Appendix 2A: AMS 10-01 Asset Management Strategy

2023-27 Transmission Revenue Reset

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EXECUTIVE SUMMARY

This Asset Management Strategy (AMS) is central to AusNet Services' Electricity Safety Management Scheme (ESMS) for managing Victoria's electricity transmission assets, determining the delivery of quality services to customers and value to shareholders. It summarises the medium-term strategic actions for achieving regulatory and business performance targets, which are implemented via the programs of work listed in the five-year Asset Management Plan produced each year.

The AMS is underpinned by the regulatory and commercial imperatives of delivering efficient cost and service performance. It recognises that cost and service efficiency does not mean lowest possible cost, nor does it mean guaranteed reliability. Instead, efficiency requires the costs and benefits of all expenditure decisions to be weighed against one another. A key element in this cost benefit analysis is the consideration of risk in relation to asset performance and network reliability.

AusNet Services' ongoing commitment to maintain compliance with the ISO 55001 standard ensures an auditable asset management system facilitating customer's expectations to safely maintain the quality, reliability and security of supply in an economic manner.

AusNet Services welcomes feedback from stakeholders on this document.

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1 DOCUMENT OVERVIEW

1.1 Purpose

The electricity transmission Asset Management Strategy (AMS) and its supporting documentation provide robust technical direction for the responsible stewardship of electricity transmission assets which AusNet Services manages as a service to Victoria's energy users and more broadly, the National Electricity Market (NEM).

The AMS has the following key functions:

- It sets the framework for AusNet Services' holistic approach to management of the network assets, and in so doing establishes the linkages with and between the underpinning detailed strategies, processes and plans;
- It provides important context for management strategies, by taking into account the demand for network services, the condition of network assets, and expected trends into the future. It therefore also has regard to the network augmentation planning process;

As the output of a strategic assessment process, the AMS sets out the significant asset management focus areas, and associated management strategies, for the key asset classes.

The AMS is central to AusNet Services' processes for delivery of network services to customers safely and reliably in accordance with AusNet Services' Asset Management Policy.

The AMS provides authoritative guidance for the development of asset management works programs and provides context for the asset strategies that will enhance the skills, resources and knowledge employed at AusNet Services, and thereby facilitate efficient network development and asset management.

The information presented in the AMS also extends to longer term expectations for technological advancement of network assets, the functionality of the network and evolution of management approaches.

1.2 Scope

This AMS covers AusNet Services' electricity transmission assets operating across Victoria[1], including:

- Transmission lines[2], power cables and associated easements and access tracks;
- Terminal stations, switching stations, communication stations and depots including associated electrical plant[3], buildings and civil infrastructure;
- Protection, control, metering and communications equipment;
- Related functions and facilities such as spares, maintenance and test equipment; and
- Asset management processes and systems such as Supervisory Control And Data Acquisition (SCADA) and asset management information systems (including SAP).

More specifically, the AMS relates to electricity transmission sites and facilities:

- Listed in the Network Agreement between AusNet Services (then PowerNet Victoria) and the Australian Energy Market Operator (AEMO) (then the Victorian Power Exchange) 1994;

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1 Including interfacing assets owned and operated by AusNet Services outside Victoria

2 500 kV, 330 kV, 275 kV and 220 kV transmission lines and cables.

3 500 kV, 330 kV, 275 kV, 220 kV, 66 kV and 22 kV switchgear and transformers.

- Listed in 1994 Connection Agreements between AusNet Services and connected parties, largely consisting of generators, direct connect customers and distributors; and
- Listed in various supplementary network and connection agreements, detailing AusNet Services' unregulated transmission assets (known as Mondo assets).

This AMS excludes the assets and infrastructure owned by:

- Generators;
- Exit customers; and
- Other companies providing transmission services within Victoria.

This AMS also excludes AusNet Services' corporate processes and associated information technology systems such as business communication, human resources and financial management systems. It does not include information on corporate offices or general business equipment such as computers and motor vehicles.

1.3 Relationship to Other Management Documents

AusNet Services' Asset Management System (AMS) including the policy, objectives and its underlying methodology, context, process, decision making criteria and certification is detailed in AMS 01-01 *Asset Management System Overview*.

The electricity transmission AMS is one of a number of asset management related documents. It provides more specific information on the issues and strategies specific to the electricity transmission network.

The suite of documents together comprises the Asset Management System as represented in Figure 1, with this document circled in red.

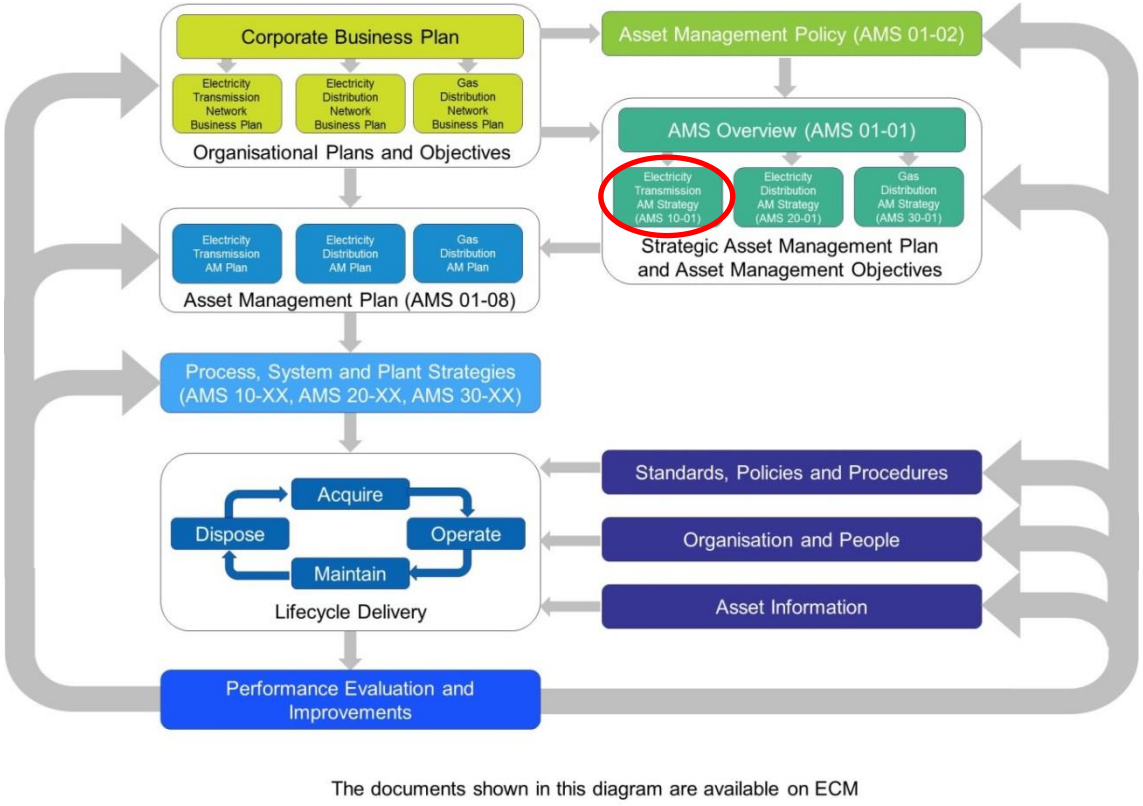

Figure 1: Asset Management System Document Interdependencies

2 ORGANISATIONAL CONTEXT

2.1 Regulatory Framework

The Victorian transmission network is subject to economic and technical regulation, which is the responsibility of the Australian Energy Regulator (AER) and Energy Safe Victoria (ESV) respectively.

2.1.1 Australian Energy Regulator (AER)

Economic regulation is subject to a national regulatory framework, which is governed by the National Electricity Law (NEL) and contained in the National Electricity Rules (Rules). The Australian Energy Markets Commission (AEMC) has responsibility for development of the Rules, and the AER is responsible for regulation of industry participants in accordance with the Rules. The AER's regulatory functions and powers are conferred upon it by the NEL and it must act in accordance with its obligations under the Rules (as must industry participants).

The AER's key responsibilities include:

- Regulating the revenues of transmission network service providers and distribution network service providers;
- Monitoring the electricity wholesale market;
- Monitoring compliance with the national electricity law, national electricity rules and national electricity regulations;
- Investigating breaches or possible breaches of provisions of the national electricity law, rules and regulations and instituting and conducting enforcement proceedings against relevant market participants;
- Establishing service standards for electricity transmission network service providers;
- Establishing ring-fencing guidelines for business operations with respect to regulated transmission services; and
- Exempting network service providers from registration.

Regulatory proposals (i.e. revenue applications) to the AER are assessed against, amongst other things, the operating expenditure objective and the capital expenditure objective (clauses 6A.6.6 (a) and 6A.6.7 (a) of the Rules). Accordingly network businesses are required to submit the total forecast operating expenditure and capital expenditure. The applicable criteria for the expenditure forecasts are:

- Meet or manage the expected demand for standard control services over that period;
- Comply with all applicable regulatory obligations or requirements associated with the provision of standard control services;
- Maintain the quality, reliability and security of supply of standard control services; and
- Maintain the reliability, safety and security of the distribution system through the supply of standard control services.

2.1.2 Energy Safe Victoria (ESV)

ESV is an independent Victorian statutory authority. The objectives of ESV relevant to electricity networks are:

- Ensure the electrical safety of electrical generation, transmission and distribution systems, electrical installations and electrical equipment;
- Control the electrical safety standards of electrical work carried out by electrical workers;

- Promote awareness of energy efficiency through energy efficiency labelling of electrical equipment and energy efficiency regulation of electrical equipment;
- Promote the prevention and mitigation of bushfire danger;
- Protect underground and underwater structures from corrosion caused by stray electrical currents; and
- Maintain public and industry awareness of electrical safety requirements.

From time to time, ESV may issue directives to give effect to these objectives.

The Council of Australian Governments has initiated the development of a regulatory framework for national safety regulation of energy networks.

The *Electricity Safety Act 1998* requires AusNet Services to:

> *"…design, construct, operate, maintain and decommission its supply network to minimise as far as practicable:*
>
> *(a) the hazards and risks to the safety of any person arising from the supply network; and*
>
> *(b) the hazards and risks of damage to the property of any person arising from the supply network; and*
>
> *(c) the bushfire danger arising from the supply network".*

The *Electricity Safety Act* also requires major electricity companies to submit to the ESV for approval, an Electricity Safety Management Scheme (ESMS) which complies with Part 10, Division 2 of the *Electricity Safety Act 1998* and *Electricity Safety (Management) Regulations 2009* in respect of safety in design, construction, operation, maintenance and decommissioning of AusNet Service's electricity transmission network.

Further information can be found in ESMS 10-01 *Electricity Safety Management Scheme*.

2.2 Victorian Planning Framework

Responsibility for planning of transmission network services in Victoria is shared by three different parties including the following:

- Australian Energy Market Operator (AEMO), which is the body solely responsible for planning the shared network[4] and procuring network support and shared network augmentations;
- The asset owners, AusNet Services and other network owners; and
- The transmission customers (distribution companies, generation companies and directly-connected customers) which are responsible for planning and directing the augmentation of their respective transmission connection facilities.

In Victoria, the transmission network planning functions are separated from the functions of ownership and operation. This section summarises the planning roles of the various parties in Victoria. These arrangements differ from other states in Australia, where planning and responsibility for augmentation is integrated with the incumbent transmission company (although independent planning oversight occurs in South Australia). The relationships between these parties and the Regulators are shown in Figure 2.

[4] The shared transmission network is the main extra high voltage network that provides or potentially provides supply to more than a single point. This network includes all lines rated above 66 kV and main system tie transformers that operate between two voltage levels above 66 kV.

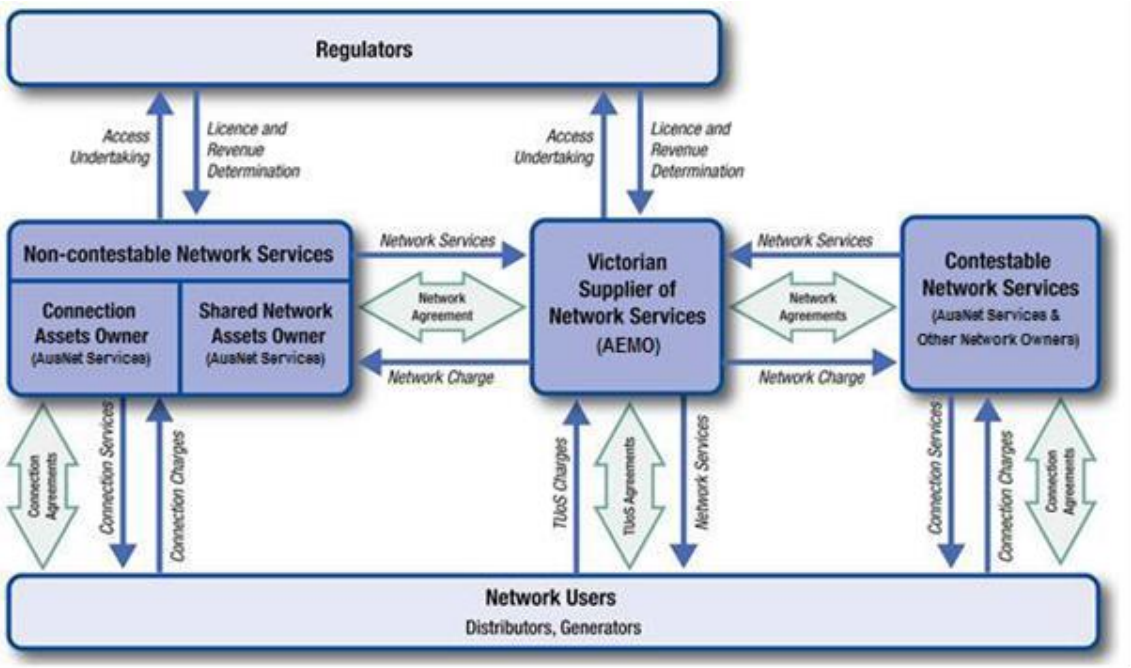

Figure 2: Regulatory and commercial relationships (new version from AEMO)

2.2.1 AEMO

The Australian Energy Market Operator (AEMO) is responsible for:

- Procuring bulk shared network services from AusNet Services and other providers;
- Providing transmission use of system services to transmission customers (including administering transmission pricing); and
- Planning and requisition of augmentation to the shared transmission network.

The responsibilities of the parties within the Victorian structure for electricity supply are set out in Victorian legislation, the licences, guidelines and codes administered by the Essential Services Commission and Victorian derogations in Chapter 9 of the National Electricity Rules (NER). Together these describe the Victorian model for procurement and provision of transmission services in Victoria.

2.2.2 Connected Parties

In Victoria, connected parties are responsible for the planning and augmentation of their connection assets. The five distribution businesses (DBs) have responsibility for planning and directing the augmentation of those facilities that connect their distribution systems to the shared transmission network. DBs plan and direct augmentation in a way that minimises costs to customers, taking into account the consequence of an asset failure, the likelihood of it occurring and the cost to augment the connection station. Other connected parties (major consumers or generators) are responsible for their own connection planning. They can choose to delegate this task to a DB if they wish.

In the event that a new connection or augmentation of an existing connection is required the connected parties must consult with and meet the reasonable technical requirements of AEMO, AusNet Services and other effected parties.

Each year the DBs publish the Transmission Connection Planning Report (TCPR) that assesses network planning criteria, the risks of lost load and options for meeting forecast demand.

2.3 Stakeholders

Table 1 summarises key stakeholders and their expectations of the service provided by AusNet Services' transmission network.

Table 1: Energy network stakeholders and expectations

Asset Owner	• Compliance with contract • Reliable information
AEMO	• Joint planning • Compliance with Acts, Regulations and Codes • Transparent processes • Reliable information
Connected Parties (energy consumers, electricity generators and gas producers, other network service providers)	• Network access • Efficient service costs with minimum increases • No network related fire or safety issues • Reliability, uninterrupted energy supply • Efficient, well planned investment and expenditure • Proactive and responsive network planning • Reliable information and effective engagement
Community	• Public safety • Reliable and secure energy supply • Environmental performance within Code • Minimal traffic disruptions • Protected infrastructure • Community consultation
Employees and contractors	• Safe work place • Reward and recognition • Skill development
Shareholders	• Return on investment • Growth in investment value • Commensurate opportunities, liabilities and risks
Energy Retailers	• Reliable information • Efficient service costs
Safety Regulator	• Compliance with Acts, Regulations and Codes • Improving safety performance • Transparent processes • Reliable information
Economic Regulator	• Compliance with Acts, Rules and Codes • Efficient service costs • Transparent processes • Reliable information

State and Federal Government	• Compliance with Acts and Regulation • Support economic development and investment • Improving safety performance • Efficient service costs
Local Government and VicRoads	• Coordinated infrastructure development • Coordination of works • Public land reinstatement

The performance of the distribution network is reported to the AER in accordance with the specifications established in the Regulatory Information Notice, Regulatory Accounts and Non-Financial Regulatory Accounts.

Monthly and annual reports are submitted to ESV in accordance with the Electrical Safety Performance Reporting Guidelines.

2.4 Customer Focus

To deliver on AusNet Services' Energising Futures corporate strategy, one strategic priority is to generate trust and respect with customers and partners. Since 2015, the business has focussed on investing in customer service to minimise frontline customer effort and pain, recognising that this would provide a foundation for building trust. The development of the current Customer Service Index (CSI) reflected this need. Since its implementation, the CSI has been successful in driving a reduction in customer complaints and meeting current customer expectations of energy service delivery.

However, the next phase of AusNet Services' journey demands that we explore how to develop a long-term relationship of trust. This requires us to not only be good at customer service, but also to design and build a customer experience that is anchored in the needs of our customers. In order to do that, we need to find the right measure (we now have an externally verifiable measure of Customer Satisfaction) and embed this in our Corporate KPIs, we need to acknowledge that culture supports customer thinking and we are not there yet, we need to build our customer experience capability. We will then design this experience across each of the 3 networks, despite the fact that customer expectations around service offerings, service levels and experience will vary for each network.

An important first step was to define very simply who our customer is. We have defined that as 'the end consumer of our products and services'; which works well for our Electricity and gas distribution networks. For Transmission, it means we will concentrate on our directly connected customers (e.g. Air Liquide, etc) but more broadly it means that every single Victorian is a customer of the Transmission network. This does not make being customer centric easy for the Transmission business as most of the services are being delivered to the end customer through the Distribution network. It does mean that in order to deliver to those end customers, we need to take into account a very important group of stakeholders, and those are the generators connecting into the network. If we can get that experience right, then the rest of the energy chain is in a good position to deliver to our end customers. Therefore generators form a very important part of our customer strategy.

2.5 Customer and Community Engagement

There is currently an unprecedented focus on consumer engagement from the AER and consumer advocates and a broad expectation that regulatory proposals should be driven by in-depth engagement with customers and suitably qualified customer representatives.

To satisfy these expectations and the AER's stakeholder consultation requirements, and in line with our intent to become more customer-focussed, we have established a Customer

Advisory Panel (CAP) comprising representatives from a range of customer advocacy groups, clean energy bodies, generators and the Victorian distribution businesses.

The CAP does not have a formal status in negotiating or agreeing aspects of our proposal with us; its role is as an advisory body from which we can seek feedback on our plans. The CAP is chaired by the General Manager – Transmission.

Three CAP meetings have been held so far. At the most recent meeting on 28 November 2019, AusNet Services presented on and obtained initial feedback on its preliminary expenditure forecasts. To the extent possible, the CAP's views and preferences will be reflected in the Regulatory Proposal.

To complement the CAP and the Draft Regulatory Proposal processes, we are also undertaking or planning the following engagement activities:

- Deep dive workshops targeted at customer advocates and large customers
- One-on-one meetings with large customers and key advocates to understand priorities
- Consultation with our Customer Consultative Committee on key strategic issues
- Leveraging the ongoing research being conducted as part of the Customer Satisfaction program (i.e. annual interviews with directly connected customers, generators, DNSPs, AEMO).
- Leveraging the research done for 2021-25 EDPR (by ourselves and other Vic. DNSPs) to understand the views of Victorian end-use customers
- Leveraging the corporate membership we have with the Energy Users Association of Australia.

In January 2017 AusNet Services rolled out of a Stakeholder Engagement Framework across all infrastructure projects.

This framework, and its associated templates, clearly establishes the Business' commitment to best practice engagement, and details the necessary processes for our staff to follow, ensuring that for every applicable project:

- A review is undertaken early in the project's lifecycle to establish whether stakeholder engagement is needed;
- Community impacts and stakeholder risks are understood and considered early, and monitored thereafter;
- An appropriate engagement approach and plan is developed, and
- Genuine, meaningful and best practice engagement is undertaken.

2.6 New Connections

There are four types of customer connections to the transmission network:

1. Generators;
2. Interstate connections;
3. Industrial customers; and
4. Distribution business connections.

AusNet Services charges customers for the use of connection assets. Connection assets are those assets that are dedicated to the connection of the generators, interstate networks, industrial customers and distributors to the transmission network. In some cases the connection assets are owned by the customer. Where this is the case, AusNet Services is not responsible for the management of the connection assets.

The number of generator connections continues to grow due to an increasing number of generation sources, mainly wind farms and solar connections. The volume of connection

applications and enquiries has continued to increase over the past year and is expected to remain at elevated levels. Several connections have been completed in 2019, adding 400 MW of generation at multiple sites. Additionally, a generation connection of 550 MW has claimed practical completion, but is pending approval from AEMO.

These additional connections significantly change the function of the network from transporting coal fired baseload generation from the Latrobe Valley to load centres in other parts of the state, to providing customers a with flexible solutions for the connection of intermittent renewable generation sources.

2.7 Changing Function of the Transmission Network

Due to the changing function of the network, several complexities are posing challenges for AusNet Services including:

- Significantly increase the complexity of the necessary protection, communications and control schemes;
- Increasing load on certain lines and stations;
- Reverse power flow;
- Decreasing minimum demand;
- Power quality control;
- Impacts on outages and maintenance accessibility depending on the type of connections; and
- Changing criticality of particular areas of the network.

AusNet Services is committed to better understanding and developing relationships with existing and prospective generators to assist with enabling their investment choices and connecting them in a timely manner.

2.8 Operating Considerations

Recent significant outages and generation shortfalls at certain times in the NEM have put electricity supply, and in particular reliability in the media spotlight and it has become a key political issue. This circumstance has led to increased scrutiny on AEMO to manage the network which has resulted in increased restrictions on our operational ability to switch the network for maintenance and project works. AEMO has now placed restrictions on planned outages that have significantly extended to period during which outages are restricted and expand the coverage to include all the 500 kV network and a significant proportion of the 220 kV network.

In addition AusNet Services is subject to the Market Impact Component (MIC) incentive scheme, known internally as Market Impact Parameter (MIP), which imposes significant costs on the business if planned outages impact generation sufficiently to change the market price for electricity.

These restrictions have particular effect on interconnecting lines and the 500 kV network between SMTS and HYTS and result in:

- Outages being cancelled at last minute
- Planned maintenance being postponed due to being unable to get an outage
- The need to plan maintenance years in advance and group activities in order to minimise the number and duration of outages

The tight balance between supply and demand in Victoria as well as the closure of the Hazelwood Power Station has changed the load flows and criticality of certain network elements resulting in changes to how the network is managed operationally and how assets

are managed. One change in particular is the renewed focus on incident response in the event of an asset failure or an outage event.

This focus has led to the development of risk themes for the network resilience activities under which controls are developed for individual risks and an action plan developed.

Risk themes include:

- Supply, Demand and Planning
- Assets
- Stakeholder and Communications
- Incident Management
- Our People

2.9 Regulatory Investment Test Rule

A Regulatory Investment Test – Transmission (RIT-T) is a process which AusNet Services is responsible for carrying out under the National Electricity Rules (NER) to ensure that investment is required, non-network options considered, and customers have been consulted.

For transmission projects over $41 million, the RIT-T process is likely to take around 12 months to complete, and scenarios presented must consider the impact on the energy market of proposed works.

AusNet Services will be required to carry out market modelling to support the transmission revenue reset and RIT-T.

The development of market modelling skills is commencing and consultants have been engaged for initial RIT-T modelling work to ensure that future RIT-T are undertaken in a timely and efficient manner.

2.10 Corporate Business Plan

AusNet Services' purpose is to:

> *Empower communities and their energy future.*

This purpose acknowledges that the nature of the energy sector will alter fundamentally over the next decade, responding to community concerns about energy prices, shifting consumer behaviour and developments in the energy environment.

The vision of AusNet Services' Energising Futures strategy is:

> *To create energising futures by delivering value to our customers, communities and partners.*

Transitioning from our Focus 2021 strategy, Energising Futures continues to focus on growth and cost efficiency, but also brings greater attention to customer centricity, digital utility and the capabilities and culture that we will need in the future.

Five strategic objectives have been identified:

1. Growth – increase our contracted asset base by $1 billion
2. Cost efficiency – benchmark in the top quartile for all three regulated networks
3. Customer centricity – Customer Satisfaction Score (CSAT) above industry average and lower cost to serve
4. Digital utility – cost efficiency enabled by technology and cyber security level
5. Capabilities and culture – measured through:
   a. Employee engagement score;
   b. Culture score; and

c. Capability maturity score.

This is underpinned by AusNet Services four company values:

1. We work safely
2. We do what's right
3. We're one team
4. We deliver

2.11 Electricity Transmission Business Plan

Each year AusNet Services produces a business plan for each of the three regulated businesses.

The Electricity Transmission Business Plan is focused on the upcoming financial year and the subsequent years, but with an eye into the future, as there are expected to be major changes to the operating environment by 2040.

The business plan aligns with the strategic priorities at a corporate level.

The strategic objectives for the electricity transmission network are:

1. Strengthen regulated network in transitioning to a low-carbon future
   d. Strengthen the regulated network and secure regulated opportunities from network augmentation
   e. Ensure we enable generators choices and investments where efficient and improve their connection experience
2. Partnering with AEMO to influence and drive timely planning
3. Remain top quartile on cost and advocate for improved regulatory regime
   a. Undertake cost efficiencies to remain top quartile
   b. Improved regulatory regime to reflect changing market and a high future renewables mix
4. We will develop a team that is fully equipped for the future, and
5. Keep a relentless focus on safety improvement.

2.12 Safety Vision

AusNet Services' safety vision is:

> *Safety is a key value and our way of life at AusNet Services. We work together safely and protect and respect our community and our people. At AusNet Services, our overarching priority is the safety and wellbeing of our people.*

Our safety vision is symbolised by the simple expression:

Workplace injuries have a significant impact on our business, and more importantly impact on our lives.

When it comes to the safety of our people, contractors and visitors, zero injuries is the only acceptable target. We will not compromise on safety and we will not tolerate unsafe acts and behaviours.

It is this mind-set that drives us to ensure there are no negative impacts on our families and communities as a result of our business operations.

To achieve our safety vision, our mission must be to work together to implement a common strategy with unified purpose and consistency of attitude.

2.13 Integrated System Plan (ISP)

The Integrated System Plan (ISP) is a whole-of-system plan that provides an integrated roadmap for the efficient development of the NEM over the next 20 years and beyond.

Its primary objective is to maximise value to end consumers by designing the lowest cost, secure and reliable energy system capable of meeting any emissions trajectory determined by policy makers at an acceptable level of risk.

It fully utilises the opportunities provided from existing technologies and anticipated innovations in Distributed Energy Resources (DER), large-scale generation, networks and coupled sectors such as gas and transport.

AEMO prepared the inaugural ISP for the NEM in 2018, and it will be updated every two years.

The key observations in the 2018 ISP for the future of a successful NEM were the consideration of:

- Changes in demand for power from the grid;
- A portfolio approach;
- The crucial role of transmission in the NEM;
- Highly valued renewable energy zones;
- DER and inter-regional development;
- Power system requirements; and
- Timing of development.

2.14 Changes in Regulations affecting Electricity Transmission

The regulatory environment continues to change as ongoing reviews and investigations into the energy sector are undertaken. One current review with particular relevance to electricity transmission is Coordination of Generation and Transmission Investment (COGATI).

This review is considering options for how to make the ISP developed by AEMO an actionable strategic plan.

Under consideration in the review are areas such as:

- Renewable energy zones, in particular how the transmission network could be developed to support the new renewable energy zones identified in the ISP.
- Congestion and access, if trends around increased congestion suggest that reconsideration of the existing access regime may need to be addressed in the near term once the role of the ISP has been addressed
- Treatment of large scale storage facilities, with the Commission setting out ways that barriers to these parties connecting could be removed to promote efficient entry and competition in the wholesale market

A likely outcome of the review is a shift of responsibility for transmission network planning further towards AEMO for all jurisdictions to ensure that the least cost combination of projects will be delivered across the NEM rather than a state based piecemeal approach to planning that currently exists.

2.15 Network Demand Forecasts

2.15.1 AEMO Maximum and Minimum Demand Forecast for Victoria

AEMO provides Electricity Forecasting Insights as independent electricity consumption and maximum and minimum demand forecasts over a 20-year outlook period for the NEM.

Figure 3 shows the summer maximum demand for the central scenario with 10% and 50% probability of exceedance.

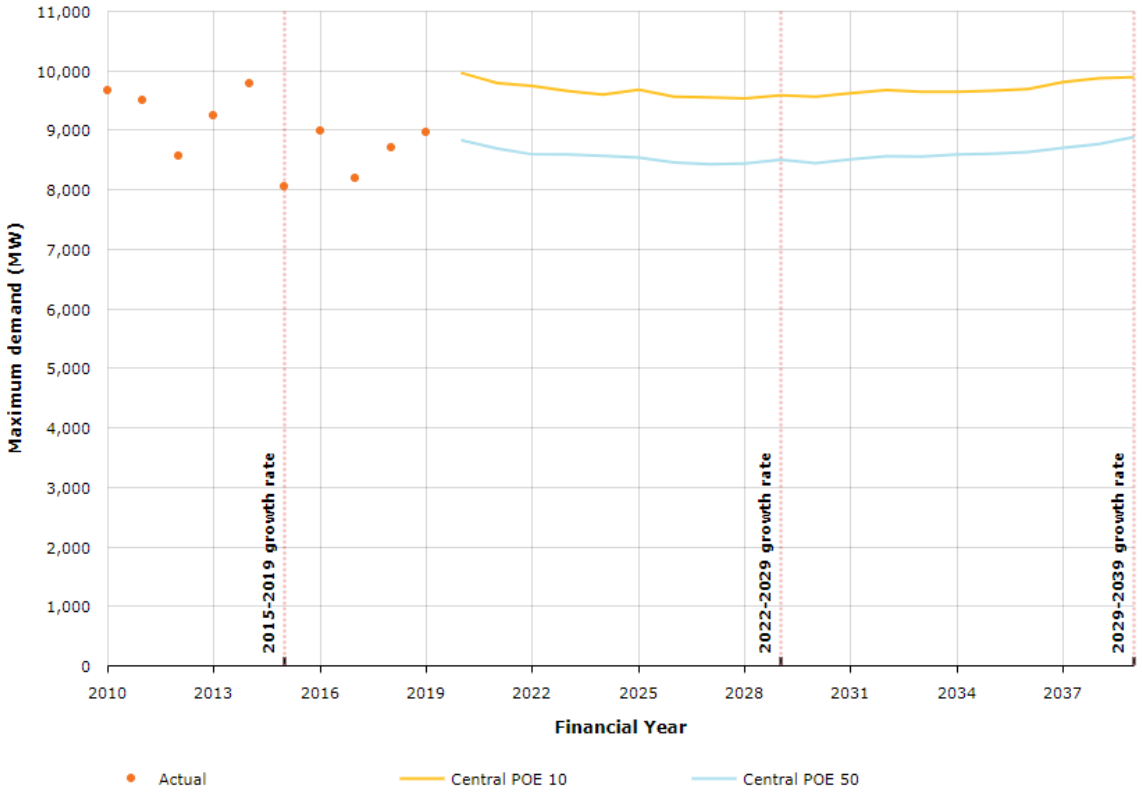

Figure 3: Maximum Demand Forecast[5]

Figure 4 shows the summer minimum demand for the central scenario with 10%, 50% and 90% probability of exceedance. The minimum demand is falling because AEMO's rooftop PV forecast pushes minimum demand to the middle of the day.

The impact of low demand and excess generation due to large scale solar and wind generation (see Section 2.6) will present an issue for the network in terms of voltage control, stability and protection.

[5] Source: AEMO, 2019 Electricity Statement of Opportunities (ESOO)

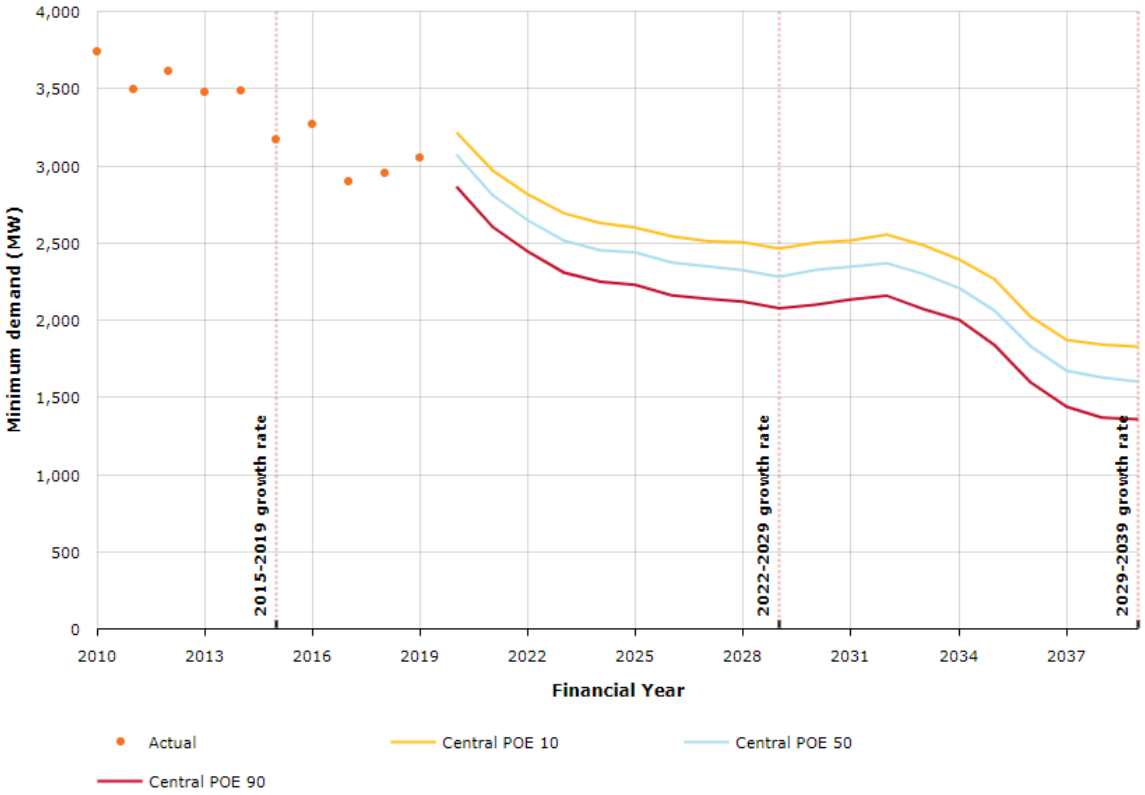

Figure 4: Minimum Demand Forecast[5]

2.15.2 AEMO connection point forecasting

The connection point forecasting by AEMO in Figure 5 and Figure 6 shows that forecast demand growth varies significantly at different connection points, suggesting that whilst the overall network demand forecast is for gradual growth over the same period, individual stations will have different requirements for investment.

Population growth is seen as the key driver in consumer demand, which in most cases is offset by increased building and energy efficiency and installation of PV systems.

Network augmentation investments are driven by growth in electricity consumption and demand, new generation connections and rising fault levels. New drivers for augmentation will emerge in the future which may include reactive support, increased control, protection and communication infrastructure, and other measures to strengthen the 'robustness' of the network to accommodate new levels and locations for renewable generation. AEMO is responsible for the planning and justification of transmission network augmentation projects.

AusNet Services will bear the risk if planning decisions are not made in a timely and responsive manner, thus AusNet Services aims to build on our 'close' and 'partnering' relationship with AEMO to ensure that we actively influence and drive timely planning decisions, drive a more co-ordinated planning approach and assess the opportunity and risk of our role extending to full transmission planning.

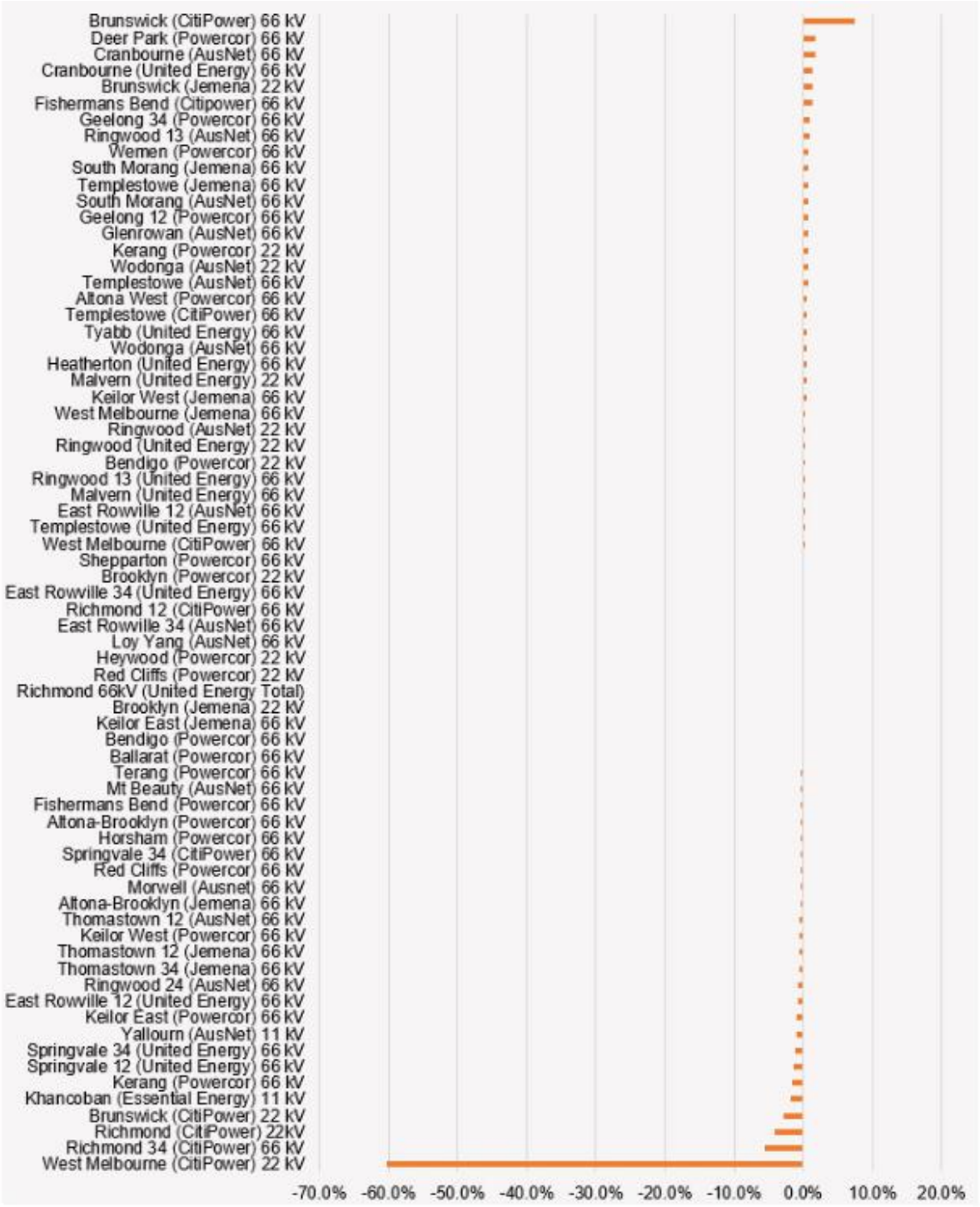

Figure 5:Victoria 10% POE summer 10-year average annual growth rates, 2019/20 to 2028/29[6]

[6] AEMO Transmission Connection Point Forecasts for Victoria 2019

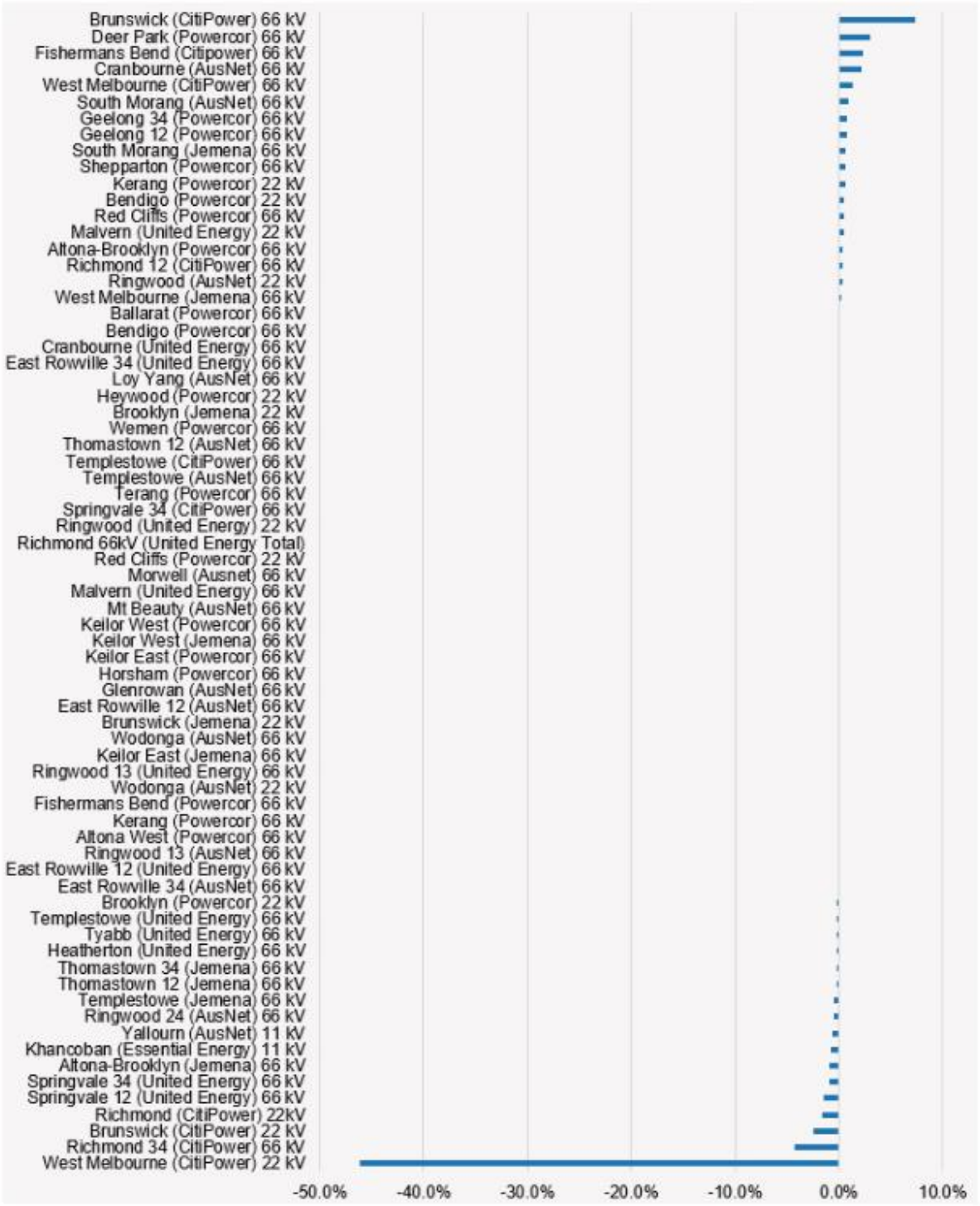

Figure 6: Victoria 10% POE winter 10-year average annual growth rates, 2019/20 to 2028/29[6]

3 AUSNET SERVICES OVERVIEW

AusNet Services is a leading energy infrastructure company operating a diversified portfolio of both gas and electricity assets throughout Victoria, helping to meet the energy needs of more than 1.3 million residential and business consumers. AusNet Services' core assets include:

- **Gas Distribution Network**

  Transportation of natural gas to approximately 660,000 customers across central and western Victoria. The network spans approximately 11,000km of buried pipelines.

- **Electricity Distribution Network**

  Consists of approximately 50,000km of conductors that carry electricity from the high voltage transmission grid to more than 700,000 customers across eastern Victoria.

- **Electricity Transmission Network**

  Consists of approximately 13,000 high voltage towers and 6,580km of transmission lines that carry high voltage electricity from power stations to electricity distributors across Victoria.

AusNet Services is a publicly listed company listed on the Australian Securities Exchange (ASX: AST). AusNet Services' securities are 31.1% owned by Singapore Power Limited (SPI) and 19.9% by State Grid International Development Limited (SGID) with the remaining owned by ASX investors.

3.1 Transmission Network Overview

AusNet Services' core assets include an electricity transmission network that services all electricity consumers across Victoria. The electricity transmission network serves more than 2.5 million Victorian households and businesses with more than 6,500 circuit kilometres of transmission lines that transport electricity from power stations to electricity distributors and large customers.

The traditional electricity supply arrangement in Victoria is illustrated in Figure 7, however this arrangement is changing as more generation is connected to the distribution network and terminal stations.

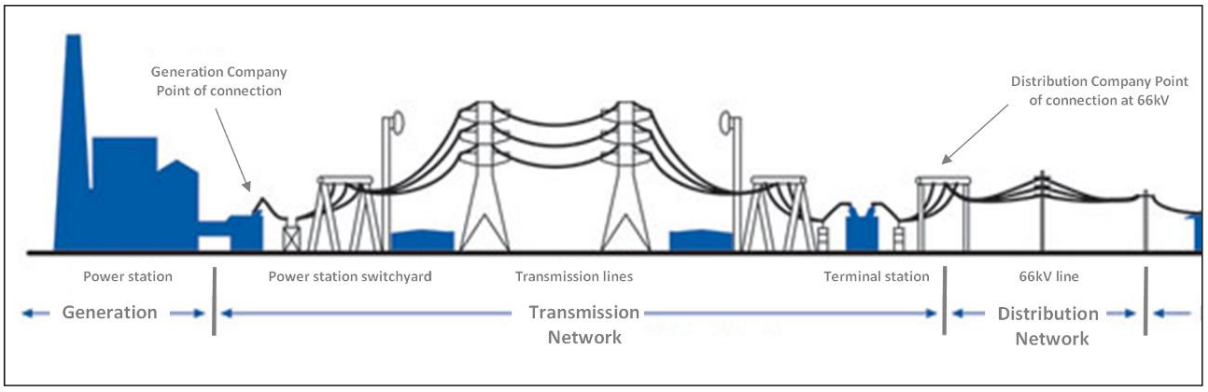

Figure 7: Illustration of Victorian Electricity Supply Arrangements

Figure 8 shows the impact these changes are having on the transmission network.

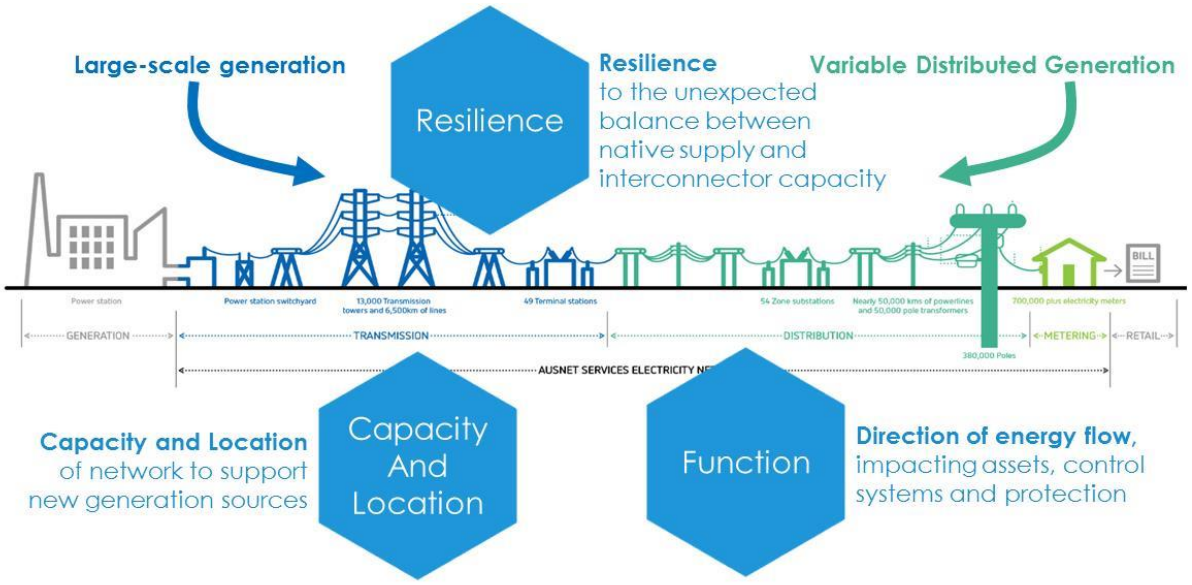

Figure 8: Changing network requirements

3.2 Locality and Geography

The Victorian electricity transmission network is depicted in Figure 9.

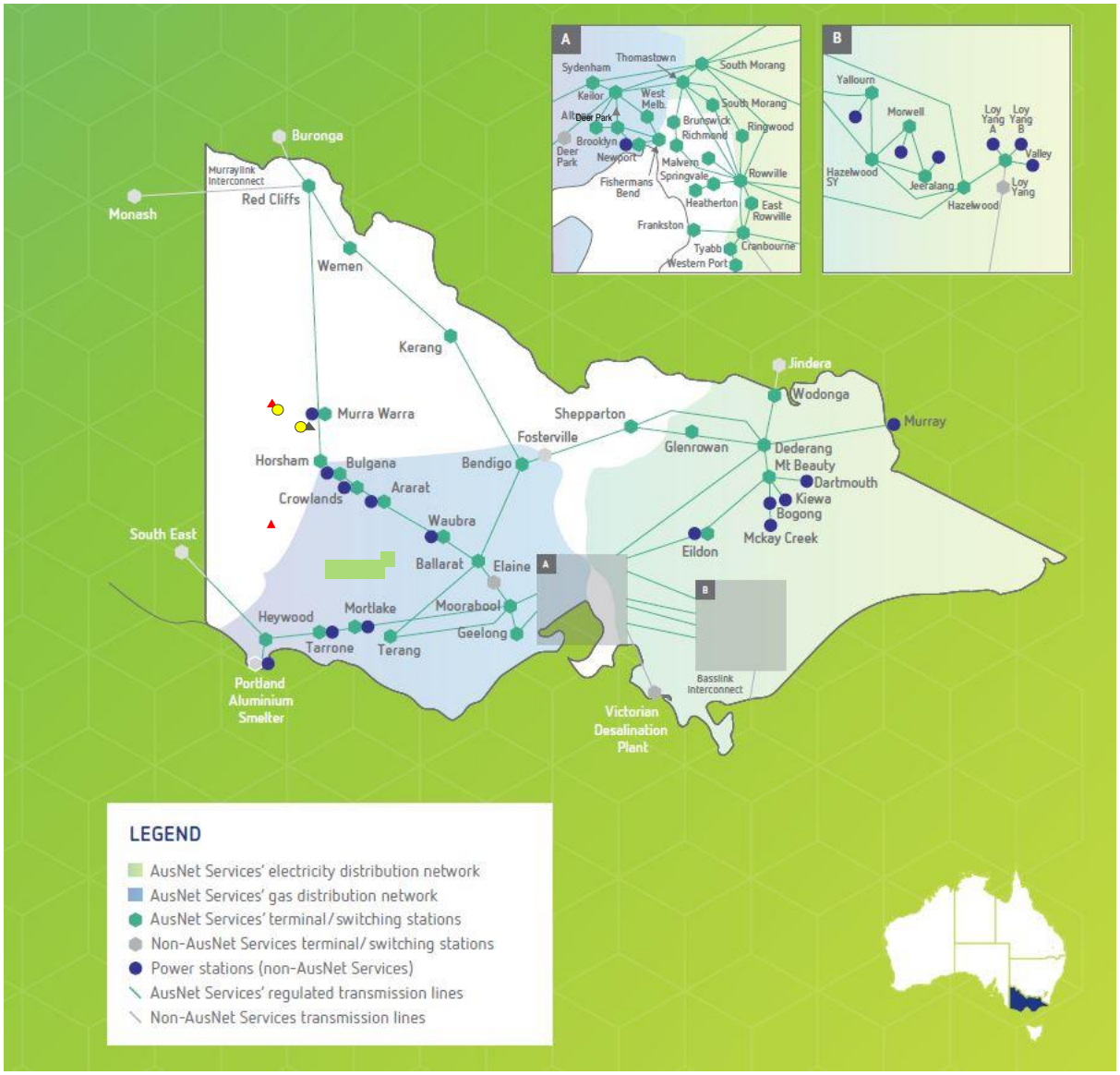

Figure 9: Victorian Electricity Transmission Network

The network is centrally located among Australia's five eastern states that form the NEM, providing key connections between South Australia, New South Wales and Tasmania's electricity transmission networks.

The NEM interconnections include:

- Two 330 kV lines from Dederang Terminal Station, to the Murray Switching Station (NSW);
- One 330 kV line from Wodonga Terminal Station to Jindera Substation (NSW);
- One 220 kV line from Red Cliffs Terminal Station to Buronga Substation (NSW);
- Two 275 kV lines from Heywood Terminal Station to South East Substation (SA);
- Murraylink, which is a 300 kV DC link from Red Cliffs Terminal Station to Berri (SA); and
- Basslink which is a 400 kV DC link to from Loy Yang to Bell Bay (TAS).

3.3 Asset Summary

Table 2 summarises the volumes of major assets in the network.

Table 2: Asset Categories and Quantities[7]

ASSET CATEGORY	TOTAL
Transmission Towers	13,212
Conductors (km)	12,124
Cables (km)	9
Switchbays (Circuit breakers, Isolators/Earth Switch, Instrument transformers and GIS modules)	9,011
Power Transformers	165
Reactive Plant	468
SCADA, Network Control and Protection Systems	23,670

[7] AusNet Services (transmission) 2018-19 Category Analysis RIN

4 ASSET MANAGEMENT SYSTEM

AusNet Services maintains an Asset Management System compliant with ISO 55001, the international standard for Asset Management. Adoption of this standard enables AusNet Services to achieve its objectives through effective and efficient management of its assets.

Compliance with ISO 55001 requires the demonstration of robust and transparent asset management policies, processes, procedures, practices and a sustainable performance framework. Accreditation is recognised as an indicator of best practice in asset management.

AMS 01-01 Asset Management System Overview provides an overview of the asset management system.

A key component of the asset management system is the Asset Management Policy (refer Appendix A), which acknowledges the company's purpose and directs the content and implementation of AMSs, objectives and plans for the energy delivery networks.

This Policy sets the foundation for all asset management decisions and has been formally endorsed and communicated throughout the business.

The Asset Management Policy summarises AusNet Services' fundamental asset management principles and from this overarching asset management objectives have been developed to support the successful delivery of AusNet Services' purpose.

The overarching asset management objectives for AusNet Services' energy networks are:

- Comply with legal and contractual obligations;
- Maintain safety;
- Be future ready;
- Maintain network performance at the least sustainable cost; and
- Meet customer needs

The objectives are supported by network specific objectives. The electricity transmission network asset management objectives are detailed in Section 6 of this strategy.

5 ASSET MANAGEMENT DRIVERS

The following sections discuss the significant drivers for future network investment to achieve customer, regulatory and shareholder expectations. AusNet Services is accountable for responding to these drivers in accordance with legislative and other regulatory instruments.

5.1 Transmission Element Outage Risk

Table 3 is a summary of the key areas of the transmission network (in its current configuration) where an outage of a transmission element would have significant consequences. Workshops have been held by subject matter experts to determine ways in which to mitigate the identified risks.

Table 3: Critical Assets and Risks

Assets	Risk
Major Flow Paths LYPS-HWTS 500 kV Lines, Latrobe Valley to Melbourne 500 kV and YPS to ROTS 220 kV lines	Loss of two HWTS-LYPS lines could lead to state wide pre-contingent load shedding of up to 5000 MW. Involuntary load shedding for unplanned outages of Latrobe Valley to Melbourne 500kV lines. YPS to ROTS 220 kV lines and the 500/220 kV metro transformers supply the Melbourne metropolitan load.
VIC-South Australia Interconnector SMTS-SYTS/KTS-SYTS-MLTS-MOPS/TRTS-HYTS-SESS 500kV Lines	Loss of any one line places SA & APD on single contingency. Loss of next line may result in load shedding in VIC and/or SA and significant impact to APD. Similar for SMTS-SYTS/KTS lines but not quite as much load at risk.
VIC- New South Wales Interconnector MSS-DDTS-SMTS and DDTS-WOTS-JIND 330 kV Lines SMTS F2 500/330 kV Transformer	Loss of two lines could lead to state wide pre-contingency load shedding during peak times. Estimated < 1000 MW in either state. WOTS and Southwest NSW on single contingency.
Metro Connection Stations and 500/220 kV Terminal Stations Includes ROTS-SVTS-HTS, TTS-TSTS-ROTS, ROTS-MTS, ROTS-RWTS	Loss of any one line places terminal station on single contingency. Loss of next line leads to loss of supply of large parts of Melbourne.
North Western 220 kV Ring BATS-HOTS-RCTS-MLRC-KGTS-BETS-SHTS	Loss of any one line places terminal station on single contingency. Loss of next line leads to loss of supply of large parts of Rural Victoria.
Network Reactive Support SVCs and shunt reactors	Needed for voltage and reactive power control and affects import capability.
Generator Connections	Insufficient generation reserves is forecasted over the summer period. Generator connection network outages constraining generation off may result in involuntary load shedding.
Black Start and Black Start pathways	Jeeralang Power Station and Murray Generation will be used for Black Start. Black start pathways need to be maintained as per AEMO System Restart Victoria operational procedure.

Figure 10 shows the critical elements of the Victorian transmission network.

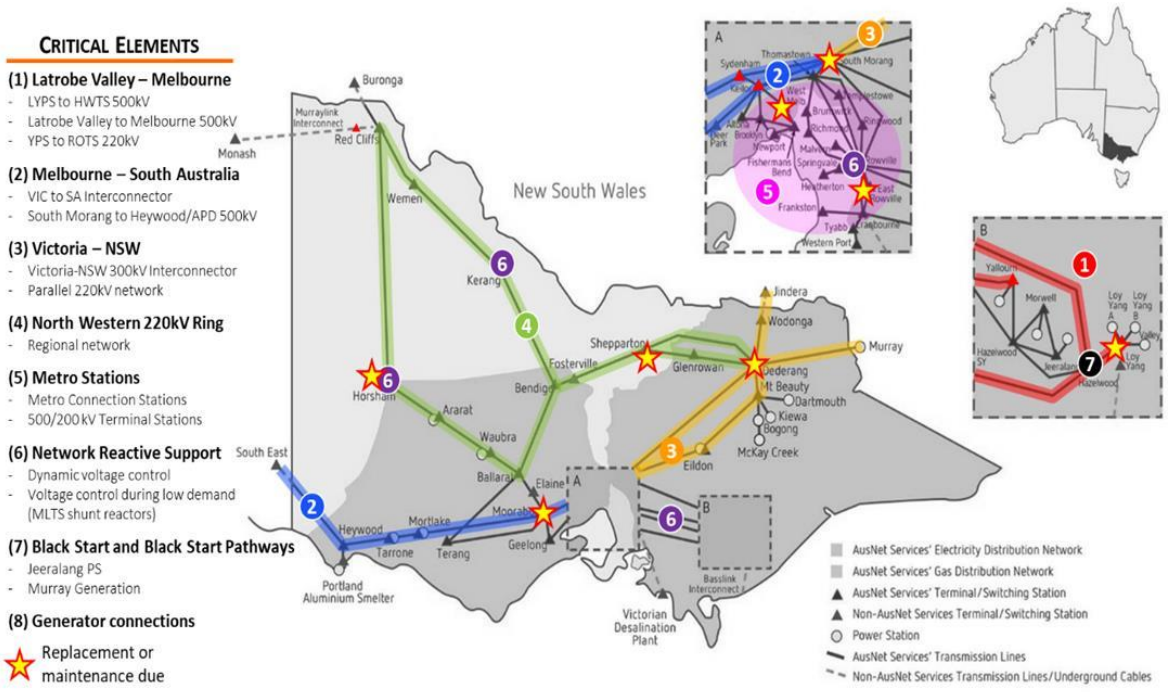

Figure 10: Critical elements of the Victorian transmission network

It is worth noting that the reasons for criticality are different in each case. For example:

1. The HWTS-LYPS lines are critical as they are part of the major flow path that connects generation from Loy Yang and Valley Power and the Basslink interconnector
2. The SA interconnector is critical to SA to meet demand and for network (voltage/frequency) support. Connection of new generation and associated protection and control schemes increase the complexity and operational risk on this network element.
3. The North Western 220 kV ring is becoming more critical due to the expected large increase in renewable generation connections.

5.2 Connection Station Supply Risk

An unplanned outage of a connection transformer over the high demand period presents the largest supply risk on the transmission connection network. Altona West, Cranbourne (CBTS), Morwell (MWTS), Wemen (WETS), South Morang (SMTS), Terang (TGTS), Bendigo (BETS), Richmond (RTS), Wodonga (WOTS) and Ballarat (BATS) Terminal Stations are forecast to have the highest supply risk of all Victorian transmission connection stations over summer

2018/19 as shown in

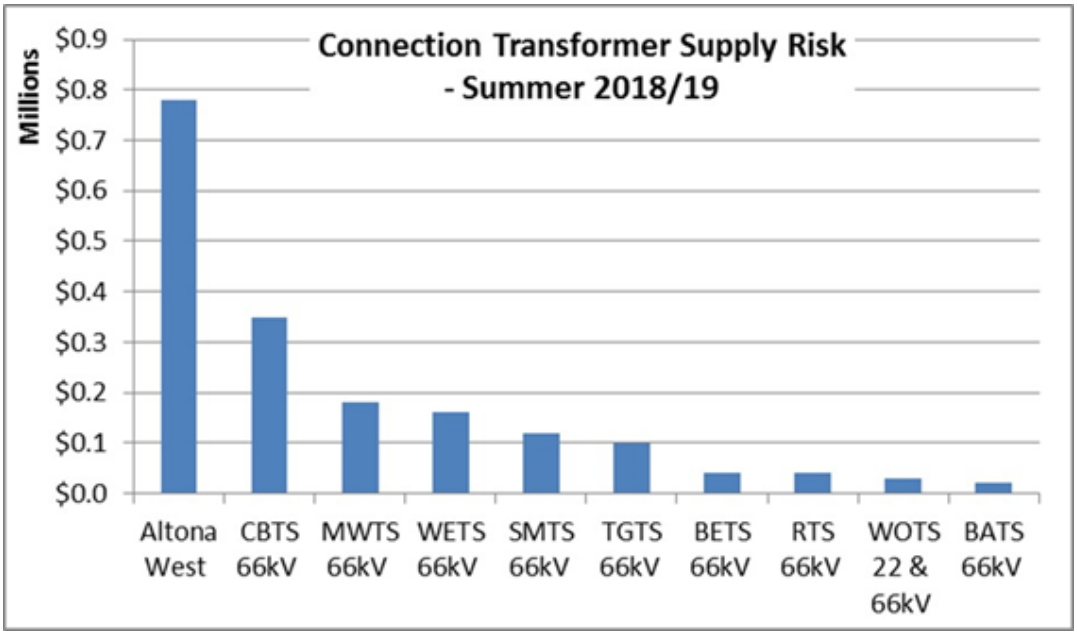

Figure 11[8]. These are also the only connection stations with material forecast N-1 supply risk for summer 2018/19.

Note: The 2019 Transmission Connection Planning Report is not released until the end of December 2019.

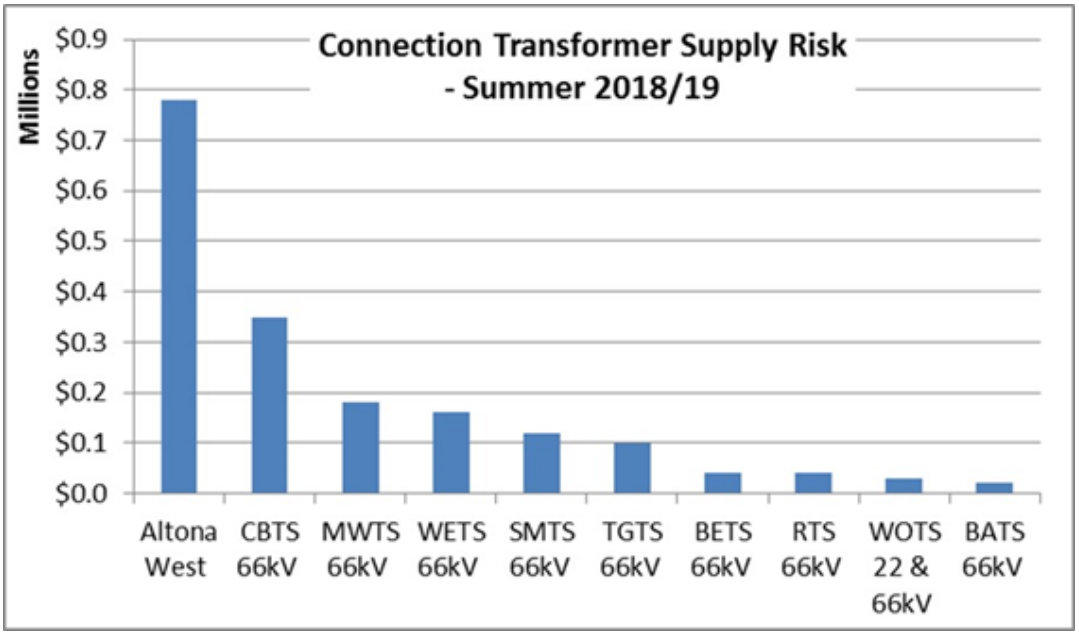

Figure 11: Forecast Transmission Connection Network Supply Risk – Summer 2018/19

5.3 Corporate Risks

AusNet Services operates a corporate Risk Management Framework[9] based on ISO 31000 *Risk management – Guidelines* to assess a range of business, operational and asset related risks.

[8] 2018 Transmission Connection Planning Report (TCPR)

[9] RM 10 - 01 Risk Management Policy and Framework, 2016, AusNet Services.

All business and some critical operational and asset related risks are registered using AusNet Services' risk management information system, Enablon. Enablon provides the monitoring and reporting capability to ensure these risks are managed in accordance with their priority level.

These risks are regularly reviewed and the actions required to manage them are implemented in specified timeframes. The registered risks that relate to the transmission network are summarised in Table 4.

Further information can be found in AMS 10-22 *Risk Management* and RM 10-01 *Risk Management Policy and Framework*.

Table 4: Transmission Network Related Risks

Risk Ref#	Risk Title	Organisational Unit	Risk Rating	
			Residual	Target
RSK.35	AusNet Services' Assets Cause a Bushfire	Regulatory & Network Strategy	B	B
RSK.36	Electric or Magnetic Fields Being Found to be Harmful	Regulatory & Network Strategy	C	C
RSK.41	Failure to respond as effectively as practicable to catastrophic events impacting network	Planning, Performance & Operations	B	C
RSK.44	Major Transmission Network Failure / Failure to Provide Reliability and Security	Network Engineering	C	C
RSK.46	Reduction in CBD Supply Security	Network Engineering	D	D
RSK.68	AusNet services field vehicle/plant operation start a fire	Delivery	B	C
RSK.70	Line Insulator Failure	Network Engineering	C	C
RSK.71	Loss of Supply During Extreme Weather Conditions	Planning, Performance & Operations	B	C
RSK.73	Easements Become Encroached	Delivery	D	D
RSK.74	Failure to Effectively Manage Changes to Technical Regulations	Regulatory & Network Strategy	D	E
RSK.75	Failure to Implement Recommendations from Vic Bushfire Royal Commission	Regulatory & Network Strategy	D	D
RSK.77	Workplace Exposure to Asbestos Containing Materials	Planning, Performance & Operations	D	D
RSK.102	HSEQ Critical Risk – Explosive Network Asset Failure	Risk and Compliance	B	D
RSK.103	HSEQ Critical Risk – Motor Vehicle Incident	Risk and Compliance	B	D
RSK.112	HSEQ Critical Risk - Electrocution	Risk and Compliance	B	C
FSA.1	Explosive network asset failure	Transmission FSA	III (3B)	III (2B)
FSA.2	Incorrect protection and control settings	Transmission FSA	III (1C)	III (1C)
FSA.3	Exposure to HV AC during testing	Transmission FSA	III (2B)	III (2B)
FSA.4	Failure of ground wire in terminal stations	Transmission FSA	III (3B)	III (3B)
FSA.5	Hazards with aerial inspection of lines	Transmission FSA	III (3B)	III (3B)
FSA.6	Exposure to fire on line easements	Transmission FSA	III (3B)	III (3B)

5.4 AER Benchmarking of Australian Transmission Network Service Providers (TNSPs)

Each year the AER conducts benchmarking of Australian Transmission Network Service Providers (TNSPs) using Regulatory Information Notice (RIN) data supplied by each business.

All graphs in this section are taken from the AER's *Annual Benchmarking Report: Electricity transmission network service providers* November 2019.

This benchmarking attempts to give a comparison of productivity of each business by comparing Inputs (opex and capex) to outputs (line length, energy throughput, maximum demand, voltage-weighted sum of entry and exit points and reliability).

Figure 12 is the multilateral total factor productivity (MTFP) which is the primary indicator used by the AER to measure and compare the efficiency of TNSPs.

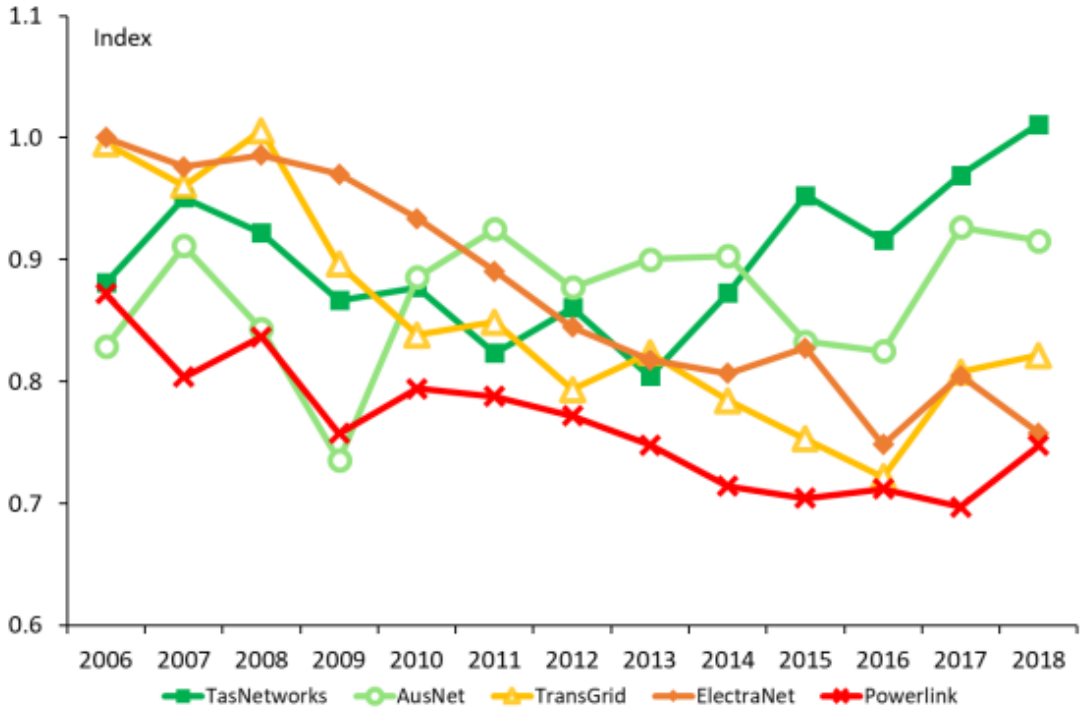

Figure 12: Multilateral Total Factor Productivity (MTFP) index by TNSP, 2006 to 2018

AusNet Services MTFP score has trended upwards by 10% over the period 2006 to 2018, making it one of the two most productive TNSPs by MTFP (along with TasNetworks).

The AER also uses Multilateral Partial Factor Productivity (MPFP) indices to examine the contribution of capital and operating expenditure to overall productivity in isolation.

Figure 13 shows the Capital MPFP of the TNSPs use of overhead lines, underground cables and transformers. AusNet Services is the only TNSP to have achieved a slight increase in this measure from 2006 to 2018.

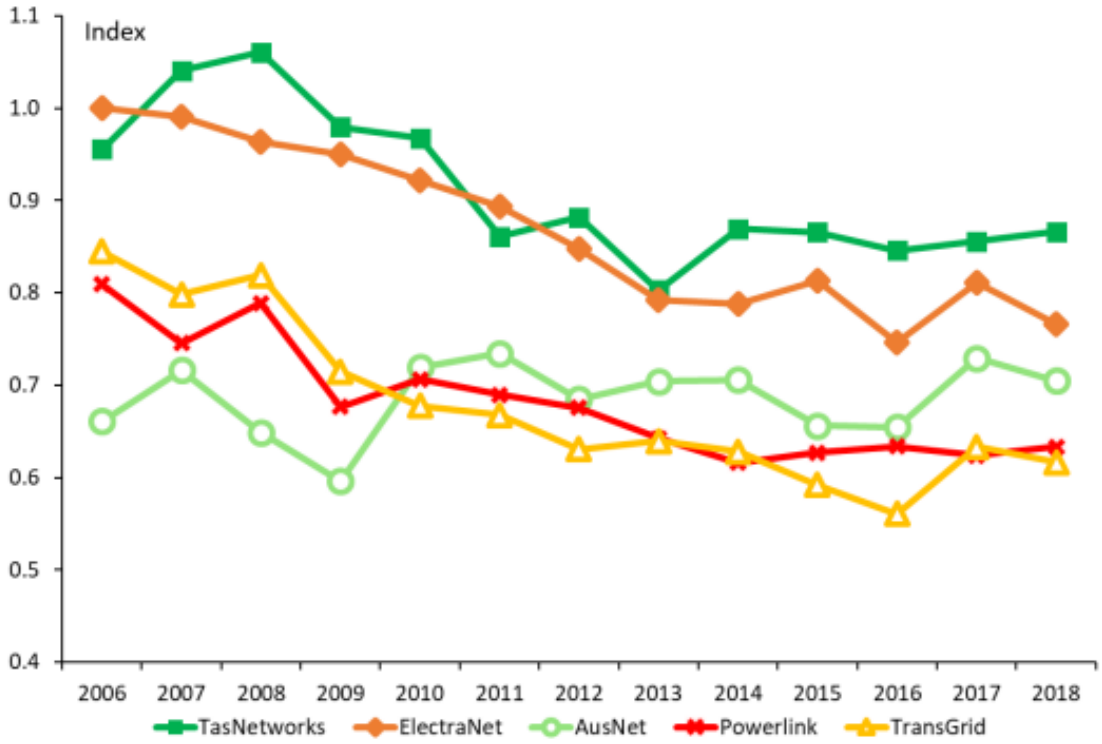

Figure 13: Capital MPFP Index, 2006-2018

Figure 14 shows the operational expenditure MPFP of the TNSPs. AusNet Services (along with TransGrid) has the highest opex MPFP over the period 2006 to 2018.

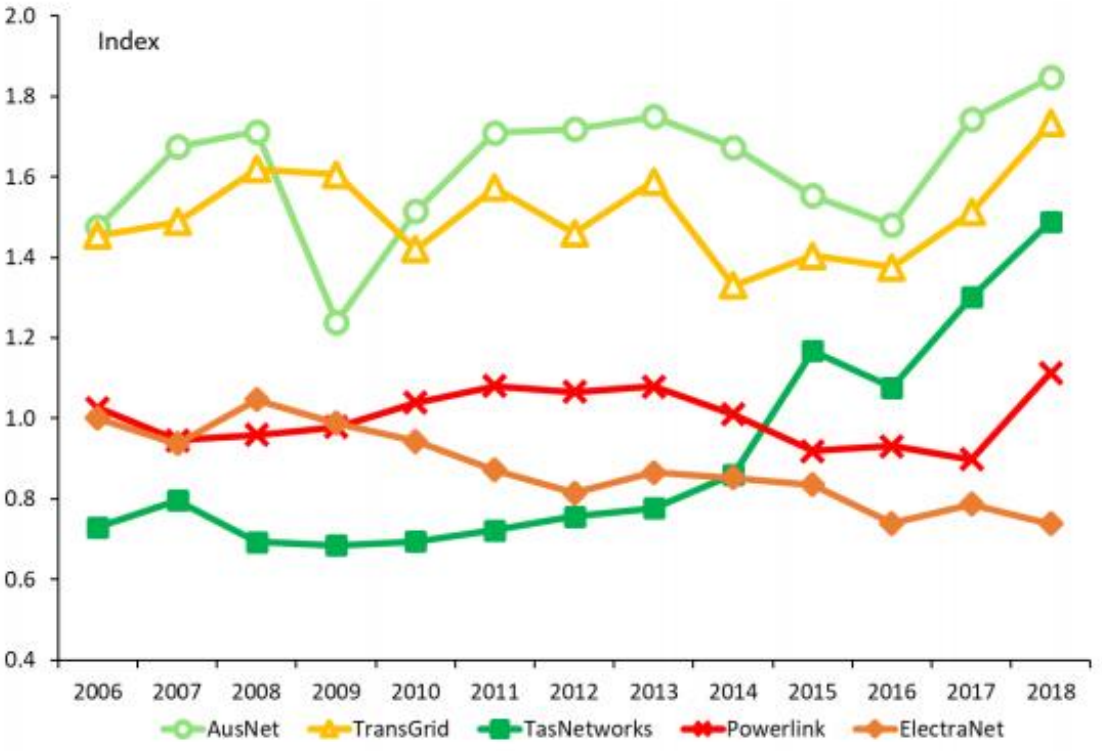

Figure 14: Opex MPFP Index, 2006-2018

5.5 Asset Condition

The deterioration of network assets over time may affect worker and public safety, the environment and network performance and impact on the organisation achieving its objectives.

Asset condition is a measure of the health of an asset and is a key parameter in determining the remaining useful life and can be used to predict how long it will be before an asset needs to be repaired, refurbished or replaced.

Asset condition is also an indicator of how well an asset is able to perform its designed function.

Health indices provide an estimate of asset condition help to provide an indicator for increasing volumes of replacement work that will occur due to deteriorating condition and serviceability.

In forecasting expenditure requirements, a sound understanding of the failure rates and replacement rates of deteriorating assets is necessary to ensure future replacement plans are consistent with sustained service performance.

Effective condition monitoring, analysis and management are essential. Accordingly condition modelling and recognition of the advanced service age of many assets is a key consideration in the AMS.

Further information on condition monitoring can be found in *AMS 10-13 Condition Monitoring*.

5.6 Sustainability

5.6.1 Carbon Footprint

Line losses represent almost the entire carbon footprint of the transmission network.

These losses are classified as Scope 2 emissions under the National Greenhouse and Energy Reporting Scheme (NGERS) classification, and therefore do not require the purchase of permits.

In addition, AusNet Services includes both electrical and environmental (i.e. SF_6) costs in economic analysis of project options to ensure efficient network augmentation and asset renewal projects are proposed.

5.6.2 Emissions Management

Climate change (both in terms of the physical effects and government policies) and funding pressures are likely to continue to influence energy sector direction over the next five years. The precise impacts remain uncertain, with ongoing global research and debate about near-term climate effects and evolving national and international climate policy.

The Government have retained the Clean Energy Regulator and the NGERS as part of the administration of the Emissions Reduction Fund.

5.7 People and Culture

The nature of the energy sector will change fundamentally over the next decade, responding to community expectations of safety and reliability, climatic change and emerging technologies. The systems, processes, tools and the appropriate employee skills set used to deliver distribution services will need to adapt to the changing operating environment as it continually evolves.

More immediately, the industry faces skill shortages through retirement of an aging workforce. The retirement profile, together with a projected increase in network expenditures, is driving the increasing demand for knowledge-management, skills-transfer, training and recruitment.

Retaining and developing AusNet Services' people will be critical to the successful implementation of the wide range of asset management initiatives. Programs must be designed to promote behaviours and activities consistent with AusNet Services' core values.

6 ELECTRICITY TRANSMISSION ASSET MANAGEMENT OBJECTIVES

Electricity Transmission Asset Management Objectives have been developed to guide the development of asset strategies to support the successful delivery of the organisation's strategic objectives.

These Electricity Transmission Asset Management Objectives are aligned to and supplement the overarching Asset Management Objectives[10] and the Electricity Transmission Strategic Objectives[11].

The Electricity Transmission Asset Management Objectives are:

1. Maintain top quartile benchmarking
2. Maintain reliability
3. Minimise market impact
4. Maximise network capability
5. Leverage advances in technology and data analytics
6. Minimise explosive failure risk

Figure 15 shows the relationship between the AusNet Services Strategic Objectives, the Electricity Transmission Strategic Objectives, the overarching Asset Management Objectives and the Electricity Transmission Asset Management Objectives.

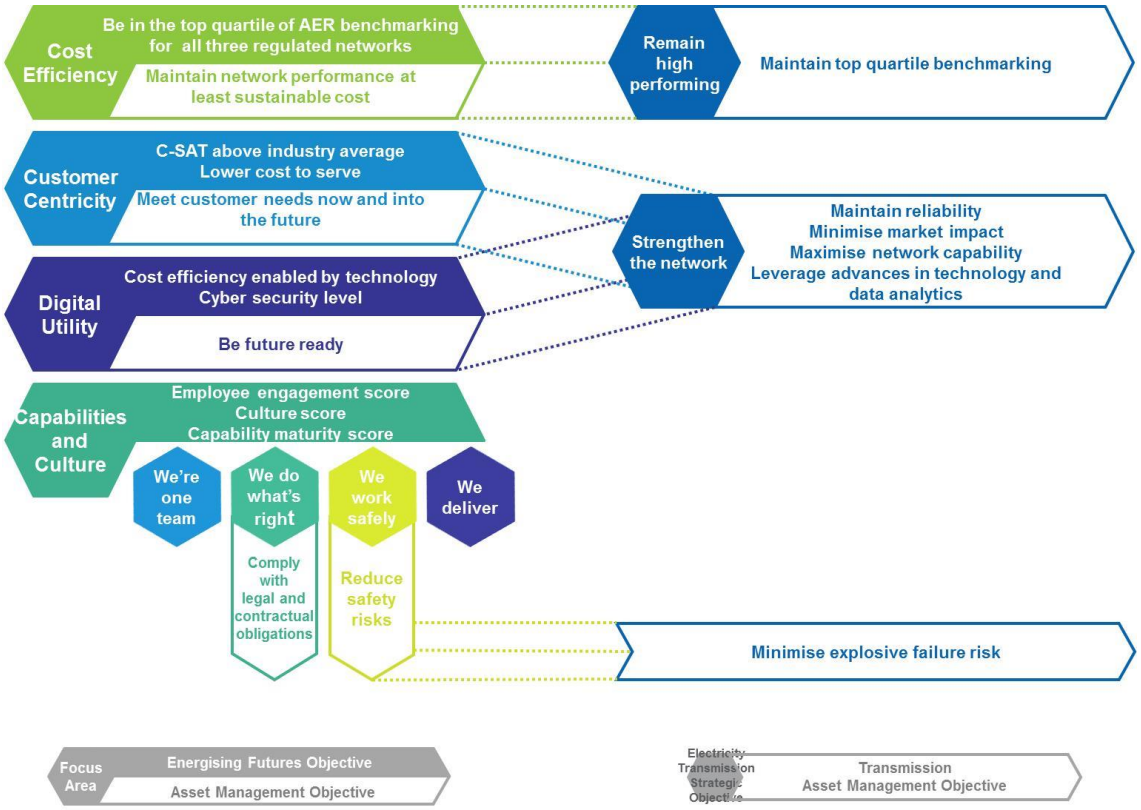

Figure 15: Alignment of Objectives

[10] AMS 01-01 Asset Management System – Overview

[11] Electricity Transmission Business Plan FY20

7 NETWORK PERFORMANCE

Network performance measures are set annual for a range of key performance indicators and monitored throughout the year to assess the performance of the transmission network.

Performance measures cover a range of aspects of the network and are split into the primary and secondary measures:

1. Primary measures:
   a. Service Target Performance Incentive Scheme (STPIS);
2. Secondary measures:
   a. Safety;
   b. Reliability; and
   c. Protection Performance.

The primary measures are administered by the AER. The secondary measures are set internally, with the metrics monitored, but no specific targets set.

7.1 Service Target Performance Incentive Scheme (STPIS)

The STPIS is administered by the AER.

The STPIS currently consists of the following components:

1. Service Component (SC);
2. Market Impact Component (MIC); and
3. Network Capability Component (NCC).

7.1.1 Service Component (SC)

The Service Component (SC) provides incentives to reduce the occurrence of unplanned outages.

Table 5 shows the revenue at risk associated with each component of the Service Component in the current and subsequent regulatory periods.

Table 5: Service Component revenue at risk

Parameter	Sub-parameter	Revenue at risk (% of MAR)	
		2014-17	2017-22
Unplanned outage circuit event rate	Lines event rate – fault	0.20	0.20
	Transformer event rate – fault	0.20	0.20
	Reactive plant event rate – fault	0.10	0.10
	Lines event rate – forced	0.00	0.10
	Transformer event rate – forced	0.00	0.10
	Reactive plant event rate – forced	0.00	0.05
Loss of supply event frequency	Number of events greater than 0.05 system minutes per annum	0.15	0.15
	Number of events greater than 0.30 system minutes per annum	0.15	0.15
Average outage duration	Average outage duration	0.20	0.20
Proper operation of equipment	Failure of protection system	0.00	0.00
	Material failure of SCADA	0.00	0.00
	Incorrect operational isolation of primary or secondary equipment	0.00	0.00
Total		**1.00**	**1.25**

Table 6 shows the system minute and service component reward for the period 2012 to 2018.

Table 6: System Minutes and Service Component reward for the period 2012-2018

Year	2012	2013	2014	2015	2016	2017	2018
System Minutes	2.73	1.18	0.585	6.588	9.16	0.022	0.091
STPIS Service Component	80.90%	67.40%	42%	11%	31.5%	81.70%	84.19%

7.1.2 Market Impact Component (MIC)

The Market Impact Component (MIC), referred to internally as the Market Impact Parameter (MIP), provides an incentive to minimise the impact of transmission outages at times and on parts of the network that are most important to influencing the spot price in the wholesale market.

Performance is measured based on the number of five minute dispatch intervals (DIs) when an outage of a TNSP's network results in a network outage constraint binding with a marginal value greater than $10/MWh.

From April 2017, the MIC is a symmetrical scheme with revenue at risk of ±1% of MAR (around ±$5.5 million), down from a bonus-only scheme of 2% of MAR (up to round $11 million) as a result of STPIS version 5 changes.

Due to the changes outlined above, payments from April 2017 are expected to be substantially lower than the bonuses received under the previous scheme ($6.6m in CY2014, $1.7m in CY2015 and $0 in CY2016).

For the calendar year 2018, AusNet Services reported 318 Dispatch Intervals (DIs) resulting in a net bonus of $4 million. A breakdown of the results is shown in Table 7.

Table 7: Breakdown of Results for 2018

Target (DI)	1245
Business Target (DI)	1546
Submitted (DI)	318
Maximum Bonus	$5.38m
Maximum Penalty	-$5.38m
Submitted Bonus/Penalty	$4.00m

Even with the challenges, this was the best reported dispatch interval result to date (see Table 8). Contributing factors to this result include high impact outage postponement, no high impact asset failures, new exclusions under version 5 of the STPIS, and active management of real-time performance.

Table 8: Market Impact Component Historical Data

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Dispatch intervals	1,417	2,134	2,687	909	745	858	906	8595	3381	318

7.1.3 Network Capability Component (NCC)

The Network Capability Component (NCC) provides incentives to deliver low cost, one-off projects that increase network capability and deliver value for money to customers.

Each TNSP is required to submit, as part of its revenue proposal, a Network Capability Incentive Parameter Action Plan (NCIPAP). The TNSP must consult AEMO in developing the Network Capability Incentive Parameter Action Plan.

In Victoria, the involvement of AEMO is more substantial – as the planner of the Victorian transmission network it is responsible for identifying and scoping projects and working with AusNet Services to quantify project benefits. This is because under the Victorian planning arrangements, AusNet Services' ability to identify the limit for each transmission circuit or load injection point is limited by access to data and tools which are accessible to AEMO.

Under the NCC, TNSPs receive a cash return of close to 50% on every dollar invested in projects. In addition, any capital expenditure undertaken is rolled into the regulated asset base. When deciding whether to approve TNSP proposed projects, the AER assesses the annual cost of each project for the residual years of the regulatory period against an expenditure cap. This approach restricts AusNet Services' ability to propose projects later in the regulatory period, as the annual incentive payment is prorated to proposed project expenditure.

In the 2014-17 regulatory period, the NCC was highly profitable for AusNet Services, with the company receiving an annual incentive payment of around $7.5 million. However, the AER's application of the STPIS will limit the ability of additional projects to be proposed for the remainder of the 2017-22 NCIPAP as the current list of priority projects is close to exceeding the expenditure cap.

Each project approved by the AER and planned for completion by March 2022 are shown in Table 9.

Table 9: Network capability priority projects for 2017 to 2022 ($ real 2016/2017)

Project	Expected Completion Date	Value	Notes
Replace existing interplant connections of the Hazelwood to Jeeralang 220 kV No.4 line at Hazelwood Power Station	2017/2018	-	Project cancelled as benefits changed with the retirement of HWPS
Increase the operating temperature of the South East to Heywood 275kV lines from 90°C to 100°C	2017/2018	$18,000	Completed 31 October 2017
Increase 15 min short term rating of BATS – HOTS 220 kV transmission line	2018/2019	$0.84 million	Completed 30 August 2019
Increase 15 min short term rating of HOTS – RCTS 220 kV transmission line	2018/2019	$1.43 million	Completed 31 October 2019
SmartWires Research Project – Install 30 SmartValve devices at WOTS on the JIND-WOTS 330 kV transmission line to deliver approximately 7Ω of controllable series reactance to increase the interstate power transfer capability.	28/02/2020	$5.87 million	
Install a 100 MVAr 220 kV reactor at Keilor Terminal Station (KTS)	31/03/2021	$5.81 million	
Removing existing rating limiting station equipment, and enabling dynamic wind monitoring on the BETS-KGTS-WETS-RCTS 220 kV transmission lines to improve the line rating.	30/09/2020	$4.17 million	
Removing existing rating limiting station equipment, and enabling dynamic wind monitoring on the BATS-TGTS-MLTS 220 kV transmission lines to improve the line rating.	31/05/2020	$1.16 million	

7.2 Safety

Table 10 lists the safety performance metrics monitored by the Executive Leadership team. These metrics are reported in the transmission network performance report submitted annually to the Asset Management Committee.

Table 10: Safety Performance Metrics

Total Number of Human Error Incidents (HEI)	Number H&S Hazard or Explosive Failures, including failures with potential to cause H&S Hazard or explosive failures
Transmission System Minutes lost due to HEI	Number of line conductor drops and hardware failures.
Number of HEI where Transmission System Minutes are lost	Number Primary Plant Failure Majors
System Incident Count	Significant Protection Incidents
Significant Incidents	

7.3 Reliability

Table 11 lists the reliability performance metrics monitored by the Executive Leadership team. These metrics are reported in the transmission network performance report submitted annually to the Asset Management Committee.

Table 11: Reliability Performance Metrics

Transmission System Minutes Lost in CY	Number of dispatch intervals constrained
Total Circuit Availability	AER MIP Revenue/Penalty
Loss of supply events >0.3 system minutes	AER Service Component Revenue
Loss of supply events >0.05 system minutes	Number of AEMO Investigations Victorian Region

7.4 Protection Performance

Table 12 lists the protection performance metrics monitored by the Executive Leadership team. These metrics are reported in the transmission network performance report submitted annually to the Asset Management Committee.

Table 12: Protection Performance Metrics

System Fault Clearance Performance Index	Protection Equipment Performance Index

8 PROCESS AND SYSTEM STRATEGIES

This section covers the major processes and systems required to manage the distribution network for the achievement of the desired outcomes.

In April 2014 the electricity distribution asset management practices were certified to *ISO 55001 Asset Management – Management Systems: Requirements* following transition from the superseded British Standard Institute's Publically Available Specification *PAS 55-1:2008 Asset Management*.

The asset management system was recertified in September 2017, with the auditors finding:

> *AusNet Services continues to operate a sophisticated and mature asset management system. As a result of focus on continuous improvements, there are increases in maturity across many of the ISO 55001 clauses.*
>
> *There are two areas where improvements have not occurred, where maturity has declined, however, the issues related to these can easily be addressed within BAU activity.*
>
> *Overall, AusNet Services is exceeding the requirements as defined by ISO 55001:2014.*

8.1 Risk Management

AusNet Services operates a corporate Risk Management Framework[12] based on *AS/NZS ISO 31000 Risk management – Guidelines*. The framework is a blue print to manage risk consistently across AusNet Services.

Risks are rated and prioritised under the following categories:

- Health and Safety (Employee and Public);
- Environment and Community;
- Reputation;
- Customers;
- Regulation, Legal and Compliance;
- Management Impact and People; and
- Financial Impact.

By adopting common metrics across the broad range of business risks and investment portfolios, AusNet Services can more effectively manage business risks and optimise network outcomes and objectives.

AusNet Services uses a range of techniques to identify and assess risk and thus determine the maintenance and replacement requirements for each asset class.

The various techniques are applied depending on the asset type and the asset data available. The range of resulting risk assessments and replacement forecasts are compared, contrasted and brought together using engineering judgement to inform the management of risk and development of maintenance programs and replacement forecasts.

[12] RM 10-01 Risk Management Policy and Framework, 2018, AusNet Services.

Key strategies for the management of business and asset risks include:

- Integration of the risk management process into all processes used to make significant decisions and to deal with changes;
- Key controls are identified and allocated to nominated control owners for periodic verification that they are adequate, effective and cannot be cost effectively improved;
- Conduct analysis after any significant incident, event, change or decision to learn from both successes and failures. This will include the use of root cause analysis;
- Maintenance of Emergency Operations Management Plans, the Mutual Aid Plan and Disaster Recovery Plans through AusNet Services' Integrated Response and Contingency System (SPIRACS)[13];
- Maintain standardised asset design, installation, operation and maintenance procedures;
- Establish contingency and risk mitigation plans where network risks have been identified as unacceptable;
- Utilise economic net benefit modelling and program prioritisation techniques;
- Manage risks 'as far as practicable';
- Determine asset criticality and/or risk scores for key equipment;
- Develop and implement risk based maintenance plans for key equipment; and
- Enhance risk based replacement and refurbishment programs.

Further information can be found in *RM 10-01 Risk Management Policy and Framework* and *AMS 01-09 Asset Risk Assessment Overview*.

8.2 Electricity Safety Management System (ESMS)

AusNet Services maintains an accepted Electricity Safety Management Scheme (ESMS) as required under the *Electricity Safety Act 1998*, in compliance with the *Electricity Safety (Management) Regulations 2009* and *AS 5577 Electricity Network Safety Management Systems*.

The ESMS forms an outcome based regulatory framework against which ESV maintain regular audits to monitor AusNet Services' compliance.

AusNet Services' Electricity Safety Management Scheme (ESMS) applies a full life cycle asset management philosophy for the management of its electricity distribution network. This management philosophy supports a continuous improvement approach toward the development and maintenance of preventative strategies designed to network safety risk.

In summary, the scheme contains information on:

- Executive officers responsible for the network;
- A description of the location, extent and scope of the scheme;
- A formal safety assessment including methodology, hazards identified and measures to reduce those hazards;
- A description of the management scheme including content, responsibilities, formal policy, technical standards applied and an asset management plan detailing the change management process;
- A system authorising access to the network and preventing access by unauthorised persons;

[13] 30-4006 AusNet Services' Integrated Response and Contingency System

- Emergency preparedness plans;
- Monitoring, auditing and reviewing processes;
- Key Performance Indicators;
- Incident reporting and investigation processes;
- Competence and training;
- Record keeping; and
- Reporting procedures for serious incidents.

Further details can be found in *ESMS 10-01 Safety Management System (Electricity Transmission)*.

8.3 Health and Safety Management

As explained in Section 2.12, the AusNet Services safety vision is symbolised by the simple expression missionZero.

The AusNet Services' health and safety management system complies with the Occupational Health and Safety Act 2004 and is certified to the requirements of AS/NZS 4801 Occupational Health and Safety Management Systems by enabling a framework to manage health and safety across our business.

The primary aim of the health and safety management system is to establish an integrated, sustained and systematic approach to safety management in all areas of our activities.

Safety is a core value at AusNet Services.

Our missionZERO HSEQ strategy will be achieved through:

- strong safety leadership;
- safe behaviour;
- safe work environment; and
- safety systems and measurement.

These missionZERO strategic elements are shown in Figure 16. Each of these elements feeds off the others to create awareness, continuous improvement and our goal of missionZERO.

Figure 16: missionZERO Strategic Elements

We rely on our leaders to set clear behavioural expectations and reinforce the reasons why it is important to work safely. In turn, our people must always have safety “front of mind” and apply safe behavioural decision making guided by our HSEQ management systems (policy, procedures, guidance materials, training and audit program).

Our HSEQ Plan FY20 will continue our journey to ZERO supported by a safety strategy with four key components:

1. Safety leadership
2. Safe behaviour
3. Safe work environment
4. Systems and measurement

To ensure we energise our approach to the above four components of the strategy the following thinking will be used in the development of initiatives:

- Empowering – placing people at the centre of the solution.
- Positive – looking at the health of the safety system as a whole, look for positive outcomes and learning, not only negatives.
- Ethically Responsible – safety will be a matter of integrity, not bureaucracy.

Continuous improvement in HSEQ performance requires a commitment to improving line management accountability for safety and environment. Our leaders take responsibility for the safety of our people.

The AusNet Services' HSEQ plan has been developed in consultation with the executive and forms the basis of the AusNet Services' vision and applies to all AusNet Services' operations.

8.4 Environmental Management

AusNet Services maintains a certified ISO14001 HSEQ Management System that applies to its networks.

The HSEQ management system is the principal tool through which AusNet Services identifies environmental risks, develops and implements solutions and monitors success in controlling such risks.

The HSEQ Management System drives the integration of policies, procedures and objectives pertinent to vegetation management, bushfire mitigation and environmental management to the AusNet Services HESQ policy and environmental objectives.

In accordance with the core values of AusNet Services' Environmental Policy, the following programs have been identified as key environmental outcomes to be achieved:

- Manage oil spill risk;
- Manage asbestos risk;
- Manage noise abatement at stations;
- Minimise release greenhouse gases to the atmosphere; and
- Manage vegetation risk.

Success of the above outcomes can be reflected in achievement of AusNet Services' corporate target of zero environmental compliance notices.

Strategies to achieve this include:

- Management of oil discharge:
  - Bunding of all plant >1000 litres
  - Bunding of plant <1000 litres where environmental risk evident
  - Regular inspection and maintenance of plant
  - Remote monitoring and alarm of selected bunded installations
  - Reporting and monitoring of oil spills
  - Maintenance of oil clean-up and mitigation procedures and training
  - Investigation into the use of biodegradable vegetable oils for transformer insulation
- Management of asbestos containing materials:
  - Enhancement of the asbestos register
  - Planned removal of asbestos, particularly during station augmentation
  - Removal of friable asbestos containing materials
  - Maintenance of asbestos handling procedures and training
- Management of noise abatement:
  - Monitor noise levels of 'noisy' stations
  - Selection of plant with low noise characteristics
  - Maintain existing land buffers around stations
- Greenhouse gas reduction:
  - Monitor and implement where practicable, alternatives to and minimisation of atmospheric release of SF_6

- Vegetation management:
  - Compliance with regulations, codes and guidelines, including annual submission of a Vegetation Management Plan to the ESV for approval
  - Maintenance of vegetation management systems and training
  - Participation and consultation with community forums and stakeholders groups
  - Establishment of sustainable vegetation practices within easements
  - Communication to stakeholders of suitable vegetation species within easements.

Further details can be found in *AMS 10-14 Environmental Management*.

8.5 Condition Monitoring

AusNet Services utilises online and off-line condition monitoring (CM) techniques to continuously improve levels of network reliability and safety. The asset condition information is critical for the optimisation of maintenance plans and prioritisation of asset replacement programs.

Existing CM programs for the Victorian electricity transmission network comprise visual inspections, off-line diagnostic tests, on-line or real time monitoring and routine non-invasive scanning. Although AusNet Services manages a large CM program, the application of contemporary condition monitoring techniques to all network assets has not yet been fully implemented. Limited application of new technologies has taken place due to high costs of particular monitoring systems, resource constraints and the developing nature of certain condition monitoring techniques.

Key strategies can be found in AMS 10-13 *Condition Monitoring*.

8.6 Plant and Equipment Maintenance

AusNet Services' asset maintenance strategies ensure the safe and reliable operation of the transmission network assets. The asset maintenance strategies are developed using engineering best practice, incorporating manufacturer recommendations, and are in accordance with ESV regulations. AusNet Services' maintenance strategies are reflected in the Electrical Safety Management System which has been accepted by ESV.

AusNet Services' maintenance programs are primarily managed via SAP, a computerised maintenance management systems (CMMS). Predominantly, the asset maintenance plan is enacted based on a recurrent nature, and is categorised into scheduled maintenance, corrective unscheduled maintenance and emergency maintenance tasks.

The highest volume of tasks completed as part of asset maintenance plan are scheduled maintenance tasks which involve time based inspection, or overhauls of network assets. During these tasks condition based data is collected to allow for predictive corrective maintenance to be carried out. Issues or defects identified through asset inspection, or overhaul process are rectified as corrective maintenance tasks within predefined timeframes, depending on the level of risk associated with the defect. Corrective maintenance can also involve investigation and resolution of equipment monitoring alarms received via the SCADA system. Emergency maintenance tasks require urgent attention and are usually triggered by fault events which adversely affect the overall availability of the transmission network.

For further information please refer to AMS 10-19 *Plant and Equipment Maintenance*.

8.7 Asset Replacement and Refurbishment

In deciding between the replacement and refurbishment of assets, a range of asset management options are identified and evaluated, utility practices analysed and supporting arguments developed. Primary requirements for any replacement or refurbishment decision are a well-defined asset management strategy, a sound knowledge of asset condition and

related factors affecting performance and expected technical life. AusNet Services' plant maintenance strategies and their supporting asset risk models provide guidance on optimal asset management approaches for different asset classes operating on the transmission network.

Negative energy demand growth, closures of large industrial customers, potential generator retirements and targeted carbon emission reductions present risks that network assets may become unused or underutilised in the future. Changes have been made to the economic planning criteria used to assess asset replacement and refurbishment projects to minimise the risk of new assets becoming stranded in future. The economic planning criteria now incorporate assessments of a broader range of options including asset retirement, capacity downsizing, non-network solutions and distribution network alternatives. The option selection process now considers the maximum loss which could result from selecting a particular option by means of a regret function and investment breakeven analysis has been introduced to consider irreversibility and uncertainty in investment decisions. Further development is needed to refine the assessment of safety risk during option selection.

For further information please refer to AMS 10-11 *Asset Replacement and Refurbishment* and AMS 10-24 *Asset Renewal Planning Guideline*.

8.8 Asset Management Information Systems

AusNet Services' main asset management information systems are:

- SAP for asset and work management;
- Protection and Control Setting Information System (PACSIS) for relay settings;
- Ratings Database Repository (RADAR) for plant and equipment ratings;
- Spatial Data Management Electricity (SDME) for spatial display and network modelling and
- SAP Work Manager as the field mobility solution.

Continued investment is required in existing transmission critical systems such as:

- Teleprotection (Comms+)
- SCADA (Supervisory control and data acquisition)
- SCIMS (Substation Communication Information Management System)
- Contingency management applications – i.e. load shedding, asset overload.
- RADAR
- Engineering WAN – remote access to IEDs
- Asset condition monitoring, e.g. CAMS

New investment is required to enhance capabilities in areas such as:

- Increased incorporation of sensing (distributed) and non-network data sets that enable appropriate asset risk management
- Digital surveillance of the network, e.g. SAIP
- Cyber and physical security systems
- Extension of IEC Standards to enable station to station operational and configuration management
- Increased visibility of sub-transmission load flows and contingency impact on transmission assets
- Increase comms (data) with DBs and AEMO
- Phasor Measurement Unit Applications with focus on managing DER impact

The progressive development of asset management information systems is coordinated by the Enterprise Asset Management (EAM) program within the Business Systems Asset Management Strategy.

The key drivers of improvement in information systems are:

- Improving data quality for informed operation and strategic decision making;
- Increasing costs of supporting disparate, customised, non-interfaced systems;
- High risks associated with reliance on the 'local knowledge' of a mature-aged workforce;
- Repeatable, transparent and auditable processes to assure compliance to regulatory and safety obligations; and
- Replacement of obsolete legacy systems.

8.9 Economic Assessment of Projects and Programs

AusNet Services is focused on delivering optimal distribution network performance at efficient cost. Except in the case where outputs are mandated, this requires an explicit cost benefit analysis to be undertaken in order to ensure that capital expenditure is allocated most efficiently.

The process ensures that initiatives having the highest merit, assessed through cost/benefit analysis are given funding priority.

Projects and programs are selected for inclusion in budgetary provisions via application of high level cost/benefit comparison between initiatives. The projects and programs arise from planning studies and analysis conducted in developing asset management strategies.

Business cases are developed for individual projects and programs to ensure they are economically efficient via a net present value (NPV) analysis and this process also includes a detailed options analysis against identified alternative solutions.

In doing this, AusNet Services assesses the incremental costs of delivering an incremental change in network performance to customers, relative to the incremental benefits from the delivery of that enhanced network performance.

The AMS therefore ensures that all decisions to augment, replace or maintain network assets are justified on economic grounds. The benefits are a function of the explicit customer value proposition, or proxy via the adoption of minimum performance standards which are stipulated in legislation or other statutory or regulatory instruments.

The various drivers that are brought to bear when undertaking AusNet Services' Cost Benefit Analysis are summarised in Figure 17. An assessment of these drivers, both individually and collectively, are fundamental to the cost benefit analysis that underpins AusNet Services' approach to managing its network.

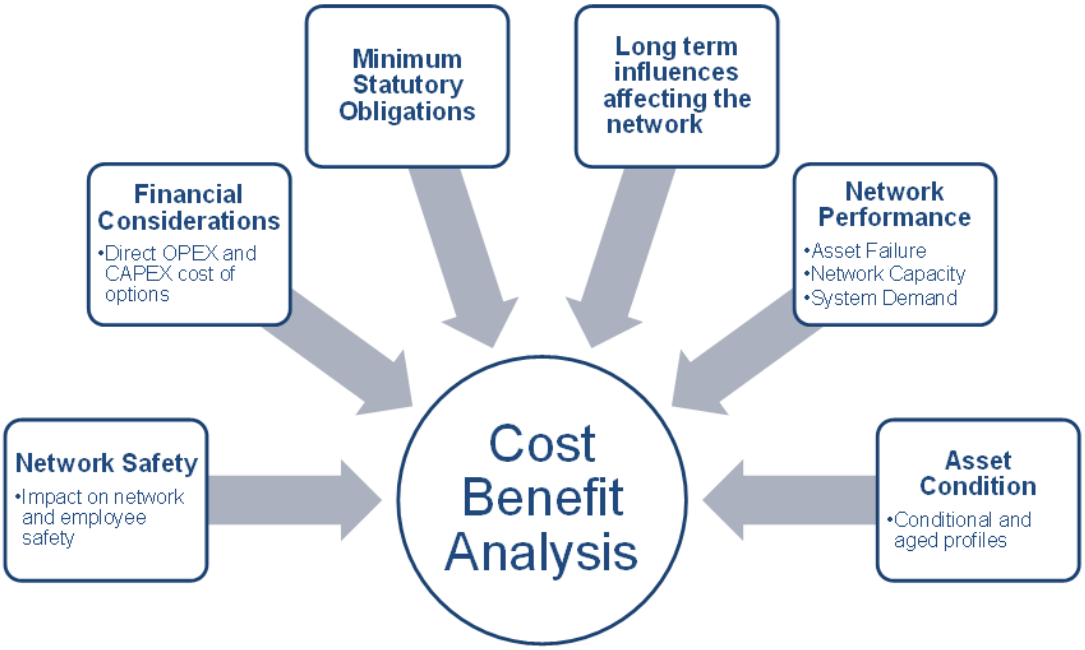

Figure 17: Cost Benefit Analysis Drivers

Final approval of programs/projects requires authorisation in accordance with AusNet Services' *Delegation of Authority Policy 10-1016*.

8.10 Program Delivery

AusNet Services has implemented a Project Governance Framework – Stage Gate Process that sets out the process for managing programs and projects from conception, through the planning, business case approval, release, delivery and close out phases.

The Project Governance Framework – Stage Gate Process is shown in Figure 18. The Project Governance Framework is supported by detailed work instruction documentation and an internal resourcing model.

Program delivery is further supported by the formation of strategic alliances with external companies that provide design services, installation services and maintenance services.

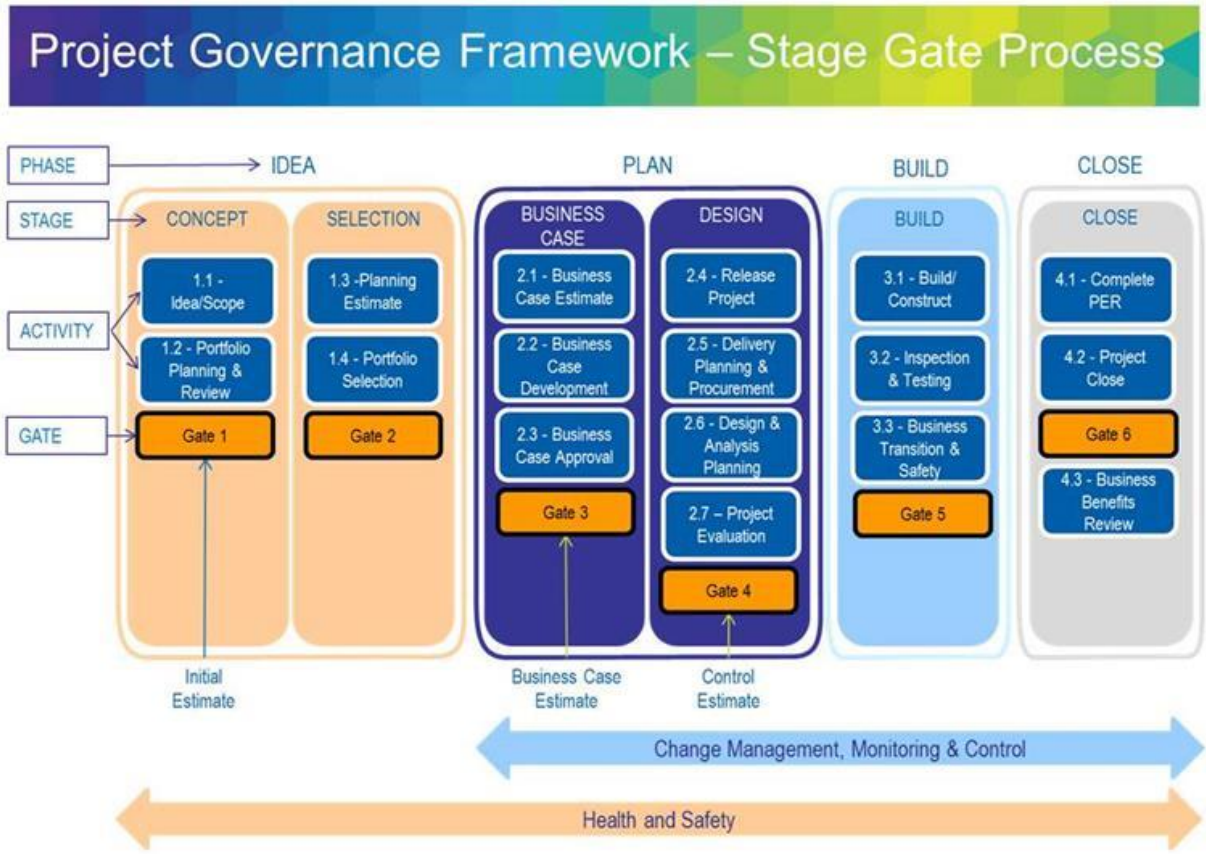

Figure 18: Project Governance Framework – Stage Gate Process

The Program Delivery group provides management and resources to deliver the AusNet Services' maintenance and capital works programs relating to network assets. The project lifecycle is supported by the SAP system and work instructions.

The resource model includes the use of internal and external resources in the delivery of maintenance and capital works programs.

AusNet Services has formed Strategic Alliances with companies that provide design services, installation services and maintenance services. Contract arrangements are performance-based with benchmarking of costs and standards to ensure that quality and value is maintained throughout the contract.

Strategies for program delivery and optimisation are:

- Maintain key internal resources within the Program Delivery area to ensure that strategic works and program control services can be sustained;
- Plan maintenance and capital works to ensure the efficient use of resources, the maximisation of network availability and the reduction of risks to supply security;
- Provide program management resources on a functional basis, covering project control, estimation, engineering standards and field technical services;
- Use unified systems which link the core project activities of planning, estimation and costing.
- Use the Constructability, Operability and Maintainability review process to test and confirm the appropriateness of technical decision making at key stages in the development and execution of major network augmentation, refurbishment and replacement projects;

- Conduct internal Post Implementation Reviews or lessons learned of all projects, with key projects undergoing these reviews by independent teams such as the PM&R and where necessary, external consultants;
- Use the Terminal Station design guide and the pre-qualified design service providers to ensure that engineering and quality standards are maintained;
- Maintain construction resources within AusNet Services to ensure that key strategic projects can be delivered to the required schedule; and
- Control and supervise all site works through the field service areas to ensure safety, network security and quality of workmanship.

8.11 Network Performance Monitoring

The effectiveness of AusNet Services' asset management practices is measured directly by the performance of extra high voltage network elements and their impact on the availability and reliability of the Victorian electricity transmission network in which they operate.

The development of these practices requires the reliable capture of accurate information and data, effective analysis and trending and robust decision support tools. Additional comparisons with the Key Performance Indicators (KPIs) set by the Australian Energy Regulator (AER), Australian Energy Market Operator (AEMO), Energy Safe Victoria (ESV) and comparisons with externally benchmarked performance standards guide the adjustment of practices.

For further information please refer to AMS 10-17 *Network Performance Monitoring*.

APPENDIX A SCHEDULE OF REVISIONS

Issue	Description
5	Editorial review following feedback from Regulatory & Business Strategy group.
6	Editorial following external review. Published to support TRR submission.
7	Editorial update and format.
8	New AM Policy and formal approval by GGM NSD
9	Integrate STEM into AMS Objectives
10	Major review and update
11	Annual review and update
12	Align network strategies, review and update
13	Review and update
14	Review and update
15	Review, update and structure change
16	Review and update
17	Restructured to align with AMS 20-01 Minor spelling and grammatical changes Section 2.3 updated to add AEMO as stakeholder Section 2.5 updated with TRR engagement Section 2.6 updated with connection numbers for 2019 Seciton 2.7 created to highlight changing requirements on transmission Section 2.9 updated market modelling requirements Section 2.10 updated to align with Energising Futures strategy Section 2.11 updated to align with business plan Section 2.13 Reference to ENTR deleted and ISP added Section 2.15 Network demand forecasts updated Section 3.1 diagram added to highlight changing requirements on transmission Section 3.2 diagram updated Section 3.3 Asset summary updated Section 4 revised and policy moved to appendix Section 5.1 diagram updated Section 5.3, Table 4 updated Section 5.4 diagrams update from 2019 benchmarking report Section 6 Asset management objectives updated Section 7.1.3 updated with new projects and to reference reaching limit of scheme Section 8.1 reference to maintenance added Section 8.3 updated to align with current plan Appendix Schedule of Revisions added

APPENDIX B ASSET MANAGEMENT POLICY

AusNet services

Empower communities and their energy future

This policy directs the content and implementation of asset management strategies, objectives and plans for AusNet Services' energy delivery networks. It provides employees, contractors, suppliers and delegates with guiding principles to underpin asset management decisions.

Our approach to Asset Management is centred around our objective to create a leading, modern energy company that will operate its networks in the top quartile of efficiency benchmarks with the aim to care for customers, enable their choices and strive to make their energy more affordable.

To achieve this we will:

- Minimise risks to the safety of any person and their property "as far as practicable".
- Place customers at the centre of our decisions to support their evolving needs and the changing energy landscape.
- Engage with our customers and stakeholders to understand and integrate their requirements in asset management decisions.
- Comply with legislation, regulation, relevant Standards and industry codes and actively contribute to the development of amendments that will benefit our customers and stakeholders.
- Use a risk-based approach to manage the energy networks and balance the environmental, economic, and social needs of today without sacrificing the interests of future generations.
- Use innovation, information and technology to facilitate a whole of life cycle approach to asset management to deliver value to our customers, communities and partners.
- Continually develop the skills of our people to ensure asset management activities are performed efficiently and effectively.
- Align and continuously improve our asset management processes and capabilities in accordance with certification to ISO 55001 Asset Management.

Nino Ficca
Managing Director
5 April 2019

We work safely | We do what's right | We're one team | We deliver

APPENDIX C PROCESS, SYSTEM AND PLANT STRATEGIES

C.1 AusNet Services Process and System Documents

AMS 01-01	Asset Management System Overview.
AMS 01-09	Asset Risk Assessment Overview
AMS 10-11	Asset Replacement and Refurbishment
AMS 10-13	Condition Monitoring
AMS 10-14	Environmental Management
AMS 10-17	Network Performance Monitoring.
AMS 10-19	Plant and Equipment Maintenance
AMS 10-22	Risk Management
AMS 10-24	Asset Renewal Planning Guideline
ESMS 10-01	Safety Management System
RM 10-01	Risk Management Policy and Framework

C.2 AusNet Services Plant Strategies

AMS 10-52	Auxiliary Power Supplies
AMS 10-53	Capacitor Banks
AMS 10-54	Circuit Breakers
AMS 10-55	Civil Infrastructure
AMS 10-56	Communication Systems
AMS 10-58	Diesel Generators
AMS 10-59	Disconnectors and Earth Switches
AMS 10-60	Earth Grids
AMS 10-61	Fire Detection and Suppression
AMS 10-62	Gas Insulated Switchgear
AMS 10-63	Infrastructure Security
AMS 10-64	Instrument Transformers
AMS 10-65	Line Easements

AMS 10-66	Power Cables
AMS 10-67	Power Transformers and Oil-Filled Reactors
AMS 10-68	Secondary Systems
AMS 10-71	Static VAR Compensators
AMS 10-73	Surge Arresters
AMS 10-75	Transmission Line Insulators
AMS 10-77	Transmission Lines Structures
AMS 10-78	Transmission Lines Structure Foundations
AMS 10-79	Transmission Lines Conductors

APPENDIX D ACRONYMS

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AMS	Asset Management Strategy
AWB	Availability Workbench
BATS	Ballarat Terminal Station
CAP	Customer Advisory Panel
CBD	Central Business District
CCP	Consumer Challenge Panel
CM	Condition Monitoring
CMMS	Computerised Maintenance Management System
COGATI	Coordination of Generation and Transmission Investment
C-SAT	Customer Satisfaction
CSI	Customer Service Index
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DB	Distribution Business
DER	Distributed Energy Resources
DI	Dispatch Interval
EAM	Enterprise Asset Management
EDDAM	Enhanced Data Driven Asset Management
ENA	Energy Networks Australia
ENTR	Electricity Network Transformation Roadmap
ESMS	Electricity Safety Management Scheme
ESV	Energy Safe Victoria
FBTS	Fisherman’s Bend Terminal Station
HEI	Human Error Incident
HOTS	Horsham Terminal Station
HSE	Health, Safety, Environment
HSEQ	Health, Safety, Environment and Quality
HTS	Heatherton Terminal Station
HWPS	Hazelwood Power Station
HYTS	Heywood Terminal Station
IED	Intelligent Electronic Device
ISP	Integrated System Plan
JIND	Jindera
KPI	Key Performance Indicator
LYPS	Loy Yang Power Station

MIC	Market Impact Component (of STPIS)
MIP	Market Impact Parameter
MTFP	Multilateral Total Factor Productivity
MPFP	Multilateral Partial Factor Productivity
NCC	Network Capability Component (of STPIS)
NCIPAP	Network Capability Incentive Parameter Action Plan
NEL	National Electricity Law
NEM	National Electricity Market
NER	National Electricity Rules
NPV	Net Present Value
NSW	New South Wales
PACSIS	Protection and Control Setting Information System
PCB	Poly Chlorinated Biphenyls
PM&R	Portfolio Management and Review (department)
PV	Photovoltaic
RADAR	Ratings Database Repository
RBM	Risk Based Maintenance
RCM	Reliability Centred Maintenance
RCTS	Redcliffs Terminal Station
RIN	Regulatory Information Notice
RIT-T	Regulatory Investment Test – Transmission
RTS	Richmond Terminal Station
RWTS	Ringwood Terminal Station
SA	South Australia
SAIP	Smart Aerial Image Processing
SC	Service Component (of STPIS)
SCADA	Supervisory Control And Data Acquisition
SDME	Spatial Data Management - Electricity
SMTS	South Morang Terminal Station
SPIRACS	AusNet Services Integrated Response and Contingency System
STPIS	Service Target Performance Incentive Scheme
TAS	Tasmania
TCPR	Transmission Connection Planning Report
TNSP	Transmission Network Service Provider
UAV	Unmanned Aerial Vehicle
WMTS	West Melbourne Terminal Station
WOTS	Wodonga Terminal Station