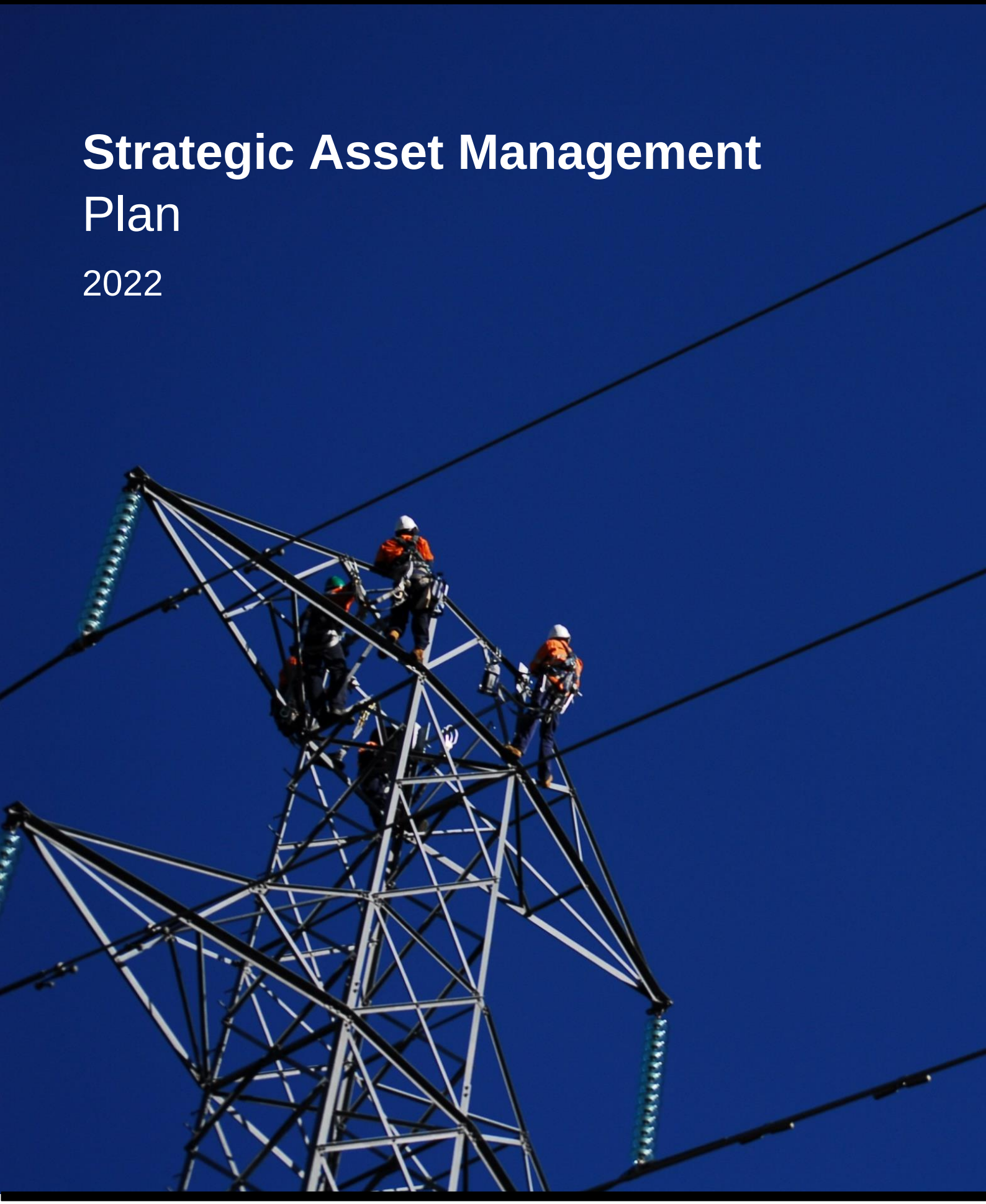
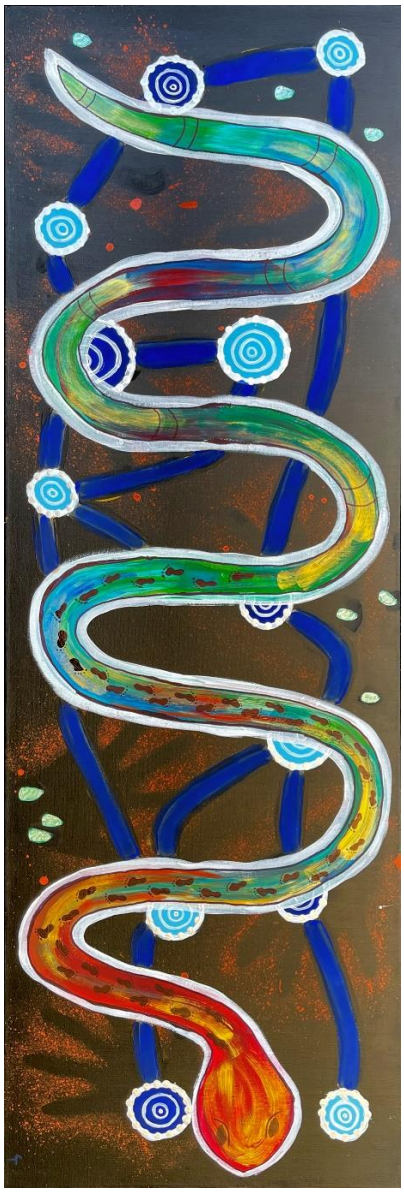
Strategic Asset Management Plan

2022



TasNetworks | Powering a Bright Future



Rainbow Snake

This painting represents palawa connection to Country and TasNetworks. The hand stencils represent our old people, we remember them, whose land on which we live, work and play. The blue circles represent lutruwita; being an island surrounded by waters, rivers, oceans, creeks and lakes; the dark blue lines connecting to TasNetworks assets that cover our Country. The nine mariner shells represent the nine nations of our old people from long ago and our strong continuing culture that is still here and is thriving. The rainbow snake represents our connection to Country and TasNetworks' logo. The footsteps forming the backbone of the snake show strength and resilience – always moving forward while remembering where we have been.

Aboriginal Artist Luana Towney

TasNetworks acknowledges the palawa (Tasmanian Aboriginal community) as the original owners and custodians of lutruwita (Tasmania). TasNetworks, acknowledges the palawa have maintained their spiritual and cultural connection to the land and water. We pay respect to Elders past and present and all Aboriginal and Torres Strait Islander peoples.

Message from the Executive Operations

Tasmanian Networks Pty Ltd (TasNetworks) owns, operates and maintains the transmission and distribution electricity networks on mainland Tasmania and Bruny Island.

We supply the power from generation sources to over 280,000 customers in homes and businesses across Tasmania through a network of transmission towers, substations and power lines worth approximately $3.5 billion. TasNetworks also owns and operates a high-reliability telecommunications network that supports the operation of the electricity network, and we also provide communications services to other customers. TasNetworks is owned by the Tasmanian Government.

It is our vision that we will be: “Trusted by our customers to deliver today and create a better tomorrow”. Our purpose is: “Powering a bright future”.

I am pleased to present our 2022 Strategic Asset Management Plan, which outlines our systems and strategies targeted to effectively and efficiently manage the delivery of electricity and telecommunication network services to customers and to provide information to stakeholders regarding the environment in which we operate. Key themes supporting our asset management approach and associated levels of investment are:

- taking a whole of life (life-cycle) approach to optimise cost and service outcomes for our customers;
- responding to the changing nature of consumer behaviours and requirements through implementation of our Enterprise Asset Management Roadmap;
- working hard to ensure we deliver the lowest sustainable prices managing our assets to ensure safety and the environment is not compromised;
- maintaining reliability of the network;
- where we can safely do so, running our network harder rather than building more; and
- assisting the MarinusLink project for a second interconnector with Victoria, assisting the achievement of the Tasmanian Renewable Energy Target, and working with Hydro Tasmania in its battery of the nation project proposal.

Mr Ross Burridge AM
Executive Operations
Tasmanian Networks Pty Ltd
ABN 24 167 357 299

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Appendices

1. Introduction and Context

1.1 Purpose

The purpose of this document is to outline our asset management systems and strategies targeted to effectively and efficiently manage the delivery of electricity and telecommunications network services to customers and to provide information to stakeholders regarding the environment in which Tasmanian Networks Pty Ltd (**TasNetworks**) operates. TasNetworks stakeholders include: shareholders, customers, regulators, policy makers, industry groups, land owners, employees and the general public.

This document aims to provide alignment between our stakeholder's requirements, the organisational objectives and the resulting asset management objectives, to ensure that the assets are being managed to provide the value required of them by the organisation and the stakeholders. This document also is structured to meet the requirements of the ISO 55000 series of asset management standards (see section 2.2).

This Strategic Asset Management Plan is part of a suite of documents that are required to satisfy TasNetworks' electricity transmission and distribution licence obligations and support the safe and efficient delivery of electricity and telecommunications network services.

1.2 Scope

This document includes the physical assets, systems and processes that are required for the provision of electricity and telecommunications network services.

1.3 Planning Period and Review

This document covers a nominal planning period of 25 years and is typically reviewed every two and a half years.

1.4 Who is TasNetworks

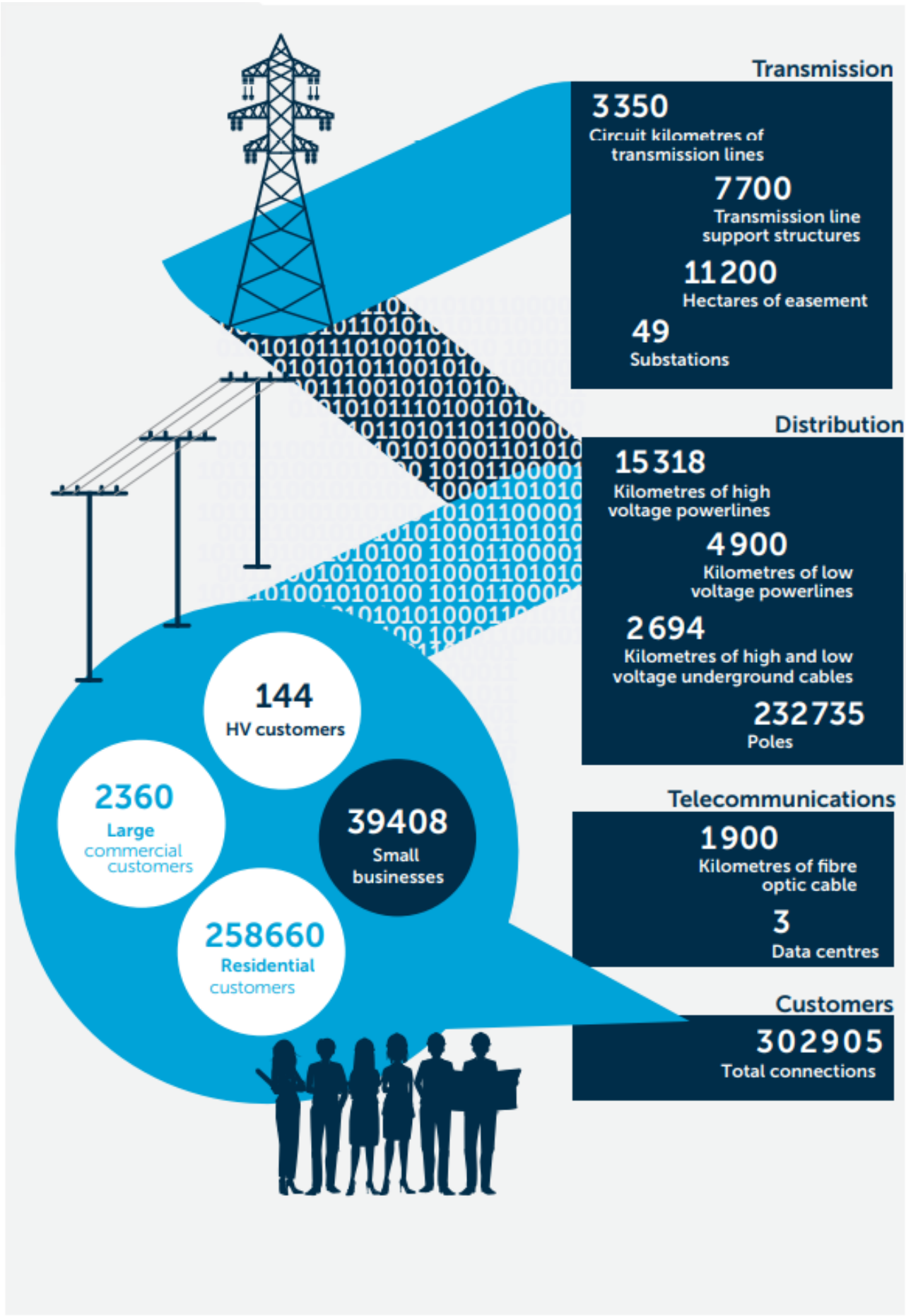
TasNetworks delivers electricity and telecommunication network services, creating value for our customers, our owners and the community. We commenced operations on 1 July 2014, and are owned by the Tasmanian Government.

TasNetworks is the sole licensee for regulated transmission and distribution network services on mainland Tasmania and Bruny Island. We are registered with the Australian Energy Market Operator (**AEMO**) as both a Transmission and Distribution Network Service Provider (**NSP**) and operate in the National Electricity Market (**NEM**). TasNetworks is unique in the NEM in that it is the only combined Transmission and Distribution NSP providing services to all customers in its jurisdiction.

As a monopoly provider of transmission and distribution network services, our revenue for these services is regulated. We prepare submissions to the Australian Energy Regulator (**AER**) who determines our revenue and the maximum amount we can recover from customers, generally for periods of five years. We have recently transitioned the timing of the Distribution revenue period to align with the Transmission revenue period.

1.5 What We Do

TasNetworks owns, operates and maintains the transmission and distribution electricity networks on mainland Tasmania and Bruny Island. We deliver electricity generated from our generation customers at hydro-electric, wind and gas-fired power stations to our more than 280,000 demand customers throughout the state. Our demand customers range from domestic and commercial customers to major energy users connected directly to the transmission network. Our network also allows electricity generated from private embedded generating units to be transported to other customers.


Transmission
3350
Circuit kilometres of transmission lines
7700
Transmission line support structures
11200
Hectares of easement
49
Substations
Distribution
15318
Kilometres of high voltage powerlines
4900
Kilometres of low voltage powerlines
2694
Kilometres of high and low voltage underground cables
232735
Poles
144
HV customers
2360
Large commercial customers
39408
Small businesses
258660
Residential customers
Telecommunications
1900
Kilometres of fibre optic cable
3
Data centres
Customers
302905
Total connections

The widespread adoption of rooftop photo-voltaic (PV) systems by private customers has dramatically increased the use of the network for this purpose in recent years.

We also facilitate the transfer of electricity to and from mainland Australia within the NEM. The NEM operates on an interconnected power system that extends from Queensland to South Australia, including a connection to Tasmania via the Basslink interconnector. Basslink is a privately-owned under-sea cable between George Town in Tasmania and Loy Yang in Victoria and can transfer electricity in either direction. TasNetworks is proposing the installation of a second inter-connector between Tasmania and Victoria with the development of its Marinus Link project.

TasNetworks also owns and operates a high-reliability telecommunications network. This network supports the operation of the electricity network, and we also provide communications services to other customers. We also own and operate non-network assets to support and facilitate the operation of the business. These assets include buildings, vehicular fleet and information systems.

Our shareholders have directed us to perform some non-commercial activities, primarily funding the 'grandfathered' solar feed-in-tariff payment to eligible customers, inspecting private poles on behalf of the State until a longer-term solution is implemented, and supporting the rollout of the National Broadband Network on the West Coast of Tasmania.

Any profits we make from delivering our services to our customers are returned back to Tasmanians in the form of returns and dividends paid directly to the State.

1.6 Subsidiary Companies

TasNetworks has three subsidiary companies:

- Fortytwo24 Pty Ltd (**42-24**), which is a telecommunications, information technology and data centre services provider for Tasmanian customers;
- Marinus Link Pty Ltd (**MLPL**), which is a facilitator for the Project Marinus business case, i.e. all activities involved with building, operating and owning the new interconnector between Tasmania and Victoria; and
- Large Scale Renewables Pty Ltd (**LSR**), which is a services business for supporting the growth of TasNetworks' unregulated transmission connections for large scale generation projects to the network.

1.7 Document Structure

The remainder of this document is structured as follows:

Chapter 2: Shows how TasNetworks has developed an integrated asset management system framework, together with supporting processes and systems, to ensure that our performance objectives are consistently achieved.

Chapter 3: Discusses relevant aspects of TasNetworks' strategic asset management including stakeholder engagement, corporate objectives, asset management policy, asset management objectives, the regulatory framework, revenue determinations and investment planning.

Chapter 4: Provides an overview of the Tasmanian electricity supply system. It discusses the entities in the supply chain and their responsibilities. It points out those aspects of the Tasmanian electricity system that are distinctly different from mainland Australia power systems.

Chapter 5: Shows the roles and responsibilities within TasNetworks' organisation structure, and the organisational roles reporting within it.

Chapter 6:	Shows how TasNetworks is building a high performance culture and high levels of employee engagement to support achievement of our business objectives and to enable us to be sustainable.
Chapter 7:	Presents the risk management framework, the operational risk management process and how asset condition and risk is managed.
Chapter 8:	Presents the electricity demand forecasts for the Tasmanian power system.
Chapter 9:	Discusses TasNetworks' life-cycle approach to asset management and the resulting key asset strategies aimed at achieving our asset management objectives and corresponding corporate objectives.
Chapter 10:	Describes the development of our Asset Management Plans, Area Development Plans and the Annual Planning Report.
Chapter 11:	Focuses on the performance of the network in recent years. Also discusses an independent asset management (AM) maturity assessment and the resulting asset management improvement program.
Appendix A:	AM Policy
Appendix B:	Zero Harm Policy
Appendix C:	Glossary and Abbreviations – common electricity industry definitions and abbreviations provided to assist readers who may be unfamiliar with particular industry terminology.

2. Asset Management System Framework

2.1 Overview

Chapter 2 shows how we have developed an integrated asset management system (AMS) framework, together with supporting processes and systems, to ensure that performance objectives are consistently achieved.

2.2 Asset Management System Framework

Our AMS continues to be further developed in alignment with the ISO 55000 series of AM standards with the aim of achieving the following benefits:

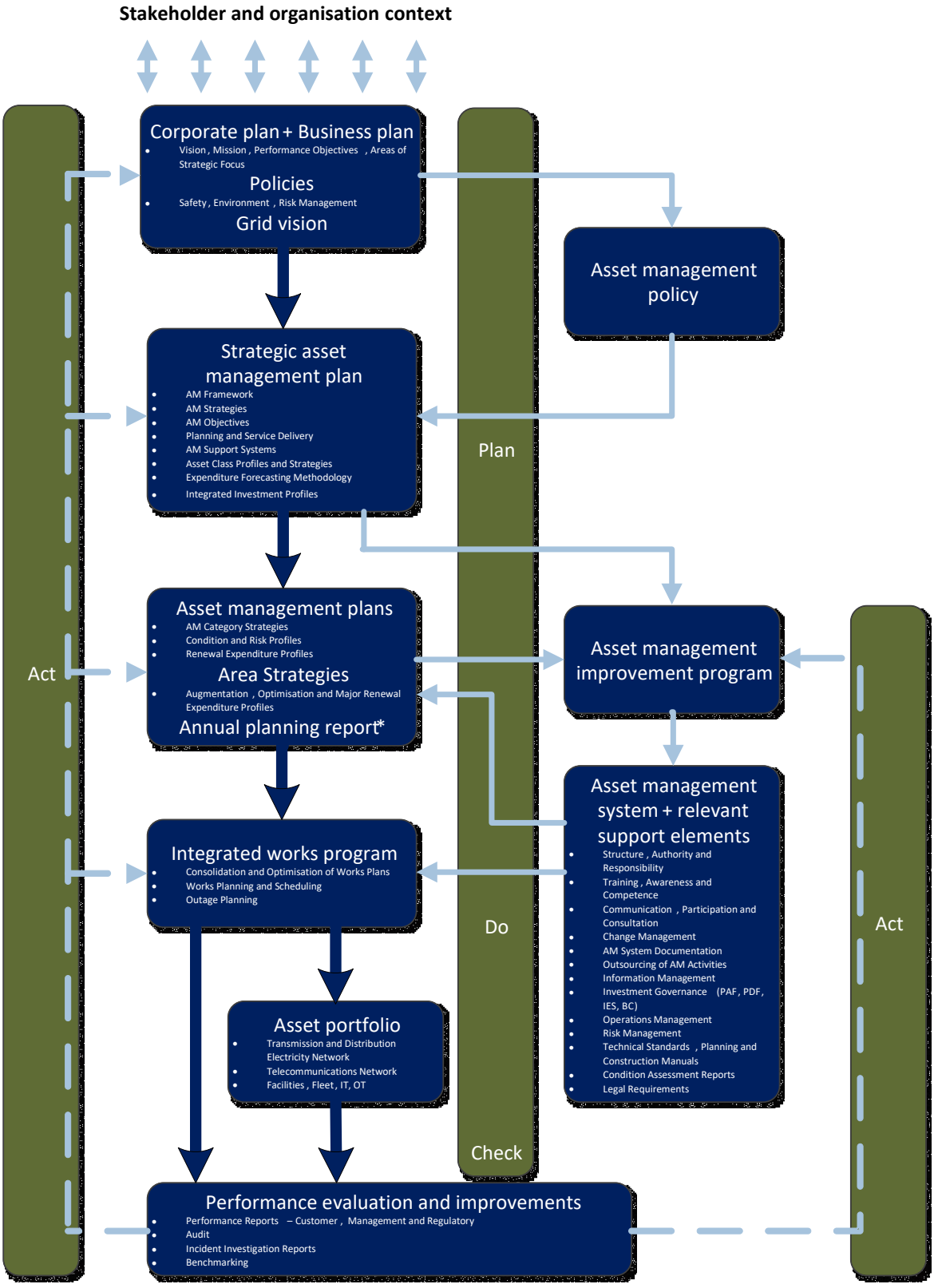
- Improved safety and environmental performance in line with our Zero Harm objectives;
- Lower AM costs over the long term;
- Alignment of strategic initiatives across the AMS;
- Increased engagement of employees, including leadership, communications and cross-disciplinary teamwork;
- Alignment of processes, resources and functional contributions;
- Better understanding and usage of data and information to provide consistent and informed decisions;
- Consistent, prioritised and auditable risk management;
- Improved AM planning;
- Improved customer service, and maintain overall network performance;
- Increased auditability across the AM life-cycle; and
- Reduced regulatory risk through implementing robust and demonstrable AM governance processes.

The ISO 55000 series of standards are the internationally accepted standard for AM. The ISO 55000 series comprises three separate standards:

1. ISO 55000:2014 provides an overview of AM;
2. ISO 55001:2014 specifies the requirements for the establishment, implementation, monitoring and improvement of an AMS; and
3. IS0 55002:2014 provides guidance for the application of the AMS.

The AMS framework is presented in Figure 1. This framework has been developed with strong alignment to ISO 55001, and in particular the relationship between the key elements of an ISO 55000 AM system. The ISO compliant framework aims to ensure that the systematic approach to AM delivers prudent and efficient outcomes that meet both the Corporate Objectives and the AM Objectives.

Figure 1 Asset management system framework



* The Annual Planning Report (APR) is a requirement of sections 5.12.2 and 5.13.2 of the National Electricity Rules (NER) and also satisfies a licence obligation to publish a Tasmanian Annual Planning Statement (TAPS). The APR is a compilation of information from multiple sources including the Area Strategies and the AM Plans.

3. Strategic Asset Management Considerations

3.1 Overview

This chapter discusses relevant aspects of TasNetworks' strategic AM including stakeholder engagement, corporate objectives, asset management policy, AM objectives, the regulatory framework, revenue determination and investment planning.

3.2 Stakeholder Requirements

Our shareholders expect us to deliver an appropriate return on their investment. Our Statement of Corporate Intent (SCI) is our annual performance agreement with our Shareholders. It details the performance measures used to track our progress against our plans for the annual reporting period. Our plans aim to strike the right balance between lowest sustainable prices to customers and an appropriate return on investment in line with the regulatory allowances. To deliver on both these goals we have to continue to implement and achieve efficiencies.

Our purpose says it all: Powering a bright future. We are enabling the move to a more sustainable electricity system and ensuring the delivery of safe, reliable, and affordable electricity for all consumers. Tasmania is Australia's renewable energy powerhouse.

To achieve the stakeholder requirements and to guide our way in achieving our purpose, we have set out five focus areas for TasNetworks as shown in Figure 2.

Figure 2 TasNetworks' focus areas

Although the future is uncertain, these five areas are likely to be enduring and will guide TasNetworks' course towards 2030 where we envisage the Tasmanian energy landscape looking like heading. Figure 3 shows our vision of the Tasmanian energy landscape[1] in 2030.

[1] Tasmania's Energy Future - To 2030 and beyond, TasNetworks

Figure 3 Tasmanian energy landscape 2022 to 2030

3.2.1 Tasmanian Renewable Energy Target

The Tasmanian Government has identified renewable energy as a key economic driver for Tasmania. To drive investment and expansion of the renewable energy sector, the Tasmanian Government has legislated the Tasmanian Renewable Energy Target (TRET) to double Tasmania's renewable energy production by 2040. Delivering the TRET will see Tasmania's current 10,500 GWh per annum of

renewable energy generation increase to 21,000 GWh by 2040. An interim target to lift renewable generation to 150 per cent of 2022 levels by 2030 will see the output from renewable generation reach 15,750 GWh.

3.2.2 Tasmanian Renewable Energy Action Plan

The Tasmanian Government's plans to achieve the TRET are underpinned by the Tasmanian Renewable Energy Action Plan (**TREAP**). The TREAP is a dynamic and living document that outlines a vision, key priority areas and targets, and a suite of actions to develop renewable energy generation in Tasmania over the next twenty years. The key priority areas in the TREAP are:

1. transforming Tasmania into a global renewable energy powerhouse;
2. making energy work for the Tasmanian community; and
3. growing the economy and providing jobs.

3.2.3 Tasmanian Renewable Hydrogen Action Plan

Hydrogen is emerging as a fuel of choice for countries seeking to decarbonise their economies and presents an opportunity for Tasmania to leverage its renewable energy resources to produce cost competitive renewable hydrogen. The TREAP has a target of Tasmania being a producer and exporter of renewable hydrogen by 2030 and the Tasmanian Renewable Hydrogen Action Plan (**Hydrogen Action Plan**) articulates the Tasmanian Government's strategy to achieve this.

One of the key initiatives of the Hydrogen Action Plan is the development of a 1,000 MW hydrogen production facility around the Bell Bay Advanced Manufacturing Zone (**BBAMZ**) supported by 2,000 MW of renewable generation. It aims to commence production in 2024 so that Tasmania is an exporter of renewable hydrogen by 2027.

3.2.4 Renewables, Climate and Future Industries Tasmania

In recognition of the alignment between a rapidly transitioning energy sector and the impacts and opportunities of climate change, the Tasmanian Government has established Renewables, Climate and Future Industries Tasmania (**ReCFIT**). ReCFIT's responsibilities include advising the Tasmanian Government on energy, climate change and emissions reduction, providing oversight of energy regulation and the current energy mix and collaborating with industry, state owned energy businesses and communities on the planning and delivery of large renewable energy projects.

3.3 Stakeholder Engagement

As an organisation, we recognise that placing our customers and stakeholders at the centre of our business planning – conducting genuine engagement with them on our plans and allowing them to shape them – is key to ensuring those plans are in their long-term interests.

TasNetworks' engagement approach is guided by an Engagement Framework, developed to articulate how we will deliver our business purpose and vision.

The engagement Framework identifies different tiers depending on the complexity of the engagement required. These Tiers include:

- **Strategic Planning**

Long-term planning for TasNetworks electricity network, future grid vision, new electricity infrastructure, government initiatives, major strategic projects or new energy innovations.

- **Tier 1**

Proposed development of new, greenfield transmission lines and/or infrastructure development; and the extension of existing easements.

- **Tier 2**

Increase in height or width of existing infrastructure (increasing scale of towers, duplication of transmission lines etc) and/or temporary easement extensions for construction.

- **Tier 3**

Delivery of TasNetworks' core business – maintenance and upgrade of existing infrastructure (like for like) and/or approved construction activities.

Engagement principles

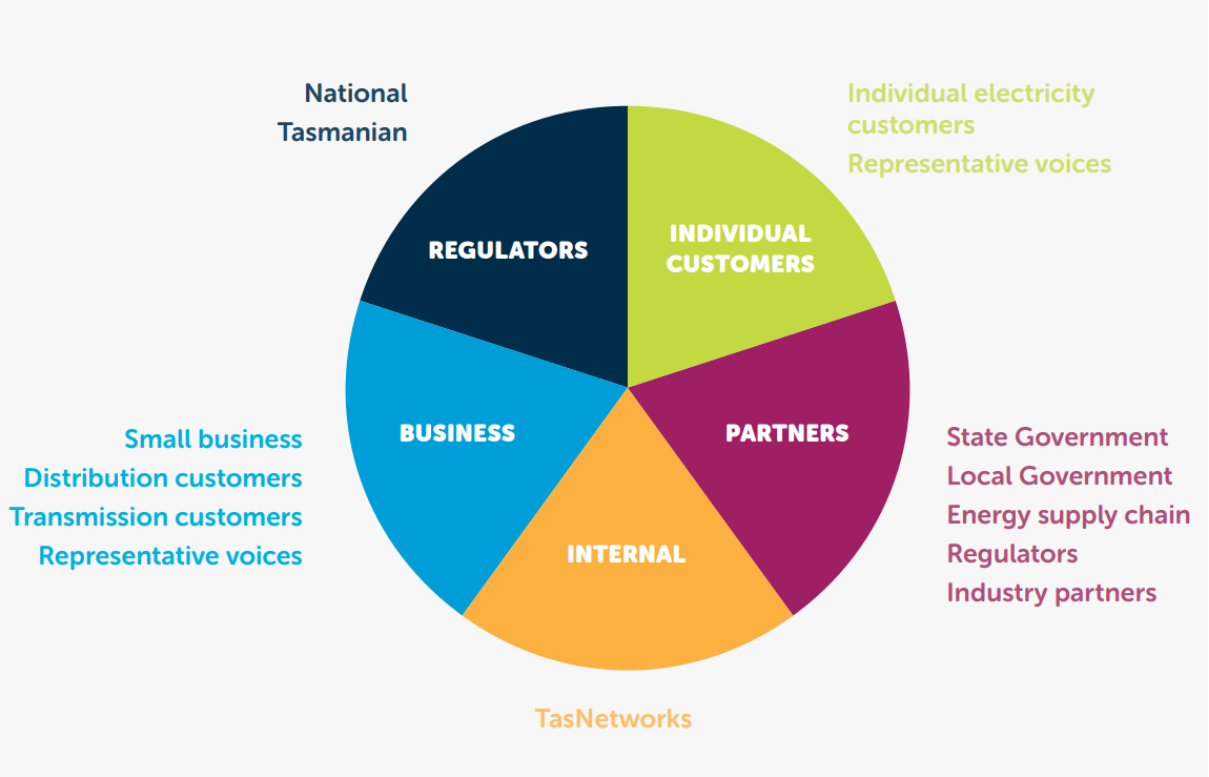
We have four principles that we apply when engaging with our stakeholders and communities. The four engagement principles, shown in Figure 4, ensure we have a consistent approach to engaging with our stakeholders, as well as driving our commitment and approach to building strong relationships.

Figure 4 Engagement principles

TasNetworks' key audiences

We have a diverse range of customers and stakeholders that we work with throughout the year, as shown in Figure 5.

Figure 5 Key audiences



Customer feedback themes

As the energy industry moves through a period of change and adaptation, understanding the expectations of our customers is more important than ever. Our extensive customer and stakeholder engagement has revealed four major themes. These themes are all connected and tensions exist as we navigate discussions on the best solution for Tasmanians while continuing to engage on the issues that matter the most to all our customers:

1. Affordable for all;
2. Reliable now; resilient for the future for the entire state;
3. A transparent, socially responsible approach which ensures a sustainable solution for Tasmania; and
4. Proactive long-term investment in renewable energy that increases Tasmania's capability and unlocks associated community benefits.

3.4 Relationship with Organisational Strategic Objectives

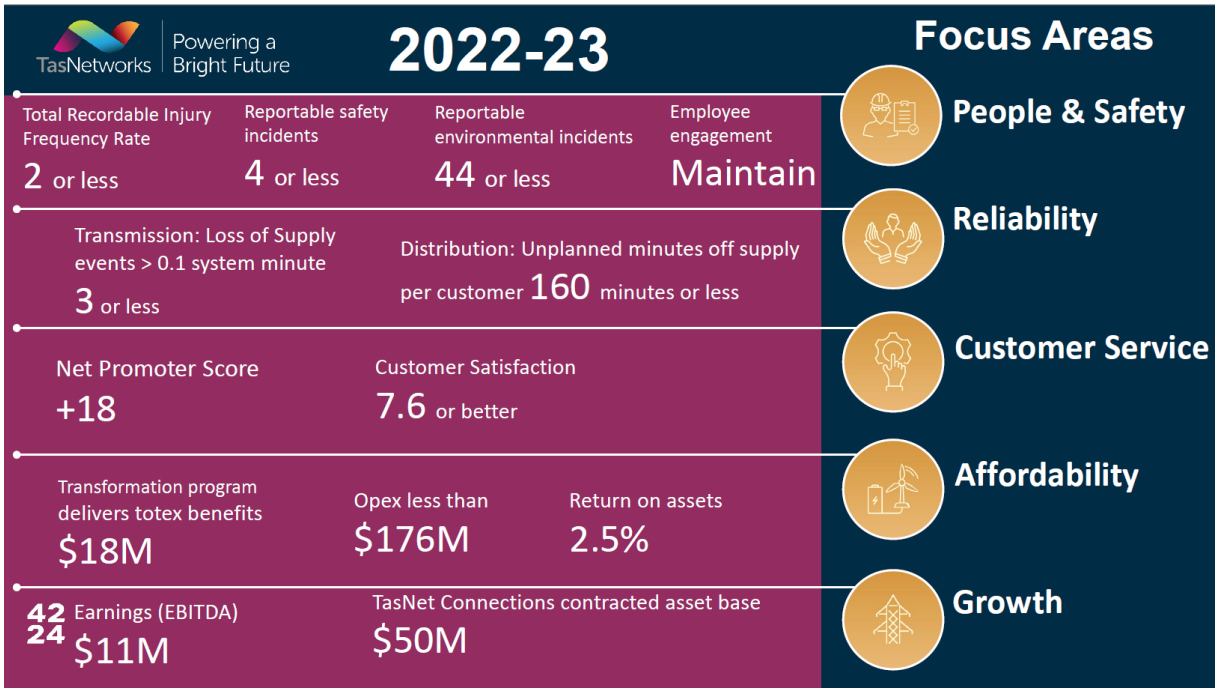
Our 'strategy on a page', shown in Figure 6, summarises the strategic direction for the business.

Figure 6 Strategy on a page

To deliver against the five focus areas previously outlined in section 1.2, TasNetworks has outlined its detailed strategic activities in *TasNetworks Towards 2030* available on our internet website.

In Figure 7 below the organisations goals against the five focus areas are summarised in the TasNetworks Balanced Business Plan 2022-23.

Figure 7 TasNetworks 2022-23 goals



3.5 Asset Management Policy

To aid 'line of sight' and alignment of our asset management activities to our strategic goals, TasNetworks has approved the asset management policy, which is shown in Appendix A.

The AM policy applies to all TasNetworks assets and associated activities and is the overarching document that supports the AM system. The AM policy provides a critical platform for TasNetworks to deliver our vision to be trusted by our customers to deliver today and create a better tomorrow.

Key factors that have been considered during the development of the AM policy include:

- Understanding the organisation and its context;
- Understanding the needs and expectations of stakeholders;
- Defining leadership involvement; and
- Organisational roles, responsibilities and authority.

Critical aspects of the AM policy are that it:

- Applies to all assets managed by TasNetworks;
- Applies to all stages of the asset life-cycle (stakeholder needs, demand analysis, strategic planning, technical requirements, works management, decommissioning and disposal, performance analysis);
- Is aspirational in some areas; and
- Is dependent on commitment from leadership.

3.6 Asset Management Objectives

The asset management objectives have been designed to align with the asset management policy and the organisational objectives, and thereby ensure clear 'line of sight'. The AM objectives state the outcomes required from the asset management system and the works program to ensure TasNetworks' strategic goals are met.

The asset management objectives focus on six key areas:

- Zero Harm will continue to be our top priority and we will ensure that our safety and environmental performance continues to improve, and our asset risks are managed in compliance with our Risk Management Framework. TasNetworks Zero Harm Policy is shown in Appendix B.
- Cost Performance will be improved through prioritisation and efficiency improvements that enable us to provide predictable and lowest sustainable pricing to our customers.
- Service Performance will be maintained at current overall network service levels, whilst service to poorly performing reliability communities will be improved to meet regulatory requirements.
- Customer Engagement will be improved to ensure that we understand customer needs, and incorporate their needs into our decision making to maximise value to them.
- Our Program of Work will be developed and delivered on time and within budget.
- Our asset management Capability will be continually improved to support our cost and service performance, and efficiency improvements.

3.7 The Regulatory Framework

TasNetworks operates under both jurisdictional and national regulatory regimes. As a participant in the NEM, we are required to develop, operate and maintain the electricity supply system in accordance with the National Electricity Rules (the Rules). In addition, there are local requirements that we need to comply with under the terms of our licences issued by the Tasmanian Economic

Regulator under the Tasmanian Electricity Supply Industry Act 1995. We are also subject to a number of industry-specific Tasmanian Acts and Regulations including (without limitation):

- The Tasmanian Electricity Code (the Code);
- Electricity Industry Safety and Administration Act 1997;
- Electricity Companies Act 1997;
- Electricity Wayleaves and Easements Act 2000;
- Electricity Ombudsman Act 1998; and
- Electricity Supply Industry (Network Planning Requirements) Regulations 2007.

The AER is responsible for the regulation of electricity transmission and distribution services in the NEM. This includes responsibility for determining the maximum allowable revenue for regulated electricity network service providers.

3.8 Revenue Determinations

The revenue we earn from providing monopoly transmission and distribution services is set by the AER. The merger of the distribution and transmission networks businesses to create TasNetworks provided us an opportunity of also 'merging' the respective regulatory determination processes for both networks. We have worked with the AER to align the transmission and distribution determination processes for the current 2019-24 regulatory control period. The outcome of merging the determination processes is to reduce costs through combined planning, contribute to our strategic objective of 'our business' and allow us to engage meaningfully with our customers on all network services offered by TasNetworks.

TasNetworks is presently preparing its Combined Proposal for the 2024-29 (R24) regulatory control period, and has recently released the Draft Plan for customer and stakeholder feedback. The Draft Plan demonstrates our proposed approach to delivering affordable and reliable services while embracing the technology transition re-shaping our industry. Our goal for R24 is to develop a Combined Proposal that delivers outcomes our customers and stakeholders value and is capable of acceptance by the Australian Energy Regulator.

3.9 Integrated Investment Planning

Asset strategy management and asset planning considers all customer and other stakeholder requirements and determines appropriate solutions to ensure that the performance of the transmission and distribution system is maintained. The outcome of this activity is operational and capital works plans. To allow effective integration and conduct of its works plans, TasNetworks must develop an overall works plan, encompassing all projects and their impacts on the network and non-network assets.

The capital plan is a combination of area strategies and asset management plans for the various asset classes. These plans are conflated to develop an integrated investment plan. This ensures that opportunities are identified to minimise expenditure, for example:

- Asset renewals and maintenance at sites affected by augmentations are coordinated to minimise outages and rework;
- Maintenance is deferred or minimised for assets that are to be replaced by augmented assets; and
- Renewal and development expenditure project contracts are bundled to achieve economies of scale.

3.9.1 Investment Evaluation

TasNetworks has developed end-to-end process guidelines that specify the steps that need to be undertaken and key considerations during the investment evaluation of projects involving network assets. These guidelines provide assistance to personnel involved in the justification of investment projects by:

- Identifying the various types of projects;
- Specifying the need for each of these steps;
- Providing guidelines as to how these steps are to be implemented;
- Identifying the inputs and outputs to various steps of project justification; and
- Linking various systems, processes and tools, to provide a consistent basis for project justifications.

3.9.2 Gated Investment Framework

TasNetworks maintains a gated investment framework that outlines the governance structures guiding the evaluation and determination of capital investment decisions.

The framework demonstrates that TasNetworks has in place and applies the required technical, managerial and financial governance processes to ensure:

- Investments meet mandated legal and regulatory obligations in a cost-effective manner and comply with the specific capital expenditure objectives and criteria stipulated in the NER;
- Investments are aligned with justified development plans and strategies, provide a reliable electricity network service, add capacity efficiently to meet forecast load growth and cater for new connections to the transmission and distribution networks;
- Investments are aligned to asset management plans; and
- Capital expenditure is prudent and results from a demonstrably prudent and efficient asset investment and management governance framework.

3.9.3 Timing and Deliverability of Works Program

TasNetworks optimises its proposed works program in terms of capital and operating tasks. In particular, the optimisation of the timing and sequencing of asset renewal projects takes into account a number of factors, including the costs and benefits of aligning asset renewal with augmentation or connection projects or with maintenance activities. In particular, optimisation is undertaken to:

- Achieve sustainable shareholder returns and customer prices;
- Ensure the achievement of corporate objectives;
- Maintain performance;
- Provide acceptable risk profile across all assets; and
- Ensure efficient delivery of the works program.

Optimisation is also undertaken across the entire asset base, both network and non-network. Timely delivery of the capital works program is essential to minimise the likelihood of additional operating expenditure to sustain assets beyond their expected service lives where run-to-failure is not employed.

3.9.4 Investment Funding Requirements

The actual and forecast integrated investment funding requirements by investment type, for managing the transmission system are as shown in Figure 8. The forecast beyond the upcoming regulatory period is a part-optimised forecast based on the economic end of life of the transmission

assets. It is aimed to show the challenge of longer-term transmission investment peakiness resulting from past installation timings of our network assets. Note that the full optimisation of our Program of Work does not occur until we forecast our Regulatory Proposal for the upcoming period. The investment bow-wave shown reflects the level of in-service assets that continue to be successfully managed beyond their economic end of life.

Figure 8 Transmission funding requirements

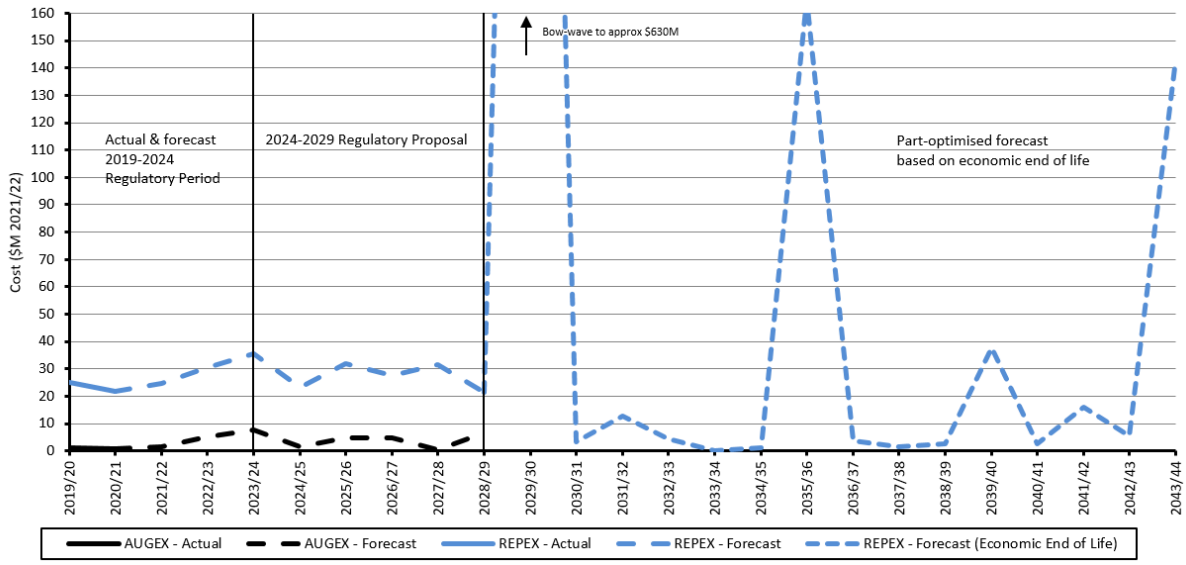


Figure 8 shows that over the past two years TasNetworks has been containing its total actual transmission investment and that TasNetworks aims to continue this by developing our transmission (and distribution) forecasts for 2024-2029 with three key considerations in mind:

- minimising upward pressure on customer pricing by keeping the level of forecast capex as low as sustainably possible;
- managing safety and risk; and
- maintaining reliability for customers.

The actual and forecast integrated investment funding requirements, for managing the distribution system are as shown in Figure 9 by investment type. The forecast beyond the upcoming regulatory period is a non-optimised forecast based on the economic end of life of the individual distribution assets. As such, it is a step above the optimised investment levels shown in the actual and forecast for the current and next regulatory period, however it is aimed to reveal the profile of longer-term distribution investment resulting from past installation timings of our network assets. Like transmission, the full optimisation of our Program of Work does not occur until we forecast our Regulatory Proposal for the upcoming period. The investment bow-wave shown reflects the level of in-service assets that continue to be successfully managed beyond their economic end of life.

Figure 9 Distribution funding requirements

Figure 9 shows that over the previous two years TasNetworks has increased its actual distribution spend to manage unacceptable safety risks (eg. bushfire mitigation) that we became aware of. However, we are forecasting a reduction to our distribution investment over the remainder of the present 2019-2024 regulatory period. The forecast distribution investment over the 2024-29 regulatory control period is forecast to be lower than that of the present 2019-2024 period to ensure costs are contained for our customers.

3.9.5 Key Forecasts

Table 1 below illustrates our key forecasts from 2022-23 through to 2025-26[2].

Table 1 TasNetworks forecasts 2022-23 through to 2025-26

Performance Measure	Forecast 2022-23	Forecast 2023-24	Forecast 2024-25	Forecast 2025-26
Total revenue ($m)	486.6	512.2	535.4	561.8
Earnings before interest, Tax, Depreciation and Amortisation (EBITDA) ($m)	295.0	332.0	350.5	367.0
Profit after tax ($m)	21.5	42.1	85.2	38.5
Dividend (at 90% payout ratio)($m)	14.2	8.5	25.5	25.6
Returns to government including dividends, tax equivalents and guarantee fee ($m)	53.9	47.8	69.8	117.7
Operating expenditure ($m)	191.7	180.2	184.9	194.8
Capital expenditure ($m)	286.2	386.7	730.8	500.5
Total equity ($m)	1,226.3	1,309.6	1,369.1	1,446.4
Total assets ($m)	4,052.8	4,324.0	4,763.3	5,146.2
Total debt ($m)	2,229.9	2,390.9	2,679.1	3,062.9
Key Financial Ratios				
Return on assets (%)	2.7	3.2	3.2	2.9
Return on equity (%)	1.8	3.3	6.4	2.7
Gearing ratio (%)	64.5	64.6	66.2	67.9
Pre-tax interest cover (x)	1.42	1.80	2.46	1.61
Borrowings ($m)	2,236.4	2,397.3	2,685.6	3,069.3
Increase (decrease) in borrowings ($m)	146.6	160.9	288.3	383.7

3.9.6 Financial Forecast Summary

The financial forecasts, and associated key issues, show that:

- Our profit after tax will be overall increasing over the forecast period;
- Our total returns to government are overall increasing over the forecast period. Returns to Government are based on the dividend payout ratio over the planning period in line with Treasury's dividend policy – ie. presently 90 per cent;
- Underlying operating cash flows (EBITDA) are increasing over the forecast period, reflecting our continued focus on achieving sustainable cost reductions;
- Debt levels are forecast to peak at approx $3.0 billion during the forecast period. In the short term we are forecasting to borrow to fund the business' capital structure and meet our capital investment requirements; and
- Despite the additional debt, and associated borrowing costs, TasNetworks' key financial indicators (including gearing ratio) remain robust.

[2] From TasNetworks Corporate Plan March 2022

3.10 Asset Management Information System

3.10.1 Introduction

The TasNetworks Asset Management Information System (AMIS) is a combination of people, processes, information and technology applied to provide the essential outputs for effective asset management. These outputs include: managed risk, enhanced network performance, enhanced compliance, effective knowledge management, effective resource utilisation and optimum infrastructure investment.

AMIS is a tool that interlinks asset management processes through the entire network asset life-cycle (see Figure).

3.10.2 AMIS Objectives

The key objectives of the AMIS are to assist the business in sustaining and improving overall performance of the transmission and distribution networks, so that the organisational and AM objectives are achieved, by undertaking the following activities:

- Ensuring holistic asset information is collected, maintained and readily accessible to support evidence-based asset management decision making;
- Enhancing the visibility of, accessibility to and trust in asset information across the business; and
- Developing effective AMIS improvement practices that support the life cycle asset management business functions in accordance with ISO55000:2014 and the IIM manual[3] 2015.

Successfully achieving these objectives will enable compliance with the requirements of the Corporate Plan and Asset Management Policy by significantly improving the quality, completeness, integrity and consistency of asset information, systems and processes at all levels. Improvement activities to the AMIS are contained within the Asset Management Improvement Program, see section 11.8.

3.11 Cyber Security

TasNetworks is facing an increasing investment requirement in Information and Communications Technology (ICT) with respect to increasing risks associated with Cyber Security. The most significant factor driving this change is the recent critical infrastructure reforms and update to the Security of Critical Infrastructure Act 2018. This update was implemented to uplift the security and resilience of critical infrastructure owned by electricity networks and other entities across Australia, with a focus on addressing the heightened cyber threat environment globally, and the increased risk of cyber-attacks on Australian networks.

TasNetworks applies the AEMO's recommended Australian Energy Sector Cyber Security Framework and we are uplifting our capability to align with AEMO's target state specified for NSPs (Security Profile 3). We will continue to implement initiatives to increase our vigilance, reduce the risk of cyber-attack and ensure the ongoing availability and reliability of our networks. This expenditure is important in ensuring the ongoing resilience of our networks.

[3] International Infrastructure Management Manual, Version 4.0, 2015

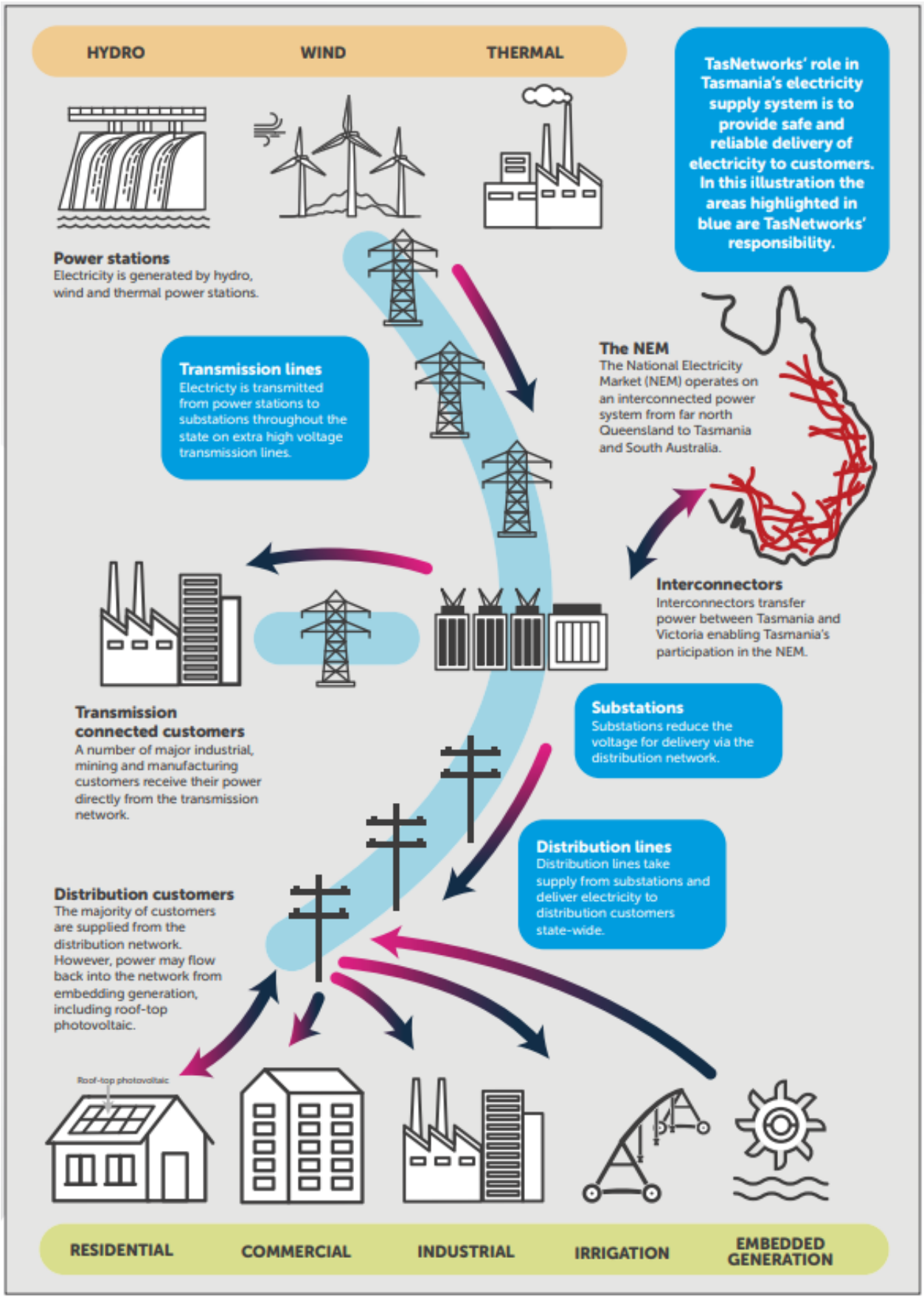
4. The Tasmanian Power System

The Tasmanian power system comprises:

- Power stations and wind farms that generate large-scale electricity;
- An extra-high-voltage transmission network that transmits electricity from generators to the distribution network and large industrial and mining customers, and permits electricity exchange with mainland Australia through Basslink;
- A distribution network that supplies industrial, commercial, irrigation and residential electricity customers;
- Embedded generation, which is small-scale generation connected typically by customers, within the distribution network;
- Retailers that provide energy services to customers; and
- End use consumers of electricity.

The Tasmanian power system is shown pictorially in Figure 10, and our area of responsibility within the power system is as highlighted in blue.

Figure 10 Tasmania's power system



4.1 Transmission Network

4.1.1 Transmission network overview

We are responsible for transmission network services on mainland Tasmania, and this is provided through the Tasmanian transmission network.

The Tasmanian transmission network comprises:

- a 220 kV, and some parallel 110 kV, bulk transmission network that provides corridors for transferring power from several major generation centres to major load centres and Basslink;
- a peripheral 110 kV transmission network that connects smaller load centres and generators to the bulk transmission network; and
- substations that form interconnections within the 110 kV and 220 kV transmission network and provide transmission connection points for the distribution network and transmission connected customers.

Most loads are concentrated in the north and south-east of the state. Bulk 220 kV supply points are located at Burnie and Sheffield (supplying the north-west), George Town, Hadspen (supplying Launceston and the north-east), and Chapel Street and Lindisfarne (supplying Hobart and the south-east) substations. Smaller load centres are supplied via the 110 kV peripheral transmission network.

Substations in the Tasmanian transmission network transform voltages between transmission voltages, between transmission and distribution voltages, or both. Our substations also connect generators to the transmission network, provide network switching, and provide supply to those customers connected directly to the transmission network. Connection points between our transmission and distribution networks are provided at 43 substations. These are known as terminal substations and supply the distribution network at 44, 33, 22, 11 and 6.6 kV. Switching stations provide network switching capabilities, allowing the transfer of power throughout the transmission network. Some switching stations also connect generation to the network.

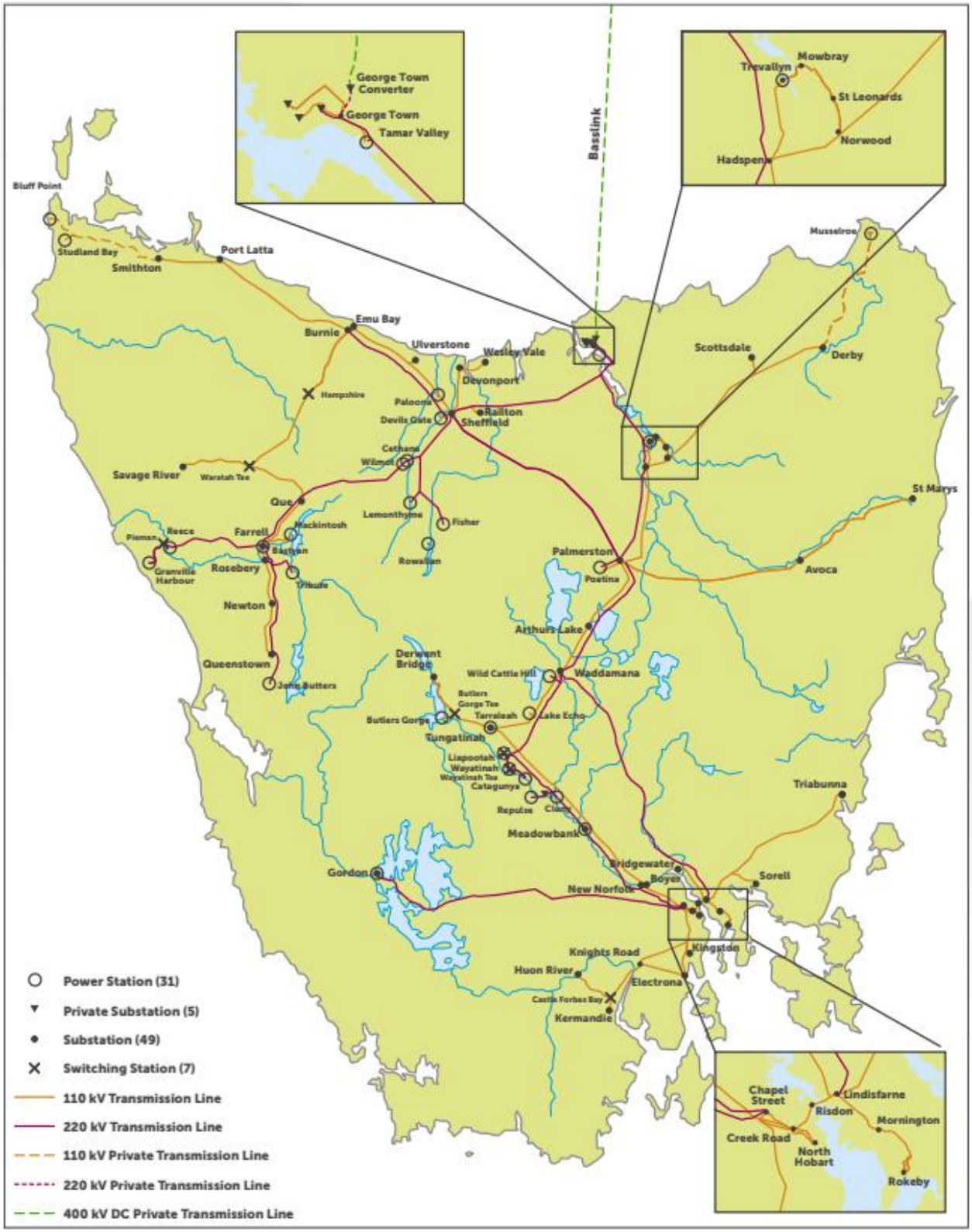
Table 2 provides a summary of key parameters of our transmission network infrastructure.

Table 2 Transmission network infrastructure

Asset	Quantity
Substations	49
Switching stations	8
Circuit kilometres of transmission lines	3,326
Route kilometres of transmission lines	2,316
Circuit kilometres of transmission cable	24
Transmission line support structures (towers and poles)	7,700
Easement area (Ha)	11,176

Figure 11 presents the geographical layout of the Tasmanian transmission network.

Figure 11 Tasmania's electricity transmission network



4.1.2 Generation customers

There are currently seven companies which have power generation stations connected to the Tasmanian transmission network:

- AETV Pty Ltd[4];
- Granville Harbour Operations Pty Ltd;
- Hydro Electric Corporation (**Hydro Tasmania**);
- Musselroe Wind Farm Pty Ltd;
- Wild Cattle Hill Pty Ltd;
- Woolnorth Bluff Point Wind Farm Pty Ltd; and
- Woolnorth Studland Bay Wind Farm Pty Ltd.

Mainland generators also supply energy to the Tasmanian transmission network via Basslink. A number of other small generators that are connected within the distribution network, termed embedded generation, are also licensed to operate in Tasmania. Very small embedded generation, such as roof-top photovoltaic systems, do not require a generating licence but must still have a connection agreement with TasNetworks.

All large generators sell electricity to a central national electricity market: the NEM. AEMO is responsible for electricity consumption and flow in the NEM and coordinates the dispatch of generators so that the power supplied into the network, at any instant, matches the total being consumed. The interconnected nature of the NEM allows electricity to flow across state borders, which means electricity can be sourced from whichever generators can supply it at the lowest cost. AEMO is also responsible for power system security in the NEM.

4.2 Basslink

Basslink is a 400kV High Voltage Direct Current (**HVDC**) electrical interconnector between Victoria and Tasmania. Basslink became commercially active in the Australian electricity market on 28 April 2006. The Basslink Interconnector was the longest HVDC cable of its type in the world at time of construction, and is still one of the longest with the submarine cable section being 290km long.

Basslink connects the 500kV Victorian transmission network at Loy Yang Substation to the 220kV Tasmanian transmission network at George Town Substation. The total transmission length between the two substations is 374.7km.

The HVDC Interconnector consists of a monopole with metallic return with a continuous rating of 500MW. Due to the minimum hold on current characteristic of the thyristor based converters the interconnector has a minimum power flow threshold of 40 MW and the submarine cable requires a 2 minute de-ionisation time when reversing power flow. Basslink is also able to transfer frequency control ancillary services (**FCAS**) between the mainland and Tasmania.

On 20 October 2022, APA Group announced that it had reached completion of its purchase of Basslink.

[4] AETV Pty Ltd owns Tamar Valley Power Station and is a wholly-owned subsidiary of Hydro Tasmania.

Battery of the Nation

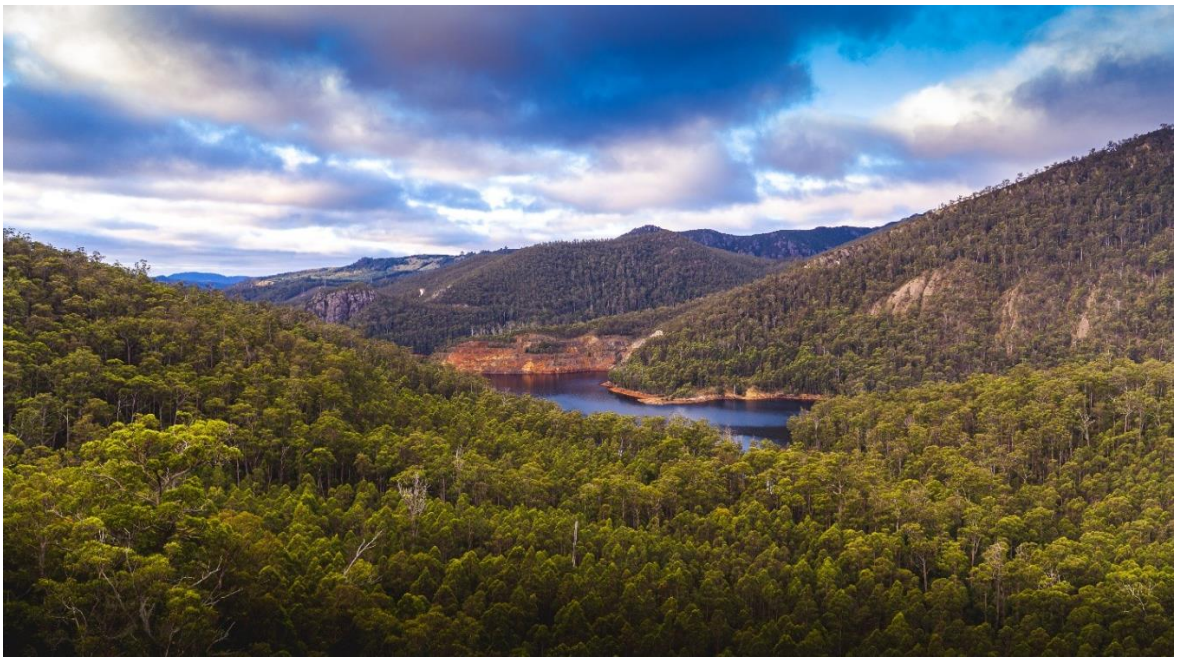
Much of Australia's power currently comes from coal-fired power stations that are likely to close in the next few decades. Wind and solar are becoming the dominant sources of new energy but they are variable. That simply means the sun doesn't always shine and the wind doesn't always blow. Energy storage will be crucial in the future, to help fill the gaps when wind and solar aren't available and ensure power is available when consumers need it.

The National Electricity Market will need a portfolio of varying storage technologies to manage grid reliability, stability and affordability as the market transitions over the coming decades. Tasmania stands ready to play a much greater role in delivering more clean, reliable and affordable energy to the National Electricity Market.

Tasmania has significant potential in the future development of wind and hydropower, coupled with more transmission and interconnection. It's anticipated these developments will drive billions of dollars in investment and create thousands of jobs in Tasmania, as well as delivering energy security for Tasmania and lowest possible power prices for Tasmanians.

Hydro Tasmania's *Battery of the Nation* initiative is about developing a pathway of future development opportunities in hydropower system expansion including the potential redevelopment of the Tarraleah hydropower scheme and a pumped hydro project at Lake Cethana.

The Australian Renewable Energy Agency (ARENA) has supported *Battery of the Nation* project studies with $5.0 million in funding as part of its Advancing Renewables Program.



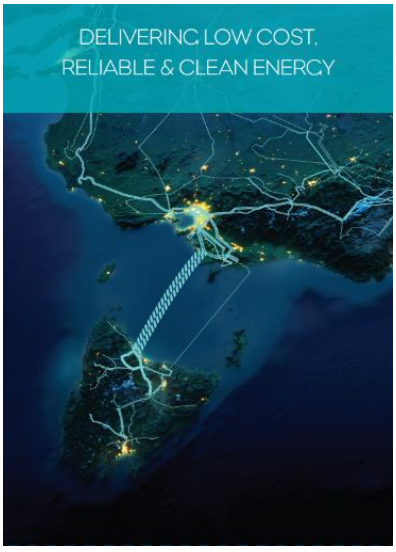
4.3 Marinus Link

Marinus Link is a proposed 1500 megawatt capacity undersea and underground electricity connection to further link Tasmania and Victoria as part of Australia's future electricity grid. The increased transmission capacity may be delivered in two 750 MW developments.

Marinus Link involves approximately 255 kilometres of undersea HVDC cable, approximately 90 kilometres of underground HVDC cable and converter stations in Tasmania and Victoria. Marinus Link will be supported by transmission network developments on the North West Tasmanian electricity network.

Marinus Link will predominantly export power from Tasmania to the mainland, however it will also be able to facilitate imports of energy into Tasmania to help facilitate hydrogen production and new renewable energy such as wind and solar. This project has now entered the design and approvals phase. On 19 October 2022, Marinus Link Pty Ltd welcomed the announcement of a historic agreement between the Australian, Tasmanian and Victorian Governments to fund and progress Marinus Link as a critical transmission project for the nation. The Australian Government funding is part of the $20 billion Rewiring the Nation plan to transform the country's electricity grid.

What are the Market Benefits?



- In addition to providing significant energy market benefits, the project also presents a valuable opportunity to stimulate employment, jobs and investment in local communities.
- Comprehensive cost-benefit and system modelling conducted for the project indicates that this project will create billions in economic growth, thousands of jobs, and be a source of skills development in Tasmania and regional Victoria.
- On its own, the project will provide a broader economic contribution to regional communities in Tasmania and Victoria estimated to be up to $2.9 billion, together with 2,800 jobs generated at peak construction.

What does the Market Operator say about Marinus Link?

AEMO's 2022 Integrated System Plan (ISP) outlines that Marinus Link should be delivered urgently for the benefit of all Australian energy consumers, delivering much-needed clean energy for the national grid. Importantly, the ISP outlines that clean energy generators (like wind farms) in Tasmania can produce energy more efficiently than other parts of the country, resulting in cheaper production and downward pressure on prices for consumers.

Critically, the ISP also recognises the benefit that Marinus Link will provide in providing increased security and reliability for the national grid.

4.4 Distribution Network

4.4.1 Distribution network overview

We are responsible for delivering electricity to homes and businesses on mainland Tasmania and Bruny Island.[5]

The Tasmanian distribution network provides supply to over 295,000 customers and comprises:

- a sub-transmission network in the greater Hobart area, including Kingston, and one sub-transmission line on the west coast that, in addition to transmission-distribution connection points, provide supply to the high-voltage distribution network;
- a high voltage network of distribution feeders[6] that distribute electricity from transmission-distribution connection points and zone substations to the low voltage network and a small number of customers connected directly to the high voltage network; and
- distribution substations and low voltage feeders providing supply to most customers in Tasmania.

Distribution feeders are classified as supplying rural and urban areas, and these tend to have the following differing characteristics:

- Rural areas generally have low load, low customer connection density, and smaller rural population centres remote from supply points. Distribution feeders supplying rural areas tend to cover wide geographic areas and can have a total route length between 50 km and 500 km. This significant route length creates a high exposure to external influences such as storm damage, trees and branches, and lightning. Additionally, rural feeders are generally radial in nature, with limited ability to interconnect with nearby feeders. These characteristics tend to result in more frequent and longer duration supply interruptions. The majority of feeders supplying rural areas are operated at 22 kV. Rural areas supplied at 11 kV are generally those on the outer areas surrounding greater Hobart, Kingston and the Huon.
- Urban areas have higher load and customer connection density. Distribution feeders supplying urban areas are generally much shorter than rural feeders. They tend to have more underground distribution and more interconnections with other urban feeders. Consequently, restoration following interruptions to supply is usually quicker than in rural areas. Feeders supplying urban areas of greater Hobart, Kingston and a pocket of the Burnie commercial area, are operated at 11 kV. Those in Launceston, Devonport and Burnie are operated at 22 kV.

Table 3 provides a summary of key parameters of our distribution network infrastructure.

[5] The provision of electricity supplies on the Bass Strait Islands is managed by Hydro Tasmania.
[6] The term 'feeder' is the common name used to describe distribution lines.

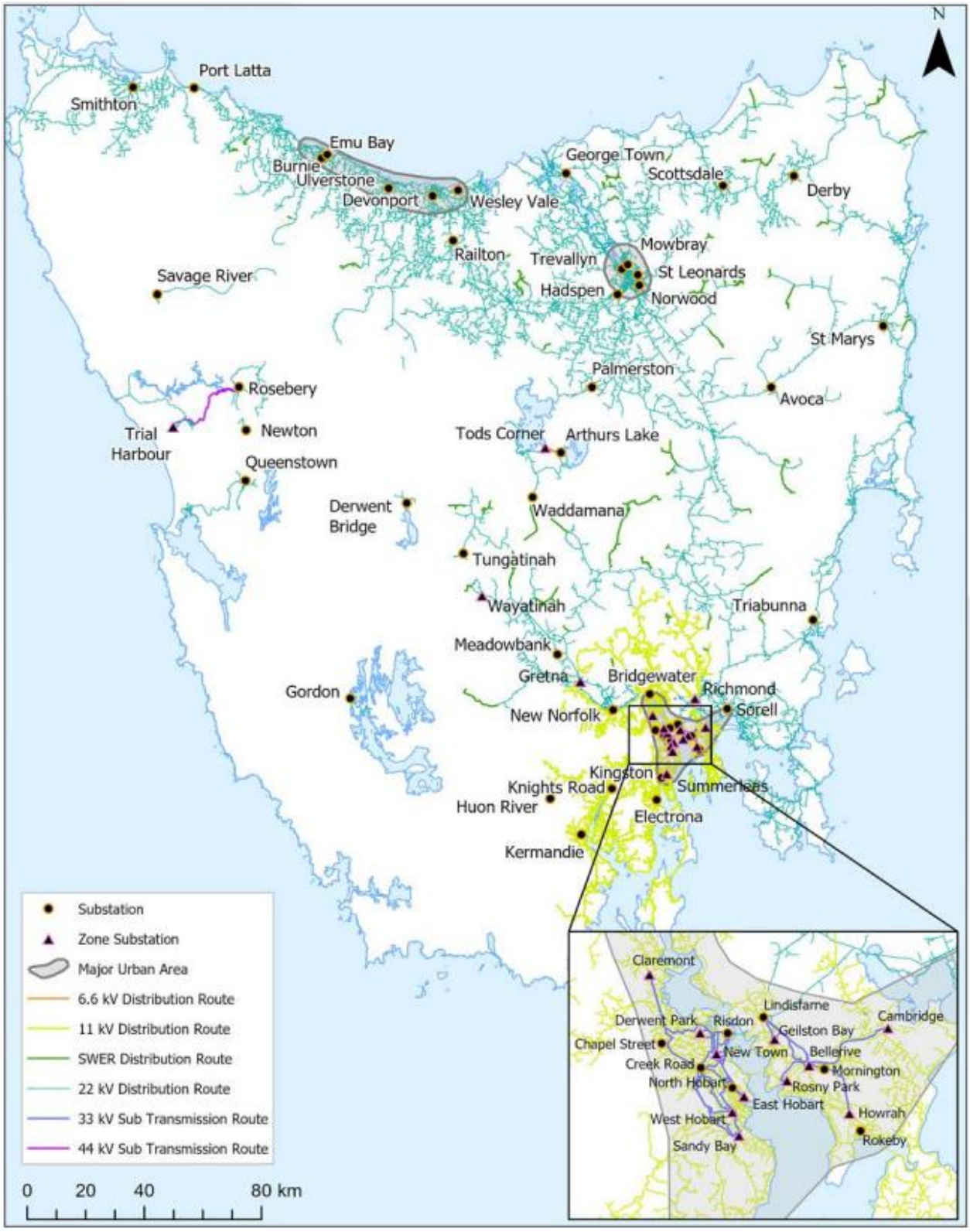
Table 3 Distribution network infrastructure

Infrastructure	Nominal Voltage (kV)	Quantity
Connection Points		
Sites	44, 33, 22, 11 and 6.6	46
Sub-transmission feeders	44, 33 and 22	27
Minor zone source feeders[7]	22 and 11	6
Distribution feeders	22, 11 and 6.6	247
Zone substations		
Major zone substations	44, 33 and 22	13
Major zone distribution feeders	22 and 11	131
Minor zone substations	22 and 11	3
Minor zone distribution feeders	22 and 11	8
Distribution substations		
Overhead		29,896
Ground-mounted		2,078
Route data[8]		
High voltage overhead (km)	6.6 to 44	15,415
High voltage underground (km)	6.6 to 44	1,114
Low voltage overhead (km)[9]	0.4	4,562
Low voltage underground (km)	0.4	1,326
Poles	All voltages	231,643

Figure 12 presents a geographical overview of the high-voltage distribution network by voltage, supplying rural and urban areas.

[7] Includes minor zone alternate-supply feeders
[8] Includes TasNetworks owned assets only
[9] Excludes customer service lines

Figure 12 Tasmania's electricity distribution network



4.5 Telecommunications Network

We also provide a telecommunications network service within Tasmania. The telecommunications network supports the operation of our electricity network interfacing protection, control and data, telephone handsets and mobile radio transceivers. It also serves customers in the electricity supply industry and is utilised by other parties under commercial agreements. The telecommunications

assets comprise: communications rooms and associated ancillary equipment within substations and administrative buildings, optical fibre on transmission and distribution lines, digital microwave radios and associated repeater stations, and some power line carrier equipment.

In support of our telecommunications network, a number of telecommunications circuits are provided via a third party network. This is generally outside our network's coverage area and includes all interstate services. Our subsidiary 42-24 also provides telecommunications, information technology and data centre services to customers. These are non-electricity services that are legally separated from our regulated distribution and transmission businesses.

4.6 How are We Different

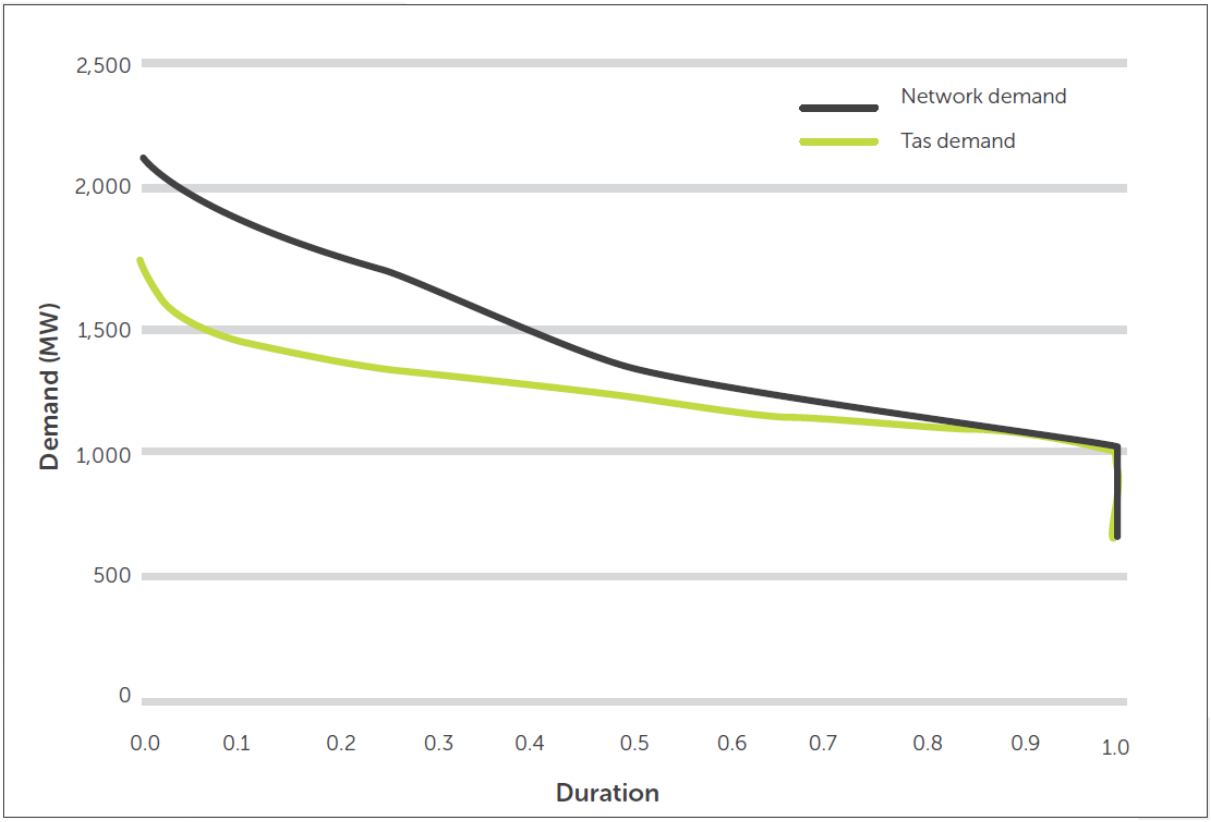
The Tasmanian electricity system has the following features which make it unique in the NEM.

4.6.1 Load characteristics

Our transmission network supplies electricity to Tasmanian customers, and to the rest of the National Electricity Market (NEM) via Basslink. Tasmania has a small load compared to other NEM regions. The median demand during 2021 was approximately 1,198 MW (up from 1,150 MW in 2020), and for 50 per cent of the time was between 1,100 and 1,300 MW.

The maximum demand on the transmission network during 2021 was 1,744 MW (up from 1721 MW in 2020) to supply Tasmanian customers only, and total network maximum demand of 2,199 MW (up from 2,107 MW in 2020) including power transfers across Basslink. Maximum demand in Tasmania occurs during winter, driven by heating load. Figure 13 presents the transmission network demand duration curves for supply to both Tasmanian customers only and total network demand.

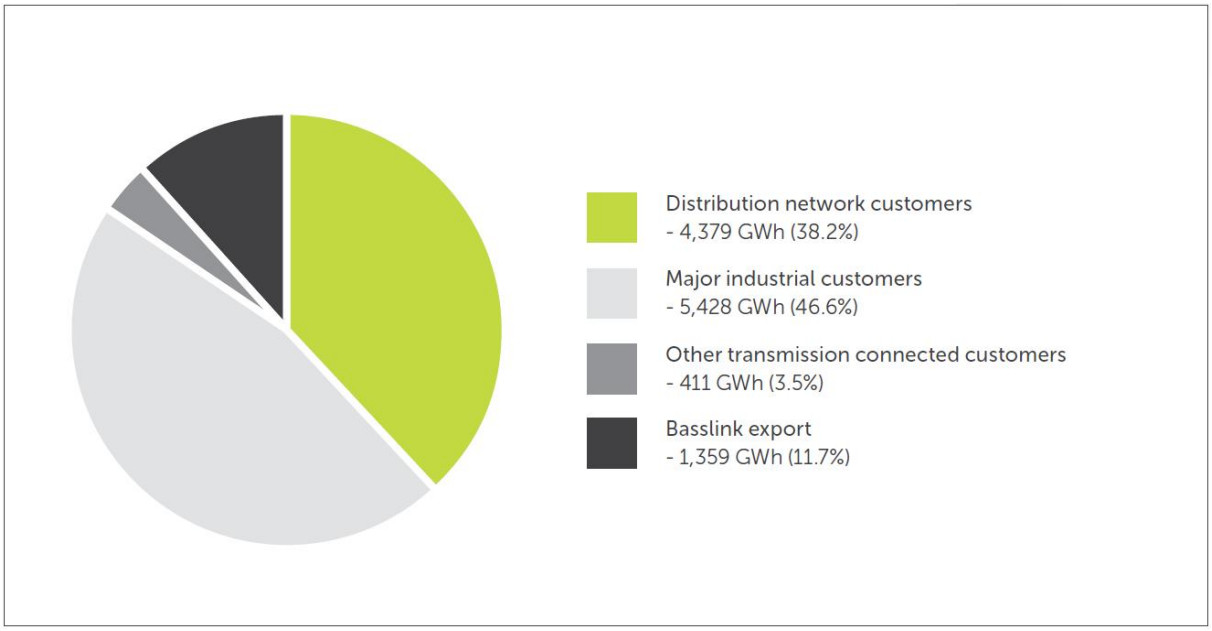
Figure 13 Transmission network demand duration curves 2021



4.6.2 Customer load base

A relatively high proportion of the energy flow through the Tasmanian network is used to supply 10 large customers directly connected to our transmission network. Collectively, transmission-connected customers (dominated by four major industrial energy users) used 50 per cent of the total energy flow delivered through the transmission network and contributed to 31 per cent of the total network maximum demand in 2021. This is 57 per cent and 40 per cent of the Tasmanian-customer energy and demand, respectively. Figure 14 presents the relative energy use in 2021 supplied from our transmission network.

Figure 14 Relative transmission network use in 2021



As major industrial and other transmission connected customers consume a significant portion of energy transferred through the transmission network, their operation can have a significant impact on the power system. Changes to the transmission-connected customer base, such as a permanent reduction in load, would alter the normal operation of the power system and impact on such things as power flow and utilisation of the transmission network. We continue to engage with our customers and be cognisant of their operations in our planning activities.

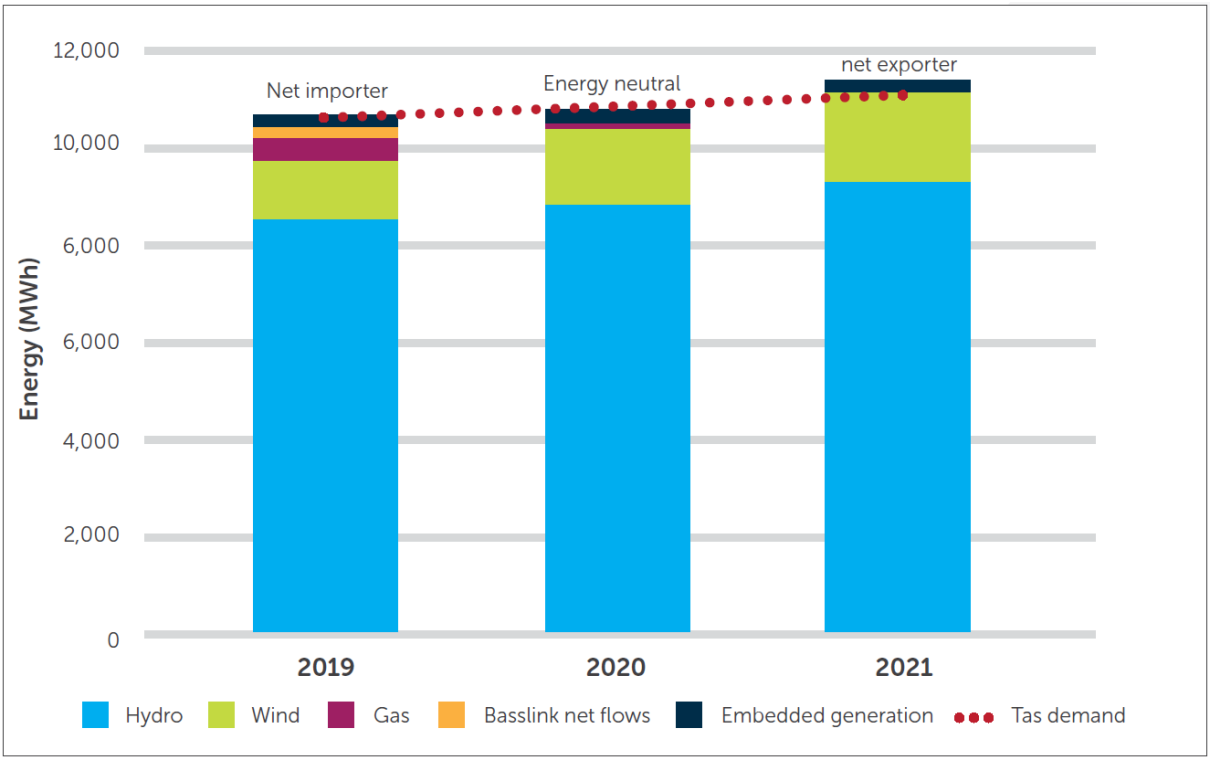
4.6.3 Hydro generation dominated

Power generation in Tasmania is dominated by hydro generating units, which are dispersed throughout the state. The dominance and geographic diversity of hydro generation has the following impacts:

- Hydro generating units are much slower to respond to frequency deviations than steam generating units, the dominant source of generation in the NEM. This compounds the frequency deviation impacts caused by the high generator size to system load ratio. Providing sufficient frequency control ancillary services (FCAS) can be problematic in Tasmania;
- The geographic dispersion of a large number of smaller sized generating units means that relatively more transmission infrastructure, per MW generated, is required compared with other states; and
- Tasmania's electricity network has traditionally been energy constrained not capacity constrained. That is, there is always sufficient generation capacity available to meet short term load peaks, but sustained low rainfall can give rise to difficulties in meeting the state's long-term electric energy needs.

Figure 15 shows the relative contribution of generator types located in Tasmania, and net BassLink flows.

Figure 15 Supply contribution by type: 2019 to 2021

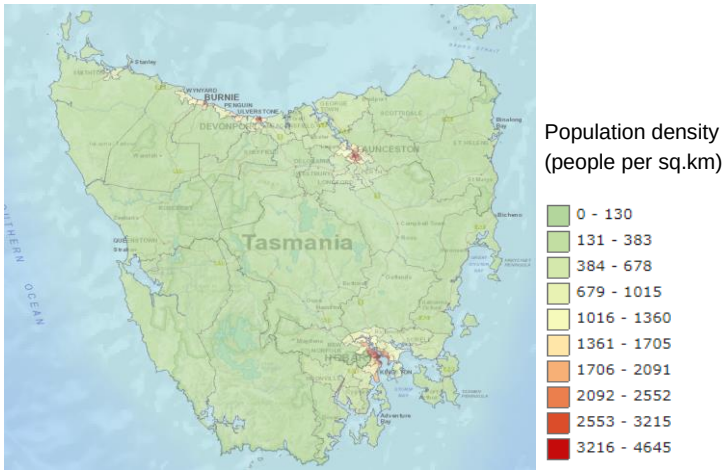


4.6.4 Windy location

Tasmania is an inherently windy state, being located in the Roaring Forties latitudes. Whilst wind farm generation in the state has grown significantly, there remains sufficient world-class wind resources for significant expansion of wind generation in the state. This needs to be balanced however against the technical issues associated with integrating wind generators into a small power system with the characteristics described above. These technical issues are entirely manageable through careful planning with wind-farm proponents.

4.6.5 Population

Tasmania has a total area of ~68,000 square kms, with a Population of ~ 570,000 people. The population density of Tasmania is concentrated in three main areas, around the cities of Hobart, Launceston and Devonport/Burnie. The capital city Hobart has a population density of 124 people per square kilometre, the second least populated capital city in Australia (Melbourne is 1,500 per square km).



4.6.6 Single non-regulated interconnector to other NEM regions

Tasmania's only connection to the remainder of the NEM is via Basslink, a privately owned HVDC market network service provider. This contrasts with mainland NEM regions, which are all interconnected via regulated interconnectors. Further details of Basslink are provided in Section 4.2. Marinus Link proposes greater interconnection between Tasmania and the mainland NEM and is discussed in Section 4.3.

4.6.7 Single regulated transmission and distribution network service provider

TasNetworks is the only provider of transmission and distribution network services in the state, as outlined in section 1.4. This integrated level of service provision is unique in the NEM.

4.6.8 Unique transmission classification

TasNetworks operates a relatively lower voltage transmission network compared to other TNSPs. Generally, mainland Australian TNSPs have network with voltage class at 132kV and above (some up to 500kV), however TasNetworks transmission overhead network classification is 110kV and 220kV. TasNetworks transmission substation asset voltages range from as low as 6.6kV through to 220kV.

Due to Tasmania's low population (refer section 4.6.5) and high number of dispersed hydro-electric power stations, TasNetworks has the lowest connection density (end user per circuit km) of all transmission NSPs in Australia. This is slowly starting to change on mainland Australia as large coal-thermal power stations begin to retire and are replaced with smaller dispersed renewable wind and solar power farms.

4.6.9 Private overhead powerline assets

TasNetworks is instructed by our shareholder, the state of Tasmania, to undertake inspections of private overhead powerline assets across the state. TasNetworks current annual expenditure on inspection and testing of private overhead powerlines is approx. $0.5M and involves approx. 65,000 private power poles.

5. Organisational Roles and Responsibilities

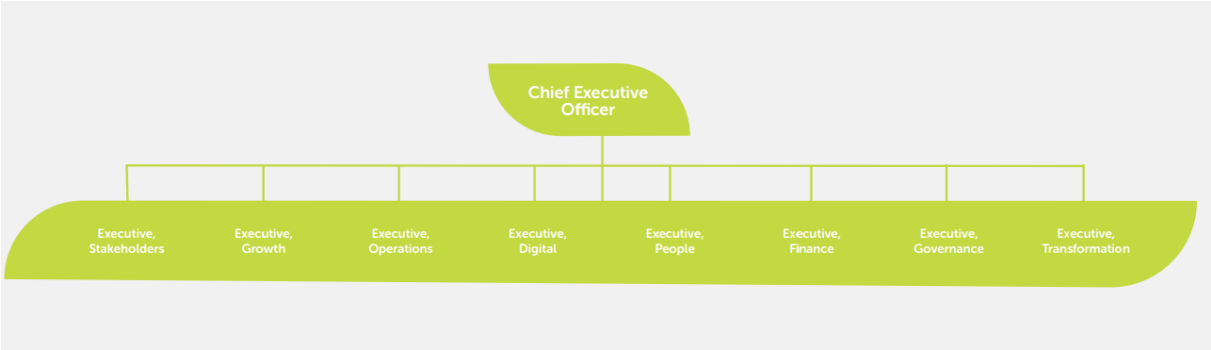
5.1 Overview

Chapter 5 discusses the organisational management structure and their roles and responsibilities.

5.2 Organisational Structure

Figure 16 shows the organisational management structure of TasNetworks.

Figure 16 Management structure



The organisational structure of TasNetworks is based around eight groups, with their responsibilities being as follows:

Governance

The Governance Group comprises Legal Services and Company Secretariat, Audit Risk and Compliance together with Information Management teams. The group is responsible for legal, governance, audit, risk and compliance support and advice to the Board, Chief Executive Officer and the business, as well as managing TasNetworks' information assets and providing guidance to all areas of the business relating to information management. The Group aims to provide trusted advice to the business to support the achievement of the business' strategic objectives.

Digital

The Digital Group aims to provide solutions that improve performance, utilising secure, reliable and innovative technology. The group is responsible for cyber security; information technology; operational technology; and telecommunications services.

Transformation

The Transformation Group was formed to assess, prioritise and implement the recommendations provided by the external Strategic Review commissioned by TasNetworks in late 2021. It is responsible for ensuring that TasNetworks has the organisational structures, processes, and tools necessary to maximise operational efficiency and deliver on the business' core mission, while also preparing TasNetworks to effectively meet future challenges and opportunities.

Stakeholders

Stakeholder is responsible for Regulation, Revenue Reset, Customer Experience, Government Relations & Communications, Corporate Social Responsibility, Land Access & Acquisitions, & Community Engagement. The Stakeholder group aims to lead genuine engagement with stakeholders ensuring they have a voice so that the business can deliver value to our customers.

Growth

The Growth team manages TasNetworks' subsidiary businesses 42-24 and TasNet Connections. 42-24 is a provider of telecommunications, information technology and data centre services. TasNet connections provides unregulated connections services and other transmission network development services. The Growth team also manages the delivery of major transmission projects, including the North West Transmission Developments (NWTD) that support Project Marinus and other strategic transmission projects.

Operations

The Operations Group provides the full end to end value chain for the delivery of TasNetworks services. This includes interactions with customers, engineering, planning and design, works delivery, field operations and network operations and planning.

People

People are responsible for safety, wellbeing and environment; people and organisational development; people partnering (including performance management systems and industrial relations), recruitment, operational and technical capability (registered training organisation).

Finance

Finance's role is to enable TasNetworks' sustained financial performance by delivering independent financial advice, and governance and analysis; and by directing financial strategies, capital structure development and debt portfolio management. Integrated supply chain functions include category management, procurement, and material management to support delivery of key commercial objectives across the value chain. Finance is also responsible for the effective management of transactional business services and TasNetworks fleet vehicles and facilities.

6. Leadership and Culture

6.1 Overview

TasNetworks is seeking to better understand our future capability requirements as we transition towards a customer-led business model. To facilitate ongoing change, we are investing in the development of our leaders at all levels as well as our culture and engagement. This chapter shows how we are building a high performance culture and high levels of employee engagement to support achievement of our business objectives and enable us to be sustainable. As leader behaviour is known to drive culture, we are investing in the development of our leaders at all levels to build self-awareness and leadership capability, focusing on communication, teamwork, business improvement and change.

The capacity of TasNetworks to implement the asset management strategy discussed in this document will rely on the continued leadership, commitment and involvement of TasNetworks management and staff. Leadership will form the major influence in the development and application of this strategy together with the strategic and operational continuous improvement plans.

To ensure success and a positive change in TasNetworks asset management practices, leadership will be paramount across the entire organisation. The CEO, the leadership team and all leaders aim to champion TasNetworks ongoing commitment to sustainable asset management in their actions and messages to staff, as well as effective mentoring.

To help guide our future workforce management we have developed a strategic workforce plan. Strategic workforce planning is the process by which a shared view is created on critical workforce segments, capabilities and gaps over the medium and long term, taking into account possible future scenarios. The strategic workforce plan does not replace existing workforce processes on an individual level, but provides evidence-based direction and input to key workforce and talent processes and programs. The strategic workforce plan helps us to answer the following workforce issues:

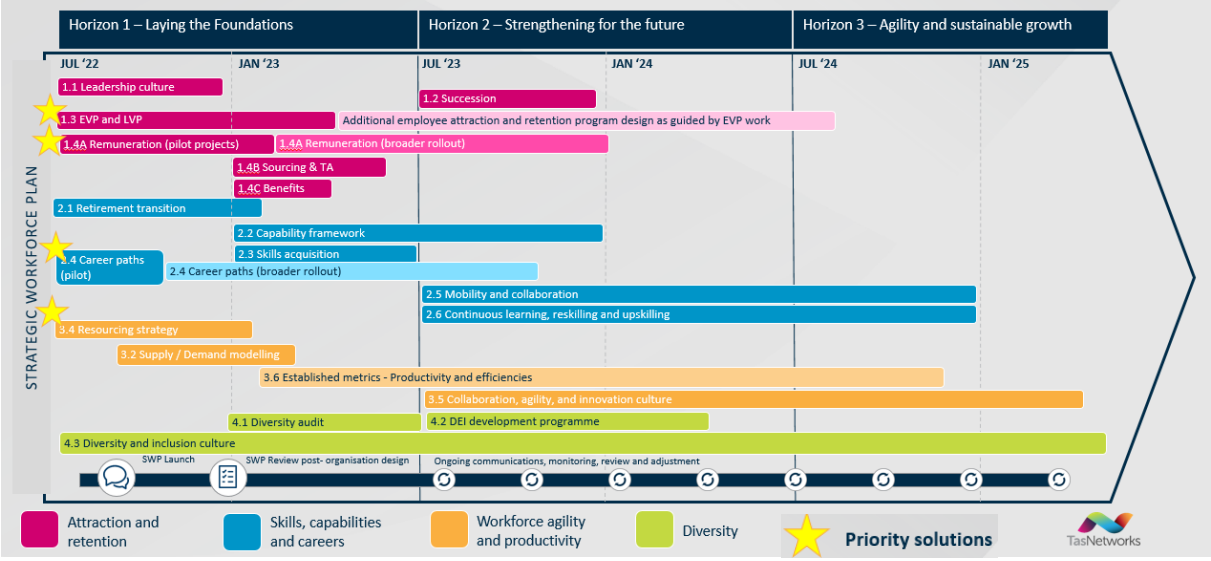
- Right proposition and deployment;
- Right capabilities; and
- Right time and right cost.

Figure 17 shows our strategic worforce plan is structured on the following four strategic categories:

Figure 17 Strategic workforce plan structure

The four strategic categories have been developed into the strategic workforce roadmap, as shown in Figure 18.

Figure 18 Strategic workforce roadmap



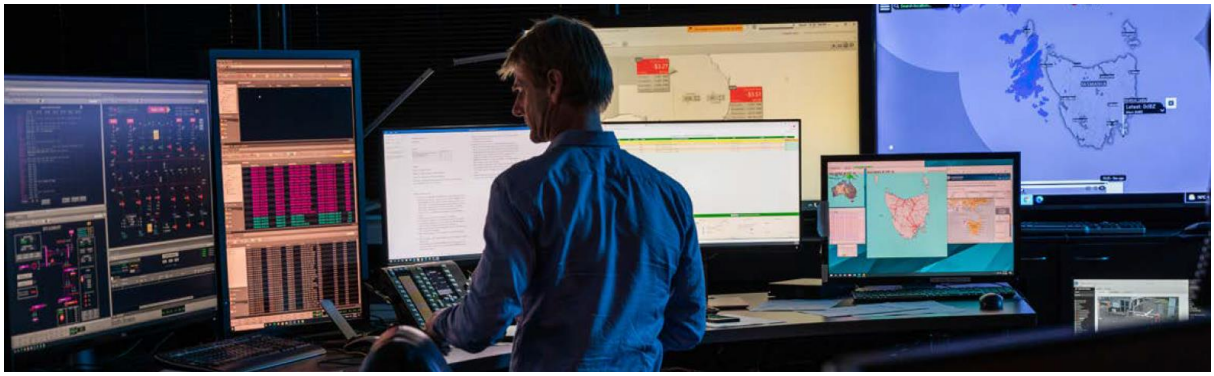
6.2 Training and Developing Our People

We offer leadership development through a number of programs and initiatives, including:

- Tasmanian Leaders Program;
- TasNetworks' Leadership Team development program (Levels 1 and 2);
- Switched on Leaders Program (Level 3 and experienced level 4 leaders);
- Empowering Leaders Program (Less experienced level 4 leaders and level 5);
- Team development workshops with discrete leadership teams; and
- Quarterly leader forums.

The workforce of the future program is a whole of business approach moving our business towards a constructive culture by investing in leadership programs, measuring culture and engagement and building capability throughout our business. Building capability that aligns with our external business environment, is a key foundation in creating competitive advantage.

We invest approximately $4 million per annum in training and developing our people across the whole business in a range of ways. Our Mornington Training Centre delivers a range of important development opportunities for our field based people, including safety and first aid training and live-line training. All of our people participate in achievement and development planning and the planned development program is implemented each year.



6.2.1 Culture Change

Culture goes to the heart of our organisations' make-up. It reveals what you're really asking of your people and how it affects their performance, motivation and job satisfaction – providing a foundation for successful, sustainable cultural change in a uncertain business environment.

We measure the impact of leadership development and associated culture change through a culture survey held typically biennially. The first survey was run in December 2014 using the Organisational Culture Inventory. The outcomes of the survey defined TasNetworks' initial culture, identified opportunities for improvement, and established a baseline to measure the impact of improvement activities.

The results from our latest survey in 2021 show that we are making good progress with all four constructive styles improved, and all eight aggressive and oppositional styles declining. Changing the culture of an organisation is not easy and progress is sometimes slow, however, our improvements to date demonstrate that we're on the right track with our employee engagement already well above the industry benchmark.

7. Risk Management

7.1 Overview

The effective management of risk is central to the core business and efficient management of TasNetworks. Our approach to risk management involves managing to achieve an appropriate balance between realising opportunities for gains while minimising adverse impacts. Risk management is an integral part of good management practice and an essential element of good corporate governance.

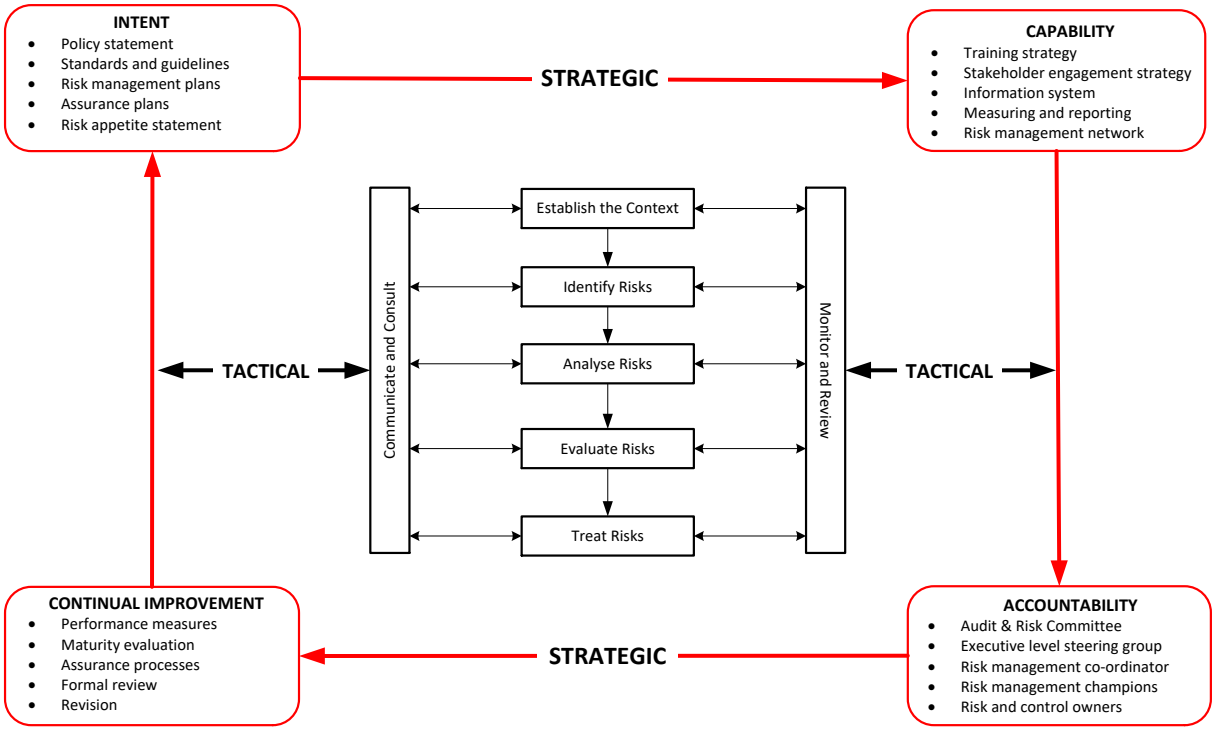
An integral part of how TasNetworks operates is the identification and treatment of risk, so all our stakeholders prosper. Our ability to deliver electricity and telecommunications network services and create value for our customers, owners and our community is significantly influenced by the effectiveness of our management of risk. We aim for risk management to become part of the culture, embedded into our operating philosophy, business practices and processes.

The Risk Management Policy is the overarching document that provides guidance on risk management practices. It is a high-level document that clearly establishes expectations in relation to risk management. The responsibilities, structures and processes established to ensure TasNetworks achieves its risk management objectives are detailed within the Risk Management Framework.

7.2 Risk Management Framework

The risk management framework sets out our management of the effects that uncertainty has on achieving our vision and strategic objectives. The framework also facilitates compliance with legislation, rules, codes, guidelines and various industry standards. Figure 19 shows the risk management framework with both its strategic and tactical (operational) components.

Figure 19 Risk management framework



7.3 Risk Management System

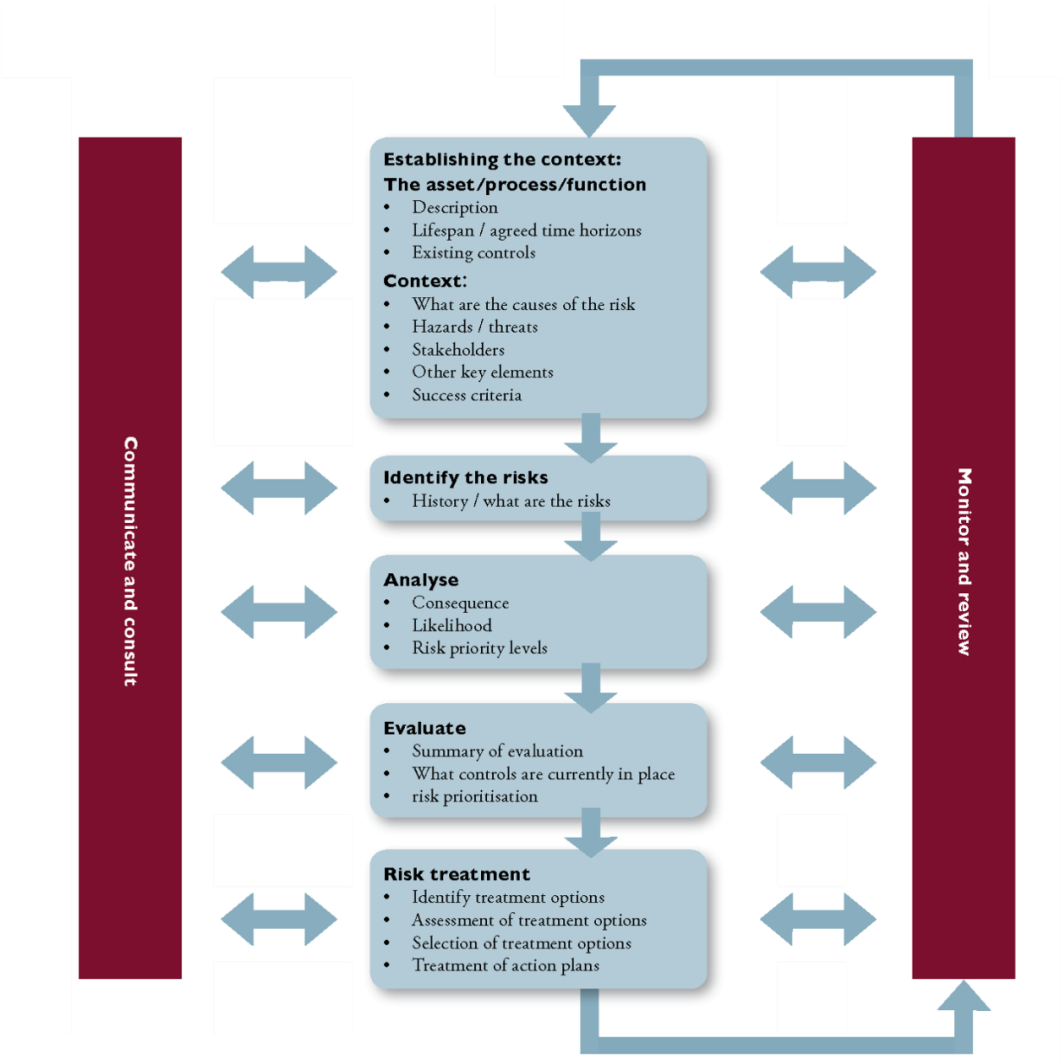
Our 'Governance Risk and Compliance' (GRC) system covers risk management processes and reporting across TasNetworks. The GRC module is an integrated application module of our SAP Enterprise Management System.

Further details of the SAP Enterprise Management System are provided in Section 9.6.14.

7.4 Operational Risk Management

In accordance with AS/NZS ISO31000:2018 Risk management – Principles and guidelines, Figure 20 shows the operational process undertaken by TasNetworks when managing risk.

Figure 20 Risk management operational process



7.5 Asset Condition and Risk

Some of our assets are older than those of our network peers, and a key focus for us is to manage the associated asset risk due to poor condition effectively to achieve our asset management service and cost performance objectives. With regard to asset condition and risk, we will continue to set service-based targets for assets within our AMPs to balance the risk of asset failure and the associated reliability impacts with cost.

Key assets are modelled within the health based risk management system (Copperleaf C55 suite of applications) enabling the assessment of asset health based on age and the assessed condition of

individual assets within the asset portfolios. This allows asset health to be integrated into our investment analysis and decision making consistent with the risk framework.

For the health based risk management system and our investment analysis to provide the best outcomes, it is essential to have the most accurate and complete asset data. This asset data must be carefully selected, well defined, visible and easily available to all users and with operability over the entire asset lifecycle. Continuously uplifting and maintaining asset data quality and completeness is a significant focus of our asset risk management process that enables our transition into more advanced condition based asset management.

We are continuing the implementation of processes for capturing, registering, assessing and tracking asset condition across a wider set of assets to better match our service performance with customer requirements.

Table 4 provides an overview as to which management techniques are applied by TasNetworks in managing the risks of each asset category in our asset base.

7.5.1 Asset defect management

Our Network Asset Defect Management Strategy defines the way asset defects are managed – from their initial identification all the way through to resolution and closeout, by providing role clarity, responsibility supported by a governance framework, standard operating procedures, good data hygiene, and reporting and monitoring over the health of the defects.

> ***Our definition of an asset defect is:***
>
> "something which is likely to result in asset failure, and consequently impact safety, system reliability or the environment, or impose unacceptable operational constraints on the network".

The Network Asset Defect Management Strategy has been developed to align with TasNetworks' Strategic Asset Management Plan and Asset Management Policy. It forms part of a suite of documentation that supports the achievement of TasNetworks' organisational strategic objectives and asset management objectives. Specifically for this strategy, the governance framework and standard operating procedures provide a consistent, risk based and well-defined approach to managing defects across all network assets.

Table 4 TasNetworks asset category management overview

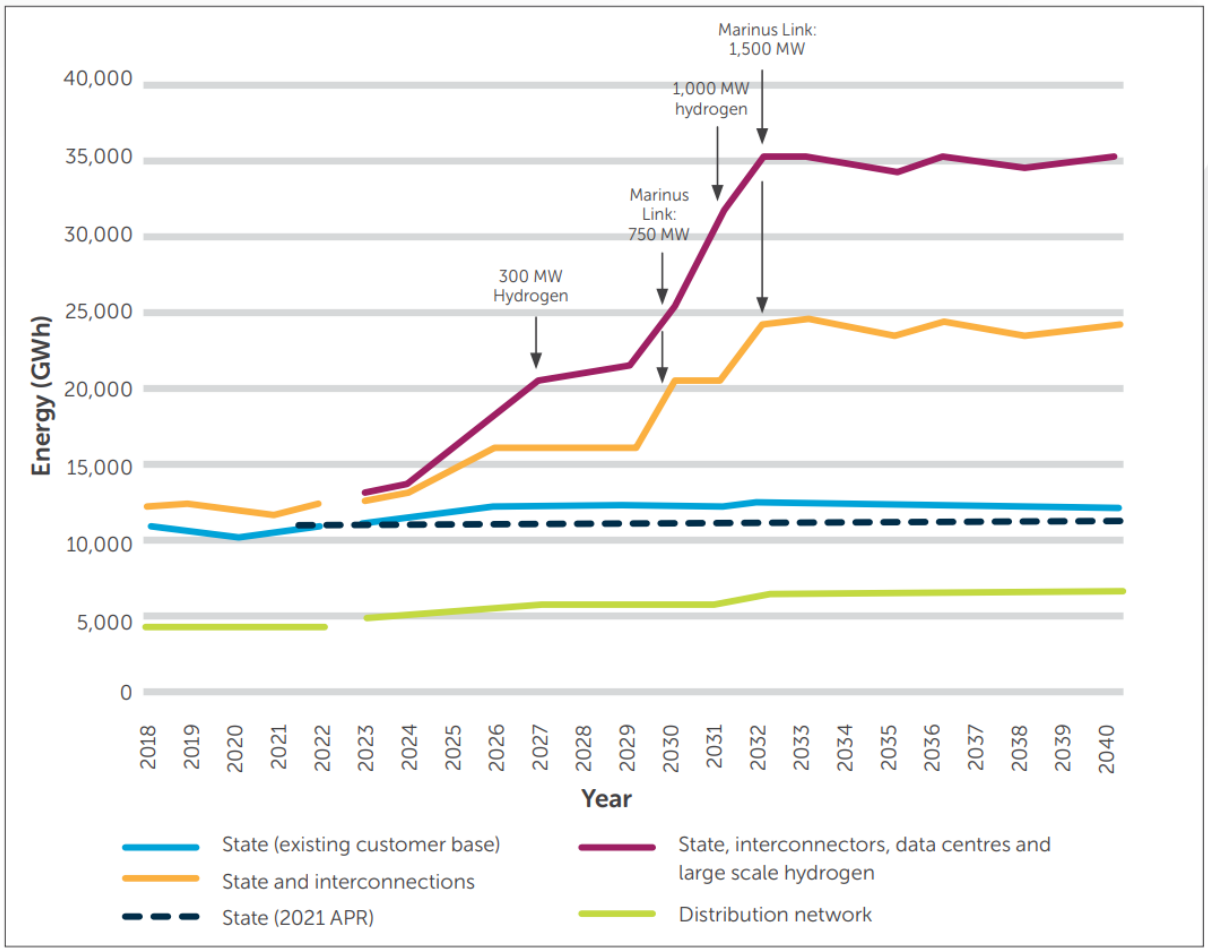
How are assets managed?														
Assets	Present						Future							
	Run to failure	Subject Matter Expert (SME)	Time based (Age)	Reliability centered maintenance (RCM)	Condition based	HBRM	Run to failure	Subject Matter Expert (SME)	Time based (Age)	Reliability centered maintenance (RCM)	Condition based	HBRM		
Distribution Assets														
Overhead lines														
Structures				✓	✓	✓				✓	✓	✓		
Conductors			✓	✓	✓					✓	✓	✓		
Switchgear	✓			✓	✓					✓	✓			
Transformers	✓			✓	✓		✓			✓	✓			
Vegetation				✓	✓					✓	✓			
HV Regulators														
Site		✓	✓		✓			✓	✓		✓			
Regulators		✓	✓		✓			✓	✓		✓	✓		
UG Network														
Cables - LV	✓						✓				✓			
Cables - HV	✓						✓				✓			
Cables - 33kV		✓	✓					✓	✓		✓			
Furniture	✓						✓				✓			
Zone substations														
Site		✓	✓					✓	✓					
Transformers		✓	✓		✓			✓	✓		✓	✓		
Switchgear		✓	✓		✓			✓	✓		✓	✓		
Dist Substations														
Site		✓	✓					✓	✓					
Transformers	✓	✓	✓		✓		✓	✓	✓		✓			
Switchgear		✓	✓		✓			✓	✓		✓			
Protection & Control														
Zone sub protection relays					✓						✓			
Zone sub DC systems					✓						✓			
Zone sub SCADA					✓						✓			
Distribution sub relays					✓						✓			
Distribution DC systems			✓						✓					
Distribution sub ancillary	✓										✓			
Recloser protection	✓										✓			
Recloser DC systems			✓						✓					
Fault indicators			✓						✓					
Regulators					✓						✓			
Transmission Assets														
Transmission lines														
Towers					✓							✓		
Conductor assemblies					✓							✓		
Insulator assemblies					✓							✓		
Foundations					✓	✓						✓		
Easements					✓							✓		
Substations														
Transformers (power)			✓ (maintenance)		✓	✓ (renewal)			✓			✓		
EHV circuit breakers			✓ (maintenance)		✓				✓			✓		
HV circuit breakers			✓ (maintenance)		✓				✓			✓		
EHV Disconnectors & Earth switches			✓ (maintenance)		✓				✓			✓		
EHV CT's			✓ (maintenance)		✓						✓	✓		
EHV VT's			✓ (maintenance)		✓						✓	✓		
Power cables			✓ (maintenance)		✓						✓	✓		
Site infrastructure					✓						✓	✓		
Protection & Control														
Busbar					✓							✓		
Feeder					✓							✓		
Transmission line					✓							✓		
Transformer					✓							✓		
Capacitor Bank					✓							✓		
SCADA					✓							✓		
Telecommunications Assets														
Communications														
Radio Bearers					✓							✓		
Optical Fibre Bearers					✓							✓		
Multiplexers					✓							✓		
Prog Logic Controllers					✓							✓		
Ethernet Devices					✓							✓		
Server Infrastructure					✓							✓		
Telephony Hardware					✓							✓		
Rectifiers					✓							✓		
Batteries			✓		✓				✓			✓		
Civil Infrastructure					✓							✓		

8. Future Demand Requirements

8.1 Tasmanian Energy Forecast

Figure 21 presents from our 2022 Annual Planning Report (**APR**) the actual to date and forecast energy requirement in Tasmania and on the transmission network over the next 20 years to 2042. Forecasts are presented for the distribution network and under the three scenarios for the transmission network. The figure also presents the Central State scenario forecast from our 2021 APR for comparison.

Figure 21 Forecast of total Tasmanian electrical energy sales



In 2021, the total annual energy consumption in Tasmania increased slightly from the previous year. Energy consumption increased for transmission-connected customers (including major industrial loads) and distribution customers.

The State region energy consumption (existing customer base) scenario indicates material demand growth for distribution connected customers, with an average rate of growth of 2.96%.

The development of Marinus Link and large-scale hydrogen in Tasmania will significantly increase the energy transfer requirements across the transmission network. Energy transfer is forecast to near-double or more over the forecast period, from approximately 10,500 GWh today, to support these developments.

In the State region, interconnectors, and large-scale hydrogen scenario, the requirement is forecast to exceed 20,000 GWh by 2029 and exceed 30,000 GWh by 2031.

Changes in timing or scale of hydrogen developments, or Marinus Link, will change the forecast transmission network energy transfer requirements

9. Life-Cycle Strategies

9.1 Overview

This chapter discusses TasNetworks life-cycle approach to asset management and the resulting key asset strategies aimed at achieving our asset management objectives (see section 3.7), and corresponding corporate objectives.

9.2 Life-Cycle Approach

The goal of infrastructure asset management is to meet a required level of service in the most cost-effective manner, through the prudent and efficient management of assets for present and future customers. The key elements of infrastructure asset management are:

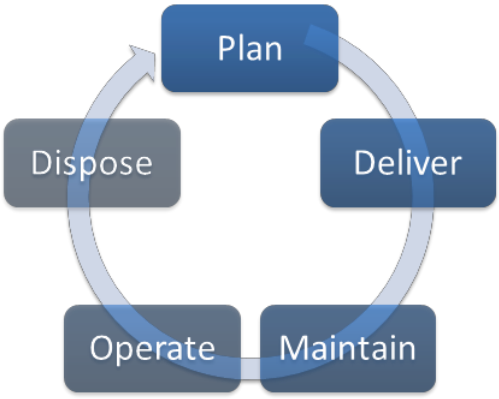
- Adopting a life-cycle approach;
- Developing cost-effective management strategies for the long term;
- Providing a defined and agreed level of service;
- Monitoring performance;
- Understanding and meeting the impact of growth through demand management and infrastructure investment;
- Managing risk associated with asset failures;
- Sustainably using physical resources; and
- Continually improving asset management processes and practices.

Ageing and potentially unreliable assets are managed as part of our overall asset management strategy. The focus of this strategy is to ensure that replacement of assets is determined on asset condition and risk rather than age alone. In developing strategies in relation to potentially unreliable assets we take a holistic approach to asset renewals, augmentations and decommissioning across both transmission and distribution networks. We ensure that our asset management plans align with our development plans to drive the most efficient outcome with a balance between cost, risk and performance.

A formal approach to the management of assets is essential to providing services in the most cost-effective manner. This enhances TasNetworks ability to demonstrate its approach to asset management to customers and other stakeholders (particularly economic regulators).

Our approach to asset management is centred on asset life-cycle management. There are five stages in the asset life-cycle as shown in Figure 22.

Figure 22 Asset management life-cycle



9.3 Life-Cycle Strategies

Each phase of the life-cycle has a corresponding life-cycle strategy, which describes our approach to the particular activities in that stage, objectives relevant to that stage, and strategies for providing performance to required levels. The five life-cycle strategies (Planning, Delivery, Maintenance, Operations, and Disposal) are summarised below.

- Planning covers Capex planning, from need identification, evaluation and approval, through to handover to delivery for implementation;
- Delivery covers implementing capital works (including detailed design, procurement, installation, and commissioning) and the dismantling and decommissioning of assets;
- Maintenance covers our approach to maintaining assets, including the types of maintenance employed and how the work is managed;
- Operations covers operation of the assets, including real-time operational control, situational awareness, outage coordination, and contingency planning; and
- Disposal covers activities relating to the disposal and divestment of assets and the disposal of waste material.

9.4 Asset Strategies and Plans

The majority of our asset management activities are managed at an asset category (or asset fleet) level. In some cases a number of asset categories that have common characteristics and functions have been grouped into a single asset category strategy plan. The asset category strategy plans are known as Asset Management Plans (AMPs) and are discussed further in Section 10.1.

9.5 Site Strategies

In addition to our asset category based life-cycle approach to asset management, we also develop a number of site based strategies. These are used to integrate and optimise asset category based activities at particular substations, lines, and circuits to assist in developing both short-term and long-term replacement, redevelopment and/or augmentation plans for each site.

9.6 Key Asset Management Strategies

We are continuing to refine our asset management strategies, to prioritise our expenditure to manage risks and ensure that our assets are effectively managed across their life-cycle. The following are a selection of the key asset management strategies.

9.6.1 Enterprise asset management roadmap

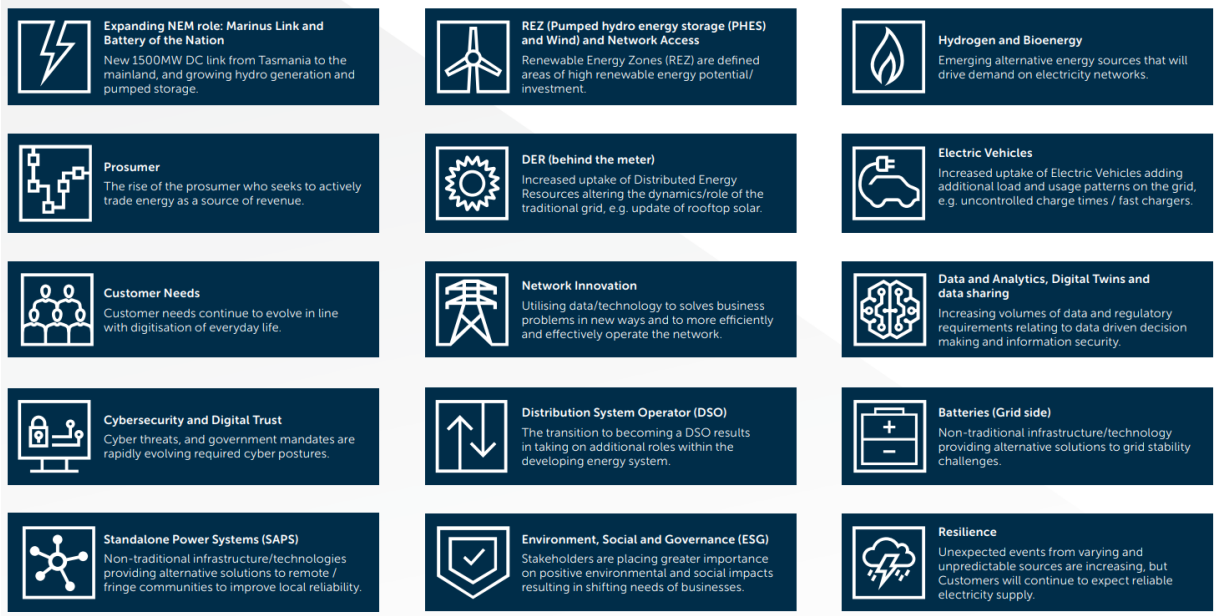
All over the world the electricity industry is changing. This is driven by factors such as:

- climate change and resilience management;
- changing behaviours, technology, customers needs;
- distributed energy resources;
- implementation of advanced analytics in management of assets; and
- new regulatory requirements to name a few.

Tasmania is not immune to these changes and we are seeing some of them here already. In light of this, we need to ensure we continue to plan for, upgrade, renew, operate and maintain our existing and future network, and respond to growth.

We have identified 15 drivers of change that are most likely to impact our customers and our Enterprise Asset Management (EAM) system, refer figure 23.

Figure 23 Drivers of change

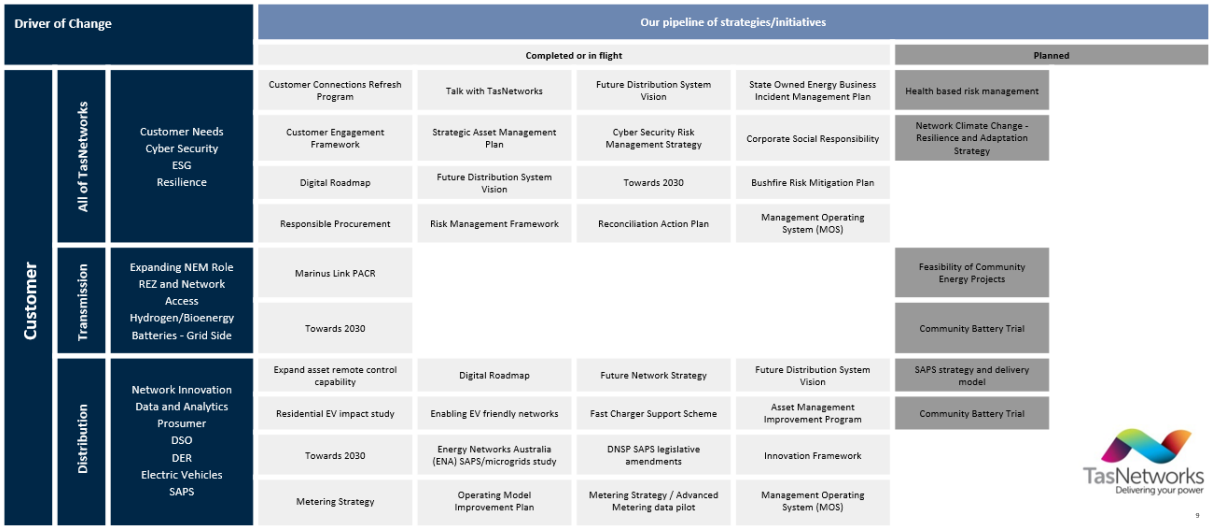


Because of these significant changes, we do not believe that our current asset management practices will be able to meet all of the future demands. So we need to look forward to understand the impact of these changes and ensure we can proactively respond and influence change rather than reacting to change as it occurs or is forced onto us.

Having this roadmap allows us to implement change in an proactive way while continuing to deliver high quality service to customers and stakeholders and minimising cost. We will incorporate learnings from others and insights from customers and stakeholders on their needs to continually improve our asset management capability.

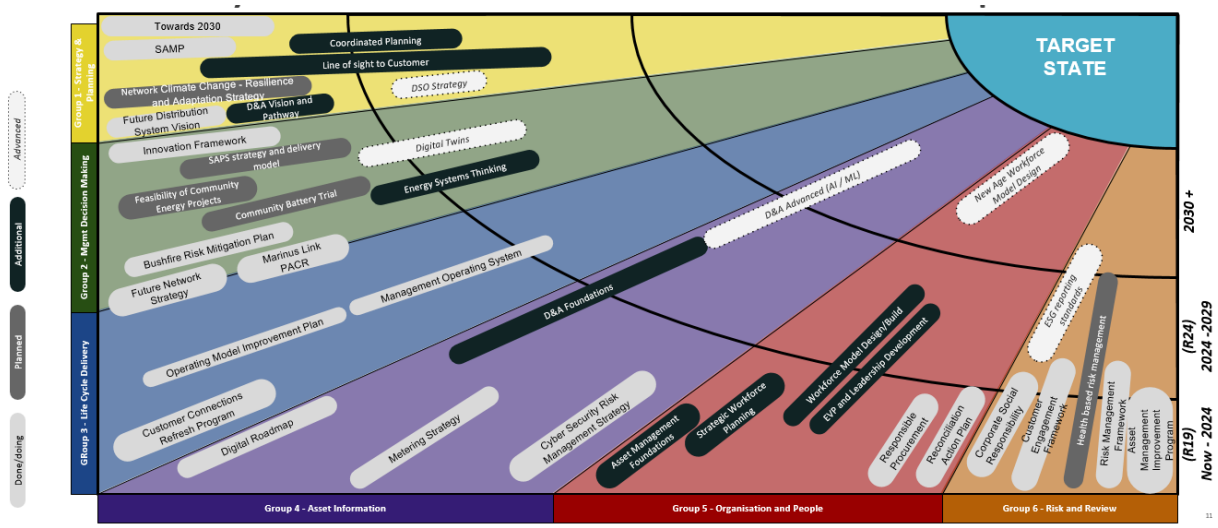
When we assessed the potential impacts using an industry standard framework we found that every area of EAM will be impacted by the drivers of change with elements of workforce and analytics playing a foundational role across all areas. Consequently, we found that we need to expand our current portfolio of EAM strategies and initiatives, refer figure 24.

Figure 24 Portfolio of EAM strategies and initiatives



Our high-level EAM Roadmap, refer figure 25, provides a single view aligning the development of our EAM system for future needs and to meet stakeholder expectations.

Figure 25 EAM roadmap



Bruny Island High Voltage Cable Replacement

Tasmania's beautiful Bruny Island is electrically supplied from the Tasmanian mainland via two sub-sea high voltage cables. The back-up high voltage cable between Tinderbox and Dennes Point (Bruny Island) failed on Sunday 3 November 2019. The damaged section was found by divers - with a boat anchor hooked onto it. The damage was deemed irreparable, and TasNetworks has since worked to replace the cable instead. The island's main subsea connector from Simmonds Point (near Oyster Cove) was not affected, and has continued supplying all customer demand. In conjunction, TasNetworks installed extra diesel generators at Alonnah to provide enough back-up to power all Bruny Island customers, in case of any problem with the main supply cable.

TasNetworks recently successfully completed the installation and commissioning of the replacement high voltage cable.

9.6.2 Our future distribution system vision and roadmap

The push for clean energy, electrification and the data accessibility is enabling community led change within our distribution system. New technologies are becoming an important enabler of efficient and sustainable distribution integration and customer services. TasNetworks Future Distribution System Vision and Roadmap has been developed to articulate our plan for Tasmania's distribution network in response to the evolving needs of our customers, emerging community expectations and efficiencies from accelerating technology transformation. It is a foundational plan that prioritises engagement with customers and stakeholders to continually refine our approach and measure progress over time. At present, a large emphasis is placed on facilitating customer adoption of Distributed Energy Resources (DER), which include rooftop solar photovoltaics (PV), battery storage and rapidly expanding electric vehicle charging (EV). This is based on principles of sharing DER value equitably, using DER to improve electricity affordability and optimising access for DER connections.

Our Future Distribution Vision is:

"to bring agility to our distribution system for the advantage of all our customers".

We will advance Tasmania's place as a renewable energy leader, contribute to the delivery of the Tasmanian Renewable Energy Target (TRET) and shape the energy future by demonstrating distribution system best practice and reaching for new opportunities.

Growing and sharing expertise

We will be a trusted expert source of analysis, education and information to assist our customers, owner and stakeholders by informing their decisions. We will be an industry leader in focused areas. Our immediate priority is to work with our industry peers and researchers to trial new solutions they are developing to understand and measure what works for our customers and us.

Modernisation and new technologies

The tools available to us for measurement, communications, data, computing and analytics are rapidly growing in capability. This automation will deliver considerable long term benefits in safety, efficiency, reliability and grid resilience, enabling TasNetworks to deliver efficient and sustainable DER integration and provision of customer DER services.

Finding new ways to serve customers

Growth in transport electrification, self-generation and other new products will profoundly change how our customers interact with the distribution system and seek support. This means more relevant, efficient and trusted customer touchpoints. Our focus will create new opportunities, support helpful market behaviour and grow Tasmania's economy.

Securing customer equity, affordability and access to Distributed Energy Resources

Rapid deployment of DER decreases network costs and increases customer options. We will design a sustainable, coordinated and robust approach to DER that addresses hosting capacity barriers and leverages the present Australian focus on grid stability. Our principles are to share DER value equitably, use DER to improve electricity affordability and optimise access for DER connections.

Key elements of the Future Distribution System Vision and Roadmap include:

- Intelligent asset management (for more information on the AMIP component refer to section 11.8)
- Advanced distribution management system
- Derwent Bridge microgrid (for more information refer to section 9.6.12)
- Electric vehicles
- Embedded generation

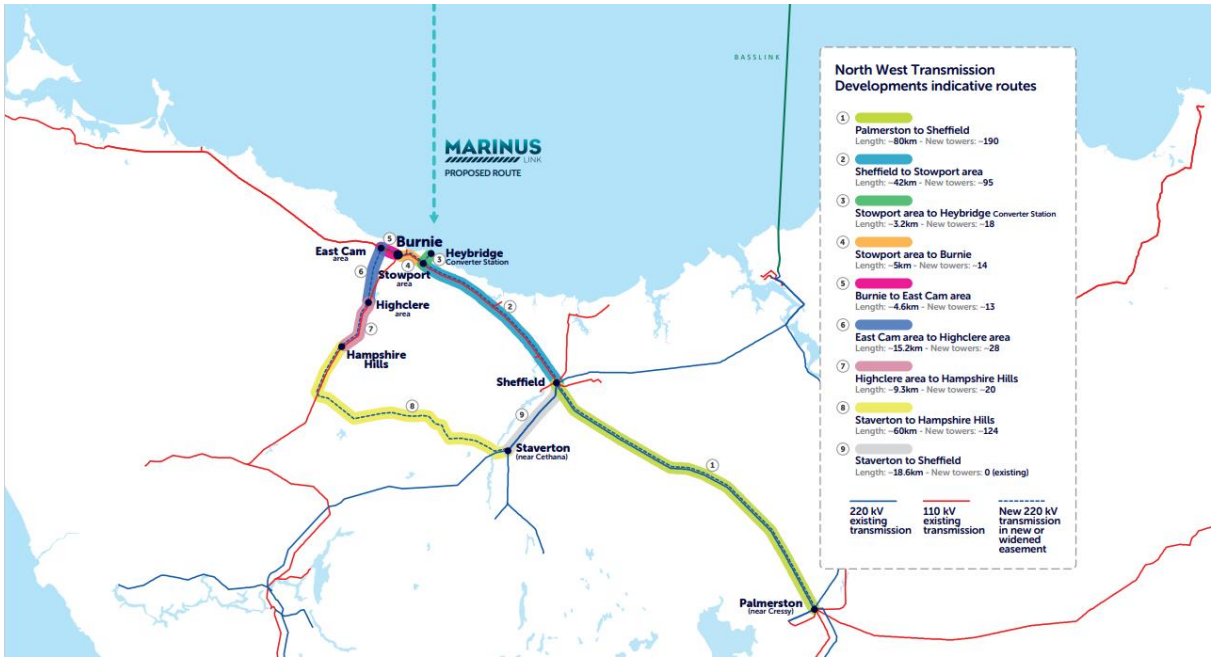
For more information on these elements refer to TasNetworks Annual Planning Report on the TasNetworks website.

9.6.3 North West Transmission Developments

The NWTD include 240km of new and upgraded transmission lines and other energy infrastructure that will support Tasmania's ambition to be a world-leading renewable energy provider. The projects will link Cressy, Sheffield, Burnie, Hampshire and Staverton to strengthen the backbone of Tasmania's transmission network supporting Marinus Link and other renewable energy developments. In 2021-22, the NWTD continued work though the design and approvals phase, refining transmission routes, increasing community engagement activities and undertaking preparations for environment, planning and heritage approvals.

Transmission line routes

The NWTD are comprised of nine routes, to be constructed in stages to meet the connection requirements of generation customers and the delivery of Marinus Link. In 2021, as project design matured, two significant changes were made in response to environmental surveys and landowner feedback. On the Staverton to Hampshire Hills transmission line, TasNetworks revised a proposed 10 km section after studies and geotechnical drilling indicated part of the route was to be located on land that is exposed to historic landslides, landslip hazard areas and was close to karst features and areas of native forest. On the Palmerston to Sheffield transmission line in response to landowner concerns and conducting a comprehensive review, TasNetworks proposed to remove the existing 220kV single circuit transmission line from the route, once the new 220kV double circuit transmission line is commissioned.



Community, landowner and stakeholder engagement

In 2021-22, the NWTD held regular drop-in and pop-up information sessions in Tasmania's north-west at community halls, events, outside shopping centres and at the Future Energy Hub in Burnie. These face-to-face activities were also supplemented by online webinars and forums, online and telephone surveys, and activities. Engagement with impacted communities focused on awareness raising and information sharing at various locations, including markets at Burnie, Wilmot and Penguin, high-traffic areas in Deloraine and Burnie, and the Westbury Agricultural Show. The NWTD is working closely with landowners, and access agreements have now been reached with approximately 75 per cent of landowners, representing around 89 per cent of land across the developments. In October 2021, the NWTD formed a Stakeholder Liaison Group that meets bi-monthly and is independently chaired, with representatives from key industry groups, peak bodies, education, skills and training sectors and state government organisations. The NWTD also held dedicated economic development workshops in the North West to review and prioritise actions in the development of an economic development strategy and action plan.

Environment, Planning and Heritage approvals

Field surveys and technical reports to inform the final technical design and approvals process including the Environmental Impact Statement progressed throughout 2021-22 including geotechnical, ecological, cultural heritage and social impact assessments. In 2022, TasNetworks submitted two new referrals to the Commonwealth Department of Agriculture, Water and Energy under the Environmental Protection, Biodiversity and Conservation Act 1999 (EPBC Act) for Sheffield to Staverton upgrades and the Remaining North West Transmission Developments.

9.6.4 Southern transmission rationalisation strategy

The southern transmission system is a critical part of the Tasmanian transmission system in that it:

- Connects 946 MW of installed generation capacity;
- Supplies approximately 700 MW of load including the greater Hobart area; and
- Forms a critical connection through Waddamana Substation to the northern transmission system, and subsequently to the Victorian region of the National Electricity Market via the Basslink interconnector.

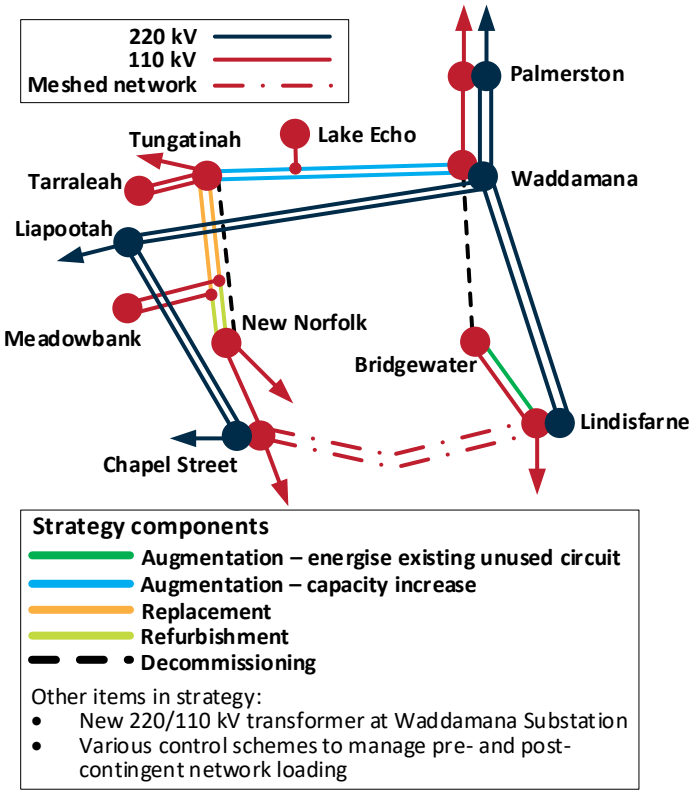
The southern transmission system includes most of the earliest transmission lines of the 110 kV network, which originated from Tarraleah Power Station in 1938. This 110 kV network was constructed as the main grid at the time to support the existing 88 kV network from Waddamana that has since been retired. The southern transmission system also includes some of the earliest transmission lines of the 220 kV network, which originated northwards from Waddamana Power Station (now Waddamana Substation) in 1957, and was extended southwards to Chapel Street in the early 1960s.

The construction in 2011 of the Waddamana-Lindisfarne double circuit 220 kV transmission line (with a summer/winter nominal rating of 420/500 MVA per circuit) has provided a secure 220 kV transmission network to southern Tasmania and relieved constraints that existed on the Liapootah–Chapel St 220 kV transmission corridor. This has reduced the requirement of the southern 110 kV network for bulk transmission purposes, and with the majority of these lines approaching end of life with asset health degrading and operational risks increasing, these factors result in an extensive refurbishment or replacement program (like-for-like) over the next 25 years. This forecast expenditure has driven the need for us to consider if a program of network rationalisation can deliver better value and service to Tasmanian electricity users in the long term.

To address the age and condition issues associated with the southern 110 kV transmission network, we are developing a long term fully integrated strategy to rationalise the southern 110 kV transmission network. This strategy aims to move the main grid function to the 220 kV transmission network, as far as possible, through the introduction of a strategically located connection between the 110 kV and 220 kV transmission networks in the central highlands of Tasmania. This will facilitate the decommissioning of end-of-life 110 kV lines and the refurbishment/replacement of remaining re-functioned 110 kV lines, resulting in lower transmission losses, increased network efficiency and reliability, reduced circuit length, reduced risk and lower life cycle cost.

Decommissioning the Waddamana–Bridgewater Junction 110 kV transmission line was identified as the first stage of the strategy to rationalise the southern 110 kV transmission network over coming years, and this circuit has now been decommissioned and is being progressively dismantled. It provided the most economical path to manage the network against the strategies assessed, including maintaining the existing network. Our preferred strategy is shown in Figure 26, with the intent to provide at least the existing network capacity to load and generation customers.

Figure 26 Southern transmission rationalisation study area and strategy components



9.6.5 Wood pole management strategy

The management strategy for the wood pole assets aims to ensure that the risks associated with asset failure remain within TasNetworks risk appetite statement. A declining supply of wood poles to suitable grade is further compounding the risk of wood pole management. To assist with managing wood pole risk, we:

- have completed trialing installation of new technology non-combustible high strength poles primarily focussed on key locations within the high bushfire consequence area. These trials have demonstrated their advantages and given us the confidence to introduce them into these key network locations through business-as usual replacement and augmentation requirements.
- have completed trialing intumescement coatings for wood poles, with this now fully introduced for business-as usual activities for protecting existing high value/high risk poles of our wood pole fleet;
- have completed trialing non-destructive testing of wood pole integrity, with this now fully introduced as the method for condition monitoring our wood pole fleet; and
- have completed deoxyribonucleic acid (DNA) testing of soft rot fungi and symbiotic bacteria for assessing rot-rate risk and bio-control options for treated wood poles. This was conducted in conjunction with the University of Tasmania, and is now made available on an as-needs basis for managing our wood pole fleet.

9.6.6 Threatened bird strategy

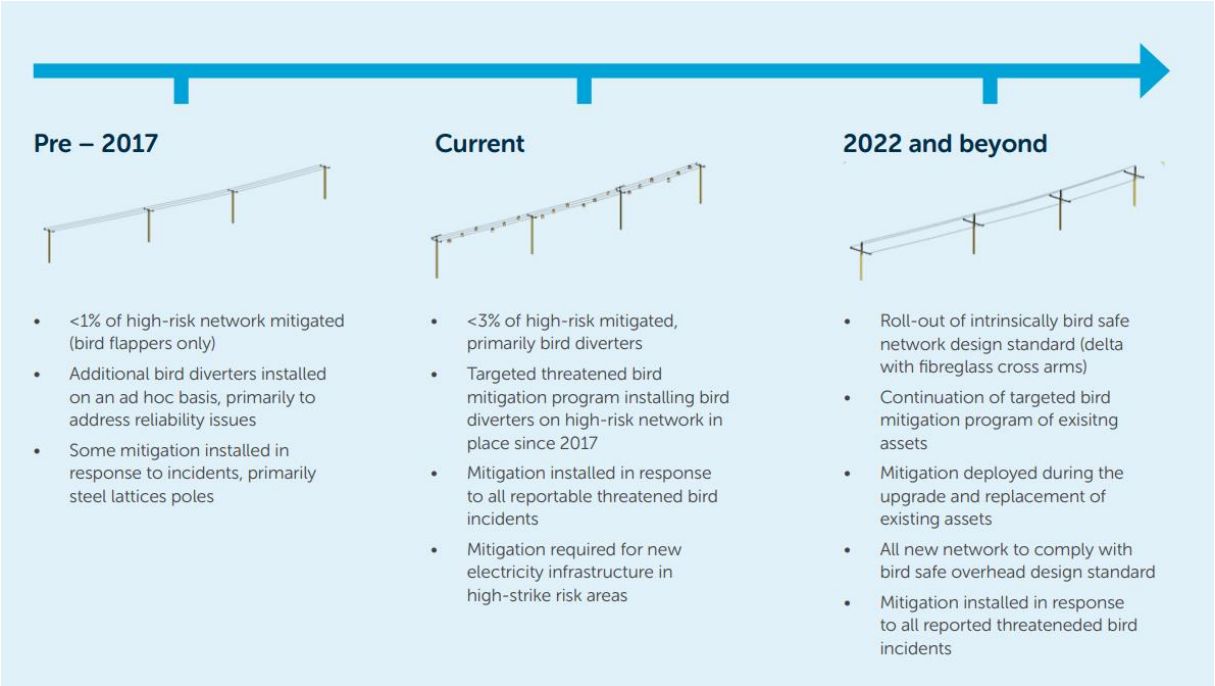
Each year a small but important number of Tasmanian threatened bird species are injured or killed by electric shock as a result of flying into powerlines or perching on power poles. The issue of birds being killed by electric shock as result of flying into powerlines is a problem faced by distribution companies all over the world.

As a business, we care about Tasmania's birdlife and have made a commitment to minimise our impact on the environment through our Zero Harm program. To help reduce the number of threatened birds of prey injured or killed by our network, TasNetworks has a ten-year Threatened Bird Strategy in place.

Credit: Lee Campbell

TasNetworks recently completed an update of its Threatened Bird Strategy for 2022-2032. The strategy commits the business to spending $1m per annum on bird mitigation measures over the next five years. This commitment enables the business to continue substantive, ongoing work to mitigate the risks posed by our overhead electricity infrastructure to threatened birds as well as demonstrating to the community and our stakeholders that we take this significant, persistent environmental issue seriously.

Over the long-term, TasNetworks is transitioning away from the use of bird diverters as our primary mitigation measure and focusing on making our network inherently 'bird safe' for large birds of prey. This involves increase the separation between conductors by adopting a delta conductor configuration and using insulating fibreglass cross arms.



Key initiatives as part of the updated strategy include work to better evaluate the effectiveness of mitigation measures, continued community outreach to maintain awareness about the need to report incidents and continued support for state-wide raptor care. TasNetworks has a range of partnerships which help to support the aim of our TasNetworks Threatened Bird Strategy and support broader conservation and research efforts to protect our iconic birds of prey.

Tasmanian Museum and Art Gallery's (TMAG) Threatened Bird Strategy Technical Officer Dr Judy Clarke studies a threatened bird specimen in the lab. TMAG collect and stores tissue samples of all threatened birds that die through contact with our infrastructure, such as powerlines.

9.6.7 Network climate change strategy

In regard to Climate Change in the Australian context, the CSIRO states:

> "Change is occurring against the background of high climate variability, but the signal is clear. Air and ocean temperatures across Australia are now, on average, almost a degree Celsius warmer than they were in 1910, with most of the warming occurring since 1950. This warming has seen Australia experiencing more warm weather and extreme heat, and fewer cool extremes. There has been an increase in extreme fire weather, and a longer fire season, across large parts of Australia". (CSIRO, 2014)

The ENA has identified that the Australian energy network sector is particularly exposed to a changing climate, including single extreme climate related phenomena such as storms, heatwaves and bushfires, as well as significant more gradual changes in the weather regime.

To ensure that climate impacts are adequately accounted for in our decision-making in achieving network resilience, we have identified the following priority impacts with potential to affect our transmission, distribution, and telecommunications networks:

Electricity Transmission Network

Maximum Wind Gust
- Direct damage
- Damage from vegetation

Maximum Temperature
- Reduced transmission capacity

Storm Intensity
- Increased outages per event

Electricity Distribution Network

Precipitation
- Flooding of assets

Maximum Wind Gust
- Direct damage
- Damage from vegetation

Maximum Temperature
- Reduced distribution capacity
- Increased number of asset overloading failures

Bushfire Weather Conditions
- Increased potential for asset damage from bushfires

Telecommunications Network

Maximum Wind Gust
- Direct damage

Storm Intensity
- Increased outages per event

Bushfire Weather Conditions
- Increased potential for asset damage from bushfires

For each of the above priority impacts we have assessed the risks and determined key strategies to mitigate the risks. The strategies include:

- installing non-burnable poles at selected high value pole locations in the High Bushfire Loss Consequence Area (HBLCA);
- installing fire-resistant wrap for selected poles in the HBLCA, and other high criticality/high fire danger locations outside the HBLCA;
- updating the HBLCA map to align with the harmonised phoenix model developed by the ENA;
- encouraging legislative changes that allow vegetation management cost savings through installation of covered conductor on the network;
- increasing installation of lightning arrestors on overhead network transformers on the distribution network;
- updating our overhead distribution line design and construction manual to include the latest AS/NZS7000 design compliance requirements; and
- increasing monitoring, analysis and modelling of extreme weather events such as bushfires and floods, through utilising a digital twin of our network (refer section 9.6.15).

Our definition of network resilience:

The ability to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard.

Through recent engagement with our customers, the participants understood that taking action on network resilience improves reliability and customer experience. The majority of participants wanted the benefits from options to improve resilience but noted that the price was challenging. Many asked for targeted action in high risk areas on resilience to improve reliability outcomes and expected that TasNetworks had a planned approach to resilience investment.

We also liaise with other state agencies, Network Service Providers, Bureau of Meteorology (BoM), ENA and CSIRO in order to keep abreast of emerging issues and solutions being implemented at a national level whereby we can assess the appropriateness of identified initiatives for the Tasmanian environment. We also participated in a joint industry climate change resilience customer consultation process to guide our future initiatives.

9.6.8 Bushfire mitigation strategy

Bushfire initiated by our electricity infrastructure presents a significant risk to the business, public safety and property. We have identified the risk of bushfires started by our assets or operations as one of the highest risks to the business. The risk of "*Major bushfire start is attributed to TasNetworks assets and/or work practices, leading to fatality or permanent impairment of a member of the public*." is included within TasNetworks' Key Business Risk Profiles.

To mitigate this risk we have developed a bushfire mitigation strategy, contained within our Bushfire Mitigation Management Plan. The key strategic objectives of the Bushfire Mitigation Strategy and Management Plan are to:

- ensure no significant fires are started by TasNetworks' assets or activities undertaken by TasNetworks' staff and contractors;

- ensure no significant safety or environmental incidents occur as a result of bushfire mitigation activities;
- minimise cost to the community to a sustainable level;
- achieve compliance with the relevant legislative, regulatory and statutory requirements;
- demonstrate commitment in carrying out corporate and community responsibilities;
- ensure procedures are in place for managing liaison with external organisations;
- establish performance measures, targets and reporting framework for bushfire mitigation; and
- ensure a formal, documented management framework is in place for bushfire mitigation that includes mechanisms for review and continual improvement.

Our bushfire mitigation position is: *"To minimise the risk of fire ignition by at-risk distribution and transmission networks by ensuring our bushfire mitigation strategies and plans are aimed at protecting the lives and property of our employees and members of the community, and are aligned with industry best practice where applicable."*

To achieve this position, we will continue to:

- minimise the risk of fire ignitions from distribution network assets that could become a bushfire threatening public safety and property;
- ensure activities undertaken by TasNetworks' staff and contractors minimise the likelihood of fire ignition;
- comply with legislative, regulatory and statutory requirements;
- minimise the frequency and length of disruptions to the general public when responding to bushfires threatening or impacting the distribution network;
- consider the safety of the community as a whole and employees engaged in the provision of services;
- benchmark our activities through the Energy Networks Association (ENA) and the International Wildfire Risk Mitigation Consortium (IWRMC);
- ensure activities are managed in a way that minimises impact on the environment; and
- regularly review and develop management frameworks to ensure compliance with policies at the lowest sustainable cost.

9.6.9 Service performance strategy

Transmission network reliability is measured in terms of the number of Loss of Supply (LOS) events that occur during a calendar year. We have an obligation to monitor and report against service measures and objectives to national (AER) and state Office of the Tasmanian Economic Regulator (OTTER) regulatory bodies, and to customers such as Hydro Tasmania and major industrials.

In meeting these requirements we actively undertake:

- Performance monitoring;
- Performance benchmarking;
- Incident investigations; and
- Implementation of service improvement initiatives.

Distribution network reliability is a measure of performance with regard to frequency (number of events) and duration of unplanned interruptions to our customers. We have an obligation under the Code to manage the reliability performance of our network and to mitigate any reliability impacts on our customers and the broader Tasmanian community.

Through our customer consultations, our customers have made it clear that service performance is a significant area of interest to them. We have developed a service performance strategy to manage our reliability obligations, and our service performance strategy seeks to:

- Maintain current overall network reliability performance in accordance with the principles of the economic incentive scheme whilst providing lowest sustainable prices and maximising value to our customers;
- Ensure compliance with regulation, codes and legislative requirements;
- Manage our risk profile to maintain a safe and reliable network, now and into the future with respect to cost effectiveness and reliability; and
- Reduce total outage costs for the network.

The strategy does not preclude enhancing network reliability where community, feeder or circuit performance is inadequate or where asset risk is unacceptably high. Specific focus areas presently underway include:

- Community zero harm;
- Distribution overhead line aerial inspections by drone;
- Asset defect management initiative;
- Future distribution vision (refer section 9.6.2);
- Line trunk reliability improvement (protection reviews, targeted vegetation management, and asset renewal/relocation), to reduce the probability of an unplanned outage occurring;
- Remote switching reinforcement (automatic restoration schemes and multiple switches), to reduce supply restoration time following an unplanned outage;
- Distribution line interconnections (including new lines), to reduce customer exposure to unplanned outages;
- Standby generation, to reduce supply restoration time following an unplanned outage;
- Advanced meter infrastructure (AMI) data and Loss of Neutral monitoring (for shock hazard) trial now completed, and network wide project underway to align with metering provider/retailer roll out of AMI across the state (refer section 9.6.14); and
- Digital Twin (refer section 9.6.15);

It is proposed that all reliability activities will be managed within the levels approved for reliability maintenance or improvement in the respective regulatory control period.

9.6.10 Asset Management Improvement Program

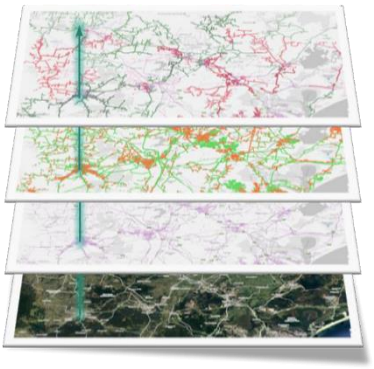
Information on this strategy to improve asset management maturity can be seen in section 11.8.

9.6.11 Improving reliability and supply through microgrids

With our distribution network rapidly evolving, there are new opportunities for utilities like TasNetworks to investigate the feasibility of microgrid solutions that benefit local customers, lower network costs and are test cases for the wider grid.

The Derwent Bridge Microgrid Feasibility Project is being run by TasNetworks in conjunction with the University of Technology Sydney, Redback Technologies and the Australian Power Institute, and is

being funded by a $1.6 million grant from the Australian Government. The project aims to develop an innovative microgrid design solution that will improve the reliability of the power supply for residents in Derwent Bridge.



This concept has the potential to be transferred to other rural and remote communities across Australia with a similar climate. The project is currently helping us to better understand:

- Microgrid design, especially in areas with severe weather and limited solar resources;
- Customer needs and how best to engage with stakeholders; and
- New and upcoming Distributed Energy Resources (DER) technologies.

9.6.12 High Voltage (HV) non-metallic screened aerial bundled cable replacement strategy

This strategy involves replacement of HV non-metallic screened aerial bundled cable in poor condition that has the potential to cause an unacceptable safety risk. This cable is proposed to be replaced with HV aerial bundled cable utilising a metallic screen.

9.6.13 SAP

The enterprise management system SAP has been installed in TasNetworks, under the Ajilis business transformation project that was a key initiative of TasNetworks' Our Business Strategy. SAP is now considerably assisting in achieving one way of doing things at TasNetworks.

SAP is a class leading enterprise management system that helps us to streamline decision-making, improve operational processes, and provide us with an integrated IT platform. Minor enhancements to SAP will be ongoing as we continuously refine our ways of working for the cost saving benefit of our customers.

9.6.14 Advanced meter integration

The deployment of AMI in Tasmania presents an opportunity for TasNetworks to utilise AMI data to operate and plan its network in a more dynamic, proactive, and costefficient way, thereby contributing towards TasNetworks' customer, people, business and owner strategic goals. Smart meter take up will continue to rise in line with the Australian Energy Market Commission's 2017 ruling that all new and replacement meters must be advanced meters.

Tasmania has approximately 40 per cent AMI coverage and continues to work towards reaching 100 per cent. We are developing a long-term vision for the use of AMI data with a focus on community safety, improved customer service and visibility of the distribution network (for fault detection and outage restoration).

9.6.15 Digital Twin

During May 2022, 42-24 entered into a Joint Venture arrangement with Enzen Australia to be known as Virtual TAS. Virtual TAS will build a 4D engineering grade digital twin of Tasmania, and this will be refreshed annually for 10 years. This is a first for Tasmania, and Virtual TAS will service multiple market sectors including government, utilities, smart cities, agriculture, and business.

The digital twin is considered critical to TasNetworks to address asset management and operational challenges. Providing timely and accurate information and enhanced insights will improve our decision making, yielding significant benefits, significantly improve community and cross sector engagement, collaboration and action on network resilience.

A large number of use cases have been identified across the business associated with the implementation of the digital twin. The initial use cases include:

- Vegetation management;
- Asset management;
- Dynamic design tool; and
- Climate change modelling.

10. Management Plans Development

10.1 Asset Management Plans

AMPs cover the existing asset base and are prepared for each significant asset category. They identify the performance issues and risks presented by each asset type within the category and define specific life-cycle strategies and actions that must be undertaken to sustain asset and system performance. The AMPs also summarise the asset operating and capital expenditure requirements for each asset category.

Where appropriate, AMPs are supported by detailed condition assessment reports and maintenance standards to ensure transmission and distribution system assets are appropriately maintained and the detailed condition, and associated risk, of selected assets is well defined and understood.

The AMPs are available within TasNetworks intranet site, The Zone, and cover all TasNetworks asset classes including:

Transmission network

- AC distribution system
- DC distribution system
- EHV circuit breaker
- EHV disconnector and earth switch
- Gas insulated switchgear
- Power cable
- Structures and busbars
- Surge arrestor
- EHV busbar protection
- HV substation protection
- System protection and monitoring
- Transmission line protection
- Transmission line conductor
- Transmission line support structures
- Circuit rating and weather monitoring
- Transmission service and performance
- Capacitor bank
- Earthing and lightning protection
- EHV current transformer
- EHV post insulator
- HV switchgear
- Power transformer
- Substation site infrastructure
- Voltage transformer
- EHV capacitor bank protection
- SCADA systems
- Transformer protection
- Transmission protection and control
- Transmission line insulator assemblies
- Transmission line support structure
- Transmission line easements
- Transmission line ratings

Distribution network

- Conductors and hardware
- Ground mounted substations
- Metering type 6 (regulated)
- Overhead line structures
- Pole mounted transformers
- Public lighting
- Underground system
- Connection assets
- HV regulators
- Metering (unregulated)
- Overhead switchgear
- Protection and control
- SCADA and automation
- Zone substations

- Distribution protection and control
- Protection maintenance
- Alternative distribution structures
- Overhead system structures
- Distribution service performance
- Revenue metering
- Mobile generation

Transmission and distribution network combined

- Bushfire mitigation
- Vegetation

Telecommunications network

- Bearer network
- Network management systems
- Telephone system
- Ethernet systems
- Site infrastructure

Operational support systems

- Network operations
- Asset management information system (AMIS)
- NPV tools
- Emergency response
- Service performance

Non network

- Information technology
- Vehicular fleet
- Facilities

10.2 Area Strategies

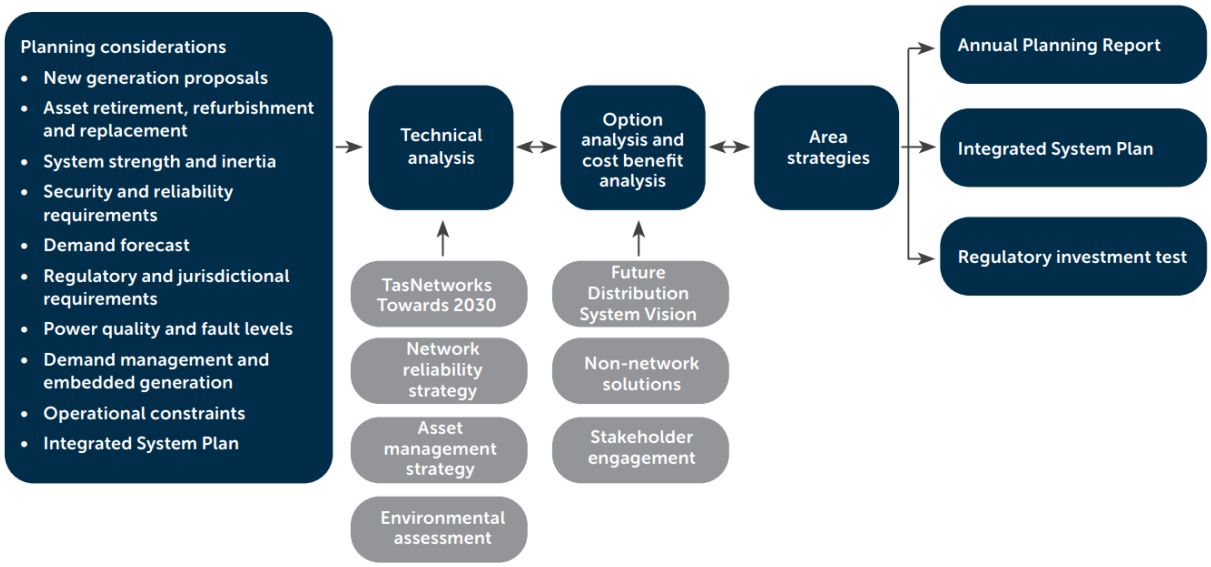
TasNetworks transmission and distribution system development program predominantly comprises of augmentation projects that provide new or modified connection points for customers, respond to increased local demands on the electricity system, or enhance security or quality of supply.

Our planning and capital investment activities are guided by customers and external agencies, including NER requirements established by the AEMC, requirements from the AER, OTTER and Tasmanian Department of State Growth. As a customer focussed organisation, customer consultation is a significant influence to system planning, providing innovative opportunities to defer or avoid unnecessary asset investment.

We conduct system planning studies to determine the expected future operation of the transmission and distribution system in detail over at least a 15 year period. The outputs of the planning process are documented in the area strategies, as shown in figure 18. From these area strategies, the projects that are required to meet Tasmanian and national electricity supply requirements for the forthcoming five year period are published in TasNetworks' APR. Further details of the APR are contained in 10.3 below.

An overview of the network planning process, and its key inputs, is shown in Figure 27.

Figure 27 Overview of the network planning process



The area strategies are available within our intranet site, The Zone, and cover the seven planning areas of Tasmania, as well as a core-grid strategy for the transmission backbone and inter-area limitations.

10.3 Annual Planning Report

We produce the APR to provide information on the planning activities we have undertaken in the past year. We conduct an annual planning review to analyse the existing network and consider its future requirements to accommodate changes to load and generation, and whether there are any limitations in meeting the required performance standards. We then look for opportunities for innovative solutions to address any emerging issues. We do this in consultation with our customers and in accordance with our relevant regulatory obligations.

The APR presents the outcomes of these planning studies, in accordance with our obligations under clauses 5.12.2 and 5.13.2 of the National Electricity Rules (the Rules) for the publication of Transmission and Distribution Annual Planning Reports. We are required to publish the APR by 31 October each year.

In addition to these requirements, we present further information to better inform stakeholders about the issues and opportunities in our network. We provide this information so that stakeholders are aware of:

- the capability of our network to transfer electrical energy;
- how the network may affect their operations;
- the locations that would benefit from supply capability improvements or network support initiatives; and
- locations where new loads or generation could be readily connected.

We actively investigate alternate options to traditional network augmentation or straight like-for-like equipment replacements to address issues. Our intent is that the APR provides existing and potential new customers and non-network solution providers with preliminary information to prompt discussion on opportunities for solutions to address issues.

The APR covers a 10-year planning period, however some aspects are based on shorter planning periods. Distribution line overload determinations are based on a 2-year planning horizon, as loading in the distribution network is dynamic and loads are often easily transferable between circuits.

11. Performance Evaluation and Improvement

11.1 Overview

Chapter 11 focuses on the performance of the network in recent years. Firstly, we present information about performance benchmarking by the AER. We then present information about the reliability of the transmission and distribution networks, and our performance against our target thresholds.

11.2 How We Compare

The AER uses benchmarking to measure and compare the operating efficiency of electricity transmission and distribution networks. We are using the AER's benchmarking data to understand how we compare with other network businesses and what we need to do better. In addition, the AER uses total cost and operating cost benchmarking to help to set expenditure allowances.

Figure 28 below illustrates that the AER's total cost productivity benchmarking places us at the lower end of mid-range of the Australian distribution networks at the end of the period 2006 to 2020. The AER notes, in footnote 33 of its report[10], that 'TasNetworks could be considered an outlier compared to its peers in terms of system structure. Compared to other DNSPs, TasNetworks operates substantially less high voltage sub-transmission assets and has a comparatively high proportion of lower voltage lines. This disadvantages TasNetworks' MTFP ranking because low voltage assets generally receive the highest capital input weighting under our benchmarking models. Economic Insights advises that some caution is required in interpreting TasNetworks' MTFP score given its comparatively unusual system structure..'

In light of the above, the AER's capital productivity performance indicator places us 12th of the 13 DNSPs compared, and the AER's operating productivity performance indicator places us 5th of the 13 DNSPs compared.

Figure 28 Distribution total cost productivity benchmarking using AER data – Multilateral total factor productivity model[11] (the best performer has the highest score)

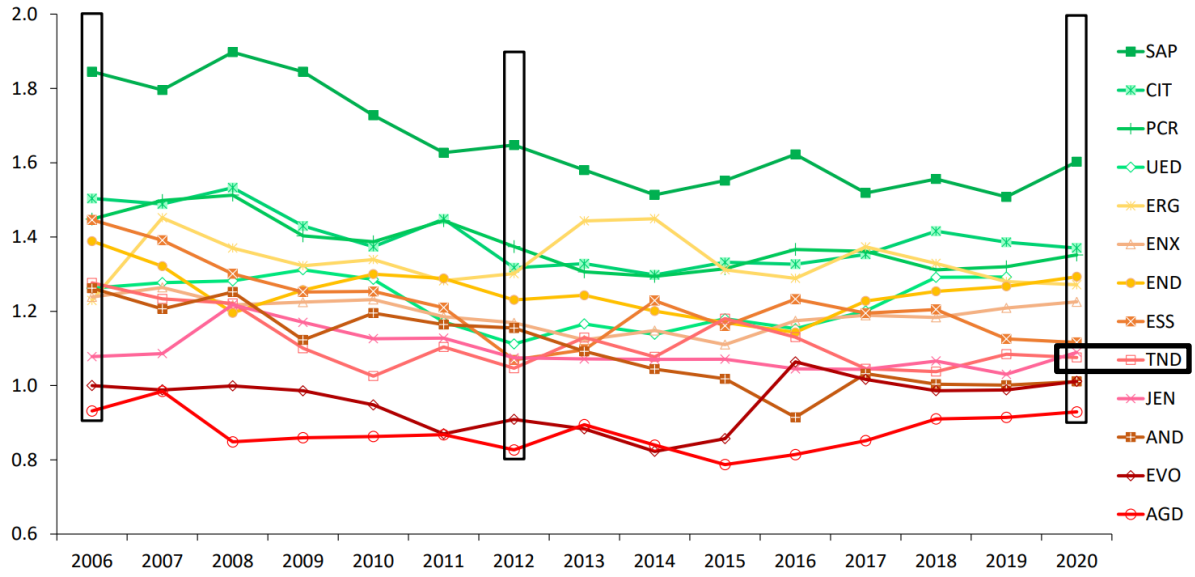
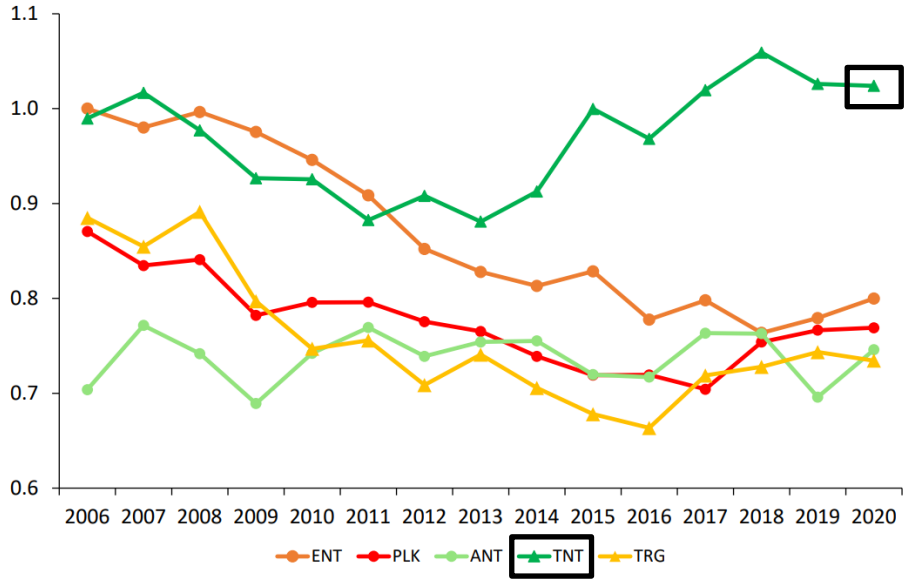


Figure 29 illustrates that the AER's total cost productivity benchmarking continues to place us at the top of the Australian transmission networks at the end of the period 2006 to 2020. The AER's capital productivity performance indicator places us 1st of the 5 TNSPs compared, and the AER's operating productivity performance indicator also places us 1st of the 5 TNSPs compared.

[10] AER Annual Benchmarking Report, Electricity distribution network service providers, dated November 2021.
[11] Sourced from Figure 10 of AER Annual Benchmarking Report, Electricity distribution network service providers, dated November 2021.

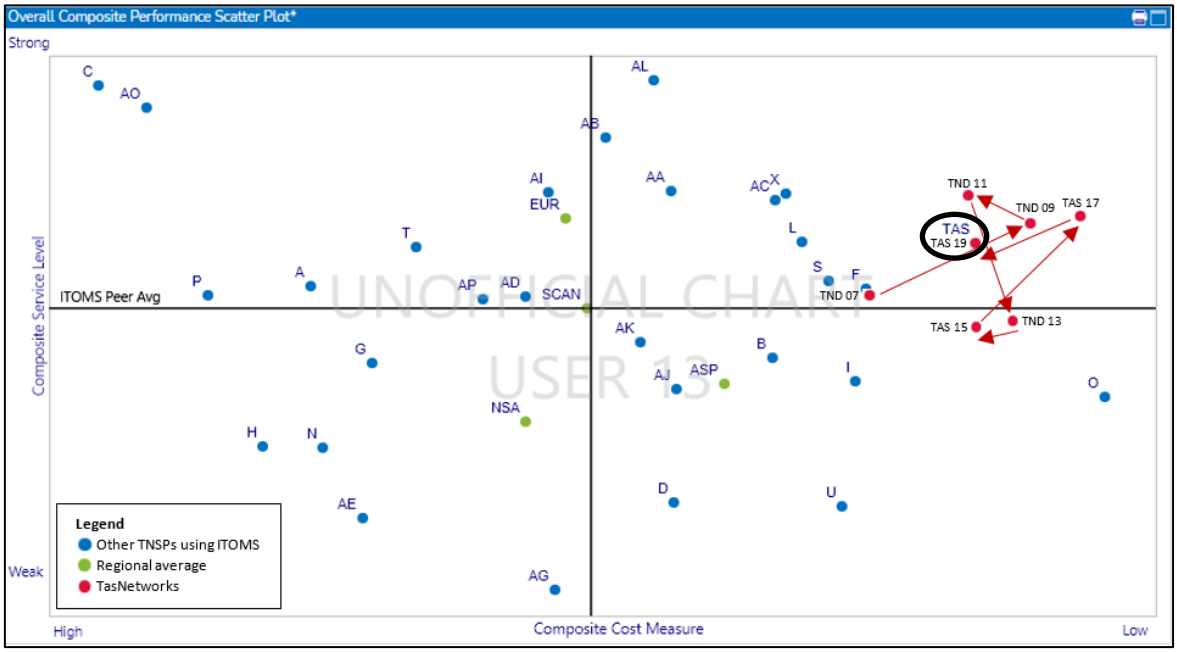
Figure 29 Transmission total cost benchmarking using AER data – Multilateral total factor productivity model[12] (the best performer has the highest score)



In addition to AER benchmarking, we participate in the biennial International Transmission Operations and Maintenance Study (ITOMS) benchmarking exercise. The ITOMS exercise involves the collection of operational asset, system and financial data to produce business level performance indicators. Our performance is benchmarked against other TNSPs both in the Australia/South Pacific region and across the world. Typical outcomes from this benchmarking exercise include sharing best practice asset management regimes and identifying various aspects of our maintenance practices that are either performing well or poorly in comparison with other similar TNSPs.

Figure 30 presents TasNetworks overall benchmarked performance against all other ITOMS participants for the last seven reporting periods. The 2021 benchmarking exercise was delayed due to the COVID pandemic, and the rescheduled 2022 exercise results are yet to be finalised.

Figure 30 ITOMS transmission operating performance benchmarking trend



[12] Sourced from Figure 9 of AER Annual Benchmarking Report, Electricity transmission network service providers, dated November 2021.

The TND identifier denotes Transend Networks, and TAS denotes TasNetworks. The international benchmarked averages (cost and service) are shown as the centre crosshairs, and the regional averages are shown as green circles marked NSA (North/South America), EUR (Europe), ASP (Australia South Pacific), and SCAN (Scandinavia). The further towards the upper right corner, the better the performance.

Figure 30 shows that our benchmarked performance over time remains considerably better than both the international and Australia South Pacific benchmarked averages.

We will continue to keep abreast of advances in asset and system performance improvement and reporting initiatives not only through continued participation in these benchmarking exercises, but also through ongoing close cooperation and sharing of information with counterparts in other TNSPs.

11.3 Tasmanian Supply Reliability

Reliability of supply is a key indicator in measuring network performance and is an indicator of the impact of supply interruptions to customers. We measure the duration, frequency and impact of supply interruptions using different measures for the transmission and distribution networks. We continually analyse the performance of our electricity network and regularly report to the OTTER and the AER against our measures. Our performance against the reliability targets set by the AER is a key component of our service target performance incentive scheme (STPIS).

The following sections provide information on network reliability targets and historical performance.

11.4 Transmission Reliability

Transmission network reliability is monitored and reported to the AER and OTTER in terms of the number of loss of supply (LoS) events that occurred during the year[13]. Loss of supply is measured in 'system minutes' and is calculated by dividing the total energy (MWh) not supplied to customers during an event by the energy supplied during one minute at the time of historical Tasmanian maximum demand[14].

The AER sets our target for the number of loss of supply events allowed per year as part of each regulatory control period. Since 2019 the target has been 3 or less events greater than 0.1 system minute, and 1 or less events greater than 1.0 system minute. The previous target from 2014 to 2018 was 10 or less events greater than 0.1 system minute, and 3 or less events greater than 1.0 system minute. Table 6 below presents the loss of supply performance of the transmission network against the targets.

Table 6 Transmission network reliability performance

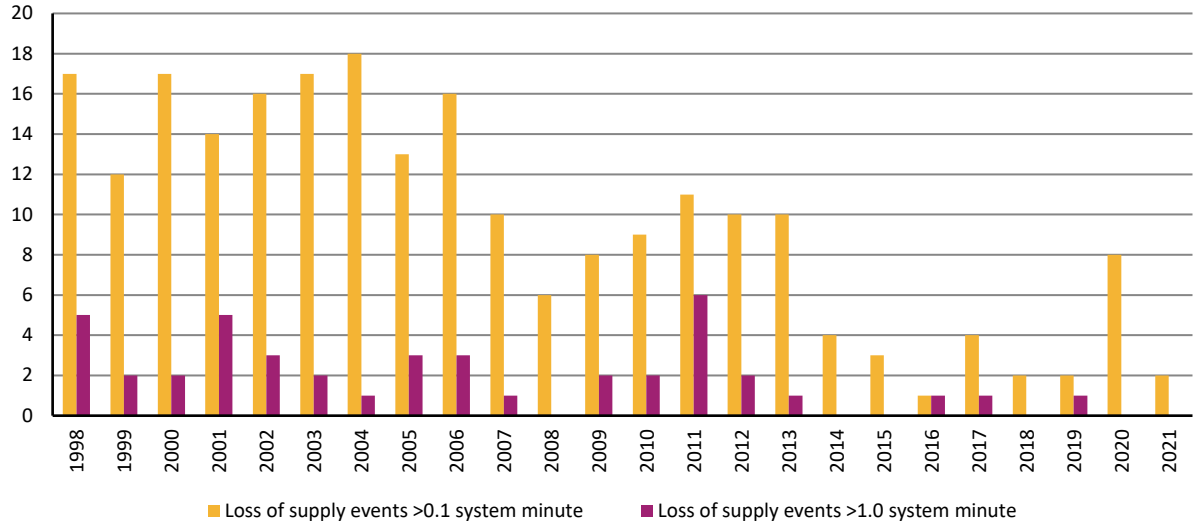
Performance Measure	2019-2024 Target	2015	2016	2017	2018	2019	2020	2021
Number of LOS events >0.1 system minute	≤3	3	1	4	0	2	8	2
Number of LOS events >1.0 system minute	≤1	0	1	1	0	1	0	0

Figure 31 below shows the improvement in loss of supply performance of the transmission network over the long term by calendar year. There were 2 LOS events greater than 0.1 system minute in 2021, and no LOS events greater than 1.0 system minute in 2021, both meeting target.

[13] Reporting to the AER and OTTER is by calendar and financial year, respectively.

[14] An event of one system minute equates to approximately 31.2 MWh of unserved energy.

Figure 31 Transmission loss-of-supply events – long term trend



11.5 Distribution Reliability

Reliability in the distribution network is measured in frequency and duration and reported as averages termed SAIFI and SAIDI totalled over a 12-month period. SAIFI is the System Average Interruption Frequency Index (measured in number of interruptions) whilst SAIDI is the equivalent measure for duration (measured in minutes). A SAIFI of two indicates that, on average, all customers in an area of study experienced two loss of supply events during the year. A SAIDI of 10 minutes indicates that, on average, those customers experienced a cumulative loss of supply for 10 minutes during the year.

For the purposes of measuring distribution supply reliability, Tasmania has been divided into 101 supply reliability communities. Each community is categorised into one of five supply reliability categories:

- Critical infrastructure (1 community);
- High density commercial (8);
- Urban and regional centres (32);
- High density rural (33); and
- Low density rural (27).

The Tasmanian Electricity Code (the Code), enforced by OTTER, specifies the reliability performance standards for both the supply reliability communities and categories. We are required to use reasonable endeavours to ensure that each supply reliability community and category meet these standards. In addition, the AER sets thresholds for the supply reliability categories (not communities) each regulatory control period as part of our performance incentive scheme. These are set based on our actual performance in the preceding five years, with the intention that we maintain our reliability performance. We report distribution reliability to OTTER on a quarterly and financial year basis, and to the AER on a financial year basis.

We are pursuing aligning our different reliability requirements and reporting frequency to promote efficiency.

The following sections report our distribution reliability performance against the thresholds set by the Code and by the AER since 2015-16.

11.5.1 Performance against the Code standards

Supply Reliability Categories

Tables 7 and 8 present our performance for reliability categories for SAIFI and SAIDI, respectively, against the standards specified in the TEC. This performance is provided against the TEC standards as part of our normal reporting process. The standards exclude outages caused by third-party faults and customer plant, and the transmission network.

Table 7 SAIFI supply reliability category performance

Supply Reliability Category	Standard (interruptions)	2015–16	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22
Critical infrastructure	0.20	0.30	0.42	0.15	0.14	0.25	0.15	0.3
High density commercial	1.00	0.41	0.14	0.38	0.41	0.33	0.46	0.7
Urban and regional centres	2.00	1.36	1.25	1.48	1.25	1.28	1.42	1.2
High density rural	4.00	2.84	3.29	3.18	2.39	2.55	2.30	2.8
Low density rural	6.00	4.18	3.86	3.72	3.37	3.26	3.23	4.2

Table 8 SAIDI supply reliability category performance

Supply Reliability Category	Standard (minutes)	2015–16	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22
Critical infrastructure	30	39.97	25.77	29.61	40.90	26.62	15.10	69.76
High density commercial	60	32.31	18.49	70.16	49.66	55.62	62.04	86.31
Urban and regional centres	120	161.87	168.30	227.31	138.38	148.50	182.89	161.10
High density rural	480	471.98	600.87	543.70	291.35	321.20	309.57	503.94
Low density rural	600	805.66	737.58	700.48	527.03	544.40	549.10	1130.70

Supply Reliability Communities

In addition to performance requirements for supply reliability categories detailed above, the Code also sets performance standards for the supply reliability communities within the categories.

Table 9 and Table 10 present our performance for the 101 supply reliability communities against the SAIFI and SAIDI standards, respectively. The tables present the standards specified in the TEC for each community across the five categories, and the number of communities in each category that are not meeting the standard.

Table 9 Number of poor performing communities (SAIFI)

Supply Reliability Category (number of communities)	Standard (interruptions)	2015–16	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22
Critical infrastructure (1)	0.2	1	1	0	0	1	0	1
High density commercial (8)	2	1	0	0	1	1	0	0
Urban and regional centres (32)	4	5	4	2	1	2	2	2
High density rural (33)	6	2	4	2	3	1	1	3
Low density rural (27)	8	1	1	0	1	1	0	2
Total (101)		10	10	4	6	6	3	8

Table 10 Number of poor performing communities (SAIDI)

Supply Reliability Category (number of communities)	Standard (minutes)	2015–16	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22
Critical infrastructure (1)	30	1	1	0	1	1	0	1
High density commercial (8)	120	1	0	1	1	2	2	2
Urban and regional centres (32)	240	11	8	13	6	11	10	11
High density rural (33)	600	4	9	9	5	4	3	10
Low density rural (27)	720	10	11	12	6	8	6	12
Total (101)		27	29	35	19	26	21	36

11.5.2 Performance against AER standards

At the commencement of each distribution regulatory control period, the AER, as part of our revenue determination, sets standards for distribution network reliability. These standards form part of our service target performance incentive scheme (STPIS) and are calculated on our actual performance for the preceding five years. The targets set by the AER exclude planned outages, major event days, total fire ban day related outages, transmission network outages, fire and certain third party outages.

Table 11 and Table 12 present our performance for reliability categories for SAIFI and SAIDI, respectively, against the targets specified by the AER.

Table 11 SAIFI supply reliability category performance (AER)

Supply Reliability Category	Standard (2019-24) (interruptions)	2015–16	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22
Critical infrastructure	0.251	0.26	0.39	0.06	0.01	0.17	0.10	0.05
High density commercial	0.260	0.42	0.10	0.27	0.31	0.27	0.35	0.65
Urban and regional centres	1.081	1.08	0.91	1.26	1.11	1.07	1.19	1.02
High density rural	2.466	2.38	2.53	2.46	2.15	2.36	2.06	2.28
Low density rural	3.219	3.44	3.10	2.79	2.86	2.89	2.77	3.45

Table 12 SAIDI supply reliability category performance (AER)

Supply Reliability Category	Standard (2019-24) (minutes)	2015–16	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22
Critical infrastructure	32.984	30.03	72.69	3.58	5.88	11.16	7.31	3.42
High density commercial	20.074	23.08	4.86	21.89	27.18	43.70	28.89	56.99
Urban and regional centres	89.657	84.26	71.48	104.72	93.89	90.64	107.49	96.86
High density rural	250.959	233.14	241.22	242.58	227.59	250.66	215.62	279.61
Low density rural	400.401	447.18	349.88	320.45	366.43	390.29	360.76	468.12

The High Density Commercial supply reliability category is the only category with below standard SAIDI performance (ie. interruption duration) over the longer term. This reflects the complexity of this network supply category with underground sections creating longer repair times.

11.6 Customer Service

As part of the AER's distribution service target performance scheme (STPIS) and OTTER regulatory reporting requirements, we report on customer service performance in terms of a telephone answering parameter, Table 13. This parameter is defined as the number of calls answered in 30 seconds, divided by the total number of calls received (after removing exclusions).

Table 13 Customer service performance

Telephone Answering	2016–17	2017–18	2018–19	2019–20	2020–21	2021–22
Number of calls	40,944	42,634	37,433	31,402	21,943	32,582
Number of calls answered in 30 seconds	33,504	34,315	31,236	27,537	17,027	25,804
Percentage of calls answered within 30 seconds (%)	81.83	80.49	83.45	87.69	77.60	79.1
Performance Target (%)	73.3	74.78	76.30	76.30	76.30	76.30

11.7 Tasmanian Supply Reliability Summary

We continue to maintain very good reliability performance of the transmission network in recent years. This performance also compares very favourably when compared against our Australian and international peers. This performance resulted from a focus on continual service improvement with many initiatives included in operational and capital programs. This included the following initiatives:

- Incentive schemes to improve performance;
- Continued focus of our incident investigation and remediation process;
- Improved inspection, condition monitoring, data analysis, and maintenance practices; and
- Targeted replacement of unreliable assets.

Our asset management objective on performance (refer section 3.7) includes maintaining overall network reliability performance while ensuring compliance with our relevant requirements. This does

not preclude enhancing network reliability where performance is inadequate or where asset risk is unacceptably high.

Reliability performance of the distribution network has been initially improving, then maintaining performance, but has declined in the last year. Following investment in the previous 2017-2019 regulatory control period to improve reliability, we have adjusted our investment in recent years with a focus on maintaining reliability levels, in line with our asset management objective. However, reliability in a number of communities and categories has not met the target standards in the last year, predominantly due to a number of Major Event Days and other significant weather events. The SAIDI measure is most affected by these events as they tend to affect a number of reliability communities and there are limited resources to attend to these concurrent faults, thereby lengthening the restoration times.

Overall, these performance outcomes are reflective of TasNetworks' current and previous capital investments in augmentation and replacement of network assets. We will be adjusting our forward investment budgets to focus on improving the underperforming areas of our distribution network supply.

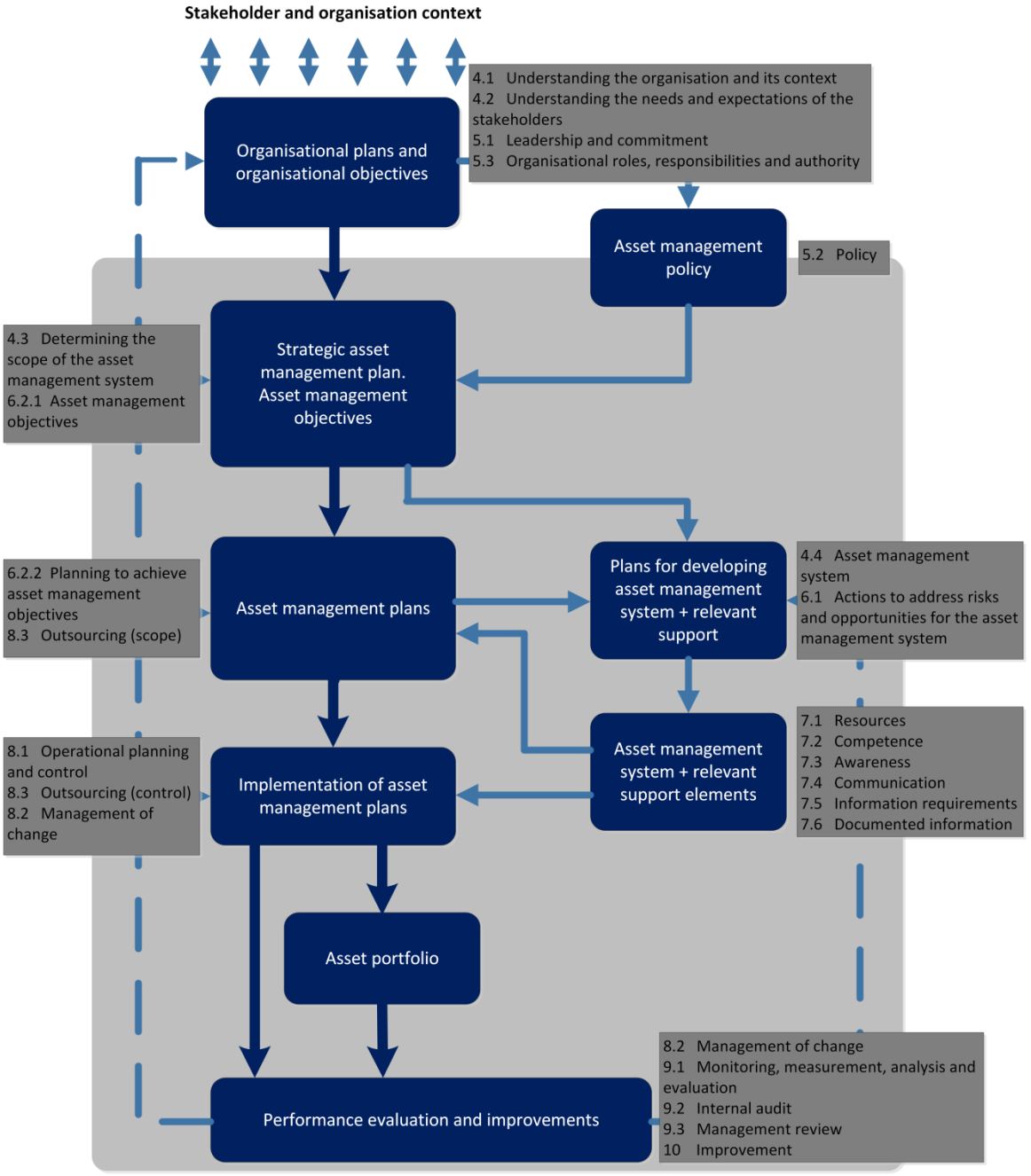
TasNetworks customer service performance in terms of the telephone answering parameter continues to meet the regulatory target.

11.8 Asset Management Maturity

We undertook an independent AM maturity assessment against the requirements of ISO 55001:2014 in December 2019. We had planned to undertake an update assessment in 2022 however this has been deferred until the completion of the current business Transformation project.

The objective of the maturity assessment was to determine our current level of AM process and system sophistication since the business merger in July 2014. The maturity assessment was completed for transmission and distribution network assets, communications assets and dedicated AM system assets. The ISO 55001:2014 assessment framework and structure can be seen in Figure 32 which shows the ISO 55002:2014 relationship between the key elements of an asset management system, together with the related ISO 55001 clauses.

Figure 32 ISO 55002:2014 Relationship between key elements of an asset management system and related ISO 55001:2014 clauses



Note 1 Only the primary connections are shown to avoid over complexity.
Note 2 This does not aim to repeat the distinction between asset management and an asset management system: it is a connections view showing directions of influence.
Note 3 The grey highlighted box designates the boundary of the asset management system.

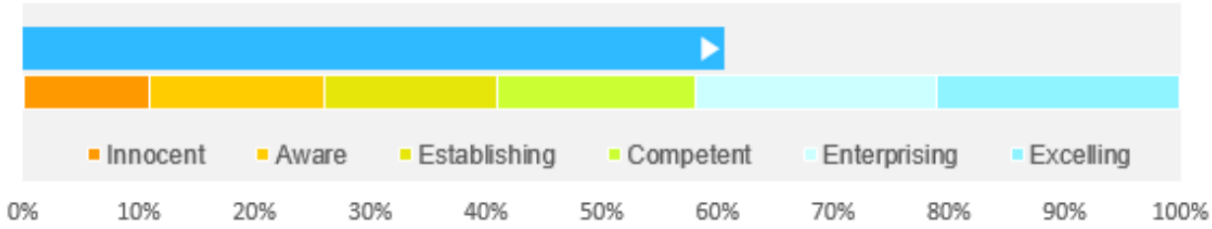
11.8.1 Assessment findings

The AM maturity assessment ratings are categorised against the following six maturity levels:

Innocent	The organisation is not aware of the principle or benefits to be derived from the application of this activity or practice.
Aware	The organisation lacks a stable environment to support this activity, however is aware of the general principles and benefits. Conduct is ad hoc/reactive. There is no or little evidence of documented processes resulting in poor predictability of outcome and processes are not repeatable. No structure is in place and there is heavy dependence on individuals skills and motivations.
Establishing	The organisation provides a more stable environment, processes are documented and repeatable. However, whilst processes are defined for their purpose, they are still mostly reactive (not known and understood), no real commitment from the organisation. Activities are generally based on previous experience.
Competent	The organisation provides a stable environment, processes are documented and repeatable. Commitment from the organisation is demonstrable and activities are assured to conformity with the processes and their goals. Output is measured, managed proactively, outcomes are qualitatively predictable.
Enterprising	The organisation provides a stable environment, processes are well defined, understood and implemented. Tasks, responsibilities and authorisations are well defined and communicated, targets for quality are set and results are measured (performance measurement). Deviating behaviour is immediately addressed. Process is controlled and managed, outcomes are quantitatively predictable. Inputs to this process come from other well controlled processes. Outputs go to other well controlled processes.
Excelling	The organisation provides a stable forward thinking environment. Processes drive quality improvements and new business opportunities beyond the process. There is evidence of successful innovation, quality management and continuous improvement activities. The organisation is able to address the causes of process variation and adapt itself and identify success factors and contribute to the organisation's success.

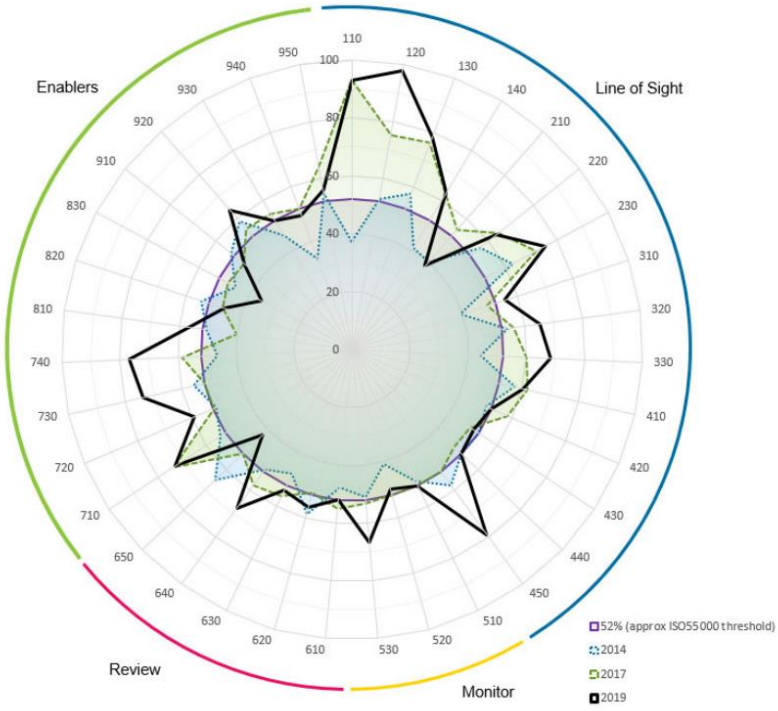
The 2019 assessment resulted in a current competency score of 61 per-cent, which indicates we are in the lower end of 'Enterprising' AM performance as presented in Figure 33 below.

Figure 33 Asset management competency score



The current competency score of 61 per-cent is considered a significant achievement, as an overall improvement in most competency levels was observed since the previous assessments in July 2014 and July 2017. The assessment also enabled a baseline competency level to be established for our AM, which is presented in Figure 34. The purple circle defines the level required by all categories for ISO 55001:2014 competency.

Figure 34 Asset management competency levels



11.9 Asset Management Improvement Program

The Asset Management Improvement Program (AMIP) is a permanent part of TasNetworks asset management system framework. It is an ongoing program designed to continuously improve TasNetworks processes, people, data, systems and technology, to more effectively and efficiently deliver our Program of Work. The primary objective of the AMIP is to continually uplift the maturity and performance of TasNetworks asset management system in alignment with ISO 55001:2014.

AMIP does this by:

- Providing a standardised process to evaluate, prioritise, implement and sustain improvements, aligned to corporate strategies and customer needs;
- Auditing, evaluating and mapping our AM processes to identify gaps and opportunities for improvement;
- Monitoring AM system performance, data quality, and people capability to identify gaps and opportunities for improvement;
- Taking corrective action as well as managing projects or activities to close identified gaps;
- Benchmarking with our peers and externally seeking out best practices and solutions;
- Identifying cost reduction opportunities;
- Implementing improvements, tracking the progress and measuring the results;
- Managing change and raising awareness through effective communications; and
- Ensuring the sustainability of improvements so that the benefits are fully realised.

The initial July 2014 AM maturity assessment, as well as subsequent assessments, identified gaps in TasNetworks' AM system and recommended a prioritised set of improvements. These recommendations provided the key inputs into the development of our Asset Management

Improvement Program. The AMIP work streams and the activities undertaken are structured to ensure alignment with ISO 55001:2014.

Since the initial assessment in 2014 we have made significant progress in completing most of the improvement actions that have been identified and included in the AMIP. However, some actions remain outstanding and require further work, as we continually improve to meet the challenges of the changing electricity industry in Tasmania.

The key activities delivered to date have been:

- Update of the AM policy;
- Alignment of AM objectives to organisational objectives;
- Update of the Strategic Asset Management Plan;
- Consumer and stakeholder engagement in development of future expenditure programs;
- Targeted recurrent investment in IT/OT associated with the improvement of Asset Management Information System (AMIS) components underpins ongoing improvement;
- AM document framework development and implementation;
- Introduction and staffing of a permanent AM Improvement process / function;
- Alignment of AM plans to ISO55000 requirements for all assets;
- Introduced configuration management processes to ISO10007 requirements, including standard engineering designs, bills of materials and task lists for high-volume assets;
- Design and implementation of an asset defect management governance framework;
- Rationalisation and simplification of operational inspection and maintenance activities;
- Significant uplift, and continual improvement of asset data completeness and quality;
- Implementation of contemporary asset risk management software (Copperleaf); and
- Development of a common end-to-end works management process.

Appendix A – Asset Management Policy

POLICY
ASSET MANAGEMENT

TasNetworks delivers electricity and telecommunication network services, creating value for our customers, our owners and the community.

This Asset Management Policy applies to all TasNetworks assets and associated activities. Our team members and contractors must comply with this policy and will be supported, resourced, and trained to follow this policy and associated documentation.

Consistent with our vision and purpose, we strive for excellence in asset management and are committed to providing a safe working environment, value for our customers, sustainable shareholder outcomes, care for our assets and the environment, safe and reliable network services, whilst effectively and efficiently managing our assets throughout their life-cycle.

To achieve this commitment, together we will:

- manage our assets to meet the strategic goals, measures and initiatives outlined in the Corporate Plan;
- comply with relevant legislation, licences, codes of practice, and industry standards;
- apply contemporary condition assessment and risk management techniques to identify and effectively manage risks and opportunities, including at a portfolio level;
- continually adapt, benchmark and improve asset management strategies and practices and apply contemporary asset management techniques, consistent with industry best practices;
- develop and continually improve asset management processes and systems to optimise asset management efficiencies and decision making processes;
- adopt the lowest whole-of-life cost solutions, cognisant of risk, for investment in asset creation, replacement or refurbishment projects;
- operate assets safely within prescribed limits and apply dynamic ratings where appropriate;
- maintain a complete and accurate register and documentation system of all our assets;
- prepare and maintain high quality asset management plans, standards, guidelines and procedures;
- ensure our team members are trained, authorised and competent to undertake their work activities;
- work closely with internal and external service providers and contractors to ensure that work performed on assets is consistent with the relevant standards and this policy; and
- undertake periodic audits to ensure assets are being managed in accordance with this policy and the asset management framework, plans, standards, guidelines and procedures.

Seán Mc Goldrick
Chief Executive Officer

Roger Gill
Chair

This policy forms part of TasNetworks' asset management system and framework, which is maintained in accordance with Australian and international standard AS/NZS ISO 55001:2014.

25 August 2022

TasNetworks

Appendix B – Zero Harm Policy

Zero Harm Policy
Health, Safety, Environment and Quality

TasNetworks delivers electricity and telecommunication network services, creating value for our customers, our owners and the community.

Zero Harm is about looking after ourselves, our workmates, our contractors, the community and the environment at all times. It is about raising awareness and focusing on behaviours to continually improve the way we work at TasNetworks.

This Zero Harm Policy applies to all TasNetworks activities. Our team members and contractors must comply with this policy and will be motivated, resourced, and trained to follow this policy and associated standards and procedures.

Our Zero Harm goals are:

- No harm to our people and the public
- Minimising our impact on the environment

We will actively engage and consult with our people, our customers and other relevant stakeholders to achieve Zero Harm. Achieving Zero Harm requires ongoing and unwavering commitment from all TasNetworks team members and contractors.

This commitment means you are responsible for:

- Working safely – demonstrating a strong safety culture and positively intervening in at-risk situations
- Working in accordance with the law and TasNetworks' policies, procedures and work practices
- Demonstrating care for the environment in the way you work

To achieve this commitment, together we will:

- Carefully plan and manage our impacts, proactively identify and manage risks so far as is reasonably practicable to prevent harm
- Intervene, delay or stop activities that have the potential to cause injury, ill health or adverse environmental impacts, including pollution, until effective controls are in place
- Actively encourage each other to improve health, safety, general wellbeing and fitness and ensure employees are supported when injured or ill, regardless of whether the injury or illness occurred at work or at home
- Ensure our team members are trained, authorised and competent to undertake their work activities
- Seek out, identify and implement opportunities that create value by integrating sustainability principles into our activities, using resources efficiently, minimising waste and physical impacts
- Take responsibility for the quality of our work and participate in achieving quality outcomes for our customers
- Actively report all health, safety and environmental incidents, issues or concerns, including near-hits, and recommend solutions to health, safety, environment and quality issues
- Set and regularly review health, safety, environment and quality objectives and targets to achieve continual improvement, monitor performance and recognise and reward achievements

Our standards and procedures are designed to follow best practice codes and support compliance with the law.

We manage health, safety, environment and some key business processes within an integrated management system. We will not compromise on Zero Harm while working to meet our customers' needs and delivering quality outcomes.

Lance Balcombe
Chief Executive Officer

Dr Dan Norton
Chairman

TasNetworks
Delivering your power

Appendix C – Glossary and Abbreviations

Glossary

The definitions provided here are common electricity industry definitions, provided to assist readers who may be unfamiliar with particular industry terminology.

Terms marked [R] are also formally defined in Chapter 10 of the National Electricity Rules (the Rules). The definitions given below may be different from the Rules definitions. For the purposes of interpreting the requirements of the Rules, the formally defined terms within the Rules should be used.

Basslink	A privately owned undersea cable connecting the Tasmanian electricity network to that of mainland Australia. Basslink is described in Section 4.2
Bay	The suite of electrical infrastructure installed within a substation to connect a specific incoming transmission line, distribution feeder, transformer or generator to the main body of the substation.
Code	Refers to the Tasmanian Electricity Code. The Code addresses Tasmanian jurisdictional interests which are not dealt with by the Rules.
Distribution network	The suite of electrical infrastructure assets required to transmit power from the transmission network to the consumer. [R]
Embedded generator	A generating unit that is directly connected to the distribution network as opposed to the transmission network. [R]
Energy generated	The total amount of electrical energy injected into the transmission network to meet the Tasmanian energy sales. It comprises the energy sent out from Tasmania's power stations, plus the energy imported via Basslink, minus energy exported to Basslink. It includes network losses but excludes power station auxiliary loads.
Energy sales	The total amount of electrical energy consumed in Tasmania for a particular period.
ESI Regulations	Reference to the Electricity Supply Industry (Network Planning Requirements) Regulations 2007.
Guaranteed Service Level scheme	A payment scheme where our retail customers are compensated for prolonged and excessive interruptions to their supply.
kilo-volt	One kilo-volt equals 1,000 volts. See also: voltage.
market network service provider	A network service provider whose network links two connection points located in different NEM regions, the power transfer between which can be independently controlled and dispatched via the central dispatch process. The network must not be the subject of a revenue determination by the Australian Energy Regulator. Basslink is the only MNSP in the NEM. [R]

Marinus Link	Marinus Link is a proposed 1500 megawatt capacity undersea and underground electricity connection to further link Tasmania and Victoria as part of Australia's future electricity grid. Marinus link is described in Section 4.3
network	The apparatus, equipment, plant and buildings used to convey, and control the conveyance of, electricity to customers. See also: distribution network; transmission network. [R]
non-network solution	A solution to a network issue that does not require the construction of a network augmentation. Examples include electronic control schemes and demand side management.
Rules	The National Electricity Rules
substation	An installation of electrical infrastructure at a strategic location on the network to provide the functions of voltage transformation, switching and voltage conversion. [R]
switching station	A substation without transformers, operating at a single voltage level.
transition station	Refers to the network location where a transmission circuit transitions from underground cable to overhead transmission line, or vice versa.
transmission network	The suite of electrical infrastructure required to transmit power from the generating stations to the distribution network and directly connected industrial consumers. In Tasmania, the transmission network comprises the network elements that operate at voltages of either 220 kV or 110 kV, plus the equipment required to control or support those elements. [R]
voltage	The force which causes electrical current to flow. [R]

Abbreviations

Acronym	Description
AC	Alternating Current
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
APR	Annual Planning Report
DC	Direct Current
DNSP	Distribution Network Service Provider
EHV	Extra High Voltage
ESI	Electricity Supply Industry
GSL	Guaranteed Service Level
GWh	Gigawatt hour

Acronym	Description
Ha	Hectare
HV	High Voltage
Hz	Hertz
kA	Kiloamps
kV	Kilovolts
LEOY	Likely end of year
LOS	Loss of Supply
MAIFI	Momentary System Average Interruption Duration Index
MED	Major Event Days
MD	Maximum Demand
MNSP	Market Network Service Provider
MV	Medium Voltage
MVA	Megavolt Amperes
MW	Megawatts
MWh	Megawatt hour
NEM	National Electricity Market
NER	National Electricity Rules
OTTER	Office of the Tasmanian Energy Regulator
PV	photovoltaic [solar generation system]
REC	Renewable Energy Certificate
RET	Renewable Energy Target
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SCADA	Supervisory Control And Data Acquisition
SPS	System Protection Scheme
STPIS	Service Target Performance Incentive Scheme
TNSP	Transmission Network Service Provider

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