

Electricity Smart Networks

Tasmanian Government Information Paper

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Executive Summary

The Tasmanian Government is working towards a major reform of the Tasmanian electricity industry, which will provide all Tasmanian electricity customers with a choice of the retailer for their electricity.

The reforms will put downward pressure on prices and will also open up the market to longer term non-price benefits such as greater choices in products tailored to suit customer needs and improved service standards.

This paper considers the role that smart networking technology – or linking the electricity network up with a communications network – can help promote the Government’s objectives of:

1. Lowest sustainable electricity bills;
2. Long-term safe, secure and reliable supplies of electricity;
3. Maximise the value of Tasmania’s low carbon advantage and the brand benefits of clean Tasmanian electricity; and
4. Financially viable state-owned electricity businesses that run efficiently and effectively and maximise the overall economic benefit to Tasmania.

A smart network would be a platform technology that supports customer engagement in the electricity market, moving the entire philosophy of the industry from a supply-side model to a model where customers can actively participate by making informed decisions about their electricity use.

A smart network will provide a long term framework that can combine with retail competition to provide choice to customers in terms of the services they receive, as well as facilitating a range of energy service solutions that goes well beyond the traditional electricity retail role.

Continuing to move to a smart networking approach will build on the Government’s electricity businesses’ work to date in providing the lowest sustainable electricity bills through reducing the pressure for network augmentation and reinforcement, which is a key driver of capital investment and hence costs to customers.

In the longer term, smart network technologies have the potential to facilitate distributed generation more efficiently and to incorporate distributed generation more holistically into network management.

Given that smart networks are a platform technology that will enable a range of innovative applications into the future, the Government will seek the active involvement of a range of interested stakeholders to capture the benefits of the smart network.

Finally, the Government’s intention to merge the transmission and distribution businesses provides the opportunity in Tasmania for end-to-end smart network solutions, which will further enhance the benefits of smart networking technologies in Tasmania.

Introduction

Smart networks

Smart networks are emerging across the world as a means of transporting electricity more efficiently and effectively. Further, the technology used to develop smart networks also provides a platform to improve the efficiency of the whole electricity supply chain. While the term “smart network” is not specifically defined and depends on the particular solution implemented for each network, the typical characteristics of a smart network approach include:

- a communications-enabled network;
- remote network management;
- enhanced and real-time measurement and data collection of network performance; and
- facilitation of demand side management and distributed generation.

Energy Networks Association Smart Network Objectives

The smart network has five key objectives:

1. change the relationship with customers, transforming their role from uninformed and non-participative to informed, active and involved, stimulating demand side response
2. accommodate connection of widely distributed, renewable energy sources across the network and in particular at customer premises, providing an ‘energy clearing house’ function
3. facilitate market interactions, providing customers access to products and services with choice, based on price and environmental concerns
4. accommodate new energy storage technologies, enabling customers to choose the source of their energy and optimise the efficiency of their use of energy, and
5. continue to improve the performance of the network by:
 - using greatly enhanced data gathering capabilities;
 - detecting and responding to problems automatically;
 - focussing on prevention;
 - strengthening interconnections; and
 - optimising replacement investment.

Delivery of those objectives involves a merging of the existing electricity network infrastructure—upgraded with sensing, monitoring and management devices—with a secure, robust, and reliable communications infrastructure, supported by relevant information technologies, resulting in two-way exchanges of energy and information.

SOURCE: Energy Networks Association *ENA Smart Networks (Smart Grid) Policy Paper*, August 2009.

Smart meters

When integrated with advanced metering infrastructure, smart networks have the capacity to involve customers more directly as participants in the electricity industry, rather than adopting the passive supply model that has been the traditional approach. Giving customers additional information, choice and flexibility around how they manage their electricity usage creates additional options for managing electricity costs. Further, flexibility in customer usage enables a greater range of solutions to technical challenges of electricity supply and raises the prospect of lower costs in building, operating and maintaining the electricity network.

However, smart networks are about more than just smart metering and in fact it is possible to build a smart network without the need for a bulk rollout of advanced metering infrastructure, or smart meters, to all customers. A smart network based on a communications network can deliver significant benefits in terms of network operation and management, investment decisions, more efficient use of the existing network and targeted demand side programs in areas of network capacity.

The communications network is also a platform technology that can be expanded to include a rollout of advanced metering infrastructure if the benefits of a mass rollout exceed the costs.

Tasmanian Government's Electricity Reforms

The Tasmanian Government is implementing an integrated package of reforms to the Tasmanian electricity sector that will meet its objectives, which are:

1. Lowest sustainable electricity bills;
2. Long-term safe, secure and reliable supplies of electricity;
3. Maximise the value of Tasmania's low carbon advantage and the brand benefits of clean Tasmanian electricity; and
4. Financially viable state-owned electricity businesses that run efficiently and effectively and maximise the overall economic benefit to Tasmania.

The key features of the reform package are:

1. Full retail competition will be introduced from 1 January 2014.
2. The Government will sell and transfer Aurora's retail customers in blocks to new, competing private sector retailers, from the start of FRC on 1 January 2014.
3. Aurora's distribution system and Transend's transmission network will be integrated to form a single combined network business. The businesses will be merged from 1 July 2014.
4. Independent regulation of Hydro Tasmania's wholesale market activities by the Tasmanian Economic Regulator from 1 July 2013.

The key features that the Government has so far announced are focussed on meeting its objectives through reforms to the structure of the market, and the rules relating to competition and market participation by the businesses that supply electricity to customers.

The Government's four objectives can also be promoted through adopting new approaches to the other aspects of supplying electricity, including the introduction of smart network solutions in Tasmania.

A Smart Network Policy for Tasmania

Smart Network Principles

The Government has adopted five Principles to guide the development of a Tasmanian Smart Network.

The Principles are:

1. Empowering consumers;
2. More efficient investment with targeted and cost effective reliability and security improvements;
3. Assisting innovation in electricity supply;
4. Facilitating renewable electricity generation and carbon mitigation policies; and
5. Stakeholder engagement and coordination.

The Principles support the Government's broader objectives for electricity reform.

Smart Network Actions

The Principles will be met through immediate, medium and long term actions that will be integrated into the Government's electricity reform agenda. Responsibility for delivering the actions will largely fall to the state's two existing network businesses, and after 1 July 2014, to the single merged network business.

Immediate Actions	Medium Term Actions	Long Term Actions
Within the next 2 years: <ul style="list-style-type: none">• Complete smart network Implementation Plan (by 30 March 2013)• Establish enabling communication platform• Bruny Island Project• Network integration• Non-network development proposals consideration• Remote Area Power Supply• Mobile generators• Fuse savers	Within the next 5 years: <ul style="list-style-type: none">• Peak Performer Initiative• Virtual Network Monitoring• Commercial and Industrial Demand Management• Advanced Automation and Automated load transfers• Dynamic Distribution Line Ratings• Stage I Distributed Generation Integration/Mitigation	More than 5 years away: <ul style="list-style-type: none">• "Last Mile" Communications platform• Statewide Smart Metering• Time of use pricing• Remote meter reading, energisation and de-energisation• Remote fault detection• Full distributed generation and smart energy storage device integration

Empowering Consumers

The electricity market in Australia is facing complex and challenging issues. Customer prices have increased significantly over recent years and further increases in other states are likely. Households and businesses are becoming more dependent on a reliable electricity supply and the pattern of electricity use is increasing demand for electricity a certain peak times, which requires significant investment in electricity networks.

Power of Choice Review – Australian Energy Market Commission

On 6 September 2012 the Australian Energy Market Commission released the draft report of its Power of Choice review. The review intends to identify opportunities for consumers to make informed choices about the way they use electricity and so move away from the traditional supply-side approach to electricity provision.

The reforms proposed in the draft report are aimed at enabling consumers to make informed choices about the way they use electricity and decide what action is best for them. It makes recommendations across all parts of the electricity supply chain designed to:

1. Provide consumers with the information, education, incentives and technology they need to efficiently manage their electricity use.
2. Provide network operators, retailers and other parts of the electricity supply chain with incentives to better support consumer choice and use flexible demand to reduce overall industry capital and operating costs.

Proposals include:

- allowing large consumers or third parties, acting on behalf of consumers, to participate in the wholesale electricity market, and to receive the spot price for changing their demand;
- different electricity tariffs at different times of day and in different locations to reward consumers for changing their behaviour while providing safeguards for vulnerable customers who may be affected by time varying prices;
- improved access to consumption data to inform consumer choices;
- introduction of time varying tariffs to be supported by consumer education to increase understanding of the potential benefits and vulnerable consumer protections;
- encouraging investment in metering technology;
- improved incentives for network service providers to consider demand side participation options rather than additional network investment in poles and wires where efficient to do so; and
- enabling consumers to sell their distributed generation (e.g. solar, embedded generation, battery storage) to parties other than their retail electricity supplier.

The Tasmanian Government supports the initiatives proposed in the draft Power of Choice review. In particular, the Government supports the recommendations relating to:

- support for vulnerable customers;
- enhancing consumers' ability to access consumption information; and
- establishing an overarching framework to encourage commercial investment in better metering and promoting consumer choice and involvement.

The Power of Choice review has a critical part to play in finding ways to ensure that the disaggregated network and retail pricing frameworks appropriately encourage consumers to respond to initiatives developed by network businesses to find cost-effective solutions to network problems.

More efficient investment with targeted and cost effective reliability and security improvements

Rolling out a smart network has significant potential to drive more efficient investment in the Tasmanian electricity network.

In Tasmania, the top 100 MW of distribution network capacity is used for only 55 hours each year. About \$10 million is spent each year on capacity projects to meet these peak times. While this is less 'peaky' than the demand in other states, driven by air conditioner load, it still presents opportunities to use the network more efficiently if demand in those 55 hours can be reduced or moved to another time.

Further, better data and information that can be collected from the smart network will help make better decisions on future investment needs, and will help to optimise the performance of both the transmission and distribution networks as they currently stand.

Merging the State's electricity network businesses, Aurora Distribution and Transend Networks, will ensure that network services are delivered more efficiently and simply.

It is an important part of the Government's broader energy reform program and will contribute to ensuring Tasmanians have the lowest sustainable electricity bills.

Smart Networks and Security

A smart network facilitates energy security by:

- reducing total demand as customers respond to price signals and implement energy saving strategies and responses in their homes and businesses
- facilitating local, renewable generation, adding to the total generation capability
- enhancing reliability by way of:
 - o real-time monitoring and control of network performance at global and local level
 - o rapid fault diagnosis and response
 - o 'self healing' or automated switching under fault conditions
 - o 'local Intelligence' automatically sectionalises to limit outage scope
 - o local generation providing alternatives to central generation in the event of major disruptions
 - o greater interconnection, and
- reducing the total cost of energy production as demand is reduced and peak demand loads are reduced, thereby reducing the need for additional infrastructure.

SOURCE: Energy Networks Association *ENA Smart Networks (Smart Grid) Policy Paper*, August 2009.

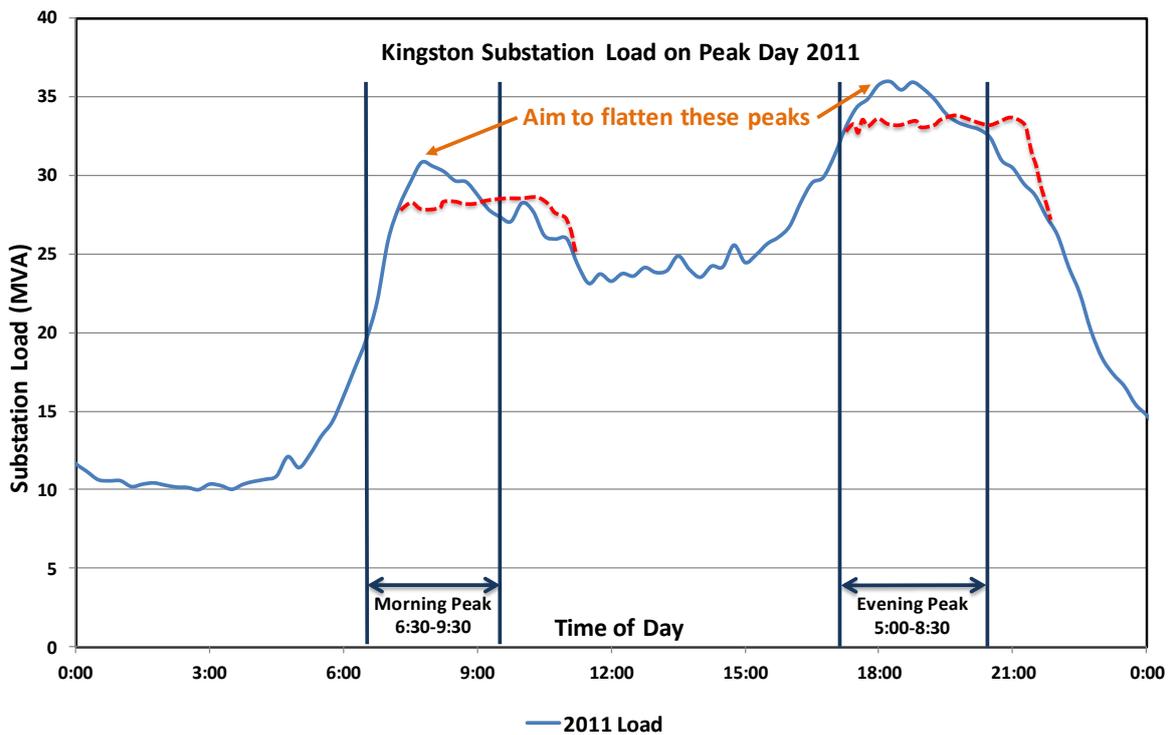
Efficient Investment – Kingston Substation Example

Because it is a growing area, the demand for electricity in the Kingston region has been increasing over recent years. A lot of the demand comes from households, because of the suburban nature of the area.

This means that demand will peak on cold mornings and evenings, when households turn on their heaters, take showers and cook meals.

Hot water cylinders will begin to reheat stored water immediately following it being used, even if the household does not need to use hot water for several hours. For instance, many households will get up, take showers in a short period and then leave the house to go to school and work, with the house vacant for several hours before hot water will again be needed.

If reheating water can be delayed for even a short period, a significant reduction in peak electricity use can be achieved. In areas such as Kingston, where capacity is starting to be reached, this could defer or avoid the need to invest in the network.



It will also secure the delivery of safe, secure, reliable and efficient supply of electricity for Tasmanians into the long-term, and ensure that value continues to be provided to the Tasmanian community from the assets that it owns.

Aurora and Transend have already been operating under a “collaboration” model, which has removed significant duplication between the two businesses. Full network integration is the next step to capture the remaining benefits of merging the two networks.

A key aim is not simply to combine the businesses, but to create a single business that operates a single network in terms of planning, capital investment, operations and maintenance.

The smart network strategy will cover the electricity network from end-to-end and ensure that the solutions made available from smart networking can influence planning and investment right through the network.

Aurora has adopted a strategic focus of meeting customer needs at the lowest sustainable cost. The submission that Aurora made to the Australian Energy Regulator in relation to the regulation of its distribution services for 2012-2017 included a significantly reduced capital program compared to that proposed for previous regulatory periods.

Over the last decade, Tasmania has completed a significant replacement program of ageing distribution and transmission assets and the scaling down of this program has allowed Aurora and Transend to develop more modest capital programs into the future. The businesses are also finding efficiencies in their operating and maintenance costs, and corporate overheads, including through their current standalone smart network strategies.

The result is that the AER has approved revenues for Aurora Energy's distribution services that increased prices to customers by three per cent in 2012 and will decrease prices in real terms for the next four years. Tasmania is the only state or territory in which distribution prices are forecast to decline in real terms. Transend is also preparing its next revenue cap submission with significantly reduced capital and operating expenditures being forecast.

This is very important context within which to consider a smart network strategy for Tasmania. Tasmania is, to date, the only state or territory that has successfully tackled the escalation in network prices to customers by reducing cost pressures.

It would not be acceptable to the Government if smart network initiatives were imposed on Aurora and Transend, and the costs of any such initiatives were subsequently imposed on customers, without offsetting reductions in prices through efficiency gains.

Assisting Innovation in Electricity Supply

The Tasmanian Government is introducing competition into the electricity retail market in Tasmania, which will give customers choice in their electricity supply. Competition is likely to create some opportunities for customers to access cheaper offers than the regulated standard retail contract.

Over time, competition is also likely to create opportunities for customers to sign up for new services, products and non-price arrangements, such as a broader choice of billing frequency, additional payment options, access to prepay products and time-of-use tariffs.

Advanced metering infrastructure, integrated with a smart network, will enable a greater range of non-price options to emerge in the retail market and provide additional choice and services to customers. Because of this, the Government sees advanced metering infrastructure as a desirable platform technology to roll out across Tasmania in the medium term.

However, the Government is acutely aware that costs to customers need to be minimised wherever possible and so the prospect of a rollout of meters that is paid for by customers is not seen as an immediate priority.

As the costs of smart metering come down and technologies are proved, the Government expects that Tasmania will move to advanced metering infrastructure as a long term objective.

Bruny Island Project

Aurora is working on a significant project to efficiently manage the power supply on Bruny Island.

At present, the island is supplied by two undersea feeders. These feeders are reaching capacity at certain times of the year. It would cost \$4 million to install a new undersea feeder.

Aurora plans to use innovative solutions including embedded generation and energy storage (batteries) to resolve the constraint and avoid installing a new feeder. This will result in significant savings for the Tasmanian consumer.

Bruny Island might become a Tasmanian showcase project (similar to Magnetic Island in Queensland), where renewables also play a significant part in the management of the island.

Aurora will investigate the potential to install large-scale solar or wind generation on the island. These capabilities could be integrated with existing technologies which are planned for installation (including the energy storage system) in order to defer the new undersea feeder and potentially make the island completely self-sustaining.

Facilitating Renewable Electricity Generation and Carbon Mitigation Policies

Traditional electricity networks are mono-directional – they assume that electrical needs to be transported from set generation points and flow through the network to set demand points. In Tasmania, with its higher number of smaller hydro generators, the transmission network has always been a little more complex than this and regularly reverses flows on main transmission lines, but the distribution network has traditionally operated by supplying electrical energy out from connection points to customers.

Increasingly, this model is becoming outdated, as small distributed generation such as solar photovoltaic installations have proliferated. To date, traditional networks have struggled to maintain a stable power supply that accommodates distributed generation, because its intermittent nature and lack of momentum present technical challenges to system stability.

The consequence can be adverse outcomes such as voltage spikes or dips, frequency deviations or even lines or loads ‘tripping off’ and resulting in blackouts.

Because smart networks measure network performance and characteristics in real time, they offer a much better scope to facilitate distributed generation and handle bi-directional flows on the network. The times when distributed generation is available and can safely be used are better able to be identified, and the technical aspects of the network can be optimised in real time.

Into the future, smart networks also present opportunities for the uptake of electric vehicles, which not only require charging, but their batteries might also be plugged in to the grid and used as backup electricity sources for network support.

Stakeholder Engagement and Coordination

The benefits of a Tasmanian smart network can be maximised through the active participation of stakeholders. This is because the smart network is a platform technology that facilitates participation and non-network solutions to the challenge of electricity supply.

For instance, customer groups will be able to use the greater information exchange to assist consumers in managing their electricity better, while investments in distributed renewable generation are likely to be proposed by stakeholders outside of the network businesses. Of course, Tasmania's network businesses (and the single network business after 1 July 2014) will also be a key stakeholder.

Recognising the potential role and interest of a range of stakeholders, the Government will convene a Smart Network Stakeholder Reference Group to leverage opportunities that arise from the implementation of a smart network in Tasmania.

King Island Renewable Energy Integration Project

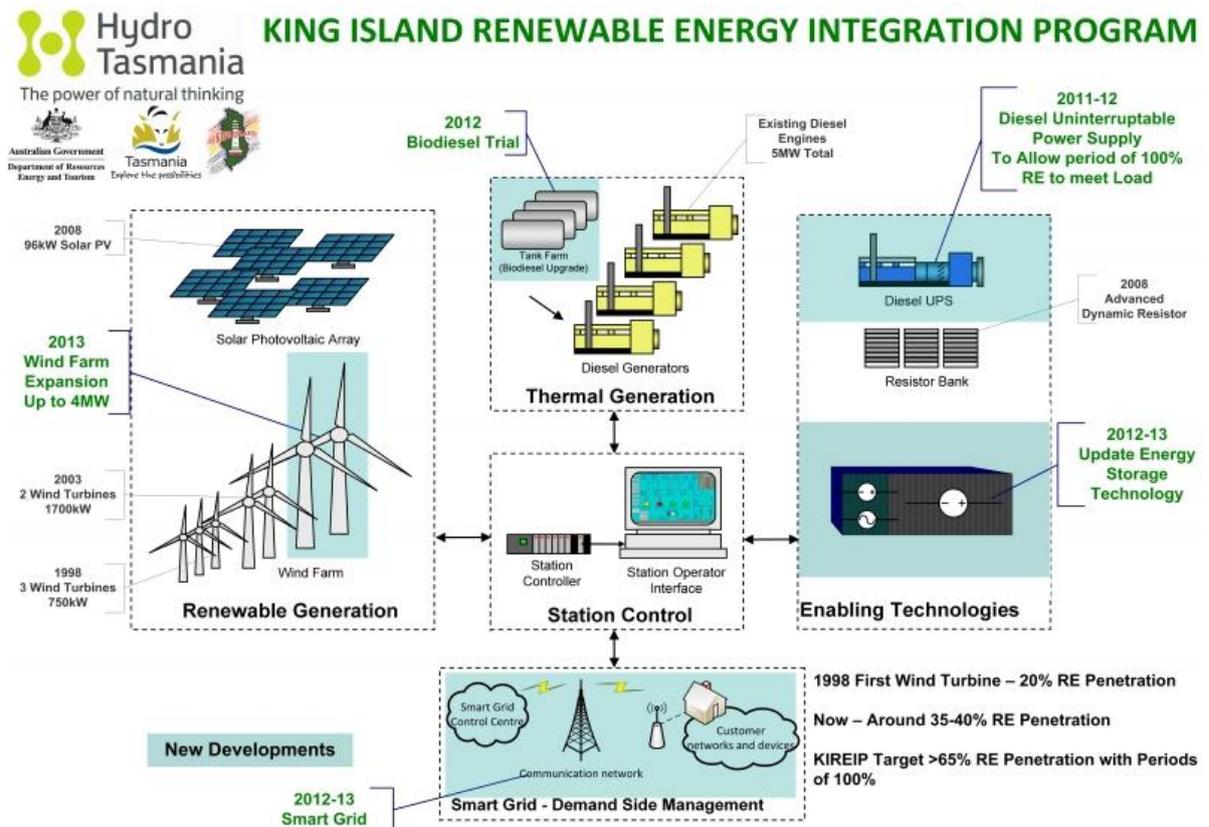
Hydro Tasmania's King Island Renewable Energy Integration Project (KIREIP) is the next step in the evolution of energy supply on King Island. The island has had a history of developing new technologies and integrating them.

The project, which is due for completion by mid 2013, will see a significant improvement to the existing King Island power station, providing residents with reliable renewable energy whilst reducing generating costs for the State of Tasmania.

KIREIP will result in the use of renewable energy for over 65% of the island's energy needs, and will reduce CO₂ emissions by more than 95%.

The unique part of this system is the integration of technologies. Although the renewable generation sources are mature (wind, solar, bio diesel) the enabling and storage technologies are new and emerging.

The development of a smart grid on King Island is an important part of the enabling technology being deployed to ensure the integration of various aspects of the project, and to facilitate customer involvement in ensuring an efficient, renewable electricity supply.



SOURCE: Hydro Tasmania King Island Renewable Energy Integration Project website.

Smart Networks and Electricity Reform

The Government's electricity reforms provide opportunities for further leveraging the benefits of smart networking in Tasmania. This is principally through the integration of Aurora's distribution network and Transend's transmission network. Also, both businesses are required to consider non network development proposals as a part of their network planning processes. However, some issues arising from introducing retail competition, which makes arrangements with customers more complex, also need to be considered.

Retail competition

The reforms will provide competition for retail services to all Tasmanians and the divestment of Aurora's retail customers is necessary to achieve this. This presents some challenges to capturing the full benefits of the *Tasmanian Smart Network Strategy*.

At present, Aurora provides both retail and distribution network services to all small customers, and sets the pricing strategies for both services. This gives Aurora considerable flexibility to align network and retail strategies.

For instance, if Aurora wants to introduce initiatives in the distribution network to avoid costly investment to increase capacity, say by offering customers a discounted price in exchange for letting Aurora's network operators switch off hot water cylinders for short periods, then the Board can tick off on the strategy and both the distribution and retail arms of the company will work together with customers to implement it.

This is to everyone's benefit, because network prices to all customers will stay lower, customers can opt in if they want to participate (and get a price benefit for opting in) and the network can run more efficiently. The retail part of Aurora, which is neither better nor worse off because of the initiative, will help to implement it because it is part of Aurora, and the company overall is better off.

Once retail competition commences and Aurora no longer acts as a retailer, the situation will be a little more complicated.

The new network business can seek to introduce these types of collaborative offers to customers, but might need to rely on other retailers to participate to ensure the initiative can be delivered.

The National Energy Customer Framework will help, because under the customer rules the network business can still negotiate a supply contract with a customer. The Government will investigate whether this is an adequate arrangement and will facilitate all of the benefits of customer involvement in the electricity market, or whether more needs to be done.

The Government expects that retailers will act in good faith to support the network business to continue to roll out smart networking solutions.

This problem is not unique to Tasmania. In fact, other states are already grappling with this issue. The Tasmanian Government supports the work currently under way to ensure that the market rules and framework does not interfere in finding smart network solutions.

The Government's first preference would be for this issue to be addressed at a national level, as the problem is common across the National Electricity Market. If no national solution is established, the Tasmanian Government will consider whether jurisdictional arrangements may be required.

Allocation of costs of a Smart Network in Tasmania

One of the Tasmanian Government's principal objectives for the electricity sector in Tasmania is to ensure that Tasmanians pay the lowest sustainable electricity bills. The Government sees this as a non-negotiable objective.

A smart network can be part of the technical solution that ensures that the sustainable cost of supplying electricity is minimised in the medium and long term.

Where governments mandate policies or technical solutions that require capital expenditure by network businesses, it is typical for that expenditure to be passed through to customers by regulators, as a required cost of providing the service required by government. This means that ultimately customers will pay for the smart network.

For this reason, it is vital that a Tasmanian smart network is rolled out in a staged way where there is a strong prospect that the benefits will exceed the additional costs within a reasonable time period.

It is also important that governments avoid stepping into the role of network businesses and mandate policies that require a specific type of technology or solution, such as metering or communications platforms.

The Tasmanian Government's strong view is that the network businesses are best placed to make decisions on the most efficient and effective technology in which to invest and that the Government's role should be to set the broad policy framework within which those investments are made.

Conclusion

Smart networks represent the future of the electricity industry. While the term has no firm definition, the concept of a smart network involves the use of a communication platform to facilitate:

- increasing asset utilisation resulting in deferred capital investments;
- remote network management;
- enhanced and real-time measurement and data collection of network performance; and
- demand side management and distributed generation and smart energy storage devices.

The platform technology on which a smart network is built also provides the opportunity for greater customer engagement in the electricity market through enhanced provision of information and buying products that might reward customers for particularly beneficial behaviours that reduce costs to everyone.

Into the future, smart networks and smart meters are likely to form the technology platform on which the electricity industry evolves from a static supply-side market into one with active customer engagement, smarter use of electricity in households, assisted by home networking technologies and a much broader range of products and services offered by energy services retailers.

However, the cost impost on customers of the deployment of these technologies also needs to be borne in mind and smart technologies need to be rolled out in a carefully managed process that ensures customers really are the beneficiaries.

The Government has adopted five Principles to guide the development of a Tasmanian Smart Network, which are:

1. Empowering consumers;
2. More efficient investment with targeted and cost effective reliability and security improvements;
3. Assisting innovation in electricity supply;
4. Facilitating renewable electricity generation and carbon mitigation policies; and
5. Stakeholder engagement and coordination.

The Principles support the Government's broader objectives for electricity reform.

The Principles will be delivered through immediate, medium and long term actions.

The Government will convene a Smart Network Stakeholder Reference Group to leverage opportunities that arise from the implementation of a smart network in Tasmania.

Appendix A – Aurora’s Smart Network Plan

Aurora Energy is executing a long-term strategic plan which is designed to enable the ongoing advancement of the Tasmanian electricity distribution network and support the best interests of Tasmanian householders and businesses. Aurora’s *Tasmanian Smart Network Strategy* explicitly supports Aurora’s strategic focus of meeting customer needs at the lowest sustainable cost. It is built upon three pillars:

- engaging, educating and empowering customers (to provide maximum customer value);
- managing the distribution network more reliably and efficiently (reducing operational and capital expenditure); and
- developing a distribution network capable of supporting Tasmania as an environmental leader.

Aurora’s *Tasmanian Smart Network Strategy*:

- includes a strong customer and community focus;
- provides greatly improved business intelligence;
- leverages innovative and proven technologies, processes and systems;
- encompasses multiple smaller projects rather than one large project;
- positions Aurora to manage future challenges in operating the Tasmanian distribution network, whilst ensuring that all current requirements are efficiently achieved; and
- provides rapidly increasing capability and performance improvements without incurring significant expenditure or risk.

There are a large number of smart network initiatives that may be pursued by a distribution utility. Aurora has undertaken thorough investigations in order to determine those initiatives which support Aurora’s *Tasmanian Smart Network Strategy*. The result is a suite of practical activities as follows:

1. *Constraint Management Initiatives*: These initiatives encompass the efficient management of existing and projected constraints on the Tasmanian distribution network, with the aim of deferring or avoiding traditional network reinforcement activities. These initiatives leverage technologies including demand management, embedded generation and energy storage.

Aurora is currently undertaking various projects:

- a. *Generation & Energy Storage Systems*: encompassing the use of Remote Area Power Supplies (RAPS), standby generation and mobile generation (for peak shaving and efficient planned/unplanned outage management).
- b. *Demand Management*: encompassing residential demand management initiatives (automated control of electric hot water storage systems & heat pumps), commercial & industrial demand management initiatives and time-of-use trials.
- c. *Cross Functional Projects*: encompassing projects leveraging numerous solutions such as those for the management of Bruny Island network constraints, the proposed Kingston third transmission circuit and new embedded generation at Tunbridge.

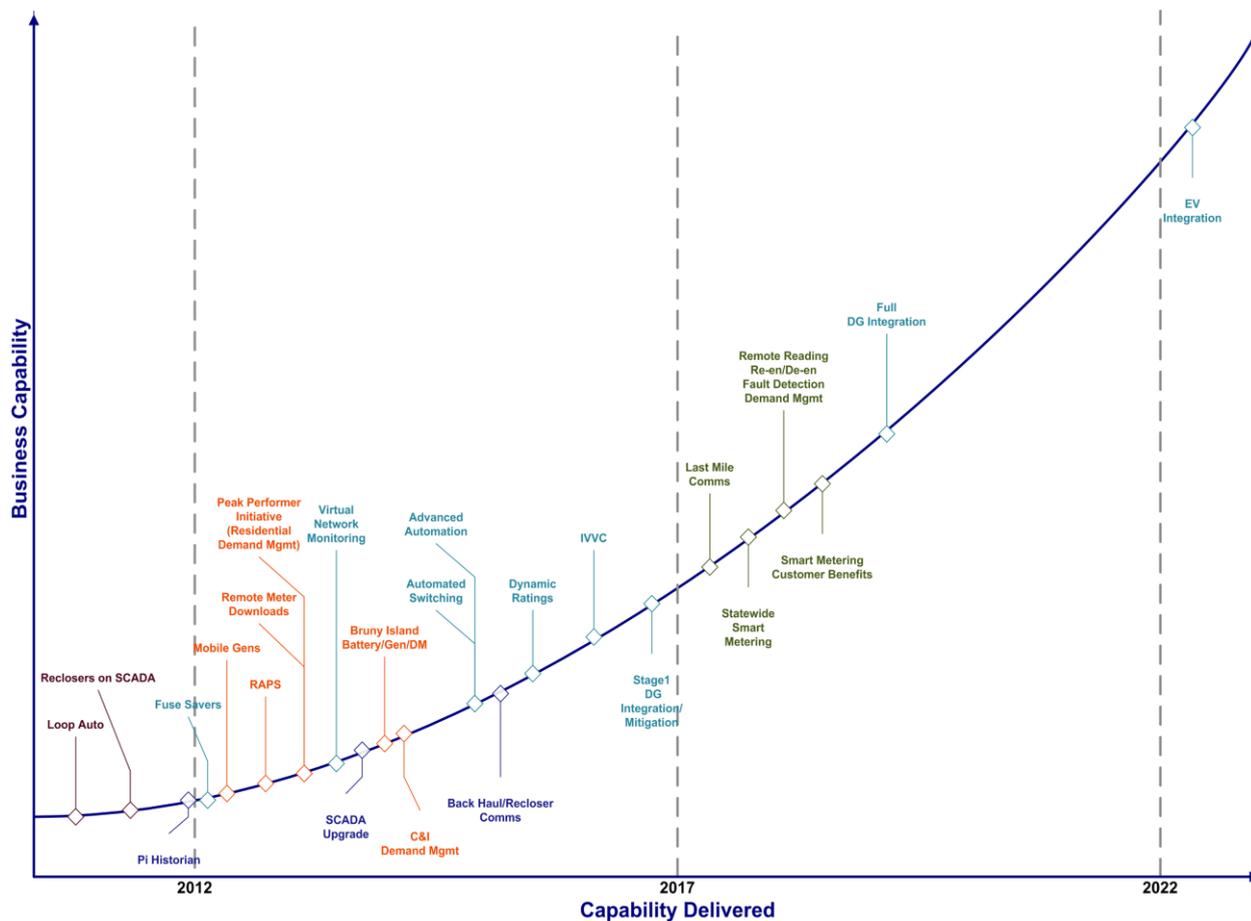
- d. *Network Upgrades & Customer Work*: encompassing the use of non-traditional solutions to more cost-effectively manage both network upgrades and customer work.
2. *Network Optimisation Initiatives*: These initiatives encompass the use of innovative technologies to optimise the day-to-day management of the distribution network, leverage the full capabilities of existing assets, improve predictive asset management capabilities and optimise asset maintenance programs. Aurora is undertaking the following projects:
 - a. *FuseSavers*: encompassing the deployment of advanced technologies to improve network reliability.
 - b. *Virtual Network Monitoring*: encompassing the use of advanced software systems to fully leverage the capabilities of existing monitoring equipment, improve network planning, improve operational awareness and proactively manage risk.
 - c. *Distribution Automation*: encompassing the deployment of advanced technologies to improve reliability via establishing a “self-healing” network.
 - d. *Centralised Voltage Management*: encompassing the establishment of systems to manage voltage on long rural feeders and avoid network reinforcement.
3. *Research & Analysis Initiatives*: These initiatives encompass various studies in support of the aforementioned activities, including partnerships with CSIRO and the University of Tasmania. Such empirical research is critical to ensure the success of various activities.

This suite of projects is broad and complex, and targets the principal problems which Aurora presently faces in managing the Tasmanian distribution network. The projects provide the foundation for meeting future challenges in managing the distribution network.

Aurora's *Tasmanian Smart Network Strategy* also includes a vision for activities which are expected to be performed over the next 10 or more years. Activities beyond 2017 are tentative since social, environmental, technological and financial considerations mean that there is still some uncertainty in whether and when those activities can be rolled out.

Aurora has analysed the potential for deployment of advanced metering infrastructure in Tasmania and thorough due-diligence activities have been completed. Whilst there are many benefits which could be leveraged from advanced metering infrastructure, the business case for the deployment of the requisite systems is not compelling at this time. Aurora will periodically review the business case in light of technological advancements and cost reductions over the coming years. The Government accepts Aurora's advice and expects Aurora to consider the rollout of advanced metering infrastructure if a business case shows more promise in the future.

Aurora's Smart Network Strategy projects



Benefits from Aurora's *Tasmanian Smart Network Strategy* will include::

- the long-term containment of network charges;
- direct incentives;
- advantageous tariffs; and
- improved quality of service.

Aurora's *Tasmanian Smart Network Strategy* represents a realistic, practical and pragmatic plan which is currently benefiting Tasmanians and will continue to do so into the future.

Appendix B – Transend’s Smart Grid plan

Transend has also included a Smart Grid project as a part of its revenue cap submission for 2014–19 regulatory period.

Embracing a Smart Grid concept is an opportunity for Transend to:

- increase the utilisation of its assets;
- increase its knowledge of asset information in a real time environment that will assist in enhancing the operation of the transmission network;
- engage with its customers to assess the value derived from this concept;
- enhance its asset strategy and planning processes; and
- defer capital expenditure.

Maximising the value of a smart grid will require bi-directional information flow between Transend and its customers, and will also significantly increase the volume of information transmitted which will require sophisticated data processing, storage and protection.

The Smart Grid concept from a transmission network point of view is defined as an integrated system consisting of three components:

- Network Operation and Control System (NOCS);
- networks; and
- substations.

Transend’s existing NOCS system performs conventional supervisory control and data acquisition (SCADA) functions and data management. Technology improvements in the NOCS are available that will provide a higher quality and quantity of information that will provide enhanced:

- data sampling and system visibility inside the region of secure operation;
- increase in the utilisation of the existing network;
- improvement in reliability and controllability through the use of advanced power electronic devices;
- response to system disturbances;
- controllability and expansion in use of system protection schemes; and
- interactions with market operation.

Transend is committed to increasing the utilisation of the existing network. In operating the network where total electricity consumption is decreasing but maximum demand remaining constant or increasing, Transend (like Aurora) is exploring alternative options to manage peak load periods instead of building new network assets. To manage this issue, Transend is:

- reviewing its dynamic line rating system to assess whether there is scope to increase the utilisation of its asset base;
- investigating opportunities in broader usage of the network control special protection schemes;
- investigating series compensation applications if an increase in transmission line capacity is required; and
- investigating the feasibility of non-network development proposals including distributed generation and distribution network reinforcement and automation.

Advances in power technologies have significantly improved power system operation and controllability. Transend will closely monitor progress in this area to consider potential applications for unified power flow controllers, static compensators and conventional synchronous condensers with an objective to remove network constraints, facilitate renewable generation integration, increase system resilience and optimise use of the new assets.

Under Transend’s Smart Grid concept, opportunities in substations will focus on rapid response to changed system conditions and load restoration management. The main features of a smart substation can be summarised as:

- installation of smart sensors and measurement equipment;
- communication between substation electronic intelligent devices based on the new IEC 61850 communication protocol;
- local control and adaptive protection coordination;
- asset monitoring and alarming;
- fault diagnosis and prognosis;
- advanced interface with distributed energy resources; and
- real-time modelling.

The diagram below illustrates the steps and phases for the implementation of Transend’s Smart Grid plan.

