

2009 Smart Grid Study

Australia

A comprehensive view of the strategies, priorities, drivers and challenges for Australia's **smart grid** adoption





Disclaimer

This publication is intended to provide an overview and analysis of the energy industry in Australia and is based on survey results, containing opinions voiced by industry executives given on condition of anonymity. This document is for general information purposes only and is subject to change without notice.

About Logica

For over 30 years, Logica has been one of the leading suppliers to energy and utilities companies in Australia. Energy network businesses, gas and water companies make up over 50% of Logica Australia's client base. Logica's combination of deep industry knowledge, as well as 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 IT needs of our clients both now and into the future. Globally we employ 40,000 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 smart grid projects both in Australia and globally, including smart grid strategy development, smart metering (AMI), meter data management, SCADA, billing systems, GIS, renewables (wind farm management), workforce mobility, distribution and outage management, as well as critical infrastructure security. Our breadth of coverage across energy network operations and ICT to handle the accelerating convergence of technologies that will define a smart grid gives Logica a unique position in this new marketplace.

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Smart grid adoption and challenges for network distribution businesses in Australia

This report is the result of an in-depth survey of 35 executives from the largest energy companies in Australia. The fundamental questions it asks - what is a smart grid strategy, what are the components and projects being undertaken to deliver a smart grid and where do the greatest challenges lie?

Logica is deeply involved in the energy industry and knows that changes to the business landscape in Australia concern all of us. We need to understand the lessons learnt so far and the issues that will need to be addressed in executing the smart grid vision.

To fulfil this need we 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 with the protection of anonymity, and this paper aims to provide a broad qualitative view of the current state of smart grid implementation in Australia.

Our thanks go out to the many executives who participated in this survey from the following companies:

Aurora Energy

Country Energy

CitiPower and Powercor

ENERGEX

EnergyAustralia

Ergon Energy

Eraring Energy

ETSA Utilities

Horizon Power

Integral Energy

Jemena

SP AusNet

Western Power

SPARQ Solutions

What does the term “smart grid” mean today?

Key to this document is understanding the current definition of a smart grid and subsequently understanding all the benefits that a more intelligent energy network will bring.

In conversations with respondents, all offered consistent definitions of what they believed a smart grid was. It was suggested the Energy Networks Association (ENA) definition clearly articulated the variation between the current network and a smart network (smart grid):

- “1. The electricity networks of today—transporting energy from major generation sources using mostly non-renewable fuels, to consumers who have limited knowledge of their consumption, where outages affecting customers are largely unknown until the customer alerts the network operator, and*

- 2. A future smart network—serving as a dynamic network for two-way energy flows; linking widely dispersed micro level renewable energy sources at the customer level and large-scale energy sources; providing more dynamic information to customers; facilitating greater customer choice about energy source and level of consumption; and providing real-time information on the performance of the network and optimising the network operations.”*

Why do we need smart grid?

We are seeing many drivers behind the requirement to adopt a smarter network in Australia including:

From a regulatory and political perspective:

1. Reduction in carbon emissions
2. The green agenda

From a distribution perspective:

- Demand growth
- Peak demand reduction
- Reliability of supply
- Return on assets
- Ageing infrastructure, ageing work force

From a consumer perspective:

- Availability of cheap reliable energy
- Carbon reduction (green energy)
- Micro generation
- Electric cars

The energy industry in Australia is working toward a common vision for enhancing and modernising the critical electricity infrastructure, but there are many challenges ahead and the job is just beginning. The responses by network distribution businesses in Australia to meet these challenges are varied, and complex.

The ENA describes the current state of the market in their *Smart Networks Position Paper* (September 2009).

“The electricity industry is poised to make the transformation from a centralised, producer-controlled network to one that is less centralised and more consumer-interactive. The move to a smarter network promises to change the industry’s business model and its relationship with all stakeholders, involving and affecting utilities, regulators, energy service providers, technology and automation vendors and all consumers of electric power.”

In this report we will explore a cross section of these challenges and how the industry is lining up to meet them.



Executive Summary

The key insight from our research is that despite the many unknowns including the regulatory environment, the consumer, and technologies, the industry is committed to progressing towards a smart grid and each distributor is at various stages of smart grid adoption.

Infrastructure in place now in Australia was developed some time ago and is due for modernisation. As the Energy Networks Association put it in their recent *Smart Networks Position Paper*:

“As much of Australia’s existing \$60 billion energy infrastructure was built in the 1950s to 1970s, with an asset life of around 40 years, there is a national trend to upgrade the nation’s network over the next decade. The replacement of aging infrastructure presents an opportunity to take advantage of new technologies and ‘future-proof’ the network, not only to meet the continuing growth in peak electricity consumption, but also to cope with a fundamental change in the delivery of electricity services in a carbon constrained environment.”

Smart grids are therefore a major business transformation for the energy industry, with some respondents drawing the comparison with the internet’s impact on the telecommunications industry. However there were two distinct views on how to proceed with some respondents using smart grids as an opportunity to transform their existing business and drive even more of a consumer focus (with the view consumers will drive smart grid success), whilst others see it as business as usual in terms of upgrading their existing network to make more intelligent.

The study revealed three key areas of focus for the industry.

1. **A new regulatory framework** is seen to be a key determinant of progress by the energy sector. Generators, distributors and retailers, constrained by present forward planning arrangements, will need some direction from, and flexibility on the part of the regulatory authorities in order to support the changes demanded by them. Strategy development was driven by regulatory determinations, making the government’s role

Key industry challenges:

1. The need for a new regulatory framework
2. Disaggregation of the industry
3. Funding the development of a smart grid
4. Development and the roll-out of the technology (ICT) and real-time systems
5. Workforce development and training
6. Getting the smart grid strategy right and grounded in solid business cases
7. Revolutionising the sectors approach and education of the consumer

pivotal.

2. **Developing the right strategy.** 25% of the industry reported that they have already developed their corporate smart grid strategy or were in the process of refining it. The balance of the industry is working on discreet projects that fit under a smart grid umbrella and these companies have plans to develop an overall strategy. All indicated that a smart grid was a business imperative and were committed to strategy development, despite the unknowns.
3. **Investment framework.** Respondents identified investment as a crucial component in order to move forward. They expressed caution around preliminary investment, expressing their reluctance to invest in solutions without knowing the shape of the challenges they address. The disaggregation of the energy value chain was a key concern for some respondents as business case benefits would be spread amongst generators, distributors, and retailers, so therefore the question becomes “who makes the investment?”

Respondents unanimously agreed that a collaborative effort is needed between government, the energy regulators and the electrical industry to provide the correct framework for progress to a smart grid.

Many pointed out that also key to their success was engagement and empowerment of the consumer and saw the responsibility of industry as well as government to educate and inform consumers on how they can ensure more efficient use of energy.

Respondents were also cautious about the smart grid timeline. At this stage timelines exist for specific projects, but for most, an overall roadmap and timeline had not yet been developed though many were confident of completing this work within the next six months.

Respondents have noted that education and training are going to be required across the board to handle the additional information loads that will accompany this innovation, and there is some concern as to whether the universities can turn out the skill sets needed to drive the changes home.

And there are many technical challenges ahead that will need to be addressed including managing data, integration of back-end systems, managing millions of end points (meters), and developing new technologies, and all within the context of a dynamic, changing business climate.

Much of the initial investment in smart grid preparation is prioritising:

- Research and study trips for business case development
- Smart metering (in Victoria)
- Integrating telecommunications and back-end infrastructure to support two-way data flow

Survey Framework

1. Describe your organisation's smart grid strategy – would you say you have one?
2. What are the common drivers that will influence/have influenced the business case for the smart grid – or smart grid technologies? Rate each one in importance for your business.
 - a. Network security – threats
 - b. Improvement to workforce safety
 - c. Capital avoidance
 - d. Quality of supply
 - e. Increase network performance reliability
 - f. Reduce network operating costs
 - g. Demand-side management
 - h. Better planning and management of load
 - i. Managing capacity change in network
 - j. Alternative and more flexible tariffs including “time of day” tariffs
 - k. Micro-generation e.g. PV solar panels
 - l. Changing consumer behaviour to reduce demand; especially at peak times
 - m. Electric cars and storage
 - n. Renewable energy e.g. wind farms
 - o. Reducing carbon emissions
3. What are your expectations of smart grids in terms of addressing your key drivers? Do you think they will improve – and by how much?
4. What do you see as the key challenges in relation to smart grids?

5. What investment do you think needs to be made for your organisation's smart grid strategy?
6. Do you have any current regulatory allocations for smart grid?
7. Do you have an overall budget for smart grid?
8. Which of the projects do you have funding for?
9. How will your organisation be structured to undertake the smart grid evolution?
10. Have you considered KPI's regarding the development of a smart grid? If yes, what are they?
11. Do you have an overall smart grid timeline and project plan or timelines for individual projects?
12. What projects are being undertaken first to move towards a smart grid and what is their maturity?
 - a. Smart meters (meter and wireless technologies)
 - b. Meter data management
 - c. Distribution monitoring
 - d. Automated monitoring
 - e. Distribution management systems (real-time)
 - f. Outage management distribution management system
 - g. Field force automation
 - h. Integration of information in real time
 - i. Communications for smart grids
 - j. New distributed generation connections processes
 - k. Other
13. Do you see Smart Metering and smart grids as independent projects?
14. Are you looking internationally for guidance and advice? If so, where? List other companies you are drawing advice from.

15. Have you seen any examples of demonstrable business case benefits through the implementation of any smart grid projects – including smart metering?
16. Have you seen anything in the market at the moment that has impressed you regarding smart grids, such as demos, presentations, papers etc?
17. How important is it for your company to include business case benefits in your smart grid strategy?
18. What is your view of the Federal Government's \$100m expenditure on smart grids?

Key insight:

All respondents indicated that a smart grid was a business imperative. However the sector is at different stages of developing their strategies. Some noted a significant change to their existing business models and requirement for a new way of thinking, particularly around consumer engagement; whilst others saw a smart grid as a business as usual upgrade of their existing network and smart grid was just a “buzz word”.

Response

Each question is repeated here with a summary and analysis of the responses received.

1. **Describe your organisation’s smart grid strategy – would you say you have one?**

Most respondents (except three), did not have a single, encompassing smart grid strategy in place. Instead, they had previously been focused on individual initiatives that fall under the term ‘smart grid’ as a descriptive umbrella.

The majority see smart grid as a component to their overall business strategy, part of the vision to improve their existing network and its performance by making it more intelligent. Respondents have a vision to improve the network - but it’s not necessarily called smart grid. One point of view was the smart grid strategy is just a continuation of what they were already doing - business as usual.

“We have a 10+ year horizon with a co-ordinated investment strategy. We’ve been investing in this type of thinking for a very long time. It’s just sexier now there is more of a focus on smart metering”.
Manager, Corporate Strategy.

However, all respondents have acknowledged smart grid as a business imperative, and are extremely positive about the potential for change.

For those respondents that don’t have a smart grid strategy in place and those that indicated it was business as usual, the majority said a strategy was in development, with some indicating they had developed visions of where they wanted to be. Some had progressed to developing detailed roadmaps to support

the vision. All respondents, therefore, were working to develop or refine their smart grid strategies.

“The vision part is easy; it’s the actual roadmap that is a little less clear.”

CEO

Respondents in Victoria were developing their strategy as an extension of the smart metering or advanced metering infrastructure (AMI) roll out, which because of its aggressive timetable, has hampered the ability to complete a full smart grid strategy prior to the commencement of this key initiative.

Across the board, the right strategy is seen as the key to success. Most respondents seem to be in the early stages of determining the business case to support the overall strategy. The business case is an essential prerequisite to any additional funding that may arise, and will determine which strategic changes are forthcoming. Investment is seen as crucial in order to move forward, but respondents are reluctant to invest in solutions without knowing the shape of the challenges they address. Return on investment needs to be measured, and the money simply won’t be there to spend unless results can be clearly identified.

“What we do has to be realistic, practical, affordable and not a waste of money. It’s a big investment!” Group General Manager, Network.

Respondents have pointed out a number of value opportunities that can be picked up and interpreted as contributing to a smart grid strategy. These cover a broad spectrum of technological innovations ranging from smart meters to self-healing networks. A large part of the challenge of strategy development is simply identifying which of these opportunities will present the best return on investment to customers and shareholders, and aligning their businesses to address them.

Direction on the part of the government and regulatory authorities is seen to be a key determinant of progress. Many respondents commented it was difficult to develop a long term strategy whilst many factors remain unclear. Strategy development was in some cases driven by regulatory determinations, making the government's role pivotal.

“Smart grid is a bit of a buzz word and we need to develop a model for the next pricing submission which needs to be made within the next twelve months.” Group Manager, Network Strategy Development.

Other strategy issues arose from consumer engagement which will be discussed further in question four.

“Smart grids have to be driven by the customer – they have to change or else smart grids won't do much at all.” Manager, Metering Services.

Respondents, therefore, remain at different stages of strategy development. However, respondents have listed individual tasks and outcomes that have already been completed to further their strategic aims.

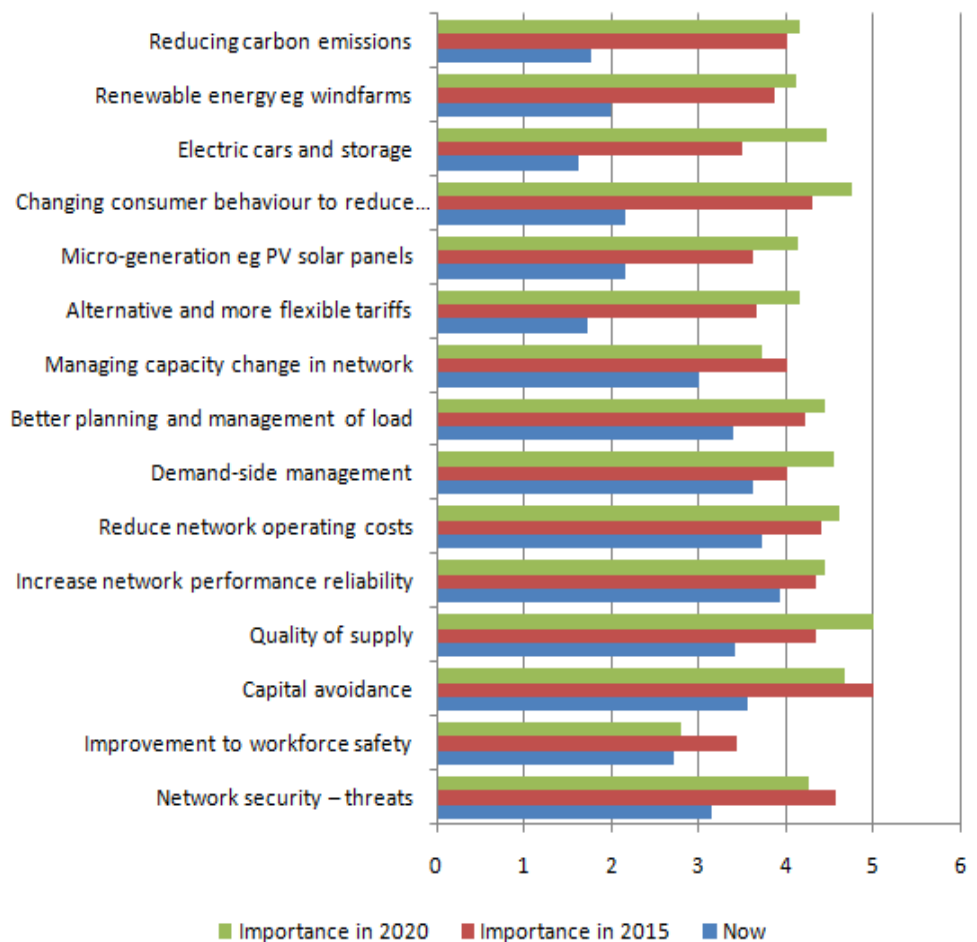
Examples of these include:

- Engagement and feedback from across the business: One distribution business is running “no regrets” sessions with all divisions to ensure no possible future scenario remains unforeseen and to ensure the right technologies are put in place.
- Promotion of the strategy internally: In one case the strategy is labelled “Electric Thinking”; another has called their strategy “Grid Smart – Customer Smart”.
- Completion of trials to support and refine the strategy: For example, testing consumer behaviour with air-conditioning trials, electric cars, renewables and smart meters.

- Development of complex financial models to support the business case and strategy development.
- Development of R&D centres.
- Timeframes were varied in terms of stages of strategy development. Three respondents indicated they had completed their strategy whilst the rest varied from two weeks to six months, to two years.

2. What are the common drivers that will influence/have influenced the business case for the smart grid – or smart grid technologies? Rate each one in importance for your business.

A selection of criteria were given to respondents and they were asked to rate them on a numerical basis from zero to five, with five being most important. The following graph shows their rated importance in the current time frame and projected out to the year 2020.



**Top 5 smart grid priorities
for today**

1. Increasing network performance reliability
2. Reducing network operating costs
3. Demand-side management
4. Better planning and management of load
5. Quality of supply

**Top 5 smart grid priorities
for 2020:**

1. Quality of supply
2. Changing consumer behaviour to reduce usage
3. Capital avoidance
4. Reduce network operating costs
5. Demand-side management

Managing capacity change in network and better planning and management of load.

These two closely related questions have quite similar average importance scores for the present time and over the next decade. They were seen as very important today for some, but for others, are not drivers at all. The management of load is especially important for some companies. The management of supply from new sources of energy generation, particularly from intermittent sources, challenges the traditional methods of managing the networks.

Questions remaining to be answered:

- What will the impact be of distributed, non-traditional and intermittent sources of energy when fed back into the grid?
- What technology and better analytical tools can be used to model the supply, and what other enhancements are needed to ensure supply is aligned with demand?
- Is a smart grid seen as a part of the response to facilitate this?

Demand-side management is seen by most respondents as important and a key smart grid driver, primarily due to the challenges inherent in developing and investing in a network able to cope with peak load.

“We have \$7B in assets invested for a 1% use for peak loads. A smart grid would help us avoid that situation.” Executive General Manager.

Many mentioned situations where unusually hot summer days (especially simultaneously across several states) with resulting high demand exacerbated from use of domestic air conditioners, put a strain on the network that can also lead to outages. One of the major benefits of a smart grid is therefore to ensure continuity of supply, by allowing the network to (automatically) manage supply and adjust to changing consumer demand.

The Energy Networks Association highlighted some of these challenges in their recent *Smart Networks Positioning Paper*:

“As we know, electricity must be consumed the moment it is generated. The main problem is supplying peak demand. The challenge for energy networks is that they must be designed to meet peak rather than average demand. There are three ways to mitigate the challenge of rapidly growing peak demand: managing supply; managing demand; and solutions to shift demand away from peaks.

In supporting these challenges, the smart network is reducing costs by reducing capital expenditure to meet peak demand.”

Reducing network operating costs is seen as an important goal, both for the present and throughout the next decade. Some respondents see cost reduction as a likely outcome of modernisation, and a key factor in implementing modernisation. An alternate response was the view that smart grids may increase operating costs due to: staff training costs, additional staff required, maintaining a more complex electrical network supported with new technologies, and the ongoing upgrades in technology required to support it.

Increased network performance reliability was, on average, rated the most influential driver by all respondents. Significant corporate key performance indicators relating to improvements in reliability are one of the key outcomes desired by respondents developing smart grid strategies.

A smarter grid means the distribution businesses are better able to manage the business of supplying from multiple energy sources whilst managing and balancing peaks in demand.

Quality of supply is rated as highly important and the issue is expected to increase in importance over the next decade as distribution businesses look to gain supply from renewable energy sources including from consumers themselves (micro generation).

If Australia follows Europe, the contribution from renewables, distributed and micro generation is set to grow. This may have an impact on the infrastructure needed to assure stable supply. Intermittent energy such as wind farm generation is considered to have a significant effect on stability of supply.

Capital avoidance is given a high importance rating for most respondents, despite the current regulatory environment not directly supporting this driver.

Currently, distribution businesses are provided with an incentivised return on capital investment, so it's not always optimal to minimise capital expenditure. One respondent stated that it is *better* capital utilisation that is most required.

All respondents did note that a smarter network would decrease capital costs overall. One reason for this is that power generation must sometimes nearly double in capacity in order to handle peak demand. Better ability to smooth out peaks in demand could result in significant savings by having less generation capacity.

Improvement to workforce safety. Workforce safety was of paramount importance to distribution businesses. However, there was no apparent connection made between smart grids and improvements in workforce safety.

Network security – threats. Network security, in terms of protection from hostile cyber threats, was not top of mind. It was noted as a consideration and a necessary control, but not something that was driving smart grid adoption. One respondent commented that they could see how this issue would be driving smart grid adoption in countries such as the US, but in Australia, it was given a lower

priority.

Reducing carbon emissions. Despite the current media and advertising focus on carbon reduction, many respondents did not see reducing carbon as a key driver for smart grid adoption. However, many respondents predicted that, depending on legislation, it would increase in importance over the next decade.

Renewable energy e.g. wind farms, solar. Managing renewable energy sources are not seen as being a key concern or driver of adoption smart grids. Respondents do, however, expect focus on renewable energy to increase over the next decade.

Many said they were currently managing renewable energy sources such as wind generated electricity at the moment but, the intermittent nature of these sources were a concern as they still are required to be supported by more manageable or predictable (i.e. gas or coal) sources. Only one respondent mentioned the Government's commitment to 20% renewables by 2020 and how that would potentially affect their business.

Electric cars and storage are currently seen as being of low importance in terms of a driver for smart grids, and are an unknown that most are only starting to consider. However they are expected to become an increasingly important factor in the energy equation over the next decade.

Major automotive manufacturers have begun introducing plug-in alternatives in pilot form, with some already committing to manufacturing. As one respondent observed, an automobile consumes nearly as much power as a home; add a million vehicles, you have effectively added a million new homes to the electricity network. One respondent noted the effect of electricity potential being moved from the network to storage in automobile batteries also presents new questions itself: will the transfer always be one-way, or will the home user or network

distributor be able to tap that energy at need? And if so, what are the implications to the profile of what constitutes peak and off-peak consumption and supply?

Micro-generation e.g. PV solar panels. Home / Small Business distributed generation facilities are not seen as important to smart grid adoption.

Many respondents indicated that they had been managing solar panels for years. However, two provided examples of where solar panel use has increased and caused operational and network issues:

“We are starting to really feel the impact of micro generation as we are now processing 30,000 applications for solar panels a year and, as we don’t have a bi-directional network – it’s becoming a huge challenge.” CIO.

Another respondent referred to a business customer which wanted to generate up to 500kw of power to be fed back into the grid.

These initiatives will put stress on existing distribution systems to model and manage load to ensure steady electricity supply, and modernisation through a smart grid may be essential to ensure success.

Alternative and more flexible tariffs are not seen as important, and weren’t even a consideration for most.

One respondent indicated they might become a fundamental enabler for changing an energy retailer’s business model. This requires better information, better usage profiling, and will be more easily facilitated by the better tracking afforded by adding data to the metering of supply.

Key insight:

Respondents are cautiously optimistic that a smart grid will deliver on all key drivers, but are unable to quantify these benefits as a comprehensive business case for a smart grid does not presently exist in the world today. However, many noted improvements in the visibility of the network, peak load management, and network reliability would be obvious benefits.

3. What are your expectations of smart grids in terms of addressing your key drivers? Do you think they will improve – and by how much?

Confidence that smart grids will deliver benefits across all key drivers was resounding and unanimous, though for most, these were currently difficult to quantify.

Reference was made to evidence from overseas case studies that suggested enhanced monitoring and control would likely lead to significant improvements in key drivers such as reliability improvement, capital efficiency and demand management. One respondent noted that in particular, a smart grid would be essential to properly quantify required improvements in carbon emissions.

Advantages of the smart grid are also seen to include better visibility of the current performance of the network, more tailored and targeted maintenance and better network management under peak loads as well as improving the ability to incorporate renewable energy into the network and so support better sustainability.

Some comments include:

“Traditionally a Distribution Business lacks information regarding performance and a smart grid will give us a lot of information around power quality for example.” Group Manager, Network Strategy Development.

“Smart grid is a fundamental enabler to shape the network going forward and a big investment is needed.” Manager, Corporate Strategy.

“There is no doubt the technology will work.” General Manager, System Management.

“The network is going to be more visual and that’s the biggest benefit.” CIO

One respondent noted that a smart grid will result in more automated processes based on established and workable rules, and depend less on what is in an individual engineer’s head at the time. Better process and less reliance on personal decision making is generally seen as a benefit in this context, as is an easier transfer of knowledge between staff.

Some respondents gave examples of savings made or key improvements found through projects that fall under the smart grid banner, such as data centre savings through an improved communications network.

Respondents were generally concerned that there were a lot of unknowns. A large amount of work is now involved in expanding each question, each issue and response into well-formed business cases suitable to describe the required capital investment. Smart grid initiatives need these business cases to move forward, and it’s generally seen by respondents as a work in progress.

“We need to assess every cause and effect and ensure we don’t burn a lot of money and invest in a considered way. It might take 20-25 years, but we’ll get there.” Group General Manager, Network.

“We are doing pilots to determine what we don’t know and are seeing where we are going to get the biggest bang for our buck. In some areas the benefits are going to be obvious, for example the sensors that will give you the information you need to improve your network performance.” CIO.

4. What do you see as the key challenges in relation to smart grids?

This question generated a lot of discussion, and the response indicated a focus around the key areas of the regulatory framework, funding, ICT, people,

Whose job is it?

Who makes the investment?

Who gets the benefit in the value chain, and how will this be managed in a regulated environment?

The distribution businesses will need incentives to invest in a smart grid, and this will require a framework that appropriately rewards the parties taking the risk for making the investment.

Quandary

The distribution businesses need to invest to determine the best strategies, to determine where investment needs to be made to effect positive change toward a smart grid. This means making recommendations on regulatory changes. Yet they are closely constrained by those regulations in where they can effectively invest – Catch-22. This indicates some government support is required to proceed.

Fortunately, much of what constitutes the smart grid can be described as an accelerated evolution of business-as-usual, and mainly involves adapting existing initiatives to the accelerated time line for change.

strategy and the consumer.

Regulatory framework

Many respondents mentioned that the current regulatory framework does not support the move towards smart grids. In particular a distribution business is incented to invest in capital assets and gains a return from such assets. As a smart grid will serve to reduce capital expenditure, the incentive to develop a smarter network and thus reduce capital expenditure is not there for a distributor.

Some indicated the inability to accept supplementary submissions, when planning is locked in over a period of five years, makes it difficult to introduce anything new, and developing a smart grid will require new initiatives to succeed.

“The key challenge is that you are planning in a 5 year period. So what happens when a new solution comes up whilst you are planning? The regulatory framework should easily accommodate supplementary submissions.” General Manager, System Management.

Many respondents said regulation doesn't allow for any return on innovation. Smart grids require a substantial investment in research and development and at present the regulators do not offer a framework to reward R&D. This is seen as a big issue by the energy community affecting many parts of the value chain, including retailers.

***“Retailers – what is their involvement and why aren’t they looking to do energy peak management? Why aren’t they looking to include renewables? The answer is they are not currently incentivised by the regulator.”
Executive General Manager.***

It was mentioned that there are many different people involved in looking at the policy development and the regulatory environment, including the Energy Networks Association, Smart Grid Australia and others, which underlines the common theme of the study, that a collaborative effort is needed between government, the energy regulators and the electrical industry to provide the correct framework for progress towards a smart grid. A common vision for this framework is vital to success. And at present, there is a lack of information to provide a complete business case for a smart grid, so the question of where exactly to invest remains an open one.

“Technology is not the issue. It’s the politics, regulatory, social issues that are more difficult.” CEO

Disaggregation

Disaggregation was seen as a challenge, because the benefits of a smart grid are therefore dispersed amongst the generator, distributor, and retailer, which makes a single business case difficult to put together.

***“Distributors, retailers and generators need to work in synergy for smart grids to really work, and there is no current drive to make that happen.”
Executive General Manager.***

“The whole industry is not structured to do smart grids, as we need an integrated business, so there are no efficiencies for those businesses that are disaggregated.” Group General Manager, Network Strategy Development.

Key insight:

The main challenges the industry described to a smart grid transition are:

- The concern over consumer engagement and education to realise the full benefits of a smart grid.
- The lack of an appropriate regulatory framework that adequately fosters investment and R&D.
- Disaggregation of the industry and lack of alignment between where the investment is made and where the benefits are realised (e.g. network roll out of smart meters but retailers control demand)
- Funding the development of a smart grid and ensuring a strong business case when there are many unknowns
- The immaturity of current technologies (and the inherent risk), and the challenge of integrating the real time network into modern IT systems.

Funding

There are no allocations for smart grid at present. Funding must come from a comprehensive business case and framework, and, these do not necessarily exist at present.

ICT Challenges

ICT and real time systems were seen as a major challenge, with concerns over the sheer volume of new data that a smart grid would represent. Managing that amount of data and making sense of it are key concerns, as is the development of the telecommunications systems necessary to bring smart grid technology to millions of new end points, such as will be required by smart metering.

“The problem for IT is going to be managing all the end points. For example we manage thousands of desktops – now we are going to be managing literally millions of end points/smart meters. How are you going to store and manage the data? How do you get intelligence from the data? How do you turn away data you don’t want? How are you going to upgrade the technology for millions of end points? How are you going to assess the functionality etc?” CIO.

Making the right decisions in terms of technology solutions is also a key issue expressed by respondents as new vendors and products are introduced into the market.

“The space is moving so quickly – the technology we deploy now will be obsolete in five years. We are trying to future proof as much as we can. We need to continue to trial certain solutions and technologies.”
General Manager, Intelligent Network.

“It’s a whole bunch of new technology and no-one in the world has worked it out yet.” General Manager, AMI.

Key insight: (continued).

- Lack of adequate skills (of engineers and technology employees)
- The challenge of major organisational change.

“The current operations are mature for a distribution business. Now we are going extend IT into the grid. The challenges are around technology and the architecture.” CIO.

One respondent pointed out that smart metering may require a new security focus due to the introduction of a metering data network to home and business customers.

Developing the right strategy and roadmap

Where to start? What structure is needed? Where to invest and how to recognise success? There was a concern among all respondents of the need to ensure that the organisation is making the right decisions.

***“We are entering the biggest investment in the history of the organisation.”
Group GM, Network.***

“We need to ensure that the organisation is making the right decisions. Really understanding what we want to get out of it from a business perspective and for the consumer. There is no point in spending dollars unless we know what we want to achieve.” CIO.

It was also recognised that the development of a strategy involves an investment itself with trials and pilots to determine where the best return on investment could be made.

One respondent (CIO) noted the importance of simply determining how many value opportunities exist. “There must be over 50 of them – which ones are we going to pick up?”

Many mentioned they still have a lot to learn in order to justify the investment, the lack of information available to do so and the limited funding available for research and development to do the job properly.

Consumer engagement

Many noted that engagement and education of the consumer is the key to success for a smart grid strategy. Government investment and policy was thought to be needed to engage the consumer and manage issues, in particular around demand management (managing peaks in demand).

One example was given regarding a distribution business having control of consumers' appliances in the home.

“Will consumers agree to us turning off their appliances remotely or are we going to be seen as Big Brother? Who is going to tell the consumer that we are going to do this and get their agreement for us to do so? What are the privacy issues that need to be overcome?”

General Manager, System Management.

Concern was also raised over whose responsibility it was to engage the consumer to manage peak demand as well as promote generation in the home (micro generation).

“Who is showing consumers what benefits there are and why they will do it?” ***Manager, Corporate Strategy.***

“Whose business case is it to enable generation at the home?”
General Manager, Network.

Interestingly, many respondents said they, as distributors, had responsibility to educate the consumer as well. This comment was made by some even without integrated retail businesses.

***“We need to find a way to influence customer and business behaviour.”
Manager, AMI.***

One respondent noted that many distribution businesses were not actively engaging the customer and the US Boulder case study was a perfect example of what goes wrong when you don't engage.

Comments were also made about the consumer's role in the more efficient use of energy. How are the consumers going to be included in the power equation? Will they just be better informed, or will they have a more active role to play in the consumption, generation and storage of energy use?

Many explained the difficulty in finalising their strategy due to the uncertainty around consumer engagement. One respondent described the impact on their existing business model.

“It's a much riskier business model, beyond poles and wires, as it's now about a customer response. Letting customer response drive initiatives is riskier. We have to break the existing business model and build a new one. And it's a riskier model because there is no framework in place.” CEO.

Many commented that consumers didn't appear to care about renewables and questioned at what point did pricing become a driver for change. That is, would they pay more to use clean energy?

“The societal impact is changing – how customers use their energy is changing. The playground for people has moved from outside the home to indoors. This means more energy is being used and the time of use is less predictable. There are more appliances using more energy such as plasma televisions and electricity needs to move from non-elastic to elastic to accommodate these changes.” Executive GM.

People and skills

The respondents noted that leadership will need to effect a change in how people within their organisations work, to grow and adapt to this new direction for the industry.

Challenges include internal education and engagement, change management and the need for additional training to add new IT focused skill sets to the organisation, in many cases for an older workforce.

“Power guys don’t understand what the IT guys do and the IT guys don’t understand what the power guys do” GM, Communications.

New technical challenges imposed by the development of smart grids will need to be met with new solutions. Respondents indicated concern over the availability of enough skilled people to support these new solutions, and observe that the universities and other educational bodies are not turning out enough people with the right skill sets.

A general change in thinking is required

Another respondent noted the challenge of 30% of their asset base going from a 40 year cycle to a 5 year planning cycle and that a major effort will be needed to on their part to adapt to this significant shift in focus

“The other issue is that smart grids are a major paradigm shift for our industry. The current planning and thinking is around the current paradigm. But it’s going to be such a major shift- people need to adjust their thinking and that isn’t happening.” Executive GM.

5. *What investment do you think needs to be made for your organisation's smart grid strategy?*

Respondents have indicated that investment needs to be made in ICT infrastructure to manage the expected increase in bi-directional data traffic and the corresponding greater need for data storage as well as additional investment in control technology such as SCADA.

Investment in strategic work was also needed to define the outcomes on which measures will be based and what technologies will need to be developed to achieve them. Many indicated a need to learn from international experience. Survey participants also indicated there will be a need to invest in education as a portion of any evolving strategy. Some noted the investment was also in the new way of thinking and changing beyond anything they've thought of before.

Respondents also pointed to the need for talent acquisition and training, with internal education as a key investment for the future.

Many noted that the investment would be continually evolving and could possibly be noted as upgrading the existing infrastructure, so business as usual, or as one respondent noted "enlightened BAU". Another noted that the investment needed to be made to prove benefits to consumers and retailers.

Achieving core functionality of smart grid implementation is seen by respondents as requiring substantial investment and R&D.

Overall, there was a low level of awareness of the total investment required and many expressed difficulty in quantifying the investment and all said there wasn't a number that could be quoted. As indicated in question three, there was some concern as to who makes the investment vs. who gets the benefit in the value change, and concern as to how that will be managed in a regulatory environment.

Key insight:

No respondents have a comprehensive smart grid budget. Much of the initial investment in smart grid preparation is prioritising:

- Research and study trips for business case development
- Smart metering (in Victoria)
- Integrating telecommunications and back-end infrastructure to support two-way data flow

There must be a framework that rewards the appropriate people who will take the risk for making the investment.

6. Do you have any current regulatory allocations for smart grid?

A few of the respondents indicated they have received allocations for smart grid, though some indicated they were not titled 'smart grid' – rather projects that could fall under the 'smart grid' banner, including amounts for monitoring, the Solar Cities program, and communications upgrades.

Most however, gave a simple "No", with the exception of those who included smart metering in the calculation. Allocations for smart metering are quite substantial, but, for the most part, involve expenditure currently allocated and underway. Much of the investment required for smart grid is not yet differentiated from business as usual.

7. Do you have an overall budget for smart grid?

Generally, no, with a few exceptions. As per question five, budgeting tends to support individual projects associated with a smart grid strategy, and many do not have a line item titled smart grid.

"If you add up all the components, approximately 20% of the network will be upgraded with new technology - which is technically a smart grid." - Chief Technology Officer.

8. Which of the projects do you have funding for?

Advanced Metering was the most prominent existing expenditure to date, however many 'business as usual' projects to upgrade the network and make it more intelligent fall easily under the smart grid banner. As smart grids are in the early stages of development, some respondents had funding for trials to support the strategy development. One respondent indicated that the onset of smart grids

had accelerated key projects.

Projects underway by respondents include:

- Smart metering, including trials, pilots and rollouts.
- Rolling out new communications networks including last mile communications
- Accelerating network augmentation
- Demand management
- Fault isolation
- Community trials around demand management, energy conservation, and smart metering
- Research and demonstration centres
- Home area networks
- Real-time management of faults and operations
- SCADA upgrades
- OMS development
- GIS improvements
- DMS
- High speed fibre optic networks
- Solar cities
- Energy storage and electric car trials
- Market segmentation and customer engagement

Key insight:

Most respondents state they are reorganising to deliver a smarter network and acknowledge that smart grids have a major impact on people, skills, training and education.

9. How will your organisation be structured to undertake the smart grid evolution?

There is no common approach to organisational restructure around smart grids. However, the majority of respondents have already restructured to support the smart grid vision, or understood they would need to restructure, based on the outcome of their smart grid strategy.

All, however, understand that smart grids have a major impact on people, skills and resources and thus major organisational change will be required.

Major institutional change is neither inexpensive nor easy, but some respondents have decided to plan for this change in advance of expected mandates so as not to be caught out.

As a result, there is a clear drift toward the development of teams and organisational structures that can align with smart grid objectives. A few respondents already have smart grid-oriented organisational structures in place.

Respondents are implementing a myriad of approaches to organisational structure:

- One respondent has noted that an integrated steering committee is now in place that puts governance over the top of the smart grid, as it goes into all aspects of the business.
- One respondent said it's too early to think about reorganisation, as the strategy is still evolving.
- One respondent has a functional review underway on how to best manage the IT and operational technology, and has set up a cross-divisional team.

- One respondent has built an entirely new division for their infrastructure strategy, as well as a steering committee for smart grid.
- One respondent has gone through a massive structural change for smart grid, with clear accountability for network technology strategy.
- One respondent indicates the structure is still to be worked out, and is focused on smart meters as a prerequisite to evolving to a smart grid.
- One respondent indicated that structural changes will depend on what mandates are imposed. It's likely that they will establish a business division with a specific job of delivering the mandated requirements to ensure the highest level of focus. It may mean bolstering their asset strategy group.
- One respondent indicated they need to 'skill up' to build the right smart grid team.
- One respondent indicated they have already restructured as a result of an earlier need to have a core area for accountability for technology transformation and change management, which is seen to be well aligned toward achieving the objectives of a smart grid.
- One respondent mentioned they're holding off restructure until they can integrate the lessons from a smart grid pilot in progress now.

Key insight:

Respondents are cautious about the smart grid timeline. At this stage timelines exist for specific projects, but an overall roadmap and timeline is unrealistic.

10. Have you considered KPIs regarding the development of a smart grid? If yes, what are they?

Most indicated no, with only three exceptions. Some have existing KPI's, including safety, reliability and service standards, and demand management. They are considering others such as carbon management, research and development, and advantages to the consumer.

Some respondents note a need for a holistic approach and thinking in terms of integration of their systems. One respondent noted that the development of the strategy and roadmap is their KPI. Many have indicated that they are too early for KPI's, and that they will be an outcome of strategies under development.

11. Do you have an overall smart grid timeline and project plan or timelines for individual projects?

The majority of respondents have timelines for individual projects but indicated they would have an overall roadmap and timeline post smart grid strategy development.

“Over the next 12 months the strategy will include a timeframe with a 3 year horizon with various steps in the roadmap.”

Group General Manager, Network.

A number expressed that the plan would need to be flexible to accommodate changes in the strategy and future unknown scenarios.

“We are scenario planning at the moment and need to map our strategy across unknowns including tariffs/pricing, spectrum, the NBN, mobile storage, advances in PEV etc.” Group Manager.

Advanced Metering, seen as a fundamental component of the smart grid, is already undergoing rollout by some. Other individual projects are currently managed as business as usual, with a mix of separate project teams, or within the existing organisational structure.

Key insight:

- Outage Management is rolling out at most distribution businesses.
- Automated Monitoring has been ongoing for some time; smart grid will see it integrating into the low voltage network.
- Currently, there is a strong focus on AMI and Smart Metering trials and roll out.

12. What projects are being undertaken first to move towards a smart grid, and what is their maturity?

The varied mix of responses to this question depicts the wide spectrum of levels of adoption of smart grid in Australia. Across all possible projects in the smart grid spectrum, many respondents had key projects that could be titled 'leading edge' and then also had projects that technologically, lagged seriously behind.

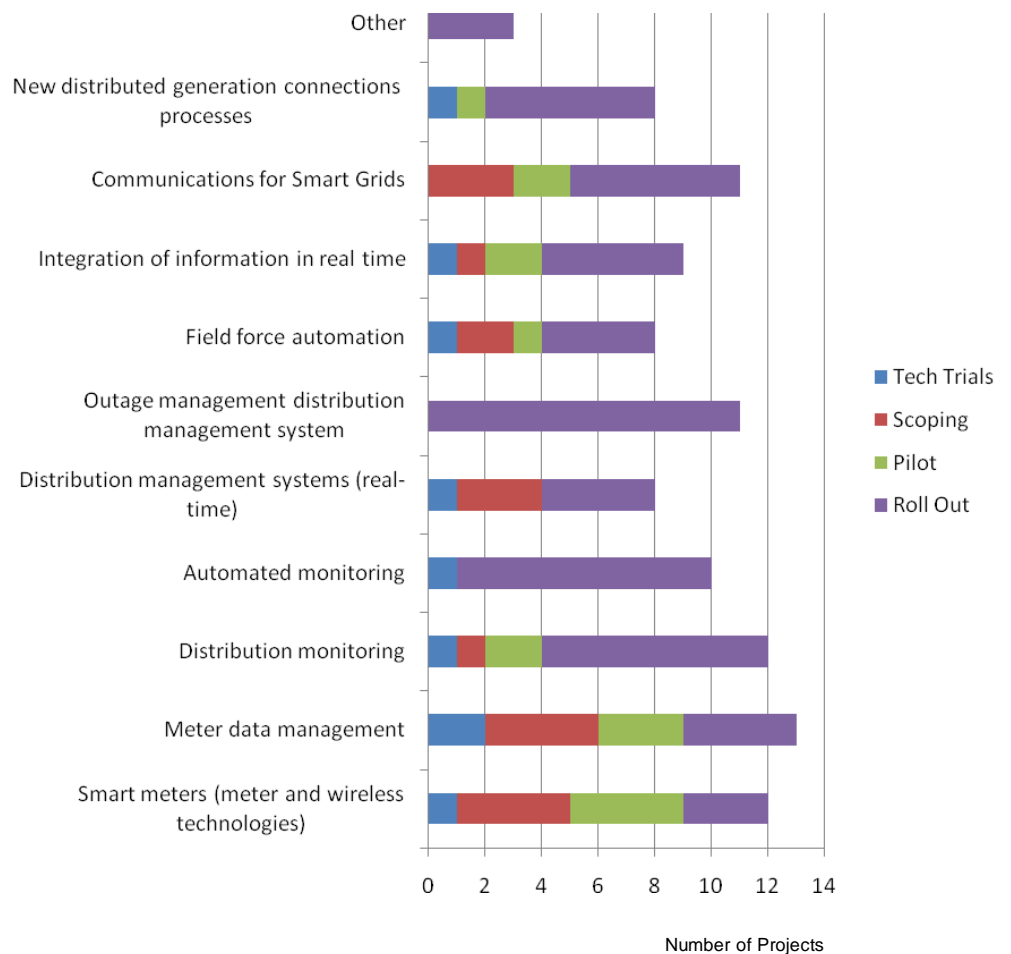
Overall, strategies, studies and smart metering are the order of the day. Some respondents are already rolling out smart metering and are working on developing plans to integrate telecommunications and back-end IT infrastructure to support the two-way data interchange this represents.

Advanced outage management in distribution systems is perhaps the most advanced initiative, with all respondents reporting having reached the point of rolling it out. However, distribution monitoring indicated as "rolled out" is, for most, only at the high-voltage level, extending only to the distribution-substation level at present. Smart grid will be faced with extending the distribution down to low voltage level, which only some respondents were working on.

Back-haul communications are undergoing review as well, and there are some concerns as to the right approach. Communications to support millions of new data end points and the sheer bulk of data are involved, and projects are underway to plan what is essentially a new data network in support of the smart grid.

Concern over the impact of the National Broadband Network (NBN) on existing communications infrastructure was prevalent amongst respondents.

Distributed generation was seen as something many have been doing for years and was not a key concern, as some respondents already have buy-back schemes in place. However, one respondent is supporting an aggressive third-party push toward photovoltaic micro generation, amounting to thousands of new applications per month, which was forcing new thinking regarding management of consumer demand.



13. Do you see smart metering and smart grids as independent projects?

Respondents replied no, across the board. Smart Metering can be seen as the first step toward a comprehensive smart grid strategy, and Victoria is using it as a building block for smart grids. Where it's included in the strategy, it's seen as an integral part of it.

Some respondents noted that it's possible to have a smart grid without advanced metering, for example by connecting additional sensors and communications to existing meters, but it's clear that more and better usage information is needed and it's fairly clear the meter is a good way to acquire it. The back-haul communications network upgrades needed to support Smart Meters extend throughout the distribution network, and although the need for new communications bandwidth isn't limited to supporting Smart Meters, they will need to be integrated with them.

14. Are you looking internationally for guidance and advice? If so, where? List other companies you are drawing advice from.

Many respondents were spending much of their time collating information on smart grids. A few respondents had already embarked on international study tours. A substantial number of others are planning them.

For those that had investigated Europe and the US, many saw a closer alignment with Europe and noted that Europe was more advanced in terms of the roll out of smart metering, demand management, and distributed generation.

Italy and Sweden are seen as advanced in smart grid and are already beginning to show measurable returns.

Key insight:

The majority are looking overseas for real smart grid business cases. There are currently two separate approaches to smart grids as demonstrated in Europe and the USA. Many found a closer alignment and noted Europe is far more advanced in smart metering, technology development, and use of renewable energy sources.

Respondents noted the following information sources:

CEATI (www.ceati.com) is the Centre for Energy Advancement through Technological Innovation. Their efforts are driven by over 100 participating organisations drawn from electricity and gas utilities, governmental agencies, and state research bodies. They offer a number of Best Practice guides for executing Energy industry projects.

EDF – France was chosen by EPRI (Electric Power Research Institute) to conduct several EPRI smart grid demonstrations. A pilot project begun in 2008 to roll out 300,000 meters in the regions of Tours and Lyon.

(http://www.smartgrid.epri.com/smartgrid_demo.html).

Xcel Energy, Boulder, USA (<http://smartgridcity.xcelenergy.com/index.asp>) is carrying out a “SmartGridCity” pilot study. Qualified homes may receive no cost installation and use of smart in-home devices that help manage energy use and environmental impact. However, this study demonstrated issues with consumer engagement and lack of competitive pricing to incentivise consumers to take up the offer.

Italy – Enel (www.enel.it)

The world's largest smart meter deployment was undertaken by Enel, the dominant utility in Italy with over 27 million customers. Between 2000 and 2005 Enel deployed smart meters to its entire customer base.

San Diego (www.sempra.com) **San Diego Gas & Electric** (SDG&E), UC San Diego and **CleanTECH San Diego** recently announced the formation of a coalition of 25 local, national and global organizations to transform the San Diego region's electrical grid into a digital smart grid.

Sempra recently was ranked first in the US for smart grid adoption by the Intelligent Utility magazine with plans to convert 1.4million meters to smart meters by end 2011. It's subsidiary, San Diego Gas & Electric has also been picked as a part of a \$99.8 million federal grant to help make the city's grid plug-in ready for the cars of the future.

The European Commission published in the end of 2006 a call for a smart grid ERA-NET (<http://www.eranet-smartgrids.eu/>) The SmartGrids ERA-NET comprises a consortium of partners representing several European countries, an essential criterion for the transnational collaboration and research activities necessary to achieve the action's aims. Research and strategic gaps will be assessed and action taken across the network to deliver coordinated, joint calls for funding proposals.

This research may include specific studies into electrical transport systems (e.g. to facilitate grid integration of large-scale electricity with renewables), electrical distribution systems (e.g. to assist Europe's more than 3 000 Distribution System Operators in sustaining electricity supply), or regulatory issues.

The Gridwise Alliance (<http://www.gridwise.org/index.asp>) offers advocacy for a smarter grid and offers a number of publications relating to smart grid and its defining characteristics.

Current Group www.currentgroup.com CURRENT provides real time distribution grid visibility through intelligent sensing and analytics to enable utilities to maximize the value of existing assets while incorporating renewable sources of generation.

Landis + Gyr are suppliers of smart grid technology branded as “Gridstream” (<http://www.landisgyr.com/na/Gridstream>). They supply multi-energy advanced metering, personal energy management and distribution automation equipment.

Powersense in Germany (<http://www.powersense.dk>) supply monitoring and control equipment with integrated supervision that apply to smart grid power infrastructure and offer pilot installations.

Cisco (<http://www.cisco.com>) delivers IP based secure communications infrastructure for the smart grid from generation to businesses and homes.

Google has posted a position paper on the subject of smart grids. They intend to develop energy information software tools, invest in energy technology companies, and advocate policies that advance a smart grid. (<http://www.google.com/googleorg/docs/GooglesmartGrid.pdf>).

Elster (http://www.elster.com/en/smart_grid.html) offer smart metering systems, demand response technologies, and smart grid management solutions.

Logica Case Study:**Vattenfall, Sweden**

Vattenfall's new automated metering infrastructure provides more information about energy flows at distribution level and the automated infrastructure also lays the foundations for distributed generation and 'smart grids'. It also offers the potential for better forecasting and thus reduced risk for trades in the wholesale market. Systems such as this are helping the national government to hit stringent targets for more frequent metering and are thus driving efficiencies into energy markets.

15. Have you seen any examples of demonstrable business case benefits through the implementation of any smart grid projects – including smart metering?

Consensus was that Australia is only in the early stages of developing a smart grid, and business initiatives advanced enough to use as examples are sparsely distributed. Many respondents are looking for examples overseas, where progress is more advanced. Planned study tours include visits to Italy, Portugal, Sweden, Germany and the US.

Specific details include Booz Allen Hamilton's business case model, remote connect/disconnect in New Zealand, Enel in Italy, and Energy Australia's PINC network.

Energy Australia's PINC (Platform for Intelligent Network Communications) project involves the roll-out of 700 kilometres of aerial optical fibre – an element of the power company's Platform for Intelligent Network Communications (PINC) project. The fibre links up around 200 zone substations to make it easier for Energy Australia to manage and maintain its high voltage assets and telecommunications. (<http://www.bbau.com.au/Default.aspx?aCateld=923>).

One respondent pointed to the San Diego micro generation business case as being highly detailed, and many mentioned Xcel Energy.

16. Have you seen anything in the market at the moment that has impressed you regarding smart grids, such as demonstrations, presentations or papers?

Respondents noted papers available from CEATI, the city of Boulder, Colorado, and the Micro grid demonstrations in the beach cities of California.

The State of the Nation smart grid report

(<http://www.oe.energy.gov/smartgrid.htm>) was referenced by a number of respondents, and the Department of Energy analysis was highly regarded.

Tendril Networks (Boulder, Colorado) produces hardware and software for demand response, load control, energy monitoring, and energy management, and is partnering with GE. Analysis at

http://www.smartgridnews.com/artman/publish/industry/Can_Tendril_Sell_smart_Grid_Directly_to_Consumers.html.

Microsoft's announcement **Microsoft Hohm**, was referenced, an application to enable consumers to better understand their energy usage

http://www.microsoft.com/presspass/press/2009/jun09/06-24EnergyUsagePR.msp?rss_fdn=Press%20Releases.

4th Generation wireless was seen by some respondents as an important smart grid technology. Ref.

<http://www.reuters.com/article/pressRelease/idUS209890+29-Jul-2009+BW20090729> (Reuters) and the UCLA studies at <http://winmec.ucla.edu/smartgrid/2009-11/>

Current Group, Elster metering, and the use of the i-Phone to communicate with appliances were also mentioned.

Respondents are accumulating their own data and building their own demonstration centres. Real world examples are generally seen as trumping presentations by vendors.

17. How important is it for your company to include business case benefits in your smart grid strategy?

The overwhelming response to this question was “Very important”. This is seen as a critical step by all respondents, due to the need to align funding with KPIs and measurable results. One respondent emphatically stated that “Business models of today simply aren’t going to be the business models of the future”. Capital investment is seen as only the beginning.

“We will never be capable of justifying a smart grid business case in all its glory as a distribution company when some of the benefits may lie elsewhere in the value chain. The business case needs to be driven by Government and legislated i.e. just like AMI.” CIO.

Similarly, this comment:

“At the end of the day there needs to be a business case but the benefits are broader than just for our company - it needs to be for the community.” Group Manager.

Key insight:

Many respondents believed the Australian Government's initial \$100 M investment was a step in the right direction for smart grids. There was concern that this funding may not be adequate.

18. What is your view of the Federal Government's \$100m expenditure on smart grids?

Most respondents believed it was a step in the right direction though funding required for actual rollout of change would be several orders of magnitude larger. There was a concern that the existing pilot funding may also be inadequate, even for initial R&D.

Responses included the following:

- “Good that it has focus and will help draw attention to the issues – however needs to have a common understanding of the smart grid. Model city is not the way to go; we need smaller projects across different locations. Not enough funding. \$100m is a token amount.”
- “Great idea – but not enough funding. Nobody knows if it is an NBN or a power company project. Funding only for pilots really.”
- “Good. \$100m though is a marketing ploy by Federal Government – it's not going to deliver. Decision is whether it's all spent in one location or on many initiatives. Our view is it needs to explore all elements of business, a holistic view – to determine the business case.”
- “Bold initiative – copying the US and Europe. Good idea, but how is it going to play out in the end? Do just business cases get the reward? But if we don't get the Federal dollars, the [State] Government will need to invest.”
- “A bit concerned that this will be solar city all over again – could potentially be the same thing. A lot of work needs to be done in the smart grid area and government are going to be quite heavy on the green agenda. Policy point of view needed on electric cars.”
- “The concept is a good one. Excellent catalyst to get sessions going. Caveats that might ruin it at the moment. Great that there is funding... however we should not be re-inventing the wheel.”

- Focus should be on collaborative R&D initiatives (on aspects not being researched elsewhere in the world) or aspects that are unique to Australia
- In Australia everybody appears to be doing their own thing independently
- Will be forced to run with shovel ready technologies to minimise risk/embarrassment
- High risk
- Logistically complex
- Still too many unknowns
- Significant commitment just to bid
- Will overlap in some respects to Solar Cities
- “Unsure of where it’s at the moment. Have to get enough to answer key questions. But is has to involve and engage the customer. The bit missing is the home management system and carbon taxes.
- Single biggest issue for [us] is demand profile. Peak loads on hot days. Investment in how to bring the peak down is needed.”

Findings Summary

- All respondents are starting to develop a smart grid strategy and roadmap and a few early adopters are refining existing smart grid strategies.
- Some noted a significant change to their existing business models and requirement for a new way of thinking, particularly around consumer engagement; whilst others saw a smart grid as a business as usual upgrade of their existing network and smart grid was just a “buzz word”.
- The industry has identified current drivers for a smart grid as being reliability, reducing capital investment and network costs, demand side management and network security. The long term drivers are focused on a greater use of renewable energy and consumer preferences and take up of low carbon products and services.
- All respondents indicated that a smart grid was a business imperative. However the sector is at different stages of developing their strategies.
- Respondents are confident that a smart grid will deliver on all key drivers, but are unable to quantify these benefits.
- Most current funding is allocated for smart metering and communication trials.
- Current regulatory framework isn't designed to:
 - Entice the industry to invest in smart grid.
 - Allocate benefits to the investment.
 - Drive collaboration across the value chain
- No respondents have a comprehensive smart grid budget.
- Respondents are cautious about the smart grid timeline. At this stage timelines exist for specific projects, but an overall roadmap and timeline is unrealistic.

- Most respondents state they are reorganising to deliver a smarter network, whilst focusing on business as usual (BAU) and enhanced technologies as part of the current network determination.
- Most are aware of or investing in research in overseas experience. Respondents are well informed of international examples and case studies of smart grids. Many noted Europe is far more advanced in smart metering and technology development.
- Scepticism of business cases to justify smart grid investment is widespread. All respondents see the business case justification as essential and are concerned about the lack of information to deliver one.
- Respondents are generally positive to the Federal Government's \$100M allocation, but hold reservations – the investment is inadequate to achieve anything more than pilot objectives.
- The study indicated that Australian Network Businesses are clearly aware of the challenges and opportunities a smart grid represents.
- Most respondents been trialling smart metering and associated technologies for some time.
- The main challenges the industry described to a smart grid transition are:
 - The concern over consumer engagement and education to realise the full benefits of a smart grid.
 - The lack of an appropriate regulatory framework that adequately fosters investment and R&D.
 - Disaggregation of the industry and lack of alignment between where the investment is made and where the benefits are realised (e.g. network roll out of smart meters but retailers control demand)
 - Funding the development of a smart grid and ensuring a strong business case when there are many unknowns

- The immaturity of current technologies (and the inherent risk), and the challenge of integrating the real time network into modern IT systems.
- Lack of adequate skills (of engineers and technology employees)
- The challenge of major organisational change.

Logica Conclusions

In conclusion, Logica believes that the smart grid phenomenon represents a generational pivot point in the industry, akin to the internet revolution, and will require coordinated and concerted effort from all sectors of society.

The political landscape must formulate the right policies to be implemented by the regulatory regime, and therefore drive the right focus and behaviours from both network energy and utilities businesses and consumers.

The collaboration of the market players will require vision, determination and action, as the refresh of a hundred year old electricity network is a long term program of work, with many obstacles and challenges.

It is Logica's view that the Australian energy market comprises of professional people who are eager to participate in the smart grid revolution. The industry needs continued widespread political will and the right economic model to succeed.

Logica Case Study: InovGrid, EDP, Portugal

With six million customers, Energías de Portugal (EDP) ranks among Europe's major electricity operators, as well as being one of Portugal's largest business groups.

Logica is the systems integrator in the InovGrid consortium, including the Portuguese government and EDP. The project encompasses smart metering, distribution management and integration of micro-generation (solar and wind) and Logica's role is to develop the infrastructure and services, to enable Smart Grid Management for EDP's distribution network.

The infrastructure under development comprises of three levels;

- At the client delivery point level – deployment of Energy Boxes (EB);
- At the medium voltage to low voltage distribution transformer level - deployment of the distribution transformer controller (DTC);
- At the central backend systems - implementation of central management and supervision system integrated with legacy systems.

The energy box has several capabilities including:

- Smart metering
- Service control (circuit breaker)
- LAN communications
- Home Area Networks (HAN) communications. In the current phase this is not yet implemented, but in the near future the Energy Box will be able to communicate with HOME Devices via Bluetooth, ZigBee, or others)

The project status so far is as follows:

- In a first phase to November 2009, 500 Energy Boxes will be rolled out. The next phase will see a Smart City completed with 50,000 Energy Boxes during Q1 2010. The final roll out to six million customers will be completed by 2015.
- 25,000 I&C MV and special LV customer meters deployed for automated data collection on a daily basis.
- Wind Farm Management system for 48 wind farms deployed.
- Smart grid control room deployed

Additional Information

Consumer Study

Turning concern into action: Energy efficiency and the European consumer

This major pan-European study examined consumer attitudes towards climate change, their personal action to reduce consumption, blockers to this behaviour and the potential role of information and technology as enablers of increased energy efficiency action. This was based on telephone interviews with a representative sample of 10,000 consumers across 10 countries.

White Paper

The next stage in metering: Delivering smart value

Smart metering can be part of a positive transformation of utility businesses. However, this must be built on a clear business case, the right technology choices and implementation. To achieve substantial benefits, it is vital that smart metering is set in the broader context of improving efficiency and reducing costs across metering operations, retail and even production.

White Paper

Energy in 2020

A vision for utilities and consumers: Meeting our future energy needs

This paper sets out why energy sector organisations need to transform, and what the industry could look like by 2020.

More information can be found at : www.logica.com/smartmetering



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