

## 2010 Australian Smart Grid Study

A comprehensive view of the strategies, priorities,  
and challenges for Smart Grid adoption in Australia

Based on interviews with senior executives in Australia's energy distributors.



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# FOREWORD

Smart Grid technology is changing the face of the electricity industry. By adopting these technologies, energy markets around the world can deliver significant benefits to all participants in the energy supply chain – generators, distributors, retailers and consumers. The pace of change is going to be phenomenal and exciting, and not dissimilar to what we experienced with the telecommunications industry at the latter part of the last century.

Globally, Logica has a significant footprint in the energy sector and is partnering with a number of progressive energy companies in rolling out their Smart Grid strategies and solutions. Our involvement with the Australian energy market began over 15 years ago, and today we remain at the heart of this market, providing new solutions on both the grid and consumer sides of the energy supply chain. Our track record in delivery and as a thought leader gives Logica a unique position to drive the Smart Grid debate forward. The increasing activity in the sector globally is being replicated in Australia. All players in the energy sector, new and existing, need to ensure that we realise the maximum benefit of the many exciting developments made possible by Smart Grid technologies.

To do this we need to understand the lessons learnt so far and the challenges we need to tackle in the future to execute the Smart Grid vision for Australia. To fulfil this need Logica went to the experts – the industry leaders charged with delivering the advantages of a Smart Grid to Australia. Each participant company offered one or more interviewees who gave a series of views directly relevant to their own business.

This survey therefore reflects the collective vision of the individual electricity network businesses, not Logica's views or the opinions of a strategy group. The ideas expressed sometimes align with published industry views, but also sometimes diverge. Thirteen major electricity generation, transmission and distribution businesses in Australia participated in the survey. We would like to thank the executives from the following companies for their time and views that helped us put this survey together:

- ActewAGL
- Aurora Energy
- Country Energy
- ENERGEX
- EnergyAustralia
- Ergon Energy
- ETSA Utilities
- Hydro Tasmania
- Integral Energy
- Jemena
- SP AusNet
- Western Power
- SPARQ Solutions



Colin Holgate  
CEO, Logica Asia Pacific



# WHAT IS A SMART GRID?

Smart Grids are important for many reasons. Without a Smart Grid, we will not be able to implement the energy management systems that will be needed if we are to reduce carbon emissions and provide power to Australia's growing population. But what exactly is a "Smart Grid"? There is no standard definition of the term, but there is a general consensus on what a Smart Grid is and what benefits it can deliver.

The electricity network, or grid, as we know it today is little changed from Thomas Edison's time. Electricity is generated, distributed, sold and consumed over a network of poles and wires that have no function beyond that task. At the same time, digital communications networks have come into being that possess a high degree of intelligence and which can process, store and deliver vast amounts of information. The Smart Grid brings the "dumb" electricity network and the "smart" communications network together.

The electricity network needs to be much smarter to handle the increasing demands being placed on it – the need to address climate change, the rise of feed-in tariffs from renewable energy and co-generation, the implementation of smart meters, the importance of improved load management, the need to balance the charging of electric vehicles (EVs), etc. Australian industry group ENA (Energy Networks Association), in its national strategy for smart electricity networks (September 2010), gives examples of Smart Grid attributes:

- integrated communications infrastructure that enables near real-time, two-way exchanges of information and power
- smarter measurement devices (including advanced metering infrastructure) that record and communicate more detailed information about energy usage
- sensors and monitoring systems throughout the network that keep a check on the flow of energy in the system and the performance of the network's assets
- automatic controls that detect and repair network problems and provide self-healing solutions
- advanced switches and cables that improve network performance
- IT systems with integrated applications and data analysis
- other technologies, devices and application such as consumers' own energy management systems, renewable energy sources, EVs and energy storage technologies.





# EXECUTIVE SUMMARY

This report is based on an in-depth survey carried out by Logica consultants with key executives from thirteen leading organisations in the energy sector in Australia in late 2010. The study focuses on the current maturity of thinking, organisation and capabilities in this sector. How advanced are they in their Smart Grid strategy and roll out? What challenges are they encountering? How are they engaging with consumers?

Logica undertook a similar study in Australia twelve months before this one, allowing for comparisons in attitudes and behaviour towards the Smart Grid in the intervening period. As might be expected, things have changed quite a bit in that short time, because the understanding of Smart Grid technology and how to implement it is changing so rapidly.

The transition to the Smart Grid represents a generational shift in the way electricity is distributed, sold and consumed. The key feature of the Smart Grid is its much greater interactivity – information and energy no longer flow in one direction, but are shunted all around the network. All phases of the energy supply chain are affected – generation, distribution, retail and consumption. All of them have vastly more information about energy flows, energy usage and energy costs than was ever previously possible. How this information is distributed and used are the key issues of Smart Grid implementation.

Respondents to this survey were all asked a series of identical questions. In many cases more than one individual from the same organisation was surveyed. Their views are outlined in detail in the second section of this report. There were many differences of opinion, but some common themes emerge. The bottom line is that Smart Grid technologies, and the new business practices made possible by those technologies, are shaking up the electricity distribution and retail industries in a way not seen in the lifetime of anyone now working in the industry.

This means that individuals and organisations are facing unique challenges. We do know we are moving towards a future that will contain vastly more information, vastly greater interaction between the links in the energy supply chain, and vastly more business opportunities at all levels.

A number of key findings emerge from the research:

### The Smart Grid will not happen without consumer involvement

There is now an increased awareness of the importance of the customer in the development of the Smart Grid. This represents a significant change from last year, when Smart Grid pilots and thinking tended to be more technologically oriented and focused on the grid.

This is a positive development. The whole purpose of the electricity network is to deliver power to commercial and residential consumers, but in the past the distributors left customer engagement to retailers. In too many cases this attitude was initially carried through to the Smart Grid, but the realisation soon hit that in the world of the Smart Grid, the customer is king.

Much of the impetus in Australia for this change of thinking came about because of the lessons learnt from the Victorian smart meter rollout, which attracted substantial criticism. The bad press focusing primarily on cost rather than the benefits of energy management has heightened consumer awareness, more negatively than positively. There are also many new players who have developed Smart Grid devices and services which are challenging a utility's traditional relationship with the consumer. The more progressive of them have realised that success in the era of the Smart Grid will come through increased consumer engagement, not through a continuation of past practices.

This is evident in many findings in the report, through discussions of focus groups, and from comments around segmentation models and value propositions. These market-led approaches are integral to many of the pilots now being undertaken, in the many comments made about the importance of involving the customer, and in the way distributors are closely aligning consumers with their Smart Grid planning.

A significant proportion of the Smart Grid benefits will ultimately be driven by consumers.

### The Smart Grid is happening now

The Smart Grid is not some vague prediction for the future. It is happening, here in Australia, right now and has moved forward dramatically since the 2009 study. It is, however, an evolution. It will evolve incrementally, project by project, as technologies like smart meters are adopted, as practices like feed-in tariffs are implemented, as distributors develop smarter infrastructure, and as the electricity network and the communications network become more integrated.

In a huge change from last year, every distributor interviewed for this report has now developed a Smart Grid strategy and implementing Smart Grid pilots, many of them quite substantial. The announcement by the Australian Government in June 2010 of the \$100 million Smart Grid, Smart City project, to be undertaken by a consortium led by EnergyAustralia and largely based in the NSW city of Newcastle, is one of the most advanced and large-scale Smart Grid implementations in the world. It has been designed as a very large scale pilot, with details of its implementation and the lessons learned to be shared with the entire industry.

There is also substantial activity, not covered in this report, from ESCOs (Energy Service Companies), which are starting to take advantage of new technologies like embedded generation, building control systems and IHDs (In Home Displays) to provide a range of energy-based products and services to consumers. This is one of the effects of Smart Grid technology – no longer is the utility the only game in town. Consumers are being given the technology to manage their own energy consumption, and the role of the traditional electricity distributor and retailer will be challenged. Distributors predict new entrants with new business models and innovative thinking will shake up the traditional retail network.

The rate of change in Smart Grid technology shows no sign of easing. Not only is the Smart Grid happening now, but the pace at which it will take hold will accelerate over the coming years. New devices, technologies and ideas are springing up on almost a weekly basis. Some are trivial, some will go nowhere, but all are part of the Smart Grid revolution.

#### There is certainty about the Smart Grid, but uncertainty about its direction

There is no doubt about the reality of the Smart Grid. All distributors are preparing for it. But their strategies and their responses still do reflect many uncertainties. Some of this uncertainty is due to the slow pace of policy makers and regulators who need to provide a framework with appropriate incentives to make the Smart Grid a reality sooner rather than later.

Distributors are facing a difficult situation: a combination of massive and rapid technological change, great uncertainty, and an imperative to get it right. That is a mixture that breeds caution, but in a competitive environment they know that they cannot be too cautious. They need to watch their peers who, may well be competitors in the future, they need to test out new technologies and

business models, and they need to monitor technological and commercial developments from a range of suppliers in an environment where standards are not drafted and regulatory changes not defined. And they need to do all that while delivering and improving their day to day services.

As the Smart Grid evolves, new certainties will evolve with it – but so will new challenges. The technological and competitive environment will not stabilise, at least not in the planning timeframe of today's strategists. They will need to deal with a decade or more of profound change – there will be no return to “normal”. Uncertainty is the new certainty.

#### Australia is neither a leader nor a laggard

Respondents to the survey are tracking international developments. They see that the USA is the leader in consumer technology, that the Europeans are ahead in integrating renewable energy into the grid, and that the Chinese are doing impressive things with infrastructure. But Australia is “right up there” compared to international counterparts, with existing pilots and roll outs plus the **Smart Grid**, **Smart City** initiative seen as international firsts.

There is a feeling that Australia is doing quite well in integrating the various aspects of the Smart Grid. But there is also a feeling that Australia's successes are neither well known internationally, nor appreciated at home outside of the industry.

It is still early days in Smart Grid development. Australia can be reasonably pleased with its position, and especially pleased with the progress it has made in the last twelve months. There are encouraging signs for the future development of Smart Grid technology in Australia. We have a long way to go with many challenges ahead of us, but we can be encouraged and proud with the progress already made.



From planning to activity, certainties are evolving from the uncertainty

# 1 SURVEY FRAMEWORK

This section outlines the questions that were asked of the survey participants. With the exception of Section B, all questions are qualitative. The body of the report follows the survey framework, with a section on responses to each question.

## Section A

1. Describe your organisation's Smart Grid strategy. Would you say you have one?
2. What do you see as the key challenges in relation to Smart Grids? E.g. business case development, consumer, IT, regulatory, etc.
3. Do you see the AER (Australian Energy Regulator) moving towards developing incentives for Smart Grid development?
4. What investment do you think needs to be made for your organisation's Smart Grid strategy? Do you have an overall budget for Smart Grid? If yes, what?
5. Which of your Smart Grid projects do you have funding for now? E.g. pilots?
6. What evaluation criteria do you use to determine which projects are prioritised?
7. How will your organisation be structured to undertake the Smart Grid evolution?
8. What are you doing about consumer engagement?
9. Have you considered KPIs regarding moving towards the development of a Smart Grid? If so, what are they?
10. Do you have an overall Smart Grid timeline and program plan or timelines for individual projects?
11. Has the recent award of the Smart Grid, Smart City project to EnergyAustralia affected your Smart Grid plans in any way? If so, how? How are you planning to exploit its findings?
12. Are you looking internationally for guidance and advice? Since last time what have you captured and utilised from international sources?

13. Who do you see as the key technology players in the Smart Grid market?
14. If you had a retail business or if you do have one now, do you see Smart Grids predominately as an opportunity or a threat?
15. Do you have firm and funded plans to test any HAN/IHD value propositions in the next 12 months?
16. Do you have a view of how Australia's progress in Smart Grid deployment compares to other countries in North America or Europe? What are your observations?

## Section B

Rate your progress on the following key Smart Grid projects

(1 = Haven't started yet, 5 = Complete.)

### Customer and employee infrastructure

- Smart meters (meter and wireless technologies)
- Field force automation
- Air conditioning load control
- Flexible tariffs, including time of use tariffs

### Information management

- Business intelligence for Smart Grids
- Meter data management for National Smart Metering Program
- Communications for Smart Grids
- Security certification

### Infrastructure management

- Asset management
- Distribution management systems
- Outage management systems
- Smart substations and self-healing networks
- Beyond the sub-station: power sensing dynamic power models

### Next generation technology

- Impact of micro-generation
- Impact of renewable energy sources
- Impact of electric vehicles

Summing up, looking back over the last 12 months, what have you progressed in relation to:

- Developing a Smart Grid strategy
- Developing a business case
- Consumer engagement
- Solving major roadblocks and challenges
- Internal reorganisation
- Pilots
- Other areas

Analysis of responses to this last question has been integrated into those for Section A.



## 2 RESPONSES

### 2.1 Strategy

**Q1. Describe your organisation's Smart Grid strategy. Would you say you have one?**

In a key shift from last year's report where only three responders said they had a Smart Grid strategy, in 2010 all organisations interviewed say they have a Smart Grid strategy, and are now executing this strategy, in many cases with a series of pilots and trials. The strategies are also in most cases based on technology more than the development of new business models, particularly those incorporating a greater understanding of the importance of consumer engagement (see 2.8 below).

It is testament to the importance of Smart Grid development in Australia that has seen in the last 12 months, organisations rapidly go from thinking about the implications of Smart Grids to having a strategy endorsed by senior management to constructing roadmaps and timelines. On top of these advancements, they have put in place many pilots and trials that support the development of the Smart Grid business case.

For most organisations Smart Grid has now moved from hype to reality. Several organisations have been undertaking aspects of what might be considered 'smart' for some time now. But these projects have been disparate, rather than part of a coherent strategy. The biggest change over the last twelve months has been the development of a more formalised Smart Grid strategy amongst distributors – "we now have some clarity around what we are trying to achieve," said one respondent.

The implementation of the Smart Grid, Smart City project (see 2.11 below) is seen as a great boost to Smart Grid development in Australia. It has allowed both the direct participants in the project and others who will benefit from its experience the ability to better define their Smart Grid strategies.

There is a general consensus that the Smart Grid is the way of the future. All utilities surveyed see major benefits from the Smart Grid in areas such as increased reliability, greater automation, better demand response, and lower distribution loss.

*"Our strategy is ultimately about network investment and preparing the network for improvement, automation, etc. It's also about providing customer choice."*

But there is uncertainty in some quarters over the best strategy to adopt. "We certainly have a strategy," says one project manager. "But it's hard to understand the right path to take. There are too many options – it would be foolhardy to try to pick winners now when there are so many unknowns."

In many cases Smart Grid strategies have evolved from previously existing programs in areas such as demand management. The Smart Grid does not come into being overnight – it is an evolutionary process. There has been a significant move toward greater efficiency and a better return on investment in recent years – many see the Smart Grid as a continuation of that trend.

*"We are looking at things like telecommunications, networking sensing, and direct load control. We want to utilise smart meter technology and demand side and supply side management, using the next generation of intelligent devices. The key is to deliver a Smart Grid strategy that provides customer value that exceeds the cost of implementation."*

Some have commented that an unexpected benefit of developing a Smart Grid strategy has been the ability to reposition power engineering as an exciting and innovative career opportunity and attract young talent into an industry that faces issues with an ageing workforce.

*"Smart Grids have absolutely made the industry sexy. Universities have been seeing declines in power engineering and now that is changing, people are more attracted to our industry based on Smart Grids. We are no longer perceived as the dinosaur industry."*





## 2.2 Key challenges

Q2. What do you see as the key challenges in relation to Smart Grids? E.g. business case development, consumer, IT, regulatory, etc.

Not surprisingly, operators see many challenges in the implementation of the Smart Grid. There are technological challenges, regulatory challenges and business challenges. All the respondents agree that Smart Grid implementation is one of the most difficult things the industry has ever confronted, with challenges on many fronts.

In the interviews conducted for this report, a number of recurrent themes emerged:

### Setting and managing customer expectations

This is one of the biggest changes from last year's survey. There is a significantly greater understanding about the importance of engaging with customers. There is an increased realisation, especially after the Victorian smart meter experience, that Smart Grid technology cannot be introduced without getting customers onside. This comes through in many aspects of the survey (see 2.8 below).

"Customer engagement is the key. We have developed a strong program into the local community, so we feel we can build on that. New Smart Grid initiatives have been worked into the customer engagement process, and we have built a communication and consulting practice."

### Developing a Smart Grid business case

More than one respondent spoke of the difficulty of developing a business case for the Smart Grid, particularly on the consumer side. Everyone believes it to be the way of the future, but there is still uncertainty about how to justify speculative expenditure with no clear and immediate benefit. Hence the requirement to fund pilots and trials to build the business case going forward. This issue though was much less important than it was last year, when many respondents were struggling with the parameters which would allow them to develop a business case. There is a feeling this will become easier as more information becomes available about Smart Grids.

"We don't have sufficient data. Going to the board and saying 'trust me' on this is difficult. But we all agree with a basic strategy of reducing cost and making the asset work harder. We can't increase the size of the network infrastructure cake, and we're not going to be able to bill more, so increased integration is the smarter way of doing things."

### Information management

A key aspect of the Smart Grid is that it will generate vast amounts of data about network performance and customer usage. There are significant concerns about how this information will be managed. How will the Smart Grid integrate with new communications technologies like the NBN? Will information be managed locally or centrally? How will the information be structured and accessed?

"The IT component is an enormous challenge. How do you manage the vast amount of data? How distributed do you want the intelligence? How do you interface all the components and manage all the connections?"

### The immaturity of many technologies and standards

There are concerns that Smart Grid technology is as yet unproven, or that new technologies like electric vehicles (EVs) will throw up challenges that have no existing solutions. There are few standards and a lack of a clear roadmap. There is some concern that products are taking too long to get to market – distributors hear the sales pitch from the vendor and then find they can't yet buy the product.

"There is no common view of what a Smart Grid strategy looks like. There are no international standards and no-one is implementing the same solutions."

There needs to be a consensus so we can have the same standards and vendors."

### Integration with the NBN

Many respondents mentioned the difficulty of doing too much before the NBN is implemented, because so much will depend upon it.

"Nationally, the synergy between the NBN and smart meter roll out needs to happen. The NBN end point is installed on the end of fibre optics and needs to be powered. Installing the power device and changing the meter at the same time would be a nice synergy."

### 2.3 Role of the Australian Energy Regulator

Q3. Do you see the AER (Australian Energy Regulator) moving towards developing incentives for Smart Grid development?

The AER is part of the ACCC (Australian Competition and Consumer Commission), an Australian Government statutory authority. The AER regulates the wholesale electricity market and is responsible for the economic regulation of the electricity transmission and distribution networks in the National Electricity Market (NEM).

Generally speaking, the survey respondents do not believe the AER is doing enough to facilitate the move to a Smart Grid, or to encourage innovation generally. But nor do some necessarily believe it is the AER's role to offer incentives, though it should have a "facilitation and enabling" role, as one respondent put it. There were distinct views on the AER's role and no consensus.

Most noted that the AER is not structured for innovation and is therefore not driving Smart Grid development. The AER is still stuck in the world of long cycle time, not in a world where innovation is necessary and plans change quickly. Distributors' incentives are still based on return on capital. But, for many the AER is seen as important in driving Smart Grid success.

There was little outright criticism of the AER, but not a lot of praise either. There is a feeling that its role is poorly defined and unsuited to responding to the many changes that Smart Grids will cause. One respondent asked how the AER can ignore the Smart Grid. "I would be stunned if they weren't preparing for the Smart Grid, and for a shift in their model as well. How can the industry as a whole move without them?"

"The AER needs to try and look at cheaper alternatives to capital upgrades. It needs to look at efficiency gains with smart networks. An important aspect is demand side response – you can receive a return for that. Models are morphing – they need to look at alternatives."

"I question the current regulatory environment. If you had a commercial case you would do it anyway. The problem is where you have fragmentation. The AER is not the problem as the industry cannot articulate what it wants to do."

We need to engage with the market institutions and regulators to make some real changes



## 2.4 Investment

Q4. What investment do you think needs to be made for your organisation's Smart Grid strategy? Do you have an overall budget for Smart Grid? If yes, what?

Most utilities have developed a business case, or at least cost projections, for the implementation of Smart Grid technologies. Some have specific budgets, and those that do not are still making Smart Grid investments as part of the usual R&D process. All have budgets for pilots and trials to support the business case for additional funding.

This is a key difference from last year's survey – most companies then were still only thinking about it. This is a very positive development. It shows that the Smart Grid is no longer regarded as some distant event, but that it is happening now.

Because there is no standardised way of defining Smart Grid development across various distributors, it is impossible to come up with a firm figure on total Smart Grid investment in Australia. But the figure would run into hundreds of millions of dollars over the next year. One major distributor said around 10 per cent of its budget was being invested in its Smart Grid strategy, and that the figure would grow larger than that in future years. We believe that figure to be typical.

"We are not explicitly funded for the Smart Grid. We are pulling smaller projects together to ensure there is alignment. We'll spend nearly \$100 million over the next year."

"We have a small budget to focus on pilots and trials in key focus areas. These trials will be used to determine business cases for the next AER determination. We are currently building a fibre network as well as remote control switches to improve reliability."

"We've done the overall assessment – we'll spend \$700 million over the next 15 years. That's how far our business case extends. But we probably won't see the benefits for ten years. Every utility will be different in that respect."

Our approach is we start small, test and move onto bigger projects



## 2.5 Funding and pilots

### Q5. Which of your Smart Grid projects do you have funding for now e.g. pilots?

Respondents are funding a wide range of Smart Grid projects and pilots. There is little commonality – some are based around smart meters, some are based around demand management, some are based around integration with the NBN or other aspects of the communications infrastructure. EnergyAustralia's Smart Grid, Smart City project is the largest and most high profile project (see 2.11 below), but there are many others. Some have cut back because of this project, which they see as essentially conducting a large scale pilot on behalf of the whole industry.

Some pilots have been discontinued because it was realised they were not yielding results. But other pilots have been completed, or are complete enough that lessons can be drawn from them. Some projects mentioned (in addition to Smart Grid, Smart Cities) are included below. Note that this is not a definitive list, but representative of the types of trials being conducted.

#### ActewAGL

Has completed a HAN trial. Continuing with the implementation of a multi-utility smart metering pilot with gas, water and electricity over the next two years. Have results from the initial trial and currently analysing the data to determine where the best returns are.

#### Aurora Energy

A number of major pilots underway – connecting with the NBN for which ten more towns scheduled for 2011, improving network reliability, improved customer information. Intending to use its own broadband connections if the NBN is not available. Many of these are summarised in Aurora's Distribution System Planning Report.

[www.auroraenergy.com.au/pdf/electricity\\_network/tariffs/distribution\\_system\\_planning\\_report\\_2010.pdf](http://www.auroraenergy.com.au/pdf/electricity_network/tariffs/distribution_system_planning_report_2010.pdf)

#### Country Energy

Pilots in Armidale, Bega and Port Macquarie, which include testing many elements of the Smart Grid as well as customer HANs. Over 10,000 customers currently involved in two IN (Intelligent Network) communities. Comprehensive information available at

[www.intelligentnetwork.com.au](http://www.intelligentnetwork.com.au)

#### ENERGEX

A number of customer trials, such as a "peak rate rewards trial" and "cool change" air conditioner management in various Brisbane suburbs as well as working with Ergon on a trial of 1600 In Home Displays (IHDs). Focus on energy conservation and demand management. Use of the fibre network, UbiNet. Feeder of the Future project with Ergon.

[www.energex.com.au/trial/index.html](http://www.energex.com.au/trial/index.html)

#### Ergon Energy

Extensive work in Townsville, Queensland's largest regional city. Focusing on distribution automation, protection upgrades and smart meter trials. Also trials in Cairns and Toowoomba, and working on funding for a larger trial. Work on Magnetic Island and the Townsville suburbs of Rocky Springs and Riverway with Solar Cities and NBN. Extensive involvement with the Solar Cities program. Continuing with a Feeder of the Future project. Looking at ways to use Google PowerMeter to reduce the cost of implementation.

[www.ergon.com.au/energy-conservation/demand-management/electricity-demand-trials](http://www.ergon.com.au/energy-conservation/demand-management/electricity-demand-trials)

#### ETSA Utilities

Significant demand management trial running over two years in Adelaide, using network sensing to trigger an automated demand response. Also pilots with three EVs, HANs, and trialling alternative communications. Work with NBN integration in Adelaide, with ETSA doing some of the NBN installation.

#### Hydro Tasmania

Pilot project in the Bass Strait Islands with 2000 people. Includes solar PV feed-in, interval metering (AMI) and field devices for provision of demand-side response

and improved power system quality), load shedding. Three year project. Focus on demand-side response, reduction of diesel fuels and increased renewables. IHD and HAN trials in 1600 homes in early 2011.

[www.hydro.com.au/about-us/news/2008-06/king-island-solar-installation-granted-720000-australian-government-funding](http://www.hydro.com.au/about-us/news/2008-06/king-island-solar-installation-granted-720000-australian-government-funding)

#### Integral Energy

Trials around fault detection, peak load reduction, smart meters, network losses. Trialling an energy efficiency portal for consumers to compare usage with neighbours. Conducting a major solar energy trial in the Sydney suburb of Blacktown, and various customer pricing trials. Part of the Smart Cities trial with EnergyAustralia.

[www.integral.com.au/wps/wcm/connect/IntegralEnergy/NSW/NSW+Homepage/environmentNav/Blacktown+Solar+City/](http://www.integral.com.au/wps/wcm/connect/IntegralEnergy/NSW/NSW+Homepage/environmentNav/Blacktown+Solar+City/)

#### Jemena

Completed a ground fault neutraliser pilot with United Energy Distribution. Further work with outage verification and restoration. Smart metering and HAN trials to develop power quality information, to be followed by work in information management. Trialling IEC 61850 substation automation project.

#### SP AusNet

Has been very involved with Victoria's smart meter rollout. Trials continue with WiMAX technology. Substantial feeder automation work in locating faults and isolating faults, which continues. Trials with plug-in hybrid electric vehicles (PHEVs). Trialling Broadband over Power Line (BPL).

#### Western Power

Pilots involving demand management and 10,000 smart meters, including the communications infrastructure. Looking at direct load control and PV saturation from previous air conditioning trials, and time of use tariffs, IHDs and HANs. Also completing a segmentation analysis. Now 98 per cent through the trial, with results due by end of year. Supporting the Smart Cities trial with EnergyAustralia.

[www.westernpower.com.au/networkprojects/Smart\\_grid.html](http://www.westernpower.com.au/networkprojects/Smart_grid.html)



## 2.6 Evaluation criteria

Q6. What evaluation criteria do you use to determine which projects are prioritised?

Utilities use a wide range of evaluation criteria for Smart Grid projects, but most of them have to do with some sort of return on investment or cost-benefit analysis. Some say that they are still struggling to develop meaningful criteria, but an increasing number are based on consumer-based criteria.

The best way to indicate the variety of responses is to quote some of them verbatim:

“That’s a good question. That’s work that needs to be done now. We’ll probably look at a range of criteria, based on best probable business case and return on investment.”

“Demand management is our main driver. We look at the desired outcome and smart ways of achieving it. You have to build a platform and use the technologies, and look at benefits as well as costs.”

“Our key criteria are around providing operational efficiencies – improving reliability and power quality, and the integration of renewable and distributed energy resources.”

“We haven’t done this yet. We will look at ROI, risk, does it solve a greater network problem, does it fit with our strategic direction, etc. Smart metering was chosen first because of the range of experiences it would give us. The composition of every element is now customer-based.”

“We’ll use a range of criteria. Which area of the network would be most effective – which feeders were the worst performing – which substations have the greatest load constraint, etc. Find out what is measurable and look for bad areas.”

“We want the business case to be successful so choose an area that needs to be fixed. The roll-out may actually be a series of pilots.”

“Key criteria for us is whether the initiative will allow us to defer network capital investment and provide the customer with a better service.”



## 2.7 Organisation structure

### Q7. How will your organisation be structured to undertake the Smart Grid evolution?

There is widespread understanding that corporate structures will need to change if they haven't already. Last year's survey found that many distributors were beginning to implement structural changes, many of which are now completed or well underway.

Generally speaking, those respondents who have a separate Smart Grid project team say that approach is working well. These teams have grown rapidly over the last 12 months. There is now a view that more change may be required in years to come as the Smart Grid project team returns to the mainstream of the business. The question becomes how to integrate the innovation captured in the separate team into the business DNA.

One organisation undertook a restructure around 18 months ago which it says is working well, though it will continue to evolve. "We had a separate team for Smart Grids but we'll only know it's been successful when it's completely integrated into the business. Eventually it needs to be business driven rather than a separate program." There was general agreement that constant restructuring is now a way of life.

"We are continually restructuring, as our focus changes from business development to asset management."

"It's generally accepted that we need to change our structure – you can't have a separate IT group and engineering group and bring them together and have a Smart Grid group. We need to get our electrical people IT savvy, especially in networking for example. Our trials all have multi-skilled teams."

As mentioned previously, Smart Grids are allowing organisations to attract new talent and address the ageing workforce problem. One organisation has had success in pairing up young engineers with more experienced team members.

"We have a good culture now. In the past, DBs were tarnished as mundane engineering was perceived as boring. Now we are in the exciting part of the business. We are the good news story and people flock to that so we are getting loads of people wanting to work in our division. It's contagious. It's an exciting time and we're using it to transform our business and attract talent."

We'll only know if it's been successful when Smart Grids are completely integrated into the business

## 2.8 Consumer engagement

### Q8. What are you doing about consumer engagement?

The biggest change from last year's survey is a much stronger focus on the consumer. This change of focus comes through the responses to this question, but in many other areas. So marked is the change that it is no exaggeration to say that 2010 marks "the year of the customer" in Australia's Smart Grid maturity. This is an important development.

Initial trials and experiences have made most utilities realise that the customer is king, and that the Smart Grid cannot happen, and cannot realise its potential, without satisfactory customer engagement. Also, many respondents realise that customer expectations and knowledge are changing quickly – "the customer is moving faster than we are," said one.

Many respondents admitted that they have not done sufficient work in consumer engagement, but say this is changing now. A consistent theme is that of wide variation in consumer expectation. Consumer engagement is a double-edged sword – it is fine to try to give customers what they want, but that means that many different types of customer expectations must be met.

This is a major change from what has happened in the past, where all customers received exactly the same product and level of service.

"Customers are always different – we have to tailor what we do to suit different needs. Lots of different choices and lifestyles need to be considered. Some customers have no time or desire to look at IHDs, others want incredible amounts of information they can study in great detail."

A common theme is customer education. One distributor has initiated a large scale customer education program, door knocking electricity consumers about discounted products and the installation of PV solar systems, and an energy efficiency call centre.

"Engagement of customers is a must until the maturity of products improves and 'set and forge' autonomous functions can be delivered to a customer."

Many of the respondents spoke about customer segmentation as a first step to understanding them. One made the point that most customers are "naturally apathetic" and need strong price messages to make them change their behaviour. Consumer engagement may be important, but many customers need to be encouraged to be aware of and to take advantage of Smart Grid functionality.

"One thing we've learnt is that desk based research can go out the window. You have to engage directly with the customer. We thought we would provide them with an In Home Display and that was it. But one size doesn't fit all. Customers want what fits their lifestyle. Customers are now included in the scope of everything we do."

Many different methods have been employed to increase customer engagement:

- Reward based tariffs
- "Community engagement" programs
- Market research surveys into customer behaviour
- Focus groups on what customers want
- Creation of customer manager role.

"We think we are more customer-centric than other utilities. We look at the applications and their relationship with customer behaviour and customer requirements. We absolutely think that community engagement is the most important factor in making the Smart Grid successful."

"The introduction of smart meters has been deferred, but we are running rewards based tariff trials which contain numerous programs on customer education. We also conduct surveys to understand customer behaviour across all customer segments."

One comment made the point that it is not necessarily Smart Grid technology that is needed to change customer behaviour:

"You don't need a Smart Grid to save energy. Just change consumer behaviour to be more conscious of what they do around the home and incentivise them to do it."

Whilst still early days, there have been some important lessons learnt in consumer engagement. These include the operational challenges of installing technology in someone's home, consumer's unpredictability to take up new energy management methods despite extensive research studies, the fact that no two consumers are the same, and the need to work jointly with retailers to come up with a consistent and comprehensive engagement plan encompassing all communication methods.

The increased understanding of consumer engagement is an important step in the increased maturity of distributor attitudes towards the Smart Grid. It is no longer seen only as a technological challenge, but also as a consumer-based opportunity. There are many challenges there as well, but the realisation that the consumer experience is a major aspect of what the Smart Grid has to offer marks a significant development.

For Smart Grids to deliver benefits, consumers have to be engaged – what do they want to pay for?

## 2.9 KPIs

Q9. Have you considered KPIs regarding moving towards the development of a Smart Grid? If so, what are they?

Most of the respondents had not developed specific Smart Grid Key Performance Indicators, but most agree they need them. In many cases, and as per last year's response they will be an extension of existing KPIs. Some acknowledged that they needed KPIs but that these will be incorporated much later in the development stage.

One said that they were currently engaged in building solid foundations for Smart Grid metrics, but they didn't yet know what these would be. Another said they had to measure things, as that was the only way to show proof of concept. Some KPIs that were mentioned were:

- Cost versus benefit
- Improving network reliability
- Increasing asset utilisation
- Cost reduction, such as savings on manual meter readings
- Efficiencies in better utilisation of renewables
- Customer response and reaction.

“The key KPI is around the benefits and project delivery – time, cost, quality. The percentage of customer take up and engagement will be important – we will need a hard metric around demand response.”

“We have specific KPIs around savings of Megawatts. Energy savings, network performance, reliability targets, service performance targets.”





## 2.10 Timelines and program plans

Q10. Do you have an overall Smart Grid timeline and program plan or timelines for individual projects?

This question has moved dramatically from last year, where most respondents didn't have timelines or a roadmap for Smart Grids, but did have timelines for some projects. This year, most said they had both – an overall timeline and individual timelines for projects.

Electricity utilities have one of the longest investment cycles and horizons of any industry – 20 to 30 years or more. The introduction of new technologies, like those associated with the Smart Grid, does not change the necessity for long term planning. Indeed, it means that those plans need to be based on realistic assumptions and goals.

The biggest variation is in timelines and program plans. There is little commonality – some projects are very short term, some strategies go out to 2025 or beyond. Some have both high level timelines and timelines by projects.

Roadmaps have been developed, timelines put in place



## 2.11 Effects of the Smart Grid, Smart City project

Q11. Has the recent award of the Smart Grid, Smart City project to EnergyAustralia affected your Smart Grid plans in any way? If so, how? How are you planning to exploit its findings?

In 2009 the Australian Government announced \$100 million in funding for a major Smart Grid demonstration project, and invited bids from interested parties. In June 2010 it announced that a consortium led by EnergyAustralia had won the Smart Grid, Smart City project to connect over 9000 homes to a Smart Grid.

The project will be a demonstration based in Newcastle NSW, with parts of the trial also conducted in the Sydney suburb of Newington (the Olympic village site), Sydney's CBD, Ku-ring-gai in Sydney's northern suburbs, and the Hunter Valley town of Scone.

EnergyAustralia is owned by the NSW state government. It operates in the Sydney, Central Coast and Hunter regions of NSW. It is Australia's largest energy network, with 1.6 million network customers. Other consortium partners are AGL Energy, GE, Hunter Water Australia, IBM Australia, Newcastle City Council and Sydney Water.

The project is intended to share its experiences with the entire electricity distribution industry. There is great consistency in the comments from survey respondents. They are very positive, and see it as a large scale proving ground for the Smart Grid, under Australian conditions.

This represents a significant change from last year's survey, which was conducted after the initiative was announced but before the project was initiated. Last year most respondents were doubtful on the success of the project and thought the funding was not enough – now they see great value in it.

"The project has made us take a step back and look at what we want to achieve. Now EnergyAustralia is starting to put some of the information and learnings into the public domain it is helping us look more closely at what we are doing."

"It's forced us to think seriously about what we wanted to do and why. It costs money to develop the IP – and we now know how to make the best use of it. We are already exploiting the findings."

"It has slowed some of our pilots and trials, as we do not want to duplicate what they are doing. It will help us understand the architecture, costs, benefits, lessons learned, etc."

"It's good that the information will come back to the industry. It means we can avoid many expensive trials. The customer base is quite similar to our own."

"It will help us define our test scenarios and act as a reference point to check assumptions made in our business cases."

The Smart Grid, Smart City project is a focus point pushing progress



## 2.12 International guidance

Q12. Are you looking internationally for guidance and advice? Since last time what have you captured and utilised from international sources?

Survey respondents said they were looking closely at experiences around the world but not as intently as last year and with a different focus – not needing to explore as much. Countries most often mentioned were the USA, France, Portugal, China and Korea, however nothing really stood out as a key learning from 2009.

They were following developments by attending trade shows and industry conferences, by following market analysts and vendors, and by visiting other utilities, often in the USA. Many distributors make regular tours to the USA to study developments there. US Smart Grid pilots in Austin, Texas and Boulder, Colorado were mentioned more than once.

A few respondents mentioned Asia and China this year. “The technology will all come out of Asia,” as one put it. China’s experience with developing large scale electricity infrastructure was mentioned by some of the respondents. But many felt there was not an enormous amount to be learnt from the international experience. “A lot of people making a lot of noise but not doing much,” said one. “We haven’t found anything that is obvious,” said another.

There is a feeling that, while it is useful to look at international developments, it is ultimately local experiences that will offer the best examples of Smart Grid success.

There is a feeling that, while it is useful to look at international developments, it is ultimately local experiences that will offer the best examples of Smart Grid success





## 2.13 Key technology players

### Q13. Who do you see as the key technology players in the Smart Grid market?

There are many companies around the world regarded as key technology players by many of the respondents, but few were mentioned more than once. Respondents had great difficulty answering this question, indicating there is no Smart Grid market leader – many companies do many different things. The companies mentioned are also very diverse – IT vendors, infrastructure suppliers, consultants, smart meter suppliers, other utilities, etc.

This lack of a clear market leader and proliferation of suppliers is a classic feature of an immature market. Most technologies in their early days attract many suppliers with diverse solutions and a lack of standards. Then over time the market consolidates and de facto, mandated standards emerge.

That is exactly what is happening with the many aspects of Smart Grid technology today. Large and small suppliers are jockeying for position, and most of them will not be serious players in a few years' time. The problem is, it's impossible to pick the winners from the losers.

“There's no one supplier that stands out. There are still small players all over the market. The vendor community has a problem in that the industry doesn't know what it wants so the vendors don't know what to produce. It's disappointing that you can't go and buy a standard model of anything anywhere.”

Respondents were not keen to mention names. Those that were mentioned included companies as diverse as:

- ABB
- Alcatel-Lucent
- Alstom
- The Brattle Group
- Cisco
- eMeter
- GE
- Google
- IBM
- Itron
- KEMA
- Kepco
- Landis+Gyr
- LG
- Logica
- Nokia
- Siemens
- SAP
- Silver Spring
- ZigBee

New Smart Grid entrants from enterprise players, coupled with new innovators makes it a very cluttered market





## 2.14 Smart Grids – Retail opportunity or threat?

Q14. If you had a retail business or if you have one now, do you see Smart Grids predominately as an opportunity or a threat?

Electricity distributors interviewed for this report overwhelmingly see Smart Grids as an opportunity. But if they put themselves in a retailer's shoes many of them say they could also see it as a threat (though this was qualified in many cases). The most widely mentioned advantages for the retail business had to do with greater choices for customers and increased opportunities for engaging stronger customer relationships.

"It's a huge opportunity. With the current retail sales model there is nothing that makes customers want to change suppliers, and there are no personalised plans. There is nothing really compelling. With Smart Grids retailers will be able to offer true differentiation and innovation, developing products that are interesting and varied."

This theme of greatly increased interaction and engagement with customers was mentioned frequently. One respondent spoke of the ability to "shift the paradigm" and the ability to explore new opportunities and new business models, and many spoke of greater service differentiation and "tariff innovation."

"There will be more data, more insight into usage. We will be able to identify which customers make us money and which don't."

Those who thought retailers saw the Smart Grid as a threat usually mentioned problems related to diminished revenue or a loss of control:

"It will threaten current business models. The relationship between a distributor and a retailer will be tested, with a fight over who has access to data. What if the customer gets educated about power and goes and buys an Xbox with a power metering option?"

"The problem is that the Smart Grid is going to save customers money, so many retailers don't want that publicised."

"We can't tell whether it's an opportunity or a threat – we don't know yet what the implications are. Demand management is an issue – it may end up penalising the retailer business."

"I wouldn't see as an opportunity – reducing pricing is not attractive."

"Smart Grids have the potential to be a huge threat, as less energy usage means less money."



## 2.15 HAN and IHD plans

Q15. Do you have firm and funded plans to test any HAN/IHD value propositions in the next 12 months?

- A HAN (Home Area Network) is a local area network that connects all digital devices in a home – PCs, home entertainment system, peripherals, etc. Connection can be wired or wireless, or a combination of the two. In the context of the Smart Grid, the term is used to describe homes wired into the grid, where the HAN can be used to monitor, and often control, the energy consumption of individual devices.
- An IHD (In House Display) is a small monitoring device connected to a HAN which provides the customer with information about power consumption, at the household or device level. IHDs can be connected to smart meters, but increasingly are being installed directly by consumers or ESCOs rather than retailers or distributors.

All distributors surveyed are piloting HAN and IHD technologies with load control units connected to individual appliances. Some are looking not at specific IHD devices, but at the ability to provide customers with information over the Web, through such applications as Google PowerMeter and via smart phones. Some say that HANs are much more critical than IHDs.

The interest in HANs and IHDs is as a direct result of the increased awareness of the importance of consumer engagement over the last twelve months. These are critical technologies, as they provide the customer interface.

“Demand response is critical – it’s the lynchpin of the strategy. Smart Grids won’t roll out in a big way unless we get inside the home working well with consumer engagement.”

“We’ve finished our first IHD/HAN trial, and we’re now able to consolidate the findings and use the information to refine a more compelling proposition. We have learnt not to juggle customers or to burn them out on their enthusiasm. There are so many operational issues when you go inside the house, so many customer issues.”

“We have completed our home efficiency trial with IHDs. We found that if you give the consumer more information they will change their behaviour.”

“To get all the benefits of Smart Grids in the consumer world you need an enabled HAN and IHD. That’s an example of where we need policy leadership.”

The interest in HANs and IHDs is as a direct result of the increased awareness of the importance of consumer engagement over the last twelve months



## 2.16 Australia's progress in Smart Grid deployment

Q16. Do you have a view of how Australia's progress in Smart Grid deployment compares to other countries in North America or Europe? What are your observations?

There is a consensus that Australia is reasonably well advanced in Smart Grid development, and that it is looking at things more holistically than the USA and Europe. The USA is concentrating more on smart metering and consumer interface functionality, while in Europe the focus is on how to integrate renewable energy sources, with load control and demand management an after-thought.

"Australia has the biggest focus on load control. Our distributors are more sophisticated. Europe is patchwork."

Australia is regarded as a leader in integrating customer engagement with back end Smart Grid technology. But, as one respondent says, that is not saying a lot, as very few utilities worldwide have worked this out properly. But there is a feeling that despite Australia's comparative sophistication with Smart Grid technology, its efforts are not well understood internationally.

"We are not great at marketing the hype. We will talk about what we've done but we won't talk about what we are going to do."

"We are quiet achievers. We aren't making enough of the really big decisions, such as rolling out smart meters and NBN together – it would be a huge statement for Australia to make to the world. China is building networks and has an opportunity to make it smart from the beginning. Why aren't we sending the engineers over to Asia?"

There is a feeling that Australia started a little late but is now moving quickly, because it has learnt a lot from some international experiences. All in all, respondents are happy that Australia is doing at least as well as the rest of the world in understanding and implementing Smart Grid technologies and business practices.



The hype the industry had around Smart Grids internationally has been tempered by the reality of implementations – Australia is now right “up there”

## 3 PROGRESS ON SMART GRID PROJECTS

### 3.1 Overview

Section B of the survey asked respondents to quantify their progress on various Smart Grid projects, where 1 is "Haven't started yet" and 5 is "Complete." The question was asked of 16 different aspects of Smart Grid technology, in four distinct categories.

#### Customer and employee infrastructure

- Smart meters (meter and wireless technologies)
- Field force automation
- Air conditioning load control
- Flexible tariffs, including time of use tariffs

#### Information management

- Business intelligence for Smart Grids
- Meter data management for National Smart Metering Program
- Communications for Smart Grids
- Security certification

#### Infrastructure management

- Asset management
- Distribution management systems
- Outage management systems
- Smart substations and self-healing networks
- Beyond the substation: power sensing dynamic power models

#### Next generation technology

- Impact of micro-generation
- Impact of renewable energy sources
- Impact of electric vehicles

Note that these questions were sometimes asked of more than one individual from the same organisation, and that their responses often differed. This reflects the different views of individuals and of different parts of the same organisation.





Responses are expressed as the average of all individual responses, and are not averaged for each organisation. The findings thus express individual rather than corporate views.

The chart below shows all 16 areas, colour coded by the four categories. Each category is examined separately on the following pages. The best area overall is outage management systems, and the category that does best is customer and employee infrastructure. Worst area overall is business intelligence for Smart Grids, and the worst category is information management.

Three of the bottom four areas overall are in the area of information management. Note that this was regarded as one of the key challenges of the Smart Grid (see 2.2 above) – the electricity distribution industry has not traditionally had to worry about the management of large amounts of data. There is now a realisation that not only is this important, it is in many ways the essence of the Smart Grid – it is this very wealth of information that makes the Smart Grid smart.

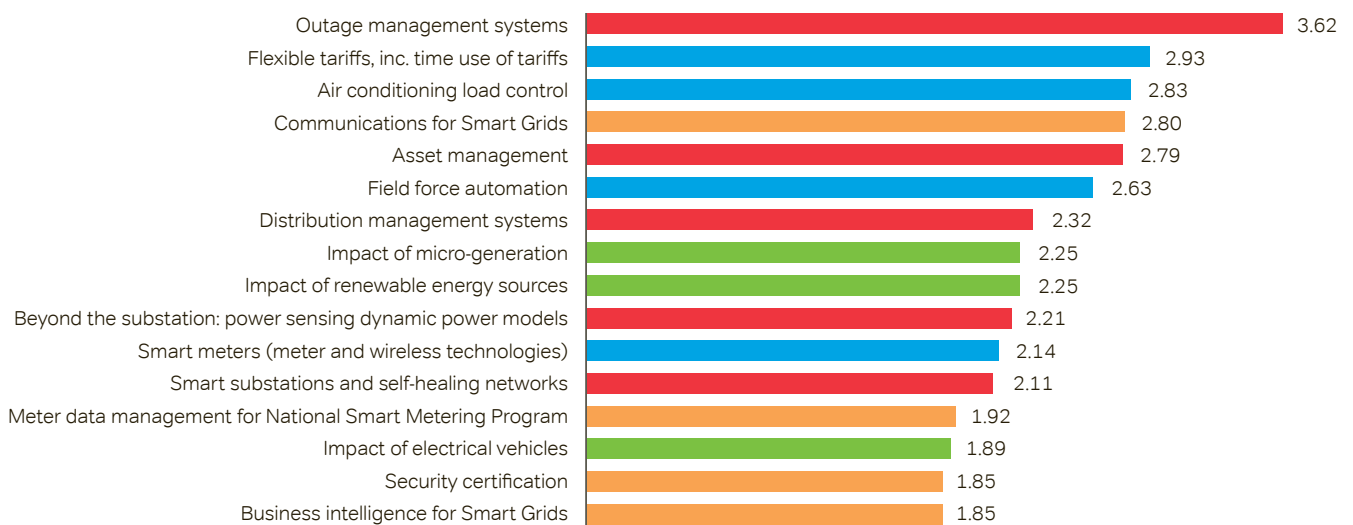
Note also that two of the top three areas, and half the top six, are in the category of customer and employee infrastructure. One of the key findings of this report is the increased importance placed on consumer engagement (see 2.8 above), which is reflected in the maturity data. The other two areas, infrastructure management and next generation technology, are gathered around the middle of the maturity chart.

The results overall show some maturity, but they also indicate there is a long way to go. The chart does pinpoint some key relativities, and in particular highlights how much work remains to be done in the critical area of information management.

The average all 16 categories is 2.40 out of 5. The minimum possible response is “1”, which means the median possible response is 3 (not 2.5). If this were expressed as a percentage figure, a score of 3 would indicate 50 per cent. The overall figure of 2.40 indicates that by this rough measure respondents are only a little over one third of the way along the Smart Grid journey.

The results overall show some maturity, but they also indicate there is a long way to go

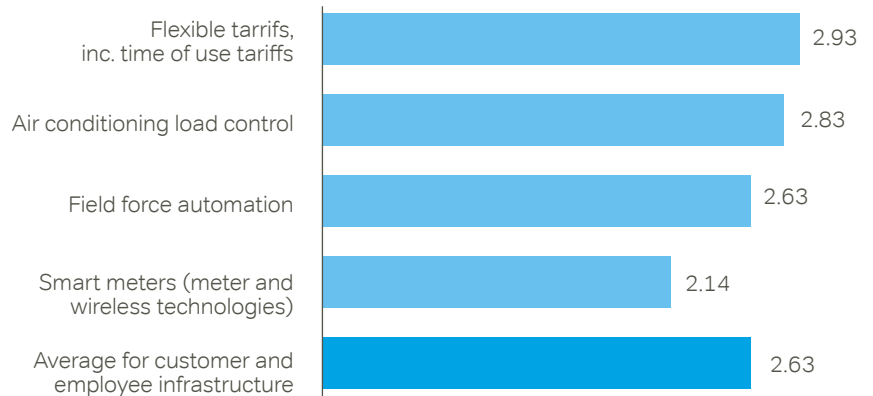
## Smart Grid Maturity



■ Customer and employee infrastructure  
 ■ Information management  
 ■ Infrastructure management  
 ■ Next generation technology

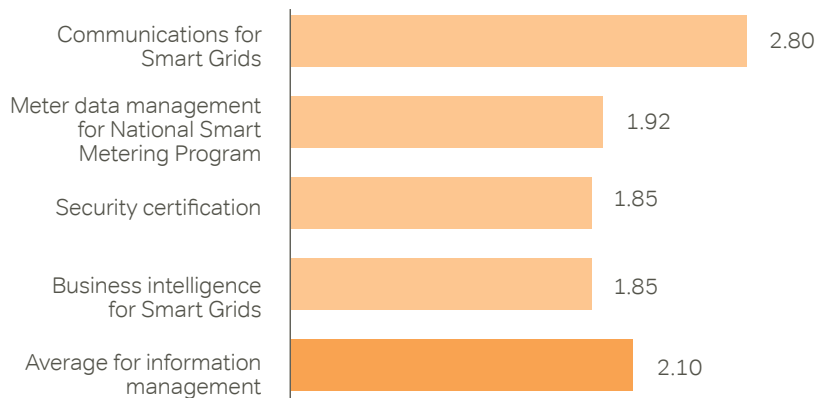
### 3.2 Customer and employee infrastructure

Customer infrastructure refers to that part of the Smart Grid that interfaces directly with the customer, or which supports consumer engagement. Respondents are doing better in this area, in terms of the maturity of implementation, than in any other of the four areas surveyed. The use of flexible tariffs, including time of use tariffs, does best of the four items in this category, and smart metering technology does worst. However it is noted that many states are still waiting on Government policy and mandates prior to embarking on a smart meter roll out. Field force automation (employee infrastructure) is also relatively immature.



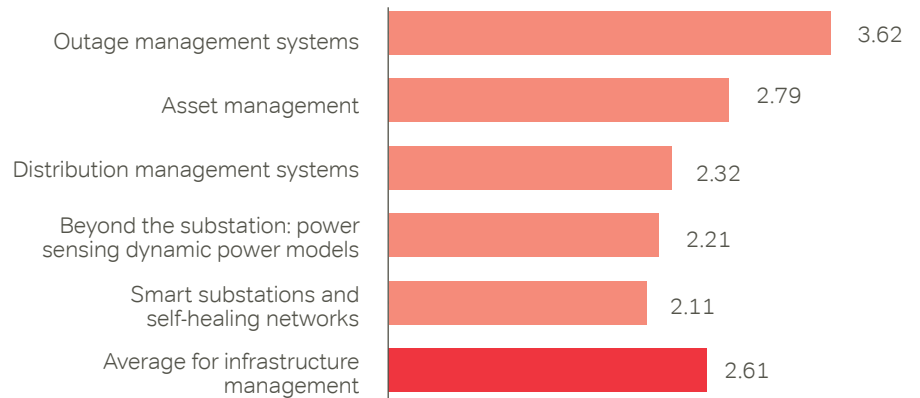
### 3.3 Information management

Information management refers to the massive job of collecting, storing, disseminating and analysing the vast amounts of data generated by Smart Grid technology, at every stage in the process. Many respondents have rightly identified information management as one of the most important Smart Grid challenges. Generally, respondents admit that they are not very advanced in information management. The average maturity rating out of 5 is only 1.77, the lowest of the four categories measured. Communications rates highest – and is one of the most mature areas overall, but the other areas rate very poorly, with security certification and business intelligence for Smart Grids the lowest of any area.



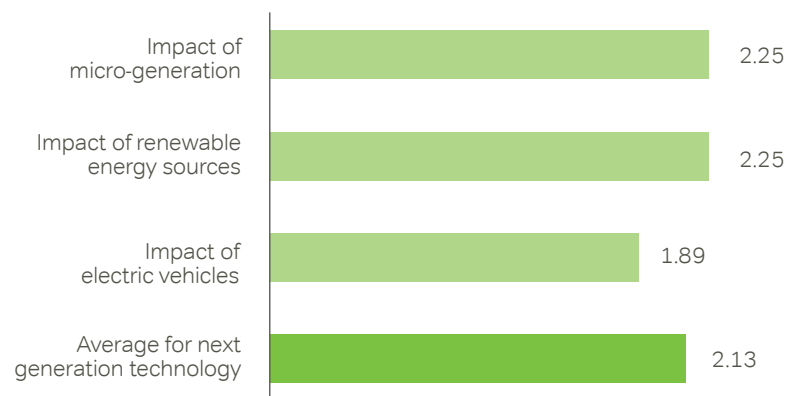
### 3.4 Infrastructure management

Infrastructure management refers to the “back end” technologies that keep the Smart Grid running. Distributors have relatively sophisticated outage management systems – a very important aspect of any energy grid and which predates Smart Grid technologies. The same is true of asset management – the disciplines have been in place for some time. But distributors are not so mature in some of the newer areas of Smart Grid infrastructure such as substations and networks with power sensing and self-healing capabilities.



### 3.5 Next generation technology

Next generation technology refers to a range of technologies which are associated with the introduction of the Smart Grid and which are in many ways dependent upon its success for their own prospects. Distributors are not very mature in their readiness or maturity in the three areas surveyed – but they have begun to incorporate micro-generation, such as PV solar cells, into their networks. Compared to last year where electric vehicles were an unknown, this year organisations are actively pursuing trials of electric vehicles within their network.



# 4 THE DEMAND SIDE

Most discussions about the Smart Grid, in Australia and internationally, have to do with the supply side of electricity distribution. Participants in the supply side are electricity generators, distributors and retailers, whose perspective is necessarily based on the increased efficiencies and other advantages that Smart Grid technologies and practices bring to their own operations.

But there is another important aspect to the Smart Grid – the demand side. This comprises the consumers of electricity – in the home, in the office, and in industry. Smart Grid technology is of at least as much benefit to consumers as it is to suppliers. Indeed, it can be argued that it is of much greater benefit, as the whole purpose of the electricity grid is to provide electricity for use by consumers.

Unfortunately the benefits to consumers have too often been left out of the debate. There is an increased realisation that the demand side of the equation needs to be taken into account when implementing Smart Grid technologies, and when assessing the benefits and the costs.

This section of the report draws on two studies conducted by market analysis group Connection Research, which recently surveyed Australian business and residential users of electricity. Both studies found that while there is not a lot of knowledge about Smart Grid technology amongst Australian consumers, there is

increasing concern about higher electricity bills, and an increasing desire for more information about electricity consumption and its relationship to pricing.

The first survey, **Business Energy Consumption in Australia**, was conducted in January and February 2010. It surveyed over 1000 Australian businesses, mostly SMEs, on their energy consumption patterns, their attempts at energy conservation, and their knowledge of various technologies. The second, **Residential Energy Management in Australia**, was conducted in September 2010 and surveyed over 2700 Australian households with similar questions, with a particular emphasis on such areas as smart meters and time of use tariffs.

Business owners say they want help to become more energy efficient. When asked to rate the importance of various factors in changing their energy consumption behaviour, nearly two thirds of respondents to the **Business Energy Consumption in Australia** survey said more information about how to use energy more efficiently would be an important factor. One third said that a lack of knowledge and time were inhibiting factors in changing their energy usage.

Half of all businesses said they wanted more information about their energy consumption, rising to more than two thirds of businesses with more than 100 staff. And nearly three quarters of these

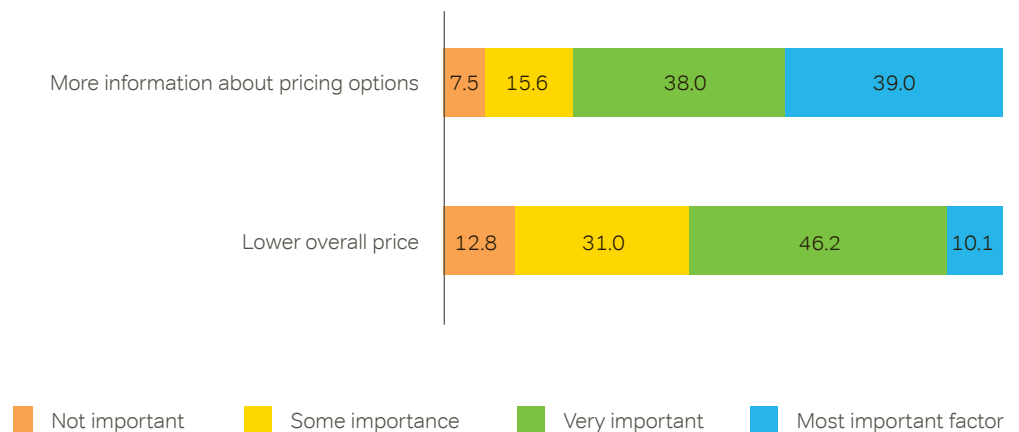
business respondents said they are affected by rising electricity prices, with very few saying they could pass these costs onto their customers.

The story is similar amongst residential electricity consumers. Fewer than half have even heard of the term “Smart Grid”, and most of those that have heard of it don’t know what it means. Slightly more, mostly Victorians, have heard of smart meters. The proportion of respondents concerned about rising energy prices, and the proportion that now closely scrutinise their quarterly electricity bill, have risen significantly from the numbers in a similar survey conducted 18 months earlier. Then only 44 per cent of respondents said they closely look at their electricity bill and compare it to last year’s. Now 71 per cent do.

When asked about the importance of various factors in changing energy supplier, nine out of ten of the respondents agreed that more information about pricing options was a factor, including more than three quarters who said it is ‘very important’ or the ‘most important’ factor. This is much higher than the number who considered a lower overall price a factor. Only 10 per cent said this was the most important factor. Clearly, consumers want more information about their usage patterns.

See figure 4a.

Figure 4a  
Factors in changing electricity supplier



Source: Connection Research



Respondents were asked how important each proposed advantage of smart metering is to them. All proposed advantages were either very important or the most important to over half the respondents. Only a very small percentage of respondents said any of the advantages were not important.

Nearly one third of respondents said that increased visibility to the electricity utility was the most important advantages of smart meters, many more than the proportion who said increased visibility to consumers. Over a quarter of respondents said that saving money is the most important advantage, and two fifths said it is a very important advantage.

See figure 4b.

This lack of knowledge about the technology, combined with increased concerns about rising costs and a strong desire for more knowledge about their electricity consumption, indicates that consumers are ripe for Smart Grid technology. Their expectations have grown in the information millennium.

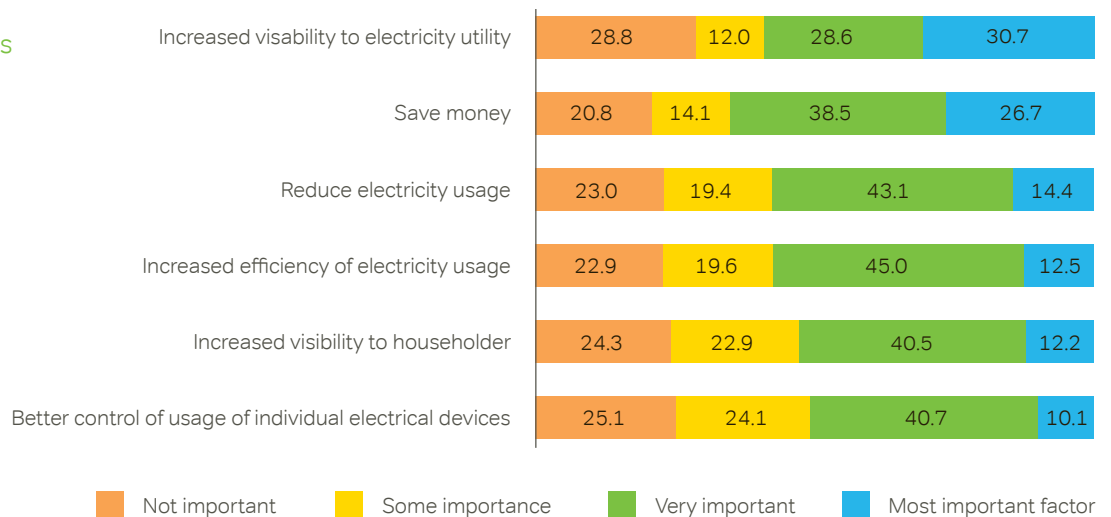
The emergence of energy service companies (ESCOs), which offer a large range of energy management services to consumers is a symptom of both this increased desire for information and management, and new technologies that make such things possible. There is

a proliferation of energy monitoring and management devices at the consumer level, often performing services that should in theory have been offered by utilities. The existing business models are already being challenged.

This trend will continue into the future. Electricity costs to consumers are likely to increase, monitoring devices are dropping in price, and an increasing number of service offerings will be made available to consumers. Their current lack of knowledge, when combined with their concern over rising prices and their strong desire for more information about their consumption patterns, means there is enormous unmet demand for energy services – all of which can be enabled through the implementation of Smart Grid technology.

The rise of the ESCO is an indication that traditional electricity utilities are not meeting the needs of consumers. They will need to do so, or a significant amount of the extra business that will be made possible by Smart Grid technology will be denied to them.

Figure 4b  
Perceived advantages of Smart Meters



Source: Connection Research

## 5 LOGICA CONCLUSIONS

The Smart Grid evolution in Australia is only in its early days, but it is already changing the landscape of the electricity supply and distribution industry. New technologies and techniques are causing many players in the industry, at every stage of the energy supply chain, to re-evaluate the way they do business. There will be more changes in the next decade, in both the technology and the structure of the industry, than there has been in the last fifty years. Old certainties are disappearing, leading to many challenges.

Not all players in the industry will confront these competitive challenges with equal success. There will be winners and losers. The winners will be those who best adapt to changing circumstances and who are better able to implement and take advantage of new technologies. The losers will be those whose business models and mindsets are static rather than forward-looking. The old ways of doing things will lead to a much smaller share of the pie as value moves to new activities within the value chain.

Our study focuses on the position of each individual business. We believe that is what makes it unique. And, although no individual business is explicitly identified with any remark or position, the study reveals many things about the state of Smart Grid maturity in Australia that are not always clear when studying the collective views of industry associations. The conclusions we have drawn from this study reflect the responses gathered, highlighting specific insights provided by a respondent as well as Logica's own observations on the industry.

**Effective customer engagement is critical to success**

Initial trials and experiences have made most utilities realise that the customer is integral to a large part of the Smart Grid business case, and that the Smart Grid cannot happen, and cannot realise its potential, without satisfactory customer engagement. From changing consumer behaviour, through IHDs and better access to information, to gaining regulatory approval for network augmentation, substantial evidence-based work will be needed to prove to all interested parties that the investment in a Smart Grid is appropriate.

Securing appropriate consents to use new personal data, and managing and analysing this data, will be a new core competency for the distribution company of the future. This will provide new insights on the network side in terms of load management, phase balancing, etc. But it is the customer side where the changes will be most profound. Companies with existing brand presence, data mining and business intelligence skills will be well positioned to exploit the new opportunities that will emerge. One only has to look to the UK supermarkets' entry into the energy retail and solar markets to see how this model might evolve. And the UK experience has evolved without the use of interval data – with more information much more sophisticated models will be deployed.



### Opportunity versus threat

When putting the retailer's hat on, there were interesting views on whether Smart Grids were an opportunity or a threat. Threats could be concentrated on such aspects as lack of regulatory incentives, falling retail margins and lower revenues, but these don't take into account the many new business models and opportunities the Smart Grid makes possible. Those who regard the Smart Grid as an opportunity are forward-looking. They regard the new technologies and the new business models and opportunities as opening up a new world of service delivery and customer engagement.

Many respondents pointed to the difficulty of building business cases, partially because of the blurring of the lines between regulated and non-regulated opportunities and uncertain future regulatory frameworks. This makes it problematic to justify investment, particularly at the customer end. Distributors in particular will face significant strategic conundrums as to whether to adapt and expand business models into the new opportunities presented or focus on improving the traditional core network area.

Logica believes that the Smart Grid provides massive opportunities to dynamic distributors and retailers, as well as to new entrants. It is no accident that the number of ESCOs is rising quickly as smart entrepreneurs see the many ways they can help consumers monitor and manage their energy consumption. The smarter distributors will themselves incorporate ESCOs, offering a range of new products and services made possible by Smart Grid technologies. For hard evidence of these possibilities one only has to look to the emergence of demand side aggregators in the USA, with companies such as Enernoc and Converge.

### Increasing focus on regulatory and standards-related Smart Grid challenges

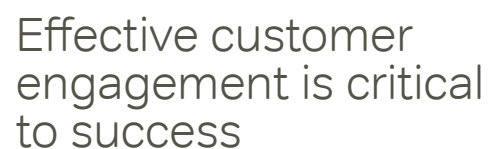
Australian electricity distribution businesses are currently driven by a policy framework and regulatory regime with a five year model of access arrangements, and by the behaviours that are encouraged by this model. Retail, data access and other policy areas are in need of an overhaul to provide a consistent Australia-wide framework. The road to the Smart Grid in Australia will depend on how and when the fragmented policy framework driving the regulatory environment motivates the distribution companies to change and adapt.

Respondents to the survey also highlighted that making decisions on technologies and new directions was difficult when standards either do not exist or are embryonic. There is a feeling there is real risk of ending up with a stranded technology with limited future options. Logica agrees with these comments, and believes that taking an aggressive proactive approach to accelerating and aligning to international standards is important for supporting the rapid introduction of Smart Grid technologies. A fast follower strategy is very attractive in this context.

### More formal international linkages are required

While there are some formal arrangements in place between Australian distributors and trade associations and their overseas counterparts, Logica believes there needs to be more work done to ensure that international experience and lessons are formally channelled into Australia. The vast sums of money being spent in Asia, Europe and the USA means that many of the key approaches and solutions will emerge from outside our shores.

It is in Australia's interest to formalise access to this work and accelerate its entry into Australia. Logica expects that in many areas Australia will be an early follower, not a pioneer. When considering the Victorian smart metering program, one can see that for many of the key aspects of the technology the companies providing the technology were largely unknown in Australia prior to the initiation of the project. Most of these companies had offshore references to underpin their Australian market debut.



Effective customer engagement is critical to success

### Use Smart Grid to rejuvenate and reinvigorate the workforce

One key insight from some respondents was the use of Smart Grid projects to leverage individual skills and integrate with an aligned human resource strategy. The industry has been suffering for some years for an ageing workforce and changing social demographics, making it harder and harder to recruit and retain key people. This will be exacerbated by Smart Grid as resource demands increase to support delivery.

Some forward thinking distributors see the Smart Grid as an opportunity not only to deal with the issue of the ageing workforce, but to rejuvenate and reinvigorate the workforce by attracting new employees into an industry previously regarded as mature and unexciting. Smart Grids are capable of attracting young university graduates to the energy sector, and the universities are responding with renewed interest in graduate programs for power engineering and related fields. The Smart Grid provides an opportunity to redefine the roles and status of electricity industry employees, and begin to transform the industry into a truly forward thinking and innovative environment.

### End-to-end industry change is inevitable

The survey respondents clearly recognise that to deliver the benefits of Smart Grids (particularly the carbon reduction we all believe to be a key driver) the industry needs to change. Distributors need to understand the implications of consumer behaviour, the emerging impacts of distributed low carbon generation, and the opportunities afforded to improve reliability, performance and network efficiency.

While there is consensus on the Smart Grid leading to transformational change, there is an underlying pragmatism that will ensure that this will be achieved by breaking the process down into a number of discreet elements, with each element being considered as a project on its own merits in terms of its business case. Logica agrees with this approach, but also sees risks from cultural change as project synergies disappear or project leadership is fragmented, with the link to the overall Smart Grid strategy becoming unclear to the wider organisation.

Strong governance and stakeholder management is critical in order to manage these projects effectively.

### Technology-driven change is not the answer

One of the more striking revelations of the previous survey, twelve months ago, was the extent of the technological focus of the Smart Grid community. As discussed above, many businesses are slowly recognising that fundamental industry change is the only route to the Smart Grid. As such, they are at least beginning to talk the talk of new business processes and commercial change as critical enablers.

But at the same time, talk of pilots and existing projects too often focus on technology and not on new ways of working and the desired organisational culture. It is all too easy for electricity distributors to fall back into a comfort zone of new gadgets on the network or new algorithms for smart control systems.

We cannot let this happen. Focusing on technology will not yield the real benefits of the Smart Grid, which can only come from genuine industry transformation. It is true that technological developments are needed, but they are just a beginning. Entirely new business processes, practices, collaborations and relationships are as important to facilitate a move towards a smarter electricity distribution network – the Smart Grid.



## 6 RELATED PUBLICATIONS

### UK overview

This report is based on in-depth interviews with senior management in six of the eight major UK electricity transmission and distribution network businesses. It provides a comprehensive view of the strategies, priorities, drivers and challenges for Great Britain's Smart Grid adoption, and includes answers to such questions as:

- What are the key challenges in relation to Smart Grids?
- What is the Smart Grid strategy for key players in the UK?
- What are the drivers for investing in Smart Grids, now and in the medium to long term?

The full report can be downloaded from our website:

[www.logica.co.uk/we-are-logica/media-centre/brochures/smart-grid-study](http://www.logica.co.uk/we-are-logica/media-centre/brochures/smart-grid-study)

### Germany overview

This report is based upon a survey conducted by the market research and consulting company IDC and the consulting services provider Logica Management Consulting in November and December 2009, among 76 top managers in the German power supply sector. The most important challenges faced by the sector are increased pressure to reduce costs, increasing regulation and greater customer migration. This means the IT department has to provide greater support to facilitate the optimisation of business processes.

Many of the power suppliers who were questioned are only just beginning to grapple with this. More than half of these are currently focusing on smart metering and are waiting to see how the topic of Smart Grids will develop.

The report in full can be downloaded from our website:

[www.logica.de/we-are-logica/media-centre/thought-pieces/studie-smart-grids-de](http://www.logica.de/we-are-logica/media-centre/thought-pieces/studie-smart-grids-de)

### Smart Meters and Smart Grids for Dummies

Logica, in association with Wiley Publishing, has produced two introductory books on Smart Grids: *Smart Metering for Dummies*, and *Smart Grids for Dummies*. What is a Smart Grid? What makes it so much cleverer than what we have now? Are all Smart Grids equally smart? And how do you recognise one?

[www.logica.co.uk/we-are-logica/media-centre/articles/smart-metering-for-dummies](http://www.logica.co.uk/we-are-logica/media-centre/articles/smart-metering-for-dummies)

[www.logica.co.uk/we-are-logica/media-centre/articles/smart-grid-for-dummies](http://www.logica.co.uk/we-are-logica/media-centre/articles/smart-grid-for-dummies)

### Logica's work with clients on Smart Grid projects

Logica Australia has been working with many distributors on a range of Smart Grid projects. Our references and solutions are detailed in a brochure titled "Logica in Smart Grids" which is located at:

<http://www.logica.com.au/we-are-logica/media-centre/factsheets/smart-grid/>







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#### Disclaimer

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#### About Logica

Logica has been one of the leading suppliers to energy and utilities companies in Australia for over 30 years. Energy network, gas and water companies represent over 60 per cent of Logica Australia's revenue and client base. Logica's blend of deep industry knowledge, technical excellence and global delivery expertise gives us an unparalleled track record. We have provided IT services and solutions to 11 of the 13 energy network companies in Australia.

We provide leadership in consulting, implementation and ongoing IT support capabilities to address the business and IT needs of our clients, both now and into the future. Globally we employ 39,000 people, providing business consulting, systems integration, operational systems support and IT and business process outsourcing services.

Logica continues to invest in Smart Grid capabilities, and has recently been delivering key projects both in Australia and globally, including Smart Grid strategy, consumer engagement, development and delivery of advanced metering infrastructure (AMI), meter data management, SCADA, billing systems, GIS, renewable energy (wind farm management), and workforce mobility across energy network operations and ICT. Logica understands the accelerating convergence of technologies that will define the Smart Grid, which puts us in a unique position in this important new market.

Logica is listed on both the London Stock Exchange and Euronext (Amsterdam) (LSE: LOG; Euronext: LOG). More information is available at [www.logica.com](http://www.logica.com). The company is a public company incorporated and domiciled in the UK. The address of its registered office is 250 Brook Drive, Green Park, Reading, RG2 6UA, United Kingdom. Copyright © November 2010 Logica Pty Ltd.

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