

# AusNet



## Transmission Revenue Reset TRR (2027-32)

Advanced Energy  
Management System (AEMS)

Friday, 31 October 2025

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## Document history

| DATE       | VERSION | COMMENT                                   |
|------------|---------|-------------------------------------------|
| 15/09/2025 | V1.0    | Initial draft business case for review    |
| 30/09/2025 | V2.0    | Revised business case incorporating input |
| 13/10/2025 | V3.0    | Updated for final review                  |
| 29/10/2025 | V4.0    | Final business case document              |

## Related documents

| DOCUMENT                                | VERSION | AUTHOR          |
|-----------------------------------------|---------|-----------------|
| Technology Strategy and Investment Plan | V2.0    | AusNet Services |
| Digital Program NPV Model               | V2.0    | AusNet Services |

## Approvals

| POSITION                                                           | DATE         |
|--------------------------------------------------------------------|--------------|
| Digital & Technology – Strategy, Regulatory and Partner Management | October 2025 |
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# Executive Summary

The Advanced Energy Management System (AEMS) is a technology platform used by AusNet's transmission service to monitor and control the transmission network in real time, manage planned and unplanned outages, and optimise decision making. It is critical to mitigate the risk of system blacks and station blacks that would cause widescale outages for Victorians. It is also essential for AusNet to undertake planned outages in an efficient way to ensure that market prices can be as low as possible for customers.

In the current period, AusNet is uplifting its capabilities in AEMS in planned outages including remote switching thorough tablets, and improved incident and access reporting. We are also improving our contingency and short circuit contingency analysis.

Our capability gap assessment indicates a need to further uplift our AEMS capabilities in the TRR 2027-32 period to maintain the reliability and security of the national electricity system, consistent with the National Electricity Objective. Over the next decade, the Victorian power system will accelerate its transition to renewable energy, with the closure of coal plants and new solar and wind resources being added to the generation stock. Renewables will grow from 31 per cent of electricity production to 65 per cent by 2030 and 95 per cent by 2035 under Victorian Government targets. While the shift to renewable energy is essential, it increases the risk to the power system with increasing likelihood of system and station blacks. This is because renewable inverter-based generation energy does not have the same power stability qualities of the spinning machine technologies they are displacing including frequency control, inertia and system strength.

In addition, we expect that planned outages will increase significantly in the TRR 2027-32 period as we undertake upgrades and replacements, and as the network continues to age. We recognise that planned outages can lead to higher wholesale prices by constraining lower cost generation.

We have undertaken a capability gap assessment to ensure the AEMS can meet the challenges of an acceleration in renewable energy and increase in planned outages. We have been guided by peer assessment which shows that we have relatively low maturity on a spectrum of AEMS capabilities compared to other transmission networks in Australia. We have also been guided by industry roadmaps such as AEMO's Operations Technology Roadmap and the Engineering Framework which provided a system wide view of capabilities required to enable transformative change while maintaining electricity system reliability, security and resilience.

Through the capability gap assessment, we identified four broad needs in the TRR 2027-32 period requiring an uplift to our AEMS capabilities:

- Uplift emergency and contingency response (system black) – we see a need to uplift our wide-area monitoring and simulation training to mitigate the growing risk of system blacks.
- Mitigate risk of increased unplanned outages (station black) – we have identified a need to improve the accuracy of our ratings and model management and to improve visibility of the impact of rooftop solar on our terminal substations.
- Improve effectiveness of controllers in a more complex environment – to ensure that we can meet the increased cognitive load of controllers, we see a need to uplift our training and knowledge, data and tools to such that we minimise the need to increase resources.
- Opportunities to improve planned outages – We see a need to uplift our Transmission Access and Switching Management (TASM) system to more effectively manage the increasing number of planned outages on the network. This will reduce the constraints on low cost generation dispatch.

Based on these risks and capability gaps, we identified a suite of initiatives that would address the needs. We then undertook a net present value assessment of four pathway options.

- **Option 1** provided a counter-factual where we would maintain the current state of our AEMS without any capability uplift in the TRR 2027-32 period.
- **Option 2** was a set of initiatives that would improve our maturity across capabilities to a level on par with peer networks, but not increase our maturity in areas where we are high maturity such as SCADA.
- **Option 3** included the uplift initiatives in Option 2 but also extended our maturity in areas where we had high maturity.
- **Option 4** included additional initiatives that would enable AusNet to be a leader in AEMS capabilities.

The options assessment considered benefits including the avoided cost of system events and station blacks, reduced need to hire new staff, reductions in the market pool price, and avoided safety events. While Option 4 maximises capabilities and benefits, the net present value analysis showed that Option 3 was the recommended option as detailed in **Table 1** below.

**Table 1 – Summary of options and assessment outcomes**

| # | OPTION NAME                                                       | CAPEX (\$'M) | OPEX (\$'M) | NPV (\$'M) | PREFERRED  |
|---|-------------------------------------------------------------------|--------------|-------------|------------|------------|
| 1 | Retain current EMS state (no further investment)                  | \$0          | \$0         | \$0        | No         |
| 2 | Uplift AEMS capability to peers where maturity low                | \$39.2       | \$10.7      | \$103.8    | No         |
| 3 | Enhance AEMS capability to keep pace with peers                   | \$73.8       | \$15.1      | \$189.3    | <b>Yes</b> |
| 4 | Further enhancements to make AusNet a leader in AEMS capabilities | \$130.3      | \$15.2      | \$138.8    | No         |

Consistent with recommended Option 3, we are proposing \$73.8 million capex (\$real, 2025). **Table 2** identifies the total expenditure for this program, incorporating capex and implementation opex (as per SaaS implementation and configuration accounting guidelines), and ongoing licencing and support opex. All expenditure in this program is 100% allocated to AusNet's transmission business.

**Table 2 – Annual expenditure required for AEMS (\$'M, real 2025)**

| Cost item                                                  | R2028         | R2029         | R2030         | R2031         | R2032         | Total          |
|------------------------------------------------------------|---------------|---------------|---------------|---------------|---------------|----------------|
| Capex                                                      | \$12.02       | \$15.00       | \$14.25       | \$16.00       | \$16.50       | <b>\$73.77</b> |
| Project Implementation Opex ("propex", non-recurrent opex) | \$3.25        | \$0.00        | \$0.00        | \$0.00        | \$0.00        | <b>\$3.25</b>  |
| Ongoing Licences & Support Opex (recurrent opex)           | \$0.43        | \$1.31        | \$2.31        | \$3.74        | \$4.04        | <b>\$11.83</b> |
| <b>Total</b>                                               | <b>\$15.7</b> | <b>\$16.3</b> | <b>\$16.6</b> | <b>\$19.7</b> | <b>\$20.5</b> | <b>\$88.84</b> |

**Note:** this is recurrent opex that is associated with the new systems implemented under non-recurrent capex so is additional to baseline opex

# 1. Context

In this section, we provide context on the role of the Advanced Energy Management System (AEMS) in enabling AusNet to operate our transmission services securely, reliably and safely for electricity customers in Victoria. We discuss our current state and drivers of new investment.

## 2.1 AEMS underpins security and reliability

The AEMS is a technology platform used by AusNet and other transmission network operators to monitor the real-time status of the high-voltage network, assist with control of the network including switching and emergency operations, and to forecast and optimise power system operation. Specifically, the AEMS supports:

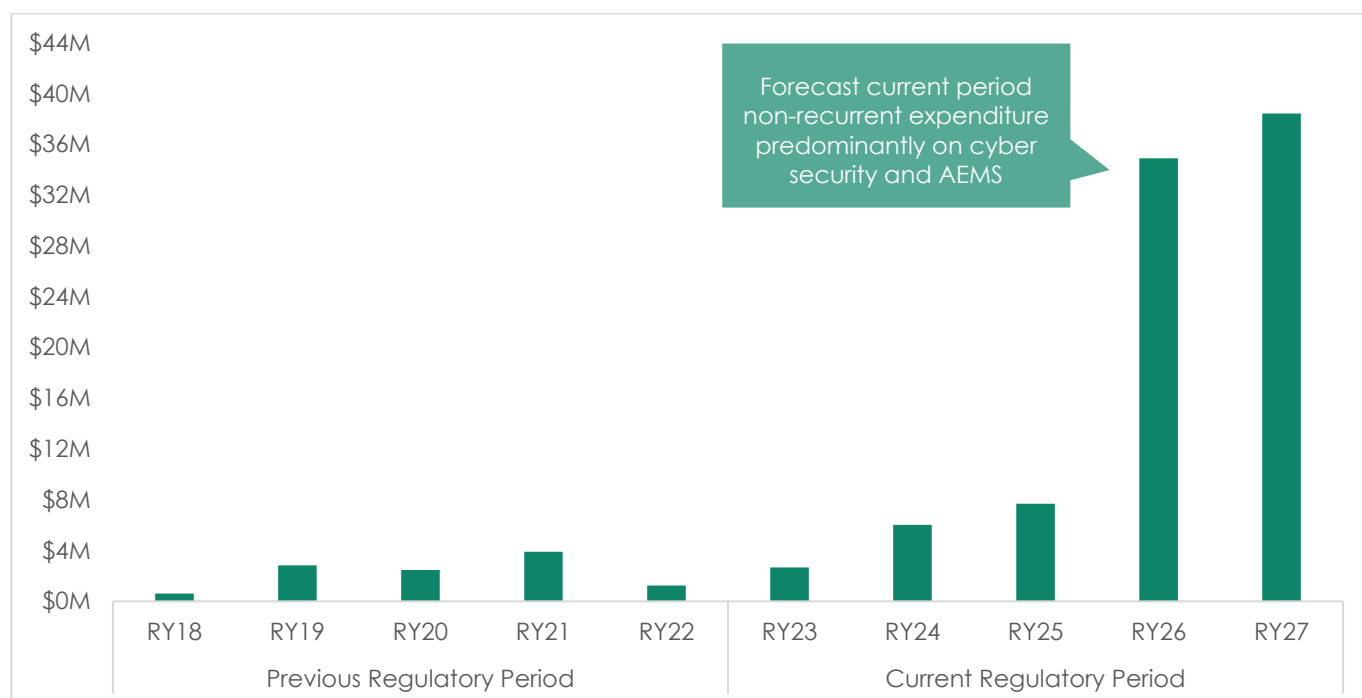
- Real-time monitoring - Tracks line flows, voltages, transformer loading, events/alarms and provides a live model of the grid using SCADA software.
- Control and dispatch support - Enables control signals for switching, tap-changing transformers, reactive power devices and interfaces with AEMO's systems to reflect capability.
- Outage and contingency analysis - Enables simulations to see how the network behaves if a line or generator trips and used when planning or executing planned outages to ensure the grid remains secure.
- Renewables and storage integration - Models and manages new challenges like variable solar/wind output, inverter controls, and distributed storage.
- Decision support and optimisation - Provides operators with tools to manage unplanned events, monitor for non-credible events, track complex design behaviour, and monitoring market and inter-regional issues. Also, supports compliance with the National Electricity Rules (NER) for reliability and security.

## 2.2 Current state

Over the past 7 years, AusNet has made relatively limited investments in new digital capabilities for the transmission business, as shown by **Figure 1** below. We have focused on maintaining the resilience of our existing applications and systems and enhancing cyber security maturity. This has enabled low cost to our customers.

As part of our 2022-27 regulatory proposal, AusNet sought to commence uplift our capabilities, particularly in AEMS after this period of limited expenditure. Figure 1 highlights that we are now commencing this necessary capability uplift.

**Figure 1 – Non recurrent digital capex between RY18 and RY27 (\$m, real 2025)**



In the TRR 2022-2027 period, we have focused on the following incremental improvements in capacity for AEMS:

- Investing in the Transmission Access and Switching Management (TASM) Phase 1 – We will have improved our ability to undertake electronic based remote switching, and improve our ability to communicate access restrictions and report incidents.
- Ratings Management Phase 1 – We will have improved our models on asset utilisation and risks to assets enabling a single source of truth.
- Contingency Analysis – We have improved our contingency and short circuit contingency analysis to inform our understanding of risks.
- Minimum system load – We have established processes for minimum load events including monitoring of Underfrequency Load Shedding.

While we have made significant improvements to our AEMS capabilities, we still trail other networks in terms of maturity across a spectrum of capabilities.

## 2.3 Drivers of new investment

AusNet will need to uplift our monitoring and control capabilities of the transmission system over the next decade to meet power system challenges associated with a sharp acceleration in the transition to renewable energy. Without an uplift, we face much higher risks of power system events and station blacks. At the same time, we recognise opportunities to improve our planned outage process and systems to minimise outage times and reduce wholesale prices.

### Impact of the energy transition on increasing power system risks

Australia's electricity power system is undergoing a transformative change, as we transition from mass thermal generation to decentralised renewable generation. In 2024, Victoria's electricity consumption was comprised of about 31 per cent renewable energy. Under the Victorian Government's renewable targets renewables will grow to 65 per cent by 2030 and 95 per cent by 2035.

While the transition to renewable energy is essential, it risks power system security as we move from a largely synchronous generation base to inverter-based technologies like solar, wind, and batteries. These technologies, while clean and scalable, fundamentally alter how the grid behaves. Unlike traditional thermal generators that spin massive turbines and provide inertia, inverter-based resources rely on software to convert direct current to alternating current, creating the following risks to power system security:

- No natural resistance to frequency fluctuations.
- Increased risk of sub synchronous oscillations, where inverters fall out of sync and destabilise the grid.
- Vulnerability to software bugs, misconfigurations, and cyber threat.

In addition, the dynamics of bi-directional flow from rooftop solar and embedded generation create further complexity to operating our physical infrastructure that was traditionally designed for one-way flow. Currently, we are layering remedial software on top of these assets. This increases the risk of overloading our stations.

Finally, the dynamics of large new loads from data centres will compound the complexity of operating the transmission system. Modern data centres are also inverter-based. Their power electronics behave unpredictably during faults, adding to grid instability.

In Section 3.1, we show how this driver has impacted our assessment of needs to mitigate increasing risks of power system and station black events and reducing the cognitive load on controllers.

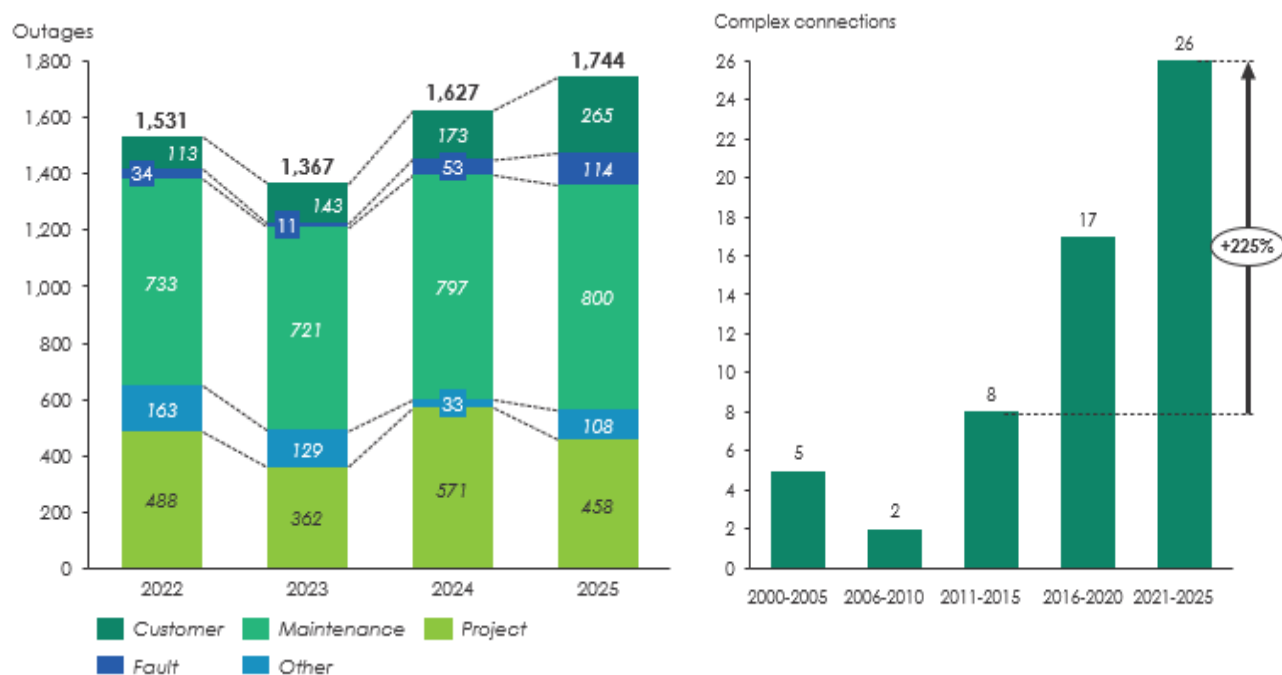
### Increasing number of planned outages

Transmission networks are required to undertake planned outages to enable appropriate maintenance and inspections, to install new assets or replace existing assets that are in deteriorated condition, or for a safety reason. Planned outages can have a material impact on the wholesale price of electricity. When a transmission line or element is out for maintenance, the flow of electricity is restricted, potentially causing congestion of a cheaper generation source. In this context, improving the efficiency of planned outages can reduce the amount of time that a transmission element is out of service.

We expect that AusNet's unplanned activity will significantly increase in TRR 2027-32 period relative to current levels based on historical trajectory. **Figure 2** shows the volume of planned outages including complex connections over the last 4 years. We note that:

- Groups are competing for access to the network but also for the resources performing the work. The resourcing and windows do not always align.
- There are more connections resulting in more complex outage planning. Commissioning works take materially longer to plan as all the models, protection, telemetry, procedures, testing and sequencing have to be validated.
- The network is being pushed to the technical limits. Each outage requires more assessments also resulting in more outage rescheduling and cancellations. These limitations are for various security situations for example voltage, short circuit and transient stability.
- Maintenance will increase over time as we put more assets on the network.
- Market impact is a key consideration - if constraints are significant, outages are often replanned or rejected

**Figure 2 - Number and complexity of outages**



## 3. Needs identification

The purpose of this section is to identify the need to uplift in the AEMS capabilities in the TRR 2027-32 period. We then discuss the initiatives and the underlying needs.

### 3.1 Identified needs

In this section, we articulate the underlying needs based on the drivers discussed in Section 2.3.

#### Uplift emergency and contingency response (system black)

A system black is a large-scale disturbance that results in widespread outages due to grid collapse. These events are extremely rare, but the consequences for Victorians would be extremely high. The risk of a power system event, while very low, will increase over the next decade as we accelerate the transition from synchronous generation to inverter-based technology such as solar and wind, with renewable energy sources growing from 35 to 40 per cent today to 95 per cent by 2035.

In this context, it is vital that AusNet consider improvements in the AEMS to mitigate the risk of system blacks through improved capability in terms of wide area monitoring, enhancements to SCADA, and training for our controllers to improve the effectiveness of how we respond.

#### Mitigate risk of increased unplanned outages (station black)

A station black is the complete loss of a power station from the grid due to a fault such as short circuit or equipment failure, protection system tripping, system instability from voltage or frequency issues, or external events such as a storm, fire or human error. The consequences can be severe including wide-scale outages to a region, frequency drop and grid instability that can lead to potential cascading system event.

Similar to a system black, the risk of a station black is increasing as we transition to a renewable energy system that is more sensitive to disturbances on the network. Further, as climate change worsens, we are at risk of more extreme weather that heighten the risk of station blacks. In response to growing risks, we see a need to uplift our ratings data and models to ensure accuracy and the ability to provide that information to AEMO. We also see a need to improve our monitoring of weather threats.

#### Improved effectiveness of controllers in a more complex environment

In a more dynamic and less stable transmission system, control room operators face significantly higher workload and are required to make complex decisions. For example, controllers have to more closely monitor dynamic conditions, such as fluctuating wind and solar output from the weather, while also actively managing increasing risks of power system instability such as fault levels and system limits.

This environment increases the mental workload required to maintain system stability as operators need to make faster, more complex decisions to prevent cascading failures or load shedding. Day-to-day activities shift from routine monitoring to proactive contingency planning and continuous risk assessment. In a more fragile system, an error is more likely to result in an adverse outcome. Situational awareness and early intelligence such as from security cameras and drone inspections enhance visibility and safety, enabling faster response times and earlier recovery.

To meet the increased needs of AusNet's control room, we see a need to uplift capabilities through improved training that integrates with AI tools, improved decision-making tools such as an improved alarm alert system, and more intuitive visualisations to process large amounts of information efficiently.

#### Opportunities to improve planned outage

As discussed in Section 2.3, we expect an increase in the volume of planned activities in the TRR 2027-32 period. We see a need to invest in an uplift to our current Transmission Access and Switching Management (TASM) system to enable faster processing of successful network access requests and to reduce unsuccessful network access requests. This will help us to minimise the additional staff we would have required to plan and coordinate scheduled work. It also minimises the impact on the wholesale energy prices by curtailing the number and duration of planned outages.

## 3.2 Capability gap assessment

In determining the extent of uplift we need in our capabilities, AusNet undertook benchmarking analysis of our maturity relative to other transmission networks and with consideration of industry roadmaps.

Our starting point was to consider AEMO's engineering framework and operational technology roadmaps to provide an industry lens on the capability required in the future to enable transformative change while maintaining electricity system reliability, security and resilience. AEMO's Engineering Roadmap program aims to prepare Australia's power systems for operation at times of high renewables contribution. In effect, the Roadmap identifies key areas that AEMO and transmission networks need to build capability to uplift operational capabilities and prepare for transition points. The Operational Technology roadmap effectively provided a capability model to baseline the capabilities in system control and resilience. The work feeds into the future state architecture development and is a foundational process to identify and address needs in the years ahead.

The imperative for implementing system control and resilience capabilities is highlighted by the scale of AEMS investment being undertaken by industry. **Table 3** shows that both peer transmission networks and AEMO are significantly uplifting their AEMS capabilities.

**Table 3 – Total expenditure on AEMS over the last decade (\$m)**

|             | Transgrid                                                                                                                                                                                                                                  | Powerlink                                                                                                                                                                                   | AEMO                                                                                                                                                                                             |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Project     | System Security Roadmap<br>Operational Technology<br>Upgrades                                                                                                                                                                              | Next Generation Network<br>Operations Program (NGNO)                                                                                                                                        | Operations Technology<br>Program (roadmap)                                                                                                                                                       |
| Description | A substantial uplift in information and analysis capabilities across operational control and operational planning functions, due to an increase in the number and new types of assets, in combination with changes in generation and load. | Significant investment in their NGNO program (in alignment to AusNet's AEMS capabilities) to secure core operational services supporting the need to meet future energy management needs.   | New technology that improves system monitoring and simulation capability, increasing visibility of real-time and forecasted system positions, resulting in better decisions and market outcomes. |
| Cost        | \$212 million in capital expenditure over the 2025-33 period (PACR update) <sup>1</sup>                                                                                                                                                    | Powerlink's draft 2027-32 proposal <sup>2</sup> reported \$180m additional capex in relation to NGNO related projects, compared to the allowance for NGNO in the current regulatory period. | In FY26, AEMO investing \$38.6 million on "designing and modernising market operations systems" <sup>3</sup>                                                                                     |

Sources: 1. Transgrid's System Security Roadmap Operational Technology RIT-T Project Assessment Conclusions Report update, accessed [here](#); 2. Powerlink 2027032 Revenue Proposal (Draft) September 2025, accessed [here](#); 3. Budget and Fees FY26, page 39, accessed [here](#)

Our second step was to identify the core capabilities associated with the needs identified in Section 3.1 and assess our relative maturity. **Table 4** provides a relative maturity scale of AusNet compared to our transmission network peers. While we have high maturity in our SCADA capabilities, we have low maturity in our wide area monitoring which increases the risk associated with power system events. In terms of mitigating the risks of station blacks, we have relatively mature ratings management but have low maturity in respect of models and alarms management. Overall, we have relatively low maturity in systems that improve the effectiveness of our controllers including switching, incident and access management. While we have high maturity of data management for planned outages we have low maturity for controller training platforms.

**Table 4 – Benchmarking assessment**

| Identified needs                                                  | Capabilities                  | AusNet maturity |
|-------------------------------------------------------------------|-------------------------------|-----------------|
| Mitigate increasing risk of power security events (System blacks) | Wide Area Monitoring          | Low             |
|                                                                   | EMS/SCADA system enhancements | High            |
| Mitigate risk of increased unplanned outages (Station blacks)     | Dynamic Ratings               | High            |
|                                                                   | Model Management              | Low             |
|                                                                   | Ratings Management            | Medium          |
|                                                                   | Alarms Management             | Low             |
| Improved effectiveness of controllers                             | Controller training platforms | Low             |
|                                                                   | Data management               | High            |
| Improve efficiency of planned outages                             | Switching Management          | Low             |
|                                                                   | Incident Management           | Low             |
|                                                                   | Access Management             | Low             |

Overall, the analysis suggests the need for AusNet to reach best practice as other networks respond to drivers of change over the next decade. **Appendix A** provides more detailed peer comparison of each network.

### 3.3 Initiatives to meet identified need

Based on a bottom-up analysis, we identified initiatives that would meet future needs and would effectively lift AusNet's maturity to be a leader by the 2032 period. As discussed in our options assessment, we then categorised the initiative as either maintain current capability (Option 1), catch up to peers (Option 2), keeping pace with increasing maturity of our peers (Option 3), and being the leader across all AEMS categories (Option 4). We have identified whether the initiatives relate to one or more of these options, noting that new initiatives are excluded from Option 1.

## Initiatives to uplift emergency and contingency response

**Table 5** identifies initiatives that address the four identified needs, and the estimated cost. These initiatives relate to improving our monitoring of the entire network for conditions that could give rise to system blacks, and improving our preparedness for these events. The "Options" column details which cost-benefit evaluation option in Section 4 incorporates each initiative.

**Table 5 – Initiatives to uplift emergency and contingency response**

| Initiative                                                   | How addresses identified needs                                                                                                                                                                                                                                                                                                                                                                                                                             | Capex   | Options    |
|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------|
| Wide Area Monitoring System (WAMS) Phase 1                   | Wide Area Monitoring refers to the ability to detect electrical oscillations across the transmission network. The system would provide AusNet with the ability to collect, alert and monitor oscillations across broader part of the network.<br><br><i>Capability Addressed: Wide Area Monitoring</i>                                                                                                                                                     | (C-I-C) | 2,3, and 4 |
| PMU data for incident response and investigation             | This is a precursor to WAMS Phase 1. We will be commencing the project in the current period, with the carry over spend included in the RY2028-32 period.                                                                                                                                                                                                                                                                                                  | (C-I-C) | 2,3, and 4 |
| Geospatial threat monitoring and forecast                    | This initiative enables the control centre to conduct analytics using historic weather and asset damage data to assess weather forecasts for anticipated impact on the network. This initiative will enable capability to: Recognise and prepare for operational threat by weather zone, recognise space weather threats and Bureau of Meteorology threats, enable emergency management.<br><br><i>Capability Addressed: Model &amp; Rating Management</i> | (C-I-C) | 2,3, and 4 |
| System restart uplift                                        | This initiative proposes to implement better tools in the control room to manage a Total System Restart, which is restoring the entire network after a complete shutdown. This initiative also includes digital solutions to ensure we have processes to support a Cold System Restart / Black Start such as telephony systems to contact people to be sent out on site.<br><br><i>Capability Addressed: Controller Training Platform</i>                  | (C-I-C) | 2,3, and 4 |
| Wide Area Monitoring System (WAMS) Phase 2                   | Phase 1 of WAMS helps to detect electrical oscillations across the transmission network.<br><br>Phase 2 would provide diagnostic capability to understand the underlying cause of the issue.<br><br><i>Capability Addressed: Wide Area Monitoring</i>                                                                                                                                                                                                      | (C-I-C) | 4          |
| Under Frequency Load Response (UFLR) monitoring and controls | This initiative would involve integrating the UFLR with batteries so that frequency events could be better managed without the need to shed load or generation.<br><br><i>Capability Addressed: Incident Management</i>                                                                                                                                                                                                                                    | (C-I-C) | 4          |
| Expansion of Geospatial Threat Monitoring                    | This initiative would likely include more cameras on telecommunication towers and the transmission network to share with emergency services. This enables early detection of fires, together with monitoring wind, humidity, and temperature to enable smarter management processes.                                                                                                                                                                       | (C-I-C) | 4          |

## Initiatives to mitigate risks of unplanned outages

**Table 6** identifies initiatives that mitigate the risk of unplanned outages related to station blacks. This includes initiatives that help us improve our understanding and forecasting of major weather events, improved surveillance of our stations, and improvements in our ratings management to have a single source of truth on asset utilisation and health. The "Options" column reflects which cost-benefit evaluation option in Section 4 incorporates each initiative.

**Table 6 – Initiatives to mitigate risks of unplanned outages**

| Initiative                                                 | How does it address identified needs                                                                                                                                                                                                                                                                                                                                                                                                             | Capex   | Options    |
|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------|
| Security cameras                                           | This initiative would increase capability of security cameras in terminal stations. The controllers would be able to zoom in to see if people are near assets before they are remotely operated. It also enables thermal imaging to automatically generate work orders based on a rules engine.                                                                                                                                                  | (C-I-C) | 2,3 and 4  |
| <i>Capability Addressed: Alarms Management</i>             |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |            |
| Drone Inspections                                          | This initiative will be used to inspect network assets where the fixed camera is unable to detect issues. It will also be used for routine field condition assessments, health safety and environmental assessments, emergency scenarios.                                                                                                                                                                                                        | (C-I-C) | 2,3 and 4  |
| Ratings management – Phase 1                               | The underlying driver for this initiative is that AEMO requires us to share ratings (the maximum operating limits of equipment items) for its 2025 engineering roadmap. Some ratings information does not match AEMO's system, and AEMO does not have direct access to our ratings data. This initiative proposes to introduce a source of truth for ratings, which requires data governance and cleansing, and integration with AEMO's systems. | (C-I-C) | 2,3 and 4  |
| <i>Capability Addressed: Model &amp; Rating Management</i> |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |            |
| HMI upgrades for transmission operations centre (TOC)      | This initiative Upgrade HMI (Human Machine Interface) for the TOC providing capability for pseudo SCADA (if SCADA goes down). Currently we can only read HMI at individual terminals by separately logging in, but this initiative will enable an aggregated view with increased capability for tagging, noting, and logging.                                                                                                                    | (C-I-C) | 2,3, and 4 |
| <i>Capability Addressed: EMS/SCADA System Enhancement</i>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |            |
| Ratings management – Phase 2                               | This initiative seeks to integrate ratings management with AEMS. Currently, we manually extract data out of the tool and manually enter it into AEMS, creating the risk of human error.                                                                                                                                                                                                                                                          | (C-I-C) | 3 and 4    |
| <i>Capability Addressed: Model &amp; Rating Management</i> |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |            |
| Network operations security simulator                      | This initiative would enhance network simulation and scenario modelling capabilities. The initiative would improve the effectiveness of the control room when security events occur                                                                                                                                                                                                                                                              | (C-I-C) | 2,3, and 4 |
| <i>Capability Addressed: Controller training platform</i>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |            |

|                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                    |         |           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------|
| Dynamic forecast asset utilisation analytics                                                                                                                                                                                | This initiative proposes to predicts asset utilization based on the latest forecast conditions. Effectively creates 'what if' such as impact of an outage on a feeder at a certain hour of the day.                                                                                                                                | (C-I-C) | 4         |
| <i>Capability Addressed: Model &amp; Rating Management and Dynamic Ratings</i>                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                    |         |           |
| Distributed Photovoltaics (DPV) forecasts for modelling                                                                                                                                                                     | This initiative proposes to introduce the capability to undertake outage assessments that take into account solar rooftop connections. The modelling will enable predictive risk assessments to protect terminal stations against sudden disconnections. In effect it incorporated real-time SCADA contingency analysis into TASM. | (C-I-C) | 2,3 and 4 |
| <i>Capability Addressed: EMS/SCADA System Enhancements &amp; Dynamic Ratings</i>                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                    |         |           |
| Non-credible contingency analysis                                                                                                                                                                                           | This initiative will enable the ability to run analysis to assess and develop response plans for a non-credible contingency. A non-credible contingency are events that are typically excluded from routine planning and operational analysis such as loss of multiple assets or loss of a busbar.                                 | (C-I-C) | 4         |
| <i>Capability Addressed: Model &amp; Rating Management and Dynamic Ratings</i>                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                    |         |           |
| Connection asset demand management                                                                                                                                                                                          | This initiative improves asset utilisation by analysing forecasts and generator availability to calculate targets on which assets get capacity.                                                                                                                                                                                    | (C-I-C) | 2,3 and 4 |
| <i>Capability Addressed: Dynamic Ratings</i>                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                    |         |           |
| Demand Management Phase 2                                                                                                                                                                                                   | This initiative receives forecasts and capabilities and send controls to and from DNSPs in a live format. This enables more selective load shedding.                                                                                                                                                                               | (C-I-C) | 2,3 and 4 |
| <i>Capability Addressed: Model &amp; Rating Management &amp; Dynamic Ratings</i>                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                    |         |           |
| Dynamic Ratings upgrade                                                                                                                                                                                                     | This initiative provides a model to indicate increased capacity of powerlines and connection assets under favourable weather conditions.                                                                                                                                                                                           | (C-I-C) | 2,3 and 4 |
| This includes improving the functionality of the System Overload Control Scheme (SOCS) which currently does not capture the full range of possibilities and therefore can unnecessarily constrain the transmission network. |                                                                                                                                                                                                                                                                                                                                    |         |           |
| <i>Capability Addressed: Dynamic Ratings</i>                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                    |         |           |
| Load forecasting by feeder                                                                                                                                                                                                  | Currently, we have no visibility of forecast load by feeder based on weather. This initiative enables a 2 day ahead forecast of forecasts for 66kV feeders.                                                                                                                                                                        | (C-I-C) | 2,3 and 4 |
| <i>Capability Addressed: EMS/SCADA System Enhancements &amp; Dynamic Ratings</i>                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                    |         |           |

## Initiatives to improve planned outages

**Table 7** identifies the initiatives to improve the effectiveness of our planned outages through reduced outage time, and improved access communications. The "Options" column reflects which cost-benefit evaluation option in Section 4 incorporates each initiative.

**Table 7 – Initiatives to improve planned outages**

| Initiative                                                   | How does it address identified needs                                                                                                                                                                                                                                                                                                                                                                                                                                              | Capex   | Options |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|
| TASM - Phase 2 - ERP automation                              | This initiative will automate parts of the access management process in (C-I-C) such as forward planning work order bundling by outage groups. It would also automate conditions & constraints analysis. For example, it would automatically optimise outage scheduling for 13 month forward planning with consideration for maintenance plans and 3rd party outages and resourcing constraints.<br><br><i>Capability Addressed: Switching Management &amp; Access Management</i> | (C-I-C) | 3 and 4 |
| TASM Phase 3 - Integrating new adjacent capabilities         | This initiative integrates TASM with other applications to adjacent capabilities. For example, it integrates with access tools for assigning people on site to tasks, our voice recording system to attach to logs for records and incident investigation, and to SCADA for managing permits and network state inputs.<br><br><i>Capability Addressed: Switching Management &amp; Access Management</i>                                                                           | (C-I-C) | 3 and 4 |
| TASM Phase 4: Automate network switching                     | This initiative would use TASM to automate switching instructions and enable SCADA to perform the controller switching steps. Currently, the controller undertakes each step. The controller can issue switching steps to the software to perform analysis & switching on the controller's behalf up to predefined hold points.<br><br><i>Capability Addressed: Switching Management &amp; Access Management</i>                                                                  | (C-I-C) | 4       |
| Management of network support and control ancillary services | This initiative proposes to implement digital tools to economically manage network support and control ancillary services, which will become increasingly important as planned outages impact power system qualities.<br><br><i>Capability Addressed: EMS/SCADA System Enhancements</i>                                                                                                                                                                                           | (C-I-C) | 4       |

## Initiatives to improve effectiveness of controllers in a more complex environment

**Table 8** identifies the initiatives that uplift the capability of controllers through improved training, procedures, operational tools and forecasts. The "Options" column reflects which cost-benefit evaluation option in Section 4 incorporates each initiative.

**Table 8 – Initiatives to meet identified needs (\$m, real 2025)**

| Initiative                                    | How does it address identified needs                                                                                                                                                                                                                               | Capex   | Options   |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------|
| Transmission alarm management                 | This initiative uses alarm analytics to automatically identify nuisance alarms (problem with alarm itself e.g. temperature triggered, voltage triggered) vs genuine asset issue requiring prompt review, to reduce load on controllers.                            | (C-I-C) | 2,3 and 4 |
|                                               | <i>Capability Addressed: Alarms Management</i>                                                                                                                                                                                                                     |         |           |
| Dynamic control room displays                 | Dynamic screens for controllers using AI to present the most relevant information for emerging situations, for related/adjacent information required to respond to alarms (e.g. asset information, operating procedures etc)                                       | (C-I-C) | 2,3 and 4 |
|                                               | <i>Capability Addressed: Controller Training Platform &amp; Alarms Management</i>                                                                                                                                                                                  |         |           |
| Victorian TNSP capability                     | This initiative relates to the transfer of operations from AEMO to AusNet requiring an uplift in digital capabilities to meet power flow analysis, network limits advice and contingency plans.                                                                    | (C-I-C) | 2,3 and 4 |
| Passive knowledge management                  | This initiative uses artificial intelligence (e.g.: ChatGPT/Copilot) for controllers with integration with procedures, asset management system, and SCADA information (for example, information on whether voltage is outside its limit in a particular location). | (C-I-C) | 2,3 and 4 |
|                                               | <i>Capability Addressed: Controller Training Platform</i>                                                                                                                                                                                                          |         |           |
| Active controller knowledge management uplift | This initiative would improve the capability of the control room to prevent and respond to system blacks by simulating scenarios that require a response.                                                                                                          | (C-I-C) | 4         |
|                                               | <i>Capability Addressed: Controller Training Platform</i>                                                                                                                                                                                                          |         |           |
| Sensory Information experience                | This would enable controllers to use virtual reality rather than rely on the display board in the control room.                                                                                                                                                    | (C-I-C) | 4         |
|                                               | <i>Capability Addressed: Controller Training Platform</i>                                                                                                                                                                                                          |         |           |
| AI training simulator                         | This initiative would improve the capability of the control room to prevent and respond to system blacks by simulating scenarios that require a response. Currently, these scenarios are manually undertaken. AI would build more dynamic and complex scenarios.   | (C-I-C) | 4         |
|                                               | <i>Capability Addressed: Controller Training Platform</i>                                                                                                                                                                                                          |         |           |

## 4. Options consideration

This section provides an overview of the investment options evaluated in the context of the identified needs and initiatives in section 3.2 and 3.3.

The AER's guidance note – "Non-network ICT capex assessment approach" of November 2019 notes that non-recurrent expenditure should have a positive net present value unless a compliance requirement, or unless strong customer support and willingness to pay is demonstrated. In all cases, it is expected that timing and scope options of the investments (to demonstrate prudence) and options for alternative implementation approaches, systems and service providers (to demonstrate efficiency) will be evaluated. Assessment is to be made of the discounted costs against the benefits of the program. As per the AER guidelines, we have examined credible options for the AEMS as set out in the remaining chapter.

### 4.1 Options analysis

We identified four options based on the counterfactual of maintaining current AEMS capabilities, and differing levels of maturity compared to our peers. The four options included:

- **Maintain current state (Option 1)** – Under this option we would maintain the existing capability of the AEMS as at the end of the current RY2023-27 period with no further investment to uplift our capabilities.
- **Catch up to peers (Option 2)** – Under this option, we would invest only in initiatives that enables AusNet to 'catch up' to peer TNSPs in areas of low maturity.
- **Keep up with peers (Option 3)** – Under this option, we would invest only in initiatives that enable AusNet to catch up to peer TNSPs in areas of low maturity, and also expand maturity in areas to facilitate the energy transition. Effectively this would mean we keep pace with peer TNSPs as they enhance capabilities.
- **Leader in AEMS (Option 4)** – Under this option we would invest in all identified initiatives that would enable AusNet to be a leader in AEMS among peer TNSPs by the end of the RY2028-32 period.

We have applied cost-benefit analysis to determine the preferred option. In terms of costs, we have considered the implementation cost (capex and project opex) and ongoing licencing and support opex costs in real dollar terms. We have then assessed the benefits of each initiative. In effect, the benefits relate to the value in meeting the identified needs. These benefits have all been modelled in the economic assessment of identified options based on the consistent set of assumptions.

Table 9 – Quantified benefit pools

| IDENTIFIED LIMITATION                                              | CALCULATION DESCRIPTION |
|--------------------------------------------------------------------|-------------------------|
| Better network information to mitigate risk of power system events | (C-I-C)                 |
| Better network information to mitigate risk of station blacks      | (C-I-C)                 |
| Reduced cognitive load for controllers                             | (C-I-C)                 |
| Better planned outages effectiveness                               | (C-I-C)                 |

## 4.2 Assessment of options

In this section, we evaluate the advantages and disadvantages of each of the four options, and set out the results of the NPV analysis.

### 4.2.1 Maintain current state (Option 1)

This option proposes to maintain AusNet's existing AEMS capabilities. **Table 10** sets out a qualitative assessment of the benefits and costs of this option.

**Table 10 – Advantages and disadvantages of Option 1**

| Advantage                                                                                                                                                                                                                                                        | Disadvantage                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• This reduces the costs of implementing new systems, limiting expenditure solely to recurrent capex for existing systems</li> <li>• Minimal implementation effort to integrate and transition to new systems.</li> </ul> | <ul style="list-style-type: none"> <li>• Does not implement measures that would mitigate against the increasing risk of system and station blacks.</li> <li>• Would require significantly more staff and resources to be employed to meet the additional complexity with controlling the system and the expected increase in planned outages.</li> <li>• Would likely increase planned outage minutes, meaning that more low-cost generation will be constrained in the market.</li> </ul> |

This option is effectively a counter-factual where there is zero spent on non-recurrent capex or opex. Under this option there are zero benefits, resulting in \$0 of net present value. To be clear, this option increases the risk of system blacks and station blacks in the RY2028-32 period compared to today due to the increased risks to the power system that we would not be able to mitigate through these initiatives. This would be inconsistent with the National Electricity Objective to maintain the reliability, safety and security of the national electricity system.

### 4.2.2. Uplift AEMS capability to peers where maturity is low (Option 2)

This option proposes to invest in the initiatives as identified in Section 3.3, which reflects a subset of initiatives that would enable AusNet to uplift out AEMS capabilities to peer transmission networks. The advantages and disadvantages of this option are set out in **Table 11**.

**Table 11 - Advantages and disadvantages of Option 2**

| Benefits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Disadvantage                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Maintains existing risk levels relating to system and station blacks that would otherwise significantly increased due to the acceleration of renewable energy in the power system.</li> <li>• Ensures that we do not need to hire new staff to meet the expected increase in workload to control the network and undertake planned outages.</li> <li>• Helps to mitigate the risks of rising wholesale prices related to increased planned outage minutes on the network.</li> <li>• Mitigates the increased risk of safety events.</li> </ul> | <ul style="list-style-type: none"> <li>• Higher costs than Option 1.</li> <li>• More resources to integrate new systems, leading to some level of complexity in a dynamic environment.</li> <li>• AusNet would not expand in areas where we have high maturity, meaning we may not be able to keep pace with drivers of change.</li> </ul> |

Option 2 has a total capex cost of \$39.3 million capex and \$10.7 million opex with the expenditure profile shown in **Table 12**. Opex in this expenditure profile includes both project implementation opex ("propex") for implementation and configuration of software-as-a-service (SaaS) solutions, and ongoing licencing and support costs.

**Table 12 - Forecast expenditure for Option 2 (\$'million, real FY25)**

| Cost item                                                  | R2028         | R2029         | R2030        | R2031         | R2032        | Total         |
|------------------------------------------------------------|---------------|---------------|--------------|---------------|--------------|---------------|
| Capex                                                      | \$7.0         | \$10.0        | \$4.8        | \$11.0        | \$6.5        | <b>\$39.3</b> |
| Project Implementation Opex ("propex", non-recurrent opex) | \$3.3         | \$0.0         | \$0.0        | \$0.0         | \$0.0        | <b>\$3.3</b>  |
| Ongoing Licences & Support Opex (recurrent opex)           | \$0.0         | \$0.9         | \$1.9        | \$2.4         | \$2.4        | <b>\$7.5</b>  |
| <b>Total</b>                                               | <b>\$10.3</b> | <b>\$10.9</b> | <b>\$6.6</b> | <b>\$13.4</b> | <b>\$8.9</b> | <b>\$50.0</b> |

This option results in significant quantified benefits, with present value benefits of \$149.6 million incorporating:

- Mitigating the risks associated with a system black – We calculated that the benefit of mitigating the increased risk of a system black and the time to restore is \$50.3 million over the 10 year period based on a reduction of likelihood (C-I-C)
- Mitigating the risks associated with a station black – We calculated that the benefit of mitigating a station black would be \$84.9 million over the 10 year period based on (C-I-C)
- Improved effectiveness of controllers – (C-I-C)

In addition to the above, this option also delivers quantified benefits relating to reduce need to for incremental employee hiring and improving safety.

Our analysis has found that Option 2 has an NPV of \$103.8 million over the 10-year period. The NPV is significantly higher than Option 1.

### 4.2.3. Enhance AEMS capability to keep pace with peers (Option 3)

In developing our business case, we also identified additional initiatives that would enable AusNet to keep maturing in areas where we are currently high such as switching, SCADA and ratings management. Continued capability enhancement is reflective of the investments that peer networks are similarly making, and would enable AusNet to keep pace with peers.

The qualitative assessment of advantages and disadvantages is presented in **Table 13**.

**Table 13 - Advantages and disadvantages of Option 3**

| Benefits                                                                                                                                                                                                                                                                                                   | Disadvantage                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Same as Option 2</li> <li>• Additional benefits of improving our maturity in switching, ratings management and SCADA.</li> <li>• Would improve productivity and effectiveness of our controllers as we head into a more complex environment post 2032.</li> </ul> | <ul style="list-style-type: none"> <li>• Higher costs than Option 2.</li> <li>• More resources than Option 2, leading to higher delivery risk.</li> <li>• We do not have the advantage of learning from our peers for areas where we are already mature.</li> <li>• More complexity in integrating systems and delivery risk.</li> </ul> |

**Table 14** identifies higher capex and opex costs compared to Option 2 with capex of \$73.8 million and opex of \$15.1 million. Opex in this expenditure profile includes both project implementation opex ("propex") for implementation and configuration of software-as-a-service (SaaS) solutions, and ongoing licencing and support costs.

**Table 14 – Forecast expenditure for Option 3 (\$'million, real FY25)**

| Cost item                                                  | R2028         | R2029         | R2030         | R2031         | R2032         | Total          |
|------------------------------------------------------------|---------------|---------------|---------------|---------------|---------------|----------------|
| Capex                                                      | \$12.02       | \$15.00       | \$14.25       | \$16.00       | \$16.50       | <b>\$73.77</b> |
| Project Implementation Opex ("propex", non-recurrent opex) | \$3.25        | \$0.00        | \$0.00        | \$0.00        | \$0.00        | <b>\$3.25</b>  |
| Ongoing Licences & Support Opex (recurrent opex)           | \$0.43        | \$1.31        | \$2.31        | \$3.74        | \$4.04        | <b>\$11.83</b> |
| <b>Total</b>                                               | <b>\$15.7</b> | <b>\$16.3</b> | <b>\$16.6</b> | <b>\$19.7</b> | <b>\$20.5</b> | <b>\$88.84</b> |

However, the present value benefits were \$269.5 million over the 10 year period, significantly higher than Option 2. The increased benefits were driven primarily by improving planning and switching capabilities that results in reductions to the spot price from improved effectiveness of planned outages.

Option 3 has an NPV of \$189.3 million over the 10 year period. This is significantly higher than Option 1 and Option 2.

#### 4.2.4. Enhance AEMS capability to lead peers (Option 4)

In developing our business case, we also identified additional initiatives that would move AusNet to a leader in AEMS. These included transitioning to the latest versions of TASM, wide area system monitoring, and (C-I-C). We also identified other tools and training programs that represent best practice for AEMS including dynamic forecast asset utilisation, non-credible contingency analysis, dynamic topology line ratings, and sensory information experience.

The qualitative assessment of advantages and disadvantages is presented in **Table 15**.

**Table 15 - Advantages and disadvantages of Option 4**

| Benefits                                                                                                                                                                                                                                                                                                                                                                                                                                       | Disadvantage                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Same as Option 3</li> <li>• Additional benefits of using best of breed versions that could potentially further mitigate the risk of system blacks and station blacks.</li> <li>• Best of breed TASM software could further reduce planned outage minutes.</li> <li>• Would improve productivity and effectiveness of our controllers as we head into a more complex environment post 2032.</li> </ul> | <ul style="list-style-type: none"> <li>• Higher costs than Option 3.</li> <li>• A clear link to our current needs was not present – there may be the need for systems beyond 2032.</li> <li>• We do not have the advantage of learning from our peers.</li> <li>• More complexity in development and integrating systems resulting in delivery risk.</li> </ul> |

**Table 16** shows that the costs are significantly higher for Option 4 with capex of \$130.3 million and opex of \$15.2 million. The benefits are higher than Option 3 over the 10 year period, but our analysis found that the NPV was \$138.8 million, a reduction from Option 3.

**Table 16 – Forecast expenditure for Option 4 (\$'million, real FY25)**

| Cost item                                                  | R2028         | R2029         | R2030         | R2031         | R2032          | Total          |
|------------------------------------------------------------|---------------|---------------|---------------|---------------|----------------|----------------|
| Capex                                                      | \$12.02       | \$15.00       | \$14.25       | \$25.50       | \$63.5         | <b>\$130.3</b> |
| Project Implementation Opex ("propex", non-recurrent opex) | \$3.25        | \$0.00        | \$0.00        | \$0.00        | \$0.00         | <b>\$3.25</b>  |
| Ongoing Licences & Support Opex (recurrent opex)           | \$0.43        | \$1.31        | \$2.31        | \$3.74        | \$4.19         | <b>\$11.8</b>  |
| <b>Total</b>                                               | <b>\$15.7</b> | <b>\$16.3</b> | <b>\$16.6</b> | <b>\$29.3</b> | <b>\$67.69</b> | <b>\$145.5</b> |

## 4.3 Preferred option

**Table 17** shows an overall assessment of each option against the identified capability needs in a more complex power system and with more planned outages. Options 3 and 4 address the capability gaps, noting that Option 3 is proactively enabling AusNet to meet even more complexity beyond this regulatory period, and would effectively move AusNet to best practice AEMS.

**Table 17 Summary of options assessment against identified needs**

| Identified capability gaps                             | Option 1 | Option 2  | Option 3 | Option 4 |
|--------------------------------------------------------|----------|-----------|----------|----------|
| Increased risk of mitigating system blacks             | No       | Yes       | Yes      | Yes      |
| Increased risk of mitigating station blacks            | No       | Yes       | Yes      | Yes      |
| Increased cognitive load on controllers                | No       | Partially | Yes      | Yes      |
| Higher wholesale prices from increased planned outages | No       | Partially | Yes      | Yes      |

**Table 18** provides a summary of findings from our options analysis. It shows that Option 3 is preferred as it has the highest NPV, addresses each of the identified needs, and can be delivered in the timeframe. The costs of this option are 100% attributable to AusNet's transmission business, and incorporate capex and implementation opex for the required new metering systems, and ongoing licencing and support opex. The delivery linkages and scheduling of the proposed 22 AEMS initiatives are detailed in **Appendix B**.

**Table 18 - Options analysis summary**

| Criteria                                   | Option 1 | Option 2 | Option 3 | Option 4  |
|--------------------------------------------|----------|----------|----------|-----------|
| Capex and Propex (\$'million, real FY2025) | -        | 39.3     | 73.8     | 130.3     |
| Opex (\$'million, real FY2025)             | -        | 10.7     | 15.1     | 15.1      |
| NPV (\$'million, real FY2025)              | -        | 103.8    | 189.3    | 135.8     |
| Technically feasible                       | ✓        | ✓        | ✓        | ✓         |
| Addresses identified need                  | ✗        | ✓        | ✓        | ✓         |
| Deliverable within timeframe               | ✓        | ✓        | ✓        | Some Risk |
| Preferred option                           | ✗        | ✗        | ✓        | ✗         |

# Appendix A – Peer assessment of AEMS capabilities

Figure 3 below provides a peer assessment of AEMS capabilities as forecast at the end of AusNet's current 2022-27 regulatory period. This has been undertaken with the assistance of other networks, but does contain an element of subjectivity.

**Figure 3 - Indicative maturity levels assessed at the end of the current TRR period (RY2027)**

| Capabilities                  | Description – Target State                                                                                                                                                                                 | (C-I-C) | (C-I-C) | (C-I-C) | (C-I-C) |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|---------|
| Wide Area Monitoring (WAM)    | Ability to detect voltage oscillations and pinpoint probable causes with accuracy.                                                                                                                         | (C-I-C) | (C-I-C) | (C-I-C) | (C-I-C) |
| Switching Management          | Electronic switching is managed via field control systems. (C-I-C)                                                                                                                                         | (C-I-C) | (C-I-C) | (C-I-C) | (C-I-C) |
| Access Management             | Automated tools support outage planning and automated customer communication, helping manage rising access requests driven by the energy transition.                                                       | (C-I-C) | (C-I-C) | (C-I-C) | (C-I-C) |
| Dynamic Ratings               | In-house software infrastructure developed to assess dynamic line ratings and connection asset ratings. AusNet. We have investment planned under the Emergency Management Uplift (EMU) Initiative in 2026. | (C-I-C) | (C-I-C) | (C-I-C) | (C-I-C) |
| Model & Rating Management     | Ability to integrate ratings and network model management (offline and real-time) with AEMO and AEMS systems.                                                                                              | (C-I-C) | (C-I-C) | (C-I-C) | (C-I-C) |
| Alarms Management             | Alarm volumes remain within human safety limits, supported by clear and defined response protocols and analytics to assess problematic alarms.                                                             | (C-I-C) | (C-I-C) | (C-I-C) | (C-I-C) |
| Controller training platforms | Combines simulator training with up-to-date structured course materials.                                                                                                                                   | (C-I-C) | (C-I-C) | (C-I-C) | (C-I-C) |

EMS/SCADA system  
enhancements

Fully developed solution deployed on supported  
platforms.

(C-I-C)

(C-I-C)

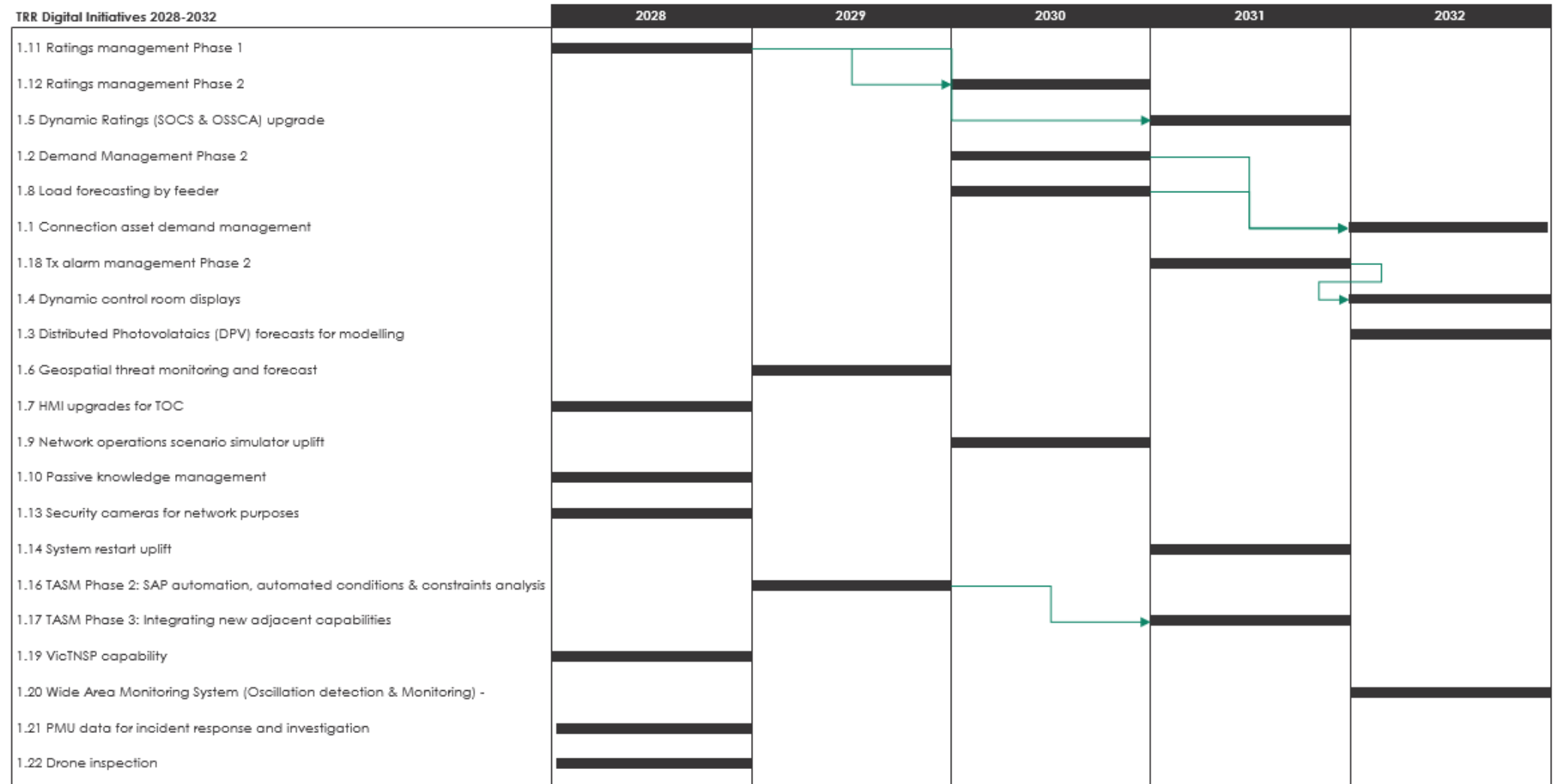
(C-I-C)

(C-I-C)

# Appendix B – Delivery inter-relationships

Figure 4 below identifies the proposed delivery pathway and inter-relationships between initiatives.

Figure 4 – Delivery of initiatives



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