, such as Colombia, Argentina and Venezuela, others are growing at lower rates. Growth is expected to ease slightly to around 4.5% in 2007, in line with a more measured global expansion, the likely easing of commodity prices, and the maturing of recoveries within the region.

## The investment outlook

Investment in power projects is critical in the region but a variety of concerns are causing utility companies to switch their attention away from 'greenfield projects'. Respondents reported that they were much more inclined to invest in or bid for new projects globally (75% reporting that this was an 'important priority') than locally (25%) or regionally (13%) with half saying that selling out of existing investments was an 'important priority'. Companies are prioritising management projects, which carry less risk exposure, and maintaining investment in current projects (figure 1).

Companies are facing financing challenges in the region and expected rates of return on projects pose a barrier to investment in some cases. Financial constraints and the high cost of financing are cited as major constraints (scored four or five) by 76% and 63% of respondents respectively. Indeed, 38% of respondents said that they had had to cancel projects because of financial constraints. This is symptomatic of a difficult financing environment for companies in the region and the fact that many investors from developed countries are not currently prioritising South America.

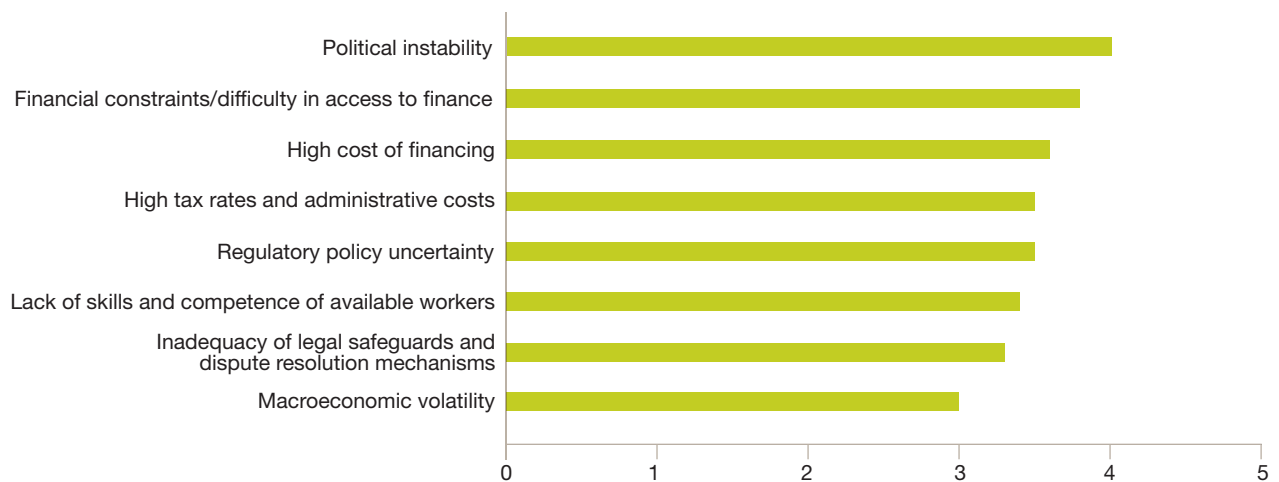


**Note:** Average response. Rate where: 5 = very high priority; 1 = not a priority  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

Political instability is also a key concern for investment and is scored highly by 63% of respondents. Moreover, issues of regulatory uncertainty, lack of skills and competence of available workers, taxation and legal safeguards are all also significant factors in the minds of utility executives (figure 2).

The challenge for project investment in the region is illustrated by the fact that all the survey respondents stated that they have cancelled or sold off participation in a utility project in the past. In the majority of cases they report that this action was due to investment opportunities in other sectors or financial constraints affecting the project. Again, this indicates that the region's utility sector is not as attractive to investors compared with other sectors. A quarter of respondents attributed their move to corporate governance and compliance issues. Significantly, though, despite the overall concern about political instability, none of the companies surveyed have diminished their participation in a project because of changes in government policies, or because of unforeseen or changing circumstances.

South America Figure 2: **Which of the following does the company consider to be the main concern facing investors in the region in the coming years?**



**Note:** Average response. Rate where: 5 = biggest constraint; 1 = not an important constraint  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

## Future financing

More than 60% of the companies see private foreign investors as a source for future investment in the utility sector and only a quarter view local banks and investors as an important financial source (see figure 3). What is not completely evident is if those foreign investors are willing to invest where there are political instability concerns. Additional sources of finance are expected to come from a more active participation of local governments and/or multilateral funding agencies. For example, the feasibility study into the integration of gas pipelines in the Southern Cone was financed by the World Bank, while the strategic analysis to introduce gas in the Central American region is financed by the Inter-American Development Bank.

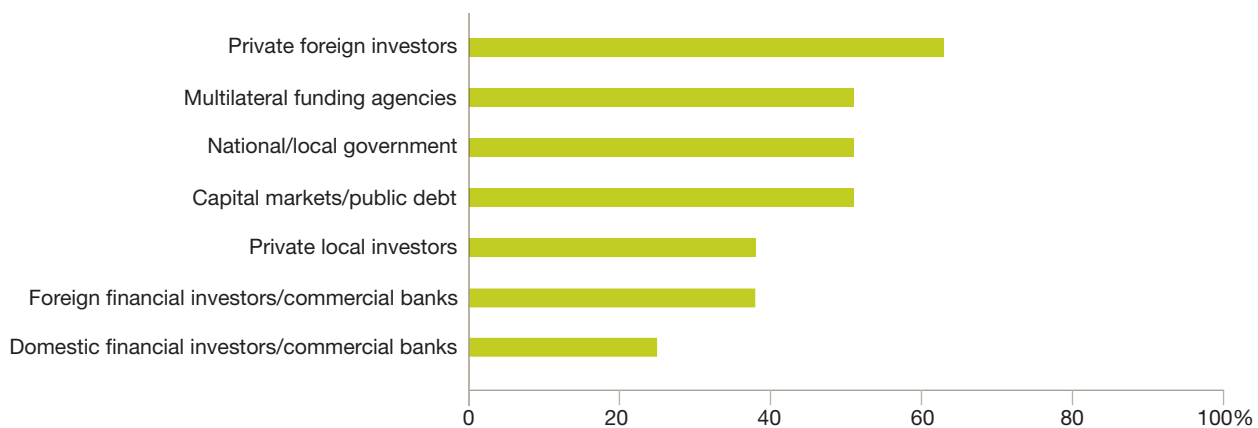
With financial resources being the main constraint facing companies in the region, the development of local capital markets in South America will be crucial to increase future investments in the sector. This also explains why local companies are more inclined to participate in management contracts and not in 'greenfield projects', which pose not just an investment challenge but carry higher risks.

## Sustainable energy

Alternative sustainable energy sources will affect competitive electricity pricing in the region in the near future. Various sources stand out as being the main alternatives of sustainable supply, among which are solar, hydropower, wind energy and bio-energy (see figure 4). In line with global results, the prominence of sustainable energy sources is much higher in respondents' answers than in previous years.

In general, the region does not have a record of important successful solar sources of energy. Hydropower is the cheapest source of energy but is not available for every country and bio-energy is a 'new-born' idea. Although it is expected to bring important benefits to the producer countries such as Brazil and Argentina, it is still difficult to calculate the effect that it could have in the near future. So, this answer seems to be more an 'expression of desire' than a realistic vision of the future.

South America Figure 3: **What are you expecting to be the financial sources of future investments in the utility sector?**



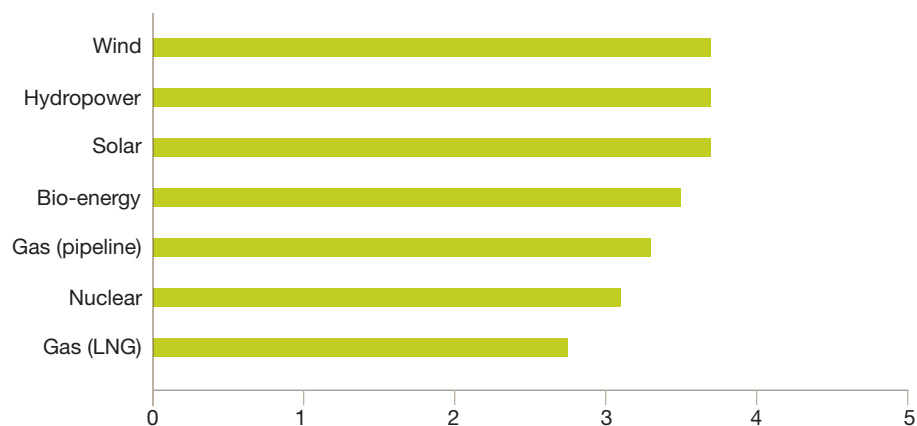
**Note:** Average responses only. % share of respondents

**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

Additionally, the region is rich in gas reserves and many projects have been implemented over the last 20 years to transport gas reserves from wellhead injection to consumer markets. In the future the southern countries of the region, including Peru, Chile, Ecuador, Brazil, Argentina, Paraguay and Uruguay, may constitute a regional gas market by incorporating two or three projects into the existing network. Central America is also analysing a strategy to introduce gas in order to generate electricity and develop an integrated energy project for the region. When talking about security of supply, 'gas' always comes first but political issues in Venezuela and Bolivia, the most 'gas-rich' countries in the region, are creating some uncertainty.

Finally, LNG projects are still subject to too much price volatility risk for the region. Nevertheless, Chile, the country with more problems in securing its supply due to its dependence on Argentine exports, is seeking to diversify its supply sources through examination of two options – transporting natural gas from Peru through a new pipeline and the construction of a regasification plant in the north of the country.

South America Figure 4: **Which of the following alternative sustainable energy sources do you believe will affect competitive electricity pricing in your region in the near future?**

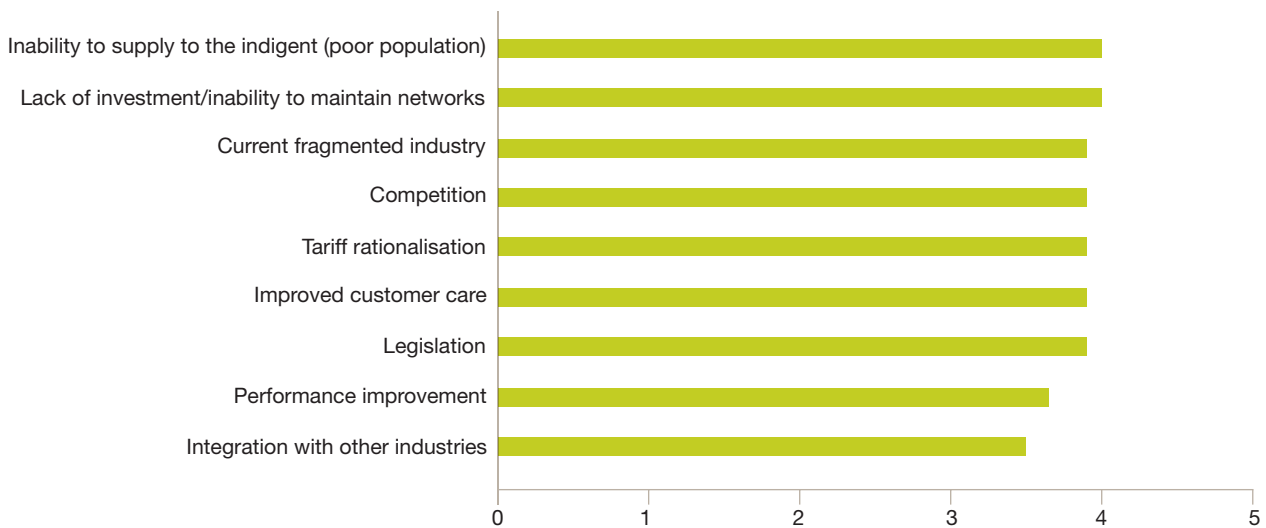


**Note:** Average response. Rate where: 5 = most affect; 1 = least affect  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

## Restructuring of power markets

Utility executives point to compelling reasons for restructuring of power generation and distribution markets in the region (figure 5). Strong scores are awarded pretty much across the board to a range of factors, of which the need for urgent investment in transmission and distribution networks and the continuing ambition of extending power access to poor households are rated highest. Utility companies hope that market restructuring will improve their access to finance for projects. However, the extension of the grid to low-income households poses challenges for tariff collection and subsidies.

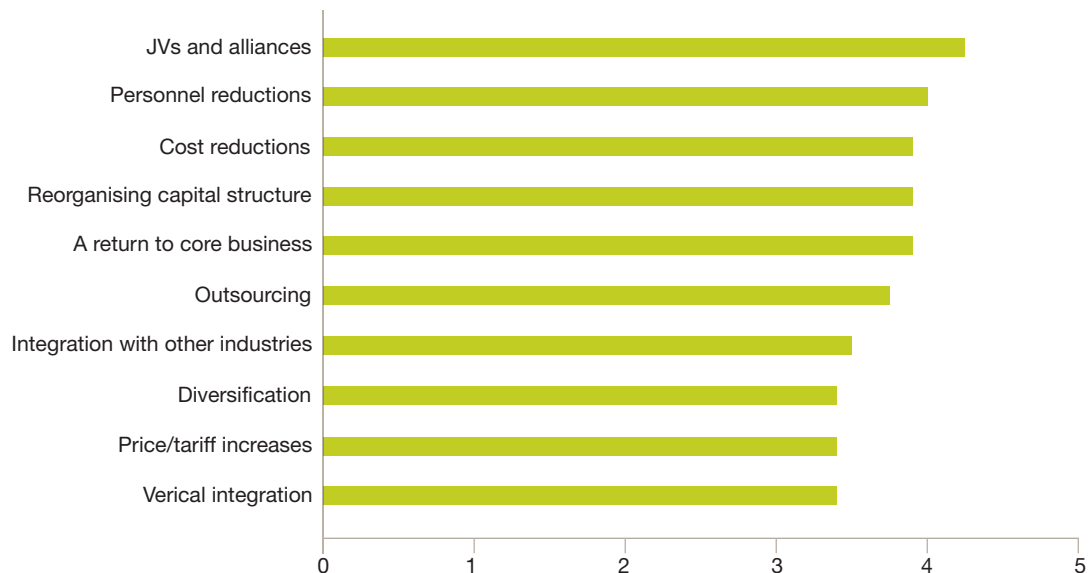
South America Figure 5: **What are the key drivers for the restructuring of the generation and distribution markets?**



**Note:** Average response. Rate where: 5 = key driver; 1 = not a driver

**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

South America Figure 6: **Which do you see as the most likely way to improve the profitability of South American utility companies?**



**Note:** Average response. Rate where: 5 = most likely; 1 = least likely

**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

## Internal reform

Companies are looking at joint ventures and internal reforms such as personnel and cost reductions rather than expecting tariff increases to be the main spur to profitability (see figure 6). Such responses highlight the likelihood of M&A consolidation among South American utility companies as a route to achieving growth and reducing the cost base.

## Snapshot: Brazil

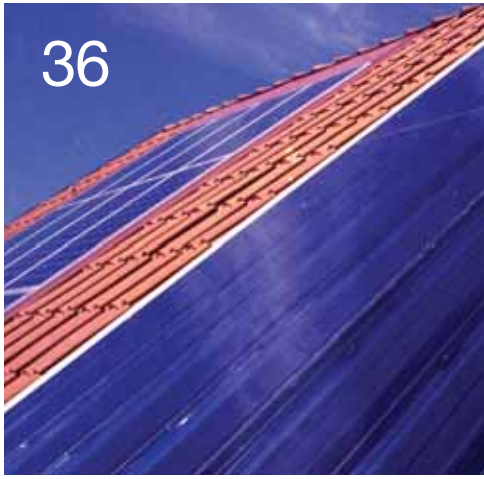
Brazil is the largest energy market in South America. It needs investment of around US\$20bn per annum in the energy sector for the next ten years, in order to sustain an economic growth of 3.7%.

The current government has abandoned electricity privatisation plans and adopted a new energy model intended to enhance competition in the generation and trading area. This uses a system of public auctions based on reversed prices, whereby the bid is based on a ceiling price and the winner is the one that offers the lowest tariff. The objective of larger private investment has not materialised and, due to the level of tariffs established, the government companies still have a dominant position in electricity generation.

Brazil has oil self-sufficiency but natural gas still accounts for a relatively small proportion of the national energy matrix. Almost 45% of the country's energy consumption comes from renewable sources. Brazil is heavily dependent in hydroelectricity and biomass and is the largest world producer of ethanol. Brazil's ethanol is competitive only if the oil price is above US\$40/bbl. The country has the potential to be one of the world's biggest bio-diesel producers. Not only can it meet its internal demand, it also has export potential.

At the beginning of 2007 the Brazilian government launched an economic growth and infrastructure programme, including the construction of major hydro plants in the north-east region of Brazil. These will help reduce the risk of potential future energy shortage but need to gain the necessary environmental licences as well as funding.

Attracting private investors to the sector remains a significant challenge. Public funds are limited given the resources needed in the sector. Other contenders for funds include transmission lines, which have been included in bidding processes by the Brazilian Energy regulator and some alternative generation projects, including wind power projects and biomass.



“Europe puts its weight behind a big push on cleaner fuels and energy efficiency”

## Europe

The European power utilities sector is witnessing a number of big developments. We examine many aspects of them in the company responses to our survey. July 2007 sees the deadline for the full liberalisation of customer choice for all power and gas customers in the EU. The run up to liberalisation has seen continued unprecedented levels of M&A activity. European utility companies moved in for US\$190.6bn worth of targets during 2006, in part motivated by the quest to build super-regional scale ahead of full liberalisation\*.

The EU Commission has taken a very active interest in the power utilities market, announcing moves to seek the effective separation of supply and production activities from network operations. However, the jury is still out on the exact nature of unbundling reform. The Commission has suggested a second, less radical option that would allow energy groups to hand over management of grids to independent operators while retaining ownership. Legislation is expected in summer 2007.

A two-day Energy Summit of EU leaders in March 2007 agreed to strive for a 20% reduction in greenhouse gas emissions by 2020 compared with 1990 levels, going beyond the 8% by 2012 that Europe signed up to at Kyoto. A series of mini-targets include 20% of European energy to come from renewable sources by 2020, which is triple renewables' 2005 share in the energy mix, and a 20% saving on total EU energy consumption compared to projections for 2020.

Underpinning much of this is the EU emissions trading scheme. The scheme, though, came close to falling into disrepute during 2006 when it emerged that there had been an over-allocation of phase 1 allowances. Now the sector is gearing up for phase 2 from 2008 onwards, taking on board learning from phase 1. But the big issue for governments and the sector will be the future direction of the scheme after 2012. Emissions trading post-2012 is a key factor in company decision-making and many companies believe the ETS review periods are too short-term for the investments needed in the industry.

\* PricewaterhouseCoopers, *Power Deals 2006 Annual Review*, 2007.

### The impact of emissions trading

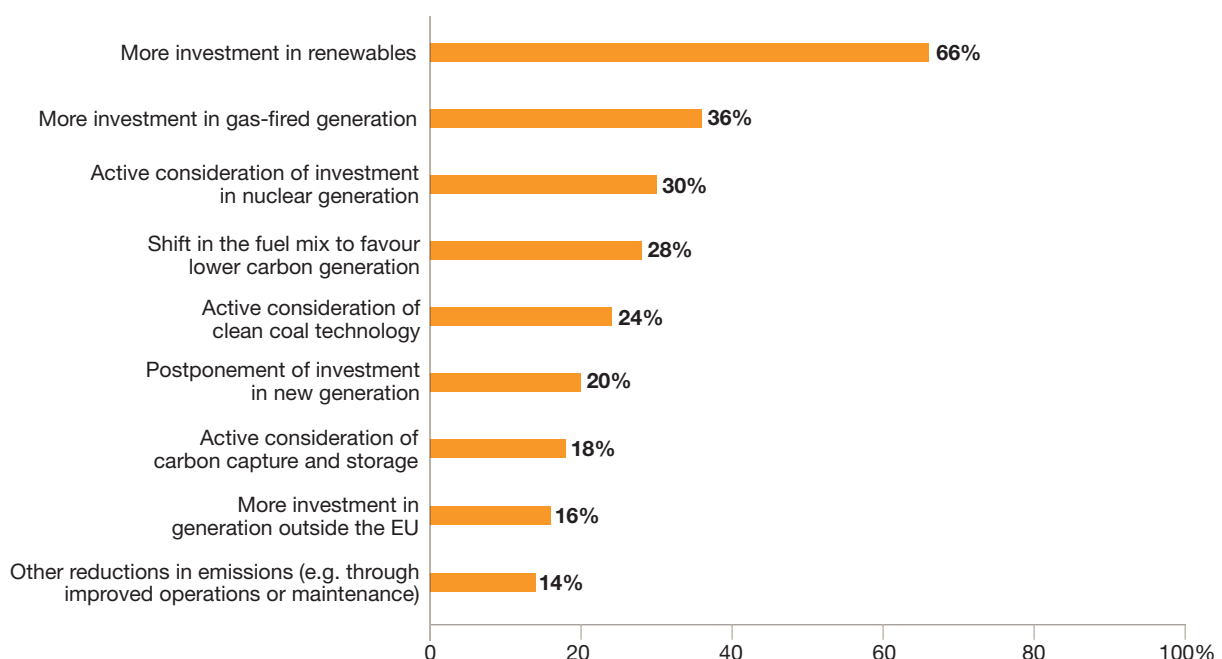
The European Emissions Trading Scheme (EU ETS) has spurred investment in renewable generation among European utility companies. Two thirds of respondents from European utility companies report that Phase 1 of the scheme, which began in 2005, has increased such investment and just over a third (36%) report that they have increased investment in gas generation.

The scheme has only been in operation for two full years and, in some key markets, had a slow start in terms of the cost of carbon feeding through to power markets. Phase 1 has also suffered from an over allocation of permits which knocked confidence in the scheme. Against this background, only 28% of respondents report that the scheme has prompted them to switch their companies' fuel mix in favour of cleaner generation (figure 1). However, this low figure has to be understood both against the lead-in times required for new generation and in the context of marginally available capacity.

A significant minority of respondents are actively considering stepping up investment in nuclear and clean coal technologies, which would have been less likely to be on their agenda before the scheme started.

The EU ETS is a key factor for utility companies' strategies and operations. Utility company executives, however, remain unconvinced that analysts and brokers have a good understanding of the implications for their business. While 46% of respondents felt analysts' and brokers' understanding in this area was 'good', rather more rated their understanding as 'mixed' (44%) or 'poor' (10%). Indeed, among western European respondents, only a third rated understanding as 'good' and 44% said it was 'mixed'. These results show no real improvement compared to the previous year when we asked the same question and, if anything, are slightly worse. However, utility companies must ask themselves how good are they at briefing and educating the investment community on this vital aspect of their business.

Europe Figure 1: What impact has the EU ETS had on your business since 1 January 2005?



Note: Europe responses only. % share of responses

Source: PricewaterhouseCoopers, Utilities global survey 2007

## Technological promise

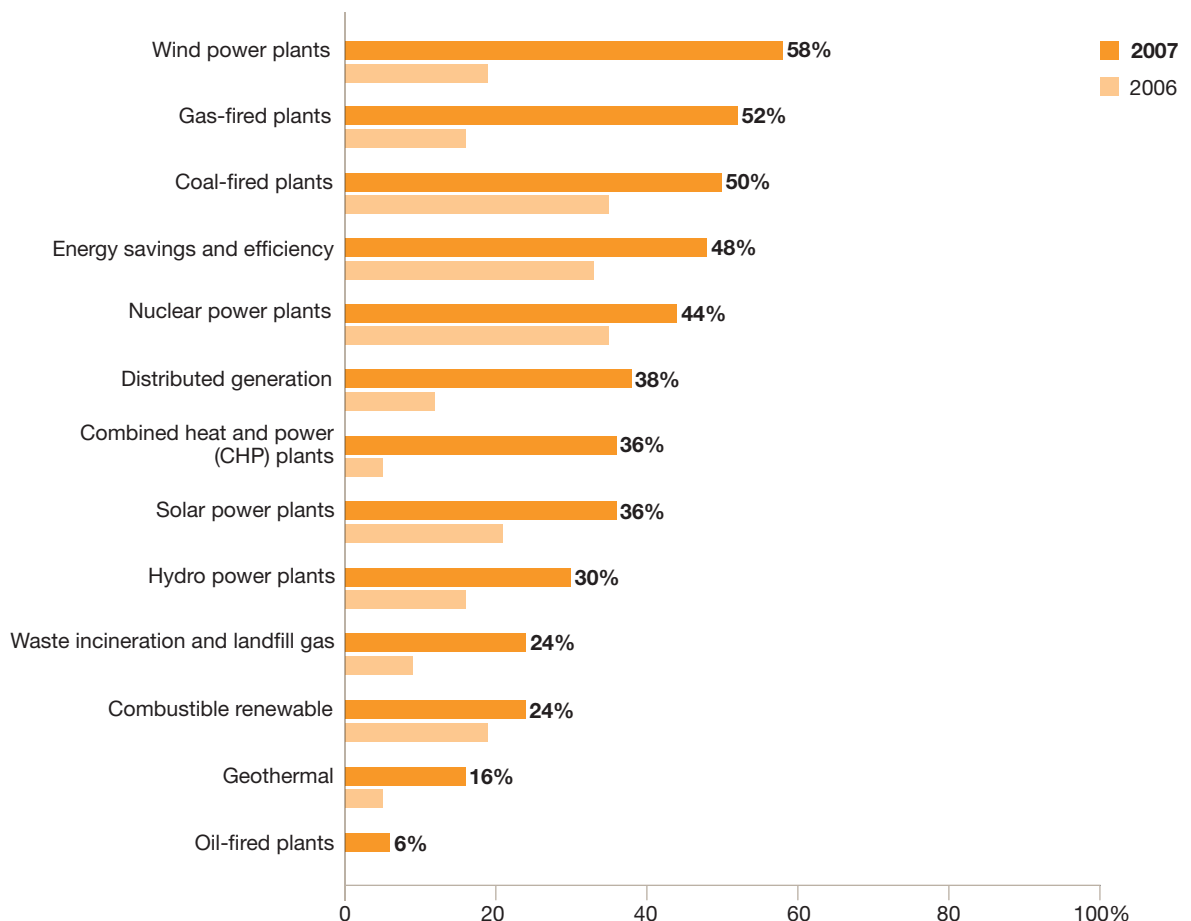
European utility company executives believe the impact of technology will be felt greatest in generation. In contrast to American respondents, they put the impact on wind, coal- and gas-fired generation ahead of the effect on energy savings and efficiency. A significant minority of utility company executives on both sides of the Atlantic also highlight the potential impact on developments such as distributed generation, local combined heat and power plants and the capture of gas from waste incineration and landfill.

There were big year-on-year increases in the proportion of European respondents anticipating that renewables, LNG and nuclear energy would play a more prominent role in the continent's energy mix (figure 3). Coal and pipeline gas remain mainstays and were each mentioned by 46% of respondents. However, the most mentions were for 'other renewables', perhaps reflecting increasing awareness of the significant pick-up in bio-mass in European electricity generation. Looking further ahead, companies including Scottish Power and E.ON are beginning to develop wave power initiatives.

## Future carbon prices

The EU Emissions Trading Scheme has ensured that the price of carbon is an important factor in utility company business decisions. Phase 1 of the scheme ran from 2005 and ends on 31 December 2007. Carbon prices during the period have been fairly volatile. They peaked at around €30/t before falling sharply to the low teens and subsequently fading over time to around €1. Phase 1 was intended to be a 'learning by doing' period. Some of the lessons of Phase 1 are being addressed in the second phase which will run from 1 January 2008 to 31 December 2012. Allocations in Phase 2 are tighter. Utility company executives' prediction for the future of carbon prices confirms that power companies are expecting the market to be net short in Phase 2. The majority anticipate a price between €10 and €20. Few expect the price to fall below this range and a third anticipate that it will rise above €20.

Europe Figure 2: In which areas of generation and supply do you expect technological developments to have the greatest impact over the next ten years in your market?



Note: Europe responses only. % share of responses

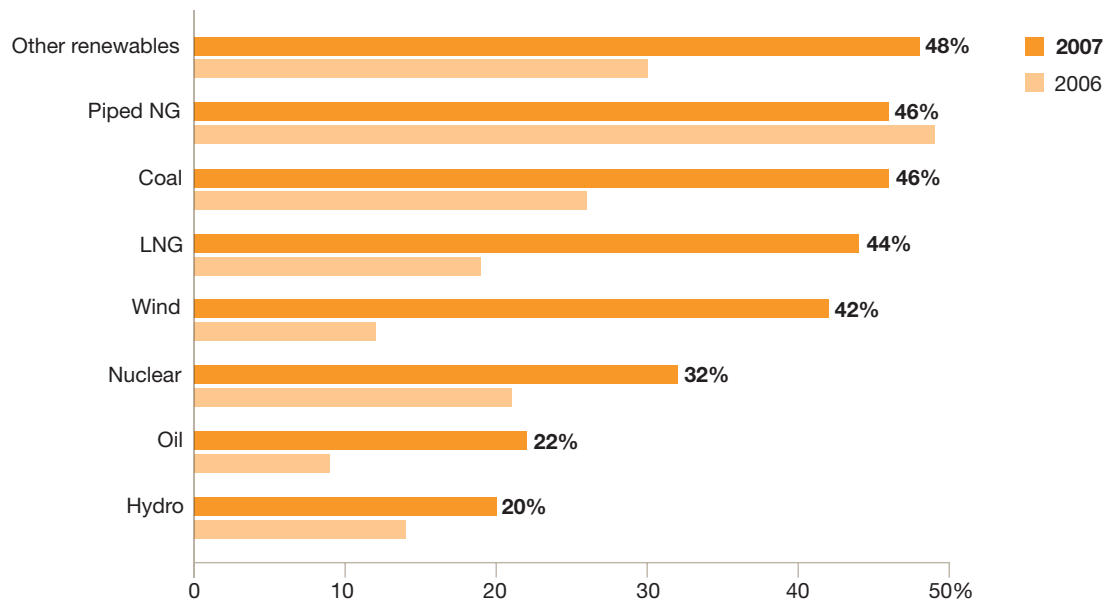
Source: PricewaterhouseCoopers, Utilities global survey 2007

This response reflects the fact that there will be a substantial internal shortfall from the Phase 2 national allocation plans (NAPs) and stricter EU limits on the use of Certified Emission Reduction (CER) credits from the Clean Development Mechanism (CDM) and Emission Reduction Units (ERUs) from Joint Implementation (JI) projects. The price of carbon will, thus, reflect fuel price relativities, crucially the coal/gas spread.

The general consensus is that, if carbon prices are going anywhere, they are likely to move upward. Our survey findings are in line with wider market sentiment.

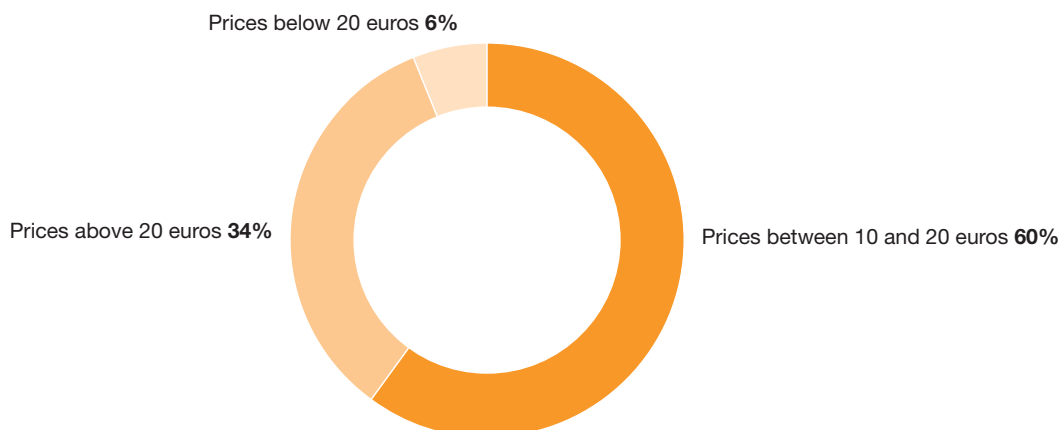
An International Emissions Trading Association (IETA) survey conducted by PricewaterhouseCoopers found that views on prices from major players in all segments of the GHG market were generally bullish. The survey was conducted in April 2007 and almost two thirds of respondents expected EUA prices to be higher in Phase 2, with 14% expecting significant increases. Moreover, confidence in the market is increasing – 73% confirmed that the GHG market is a better business proposition now than it was a year ago (*The IETA Index of GHG Market Sentiment*, IETA, 2007).

Europe Figure 3: What type of primary energy supply is expected to account for an increasing proportion of your market's energy consumption over the next five years?



Note: Europe responses only. % share of responses  
 Source: PricewaterhouseCoopers, Utilities global survey 2007

Europe Figure 4: What impact do you expect NAP2 to have on carbon prices in the 2008-12 period?



Note: Europe responses only. % share of responses  
 Source: PricewaterhouseCoopers, Utilities global survey 2007

As we look ahead, demand growth and energy efficiency will both be key factors with the impact of the latter more difficult to predict. Our European utility company survey respondents are anticipating a fair degree of volatility in carbon prices during the 2008-12 period. Only 22% expect less volatility with the remainder being more or less equally divided between increased volatility (41%) and a continued volatility as under the current scheme (38%). As we have seen, the period to date has been fairly volatile. Companies may feel that with a longer Phase 2 time period, new industries coming into the scheme and more variables at play, there are few reasons to expect more stable prices.

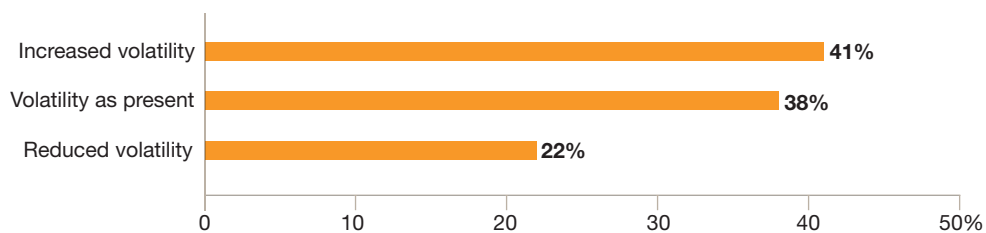
### CDM/JI markets

The importance of the CDM market is growing. Most of the European respondents to our survey plan to be involved during the remainder of Phase 1 (figure 6). While 30% of respondents are not planning significant purchases, this is largely because such purchases are not relevant to them, either because they are outside of the EU ETS geographic area or because their activities are in parts of the utility value chain that are not affected. The majority of the rest expect to make significant purchases, either for straight compliance reasons or, in the case of larger players, as a trading activity in its own right.

Where companies are buying for trading purposes they are most likely to be doing this directly through their own trading desk. Those buying for compliance reasons split roughly 50:50 between those who do so directly and those who choose to use a fund or an intermediary. We might expect that direct purchases and trading will increase as familiarity with the scheme increases and as utility markets are liberalised across Europe.

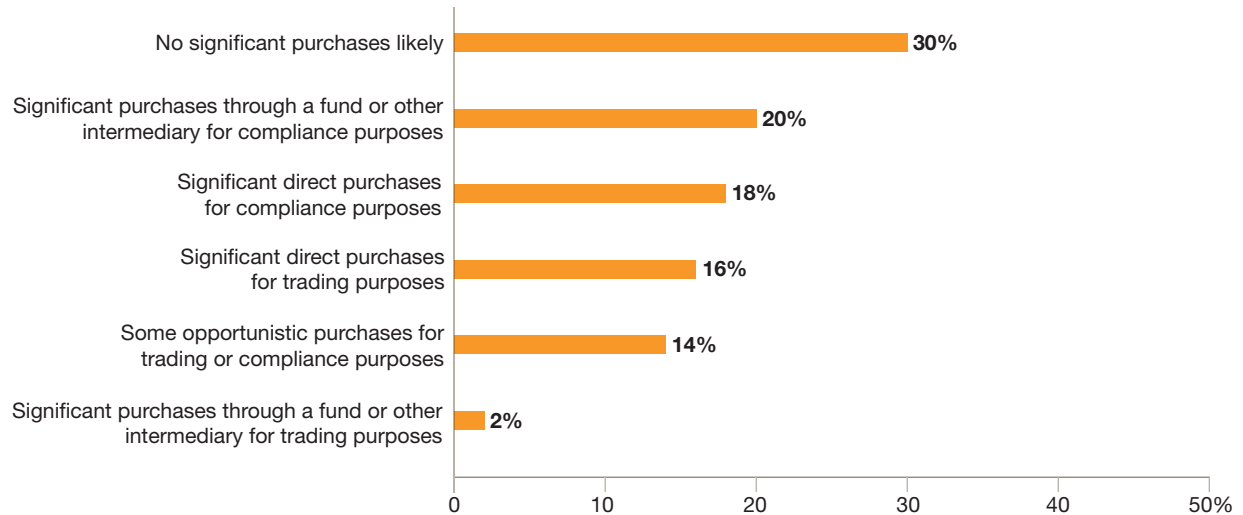
Looking ahead, the potential for CERs is substantial although the EU ETS rules place a limit on imports. Nearly half (48%) of the European utility company executives we interviewed expect such limits to lead to postponements and cancellations. The pipeline for CERs is not yet fully flowing. When it is, the European market may not be able to take all the credits that are available and, thus, the European market alone may not set the price. Forty-four per cent of our survey respondents expect CERs to trade at a significant discount to EU emission allowances (figure 7).

Europe Figure 5: What impact do you expect NAP2 to have on volatility of carbon prices in the 2008-12 period?



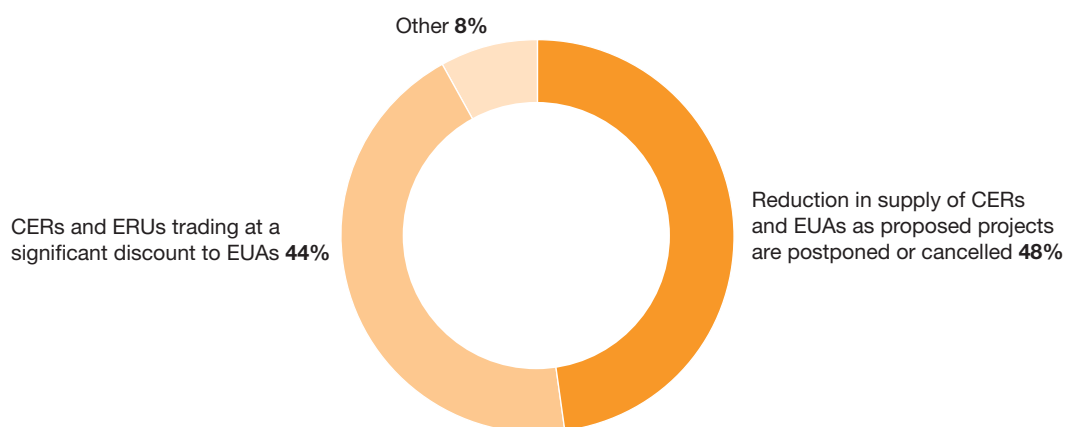
**Note:** Europe responses only. Total % share of responses  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

Europe Figure 6: Which of the following best describes the likely involvement of your company in the CDM market during the remainder of the first phase of the EU-ETS?



**Note:** Europe responses only. Total % share of responses  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

Europe Figure 7: What impact do you expect restrictions on the use of CERs within the EU ETS will have on the CDM and JI markets?



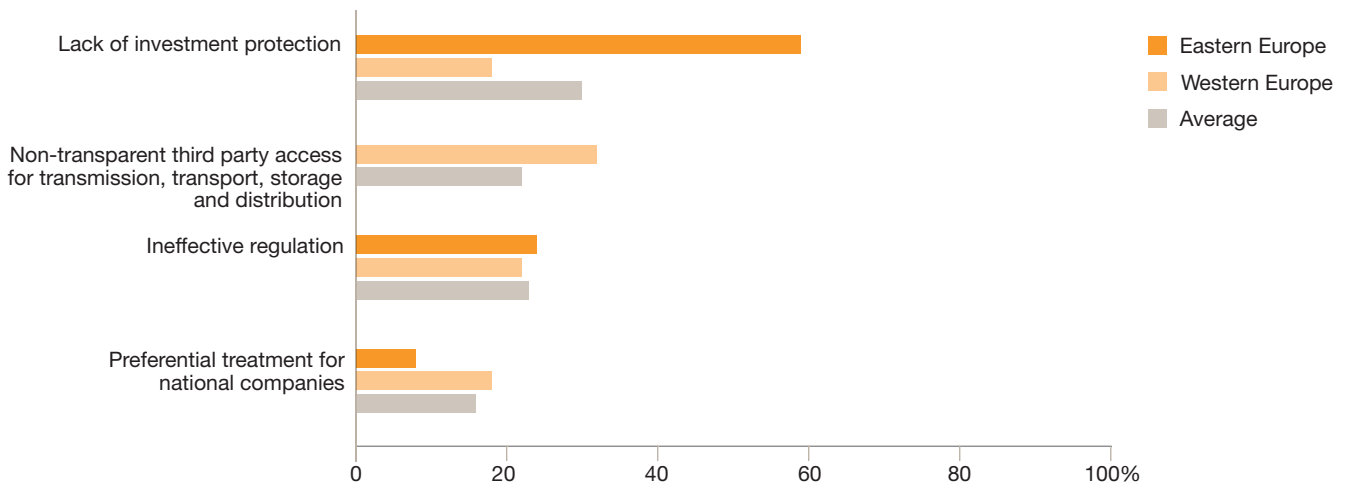
**Note:** Europe responses only. Total % share of responses  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

**Liberalisation**

The reform of EU power markets reaches a key stage in July 2007 with the full implementation of the Gas and Electricity Directives. Since 1 July 2004, all non-household users (industrial, commercial and professional customers) have been free to choose their supplier and all households across the EU will obtain this right at the latest on 1 July 2007. Some EU countries liberalised well ahead of these milestones but, while consumer choice is becoming very real, other barriers remain in the marketplace as a whole. Hence, while 1 July 2007 will be a key date, it is unlikely to mark the end of reforms. Inconsistencies remain and our survey results indicate that a minority of respondents remain concerned about the need for more effective regulation, third party access to transmission networks and preferential treatment of 'national champions'. Respondents in eastern Europe are particularly concerned about the lack of investment protection in their countries.

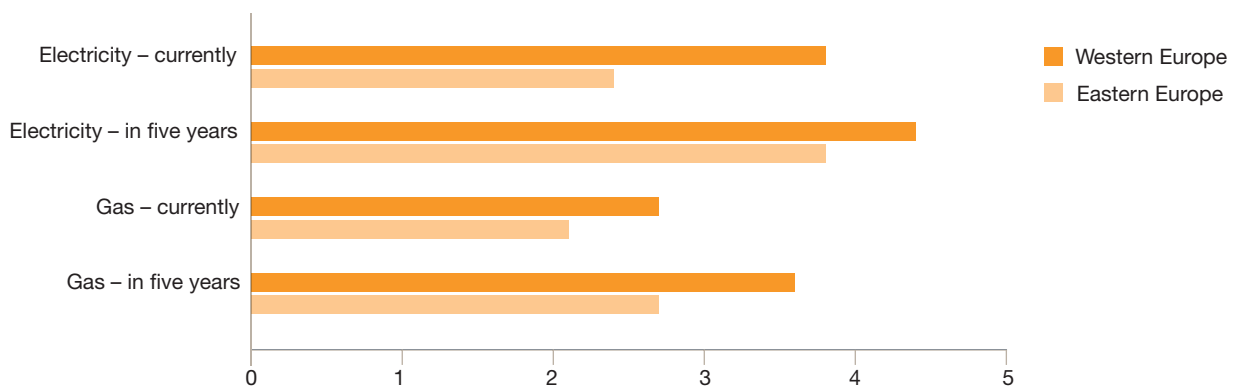
Because of these barriers, many of the utility executives in our survey feel that, while progress will be made in the next five years, the European power market will still fall short of being fully open. This is particularly the case in gas and in eastern Europe, where liberalisation is not at such an advanced stage. In western Europe, half of the survey respondents felt that the electricity market would not be at a stage where it could be described as 'fully open' (a score of 5 in figure 9) even in five years time and two-thirds said the same thing about gas. Nonetheless, the extent of progress in the electricity market is reflected in the fact that only 14% of respondents in western Europe gave scores of three or less for electricity market openness in five years' time. In addition, the responses indicate that companies believe that gas is becoming more open at a pace that will suggest it will close the gap with electricity.

Europe Figure 8: Which is the largest barrier to entry (assuming appropriate laws have been passed to permit competition)?



Note: Europe responses only. % share of responses  
 Source: PricewaterhouseCoopers, Utilities global survey 2007

Europe Figure 9: How open do you consider your home market to be now, and how open will it be in five years time?



Note: Average response. Rate where: 5 = fully open; 1 = not open  
 Source: PricewaterhouseCoopers, Utilities global survey 2007

Russia is the fourth largest power producer in the world (after the US, China, and Japan). Total electric generation capacity was 215 GW in 2005. Russia's power sector includes over 440 thermal and hydropower plants (approximately 77 of which are coal-fired) and 31 nuclear reactors. Thermal power (oil, natural gas, and coal-fired) accounts for roughly 65% of Russia's electricity generation, followed by hydropower (19%) and nuclear (16%). Currently Unified Energy Systems (RAO UES), the majority state-owned power company, controls most of the non-nuclear power sector.

Recovery in demand as the economy expands is already threatening a power deficit. Many of the country's power plants are antiquated, and the country's electricity transmission and distribution network is in desperate need of modernisation. Market-oriented reforms are necessary to attract private investment in maintenance and renovation of Russia's massive electricity infrastructure. In 2003 the Russian Parliament passed a package of reforms geared to overhaul the power sector, with provisions for an unbundling of the dominant utility, the liberalisation of electricity prices, the introduction of competition and eventual privatisation of power generation and distribution assets. As part of this electricity sector restructuring programme, RAO UES is scheduled to be liquidated (by July 2008) and unbundled into separate generation, transmission and distribution units.

Generation assets are being consolidated into interregional companies of two types: wholesale generation companies (WGCs) and territorial generation companies (TGCs). WGCs contain power plants, specialising mainly in electric power generation. HydroWGC, which consolidated all hydropower assets, will be controlled by the government (more than 50%). TGCs contain predominantly combined heat and power plants. Generation, sales and repair companies will become mainly private and enter into mutual competition, although, the federal government will retain control over Russia's electricity transmission grid via a new spin-off company (Federal Grid Company).

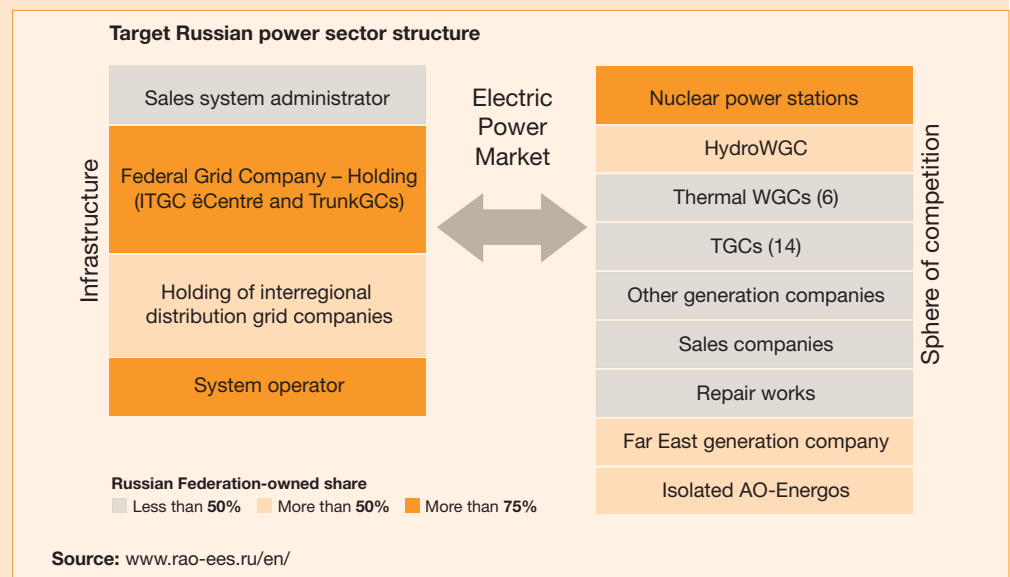
RAO UES has a planned US\$83bn investment programme for 2006-10. This is the largest investment programme in Russia. Its sources include additional stock issue (IPO and private placement), own funds, loans, project financing, the investment guarantee mechanism and direct private investments. Currently two WGCs' IPOs have already taken place. Four more WGCs and ten TGCs are planned to follow. The IPOs have started to change the shareholding structure of utility assets. For example, Norilsk Nickel has secured 46.5% of WGC-3, Gazprom acquired 33.3% in TGC-3 (which includes Mosenergo – the largest regional power generation company with a capacity of 14.8 GW). No foreign investors have a controlling stake in any of the Russian utilities companies and it is unlikely that this would be allowed due to the political sensitivities with regard to the IPO process.

The reforms include the liberalisation of Russian electricity prices through the introduction of a competitive power market. However, freeing prices to market forces has encountered some opposition. The government agreed to launch a day-ahead market for freely traded power in 2006 and is moving in stages towards 100% liberation of the wholesale market. Since April 2006, consumers and suppliers have been allowed to sign bilateral power contracts, bypassing state-regulated tariffs.

Nevertheless, competition in the Russian power generation sector remains limited at this point. The wide geographical separation between numerous Russian regions means that even when WGCs are established and privatised, competition will be limited. One of the risks here is that major Russian vertically integrated companies are looking for big stakes in WGCs and TGCs during their IPOs, which could limit competition and liberalisation of the power market again.

Russia has an installed nuclear capacity of 22.2m kilowatts and a wide array of nuclear enterprises, including: Rosenergoatom, operator of Russia's ten functioning nuclear power plants (NPPs) and their 31 reactors; TVEL, the nuclear fuel producer; Atomstroieksport, which builds NPPs abroad; and Tekhstabexport, the export company dealing in nuclear machinery and fuel. In 2006, Russian officials announced plans to consolidate the country's various nuclear concerns by creating a state-owned umbrella company under which all enterprises operating in the Russian nuclear sector will be vertically integrated.

The new holding company, tentatively called Rosatomprom, is to include three smaller holdings: one operating Russia's NPPs; one uniting all companies operating in mining and uranium enrichment; and one in charge of the manufacturing of machinery for the nuclear sector. The government is hoping to double the country's power generation from its nuclear power plants, with nuclear energy slated to account for up to 25% (from 16%) of Russia's overall power generation by 2030. In order to achieve this goal, 40 new nuclear power reactors will have to be built.





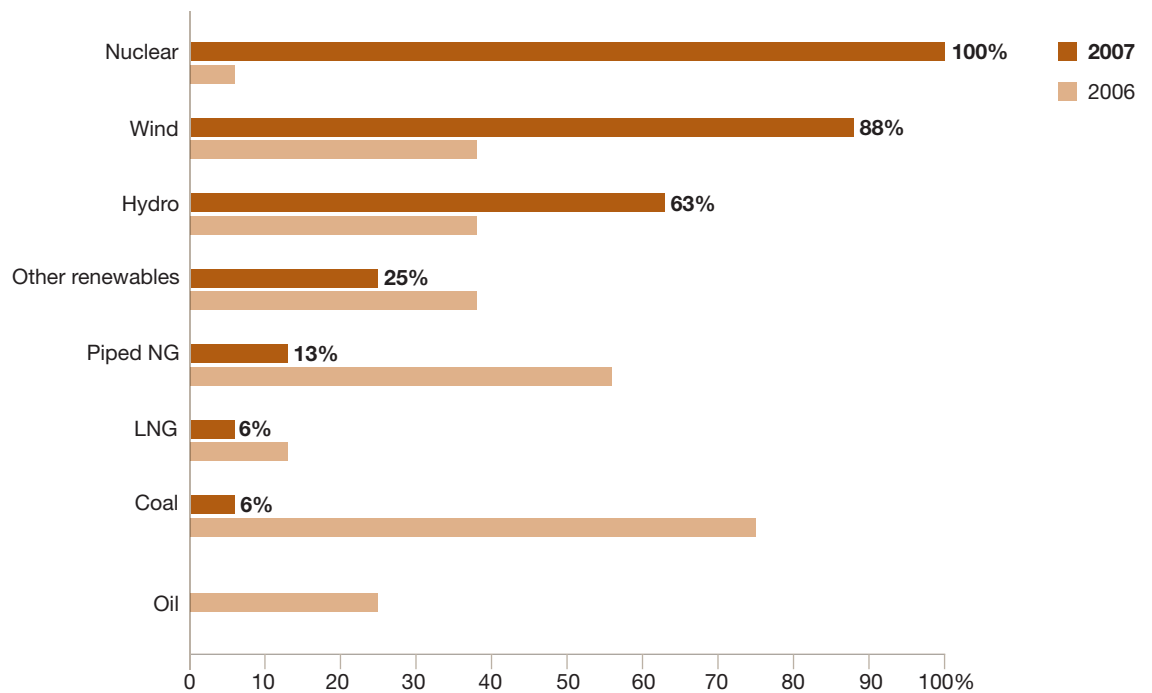
“Inevitably, the challenge of meeting big demand growth dominates the Asia utilities landscape”

## Asia Pacific

Coal is the predominant energy source for power generation in Asia. Nonetheless, it is the likely growth in nuclear, wind and hydro that is highlighted most by utility company executives in the Asia Pacific region. These three sources are all expected to account for an increasing proportion of the region's energy in the period ahead.

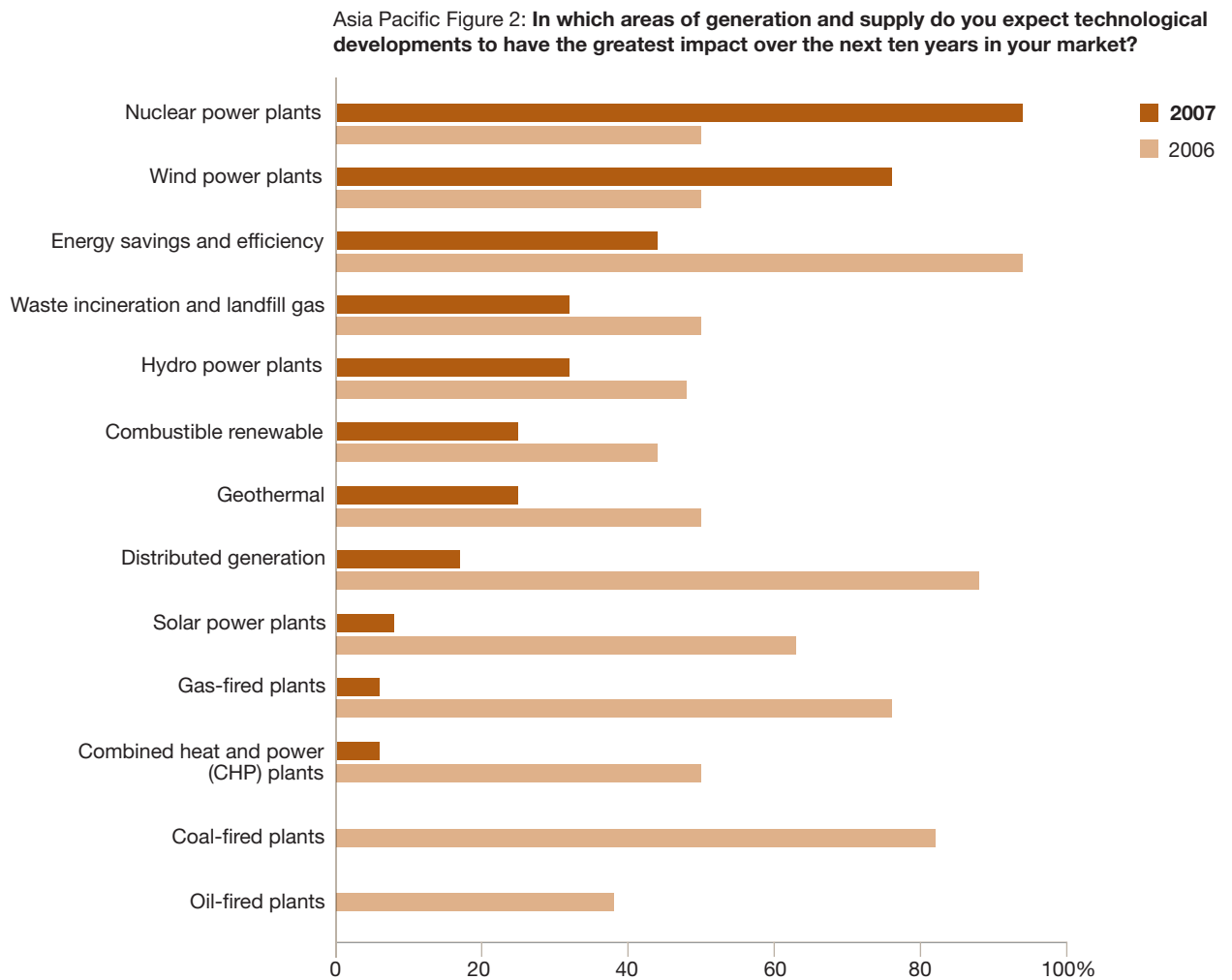
The responses from Asia Pacific respondents suggest that the region's utility companies may be seizing on these sources to an even greater extent than their counterparts in Europe and the Americas. In part, this may reflect the immense challenge that companies face in many fast-growing markets to satisfy demand.

Asia Pacific Figure 1: **What type of primary energy supply is expected to account for an increasing proportion of your market's energy consumption over the next five years?**



**Note:** Asia Pacific responses only. % share of responses  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

Certainly, when it comes to expectations of the impact that technology will have, the focus of Asia Pacific respondents is firmly on the supply side. The opportunities for meeting demand through wind and nuclear receive much more mention than the impact on energy savings and efficiency, in contrast to last year when it was the other way round.



**Note:** Asia Pacific responses only. % share of responses

**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

# Asia

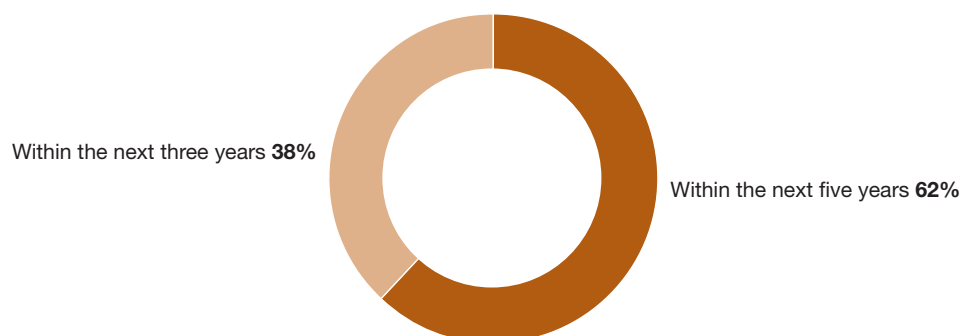
Strong economic growth is characterising much of the Asia region with consequent huge challenges for power utilities in markets where supply is already stretched. Liberalisation of markets to improve competitiveness, financing and efficiency, is important for the future of the sector and is acting as a spur to modernisation.

## Liberalisation

The pace and progress of liberalisation varies enormously across the continent. Only a quarter of the Asian respondents in our survey describe their market as fully liberalised: 38% are monopolies and 38% are partially privatised companies. While Japan and Philippines, for example, have relatively more liberalised markets and power pools being formed, the market in India is majority-controlled by government and private investment incentives are limited. China is in the middle of power industry reform. After segregating generation and transmission, the government is judging the most appropriate type of power market by pilot-testing tariff-bidding mechanisms in different regions of China. With the long-term plan to have a fully implemented tariff-bidding system, it is, however, unlikely that there will be major changes in the near future.

The outlook for liberalisation, thus, greatly depends on which country is being considered. Taking the responses to our survey overall, three-quarters of the respondents anticipate progress on liberalisation in their own market within the next five years (see figure 3). This is broadly in line with last year's results. However, a quarter of respondents cannot see any prospect of liberalisation within the foreseeable future. There is no sign from our survey that, looking at the region as a whole, liberalisation is accelerating.

Asia Figure 3: **Within what time period do you believe your market will liberalise?**



**Note:** Average responses only. % share of respondents  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

## Regulation

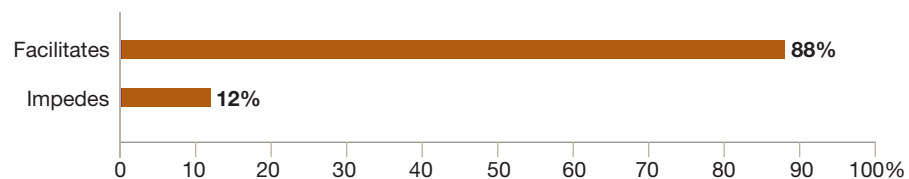
Around a third of the survey respondents operate in countries where regulation is government-run, with the remainder subject to regulation that is independently governed. Half of those surveyed expect regulation to increase in the next three years and half expect it to remain about the same. No companies are expecting reduced regulation. However, despite the fact that the regulatory burden is not expected to decrease, the vast majority of companies believe that regulation facilitates business development (figure 4). This acceptance of the importance of regulation bodes well for the development of more sophisticated power markets in the continent in the future.

## Performance improvement

Cost reduction, capital restructuring, joint ventures and outsourcing are all cited as key to performance improvement by the utility company executives we interviewed. Three-quarters viewed cost reduction and capital restructuring as 'important' or 'very important' for their companies. The focus on cost reduction demonstrates the increasingly competitive utility market environment across Asia.

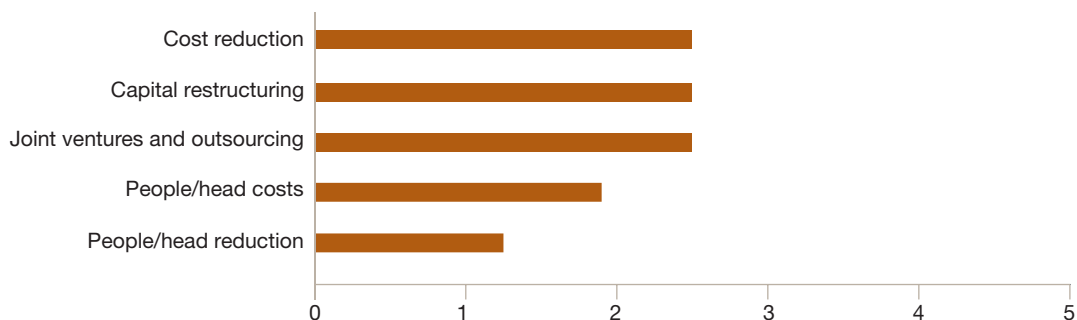
The emphasis on capital restructuring is a manifestation of the desire for efficient financial management but may also be caused by the increasing cost and the relative slow responsiveness of tariff changes. In China, although there are coal-price linkage mechanisms which allow a pass-through of any coal price increase to tariffs, the power utilities are not getting a 100% tariff pass-through.

Asia Figure 4: Is the nature of regulation a facilitator of business development or an impediment?



**Note:** Average responses only. % share of respondents  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

Asia Figure 5: What is driving performance improvement?



**Note:** Average response. Rate where: 5 = very important; 1 = not important  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

## Investment and future challenges

The investment focus of Asian utility companies is strongly geared towards investment to meet the growth in demand and to deliver more efficiency from existing assets and management processes. Nearly two-thirds (63%) of utility company executives report that they have invested recently in new technology in generation and transmission as well as IT business technology (figure 6). The same proportion report investing in new acquisitions or non-domestic businesses. The focus is largely on local power projects than foreign investments. Part of this is investment in generation and transmission for nuclear and renewable energy to address the demand for cleaner generation. In China, for example, more wind power, gas-fired plant and nuclear plants have commenced operation or are planned for construction in the near future.

In the near future, fuel costs are undoubtedly the key challenge due to rising fuel costs. Companies are also concerned about environmental compliance costs. Although utilities are moving to hydropower, nuclear and other renewables in the coming years, coal-fired plant continues to play a dominant role in the generation sectors in Asia. Environmental compliance has assumed an increasingly important role for power utilities as more countries have increased the relevant regulation (figure 7).

With more new power plants coming on-line, balancing demand with increasing supply will become a new challenge to the power utilities. For example, in China, the increase in new power plants has affected the generation that can be made by other power utilities even though demand is catching up and there is still a severe seasonal shortage of power. More individual power plants are expected to generate less in 2007 than previous years due to more competitive power generation facilities available in the region.

Asia Figure 6: In which areas of your business have you invested recently?



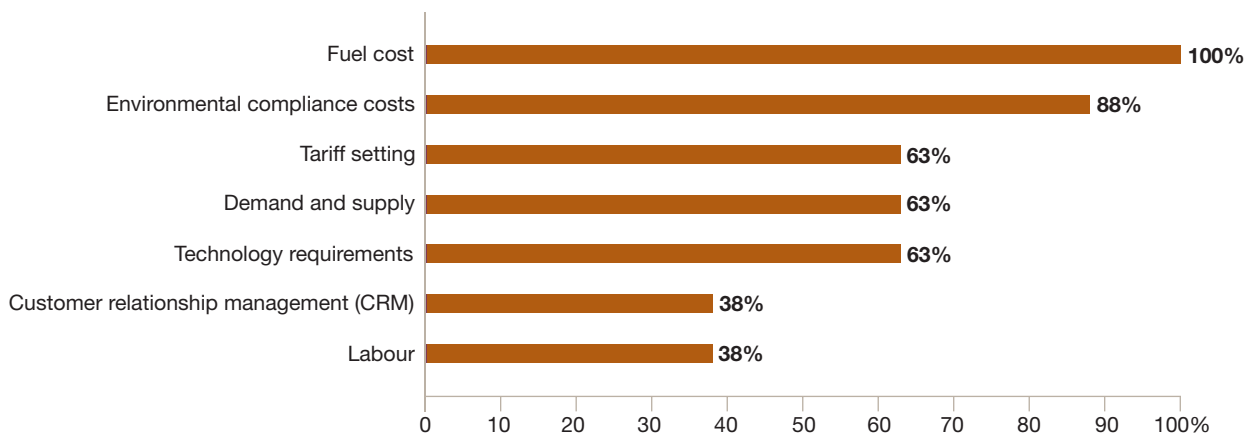
**Note:** Asia responses only. % share of responses

**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

The tariff setting mechanism is critical for operators of power plant. In China, as well as other Asian countries, the guarantee-return tariff policy has already been replaced by an average tariff policy or competitive bidding pricing. These have increased the need for power plants to introduce measures for cost efficiencies in order to maintain competitiveness in the market. Power utilities are giving more attention to more technological advanced generation. In China, for example, two large generation units of 1,000 MW are being built to increase generation efficiency. It is expected more of these units will come on line to replace older, smaller units.

The Asian market is expected to continue its growth and liberalisation, with different speed in different countries. Different methods are being adopted by the utilities in terms of cost cutting, capital restructuring, improved information systems, upgraded technology as well as introducing other types of generation to respond to supply shortages and rising fuel costs. The drive by power utilities to develop sophisticated, modern enterprises provides significant opportunities for investors in such a dynamic region.

Asia Figure 7: **What are the major challenges to your business within the next 12 to 24 months?**



**Note:** Asia responses only. % share of responses

**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

India has the fifth largest electricity sector in the world. The electricity sector will need significant new investments to overcome current shortages and to supply an economy growing at nine to ten per cent a year. Indian utility companies have an installed capacity of 128GW, generate 663TWh of electricity, and serve over 150 million consumers. The combined 2007-12 investment plans of utilities amount to 76.4GW of new generation capacity (US\$71bn), 60,000 km of interstate transmission lines (US\$16bn) and 22GW of additional inter-regional transmission capacity.

Structural reforms in India's electricity industry are gradual but gathering pace. Key milestones include the introduction of IPPs (1991), unbundling of state utilities (initiated in 1996, ongoing, and still pending in some states), independent regulation (1998), open access (2003), and retail competition (phased 2004-09).

The Government of India has taken steps to bring in investment. In thermal, it is bidding out nine projects of 4000MW each, all suitably pre-approved. Those based inland include an offer of captive coal. In hydro, a shelf of pre-feasibility reports has been prepared for projects totalling 50GW. Merchant plants are being encouraged in a recent initiative, with an offer of captive coal blocks, to set up a total capacity of 10GW. In nuclear energy, the US-India Peaceful Atomic Energy Cooperation Act is expected to result in significant new investment in nuclear power plants, potentially of the order of 48-63GW by 2030. In renewable energy, the primary opportunities are in biomass, wind power and small hydro generation. In fact India has emerged as the fourth largest market in wind power, with an installed capacity of 4.4GW.

The private sector presently accounts for only 11% of generation capacity contracted by utilities, but most of the merchant and captive capacity. This proportion is set to increase. All utilities are required to procure new generation capacity through an open competitive bidding process and a number of new investors have shown interest in recent bids. There are no limits on private or foreign ownership in the power sector.

In transmission, about 30% of new investment is expected to come from the private sector, either in joint venture form or as independent licensees. A national power exchange is being set up to provide a platform for voluntary trades. Bilateral trading is growing at 14% per annum, and rates have climbed up to 11-13c/kWh in recent trades. The power exchange is expected to bring in new participants, improve transparency and reduce transaction costs.

In retail supply, liberalisation is scheduled to allow consumers with loads of 1MW and above to be able to choose the source of their electricity in an open competitive market from 2009 onwards. Many states are preparing for this, from drafting the operating rules and setting up settlement systems, to lowering tariffs and improving service quality for these large consumers.

India has about 78 million people who have no electricity. The government has an ambition to achieve universal electrification and meet demand in full by 2012. Rural electrification is being financed on a grant basis, generation and distribution is being deregulated in the notified areas, and supply is to be managed on a local public-private partnership or franchisee approach.

However, primary fuel shortages have slowed development to an extent. Gas-based plants are getting only 64% of their gas requirements. The situation is likely to ease in 2008/09 when new local gas finds are expected to come to market. Power companies already consume 78% of India's coal production, and will, increasingly, have to import coal.

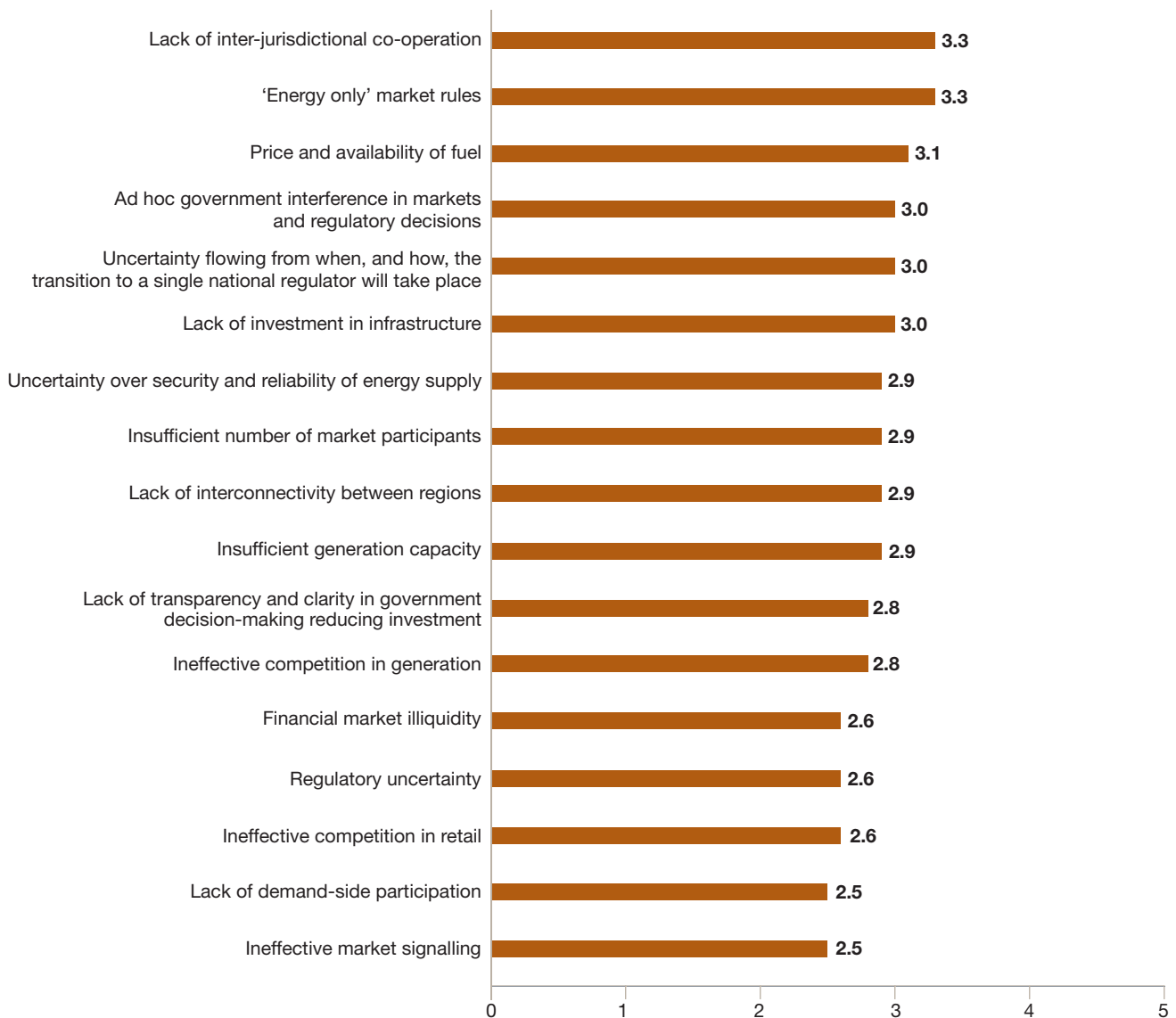
Regional Electricity Markets and cross-border trading are also gaining more attention. India imports electricity from Bhutan and there are plans for interconnection with Nepal and Sri Lanka. Under the BIMSTEC (the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation) energy ministers have agreed to interconnect and enhance power trade among the seven participating nations. Likewise, under SAARC (South Asian Association for Regional Cooperation), the countries of the south Asia region have agreed to pursue the development of a regional grid.

These initiatives provide attractive opportunities for the utilities, investors, technology, fuel and equipment suppliers and other service providers. They are key to meeting the growing social and economic aspirations of the one billion plus people in India and, more broadly, the south Asia region.

# Australia

Australia's electricity and gas markets have evolved from isolated state-based markets into more integrated regional markets. The current focus for market reform is to move from regional markets with limited interconnection in electricity to a national market and to develop the relatively immature gas market.

Australia Figure 1: **What do you see as the current impediments to an efficient national energy market in electricity in Australia?**



**Note:** Average response. Rate where: 5 = significant impediment; 1 = low impediment  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

## Barriers to a national energy market

The two highest rated impediments to an efficient national energy market, according to survey respondents, are a perceived lack of inter-jurisdictional co-operation and 'energy only' market rules. Concerns in these areas reflect a perception that the inconsistent policy and regulatory environment across the various states is having a greater detrimental impact on market efficiency than in previous years. This underscores market participants' views as to the importance of a rapid conclusion to the national reform processes currently being driven by the Ministerial Council on Energy (MCE).

The perceived need for new capacity is becoming a more pressing issue year on year. Survey respondents see 'energy only' market rules as potentially providing inadequate pricing signals to bring on new generation as required, in the absence of any capacity payment mechanism.

Australia's concentration of coal-fired plants, and the necessity for carbon emission reduction, mean that alternative sources of fuel are seen as a big issue in the market. The expectation of greater diversification into gas as a fuel source may lie behind heightened survey concerns regarding price and availability of fuel. Many respondents regard the gas market as immature, particularly on a national basis.

The perceived unpredictability of government interference in markets and regulation, coupled with continued uncertainty flowing from the transition to a single national regulator, is seen as creating unnecessarily high levels of business risk. As a consequence, utility company executives in our survey identify lack of investment in infrastructure as a key risk, particularly in the context of Australia's burgeoning energy demand.

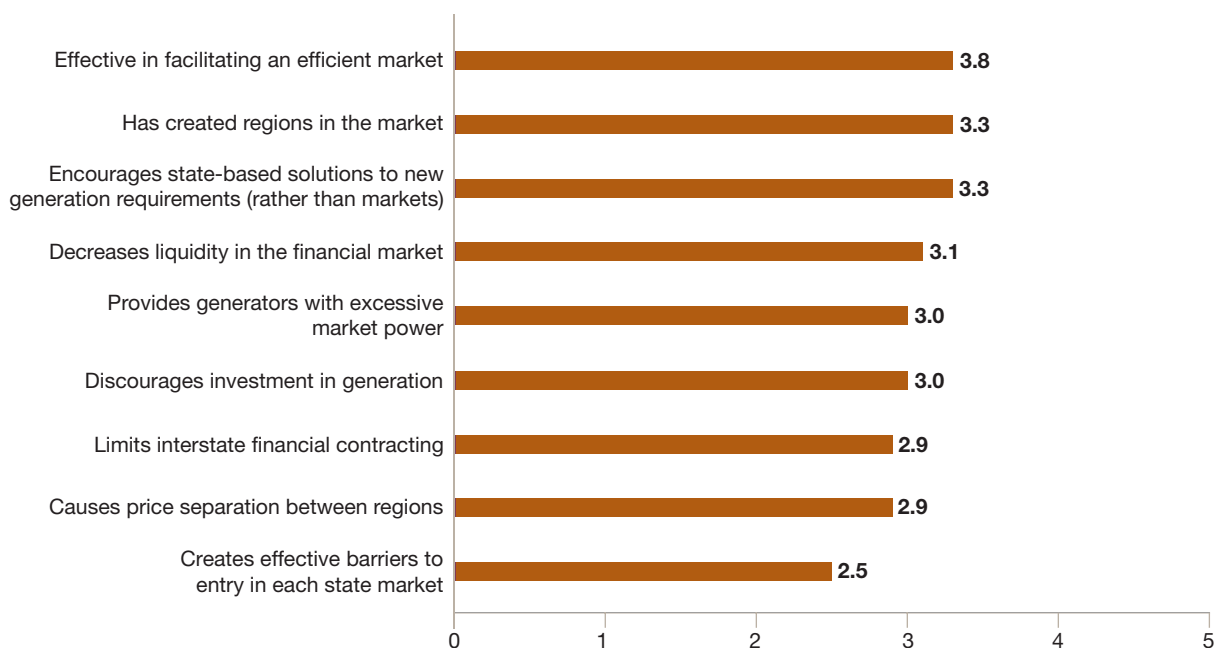
With the majority of states having mature, fully contestable retail markets and Queensland about to implement full retail price contestability (FRC) in 2007, there is a more positive view of the effectiveness of competition in retail this year. The effectiveness of market signalling is also seen to have improved as a result of this fully competitive environment, together with increased liquidity and price transparency.

## Transmission

Three-quarters (76%) of respondents in our survey consider transmission arrangements as effective in facilitating an efficient national market, and this situation is seen as having improved substantially over the past 12 months. This reflects the progress made on transmission matters generally over the past year.

Notwithstanding the above, many respondents still hold a contradictory view that transmission arrangements create regionalised and insular state markets, with intra-state generation solutions rather than a truly efficient national approach.

Australia Figure 2: In your opinion, what has been the impact of the existing transmission infrastructure and regulatory arrangements on the energy market in Australia?



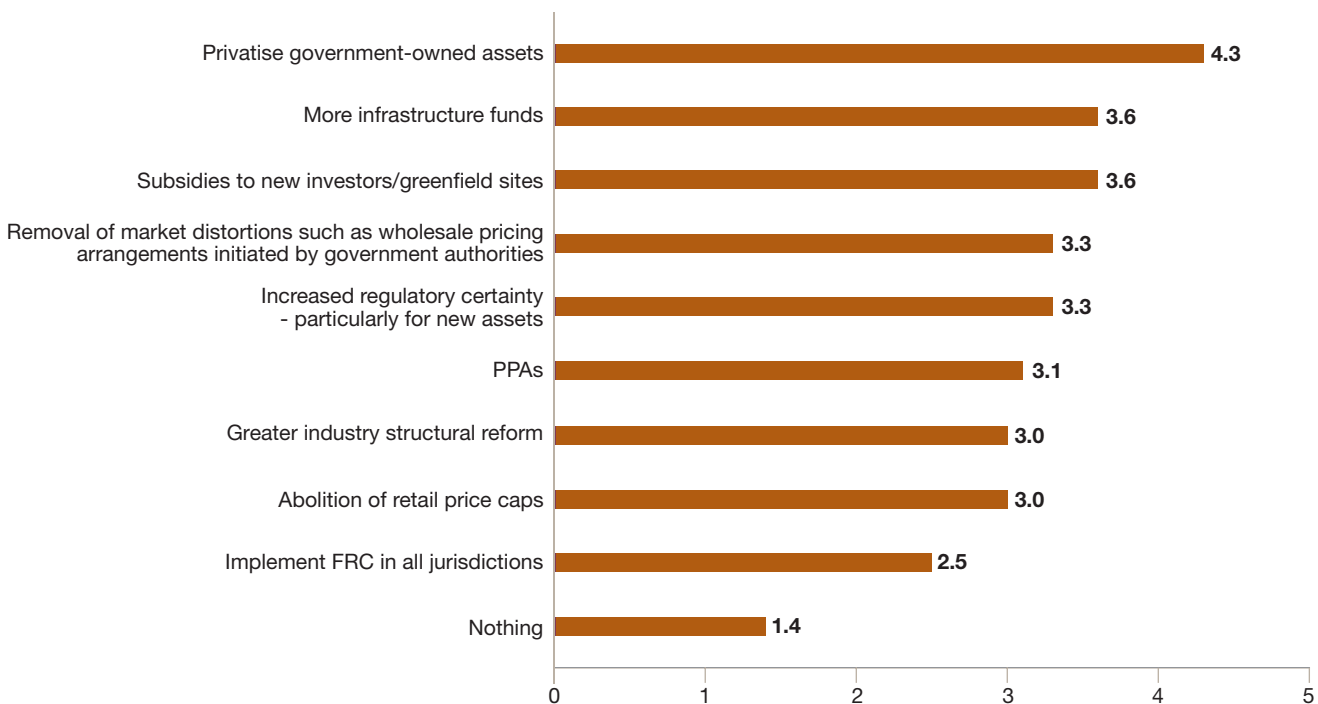
Note: Average response. Rate where: 5 = significant impact; 1 = little impact  
 Source: PricewaterhouseCoopers, Utilities global survey 2007

## Investment in energy infrastructure

A number of states have privatised parts or all of their energy industries over the past decade. This is clearly supported by the market, with calls for the privatisation process to be completed across the country. The substantial increase in the importance given to this point is no doubt inspired heavily by the success of the Queensland energy retailer privatisation programme in the last year.

Availability of capital remains a key issue with a call for more infrastructure funds rating strongly. Such funds however, like all investors, require regulatory certainty, and respondents again rate this as a significant concern. Moving very much to the fore this year are two possible sources of improved certainty – the continued need to remove government-initiated wholesale pricing arrangements, and the provision of subsidies for new generation. The substantially increased focus on wholesale pricing arrangements reflects the importance placed by the market on the New South Wales Government's recently announced programme for the abolition of the Electricity Tariff Equalisation Fund. The dramatic increase in the call for subsidies is concerning, as it calls into question the fundamental effectiveness of a key aspect of Australia's market-based approach.

Australia Figure 3: **What should be done to encourage more investment in energy infrastructure?**



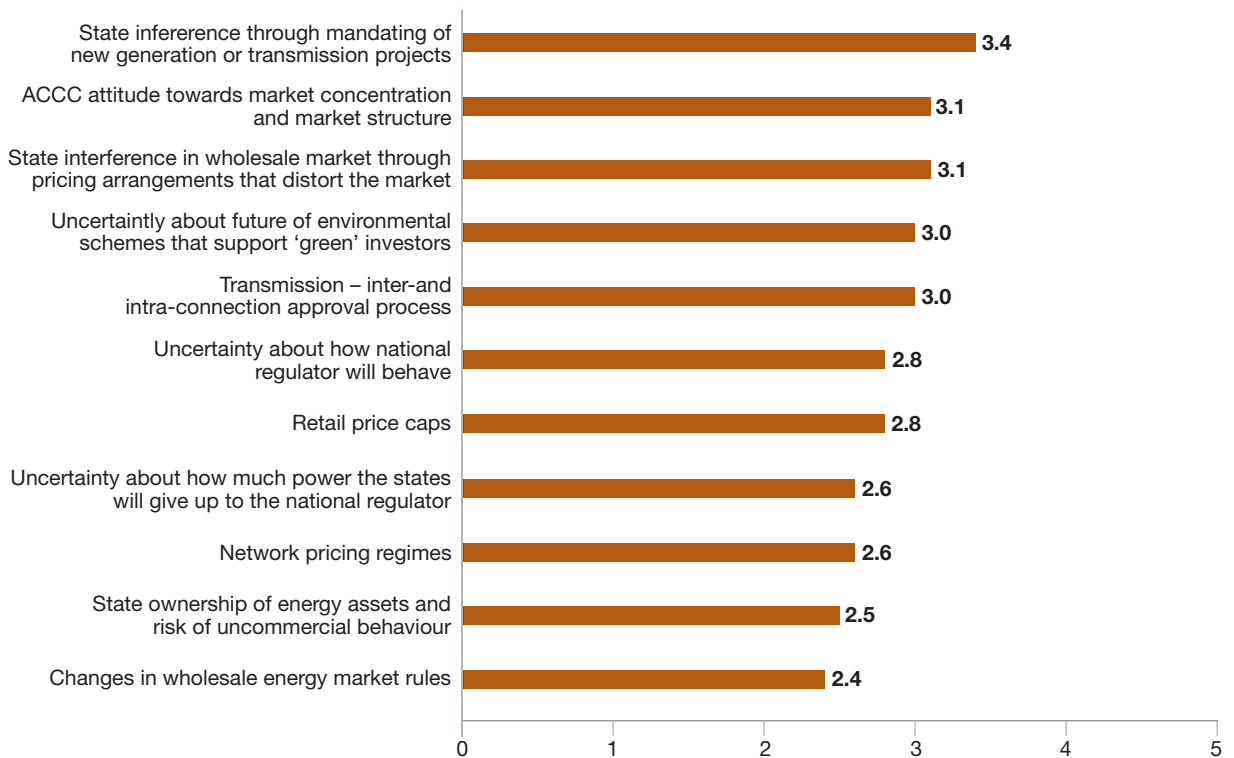
**Note:** Average response. Rate where: 5 = very important; 1 = not important  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

## Regulatory uncertainty

Worryingly, perceptions of increased government interference have leapt to the fore in 2007, manifested through both the mandating of new generation or transmission projects and also wholesale market pricing arrangements. Participants rate the Australian Competition and Consumer Commission's (ACCC) attitudes as a far more important concern in 2007. Given recent decisions, this may reflect the ACCC's views on limits to vertical integration and/or the extent to which horizontal concentration has been permitted.

These issues have relegated uncertainty about the future of environmental schemes from highest impact in 2006 to fourth highest this year. However, the encouraging early progress on future environmental regulation still needs to be followed through with comprehensive and decisive action. Moves toward some form of national carbon scheme remain a key part of this issue.

Australia Figure 4: Which aspects of regulatory uncertainty provide the greatest disincentive to investment in the energy and utilities sector?



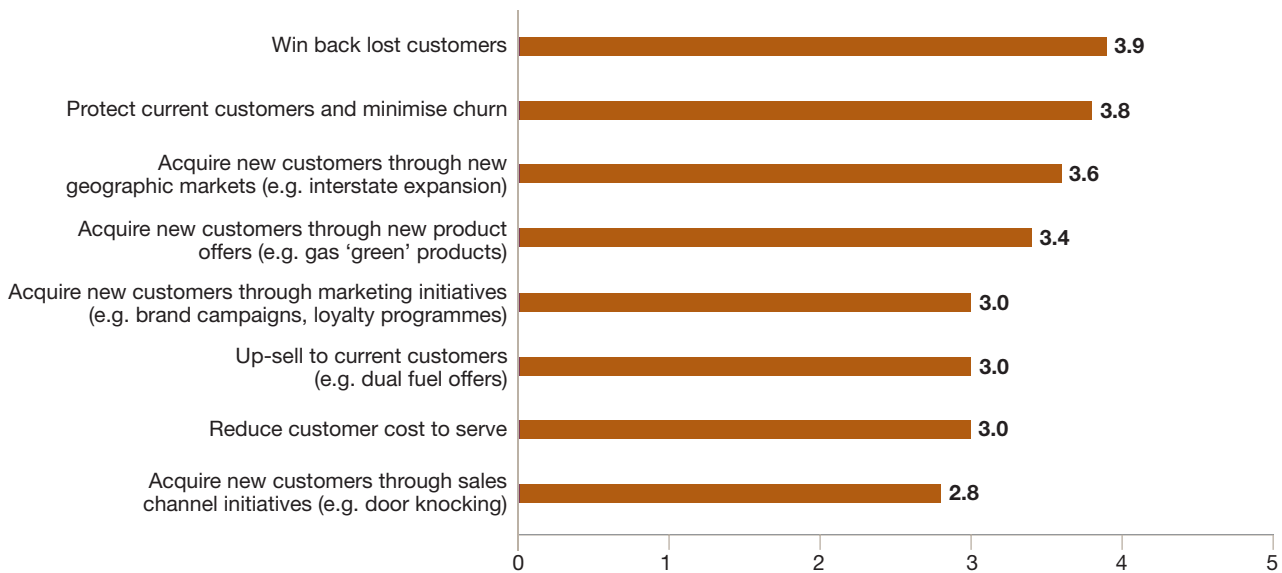
**Note:** Average response. Rate where: 5 = significant impact; 1 = little impact  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

## Retail priorities

This year respondents put the focus on a 'back to basics' retail strategy by concentrating on maintaining their current customer base and minimising churn. In addition, participants now place greater importance on winning back their previously lost customers. Through recent acquisitions, many companies have invested heavily in their customer base and want to ensure the value of their investment is retained.

There has been a decrease in the perceived importance of more sophisticated strategies such as loyalty programmes, channel initiatives and up-selling to current customers, including dual fuel offers. This could reflect a view that, in practice, dual offerings may have proven more costly to deliver than first expected relative to their effectiveness in attracting and retaining customers.

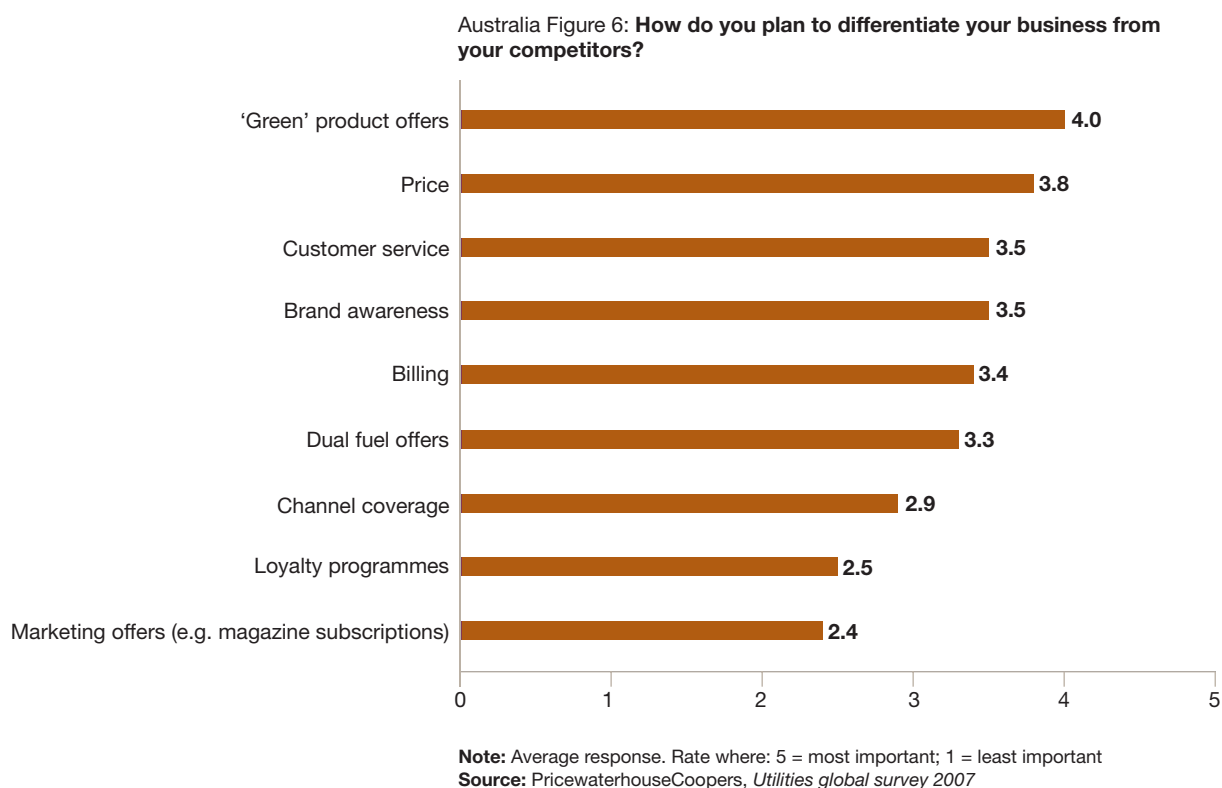
Australia Figure 5: **Which factors are key to your organisation's retail customer strategy?**



**Note:** Average response. Rate where: 5 = very important; 1 = not important  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

## Green differentiation

Despite Australia not having ratified the Kyoto treaty, there are a number of state-based carbon emission reduction and renewable energy schemes in operation, and there is strong focus in the community on reducing the nation's 'carbon footprint'. With the Federal Government currently undertaking a review of a possible national emissions trading scheme, the importance of factoring carbon costs into energy products will become increasingly important. Consequently, providing innovative green products is seen as a potentially effective way for energy providers to differentiate themselves. However, the experience in Australia's fully contestable retail markets, where significant amounts of customer churn have occurred, means that utilities are also mindful of the importance of price as a differentiator.

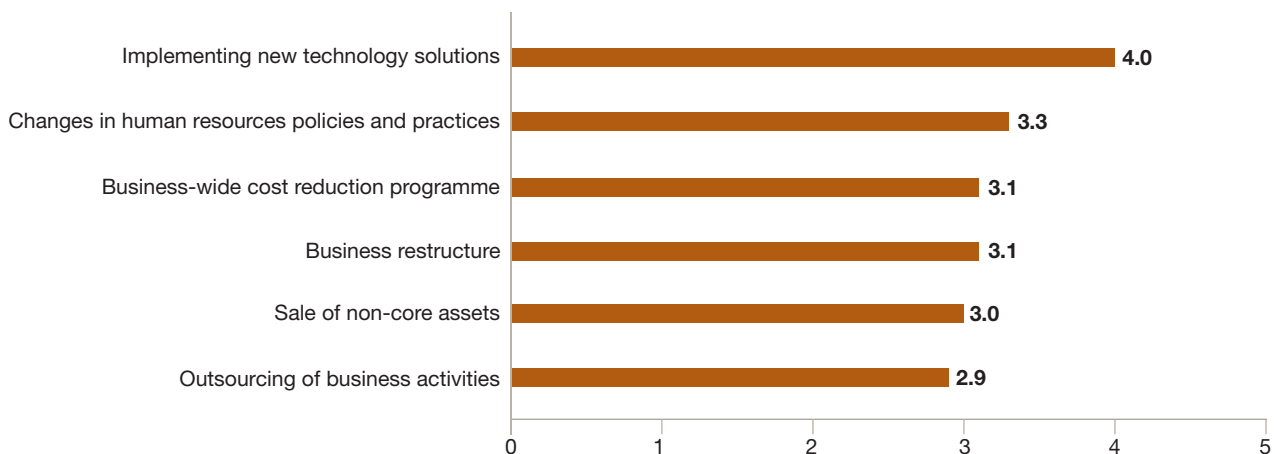


## Improving operational effectiveness

Utility company executives report a significant focus on technology solutions to deliver operational improvement over the next 12-18 months. This focus is understandable given the amount of difficulty organisations can experience with the technology systems that support business processes. This is especially the case in the utilities sector with the changes required to make the most of the opportunities presented by market deregulation, particularly in energy retailing.

Of course, technology solutions are merely an enabler of business processes. The danger of too exclusive a focus on technology is that it can pay insufficient attention to improvements in the business processes the technology is intended to support. Encouragingly, utility company executives attach strong importance to areas such as human resource policy and procedure changes as well as business-wide cost reduction or restructure programmes. These points are all related: cost reduction can be achieved by a thorough analysis of existing processes to highlight the process improvement that is required, in addition to the implementation of improved HR policies (particularly in performance management), supported by appropriate IT and business restructure initiatives.

Australia Figure 7: **What activities are you planning over the next 12-18 months to improve the operational effectiveness of your business?**



**Note:** Average response. Rate where: 5 = very important; 1 = not important

**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

Human resource constraints

The Australian economy, and in particular the energy sector, is continuing to experience exceptional growth. This has led to concerns over the availability of human resources being even greater than in previous years. Companies face the problem of finding the most efficient use of these limited resources. Part of this process is to optimise current operating procedures. Attracting and retaining the right combination of skills and experience requires flexible career arrangements and competitive remuneration packages.

Australia Figure 8: Given an increasing scarcity of resources, which areas are of greatest concern to you?

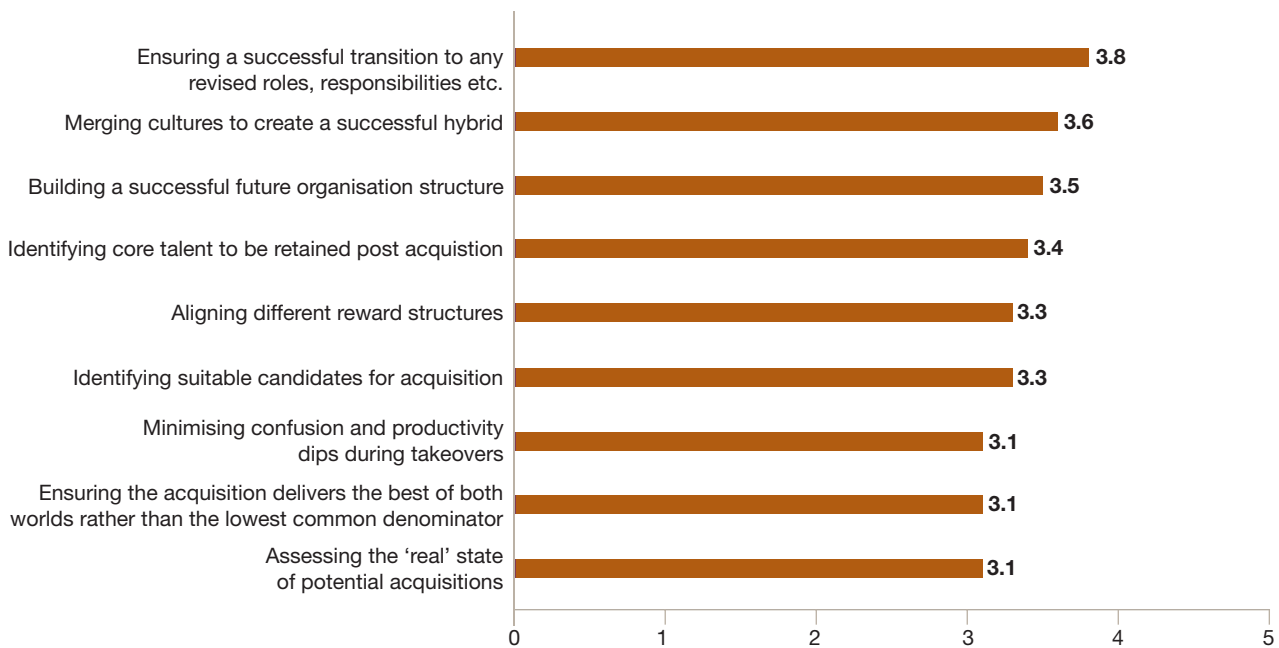


Note: Average response. Rate where: 5 = most concern; 1 = least concern  
 Source: PricewaterhouseCoopers, Utilities global survey 2007

## Delivering M&A benefits

The industry is continuing to experience a large amount of M&A activity which includes the recent sale of the Queensland Government-owned retail assets to the private sector. Additionally, investment activity continues, particularly in new generation. Utility company executives are mindful of the difficulties associated with realising the benefits of any acquisition strategy (figure 8). A number of the highly rated responses focus on the four key challenges that companies need to address if they are to achieve their strategic intent: aligning the organisational structure; aligning performance measurement systems; aligning HR; and aligning culture. Reflecting the issue of resource scarcity, participants also place greater importance on identifying the core talent that needs to be retained post-acquisition.

Australia Figure 9: In the face of increasing investment and change of ownership activities, which of the following factors are most likely to be key challenges?



**Note:** Average response. Rate where: 5 = significant challenge; 1 = no challenge  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

The Chinese economy continues to prosper and achieve double-digit growth. First quarter GDP growth in 2007 was 11.1%. Strong power demand growth has led to significant spending on generation and transmission infrastructure in the last few years. In 2006 alone, as much as 70,000MW of new generation capacity was scheduled to commence. With more and more generation facilities commencing operations, the main challenge is now less in generation and more in transmission as networks struggle to handle higher levels of supply and demand.

Coal accounts for around 70% of current generation. Its dominant role is not expected to reduce in the foreseeable future. In response to environmental concerns, the central government is promoting generation from sources such as hydropower, gas and other renewables. The government has also provided tariff incentives for power generators who install desulphurisation equipment.

Hydropower provides just under a quarter of power generation. The number of hydropower projects has significantly increased in the past few years. Apart from the Three Gorges Project, which will be the world's largest hydropower project upon completion, there are many other hydropower projects under construction. By 2010, hydro is expected to account for 23% of generation. However, environmental concerns have caused construction to stop on some projects. Other gas-fired, nuclear power and other renewable plants are also due to come onstream. But they will continue to be a tiny portion of the total generation facilities in China in the foreseeable future. Gas, nuclear and renewable energy are projected to be less than eight per cent of generation by 2010.

Power industry reform is still at the early stages of development. Existing power generation, transmission and distribution businesses are dominated by five generation groups and two grid companies. All of them are ultimately controlled by the state. Foreign investment has occurred but is limited due to the absence of guaranteed returns and uncertainty in the tariff system. There is no consistent legal framework for foreign investment. China's first Energy Law, set to be enacted in 2008, may provide a consistent framework for the national power market as a whole.

Currently, a significant majority of generation assets are still owned by local investors. In the power market, the central government closely monitors the development of a power pooling system with various provinces under pilot-testing. Further market reforms are expected to take place in the future. With the majority of power plants fuelled by coal, tariffs in recent years have been indexed to coal prices in response to the pressure from generation companies.

With tariff uncertainty and the absence of protection from a guaranteed return, cost control has been critical for power utilities. Fuel costs remain the major challenge, although there has been some relief as a result of the implementation of coal price indexation.



“Climate change comes on top of an already long list of immense change challenges facing the region”

## Middle East & Africa

The Middle East and Africa are regions with huge contrasts as well as similarities. In Africa there is the immense task of extending infrastructure and capacity to bring power to the hundreds of millions who don't have access to electricity. In the Middle East, there is the challenge of price reforms in mass markets that have become used to underpricing and subsidised power. War and conflict are problems that affect countries in both regions.

Faced with immediately pressing problems, the climate change issues that are moving to the top of the agenda in other regions are further down the list of priorities for utility company executives in the Middle East and Africa. For example, respondents from these regions are the least likely to see the encouragement of renewable energy as an important development in their power market in the coming period. Only 51% foresee renewable energy having a 'significant impact' or 'high impact' compared with 89% of respondents globally. Nonetheless, all the survey respondents from these regions expect wind and nuclear power to deliver an increasing proportion of their market's energy consumption.

Security of supply and efficiency, though, are key issues for Middle Eastern and African utility companies. Ninety per cent of respondents highlighted security of supply as having a 'significant or high impact' and 70% viewed the need to gain greater efficiency from conventional technology in the same light. Both of these are higher than the 61% and 59% ratings given to these issues by respondents globally. However, respondents in the two regions were, in general, less optimistic than their counterparts in other regions on the potential for achieving energy savings with the main focus on the potential from commercial end- users.

# Middle East

Liberalisation in power and water generation is continuing in the Middle East, particularly in the Gulf Cooperation Council (GCC) countries. More than 80% of the survey respondents describe the present state of ownership as 'part privatisation' with fewer than 20% in 'monopoly' positions. This underscores the efforts of the governments in the region to provide the local and foreign private sector with an opportunity to participate in the establishment and operation of utility service projects to improve the sector's quality. As in the developed economies in 'the West', governments are moving from being a provider of services to becoming a regulator.

## Liberalisation and regulation

More than 80% of those questioned believe that the present market situation in the electricity sector will change to enable further involvement of the private sector within the near future. Expectations are lower among water utilities with only half of respondents predicting such change in the near future. A third of those questioned believe that the electricity market will liberalise within the next three years and half expect liberalisation within the next five years. This assessment underlines the velocity of change in the Middle East region. Again, expectations are lower in the water sector with half saying the market will not liberalise within the foreseeable future.

The electricity and related water sector has traditionally been the domain of the government in the Middle East. However, there has been a concerted policy initiative during the last years towards privatisation of the electricity and water sector. As government makes the transition from being an electricity and water provider towards having a regulatory role, it normally sets up an Authority for Electricity and Water Regulation as an independent public interest regulator. These authorities have been given significant powers to regulate the electricity and water sector, including the power to grant licences and exemptions, as well as withdraw them.

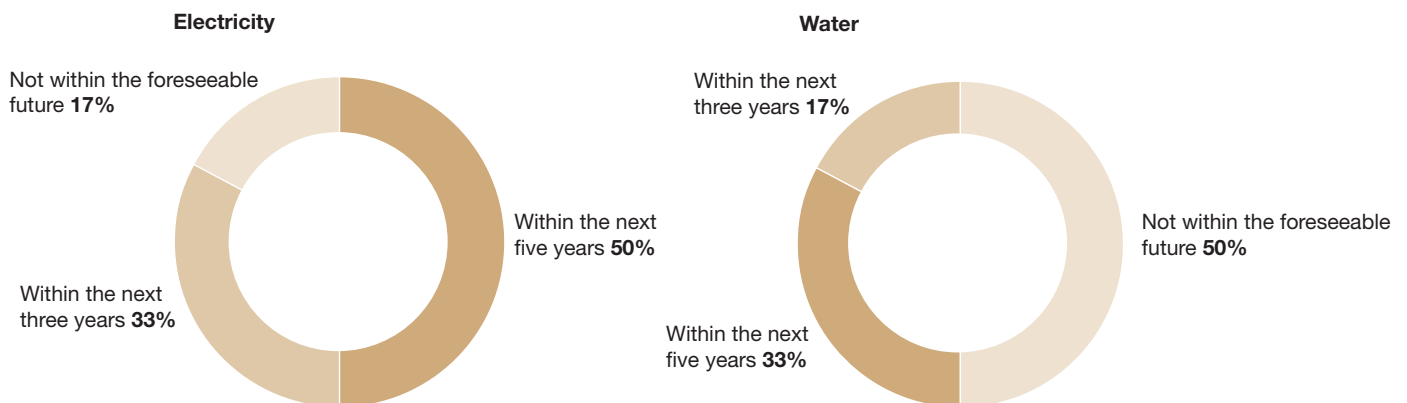
Two-thirds of those questioned expect an increase in regulation over the next three years and no respondents expect any reduction in regulation. However, all respondents in our survey are unanimously convinced that the nature of regulation facilitates business development in the Middle East region. In order to fulfil governmental targets and to correct failures of the market certain regulated activities are thought to be necessary. These activities mainly include:

- generation, transmission, distribution, export, import or supply of electricity and water;
- operation of central despatch system, development and operation of international connections;
- regulation of functions assigned to the national power and water procurement companies.

## Regional grid initiatives

Utility company executives are optimistic about the prospects for a regional electricity grid. Two thirds of those questioned believe it is likely that their country will link into a such a grid. In the Middle East region two key infrastructure projects are in development. Contracts have been awarded recently for Phase 1 of the GCC power grid, which connects the transmission grids of Bahrain, Kuwait, Qatar and Saudi Arabia. Movement on the GCC grid is also spurring investment in national power grids, notably in the United Arab Emirates, in order to prepare them for cross-border trading and to ensure that all parts of the region can benefit from increased trade in electricity. In addition, the Dolphin Project seeks to create a gas grid in the Middle East region with current plans to deliver a US\$10bn scheme to pipe gas from Qatar's plentiful North Dome reserves to Abu Dhabi and on to Dubai, Oman and possibly Pakistan.

Middle East Figure 1: **Within what time period do you believe your market will liberalise?**

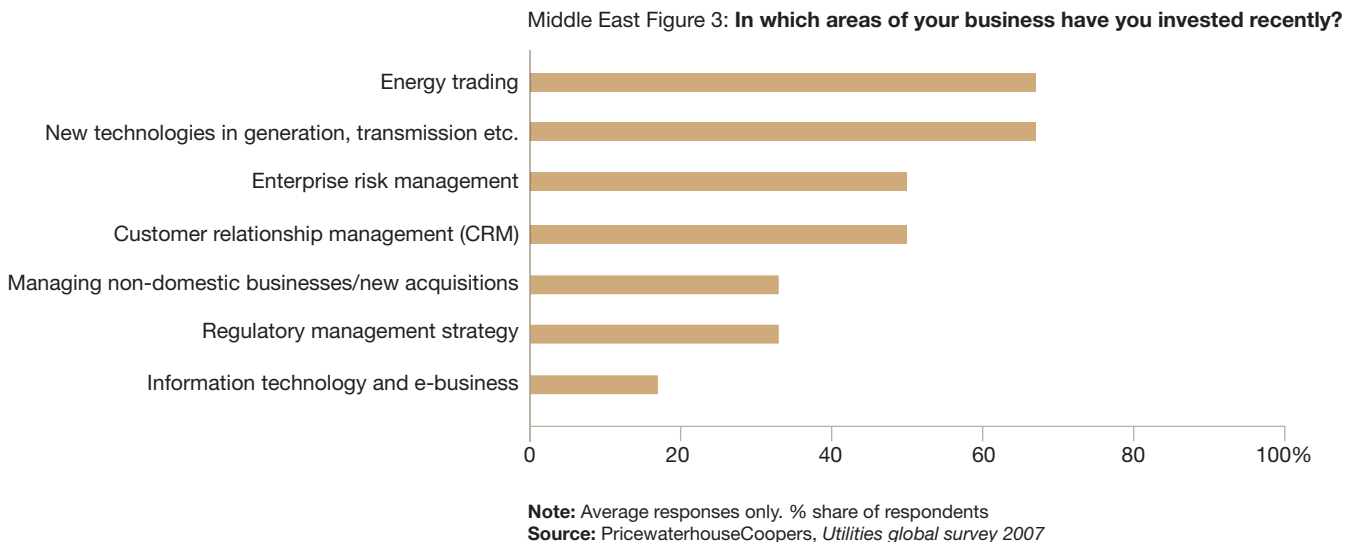
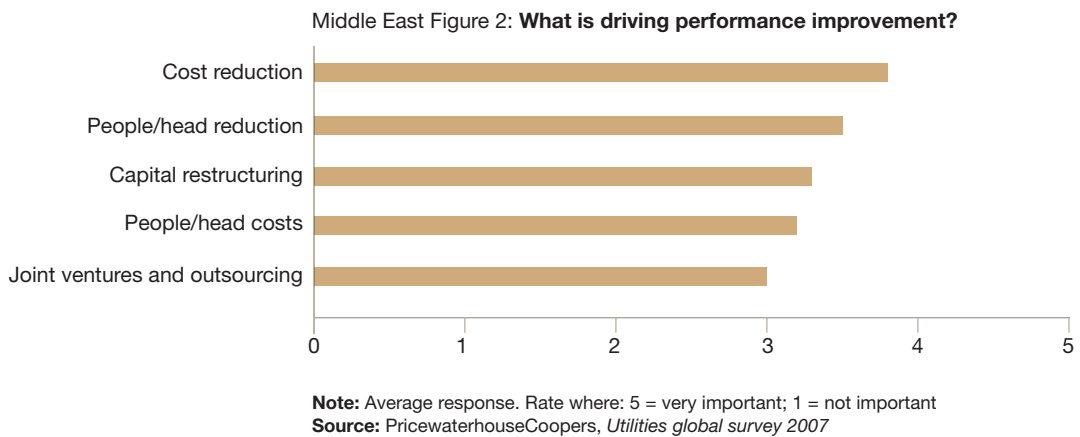


**Note:** Middle East responses only. Total % share of responses  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

## Performance improvement

Utility leaders in the Middle East are convinced that cost reduction is one of the most important performance drivers in the region (figure 2). Benchmarks with other regions will become more and more important. Joint ventures and outsourcing are also being used to secure improvement.

New technologies in generation and transmission together with a focus on energy trading are reported as the areas in which utility companies in the Middle East have invested most in recent years.



# Africa

Utility companies face a myriad of challenges in the African continent. It is a vast land area and a diverse continent. Rapid economic growth and consequent growth in demand for power is taking place in many countries. In a few countries conflict and instability continue to blight civic and economic life and, in some cases, result in negative growth. Huge numbers of people and communities remain without access to power or basic infrastructure. Many countries are rich in mineral, fossil and renewable fuel sources but these do not always match with end-markets or the finance to construct infrastructure.

## The capacity challenge

Economic growth is creating an optimistic, even bullish, mood in many countries. In turn, the need for capacity in generation, transmission and distribution is immense. In South Africa alone, there is an estimated need to build 40,000 MW of new generation in the next five years. Of course, this comes as many other parts of the developed and developing world face similar challenges. Africa is not always first in the queue to compete for the scarce resources and skills that are needed. As well as funding and skills constraints, there are also funding complications – foreign exchange, cross-border complexity, and uncertain legal frameworks compound the challenge.

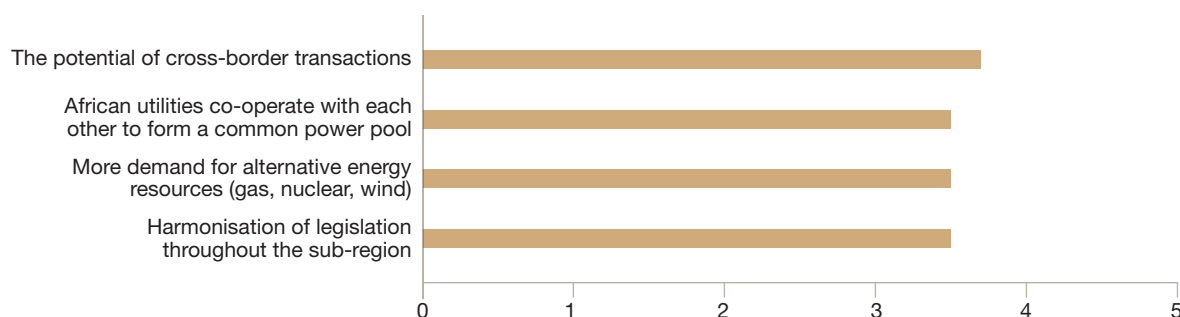
Respondents to our survey expect to see increased investment in new generation capacity, recommissioning of mothballed plant and greater use of continent-wide resources. In respect of the latter, the government-led New Partnership for Africa's Development (NEPAD) is a far-reaching strategic programme that includes important power ambitions. Our survey respondents remain uncertain just how far some of this continent-wide ambition can be achieved.

At present, while optimistic, they stop short of rating these outcomes as 'highly likely' (figure 1). One factor in this is that many companies need to grapple with the capacity and infrastructure challenges within their own countries first before focusing on pan-African issues.

## Cleaner fuels

A similar dynamic is at work when it comes to sustainability and climate change initiatives. There is very high awareness of these issues across the continent but governments and other players are facing a range of immediately pressing concerns on the social and economic front and some parts of the region face violent conflict. The continent, though, has abundant potential hydropower growth and survey respondents see this as having a medium impact on the future energy mix (figure 2). The proposed Grand Inga project in western Congo, for example, could become the largest generating facility in Africa and provide the possibility for a pan-African electricity exporting project.

Africa Figure 1: In keeping with the NEPAD principles of connecting Africa, how likely is the following?



**Note:** Average response. Rate where: 5 = very likely; 1 = unlikely  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

Survey respondents also see a role for nuclear where, for example in South Africa, the possible expansion of the country's nuclear capacity is a topic of discussion. At present, there is one nuclear plant in the Western Cape, an area that is very far distant from the coalfields further east that currently fuel 95% of the country's generation. Together, Eskom and the South African Government, hope to reduce this to 70%. As well as expansion in nuclear and hydro to reduce coal's share of the fuel mix, Eskom is conducting two pre-feasibility studies into the use of LNG.

## Restructuring and regulation

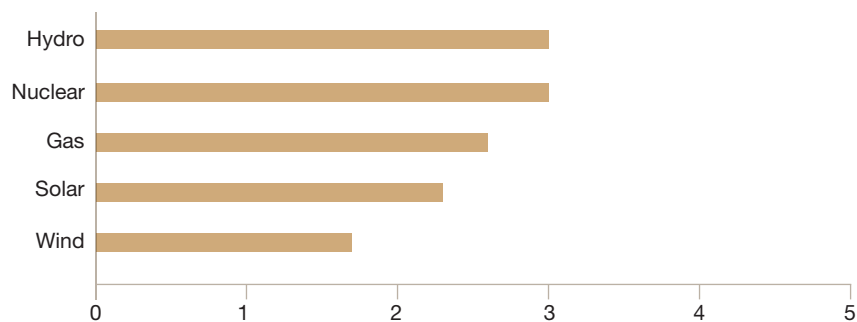
In general, there has not been the same push from governments to restructure power markets in Africa that has taken place in other regions. Respondents to our survey point out that such restructuring will be important if the industry is to meet challenges such as extending and maintaining power networks (figure 3).

What is happening is that utility companies themselves are restructuring along commercial lines in order to increase their competitiveness, attract finance and provide customers with better service and value for money. Regulation plays an important role in tariff setting and companies are being subject to close regulatory scrutiny of their cost structure as part of the tariff process.

## Empowerment initiatives

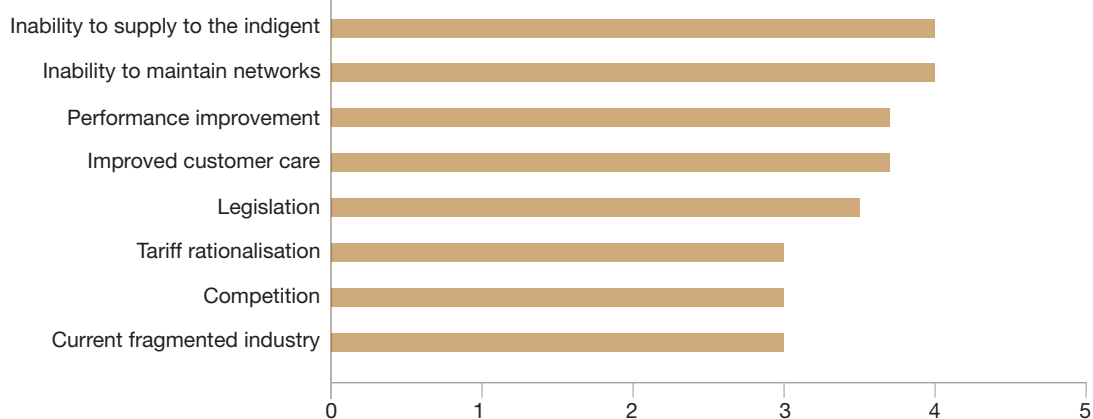
In South Africa, the programme of Black Economic Empowerment (BEE) that promotes indigenous ownership of businesses took legislative effect in February 2007. While not affecting Eskom, which is state-owned, the move will have an effect on future generation growth which the government wants to see come from the private sector. Utility company executives that we interviewed believe BEE will spur changes in ownership and management control in companies and stimulate M&A activity.

Africa Figure 2: **Which of the following alternative sustainable energy resources, or mix of resources, do you believe will affect competitive electricity pricing in your region in the foreseeable future?**



**Note:** Average response. Rate where: 5 = high impact; 1 = low impact  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

Africa Figure 3: **What are the main drivers for the restructuring of the generation and distribution markets?**



**Note:** Average response. Rate where: 5 = strong driver; 1 = weak driver  
**Source:** PricewaterhouseCoopers, *Utilities global survey 2007*

# Looking ahead

It is clear that the climate of thinking and action around cleaner power, renewables and energy efficiency is shifting fast. Improved supply and distribution efficiency; fuel switching from coal to gas; nuclear power; renewable heat and power (hydropower, solar, wind, geothermal and bioenergy); combined heat and power; and early applications of carbon capture and storage all feature, to a greater or lesser extent, in the strategies of the power utility sector.

However, the big question is the extent and pace of the actual shift that will take place in the energy mix. The Intergovernmental Panel on Climate Change (IPCC) observes that: “the widespread diffusion of low-carbon technologies may take many decades, even if early investments in these technologies are made attractive. Initial estimates show that returning global energy-related CO<sub>2</sub> emissions to 2005 levels by 2030 would require a large shift in the pattern of investment” (Summary for Policymakers, IPCC Fourth Assessment Report, Working Group III, May 2007).

Economic signals and incentives will be critical for utility companies to be able to make this ‘large shift’. An effective carbon price signal will need to exist across all regions, crucially covering high-emitting and high-growth countries such as the US, India and China. We have seen that only a third of European utility executives we surveyed expect the price of carbon to rise above €20 in the 2008-12 trading period. This compares with a price of €37.50 (US\$50) that estimates say is needed if, for example, nuclear power was to rise from the current 16% share of generation in 2005 to an 18% share by 2030 or for renewables to rise from 18% to a 30-35% share in the same time period (ibid, IPCC). A similar carbon price signal is estimated as necessary for carbon capture and storage technologies to make an impact (see p6). Thus, future policy decisions on the scope and ambition of carbon pricing will play a central part in determining the pace of change.

Energy efficiency will also play a key role. Again economic incentives will be critical. They are largely already present for both utility companies and end-users, except where companies operate in markets where they can pass on the cost of inefficiency through higher pricing. It is clear, for example, that companies in energy-intensive industries are already highly active, making moves such as integrating upstream into conventional or new energy technology, and reducing the energy intensity of their industrial processes.

The emphasis on energy saving and efficiency is equally evident in the responses from utility company executives in our survey. Such an emphasis is likely to be a strong theme in the sector in the years ahead. Improved energy efficiency is not only a route to making plant more economic and helping supply/demand balances, but it also offers opportunities to build closer ties with end-users. Indeed, 72% of respondents from companies with supply businesses in our survey are investing in demand-side efficiency measures

Interacting with all of these issues is the other big concern – security of supply. Security of supply worries are intensifying and will play a major part in the calculations of policy makers as well as utility companies. The interplay of security of supply, economic growth and policies towards climate change is a particular concern for the Chinese and Indian governments, for example, where energy supply is largely fossil-fuel based. Will there also be a trade-off between measures for securing long-term energy supplies and improving competition in gas and electricity markets? What will be the balance between open, unbundled markets versus long-term contracts and verticalisation to safeguard primary energy flows?

Deals and restructuring will continue apace in the power utilities sector. European players are likely to continue to provide a lot of the deal momentum underpinned by strong financials, fragmented home markets and an awakening appetite for international growth. Our survey also indicates that value chain repositioning and regulatory encouragement of unbundling will have an important influence on deals. The imperative of consolidation in fragmented markets will also drive deal activity in the US where the direction of the post-PUHCA regulatory climate, at the state level, will have a major deal influence. Across all regions, shortage of skills and ageing workforces are becoming not only an operational but also a strategic issue. More acquisitions will be directly driven by the need to acquire skills and expertise or, indirectly, by the advantages that becoming a bigger utility with presence in many territories confers for attracting talent.

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## Methodology

*Energy and efficiency: the changing power climate* is based on research conducted between January-February 2007 with 119 senior executives from 114 utility companies across 44 countries. Research covered the four major regions of Europe, the Americas, Asia Pacific, Middle East and Africa. The majority of utility participants were Senior Vice-Presidents and Presidents, CEOs or other senior managers. No more than two interviews were taken from any individual company, although multiple respondents were taken from some countries. The survey sample is comprised of power and gas utilities (suppliers, transmission companies, traders or generators) that have developed a broad range of interests in a number of complementary utility sectors or other regions.

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