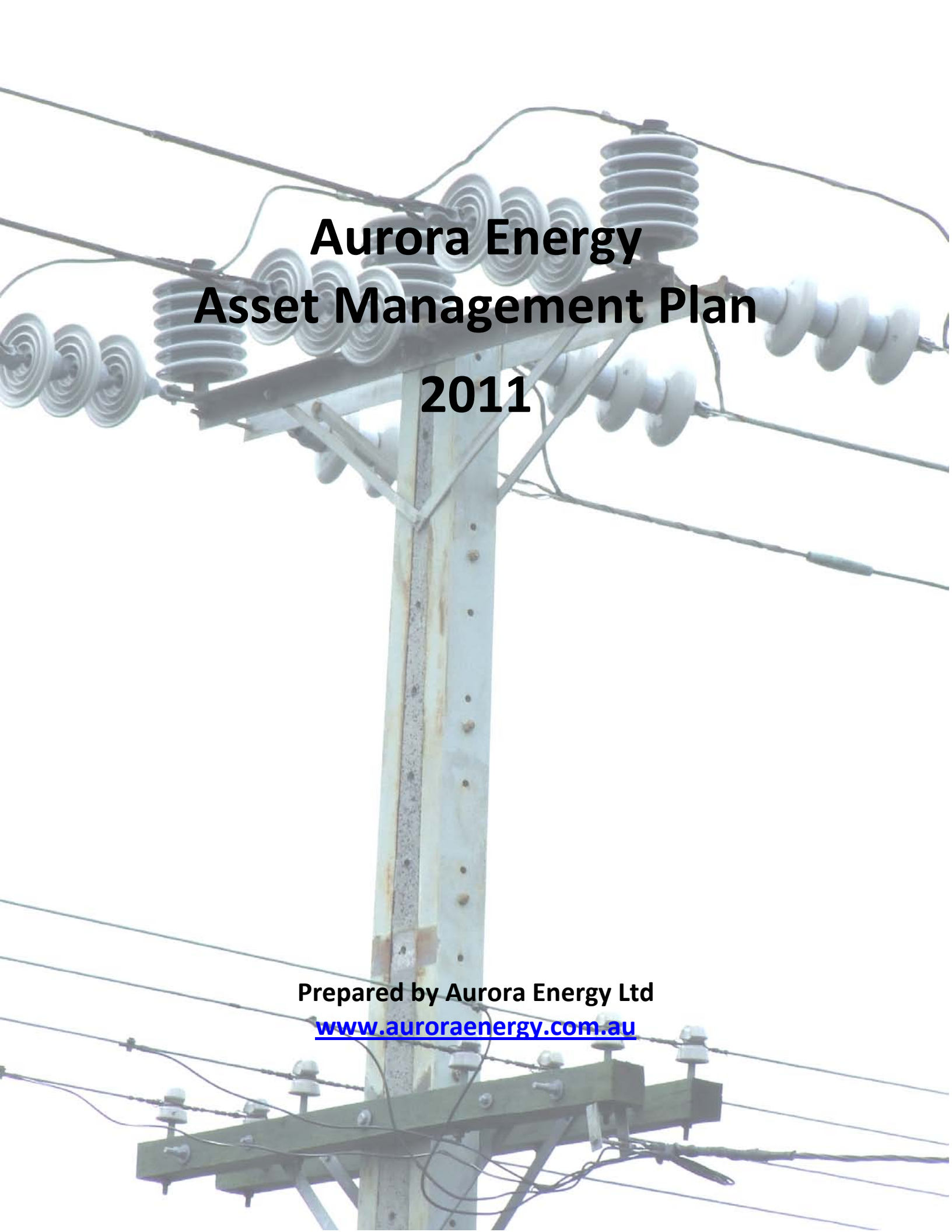

Aurora Energy
Asset Management Plan
2011

Prepared by Aurora Energy Ltd

www.auroraenergy.com.au

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1. Introduction

1.1 Purpose of the Asset Management Plan

Aurora Energy Pty Ltd (Aurora), a Tasmanian Government – owned electricity distribution and energy company, has operated in mainland Tasmania since 1 July 1998 and provides a contract service to the Bass Strait Islands on behalf of Hydro Tasmania, it also has offices in Victoria (energy trading) and South Australia (sales).

Aurora employs 1,323 Tasmanians. The Distribution Business manages core assets valued at $1.174B, and supplies electricity, through a network of overhead and underground powerlines, to approximately 271,750 customers throughout the Tasmanian mainland.

The distribution system consists of approximately 222,000 poles, 30,000 distribution substations, and 22,000 km of overhead powerlines and 2,000 km of underground cables. Whilst distribution system assets themselves are not overly complex, management difficulties are created by virtue of the sheer number of the assets, their variable age and condition, their spread throughout the state and the diverse nature of the environments in which the assets operate.

Aurora provides a 24-hour a day service to its customers to ensure a safe, reliable electricity supply across an area of approximately 67,800 square kilometres.

Aurora's commitment to its stakeholders is embraced through its Purpose - *to see the Tasmanian community prosper from our efforts*, and strategic intent – *to meet customer needs at lowest sustainable cost.*

The main purpose of the Asset Management Plan (AMP) is to describe the company's Asset Management Strategies for the purposes delivering the distribution business's strategic objectives. Aurora operates more detailed planning and operational documents to support the efficient operation of the business. This AMP draws on these documents as appropriate to describe Aurora's organisational approach to asset management and the key asset management strategies, plans and processes that will be applied to deliver efficient asset outcomes. Except where expressly indicated, references to 'Aurora' in this AMP are references to Aurora's Distribution Business.

This AMP covers the period 2011 – 2017 and is reviewed annually as part of Aurora's business planning process. The AMP has been developed for internal use by Aurora and release to approved stakeholders to assist them in understanding Aurora's organisational approach to asset management.

This AMP describes Aurora's Capital Governance Framework, and demonstrates how Aurora's systems, processes and practices have led to the compilation of spend forecasts that meet the requirements of National Electricity Rules (NER) 6.5.6 and 6.5.7 respectively.

A fundamental part of the Distribution Business strategy that facilitates the execution of the Program of Work is thread management. Thread management provides a stronger targeted focus to the key elements of the program of work, recognises what the business needs are to be able to deliver the programs of work, and is the key framework in which the asset class management and the system management strategies are undertaken. Each thread is supported through key people responsible for the decision making and prioritisation of activities within the respective threads with clear accountability of delivering a successful outcome.

To ensure that we are addressing issues and opportunities in the network, the short and long term decisions developed for each thread are then applied to the analysis and decision making at the four planning levels; Statewide, Local Area Management, Feeder and an individual locality.

1.2 Aurora Strategic Plan 2011-2015

Aurora has reviewed its strategic business drivers to ensure that the customer is always put first in everything it does with the aim of ensuring improved price, service and reliability outcomes for customers.

The strategy is focused on empowering the customer through choice (a smart customer strategy) and ensuring that the delivery of electricity meets modern lifestyle requirements in a convenient and sustainable way. This will be achieved through a focus on innovation and the deployment of modern technology, improving the efficiency of our capital and operating expenditure to deliver efficient and sustainable customer outcomes and solutions.

The strategic direction for the Distribution Business has been defined in the Aurora Strategic Plan by:

- Delivering better customer outcomes through cost efficiency;
- A focus on innovation and ensuring we have the technical capability to deal with increasing complexity and advancements in technology;
- Ensuring the business is positioned to contribute to our shareholders' policy objectives, particularly the emphasis on environmental sustainability;
- Continuing to build the important relationship between the two divisions of the Distribution Business, Network and Network Services, promoting the concept of "One Distribution Business"; and
- Maintaining safety, reliability and sustainability as business imperatives.

An aspirational target for the Distribution Business has been proposed which should ensure that:

"The Distribution Business will not contribute to any price increases for customers."

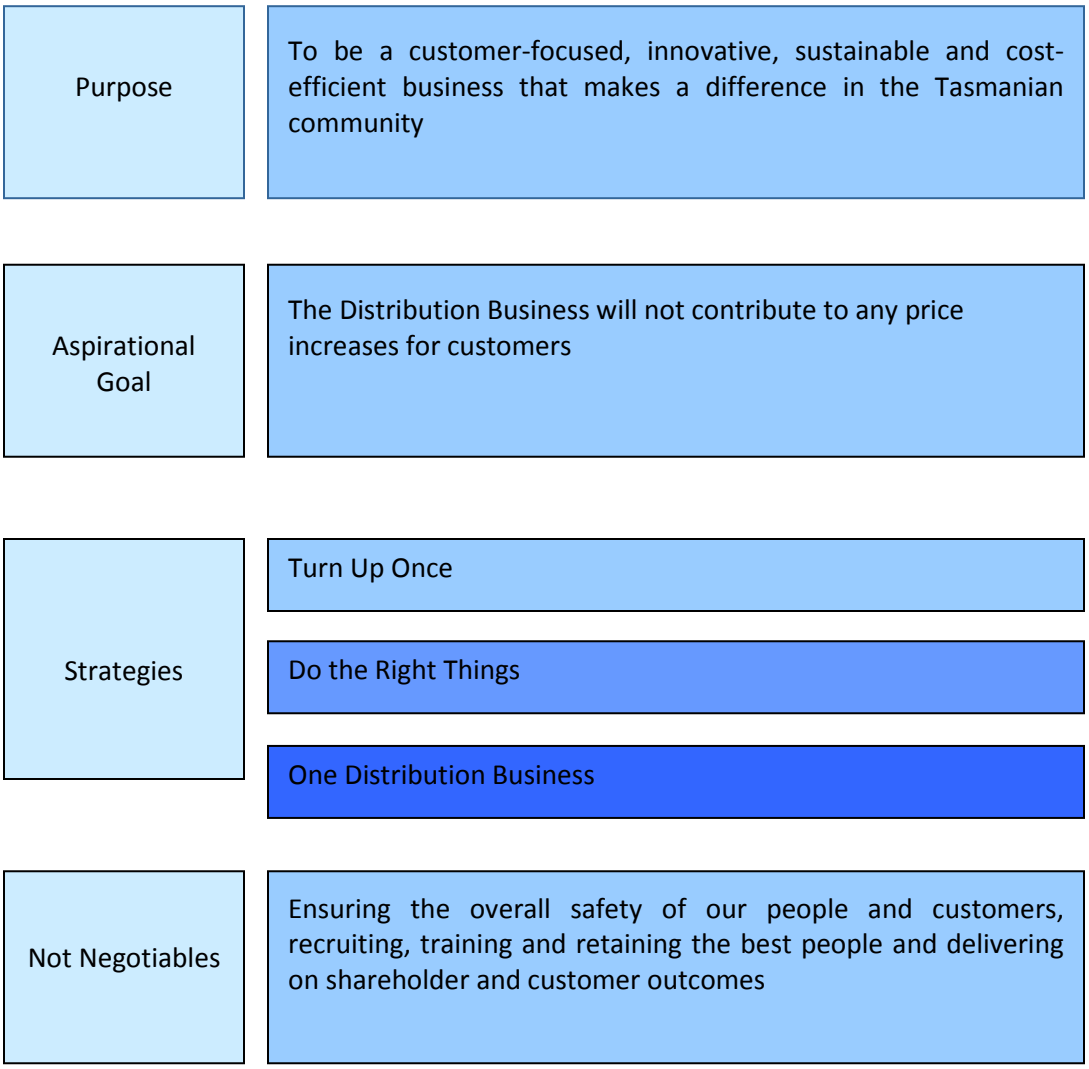


Figure 1.1 Distribution Business Strategy

The strategies are defined as:

Turn Up Once

Materially enhancing the efficiency of our work delivery processes through good planning, flexibility amongst our workforce and utilising available technology and field tools.

Grouping activities together from different drivers in the business is a key focus to reduce overall operating costs and also the level of service disruption to customers. Within the management plans every opportunity has been taken to group work requirements together to achieve these goals.

Do the Right THING

Managing the distribution system within the constraints of expenditure and risk by improving our work prioritisation tools, increasing our technical expertise and adding customer value by focussing on innovation and technology.

A significant focus in the asset strategies and management plans is to move to condition based renewals. This change is specifically targeted at achieving maximum service life from the assets and only investing in renewals when absolutely required.

Similarly practices are targeted where the best cost-benefit can be achieved or where specific issues exist in either risk profile or customer service levels. Examples of these practices include the Targeted Reliability Improvement Program (TRIP) initiatives to target customer service and specific inspection and maintenance programs driven by a detailed understanding of asset condition and likely failure modes (e.g. Regulator maintenance).

One Distribution Business

Reviewing the value achieved through business processes and optimising these through the removal of duplication and alignment of direction.

Opportunities to improve the information flow and communication from field staff to feed improved condition and performance data into the management plans are also being explored. Enabling technologies such has in-field PDAs are a key element to achieve this.

Interaction of Asset Management Plan to wider plans

The AMP fits within a structured and systematic framework of plans that includes the Aurora Strategic Plan, the Distribution Strategy Map, the Distribution Management Strategy, Management Plans (for assets), Management Plans for System Management and Other Management Plans.

Refer to the following link for the interaction and hierarchy of documents: NW30165874

1.3 Period covered by the Asset Management Plan

The period covered by this Asset Management Plan is 2011 – 2017. As Aurora strengthens its planning processes, it is expected that the planning horizon will be lengthened so that successive periods will become a smaller "slice" of a longer-term plan.

The certainty of the planning with respect to Aurora's market segments is broadly described in table 1.3 (a):

Table 1.3 (a)

Timeframe	Residential & commercial	Large industrial	Intending generators
Year 1	• Scope - very certain • Timing – very certain	• Scope - reasonably certain • Timing – reasonably certain	• Scope - reasonable certainty • Timing – reasonable certainty
Years 2 and 3	• Scope – certain • Timing - certain	• Scope - reasonably certainty • Timing – little if any certainty	• Scope - some certainty • Timing - some certainty
Years 4 to 6	• Scope – certain • Timing – reasonably certain	• Scope - little if any certainty • Timing – little if any certainty	• Scope – little if any certainty • Timing – little if any certainty
Years 7 to 10	• Scope – certain • Timing – reasonably certain	• Scope - little if any certainty • Timing – little if any certainty	• Scope - little if any certainty • Timing – little if any certainty

It is noted that many strategic issues and initiatives such as embedded generation, smart meters and electric cars are likely to reduce the certainty of the scope and timing of investment required to serve key market segments, and making it harder to accurately forecast demand, customer numbers and energy throughput.

1.4 Stakeholder interests

Aurora has a wide range of stakeholders, with an even wider range of interests that require Aurora to balance competing needs.

1.4.1 Identifying stakeholders

Aurora's stakeholders are defined as any person or class of persons that does or may do one or more of the following:

- Has a financial interest in Aurora (be it equity or debt);
- Pays money to Aurora (either directly or through an intermediary) for delivering service levels;

- Be physically connected to the network;
- Use the network for conveying electricity;
- Supplies Aurora with goods or services (including full-time labour);
- Is affected by the existence, nature or condition of the network (especially if it is in an unsafe condition or has actual or statutory easements over infrastructure); and
- Has a statutory obligation to perform an activity in relation to the network's existence or operation (such as, regulate prices, investigate accidents, include in an Emergency Management Plan etc).

1.4.2 Stakeholder interests

The interests of stakeholders are defined in Table 1.4.2(a) below:

Table 1.4.2(a) – Key stakeholder interests

Stakeholder	Interests				
	Viability	Price	Supply quality	Safety	Compliance
Tasmanian government (as owner)	✓	✓	✓	✓	✓
Connected customers	✓	✓	✓	✓	
Connected generators	✓	✓	✓	✓	
Energy retailers	✓	✓	✓		
Mass-market representative groups	✓	✓	✓		
Industry representative groups	✓	✓	✓		
Staff & contractors	✓	✓		✓	✓
Suppliers of goods & services	✓	✓			
Land owners				✓	✓
Workplace Standards Tasmania				✓	✓
Australian Energy Regulator	✓	✓	✓	✓	✓

Table 1.4.2(b) below demonstrates how stakeholder's expectations and demands are identified:

Table 1.4.2(b)– How stakeholder expectations are identified

Stakeholder	How stakeholder expectations are identified
Tasmanian government (as owner)	• By their approval or required amendment of the Aurora Strategic Plan. • Regular engagement between Aurora and Shareholder Ministers. • Monthly board meetings. • Subject specific briefings at other times as necessary.
Connected customers	• Engagement with large industrial consumers as part of their on-going development needs. • Engagement with customer advocacy groups. • Face to face meetings in communities where power upgrades are planned. • Quarterly customer satisfaction surveys, periodic focus groups.
Connected or intending generators	• Discussions with intending generators after they have made contact with Aurora.
Energy retailers	• As required in response to queries or issues.
Mass-market representative groups	• Informal contact with group representatives. • Formal independent survey of representative community groups.
Industry representative groups	• Regular liaison with large business entities regarding their energy supply arrangements. • Sponsorship of regional Chambers of Commerce functions. • Regular consultation with industry lobby groups.
Staff & contractors	• Regular staff briefings, meetings, forums and presentations from executive team and CEO. • Regular contractor meetings. • Negotiations and briefings with relevant unions. • Newsletters, intranet, email, surveys.
Suppliers of goods & services	• Regular supply meetings. • Newsletters. • Website. • Accreditation and training programs. • Public events.
Land owners	• Individual discussions as required.
Local Government Agencies	• Formally as necessary to discuss issues such as assets on Council land or mutually beneficial projects (i.e. undergrounding of asset in historical locations).
Workplace Standards Tasmania	• Promulgated regulations and codes of practice. • Audits of Aurora's activities.
Australian Energy Regulator	• Regular meetings, briefings on matters including but not limited to network pricing, system reliability, customer complaints and health, safety and environmental matters.

Stakeholder	How stakeholder expectations are identified
	• One on one discussion as needed with appropriate officers. • Release of discussion papers. • Analysis of submissions on discussion papers. • Conferences following submission process. • National Electricity Rules & AER Guidelines.

1.4.3 Accommodating stakeholder interests

Table 1.4.3(a) provides a broad indication of how stakeholder interests are accommodated:

Table 1.4.3(a) – Accommodating stakeholder interests

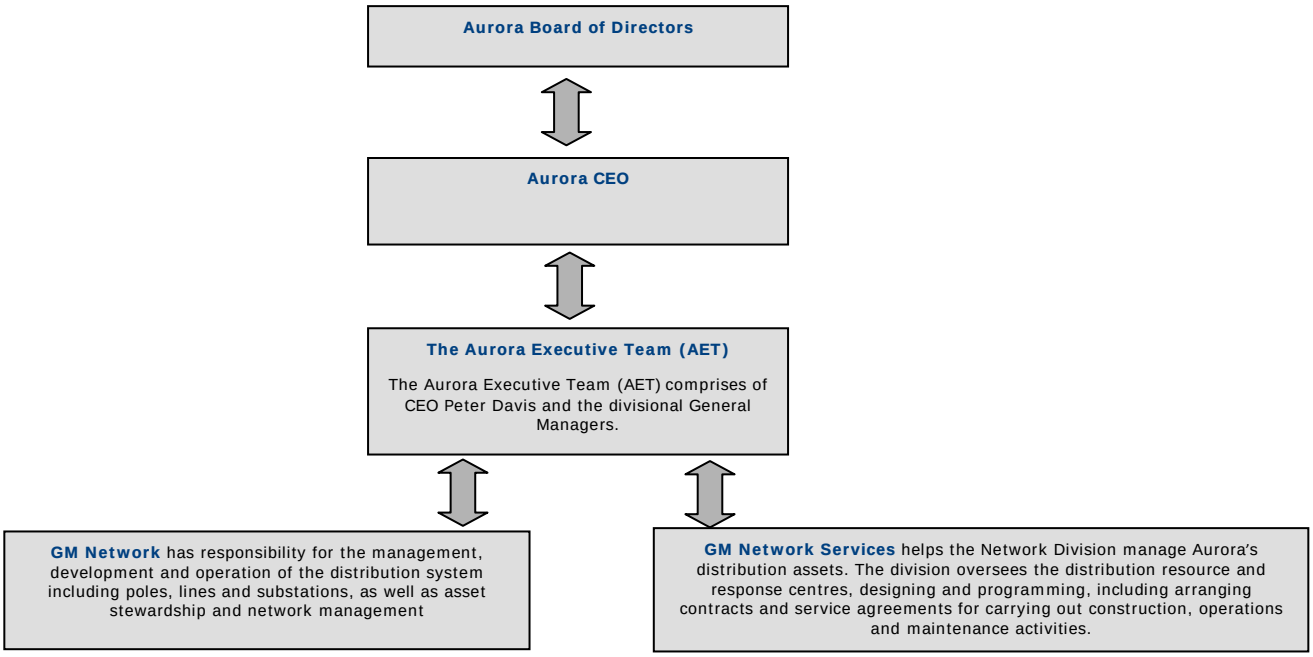
Interest	Description	How interests are accommodated
Viability	Viability is necessary to ensure that shareholders and other providers of finance have sufficient reason to keep investing in Aurora.	• Aurora accommodates stakeholders' needs for long-term viability by delivering earnings that are sustainable and reflect an appropriate risk-adjusted return on employed capital. In general terms this will need to be at least as good as the Tasmanian Government could obtain from a term deposit at the bank plus a margin to reflect the risks to capital.
Price	Price is a key means of both gathering revenue and signaling underlying costs.	• The primary focus of the Distribution Business strategic direction is to minimise price increases to customers. • Aurora's pricing methodology is expected to be cost-reflective. • Ensure that Aurora minimises significant price fluctuations and smooth revenue to ensure price stability for customers.
Supply quality	Emphasis on continuity, restoration and reducing flicker is essential to minimising interruptions to customers businesses, supporting growth and future needs	• Aurora will accommodate stakeholders' needs for supply quality by focusing resources firstly on continuity and restoration. • Targeted activities to meet local and regional targets in relation to network performance, such as Aurora's TRIP projects.
Safety	Staff, contractors and the public at large must be able to move around and work on our network in total safety.	• Aurora ensures that the public at large are kept safe by ensuring that all above-ground assets are structurally sound, live conductors are well out of reach, all enclosures are kept locked, and all exposed metal is securely earthed. • Aurora will ensure the safety of its staff and contractors by providing all necessary equipment, safe working practices, and ensuring that workers are stood down in unsafe conditions. • Motorists will be kept safe by ensuring that above ground structures are kept as far as possible from the carriageway within the constraints of private land and road reserve. • All householders connected are provided with a Cable PI to alert customers to safety issues within their home.
Compliance	Aurora needs to comply with many statutory requirements ranging from safety to disclosing information.	• Aurora will ensure that all safety issues are adequately documented and available for inspection by authorised agencies. • Aurora will disclose performance information in a timely and compliant fashion. • Aurora will comply with its regulatory and legal obligations.

1.5 Accountabilities for Asset Management

Aurora's corporate governance is the system by which the company is directed and controlled, in the interest of shareholders and other stakeholders to sustain and enhance value.

Aurora's accountabilities and accountability mechanisms are shown in Figure 1.5 below and discussed in detail in the following sections. The ultimate accountability is to the two Shareholder Ministers.

Figure 1.5 – Accountabilities for asset management



1.5.1 Accountability at ownership level

Aurora has two Shareholder Ministers, the Minister for Energy and the Treasurer. These two Shareholder Ministers are accountable to the wider community through the election process.

1.5.2 Accountability at governance level

Aurora currently has seven non-executive directors who collectively comprise the Board and are accountable to the Shareholder Ministers.

The Board is responsible for:

- Overseeing the Company, including its control and accountability systems;
- Appointing and removing the chief executive officer, or equivalent;
- Where appropriate, ratifying the appointment and the removal of senior executives who are direct reports to the CEO or the CEO of Aurora Energy subsidiaries;
- Actively engage with management in the development of corporate strategy and its final approval;

- Reviewing, ratifying and monitoring systems of risk management and internal control, codes of conduct, and legal compliance;
- Monitoring implementation of strategy;
- Ensuring appropriate resources are available to senior executives;
- Approving and monitoring the progress of major capital expenditure, capital management and acquisitions and divestitures; and
- Setting requirements for and then monitoring financial and other reporting.

Reference: CO-#10164036

1.5.3 Accountability at executive level

The Chief Executive Officer (CEO) of Aurora, Dr Peter Davis, is accountable to the Board of Aurora primarily through Aurora's Governance Framework.

The CEO's primary obligation is to manage and direct the organisation to achieve optimum profitability and effective use of business assets and human resources. The CEO must develop and review policy and plan, organise and control major functions relating to the operation and administration of the organisation through subordinate executives.

1.5.4 Accountability at management level

Accountability for asset management at the second tier is split two ways:

- Accountability for planning and design of sufficient capacity and reliability lies with the General Manager, Network. This role largely determines Aurora's allocative and dynamic efficiencies; and
- Accountability for efficient implementation of capacity and reliability projects and programs lies with the General Manager, Network Services. This role largely determines Aurora's productive efficiency.

Refer sections 6.5.6(c) (1) and 6.5.7 (c) (1): NW-#30166818

The key accountabilities of these General Managers are to the CEO through accountabilities agreed as part of the performance development process.

1.5.5 Accountability at works implementation level

The General Manager, Network Services has field services staff that are accountable to him for delivering specific outcomes that contribute to the overall productive efficiency. Aurora field staff are accountable to the General Manager, Network Services through internal service level agreements, whilst external contractors are accountable through performance based contracts and service level agreements.

Aurora also uses external contractors, hence much of its works implementation is market tested and can therefore be considered productively efficient.

Refer sections 6.5.6(c) (1) and 6.5.7 (c) (1): NW-#30166818

Summary of accountability mechanisms

Aurora has a comprehensive accountability and governance framework.

The primary and other accountability mechanisms are summarised in Figure 1.5.6

Figure 1.5.6

NOTE: OH&S Reporting box, Aurora is currently implementing a new OH&S reporting system that will be completed and operational by June 2011.

1.5.6 Key reporting lines

The key formal reporting mechanisms and their content are summarised below:

Table 1.5.7

Reporting line	Reporting mechanisms & content
Aurora to customers and wider community	• Annual report and audited accounts.
Board to Ministers	• Company annual report, includes Chairman and CEO's statements and audited accounts. • Corporate Plan • Annual information disclosure. • Twice-yearly presentation includes financial and operational performance. • Monthly post board briefings.
CEO to Board	• CEO's statement in company annual report, includes narrative of years highlights. • Monthly board report, includes progress on significant capital expenditure projects and major outages.
General Managers to CEO and Board	• Annual report on budget and major projects • Monthly report includes year to date performance and progress against budget. • Individual reports on major projects. • Daily updates on areas of concern. • Performance against agreed KPI's and customer service levels from the Distribution Strategic Plan.
Level 3 staff to level 2 managers	• Daily updates during brief meetings. • Annual reports.
Internal contractor to General Manager – Network Services	• Weekly progress reports. • Monthly meetings on progress to budget.
External contractor to General Manager – Network Services	• Weekly progress reports. • Monthly meetings on progress.

1.5.7 Delegated authorities

Aurora has a comprehensive Delegations Manual that sets out the delegated authorities for all staff. The key delegations applicable to the Distribution Business are:

Table 1.5.8 (a)

FUNCTION	DELEGATION
Projects greater than $2 million and any project which leads to an expectation that the group's approved annual capital budget will be exceeded.	Board, with CFO endorsement.
Projects greater than $1 million or projects which will lead the direct report to the CEO to exceed their annual approved capital budget.	CEO, with CFO endorsement.
Budgeted projects under $1 million.	Direct report to the CEO – up to $1M. Other persons, up to general financial authority.
Unbudgeted projects: Unbudgeted projects which can be contained within the overall capital budget controlled by the direct report to the CEO.	Direct report to CEO.

Refer to: CO-#10191803

1.5.8 Development of Annual Program of Work

Expenditure must be aligned with approved operating, capital or project funding and must be endorsed and approved through Aurora's corporate governance processes. Expenditure and projects are supported by business cases to support project evaluation, which provides information such as cost benefit analysis (NPV basis), any bottom line cost reductions, avoided continuing costs, level of contingency, impact on current program plan, and options analysis.

The process for the compilation of the Program of Work, identifying process and business responsibilities are detailed below. This covers genesis through to completion for each financial year. The Program of Work embodies the Distribution Business Strategy and Network Management Strategy and encompasses the programs and processes that deliver this.

The Program of Work is a suite of individual processes that result in the establishment of a single program covering the projects for the allocated financial year.

At its base level, it is a detailed a suite of linked projects that allow work to be conducted on Aurora assets.

The interactions, both within Network and Network Services, are relatively complex due to the size and nature of the program and ensuring that the projects listed are those required to meet the competing

priorities of Aurora i.e. customers, load growth, risk, IT systems, environment, resourcing, safety, compliance and cost.

The Program of Work has been with Aurora and its predecessor Hydro for many years. It has progressively changed to reflect the changing nature of business. It extensively uses an Excel based spreadsheet and pivot tables to manage and deliver data that aligns with business needs.

Table 1.5.9 (a) indicates the major milestones associated with the delivery of each year's Program of Work.

Table 1.5.9 (a)

Process ID	Activity	Responsibility		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
5.3.1.2	Confirm POW Budget	Network Finance manager	31-Oct											
5.3.1.2	POW day (program justification)	Network Threads												
5.3.2	Prepare draft program	Network Threads	15-Nov											
5.3.2.2	Collation POW	Network Program Manager	21-Nov											
5.3.2.2	Network STT endorsement	Network Senior engineer	21-Nov											
5.3.3	Deliver POW (Prelim) to NSC	Network Program Manager	30-Nov											
5.3.4.2.	Resource capability advised	NSC	31-Jan											
5.3.4.2	Review of POW / collation	Network Threads / Network Program Manager	09-Mar											
5.3.4.2	Final POW Network STT endorsement	STT / Network Tprogram Manager	15-Mar											
5.3.4.2	Network General Manager approval	NGM	30-Mar											
5.3.4.2	Advise B Type (unit) rates	NSC	31-Mar											
5.3.4.2	Deliver POW Final	Network Co-ordinator	31-Mar											
5.3.5.2	Scope Issue - Specific A types	Network Threads	30-Apr											
5.3.5.2	Scope Issue - Headers	Network Threads	31-May											
	POW year commences		01-Jul											

The above timeline is agreed between the Network and Network Services Divisions.

1.5.8.1 Genesis of projects / items within the program

The makeup of the Program of Work is derived from a number of processes and sources. These being:

- Known projects included in the most recent Pricing Determination;
- New projects that have arisen since the most recent Pricing Determination;
- Known maintenance schedules or programs;
- New maintenance programs, e.g. arising from new equipment technology;
- Known expenditure, e.g. Management Fees or other Labour allocations; and
- Deferred projects or programs from previous financial year(s).

1.5.8.2 Pricing determination funding

The most recent Pricing Determination will have allocated an overall level of expenditure for Operational (Opex) and Capital (Capex) work.

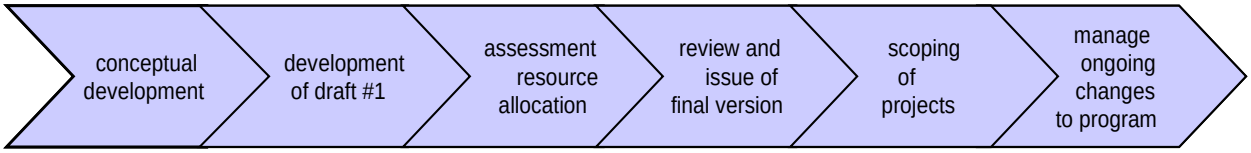
This work is done conjointly between the Network System and Asset Management and Commercial groups. This outcome aligns with Aurora's Financial Strategy.

Considerations are given to the following when these Program of Work allocations are made:

- Customers / load growth;
- Risk;
- IT programs / systems that need to be established to deliver data for future years;
- System reinforcement;
- Environment;
- Compliance;
- Cost; and
- Internal resourcing.

1.5.8.3 Process for the forward year Program of Work

The high level process, as shown below, incorporates groups of like activities that culminate in the major process blocks and milestones.



Each block indicates time based or mutual sub-processes that achieve the title requirement. These are summarised as follows.

Conceptual development**.** Formulation of new, reviewing of the existing and deferred projects and the collation into a program that considers load growth, public and personal risk, life cycle costs, prioritisation and staging;

Development of draft #1. The articulation of the specific line items that make up the individual Thread programs; their collation into a single document; validation against the Program of Work funding allocation and ultimately resulting in Network draft approval;

Assessment of resource allocation. Network Services high-level assessment of labour resourcing to meet the draft program. Endorsement of resource capability by Network Services is provided;

Review and issue of final version. Variations identified by Network Services and generally minor re-prioritisations and inclusions / deletions are incorporated into final version. Appropriate Network approvals for handover of Program of Work are provided;

Scoping of projects. Projects as listed in the Program of Work are scoped and issued to the Network Service Centre for management and execution; and

Amendment of program. The ongoing process that enables minor additions and deletions to be incorporated into the program during the Program of Work year.

Refer to the following link: NW-#236030

2 Asset description

2.1 Asset Information

2.2 High level description of geographical coverage

As of 30 June 2010, Aurora Energy's electricity distribution system, through a network of overhead and underground powerlines, supplies electricity to approximately 271,750 customers, including 226,977 residential customers and 44,773 non-residential (commercial, industrial and government) customers, in mainland Tasmania.

The distribution system consists of approximately 222,000 poles (excluding private poles); 30,000 distribution substations; 22,000 km of overhead powerlines and 2,000 km of underground cables.

The backbone of the distribution system comprises approximately 15,100 km of overhead high voltage (44,000 volt, 33,000 volt, 22,000 volt or 11,000 volt) powerlines and 1100 km of underground high voltage powerlines. These high voltage (HV) powerlines, referred to as HV feeders, supply approximately 30,000 distribution substations, which then transform the electricity to 230/400 volts, to distribute electricity at low voltage (LV), to most of Aurora Energy's customers.

The HV distribution network is predominantly rural overhead line with underground cable reticulation located within central business districts and in various subdivisions and commercial centres in the urban/suburban areas. Rural feeders generally tend to be long, between 50 and 500 km, and of a radial nature with limited ability to interconnect with other adjacent rural feeders while urban feeders have a greater flexibility to provide alternate supplies to the majority of customers on a feeder.

The LV distribution system comprises approximately 7,200 km of overhead and 1100 km of underground LV circuits.

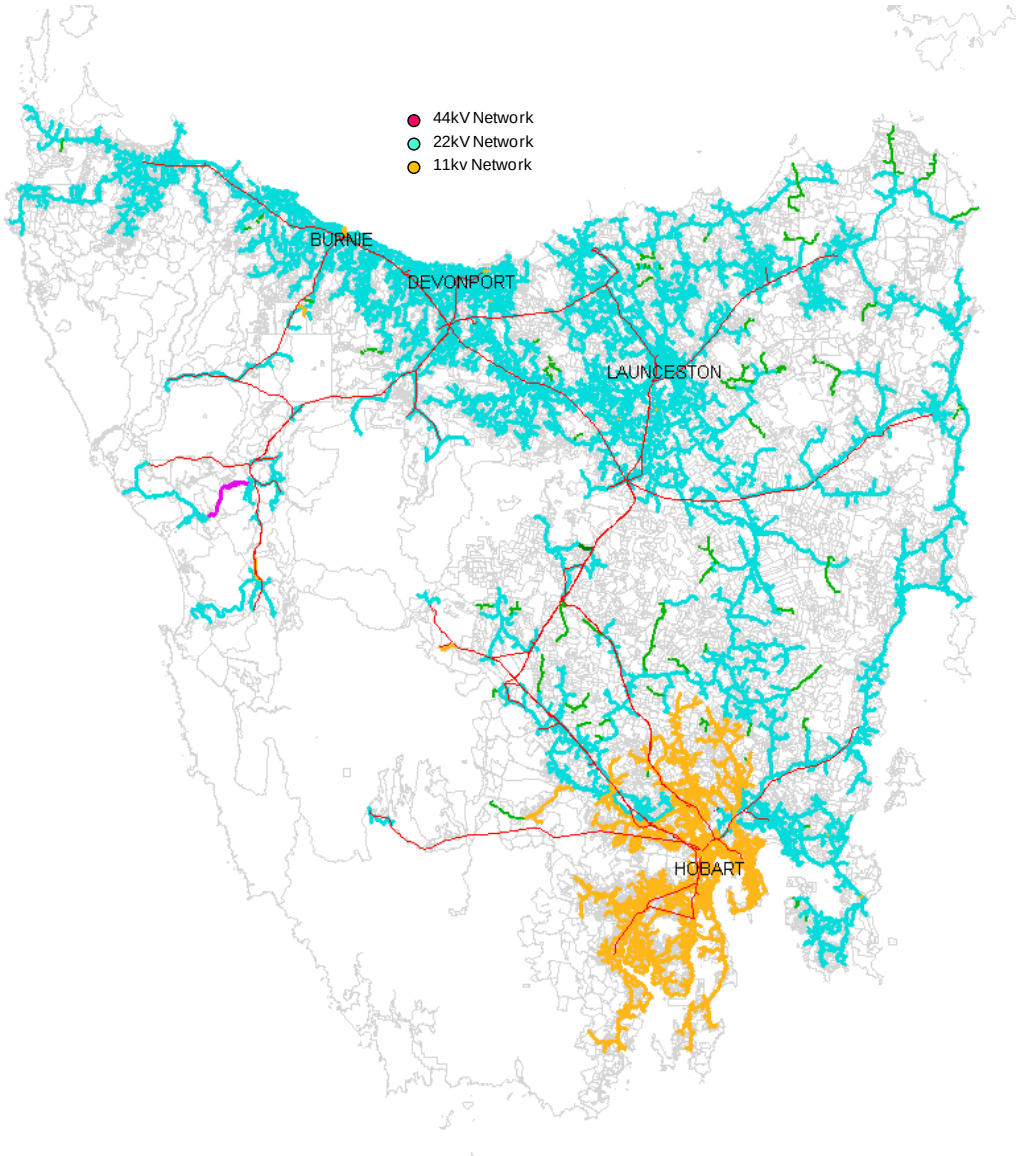
There are, however, a small number of HV customers with their own distribution substations who take electricity supply directly at 22,000 volts or 11,000 volts. There are 19 major industrial customers that are either supplied directly from Transend Networks Pty Ltd's (Transend) transmission substations or via dedicated distribution HV feeders, to meet their individual electricity demands.

Whilst distribution system assets themselves are not overly complex, management difficulties are created by virtue of the sheer number of the assets, their variable age and condition, their spread throughout the state and the diverse nature of the environments in which the assets operate. The majority of the rural feeders are subject to varying degrees of vegetated areas, climatic conditions, interaction with birds and animals, and topography that influence the condition of the asset and affect the asset's performance.

Aurora provides a 24-hour a day service to its customers to ensure a safe, reliable electricity supply across an area of approximately 67,800 square kilometres.

2.3 Asset description & configuration

Aurora's HV distribution network distributes electricity at 44, 33, 22 or 11kV via 317 distribution feeders, shown as follows:



There are 30,262 distribution substations that further reduce the voltage to 230/400 volts to supply the majority of Aurora's customers through the LV network. There are a number of HV customers, with their own distribution substations that take electricity supply directly at 22 and 11kV, and some energy intensive customers that are supplied via dedicated distribution feeders.

During the 2009-10 financial year a total of 4,695 GWh of energy was supplied to Aurora's distribution network; with 4,652 GWh of energy delivered from the transmission network and 43 GWh from distributed generation sites. The total distribution customers' aggregate consumption for the same period, as metered at the customer's point of supply, was 4,462 GWh.

The aggregate co-incident maximum distribution feeder demand for the 2009-10 financial year was 1,042 MW at 8:30am on 8 July 2009.

The HV distribution network is best characterised as a "rural, overhead" network. Most of Aurora's HV feeders and practically the entire LV network consists of overhead construction. Underground cable reticulation is restricted to central business districts and various subdivisions and commercial centers in urban or suburban areas. Aurora's rural distribution feeders tend to be lengthy, between 50 and 500 km, and of a radial nature with limited ability to interconnect with other adjacent rural distribution feeders. Urban distribution feeders, on the other hand, have a greater flexibility to provide alternate supplies to the majority of customers on a distribution feeder. In consequence, outages on rural feeders generally have a greater impact upon reliability.

Aurora's distribution network:

- Delivers electricity safely, reliably and efficiently to achieve the best outcomes for the Tasmanian community;
- Comprises a network of power poles, cables, wires and smaller transformers to deliver the electricity from terminal and zone substations to homes and businesses in Tasmania;
- Delivers electricity to Tasmanians living across an area of approximately 67,800 square kilometres. Much of Aurora's distribution network traverses rugged and isolated terrain; and
- Is primarily connected to the transmission network operated by Transend but does have a number of other feeder connections to Hydro generator sites.

A brief overview of Aurora's distribution network assets is shown in Table 2.3 (a).

Table 2.3 (a) – Aurora's Distribution Network

Parameter	As at 30th June 2010
Customer connections (Total)	329,111
Residential	229,420
Non-residential *(Commercial / industrial)*	50,369
Unmetered	49,322
Overhead (km) – High Voltage	15,069
Underground (km) – High Voltage	1,077
Overhead (km) – Low Voltage	7,197
Underground (km) – Low Voltage	1,101
Poles	221,906
Distribution substations	30,262
Distribution feeders (Total)	317
• CBD	24
• Urban / suburban	140
• Other (Rural)	153

2.3.1 Bulk supply configuration

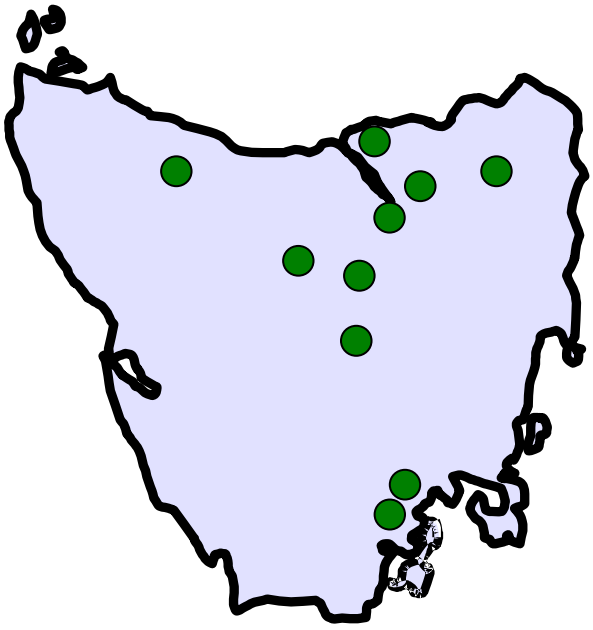
Aurora's distribution network is primarily connected to the transmission system owned and operated by Transend at 41 terminal substations throughout Tasmania. Due to historical infrastructure design and the remoteness of some distribution assets, there are a further five locations where the connection of the distribution network feeders is directly to assets owned by Hydro Tasmania.

2.3.2 Embedded generation

Aurora encourages the connection of embedded renewable generation to its network and received 20 enquiries in the 10/11 FY for distributed generation units. This has increased from 3 enquiries in the 08/09 FY and 8 enquiries in the 09/10 FY. These are usually varied in nature and range from, micro – wind and solar; small – mini hydro, wind and solar; medium – wind, mini-hydro and cogeneration (gas).

The existing distributed generation sites connected to and importing into the distribution network are shown in figure 2.3.2. Their size is generally less than 3 MW and their location has had little impact on deferment of major capital works. Also due to the size and intermittent operation of these generating facilities, they do not provide any firm capacity to support the network.

Figure 2.3.2 – Distributed Generation Sites



The vast majority of distributed enquiries have been for connection sites in the rural and semi remote areas, requiring significant infrastructure investment to enable an appropriate connection. It is expected that a number of these enquiries will proceed to the application phase in the short term and will be considered within the specific areas for distribution network planning and augmentation.

Aurora has continued to experience an average of 80 photovoltaic system connection applications per month, despite the removal of the Government grants supporting solar panel installation. Aurora currently has a total of 2832 connected residential photovoltaic systems approved, following a total of 3464 enquiries at Jan 2011. This total is since inception. Unit sizes range from 1.0kW – 6kW, typical sizes include 1.0kW and 3.0kW units. There are also eight connected wind generators from 13 enquiries since inception of the program.

2.3.3 Underground system

Aurora's underground system comprises 2,200km of cables operating at 33kV, 22kV, 11kV and LV (which also includes about 5,000 joints and terminations), and 14,750 cabinets, pillars, turrets and link boxes. There are several submarine cables located throughout the state crossing waterways or rivers of varying widths.

Underground System Thread asset family consists of:

- Underground Cables to transport electricity at both HV and LV levels, including the cable fittings, easements and earthing systems;
- Joints and Terminations both outdoor and indoor to connect cables to each other and to other components of the distribution system including the LV cable terminations in wide based street light poles; and
- Underground Furniture including turrets, cabinets, pillars, link boxes and service posts etc. to provide a safe and secure place for cable terminations and fittings, both above and below the ground.

Refer to the following link for the Management Plan: NW-#30160588

2.3.4 Zone substations

Aurora owns and operates 18 zone substations (9 urban, 8 rural and 1 that is urban in design but rural in location). These substations range in capacity from 2 MVA to 90 MVA, and have between 1 and 16 out-going (distribution) feeders. Aurora plans to build a further three zone substations by the end of the 2012 financial year.

Zone Substations Thread asset family consists of:

- Urban and rural zone substations;
- Power transformers to reduce or increase voltage;
- Switchgear and associated auxiliary equipment (battery and battery charger, SCADA and protection equipment) to provide isolation, disconnection and connection of the sub-transmission and distribution systems in order to maintain supply to the customer;
- Earthing system for personnel and public safety and the correct operation of protection equipment; and
- Enclosures to provide a safe, secure and weatherproof place for the Zone Substation equipment.

Refer to the following link for the Management Plan: NW-#30161548

2.3.5 Overhead systems & structures

Aurora's Overhead Systems and Structures include pole mounted transformers, overhead switchgear, conductors, fixtures and fittings, structures and associated earthing systems

The Overhead Thread and Structures Thread asset families include the following:

- 28,612 pole-mounted transformers;
- 13,600 HV switches, fuses or links;
- 28,600 LV switches, fuses or links;
- 22,226km of overhead conductor;
- 201,000 wood poles;
- 6,600 concrete or concrete & steel poles; and
- 14,500 steel poles and towers.

Refer to the following link for the Management Plan: NW-#30161322

2.3.6 HV regulators

Aurora's 11kV and 22kV rural distribution network includes 63 voltage regulators for maintaining the voltage to within acceptable limits. This includes 19 pole-mounted 1-phase regulators in open delta configuration, one ground-mounted 1-phase regulator, and 43 ground-mounted 3-phase regulators.

The assets covered by the High Voltage Regulator Thread are:

- High Voltage Regulators. To maintain acceptable voltage levels along high voltage feeders;
- Earthing System. To ensure personnel and public safety and to ensure correct operation of protection equipment; and
- Enclosures. To provide a safe and secure location for high voltage regulator equipment.

Refer to the following link for the Management Plan: NW-#30161495

2.3.7 Ground-mounted substations

Aurora's ground-mounted substation assets include 1,650 separate substations that include either 11kV or 22kV switches, or both switching and transformation from either 11kV or 22kV to LV.

Ground mounted substations generally supply large loads or a large number of customers predominantly within underground reticulations. They are generally considered permanent installations and are not easily upgraded or relocated once established.

The Ground Mounted Substations Thread can be further divided into the following types based on enclosure:

- Building: Indoor equipment enclosed in a permanent building with working space and passageways;
- Fence: Predominantly outdoor equipment, but may be indoor equipment installed in individual weatherproof housings, within a fenced enclosure;
- Kiosk: Indoor type equipment enclosed in a common weatherproof housing with little or no working space or passageway. Provision is made for individual items to be changed;
- Padmounted: A complete assembly, which is installed or replaced as a unit on a concrete foundation at ground level; and
- Vault: Indoor equipment housed in an underground vault with access by a vertical hatchway from a road or footpath.

Refer to the following link for the Management Plan: NW-#30160765

2.3.8 Customer connection assets

Aurora owns and operates 277,000 customer connections which include overhead service conductors, service fuses, associated fixtures and fittings, and metering panels. This asset thread excludes meters and metering transformers.

The assets covered by Connection Assets Thread are:

- Overhead service conductors to transport the electricity between the grid and the customer installation;
- Service fuses to provide protection functions in the case of a fault in the consumer mains and to act as an isolation, connection and disconnection point between the distribution system and the customer installation;
- Fixtures and fittings to connect components together;
- Meter panels to install metering equipment located in the consumer's metering enclosure; and

- LV metering current transformers for metering installations with greater than 100 amps connected load.

Refer to the following link for the Management Plan: NW-#30158001

2.3.9 System Operations

The System Operations Thread manages the Distribution Network in real-time with the core activities being:

- Emergency and Unscheduled Power System Response and Repair. The operational activities associated with the process and work in attending to system faults and emergencies;
- System Reconfigurations. The operational activities associated with the network system management for load, voltage, system stability and constraints; and
- System Status Checks. The activities associated with checking and recording of the operational status and equipment verification.

Aurora currently uses GE Interlution iFix SCADA V3.5 (10,800 points) platform for its Zone Substations and a combination of iFix and WSOS for its Nulec remote devices, which are deployed across the distribution network. The SCADA system is deployed at 12 Zone Substations with a total of 125 HV feeders.

Aurora also has deployed 400 Nulec Reclosers and Load Bread Switches that are controlled via a combination of Aurora's SCADA and WSOS which is a dial up engineering connection. Aurora is in the process of moving all of these devices across into iFix.

Refer to the following link for the Management Plan: NW-#30149544

2.3.10 Metering

Aurora owns and operates 396,000 meters that include 1-phase, multi-phase and CT-connected mechanical and electronic meters.

The Metering Thread asset family consists of various combinations of equipment to record energy consumed and to control when some tariffs are available such as off peak and multi-rate products.

The main categories are:

- Single phase – electromechanical;
- Single phase – electronic;
- Three phase – electromechanical;
- LV Current transformer – (with electromechanical meters);
- LV Current transformer – (with electronic meters);

- Single phase electromechanical and electronic meters are used in domestic and small commercial applications. This is the largest category of meters in Aurora;
- Three phase electromechanical and electronic meters are installed where customers load requirements are slightly larger than the single phase or the need to operate three-phase equipment; and
- LV Current transformer electromechanical and electronic meters are installed in commercial applications where the maximum demand is greater than 100 amps per phase.

Refer to the following link for the Metering Strategy: NW-#30161864

Refer to the following link for the Management Plan: NW-#30161525

2.3.11 Public lighting

Aurora operates 46,000 lighting fixtures, of which about 39,000 are mounted on poles used as part of Aurora's overhead distribution network.

A luminaire is an apparatus which distributes, filters or transforms the light transmitted from one or more lamps which includes, except for the lamps themselves, all the parts necessary for fixing and protecting the lamp and, where necessary, circuit auxiliaries together with the means for connecting them to the electrical supply.

A lamp is the generic term for the light source in a luminaire.

Luminaires are classified by AS/NZS1158 into the following categories:

- Category 'V' - generally referred to as Major Public Lighting, this category is used on roads where the visual requirements of motorists are dominant; and
- Category 'P' - generally referred to as Minor Public Lighting, this category is used on roads where the visual requirements of pedestrians are dominant. It is also applicable to outdoor public areas, other than roads, where the visual requirements of pedestrians are dominant, for example outdoor shopping precincts.

Road lighting circuits are connected to the low voltage system for their electrical supply. Aurora uses the following three types of control systems to turn road lighting circuits on and off:

- Pilot wire;
- Cascade; and
- Photo-Electric (PE) control.

Pilot wire and cascade control systems are similar in that they use a control wire to switch dedicated control relays. These relays energise a switch wire that will energise road lighting fittings up to 400 metres in any direction from the relay. There are approximately 541 control relays in the system.

The types of support structures that are used for road lighting are:

- Dedicated wood pole (private);
- Dedicated Steel pole (private);
- Dedicated Steel Pole (Aurora Surcharge);
- Wide Based Steel Poles (Aurora owned); and
- Dual-purpose poles (excluded from Public Lighting & covered in section 2.4.5).

Approximately 75 percent of road lighting is supported on distribution system poles. The other 25 percent of road lights are installed on dedicated poles.

Refer to the following link for the Management Plan: NW-#30148124

2.3.12 Protection and Control

Aurora has protection and control assets from the upstream protection points to the service fuse at the customer point of connection.

Transend owns and operates the primary feeder protection and control assets within terminal sub-stations as well as feeder circuit breakers.

These protection schemes typically comprise over current, earth fault and sensitive earth fault detection schemes.

The focus of managing protection and control assets is to ensure that faults are rapidly detected and cleared to minimise asset damage and to maximise reliability benefits.

Due to its extent across the State and being a major determinant of supply reliability there has been a focus on the overhead network. The higher reliability of underground cabling has required a lesser reliability-based focus with an emphasis on fault detection and clearance design performance requirements.

The protection systems with zone substations have all been recently replaced or upgraded with modern electronic relays. The overhead system uses multi-level protection comprising protection within substations, modern electronic reclosers, sectionalisers, and fuses. The coordination of this multi-level protection requires considerable management time to ensure adequate and accurate protection.

For many underground feeders there is only one level of HV protection located within zone and distribution substations that typically comprise differential schemes, over current, earth fault and sensitive earth fault detection schemes. The underground HV network includes legacy electro-mechanical relays as well as modern electronic relays. As the protection is unit based schemes there is a lesser need for management time to co-ordinate with lower voltage level protection.

Refer to the following link for the Management Plan: NW-#30151618

2.3.13Vegetation

Aurora Energy's Vegetation Management Program is designed to:

- Comply with Chapter 8A of the Tasmanian Electricity Code (TEC), as well as the *Electricity Supply Industry Act 1995* (Tas) and *Electricity Industry Safety and Administration Act 1997* (Tas) as appropriate. Aurora will design its vegetation management practices to ensure compliance with legislative and regulatory requirements;
- Control Vegetation Interaction with Network Assets. Aurora will use the principles and approaches contained within Chapter 8A of the TEC as a basis for managing the vegetation within Aurora's statutory easement;
- Customer & Stakeholder Satisfaction. Aurora will consult with customers and stakeholders affected by Aurora's vegetation management practices to obtain the best outcome whilst ensuring Aurora to meets its statutory responsibilities; and
- Cost Effectiveness. Aurora will provide cost-effective vegetation management by engaging external contractors to do the cutting, whilst keeping overall planning and management of the process "in-house". The external contractors will be engaged through a competitive tender process to ensure the most efficient prices are obtained.

Refer to the following link for the Vegetation Strategy: NW#-30165740

Refer to the following link for the Bushfire Mitigation Strategy: NW-#30146570

Refer to the following link for the Management Plan: NW#-30165991

2.4 Factors Driving and Influencing the Approach to Asset Management

The key drivers and influences that have been considered in the AMP are described in the following chapter.

Aurora Network Divisional Objectives and Investment Drivers

As the owner and manager of Aurora's electricity distribution network assets, the Network division primarily influences the achievement of Aurora's balanced scorecard objectives through its approach to asset management. Consistent with the Distribution Business Strategy:

Network's purpose is to be a customer focused, innovative, sustainable and cost efficient business that makes a difference in the Tasmanian community; and

Network Division's aspirational goal is to not contribute to any price increases for customers.

In an environment of rising prices and aging assets, the key challenges for Aurora are customer affordability and maintaining supply reliability.

The Network strategy is pivotal to these challenges, and will ensure customers and the Tasmanian community receives a secure and reliable supply of electricity at an affordable price. Aurora has taken an approach to benefit customers by improving asset utilisation and changing customer loads to maintain a reliable, affordable supply.

The overall vision is to incorporate an informed and educated customer with improved asset utilisation to ensure a reliable supply at an affordable price. Rather than building the system to cope with the peak capacity, Aurora will improve the overall utilisation of the assets. This combined with customers making informed decisions about their usage patterns, will result in system reliability at a reasonable cost.

Aurora's customer research has demonstrated over time that the four things most important to our customers in determining their perceived value are:

Price. Long term price for the customer is primarily influenced by the ***total life cycle cost*** of the network including capital expenditure and operating costs. The focus on life cycle costs will deliver both better prices and expected commercial returns;

System performance. Relates to both the reliability and the quality of supply. What is considered adequate system performance is determined by customer perspectives and the end user requirements as well as specific standards and guidelines, which must be complied with;

System Capacity. Is the ability of the network infrastructure and specific assets to supply load as and when required by each customer. Capacity and system performance are highly interrelated. Inadequate capacity is a common reason for inadequate system performance; and

Customer service. The performance of our business processes in delivery of customer service is a key driver of customer satisfaction. The key customer service processes based on importance to the customer and frequency of the interactions are:

- Management of unplanned interruptions;
- Management of planned interruptions;

- Efficient and timely delivery of customer initiated works;
- Service Connections and disconnections; and
- Management of complaints.

The transport of electricity is in many ways an inherently dangerous business. To be a successful distributor and protect our reputation as a corporate citizen, Aurora must manage the risks it poses for the community. The primary risks we strive to manage in Aurora Network are:

- Compliance with the industry and legislative standards;
- Maintaining public, employee and equipment safety; and
- Care for the environment.

Our objective is to manage our exposure to these risks to a prudent and reasonable level.

2.5 Summary of demand and energy characteristics

Aurora has 10 geographically based planning areas. Through its network development processes, Aurora aligns the short term planning projects with the long term plan for the area. This allows unnecessary expenditure to be avoided and increases the efficiency of the planning process.

The demand and energy characteristics of each of Aurora's 10 defined planning areas are:

Table 2.5 (a) – Planning Areas, Load Description and Characteristics.

Planning area	Load description	Electrical characteristics
North West	• Characterised by residential and commercial coastal strip development and an inland farming base. • The area contains the city of Burnie and a number of large towns supporting a rural and tourism industry base.	• Strong demand growth in Burnie CBD, with added complication of supply configuration making security augmentation difficult. • High penetration of gas provides opportunities to connect embedded generation. • Difficult to mesh feeders due to long river valleys, limiting security of supply. • Extreme high winds impact severely on reliability.
West Coast	• Strong association with the mining industry. • With the exception of Strahan Village, most communities either work in the mining industry or are allied to fields supporting this industry. The area has developed a viable tourism industry based upon the mining and the areas untouched wildernesses resources.	• As such the planning area sees periods of strong growth followed by times of inertia. • Rosebery Substation has an unusual voltage arrangement. The output voltage at Rosebery is at 44 kV, which is the only substation at that voltage in Tasmania.
North Coast	• Characterised by residential and commercial coastal strip development. • An inland customer base supporting farming activities.	• Generally has low load growth, with the substations supplying the area being well loaded but of no concern. • Underlying problem in this area are localised bubble developments such as Port Sorell that cause significant problems with the distribution high voltage network, but not

	• The area contains the city of Devonport and a number of significant towns and hamlets involved in the tourist industry. Cradle Mountain tourism area lies within this planning area.	to the substations supplying that network. • The difficult topography of the area limits the nature and style of the construction of the distribution network; long river valleys create planning issues, and the connection ties to the lateral feeders and high voltage feeders are difficult. • Whilst weather is generally mild, significant storms accompanied by extreme wind events occur from time to time.
Tamar	• Launceston City with its strong commercial and urban base. • Georgetown with its strong industrial base. • Areas South and West of Launceston with its mix of heritage, urban and increasing industrial developments.	• Moderate load growth with the substations supplying the area being recently refurbished. Both are well loaded but of no load concern. • Continued load growth in the Launceston CBD and surrounding areas, aided by the wood heater buyback scheme and similar heating conversions, still continue to put pressure on the capability of the distribution network to provide sufficient capacity in both the HV and LV networks in this area. Further, medium to long term load growths see an increasing loading on the existing Transend substations within Launceston. • The establishment of two connection points of Hadspen and Mowbray substations has helped to relieve the constraints of the very heavily loaded Trevallyn and Norwood substations. These two new substations are now over or near firm capacity also. Even with these substations, the Launceston area has seen consistent growth that cannot easily be met by the distribution system or the Transend substations. • The industrial area of Westbury to the west and commercial areas of Launceston Airport to the south are showing signs of system stress from capacity constraints. • The agricultural area around Palmerston substation has a strong irrigation presence, which sees this area peaking in the warmer months.
North East	• Characterised by farming, commercial and tourism developments, and a strong viticulture presence.	• Served by a number of SWER distribution systems, hampering flexibility and development in that area.
Central	• Characterised by low customer density requiring a widespread rural system to service its customers. • General highlands area has small loads but with significant tourist and economic industries, for example a fingerling hatchery at Wayatinah.	• The growth for these areas is now generally low and as such requires little investment to meet capacity criteria. Ongoing management issues in this area are system reliability and security. • In general terms the individual substations have power transformers typically 5 MVA and below. The area has rugged terrain, which is frequently inaccessible during winter storms. This area previously required significant investment in substations and general infrastructure to meet the capacity and reliability requirements.
East Coast	• Characterised by low customer density with a diverse customer base requiring a widespread rural system to service its customers.	• The area has a large coastal terrain, posing challenges to reliability during wind and sea storms. • Some demand growth due to popularity of weekend cottages.

	• It is the centre for relaxed living, and as such has seen a swelling of residential development; mainly weekend cottages, along with robust tourism, fishing, farming and viticulture industries and includes the east coast town of St Helens.	• Strong growth in tourism.
Sorell – Peninsula	• The Sorell planning area is characterised by a mixture of strong urban development in and around the beaches in Frederick Henry Bay. • Areas of the Forestier and Tasman Peninsulas have a number of hamlets with strong tourism and fishing industries including the historical settlement of Port Arthur.	• As Sorell distribution voltage is 22 kV, it cannot interact easily with the Hobart East area as this has a system voltage of 11 kV. This poses issues with transfer capacity in the Sorell Township, Midway Point and Richmond areas.
Hobart	Hobart is the capital city of Tasmania. The Hobart planning area footprint encompasses areas both sides of the Derwent River; from Lower Taroona and South Arm, to Bridgewater in the North, and has a mixture of commercial, industrial and residential customers.	The area has localised issues of system security and capacity, and localised high load growths. Being an 11 kV supply network has resulted in reliability, whilst sub optimal in some areas, that is generally good due to the short high voltage feeders that are typical with 11 kV networks. To better manage the Hobart area, it has been split into two planning areas: • Hobart – East; and • Hobart - West.
South	• Characterised by strong urban development interspersed with light farming and forestry activities. The lower south area has become a hub for tourism activities. • The Kingston region, including the Blackman's Bay, Margate and Electrona, continues to be one of the regions with significant forecasted load growth.	• The whole area has seen consistent growth over a number of years and represents one of the fastest growing areas both in electricity demand, and also new housing subdivision developments. The northern component (Kingston region) of this area is becoming a commuter suburb of Hobart. • The Kingston region is the fastest growing residential area in Tasmania, with load growth being primarily as a result of high volumes of residential and commercial developments being established in those areas.

The statewide demand and energy characteristics for the 2010 FY are shown in table 2.5 (b).

Table 2.5 (b) – Network demand 2010

Parameter	Definition	Value	Unit
Energy conveyed	Total annual energy conveyed over the network on behalf of all retailers.	4,695	GWh
Max demand	Highest coincident demand from all bulk supply points.	1,105	MW
Asset utilisation	Max demand divided by installed capacity.	34.3	%
Load factor	Average demand divided by the max demand.	48.9	%
Losses	Energy lost as a percentage of the energy entering the network (2010).	5.4	%

2.6 Approach to Asset Investment

Aurora recognises the need to justify the investment level chosen to meet a given level of service. In choosing a specified level of investment it is necessary to understand the risks of under-investing and over-investing, which are respectively:

Table 2.6 (a) – Investment Level Impacts.

Investment level	Impact on levels of service	Impact on prices	Impact on economic efficiency	Impact on prudency
Under-investment	• Likely that short-term service levels will be met by eroding capacity headroom and inherent reliability. • Long-term service levels likely to be compromised by wide-spread asset failure.	• Likely to result in slightly lower prices to customers in the short term. • Any benefit of low prices likely to be totally off-set by economic losses of wide-spread outages.	• Unlikely to be allocatively efficient as wide-spread outages will not be what customers want. • Certainly not dynamically efficient.	• May not impact on prudency in the short term if asset resilience is sufficient to "ride out" short periods of under-investment. • Unlikely to be prudent in the long term as risk of asset failure increases and reduced service levels.
Optimised	• Likely that service levels will be exactly met (but no more) by new investment in both the short and long-term.	• Likely to achieve the optimum trade-off of low tariffs and avoided outages losses.	• Likely to be optimally allocatively and dynamically efficient.	• Likely to be prudent.
Over-investment	• Likely that short-term service levels will be met by new investment. • Little if any likelihood of service levels being compromised in the long-term.	• Likely to result in slightly higher prices to customers. • Little if any likelihood of large scale economic loss due to wide-spread outages.	• Unlikely to be allocatively efficient, but preferable to under-investment. • Almost certain to be dynamically efficient if demand growth consumes excessive capacity headroom.	• Unlikely to be prudent in the short term due to excessive investment. • Likely to tend towards prudency in the medium and long term if demand growth consumes excessive headroom.

Matching the level of investment in assets to the expected service levels requires the following issues to be considered:

- It requires an intimate understanding of how asset ratings and configurations create service levels such as capacity, security, reliability and voltage stability;
- It requires the asymmetric nature of under-investment and over-investment to be clearly understood i.e. over-investing creates service levels before they are needed, but under-investing can lead to service interruptions;

- It requires the discrete “sizes” of many classes of components to be recognised eg. busbars tend to come in minimum ratings of 400A, which will often be well beyond Aurora’s likely maximum loading in remote areas;
- It requires a value judgment to be made on the level of asset utilisation (including fault rating) that will give an acceptable risk of in-service failure;
- Recognition that Aurora’s existing network has been built up over 80 years by a series of incremental investment decisions; and
- The need to accommodate reasonable expectations of future demand growth.

Refer to section 6.5.7 (c) (3): NW-#30166818

Specific justifications by asset class are as follows:

Table 2.6 (b) – Specific Justifications by Asset Class

Asset class	Assets	Justification for inclusion	Justification for capacity
66kV Lines	66kV lines	Need to transport electricity for distance required within acceptable volt drop	Load current rating Fault current rating Mechanical strength Compliant Voltage
	Switchgear	Need to clear faults on HV circuits. Need to switch load current on HV circuits Circuit isolation for planned and unplanned outages	Load current rating. Fault rating. Lightning withstand voltage Mechanical strength
Sub-transmission lines & cables	33kV lines	Need to transport electricity for distance required within acceptable volt drop	Load current rating Fault current rating Mechanical strength Compliant Voltage
	33kV cables	Need to connect substations to overhead lines where connection cannot physically be overhead.	Load current rating Fault current rating
Distribution	22kV/ 11kV lines	Need to transport electricity for distance required within acceptable volt drop	Load current rating Fault current rating Mechanical strength Compliant Voltage
	22kV/ 11kV cables	Need to connect substations to overhead lines or an overhead line interconnection where connection cannot physically be overhead or landowner has requested underground.	Load current rating Fault current rating
	Substations	Need to step voltage down from distribution to reticulation	Current demand Over current / Lightning withstand. Future demand Mechanical strength
	Switchgear	Need to clear faults on HV circuits. Need to switch load current on HV circuits Circuit isolation for planned and unplanned outages	Load current rating. Fault rating. Lightning withstand voltage Mechanical strength

	Voltage regulators	To maintain voltage within an acceptable level without upgrading transmission or distribution circuits or reconfiguring the network	Current demand Over current / Lightning withstand. Future demand Mechanical strength
Low voltage	400V lines	Need to transport electricity for distance required within acceptable volt drop	Load current rating Fault current rating Mechanical strength Compliant Voltage
	400V cables	Need to connect pillar boxes, linkboxs or Consumers overhead lines or an overhead line interconnection where connection cannot physically be overhead or land owner has requested underground.	Load current rating Fault current rating
	Switchgear	Need to clear faults on LV circuits Need to switch load current on LV circuits Circuit isolation for planned and unplanned outages	Load current rating. Fault rating. Mechanical strength
	Public Lighting circuits	As requested by Road Lighting Authority	Load current rating. Fault rating. Mechanical strength
Service connections	Pillars, Service Fuses	As an isolation point to disconnect / reconnect consumers at point of supply	Load current rating. Fault rating.
Zone substations	11kV& 22kV Switchgear	Need to clear faults on outgoing 11kV & 22kV lines. Need to switch load current on outgoing 11kV & 22kV lines	Load current rating. Fault rating. Lightning withstand voltage Mechanical strength Load shift Security Standards
	33kV switchgear	Need to clear faults on incoming 33kV lines. Need to switch load current on incoming 33kV lines	Load current rating. Fault rating. Lightning withstand voltage Mechanical strength
	Transformers	Need to transform 33kV & 22kV to 11kV or 22kV distribution voltages	Current demand Future demand Need for (n-1) security Mechanical strength

	Buildings	Needed to weather proof control/ communication equipment and records	Mechanical strength Appropriate size for installed equipment Safety requirements
SCADA		Supervisory of load control and network switch points.	Based on Network size and requirements. Propriety system
Spares	All	Need to maintain fleet of rare spares particularly with aged switchgear, transformers and regulators.	As determined by fleet of aged assets. Also determined by availability of spares nationally.

3 Service levels

3.1 Customer service levels

Aurora's customer service levels are partly established by regulation (SAIDI, SAIFI, GSL Scheme) and have been expanded into a Distribution Customer Charter involving consultation with Aurora's customers. The NECF has yet to be introduced, but is anticipated to introduced during the period of this AMP (subject to jurisdictional transitional arrangements) and will influence Aurora's service delivery obligations.

Aurora is committed to ensuring that customers are provided with the best possible access to information and services relating to the supply of electricity to the customer's premise.

The Distribution Customer Charter is aligned with the requirements set out in the TEC and provides:

- A clear explanation of Aurora's relationship with customers and customer's rights and obligations with respect to the connection of their premises to Aurora's electricity network;
- An outline of Aurora's service standards and outlines penalties Aurora may be subject to should Aurora fail to meet those standards; and
- The defined levels of service that customers should expect when dealing with Aurora.

Key issues addressed in the Distribution Customer Charter include:

- A customer's connection;
- Quality of Supply;
- Access to property;
- Vegetation;
- Public Lighting;
- Appointments; and
- Making claims.

Refer to the following link: NW-#30166034

3.2 Supply Reliability performance

Aurora uses several indices that assess the performance of the distribution system and these are measured against targets set by the Tasmanian Economic Regulator. Aurora is required to meet these service targets on a reasonable endeavors basis.

The System Average Interruption Index (SAIDI) measures the average "time out" that customers experience due to supply interruptions. The System Average Interruption Frequency Index (SAIFI) measures the average number of interruptions that customers experience.

Aurora's primary measure of reliability is based on the performance of 101 geographical communities that are categorized into one of the following five categories:

- Critical infrastructure;
- High density commercial;
- Urban;
- High density rural; and
- Low density rural.

Aurora's reliability performance targets as outlined in the TEC are contained in Table 3.2

Table 3.2 – Reliability Performance Targets

Supply reliability category	Annual number of supply interruptions (on average)		Annual duration of supply interruptions (on average)	
	Category A	Area B	Category C	Area D
Critical Infrastructure	0.2	0.2	30 mins	30 mins
High Density Commercial	1	2	60 mins	120 mins
Urban and Regional Centres	2	4	120 mins	240 mins
High Density Rural	4	6	480 mins	600 mins
Lower Density Rural	6	8	600 mins	720 mins

Aurora's targets for communities below the reliability standard in 2009/ 2010 were:

- SAIDI – 16 communities; and
- SAIFI – 2 communities.

3.3 Power quality

Customers require an appropriate quality of electricity supply to ensure that their electrical equipment and appliances operate as designed and can be used to full capability, operate continuously when required with minimal risk of interruption and are at minimal risk of damage when connected to Aurora's distribution system.

To meet these requirements it is necessary to maintain the supply from the system within certain electrical parameters for system frequency and voltages.

The TEC outlines Aurora Energy's power quality responsibilities and obligations. It covers of all the supply quality parameters in Chapter 8. The two main drivers from the code are to resolve the issue in a *timely* manner and to the required *standard*. The TEC refers to the Australian Standards where necessary and identifies the standard to which the parameters should be delivered. In conjunction with the TEC, the National Electricity Rules (NER) will be followed.

The five main strategies for power quality are:

- Continue with existing power quality complaint process;
- Proactively assess new connections to ensure no new sources of disturbances arise;
- Move to proactive power quality management based on power quality monitoring information;
- Implement a power quality monitoring and data gathering program; and
- Trial and implement emerging technologies to address issues efficiently.

The programs in place during the 2008-12 regulatory period addressed issues raised by customers on a reactive basis, effectively maintaining network power quality at existing levels. Reactive power quality management is managing a customer's issue after it has presented itself.

To enable the move to Proactive power quality management the power quality monitoring program introduced metering at all feeder level supply points, targeted padmount LV sites and numerous customer installations. This work is on going and will continue into the next regulatory period.

The introduction of CablePI into the Tasmanian community has provided a step change in steady state voltage management to Aurora. Since its introduction in 2009 CablePI has detected 154 (December 2009 – December 2010) steady state voltage issues on Aurora's distribution network. This resulted in a spike in the volumes of power quality investigations completed and corresponding network augmentation to address the issues.

All power quality improvement work is based on actual inspection monitoring at the location of the reported issues, providing an accurate measurement of the issue to direct the solutions if needed. Under this process, the exact cause of the issue is detected and ensures the appropriate solution is undertaken.

The monitoring process requires further improvement by increasing the coverage of the network and allowing proactive management.

At present all renewals are reactive to issues identified through the reactive power quality management process. The power quality monitoring program will lead to proactive management by monitoring the network for issues and allow a planned response.

Power quality management will benefit from the Non-network solutions particularly in the introduction of Demand Management initiatives planned in the near future.

Power quality issues are generally resolved by augmenting the network with either a transformer or low voltage circuit upgrade. The time frames dictated for resolution of issues does not provide any opportunities to deploy any non-network solutions. As the strategy of proactive management is implemented these opportunities will become available.

4 Future demand

4.1 Demand drivers

Aurora considers a number of external and internal parameters that, in varying degrees, will influence the load forecasts for the residential load growth, commercial / industrial load growth and the distribution system peak.

4.1.1 Residential Load Growth

The factors considered for residential load growth include:

- The Australian Bureau of Statistics (ABS) forecasted overall population growth estimates for Tasmania are reported as being flat in the medium to long term, and in some areas these estimates are believed to be negative. However, those estimates have been offset by the growth of the number of occupied dwellings and new building approvals;
- Aurora's actual load data shows high customer load growth in the Hobart (Eastern & Northern Suburbs), Southern (Kingston), Tamar West (Launceston) and East Coast areas of the state. This also is substantiated through the number of modifications to existing and new customer connections being established within these areas.

There has been a short-term higher growth effect from the wood heater buyback programs, particularly in the Launceston area, which impacts long-term load growth projections (and potentially impacting on the level of gas penetration). This wood heater buyback program continues to be promoted and in many areas across the state. The conversion from other energy sources to electricity continues.

4.1.2 Commercial / Industrial Growth

The commercial and industrial growth is driven mainly by parameters affecting the Australian economic outlook rather than local Tasmanian economic parameters, as the markets for these industries tends to be into other parts of Australia and overseas.

This group of customers has strong negative pressures caused by the estimates of relatively flat or reduced population growth over the forecast period that leads to a constrained or smaller market. This data is drawn from the *UES 2009 Distribution Network Connection Ten Year Consumption and Demand Forecast*.

Refer to the following link: NW-#30118740

4.2 Demand forecasts

4.2.1 Coincident System Peak

The Tasmanian electricity system reached a Coincident Maximum Demand (CMD) peak at approximately 8:30 am on Wednesday 8 July 2009.The estimated Aurora distribution network connected load at that time was 1042MW. The magnitude of the CMD and the Aurora distribution network connected load at the time of CMD was approx. 2.9% lower than previous year. This may be attributed to the milder season in 2009 and accompanying less peaky daily demand profile.

There are numbers of factors influencing CMD:

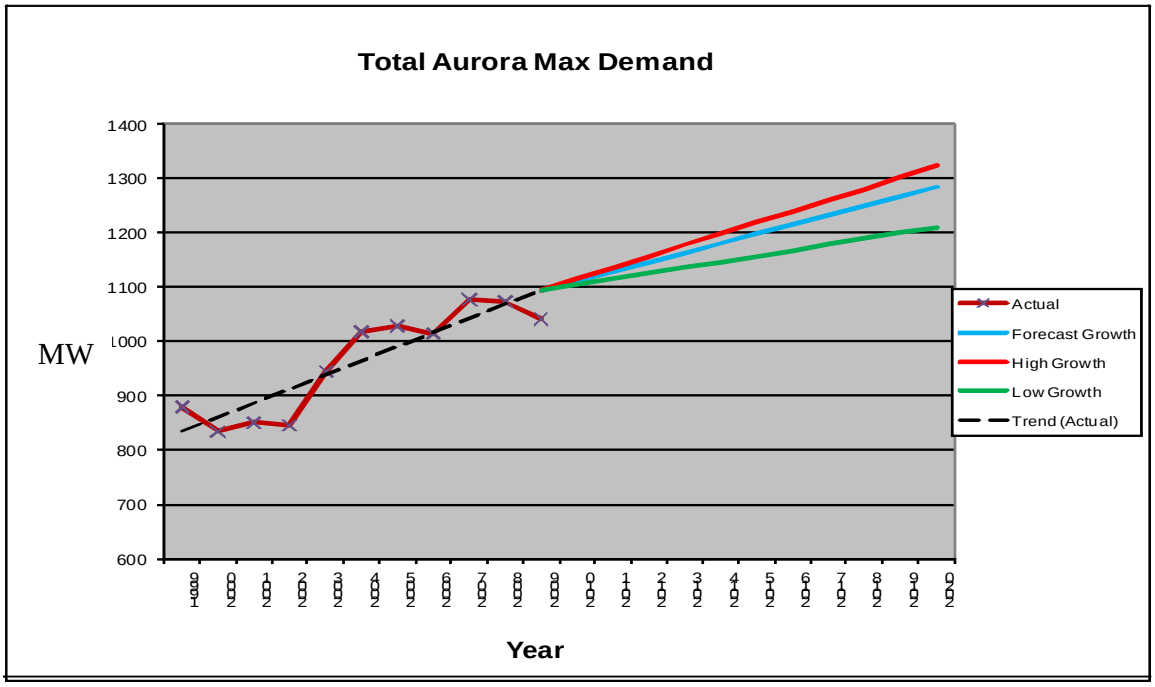
- Climate change;
- Energy Efficiency (State & Federal programs);
- Energy Usage price signals; and
- Energy Sources (Renewable-distribution / home generation).

State-wide load and consumption forecast growth rates have been determined using three growth scenarios:

- Low ;
- Medium or expected; and
- High.

The medium growth forecasts have been adopted for network assessment and planning. High and low values of growth are used to assess the level of variability and risk. Please note that the growth refers to distribution network connected loads only. These scenarios are shown in Figure 4.2.1 (a) below.

Figure 4.2.1 (a): Aurora Total Demand using high, medium and low scenarios.
Source UES 2009 Distribution Network Connection 10 year Consumption & Maximum Demand Forecast)



The overall annual consumption increased to 4,764 GWh for the year. This was an increase of approximately 3 %. The growth rate in consumption is considerably higher than the 0.4 % growth in 2007.

The consumption data shows a similar outcome to the Maximum Demand data and again this may be attributable to a milder winter season.

The load forecasting process has identified several areas where load growth rates warrant investigation. The growth rates experienced in those areas will impact on the network system capability and highlight potential or existing network capacity constraints over the next 10 years (2010 to 2020).

In order to understand the impact of these load growths and where augmentation projects may be necessary, the load forecasting outcomes are recognised and reported at a:

- System / state wide distribution network level;
- Terminal Substation / upstream network connection point; and
- Regional / area level.

4.2.2 Aurora Network Demand Forecast

The distribution network state-wide 10-year maximum demand forecast results are shown in figure 4.2.2 (a) and table 4.2.2 (b) below.

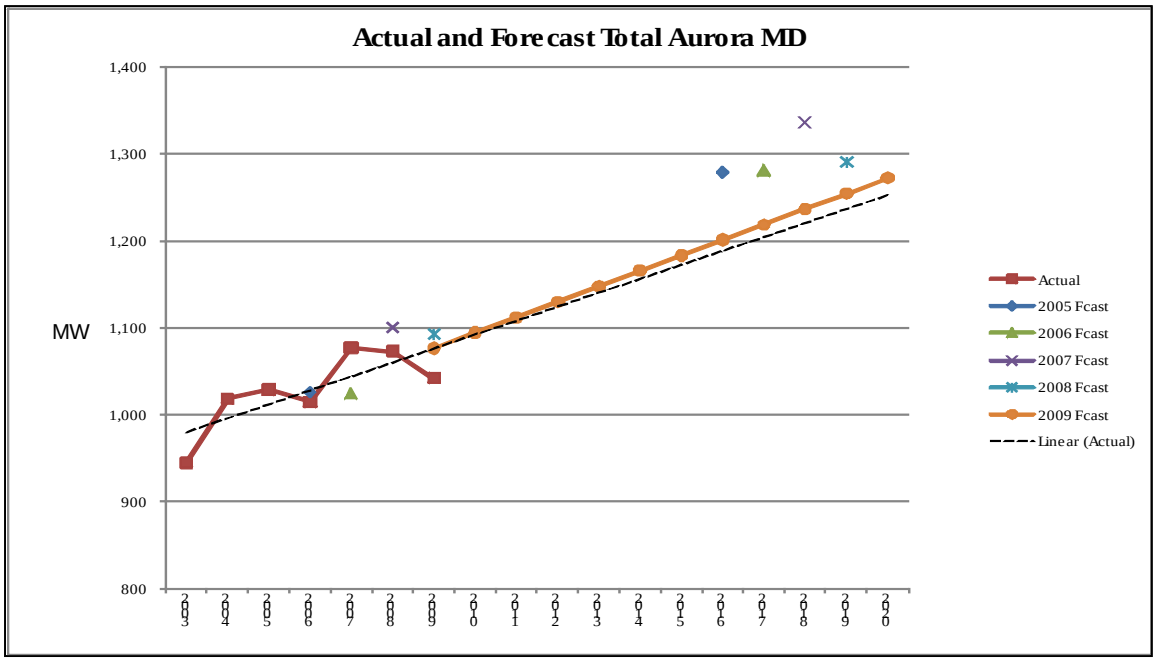


Figure 4.2.2 (a): 10 Year Distribution Network Statewide Maximum Demand Forecasts

Source UES 2009 Distribution Network Connection 10 year Consumption and Maximum Demand Forecast

Table 4.2.2 (b): Distribution Network Statewide Load & Consumption Forecasts

Tasmania		2009 Actual	2020 Low	2020 Medium	2020 High
Maximum Demand	MVA	1,042	1,210	1,286	1,323
	Growth	-	1.10%	1.80%	2.10%
Consumption	GWHr's	4,764	5,535	5,869	6,013
	Growth	-	1.40%	1.90%	2.10%

Source UES 2009 Distribution Network Connection 10 year Consumption and Maximum Demand Forecast

Refer to section 6.5.7 (c) (3): NW-#30166818

4.2.3 Aurora Connection Points / Terminal Substations

The distribution upstream connection points, predominantly terminal substations, whose load growth exceeds 30% demand growth over the 10 year forecast period is shown in Table 4.2.3 (a) below. Those highlighted in red, show where projects are being investigated, or in the planning or implementation phase. Terminal substations, whose load growth will not exceed 30% over the 10 year forecast period are shown in Table 4.2.3 (a)

Table 4.2.3 (a): Distribution connection site - 10 year forecasted load growths exceeding 30%.

Terminal Substation	Planning area	2009 MW	10 Year growth
George Town	Tamar	26	57%
Knight Roads	South	17	55%
Palmerston	Tamar	7	52%
Kermandie	South	7	52%
Kingston	South	39	50%
Port Latta	North West	5	46%
Waddamana	Central	1	43%
Tungatinah	Central	1	41%
North Hobart	Hobart West	52	41%
St Marys	East Coast	14	40%
Triabunna	East Coast	7	37%
Electrona	South	14	35%
Sorell	Sorell-Peninsula	33	35%
Scottsdale	North East	13	35%
Chapel Street	Hobart West	43	32%
Smithton	North West	23	32%
Hadspen	Tamar	44	31%
Lindisfarne	Hobart East	58	30%

Table 4.2.3 (b): Distribution connection site - 10 year forecasted load growths less then 30%.

Terminal Substation	Planning area	2009 MW	10 Year growth
Bridgewater	Hobart West	32	29%
Avoca	East Coast	8	29%
Wayatinah	Central	1	27%
Creek Road	Central	106	27%
Norwood	Tamar	67	25%
New Norfolk	Central	18	23%
Rokeby	Hobart East	38	22%
Mowbray	Tamar	39	21%
Emu Bay	North West	10	21%
Meadowbank	Central	4	20%
Railton	North Coast	30	19%
Risdon 33 KV	Hobart West	67	19%
Trevallyn	Tamar	89	18%
Burnie	North West	63	13%
Derwent Bridge	Central	1	10%
Derby	North East	3	9%
Devonport	North Coast	70	7%
Rosebery 44 & 22	West Coast	21	7%
Queenstown	West Coast	7	6%
Ulverstone	North Coast	36	4%

4.2.4 Connection Point Growth

The following table 4.2.4 (a) shows the annual growth rates based on the 10 year forecast, associated with each of the Aurora Connection Points.

Table 4.2.4 (a): Connection Points Forecasted Growth

Planning Area	Connection Point Substation	Forecast Growth pa
Central	Arthurs Lake	n/a
Central	Derwent Bridge	n/a
Central	Gordon	0.0%
Central	Meadowbank	3.7%
Central	New Norfolk	1.9%
Central	Tungatinah	3.2%
Central	Waddamana	3.3%
Central	Wayatinah	2.2%
East Coast	Avoca	2.3%
East Coast	St Marys	3.1%
East Coast	Triabunna	2.9%
Hobart West	Bridgewater	2.4%
Hobart West	Chapel St	2.6%

Planning Area	Connection Point Substation	Forecast Growth pa
Northeast	Derby	0.80%
Northeast	Scottsdale	2.80%
Northwest	Burnie	1.10%
Northwest	Emu Bay	1.70%
Northwest	Port Latta	3.50%
Northwest	Smithton	2.50%
Northwest	Ulverstone	0.40%
Sorell / Peninsula	Sorell	2.80%
South	Electrona	2.80%
South	Kermandie	3.80%
South	Kingston	3.50%
South	Knights Rd	4.00%
Tamar	George Town	4.20%

Hobart West	Creek Rd	2.2%
Hobart East	Lindisfarne	2.4%
Hobart West	North Hobart	3.1%
Hobart West	Risdon	1.6%
Hobart East	Rokeby	1.8%
North Coast	Devonport	0.6%
North Coast	Fisher	n/a
North Coast	Railton	1.6%
North Coast	Wesley Vale	n/a

Tamar	Hadspen	2.40%
Tamar	Mowbray	1.80%
Tamar	Norwood	2.00%
Tamar	Palmerston	3.90%
Tamar	Trevallyn	1.50%
West Coast	Newton	0.10%
West Coast	Queenstown	0.50%
West Coast	Rosebery	0.50%
West Coast	Savage river	0.50%

Refer to the following link: **NW-#30118740**

4.3 Key demand management activities

4.3.1 Planning criteria and assumptions

Planning is considered and managed at three distinct levels. These are:

- Major injection level - Major area sources of supply are either Transend Terminal Sub Stations or Aurora Energy Zone Substations (which are supplied from Transend Terminal Sub Stations). These stations are directly or indirectly the link from the transmission network to the distribution system;
- High voltage feeder level - The HV distribution feeder forms the link between the terminal/zone substation and the customer. The customer may be supplied directly from the feeder (if that customer has a large load) or more usually via a distribution substation; and
- Distribution substation and low voltage level - The secondary distribution mains distribute power in an area at the secondary voltage of the substation. In CBD and urban/suburban areas this distributor system can form a network that can be interconnected with other LV networks from adjoining substations.

4.3.2 Contingency planning

Contingency planning is undertaken to address the potential for high system demand and peak load conditions in order to reduce the impact should such an event occur.

Contingency plans are used to mitigate serious impact to the system from credible contingency events. These events may arise from hot spot locations with strong load growth before network or non – network solutions are put in place. In some cases such events may develop faster than normal construction activities can be undertaken. Other cases may be where the risk does not warrant an expensive construction investment.

4.3.3 Key distribution planning considerations

The planning considerations and criteria applied in the development of the distribution network are a significant determinant of network related costs. In accordance with National Electricity Rules (NER) cause 5.6.2, an economic cost effective analysis of possible options to identify options that satisfy the regulatory test, while meeting the technical requirements of NER schedule 5.1, must be undertaken to identify the appropriate solution.

Technical requirements of NER schedule 5.1; TEC chapter 8 and applicable Australian Standards are adopted within Aurora's planning standards. In addition to these, Aurora recognises and applies 'good industry practice'.

The five primary investment drivers for planning and investment at the sub-transmission, HV, distribution substation and LV network levels of the distribution system are:

- Capacity of the system;
- Cost of capital and operational activities;
- Customer service;
- Inherent risk of the infrastructure; and
- Performance of the system for reliability and power quality.

4.4 Capacity

Capacity deals with the ability of the network system to have appropriate sized conductors or equipment that allows it to adequately meet the served load. The capacity standards are as follows.

4.4.1 Zone substations and Subtransmission

Zone transformers use:

- Steady state or normal rating;
- Emergency (cyclic) ratings based upon transformers using air fans and oil pumps; and
- Group firm philosophy, which entails using a number of other zone substations and the high voltage distribution system to enable transfer of load to meet the loading constriction on the affected zone substation transformer.

For Subtransmission Feeders:

- The capacity of the feeder is based upon the greatest limitation that it has. As the majority of the subtransmission network is a combination of overhead and underground construction, the limiting component becomes the rating of that feeder; and
- This restriction is considered for a winter peak and summer peak. Of note for most of the zones, the summer restriction is well below the load of the transformer and subtransmission circuit at that time. The seasonal restriction, mainly affects the overhead component of the subtransmission line.

All of the major zone substations have feeder connected transformers.

Security of supply at zone substation level considers the following:

- Group firm philosophy; and
- Deterministic planning standards, e.g. N-1.

4.4.2 Distribution Feeders

The planning rating is considered as the feeder rating. The planning rating embodies the philosophy of shared use of adjacent feeders in times of feeder interruptions. An appropriate planning rating enables the reasonable ability to transfer load off an affected feeder onto the neighbouring feeders. As a result the neighbouring feeders will be loaded beyond their normal rating but below their emergency rating.

The ratings that are used are generally associated with the feeder tail emanating from the supply substation and not the overhead circuit that it is connected to. The cable tends to be the limiting factor.

For all main trunks a standard overhead conductor size is used. For underground sections it is a different outcome. Underground feeder tails are designed and sized giving consideration to the cable's grouping with other circuits, ground conditions and any piping. These ratings are based on being able to deliver:

- 22 kV normal load - 10 MVA;
- 22 kV emergency (one hour cyclic) - 15 MVA;
- 11 kV normal load - 5 MVA; and
- 11 kV emergency (one hour cyclic) – 7.5 MVA.

4.4.3 Distribution transformers

Distribution transformers are assessed for load based upon:

- Customer number multiplied by the customer After Diversity Maximum Demand (ADMD) to yield total kVA as compared to nameplate rating; and
- Australian Standard AS NZ. 2374 – Part 7 for the 24-hour cyclic rating of the transformer.

Refer to the following link: NW-#30118740

4.4.4 Options for meeting or managing demand

Demand Side Management (DSM) schemes have been successfully employed both nationally and internationally to reduce network demand. Similarly, Embedded Generation (EG) may offer an alternative to a network constraint solution. To be viable, any DSM or EG scheme would need to provide a reduction of the required level of demand and offset peak demand growth, thereby assisting in the deferral of network augmentation.

In accordance with the Regulatory Investment Test, larger projects require the consideration and evaluation of non-network options (such as DSM and EG), as an integral part of identifying prudent investment options and the potential deferment of capital works. This analysis is incorporated into Aurora's planning processes.

Refer to the following link: NW-#30164961

Refer to the following link: NW-#30152363

4.4.4.1 Demand side management

There have traditionally been a limited number of large scale DSM opportunities introduced into the distribution network in Tasmania. Past schemes have focused on individual businesses and have primarily been customer-initiated.

As a result of emerging technologies and legislative obligations, Aurora has initiated a review of DSM capabilities and potential opportunities for DSM programs for residential, commercial and industrial premises.

A number of DSM schemes, which are currently employed or under trial within other jurisdictions, are being considered by Aurora, such as remote control of residential and commercial storage hot water, commercial air conditioner control management systems, energy purchase/buyback or tariff incentive programs, targeted commercial demand side management and energy efficiency programs, residential demand response appliances and education programs promoting energy efficiency.

Implementation of several DSM schemes may be necessary to be an effective and viable alternative investment option to address network constraints or defer network augmentation due to the dispersed customer base within the distribution network, the daily electricity demand profile of the various customers (viz. residential urban and rural, commercial and industrial) and location factors with respect to the existing network.

Preliminary findings from Aurora's DSM review project identified potential opportunities to defer capital works in the network for the following projects:

- Austins Ferry Zone Substation (beyond 2017);
- Blackmans Bay (beyond 2017);
- Sandford Zone Substation (beyond 2017);
- Wynyard Substation (beyond 2017); and
- Bruny island submarine cable augmentation (beyond 2017).

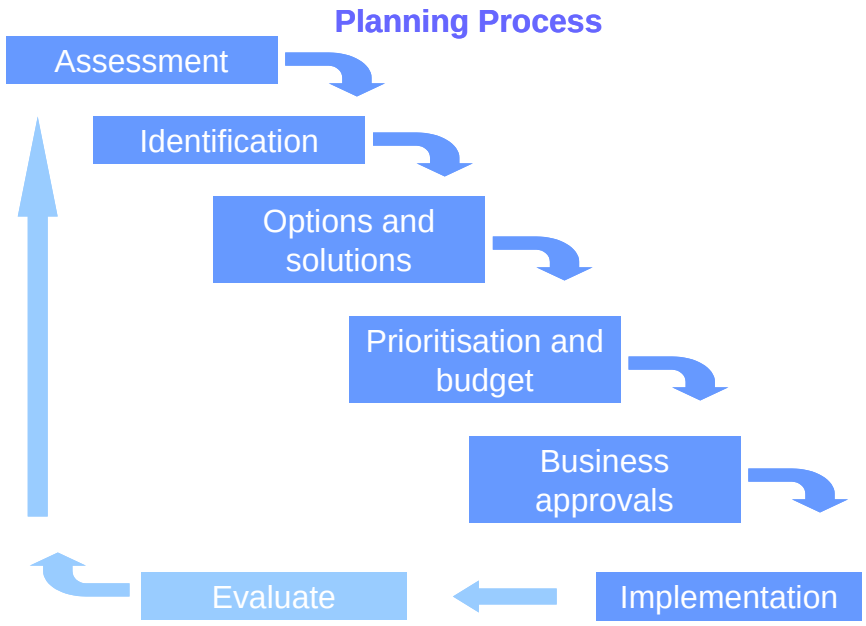
4.4.4.2 Embedded generation

Aurora is reviewing its capability and opportunities to address the connection and role of EG. EG to date has had little impact on deferment of major capital works.

Refer to the following link: NW-#30118740

4.4.5 Prioritising projects for meeting or managing demand

Aurora uses the following process to manage and prioritise projects (this broadly corresponds to the Capital Governance Framework endorsed by the AER as part of Energy Australia's price determination in 2008).



The following activities are undertaken as part of the planning process:

Identification. Understand the nature or outcome of the issue which, for example, may be associated with:

- Safety;
- Operating clearances;
- Overheating of components;
- Customers;
- Environment;
- Standards;
- Corporate image;
- Financial;
- Equipment life;
- System stability;
- Operation of system components;
- Load (amps);
- Voltage; and
- Reliability;

Assessment. The issues are understood along with their interdependencies. Causative actions are understood. The implication of not addressing the issue is understood. Identification of magnitude and breadth of the issue is undertaken to enable the assessment of treatment options;

Options and solutions. A suite of options are developed that will address the identified issue(s). Each option is assessed for treatment of the issue with consideration to its implementation, probability of success, business fit and financial requirements;

Prioritisation and budget. Options are assessed to identify the least cost option that will treat the issue. Budgets, being already identified, are further refined and year of implementation are identified. Prioritisation takes account:

- Severity of the untreated risk;
- Impact upon the business if left untreated;
- Time of requirement;
- Capital finance constraints; and
- Business appetite.

Business approvals. The identified treatment option is approved according to level of required expenditure conforming to the business delegation approval process. ;

Implementation. The project(s) are planned, designed and commissioned; and

Evaluation. Following implementation of the solution to treat the risk, the project(s) is evaluated to confirm that the treatment reduced the level of risk to an acceptable level.

Should the treatment option be unsuccessful the issue is resurrected and the planning process entered again.

Refer to the following link: NW-#30131340

5 Lifecycle management plan

Aurora's key objective in managing the life cycle of its assets is to ensure that assets perform their required function throughout the duration of their engineering lives, at least cost, while conforming to Aurora's standards, and remaining compliant with applicable legislation.

5.1 Asset Selection

Aurora maintains a set of design and construction standards to control and specify the selection and installation mode of assets into the network. The purpose of these standards is to ensure that Aurora selects assets that deliver an optimal performance at least overall cost. Similarly the way an asset is installed and/or operated when in service can have a positive or negative impact on its operating characteristics and overall service life. Aurora maintains a set of standards to ensure all elements of an assets life are controlled to deliver the best balance of safety, reliability, operational flexibility and lifecycle cost. Through its Network Management Strategy and Management Plans, performance of existing assets is used to refine and determine future standards to continually drive improvement in the network.

5.2 Asset Replacement

As a general principle, and in line with the objective of implementing life cycle cost minimisation, an asset will be replaced or refurbished when:

- It ceases to be suitable for the intended purpose;
- It becomes unsafe;
- The present value of the cost of its replacement plus the cost of removing or de-commissioning it, less the scrap value recovered, if any, becomes less than the present value of its future maintenance;
- The probability and consequences of failure become unacceptably high to deliver required service levels; and
- Its replacement or refurbishment forms part of the least cost development of the network.

5.3 Alternatives to Replacement

Replacement is only one option to restore asset performance. Other options that are evaluated include refurbishment, relocation, retrofitting or de-rating the assets and retaining them in service.

5.4 Maintenance Practices

The maintenance program is driven by the following principles:

- Reliable operation to meet the needs of the customer;

- Ensure existing assets are safe and compliant with all applicable legislation;
- Reach the least cost trade-off between different modes of maintenance (repair, refurbishment, replacement);
- Reach the optimal reactive-preventative maintenance ratio for the asset base;
- Condition monitoring and predictive analysis forms the foundation of asset maintenance; and
- The optimal mode of managing assets varies between asset classes.

An overview of Aurora's maintenance practices is provided below. The asset specific threads provide further detail on maintenance practices specifically tailored to each asset class.

5.5 Condition Monitoring and Asset Inspection

Condition assessment and inspection is performed to establish an understanding of the assets and their service status and is used as one of the key drivers for maintenance and renewal activities.

Aurora runs an extensive programme of condition monitoring and assessment on its assets. Inspection processes generating high volumes of data utilise electronic field capture systems to minimise data processing.

5.6 Routine and Preventative Maintenance

Time-based cycles of routine servicing are undertaken where condition-based monitoring is not practical or possible. The application of these techniques is based on manufacturer's recommendations, industry practice and Aurora's own experience.

Corrective and preventive maintenance work is initiated as a result of:

- Asset condition assessments;
- Performance analysis of the assets in terms of failures and defects;
- Predicting asset failures as a result of failure mode analysis;
- Asset operational importance; and
- Consequences of failure (asset and customer).

5.7 Refurbishment

The decision to repair, refurbish or replace an asset will be based on the least cost option without compromising safety and reliability targets. In many situations Aurora has determined that refurbishment to deliver life extension is a viable and cost effective activity (e.g. pole staking). Specific activities and the associated cost/benefit trade-offs are described in more detail in the relevant asset Management Plans.

5.8 Run-to-failure

In some situations where safety and reliability targets are not materially compromised, Aurora considers a run-to-failure approach can also be a valid treatment plan. This approach can be considered where predictive information on asset condition is not possible to determine, and where the consequences of failure are well understood and quantified.

5.9 Determining Optimal Level of Maintenance Expenditure

The effectiveness of each maintenance strategy is carefully and regularly monitored to ensure it is delivering tangible benefits to Aurora. Asset failure rates are monitored and maintenance cycles are modified appropriately to balance failure risks against maintenance cost. Combining different maintenance regimes (e.g. opportunistic maintenance vs. cyclical maintenance) to reduce travel costs and the use of alternate technologies are also considered for potential efficiency gains. It should be noted that safety is a very significant driver for Aurora's maintenance plans.

5.10 Asset Management Plan Structure

Thread management is the way Aurora delivers the optimal balance of activities for each asset class. Table 5.10 (a) details how these broad functions are subdivided into threads.

Table 5.10 (a): Asset Management Threads

Function	Threads
Asset Management	• Underground System • Zone Substations • Overhead System & Structures • HV Regulators • Ground Mounted Substations • Customer Connection Assets • Metering • Public Lighting • Protection and Control

A thread comprises staff from Network and Network Services involved in the planning, design, construction and maintenance of the thread. This provides an 'end-to-end' communication process across the Distribution Business.

Each thread has an assigned Thread Leader. The Thread Leaders are responsible for the planning and development of programs and budgets associated with the thread. Threads also provide a mechanism for grouping assets for planning and expenditure purposes.

5.10.1 Underground system

Establishing condition based renewal programs for most cable assets is generally problematic to do cost effectively. While some monitoring strategies are employed on oil filled cables, the technology available to accurately quantify remaining life in cables is still very immature in the industry. Thus the principle strategies employed on cable assets to determine future expenditure requirements tend to be based on historical failure rates and dissecting the population into groups of like assets that the expected to display similar reliability behavior.

Refer to the following link: NW-#30160588

5.10.2 Zone substations

Zone substations are critical elements in the network architecture, and an outage at a zone substation generally impacts a significant number of customers and large connected loads. Thus Aurora employs a number of pro-active strategies to avoid this occurrence. Aurora employs a fleet of condition monitoring and inspection programs across the various asset groups within its zone substations, and has a good view of current condition and future requirements for renewal.

Refer to the following link: NW-#30161548

5.10.3 Overhead systems & structures

Overhead systems and structures is by far the largest category of assets within Aurora's network. Aurora has developed a suite of condition monitoring, inspection, maintenance and refurbishment practices that provide a strong foundation for investment modeling based on condition based projections. As demonstrated within the thread documents, Aurora has and continues to build a good knowledge base of existing asset condition, but also detailed information on failure and replacement statistics, and these are used to fine tune practices in subsequent years.

Refer to the following link: NW-#30161322

5.10.4 HV regulators

HV Regulators are an essential element in the network and Aurora has established maintenance practices to avoid in-service failures and monitor condition to determine optimal replacement timelines. As described in the thread documents, there are a number of unique issues relating to asset types and Aurora's practices have been tailored to specifically address these.

Refer to the following link: NW-#30161495

5.10.5 Ground-mounted substations

Due to the location and nature of these assets, safety is a key driver in the management practices of ground mounted substations. Aurora has established programs in place to visit each asset on a structured cycle to confirm integrity for safety and to perform routine maintenance as required. Condition based recommendations are generated from these programs to drive planned renewal activities.

Refer to the following link: NW-#30160765

5.10.6 Connection assets

Metering assets have a requirement to be tested on a regular basis to confirm compliance, and other connection assets are generally replaced on failure when they have been identified as being in a sub-standard condition. Removal of redundant or un-used services is also an activity that drives expenditure by Aurora. In general, historical rates are used to project future requirements for these activities.

Refer to the following link: NW-#30158001

5.10.7 Metering

The asset practices relating to metering assets are principally driven by compliance obligations. In general metering assets are not considered serviceable, so when a non-confirming or failed meter is found, it is replaced. Historical failure rates have been used to extrapolate forward levels of fault driven replacement. Testing for compliance verification rates are mandated in the TEC and NER, and these are the basis for projecting future costs.

Refer to the following link: NW-#30161864

Refer to the following link: NW-#30161525

5.10.8 Public lighting

Aurora operates a structured program of pro-active bulb replacement and also a reactive response once a faulty light unit has been identified. Planned replacement of bulbs is considerably cheaper than reactive one-off activities, and this is the principle driver for the replacement programs. Aurora has defined service level targets within the Tasmanian Electricity Code which set restoration timeline expectations and these targets are the key driver for attending to one-off outages.

Refer to the following link: NW-#30148124

5.10.9Protection and Control

Network Protection & Control aims to improve and sustain the performance of Aurora's distribution system by ensuring unplanned outages or fault effect the minimum customers possible. Protection co-ordination designs and introduction of remote control ensures the protection co-ordinates so that only the section of feeder where the fault is located sees the resultant outage. Where possible the system is also switched around remotely to reduce or remove the impact on effected customers.

Refer to the following link: NW-#30151618

6 Risk management

6.1 Risk Framework

Aurora manages its business risks in accordance with a Risk Management Framework shown below in Figure 6.1. (a). The Framework and supporting policy documents are based on risk management standards and are approved by the Board Audit and Risk Committee (BARC).

The purpose of risk management is to increase the likelihood of achieving Aurora's stated vision, purpose and strategic objectives by providing the basis for integration of effective risk management within strategic and operational planning and decision making at all levels across all activities.

Risk management drives virtually all network activities and programs including:

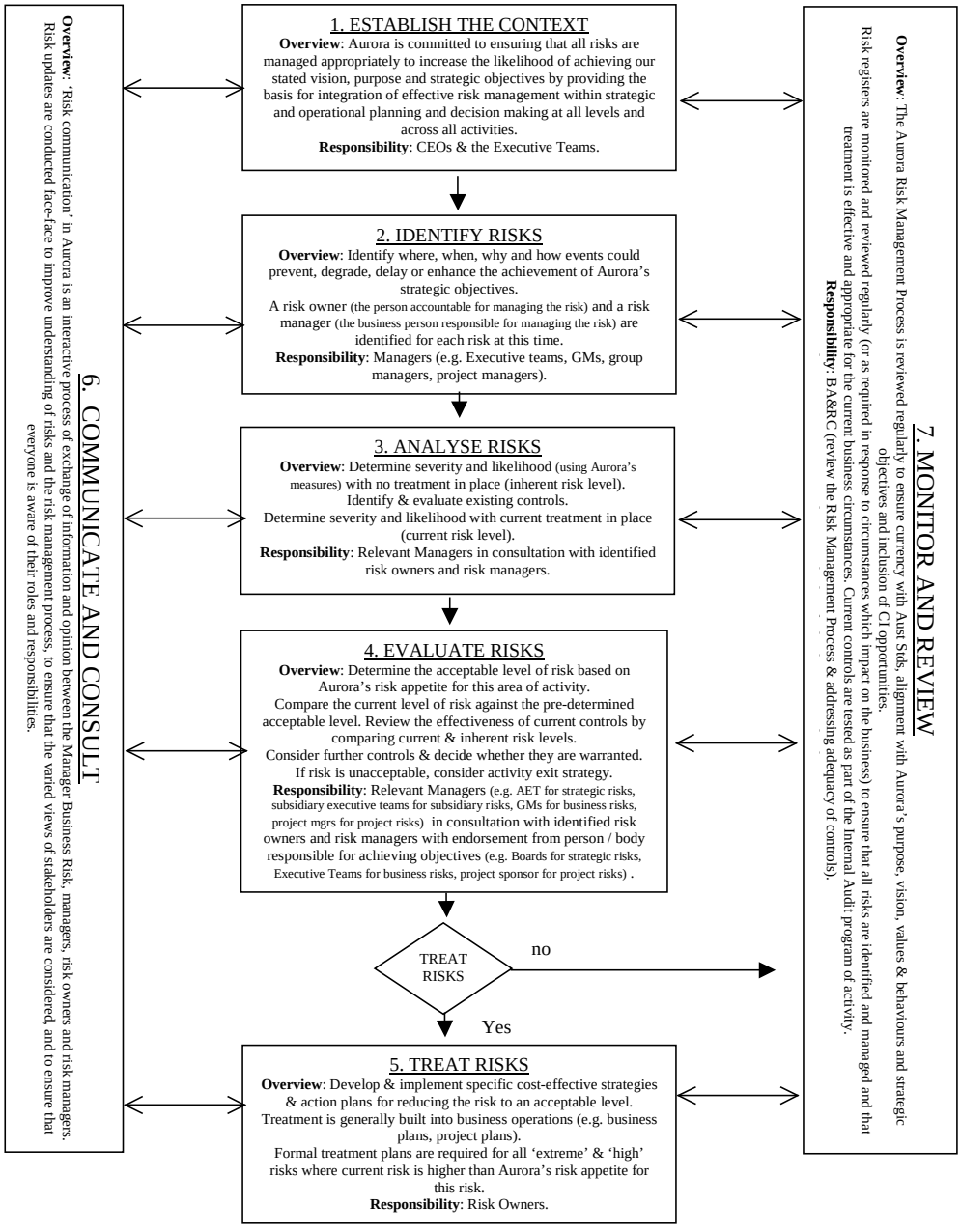
- Reliability assessment;
- Network augmentation;
- Asset replacement; and
- Asset maintenance.

Figure 6.1. (a) Risk Management Framework

AURORA RISK MANAGEMENT FRAMEWORK

(Applies to Aurora and subsidiary companies)

Overall accountability for risk management in Aurora ultimately resides with the respective CEOs and the Executive Teams.



Reference: Australian New Zealand Standard - Risk management Standards Australia, Standards New Zealand AS/NZ 4360:2004

6.2 Defining key risks

Aurora's approach to risk management is based on AS/NZS ISO 3100 "Risk management - Principles and guidelines". In particular Aurora considers the following areas:

- Safety;
- Environment;
- Reliability (customer impact);
- Financial performance;
- Legal and Regulatory compliance; and
- Corporate reputation.

Aurora has a current initiative to introduce an improved risk-based approach to optimise work programs to help determine allocations of resources across the various work programs and support activities. It is anticipated this approach will ensure that work programs are focussed on addressing the highest ranked risks first.

The outcomes of this initiative will be:

- A consistent approach for assessing risk across work programs, allowing for a comparison of risk across these programs;
- Assessment criteria are aligned with the business objectives; and
- Capital budgets developed to deliver business objectives in a sustainable manner across work programs.

The tool being developed includes a rating system to determine both the risks and the benefits associated with each project or program to allow project ranking and assist with decision making and optimising the program of work.

Aurora has a comprehensive risk policy and risk management framework that includes the following elements:

- Establish the context;
- Identify risks;
- Analyse risks;
- Evaluate risks; and
- Treat risks.

Refer to the following link: CO-#399975

6.3 Asset Management

Risk management considerations have resulted in replacement, inspection and maintenance programs of specific asset-types found to pose a safety risk or environmental risk as a result of failure. Risk is the principal driver of replacement priorities for each program. This ensures that individual assets considered the highest risk are managed to mitigate the risk to acceptable levels. All asset inspection programs have an implicit aim of assessing the asset condition to determine risk.

6.4 Disaster Management

Aurora's operational priorities in order of importance are:

- Ensuring personal safety of both the public and Aurora staff;
- Protecting equipment and infrastructure from damage;
- Efficient supply restoration. Including meeting the communication requirements of customers and other emergency services; and
- Keeping the community informed.

Aurora Energy has adopted the Incident Control System (ICS) as its methodology for event management of storms or other major incidents on our distribution system. The objectives of this system are to:

- Ensure the emergency response is always managed, controlled and co-ordinated across the whole of the affected area to achieve the best possible event management;
- Allocate our finite field resources to maximum effect;
- Plan during the event, based upon information coming from the field to allow flexibility in response;
- Ensure that all those involved understand their role and responsibilities. Keep communications flowing internally and to customers giving then clearer and more realist timeframes for power restoration; and
- Account and summarise what occurred.

ICS integrates personnel, procedures, facilities, equipment and communications into a common organisational structure. It provides clear delegation of responsibilities to effectively accomplish stated objectives. Further detail regarding the ICS is contained within the Event Response Management Manual, which is to be read in conjunction with other Aurora Energy policies and Network Division manuals. This manual is reviewed twice each year, at the end of November and the end of March. If the system has not been enacted for a period of 12 months, a desktop exercise is run with a debriefing and report.

6.5 Bushfire Preparedness

Aurora continually reviews processes and procedures to identify and implement additional and refined controls aimed at achieving Aurora's targeted risk profile. Our bushfire preparedness also takes on added focus as a consequence of the release of the recommendations of the Royal Commission into the 2009 Victorian Bushfires. The objectives of the Bushfire Mitigation Management Strategy are to:

- Control vegetation interaction with the distribution network in compliance with TEC Chapter 8A;
- Implement targeted programs to minimise the possibility of distribution network assets from starting fires;
- Implement the annual bushfire mitigation program to ensure prudent controls are in place for each fire season; and
- Implement prudent work practices associated with the operation of the network, and field activities undertaken by Aurora and its contractors.

Knowledge of the causes, incidence and environment associated with serious fires enables programs of awareness, inspection and prevention to be established and targets/rules to be set that reflect a proper focus on the causes of fire ignition that are judged to be the greatest risk to the public and the business. A considerable amount of investigation has been undertaken by the industry to determine the causes and enable electricity utilities to determine preventative actions to be taken.

The main causes of fire ignition from electricity assets are known to be:

- Failure of line hardware (electrical and mechanical);
- Failure or malfunction of network devices (such as Surge Arresters and Expulsion Drop Out (EDO) fuses;
- Clashing Conductors;
- Bird or animal contact with electricity assets;
- Surface contamination of insulators combined with moisture, resulting in electrical tracking (Pole fires);
- Failure of poles;
- Contact between vegetation and electricity network; and
- Defective Private Overhead Electric Lines (POELs).

These mechanisms of fire causes form the basis of Aurora's preventative works programs and pre-Summer works programs. Further detail regarding these programs is contained within Aurora's Bushfire Mitigation Management Plan (Asset Management).

6.6 Contingency Planning

In the event of large-scale outages, the Operations Group may have difficulty in restoring all supply in a timely manner due to the complexity and varying nature of system loads and conditions so contingency planning prior to events occurring is critical. Contingency planning provides for four aspects of restoration of supply in the minimum time possible:

- Network Operation;
- Equipment Management;
- Human Resource Management; and
- Emergency Generation.

6.6.1 Asset Operation

To assist in the development of contingency plans, Aurora has created a software tool, which quickly and accurately analyses the distribution network following outages, and identifies possible switchings, which may be performed to restore supply without exceeding prescribed voltage or rating limits. The tool leverages off Aurora's existing investment in network modules in the DINIS Network Analysis Package, the DINIS API Module, and the Feeder Loads Reporting System (FLRS). The software carries out load flows based on user entered outage feeders and loads. Contingency plans have been created for each of the major substations around the state by providing the information to fill in a contingency plan template. Each contingency plan has been developed to simulate as many major outage scenarios as practically possible. These plans include relevant information pertaining to the infrastructure and critical customers affected, and advise of appropriate switchings to be made to restore as many customers as possible. Contingency plans are reviewed annually and updated as necessary. The tool can also be used in real time to provide a guide on how far it is possible to push adjacent feeders and substations into outage areas before set limits are violated. More information can be found in the Contingency Plan Register and the Contingency Plan Review Procedure.

Ad hoc contingency plans are also produced upon notification of an increased risk of outage due to planned work that affects our n-1 conditions. These notifications can come from internally or externally, such as a transmission line outage notification from Transend.

6.6.2 Equipment Management

As part of its general contingency capability, Aurora has vendor stock arrangements for the highest volume products such as poles and pole-mounted transformers, plus a significant amount of non-inventory spare plant available for use in the event of failure of primary plant. Aurora also has a 24/7 call out roster for fault response personnel in all areas of the state to minimise disruption during out-of-hours emergencies.

6.6.3 Human Resource Management

Aurora has a large pool of skilled personnel to support contingency plans. In addition, the company has relationships with contractors to call on to respond effectively with events.

6.6.4 Emergency Generation

Aurora also has its own mobile generating unit, as well as arrangements with companies that can provide stand-alone generating units to reduce the impact on customers when network items are taken out of service for maintenance or network expansion. These units can also be used to reduce the impact of unplanned outages associated with critical primary plant. Use of these units is factored into contingency plans.

6.6.5 System Security

It should be noted that the majority of distribution supply type substations are owned and operated by Transend with only those substations in parts of Hobart and in some rural areas being the responsibility of Aurora. The security status of those substations under the control of Transend are managed through governance and load transfers and other measures are conducted through the joint planning process between the two network service providers.

6.6.6 Zone Substations

Aurora has at present 18 zone substations with a further 2 substations under construction. During the current regulatory period one substation has been decommissioned. At present of the 18 substations owned and operated by Aurora Energy 10 are considered major (over 10 MVA) and 8 minor (under 10 MVA). Of these there are none that are solely for the supply of specific major customers. Within the Aurora fleet of substations there is adequate capacity to meet the current maximum demand, under present summer or winter normal operating conditions at 11 substations (61%) of the 18 substations. Of the 5 substations which are at risk from a contingent event:

- One is marginally over nominal transformation ratings but within emergency ratings; and
- Two have either a sub transmission or distribution feeder supply with there being no alternative supply capability.
    - Of these one substation supplies a major load with a relatively small distribution load; and
    - Two have adequate alternate supply capabilities that will take less than 120 minutes to restore.

6.6.7 High Voltage feeder summary

The following table 6.6.7 (a) provides a summary of the results from the 2010 Feeder Load study in which all feeders were reviewed with their loading and compared to the planning criteria.

Table 6.6.7 (a): Distribution feeder security status 2010

Security level 2010 status for distribution feeders		
Category	**Number**	**%**
Total Feeders	369	100%
Capacity Limitation	26	7%

Note.
Does not include subtransmission feeders.

The term limitation refers to the non-compliance with the feeder planning criteria. The majority of the 26 limitations (7%) are related to feeder maximum demand loads exceeding the '3 into 2' target security level criterion applicable to urban or meshed networks meaning two adjacent feeders have the capacity pick-up the load of a feeder if it fails, rather than the individual feeder conductor ratings being exceeded under normal operating conditions.

6.6.8 Low Voltage feeder

Aurora does not assess the security status for distribution substations (nominally 1500kVA and below) formally however conducts detailed analysis of the status of its low voltage network through:

- Monitoring Power Quality complaints;
- Monitoring trends such as overloaded transformers; and
- Conducts detailed analysis of implied load based on the customer to asset link in Aurora's geospatial systems.

7 Systems, processes and practices

7.1 Overview

Information technology is critical to Aurora's operation and delivery of its strategies, with many improvements potentially enabled by technology. Whilst "Smart Grid" and "Smart Customer" paradigms are emerging as transformational strategies with the potential to deliver significant benefits, it has become clear that these strategies require new levels of sophistication in information management, "backend" operational processes, and technologies.

"IT Systems" encompass these domains and their associated underlying applications, software, hardware and communications technologies. Aurora recognises the opportunities that these technologies represent but more importantly, understands its current state and the gap that needs to be bridged before it can progress into the new and exciting future.

Aurora will develop the capabilities and gain the experiences and insights to leverage the innovations and best practices introduced through the global energy industry transformation. Aurora's unique and privileged position in Tasmania affords us the opportunity to take a prudent and pragmatic approach to address industry transformation supporting our objective of containing customer prices through improved operational efficiencies and developing new products and services that improve customer satisfaction and quality of life.

7.2 Information management

Increasing the level of knowledge on an asset can lead to greater effectiveness in work programs, but an increase in the level of knowledge may also lead to a decrease in effectiveness if the effort required to gain this extra knowledge is greater than the benefits gained from having this knowledge.

The aim of Aurora's Asset Data Capability Project which was completed in 2010 was to determine Network's asset data requirements into the future and beyond to 2020 to drive more efficient investment decisions and to find a balance between everything that could be known about an asset and what is needed to be known to run effective work programs.

Network engaged a consultant to facilitate a series of workshops bringing together key specialists from around the business to contribute their knowledge of the assets. The workshops explored issues from what external issues could impact on asset management strategies to what is an asset, how assets fail and what asset data is used for across the business.

Refer to the following link: NW-#30028182

7.3 Description of systems

The systems have been grouped into the following core pillars:

- Asset Management and Data - Support all elements of managing the physical assets;
- Real Time Management and Data - Supports the real time operation and management of the distribution system; and
- Market - Projects to support the meters to cash process.

The remaining systems have been grouped in the following complementary pillars that support the distribution business:

- Customer - Projects to support the customers experience and choices around consumption and use (i.e. Demand Response);
- Field Tools - Project to deliver field tools in support of Distribution Activates (works, asset data collection vegetation);
- Network Services Work Management - Projects to support the planning and management of works delivery;
- Infrastructure - Projects that deliver IT infrastructure;
- Innovation - A suite of projects that deliver innovative solutions to business issues, generally to support one or two users; and
- Operational Technology Support - The "peddling" required to keep existing systems running both CAPEX and OPEX (i.e. version upgrades and licence fees).

7.3.1 Asset Management and Data

The objective of Aurora's approach towards asset management is to ensure that electricity is delivered safely, reliably, economically and with respect to the environment. Aurora's asset replacement strategies are designed using the best available techniques appropriate to the criticality and value of the assets and shall incorporate a whole of life and risk-based approach.

The IT solutions currently supporting Fixed Asset Management are:

- DINIS - power flow analysis;
- WASP – works management, design and asset condition;
- WASP BASIX – Works Planning at macro and micro level;
- G-Tech – GIS and network model; and
- Spatial Data Warehouse – with a suite of in-house process and analysis tools.

Aurora will continue to enhance its capability by the acquisition and deployment of new Distribution Design tools, increasing our asset management system's capability for condition, events and history. Aurora also plans to replace its power flow analysis software.

During the current period we have made advancements in our data acquisition, management and analysis (Asset Data Capability Project). Aurora has now commenced the "sensible and staged" implementation of the main recommendations. The payoff has meant that we have a better understanding of the condition of our assets and risks and as a consequence can reduce operating costs by moving time based replacement and maintenance programs to condition based programs.

7.3.2 Real Time Management and Data

The objective of Power System Management (System Fault & Operations) is to "operate the distribution system to provide and maintain customers to agreed service standards while accommodating asset management activities and public safety considerations".

There are three key processes to achieve this objective:

- System Management – the overall management (monitoring and control) of the performance of the Network;
- Fault Management– the efficient and effective management of power system faults or emergency situations which involve the power system; and
- System Access– the safe and efficient provision of access to the power system for asset management activities such as construction and maintenance.

The IT solutions currently supporting Power System Management are:

- Interllution SCADA system and WSOS proprietary software;
- In Service OMS solution;
- Avalanche system from TVD; and
- A suite of purpose built process tools.

Aurora will continue to develop its capability in the real-time operation and management of the network by making strategic investments over the next ten years to support the evolution of new technology layers being integrated with existing physical assets. This will provide higher levels of automation, increased volumes of data for analysis and greater utilisation of existing infrastructure. This coupled with non-network alternatives with lead to the deferment of capital expenditure over time.

Future investments will include the acquisition and deployment a Distribution Management System and Historian Database capabilities.

7.3.3 Market Systems

Currently, Aurora is undertaking a major upgrade of some of these systems to enable it to interface seamlessly with the Tasmanian electricity retailers and their customer and billing systems to ensure compliance.

Aurora's approach to these system developments has been on a 'just-in-time' basis with a mix of manual and semi-automated systems and processes being implemented, with a view to enhancing functionality, the level of automation and capacity as volumes, business needs and regulatory obligations developed and increased.

Major systems developed have included:

- Meter Data Management (MDMS) by Gentrack;
- Service Order Management (SOM) by Brave Energy;
- TVD CSC - Works Management; and
- Distribution Billing (DBill) and interfaces to other Network systems.

Aurora will continue to enhance the capability of its Market systems to maintain existing levels of customer service and increase the level of automation and seamless integration of data between core market systems.

Refer to sections 6.5.7 (c) (1) to 6.5.7 (c) (3): NW-#30166818

8 Commercial Strategy

8.1 Overview

The Commercial Strategy outlines the commercial framework that will enable the distribution business to deliver its aspirational goal of no increase to customer prices as a result of our efforts. The strategy is about recognising that the distribution business requires a much greater commercial focus in undertaking its activities to deliver better customer outcomes through greater productivity and efficiencies.

8.2 Appropriate Returns to Shareholders

The long-term nature of the Distribution Business plays a key role in ensuring sustainable commercial returns to the Aurora Group. The Distribution Business aims to deliver a long-term return on assets and investments, which for regulated activities achieves the allowed regulated return and for non-regulated activities achieving the allowed regulated return, achieving an appropriate commercial return.

The objective for the Distribution Business is to ensure the business is structured and funded so that it is capable of delivering the required services over the long-term for an appropriate commercial return commensurate with risk. This is achieved by:

Demonstrating what is a long-term, sustainable level of funding (both operating and capital expenditure) in order to deliver the required level of service;

Driving efficiencies to deliver better financial outcomes e.g:

- EBIT; and
- Debt to Equity: aligning our debt portfolio to each determination period and optimising borrowing rates.
- Minimising and mitigating against credit risk exposure;
- Ensuring major investments are approved within the commercial framework and consider lifecycle costs;
- Operating within the allowed operating expenditure funding; and
- Ensuring allowed revenues are recovered via network tariffs.

8.3 Customer Expectations

Aurora's Customer Strategy is pivotal to meeting customer expectations and will assist in ensuring that customers and the Tasmanian community receive a secure and reliable supply of electricity at the lowest sustainable cost.

The Customer Strategy for Aurora's Distribution Business is *'to combine improved asset utilisation, and customer education/choice to improve reliability of supply at an affordable price to engaged customers.'*

In an environment of rising prices and aging assets, the key challenges for Aurora are customer's affordability and maintaining supply reliability.

The overall vision is to incorporate an informed and educated customer with improved asset utilisation to ensure a reliable supply at an affordable price.

The Customer Strategy will complement the Network Management Strategy and asset management plans, which incorporate the new vision of ensuring improved utilisation of the assets and changing customer loads and usage patterns. Traditionally these plans have addressed key drivers such as risk, customer, reliability, capacity, and whole of life costs. The asset management plans will continue to address these drivers and will also consider asset utilisation and changing customer loads.

Refer to the Customer Strategy: NW-#30149436-Customer Strategy

9 Resourcing plans

9.1 Overview

Aurora's Board has committed that it will continue to meet the reliability and investment requirements of its distribution electrical infrastructure, without contributing to additional prices increases to customers. Aurora plans to meet this vision through a combination of:

- A review and realignment of its distribution engineering strategy;
- Improvements in productivity through system and training improvements; and
- Alternative external work options that are complementary to its work programs implemented throughout the state.

Through these measures Aurora will position its business in such a manner that it can not only resource the right skills to complete its proposed work programs but also achieve those programs in a way that ensures that customers are provided with an efficient service delivery.

Aurora is therefore confident that it will have an efficient level of competent and skilled resources that are commensurate with the work programs it intends to deliver.

9.2 Expected work levels

The forecast Program of Work requirements indicate resource requirements for OPEX and CAPEX will be less of the determination period, than those required to deliver the 2009/10 work program. This has been taken into consideration by Aurora as part of its long term planning such that there is sufficient internal and external capability to deliver the proposed Program of Work.

Aurora has carefully considered the requirements to maintain an efficient fully skilled workforce and has set an optimal service provision at 625,000 labour hours for its field workforce. Aurora considers that this level of resourcing provides the most efficient internal resourcing model whilst allowing the necessary flexibility of delivery that takes account of weather, leave, training and peak work periods throughout the year.

Figure 9.2

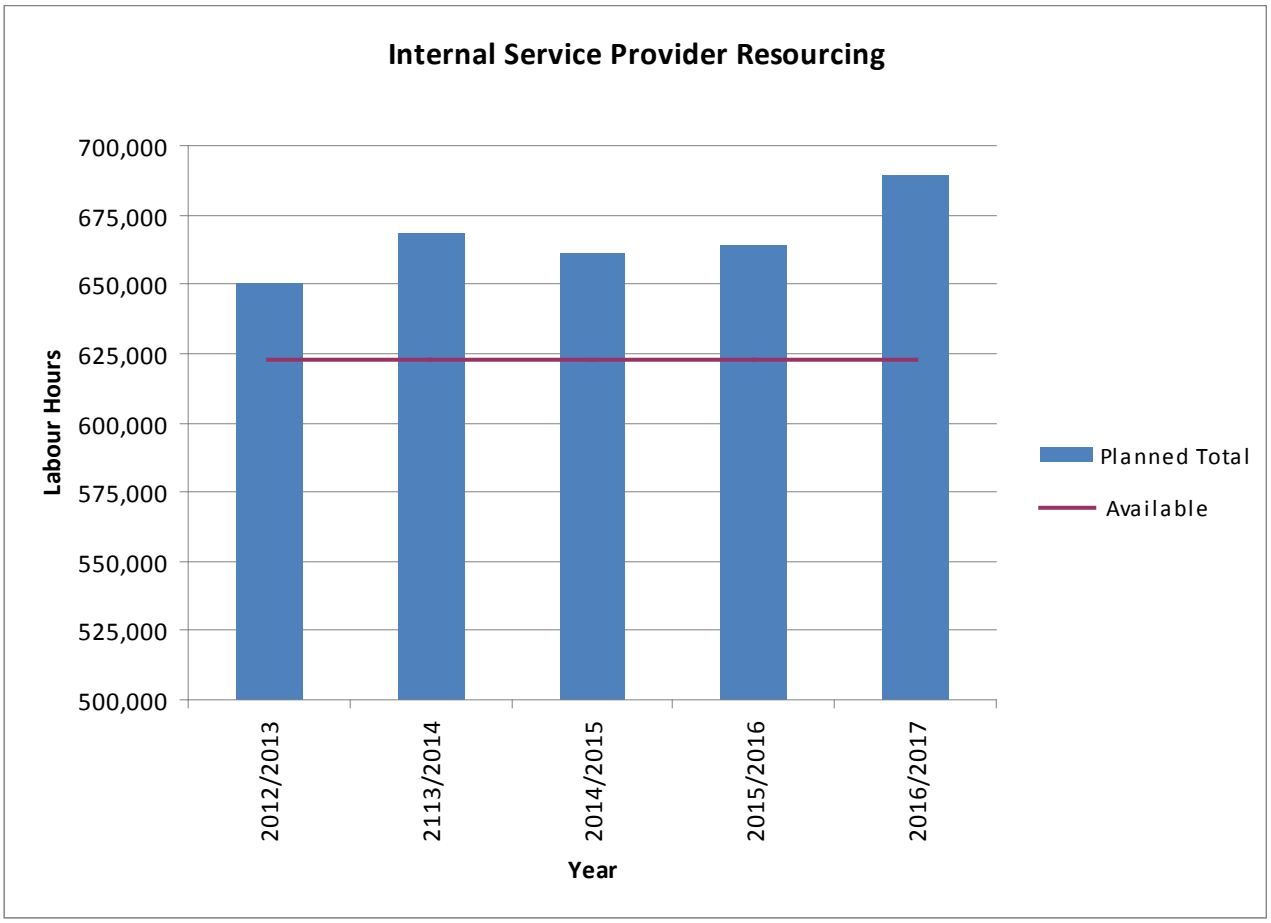


Figure 9.2 represents an analysis of the work that is predominately resourced via Aurora's internal resource capability. Any shortfalls in this area are managed by outsourcing and supplementary labour to which there is a capacity of approximately 50,000 hours. Further analysis has also been completed against each of the core skill sets.

Refer to Deliverability Plan: NW-#30169119-AE Deliverability Plan - Network Services

9.3 Works planning process

The works planning process has undergone significant change in recent years to ensure:

- That all works planning occurs in a manner that maximises planning and strategic efficiencies by use of a purpose-built works planning tool;
- Planning takes account of an efficient mix of internal and external work provision; and
- Programs are planned at a macro level on a 1 month basis that aims to maximise efficiencies in relation to:
  - Work priority;
  - Resource availability;
  - Location and travel;
  - Skill set requirements;
  - Outages; and
  - Customer requirements.

Allocation of work is distributed between the Aurora internal field work force and external contractors in order to maintain an appropriate balance for Aurora personnel in regards to required skill levels, internal work force cost efficiency, peak demand periods and management of risk. Generally outsourced work incorporates activities that:

- Are low in complexity but high in volume;
- Meet peak work volumes;
- Can be packaged as a single project such as design and construction of zone substations;
- Require civil maintenance and construction; and
- Involve vegetation maintenance.

The 2008 – 2012 regulatory control period has required the delivery of a significantly increased works program in comparison to previous regulatory periods. Aurora met this challenge through a planned and staged building of works capability and delivery.

The major strategies employed over this period to ensure deliverability of the program included:

Apprentice Program. Aurora has maintained an apprentice program that has been focused on ensuring it is developing future trades-people within the industry, supports resourcing to balance the ageing workforce demographics, and creates future flexibility through dual trade qualifications;

Improvements in planning processes. Enhancement in workload forecasting and leveling of the capital program to gain optimum design and construction efficiency within the program delivery;

Internal services focus. Aurora has directed its focus on delivery of its distribution work programs and reduced the amount of external work being undertaken, for example, private substation maintenance. Consequently this has enabled Aurora to meet the increasing distribution work program, but has not required any large increase in overall FTE's in the delivery area;

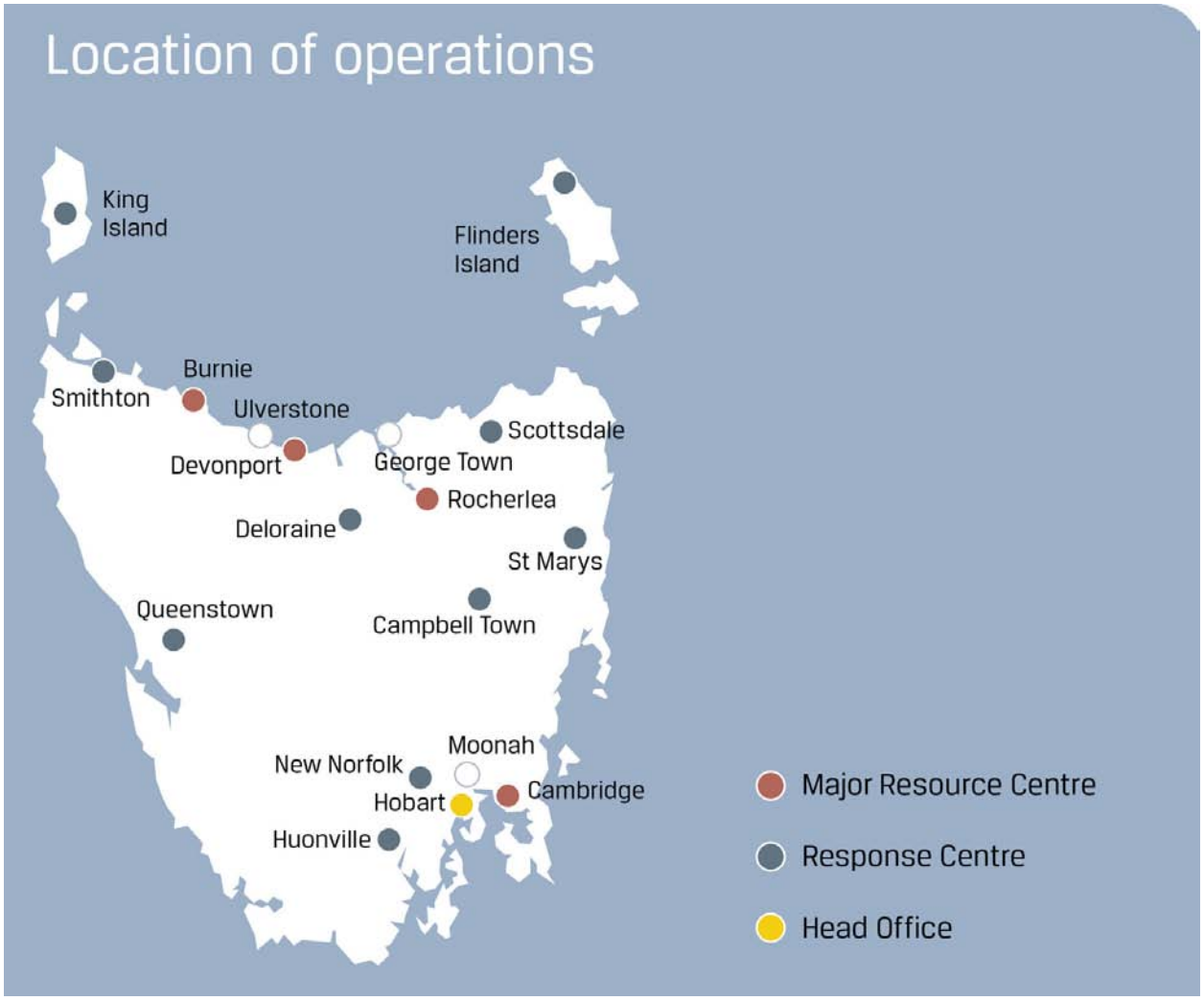
Signing of a Design and Construct contract and establishing an increased and settled contractor presence in the state – this market tested contract has allowed Aurora to identify projects that could be both entirely or partly outsourced to meet peak work loads and ensure delivery of the entire work program; and

Outsourcing**.** In addition to the Design and Construct contract, Aurora also outsources other works via market contract arrangements particularly where:

- The internal Aurora model is not cost efficient;
- There is insufficient internal capability; or
- During peak demand periods.

In employing these strategies, Aurora has successfully delivered a work program through both internal and externally-sourced service providers that was well in excess of that proposed to be delivered in the next regulatory period.

Developing and maintaining the capability and availability of skilled resources is fundamental to delivery of any work program and skill maintenance and retention has been a major issue in the recent economic climate. Whilst Tasmania is small in geographical terms, it has quite a dispersed customer base, often in isolated or difficult to reach areas. As an island, it also has to be relatively self sufficient in meeting the requirements of the customer base for reliability of supply. It is these challenges that have led to the establishment of a number of service depots around the state, indicated in the following map.



The workforce required to operate and maintain the distribution network has averaged approximately 475 personnel over the last three years with natural attrition and turnover being offset by an ongoing apprentice in-takes and targeted recruitment. Future FTE numbers will be affected by changes in work programs proposed within Aurora's regulatory proposal. Aurora has the capacity in place to assess both skill set requirements and volume of work and consequently deliver on any changes to the current resourcing strategy that may be required.

9.3.1 Apprentices

Aurora has spent significant time during the current determination period considering workforce planning and succession activities. It is acknowledged that staff require clear line of sight for career progression opportunities. These activities start with the apprentice program.

Aurora had 60 apprentices at various stages throughout their training cycle as at 31 December 2010.

The apprentice program for 2011 has been suspended for 1 year in order to:

- Ensure that the construction upgrades scheduled for 2011 to Aurora's training centre do not impede the timing of apprentice training programs. Given that in their first year, apprentices spend five months at the school, the construction phase and training activities were impossible to align;
- Allow for a review and improvement of all workplace documentation that relates to apprentices, include on call and supervision guidelines;
- To allow for the changes in field leadership occurring as part of the Distribution Business Strategic Plan to bed down and thus ensure appropriate supervision and mentoring of apprentices; and
- To be able to best match future workforce requirements to the program of work proposed in Aurora's regulatory proposal to best meet changes in the business's resourcing strategy.

An apprentice intake will recommence in 2012 and will continue annually from this time. It is anticipated that apprentices will be engaged each year as part of this ongoing commitment by Aurora.

9.3.2 Training and Competency

Aurora will continue to invest heavily in developing its staff and their workplace competencies. There is a large body of work taking place throughout the organisation that is focused on developing our workforce to achieve improved productivity and efficiencies and where necessary new skills required to meet the changing distribution environment. Some of these initiatives include:

- Multi-skilling the workforce. To create a field workforce capable of completing a majority of distribution activities without creating duplication – energised LV overhead, de-energised HV overhead, service connections from the pole to the switchboard inclusive, XLPE jointing and limited ground substation maintenance – thereby driving greater workforce efficiencies;
- Establish a Competency Framework; and
- Aurora's organisational wide commitment to training and development is seen through its corporate policies but also recent work in leadership enhancement, performance development and career and succession planning.

Aurora is implementing a five year plan that will focus on resource flexibility, in particular, dual trading for new recruits and as a transition program for current employees to enable them to work with greater flexibility. By multi-skilling its workforce, Aurora plans to increase workplace interest and challenges,

provide a visual career path for both trade and non-trade specific employees and meet the increasingly diverse range of work programs that are evolving in the distribution and communication industries.

Workforce accreditation is also vital to Aurora's ongoing activities and Aurora will continue to provide an environment where staff can progress their skills and experiences, such as through Operator Training and maintaining a close alignment with the Aurora Training School.

The Aurora Training School has Registered Training Organisation (RTO) accreditation, delivering nationally recognised training in Certificate III Powerline and Certificate IV Powerline Design. The value of having an RTO as part of Aurora's internal training activities cannot be understated. While the nationally accredited courses must meet stringent quality and auditing standards, it ensures that other courses and training provided, even though they don't require the same level of documentation and oversight, are treated in much the same manner, thereby driving continued excellence in the delivery of training services, regardless of the course undertaken. That said, all risk-based activities (for example, pole top rescue, polarity testing) are reviewed yearly to ensure that all staff maintain the highest level of preparation for potential workplace issues.

Whilst Aurora is well equipped to train its workforce in business as usual activities, it has also demonstrated capacity to introduce new technologies and practices into the training packages offered. For example, in order to meet the National Broadband Network (NBN), members of the Aurora workforce have been trained in the operation and maintenance of fibre. The training school is currently moving towards national accreditation status for this training program, again to give Aurora's workforce proven qualifications.

Resource flexibility allows Aurora to reduce its costs by means of, increased work delivery capacity, improved career and remuneration opportunities for staff, while not relinquishing the importance of specialist roles to maintain risk mitigation and safety levels. Aurora ensures that it is educating and maintaining the skills of its workforce and that the continuous improvement process with its employees will not only deliver a program of work safely, but also provides its people with the highest level of career satisfaction and safety.

Given the strategies that Aurora is implementing within the distribution side of the business, through improved planning, better scheduling and multi-skilling of the workforce, it is aiming to make significant cost savings in both operating and capital expenditure. However, as the primary service provider committed to a long term presence in the state there are benefits in creating a critical mass to offset fixed overhead costs and maximize efficiencies. The opportunities presented by other external work, such as National Broadband Network (NBN) provides a complementary business model that can be incorporated seamlessly into the business, thereby creating greater resource flexibility, easier management of peaks and troughs in core distribution work and more efficient overhead cost distribution. This balance is continually monitored through business planning processes and adjusted through changes identified in resource planning.

9.3.3 Contracting Strategy

As an island with limited capability to ramp up skilled resources quickly to meet peak demand loads, Aurora made the decision to support the introduction of increased competition in the service deliver area. A tender for major service provision to assist with delivery of Aurora's work program was awarded to Jemena Networks, with the intent being to establish an ongoing presence in the state of other contractors with similar skill sets and capabilities. The benefits of this contracting strategy include:

- An ability to outsource elements of work, whether in part or entirety, allowing for flexibility and assured program delivery;
- Benchmarking of both internal and external service providers to ensure prudent and cost effective management in the delivery of the work program;
- Matching the capability of resources to jobs within the program, specifically where tasks are small in number or unusual in execution, and would otherwise not prove economically sensible to keep targeted skill sets within the workforce; and
- Allowing the business to withdraw the internal workforce from inefficient activities as they become apparent.

It is assumed a target of at least 20% of work will be delivered via external parties with decisions on outsourcing to be driven by skill set, location and peak demand of the Aurora workforce. One of Aurora's key initiatives is to again formally review the mix of internal and external delivery across all services. Based on this approach Aurora expects to continue with a resourcing model that sees an appropriate component of work being delivered by external parties that is carefully managed by prudent and considered processes and work methodologies.