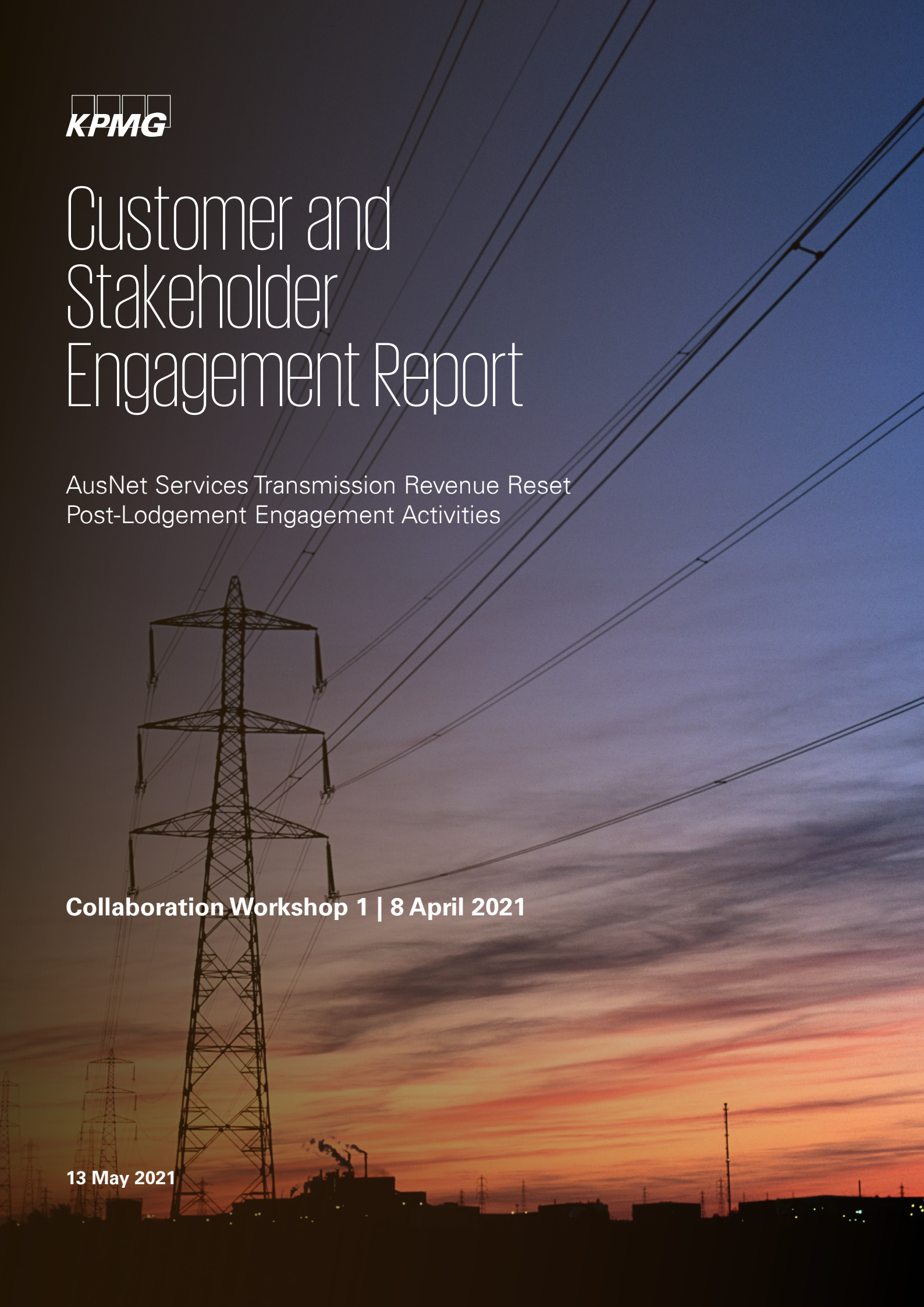


KPMG

Customer and Stakeholder Engagement Report

AusNet Services Transmission Revenue Reset
Post-Lodgement Engagement Activities

Collaboration Workshop 1 | 8 April 2021

13 May 2021

Introduction

Background

AusNet Services owns and operates the Victorian electricity transmission network, providing electricity to 5.9 million customers. As a monopoly provider, AusNet is required to lodge a Revenue Proposal containing investment plans for each five-year regulatory period with the Australian Energy Regulator (AER). The development of these investment plans is referred to as the Transmission Revenue Reset (TRR) process and AusNet's next regulatory period will occur from 1 April 2022 to 31 March 2027.

Since AusNet lodged its Revenue Proposal with the AER in October 2020, there have been a number of changes to key information inputs which may impact on the Revenue Proposal. As a result, AusNet is developing a Revised Revenue Proposal which considers these changes. At a high level, these changes are:

- Updated demand forecasts from AEMO
- Updated market modelling information
- Declining system strength across the network
- The establishment of Victoria's Renewable Energy Zones (REZs) through the Victorian Government's REZ Development Plan
- The closure of Yallourn power station earlier than originally anticipated
- Continued refinement of project scopes and costs.

Consultation with stakeholders is a crucial part of this process, to ensure that AusNet's plans are efficient and in the long-term best interests of consumers.

AusNet's Revenue Proposal was informed by consultation with stakeholders through its TRR Customer Advisory Panel (CAP), several Deep Dive Workshops and Customer Consultative Committee (CCC). In developing its Revised Revenue Proposal, AusNet seeks to continue and enhance its commitment to stakeholder engagement by collaborating with stakeholders on how to address the new information through the Revised Revenue Proposal.

Stakeholder Engagement Approach

In conducting its post-lodgement engagement activities, AusNet has stated its intention to collaborate with stakeholders by working together to develop alternatives and jointly identifying the preferred approaches for addressing the new information through AusNet's Revised Revenue Proposal. This is in line with the definition of *Collaborate* stage of the IAP2 Spectrum of Public Participation.

INCREASING IMPACT ON THE DECISION

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

Introduction

Stakeholder Engagement Approach (cont.)

AusNet's post-lodgement engagement approach included facilitating four Collaborative Workshops over April and May 2021, with the intention of ensuring participants can directly impact outcomes.

The stated objectives of each workshop are as follows:

Workshop 1 *20 April 2021*	Workshop 2 *3 May 2021*	Workshop 3 *17 May 2021*	Workshop 4 *27 May 2021*
To establish a strong, common foundation of knowledge about our Revenue Proposal and the impacts that new information may have	To focus on topics that are of interest to customers and stakeholders regarding the Revenue Proposal and the impacts of relevant changes	To align the Revised Revenue Proposal to reflect customer and stakeholder preferences where possible to deliver best outcome	To collaborate and develop the Revised Revenue Proposal with critical input from customers and stakeholders through adopting feedback

Purpose of this report

This report summarises the key items of discussion from Workshop 1, including the information shared by AusNet with stakeholders, the views expressed by and questions raised by stakeholders, and the response AusNet gave to stakeholders during the workshop. A list of attendees is provided on pages 8-9.

AusNet's objectives for Workshop 1 were to:

- establish a common understanding among stakeholders about the new information affecting AusNet's Revenue Proposal
- collaborate with stakeholders on the design of future Collaboration Workshops.

Prior to Workshop 1, stakeholders and customers were sent a pre-reading pack comprising an overview of AusNet's proposed capital expenditure forecast (refer Appendix). This was primarily focused on educating stakeholders and enabling them to make informed contributions and seek clarification during the workshop.

Role of KPMG

KPMG was engaged to support AusNet in its post-lodgement engagement activities by:

- Advising on stakeholder engagement techniques and contributing to the development of presentation materials
- Facilitating engagement workshops to enable contribution from all participants
- Documenting engagement workshops.

AusNet remains responsible for workshop content including information specific to its Revenue Proposal.

Workshop Details

Date	Thursday 8 April
Time	2-4pm (AEST)
Location	Microsoft Teams (videoconference)

To maximise attendance and ensure a range of different perspectives from stakeholders, the workshop was rescheduled from its original date to avoid the school and public holiday period. All workshops were hosted virtually, reflecting stakeholder preference and to mitigate potential disruption due to the COVID-19 pandemic at the time.

Key discussion items

Reported below are key discussion items from Collaboration Workshop 1, detailing the topics presented, questions and inputs from stakeholders, and responses provided by AusNet Services.

Topic presented by AusNet	Stakeholder input	How AusNet responded
Stakeholder Engagement Approach – This engagement process is an opportunity for stakeholders to collaborate with AusNet to inform their Revised Revenue Proposal – AusNet's principles of stakeholder engagement are: genuine and committed; clear, accurate and timely information; accessible and inclusive; and transparent – The engagement process will comprise four workshops, with the content topics for Workshops 2-4 determined by areas of interest for stakeholders	Stakeholders sought clarification on which topics were in scope for collaboration and whether some topics were out of scope Stakeholders sought to clarify whether AusNet sought to achieve the 'Collaborate' stage of the IAP2 spectrum on all aspects of the post-lodgement engagement process	AusNet advised that key areas of collaboration are how risks will be shared, how to deal with uncertainty, and considering the materiality of changes which may impact on the Revised Revenue Proposal. Collectively, stakeholders' input into these would impact on how phasing and timing of AusNet's major projects are reflected in the Revised Proposal. AusNet re-iterated their commitment to orienting the engagement process around stakeholder interests
Revenue Proposal Re-cap: Forecast Capital Expenditure – AusNet provided a re-cap of the forecast capital expenditure from its Revenue Proposal and the methodology applied to develop this forecast – AusNet advised that to improve the deliverability of the capital program, the profile was smoothed, with some projects being slipped beyond their economic timing where the risk profile allows	Stakeholders noted the information provided by AusNet. Stakeholders requested additional transparency and information in relation to impacts on consumers, including bill impacts and how cost implications resulting from augmentation programs will be managed.	AusNet stated they will provide more detail around these interactions. The impact on customer fees will be plotted over the same time period as the smoothed vs unsmoothed network capex forecasts chart. AusNet will provide transparency around information regarding costs and show the indicative bill impact on consumers.
Role of AusNet's Transmission Network – AusNet provided a brief overview of its Victorian transmission network including the sites of major planned projects in the next regulatory period – AusNet clarified that the Australian Energy Market Operator (AEMO) is the transmission network planner in Victoria – The three organisations are responsible for working together to produce the best possible outcome for energy consumers are AEMO, VicGrid and AusNet	Stakeholders raised a number of queries which were addressed in more detail at the relevant agenda item. Stakeholders expressed their interest in the driver of network upgrade requirements, questioning whether the increasing load in Melbourne is affecting these switching stations. Stakeholders noted that although AusNet has shown the networks they have direct contracts with, additional clarity is requested in relation to: – Western VIC upgrade and other ISP projects – Determine which system strength issues relate to one another – The role of AEMO, other TNSP providers and AusNet. Stakeholders expressed interest in the role of VicGrid. They enquired about the dynamic between AusNet and AEMO and the impact of the development of new Renewable Energy Zones (REZ). Stakeholders expressed their interest in ensuring AusNet works towards the lowest cost solution.	AusNet clarified that each station project is based off of the same assessment framework. AusNet clarified that projects addressing system strength issues are AEMO's responsibility; therefore, the Western VIC upgrade and other ISP projects are not in scope for AusNet's TRR. However, some of AusNet's projects' deliverability and costs are impacted by low network system strength. AusNet understands that the Victorian Government does not intend to deliver increased costs to consumers, but acknowledges that the introduction of VicGrid adds complexity. AusNet stated that it will require strong collaboration and role clarity between the three entities (VicGrid, AEMO & AusNet) in order to produce the best possible cost solution outcome for consumers. AusNet agreed to providing additional information in relation to the roles and responsibilities of managing Victoria's transmission network.

Key discussion items

Topic	What stakeholders said	How AusNet responded
Updated demand forecasts – Since AusNet lodged its Revenue Proposal, AEMO has released its 2020 demand forecasts – AusNet highlighted the major projects which may be impacted by the new information	Stakeholders queried why East Rowville station requires a major project, questioning drivers of the increased demand during the period suggested. Stakeholders expressed some concern around the implications of changing government policy on gas which may impact future electricity demand in the area.	AusNet clarified that AusNet's major projects identified were already in the Original Proposal based on the condition of assets. Therefore, the East Rowville project is not an additional project resulting from changed demand forecasts. Rather, East Rowville and all major projects shown during the workshop are stations whose timing may be impacted by these updated forecasts. AusNet assured attendees that all projects take into account the latest demand forecasts issued by AEMO.
Updated market modelling information – AusNet advised that a key driver for replacement projects at key switching stations is market benefits from ensuring generator competition and efficient dispatch across the NEM – AusNet has updated its market simulations model to reflect AEMO's latest energy forecasts, which may impact the benefits of major projects at key switching stations.	There were no specific comments.	N/A
Declining network system strength – AusNet referenced AEMO information showing declining network system strength across Victoria – AusNet advised that the capital projects most likely to be affected are located at Sydenham, South Morang, and Moorabool Switching Stations – The $500 million announced by the Victorian Government will be invested in dealing with declining network system strength limiting REZ generation capacity – Declining system strength will be a topic included in future Collaboration Workshops	Stakeholders expressed interest in understanding whether system strength issues are the result of utility scale renewable developments or distributed energy resources. Stakeholders noted they would appreciate further consultation around declining network system strength to help clarify concerns and ensure decisions reflect the best possible outcome for consumers. Stakeholders queried whether the introduction of the BESS system in late 2018 improved local system strength, additionally whether the Victorian 300MW battery was included in the analysis. Stakeholders questioned whether AusNet is using TNSPs (Transmission Network Service Providers) in regional areas to address system strength issues by using system tuning to overcome problems.	AusNet confirmed that declining network system strength issues emerged from both utility scale and DER. AusNet agreed to making system strength a key topic at future workshops. AusNet agreed that while batteries have responded well, rotating plant supplying system strength and inertia cannot at this stage be entirely replaced by batteries. The 300MW Victorian Big Battery was not included in the analysis, however provides support for system security. AusNet confirmed that they use system tuning, but that system tuning is used more for system security than system strength.

Key discussion items

Topic	What stakeholders said	How AusNet responded
Renewable Energy Zones – AusNet advised that AEMO has identified 6 renewable zones in Victoria, and that the Victorian Government announced $500M would be made available for the development of these zones – AusNet will expand on the Victorian REZ Development Plan in later workshops	Stakeholders requested further discussion on the REZ Development Plan, the role of VicGrid and the role of the Integrated System Plan (ISP) at future workshops.	AusNet agreed that these topics will form the basis of discussion in a future Collaboration Workshop.
Closure of Yallourn – The owners of Yallourn Power station have announced that it will close in 2028, earlier than assumed under the original Proposal (2032) – Analysis of implications has only just started. – Yallourn will be a topic included in future Collaborative Workshops	Stakeholders requested further discussion on the closure of Yallourn and its impact on AusNet's Revenue Proposal at future workshops. Some stakeholders raised a concern that assets on the nearby AGL site are outdated and may be decommissioned earlier than currently plan, like Yallourn.	AusNet agreed that these topics will form the basis of discussion in a future Collaboration Workshop. AusNet acknowledged that joint planning with AEMO would be necessary in relation to these assets. AusNet confirmed that its contractual arrangements with generators allow them to recover the residual value of connection assets that are no longer required due to generator closure.
Refinement of project scopes and cost – Costs have been refined for some projects that are progressing through the Regulatory Investment Test process. – This refinement reflects more detailed investigation of costs, project scope and asset replacement methodology, to derive a more accurate cost estimate overall. – Higher costs may result in some deferrals.	Stakeholders clarified whether projects on the Bendigo-to-Shepparton line would be impacted by the potential VNI West project providing an additional link into the NSW and the Snowy 2.0 project.	AusNet advised that this question would be answered at a future workshop.

Key discussion items

Topic	What stakeholders said	How AusNet responded

Next steps and focus for collaboration
– KPMG invited stakeholders to share their views on what topics should form the basis of the agendas for Workshops 2-4
– Stakeholders were asked:
  – What topics would you like us to focus on next time?
  – What level of detail would you like us to go to?
  – What other information or inputs would you find useful?
  – Would you prefer to meet online or in person for future workshops?
  – Do you have any other comments or suggestions?
	Topics of most interest among stakeholders were (in approximate order of priority):
	– REZ Development Plan
	– declining network system strength
	– closure of Yallourn
	– impact of refined project scopes and costs on asset replacement programs.
	
	Stakeholders additionally requested that in discussing these topics, AusNet:
	– give consideration to the longer-term impacts (e.g. a 15-year horizon)
	– provide information about impacts on consumers, particularly in relation to bill impacts.
	
	Stakeholders varied in their preferences as to the degree of detail explored, but after discussion reached broad consensus that they prefer AusNet to provide more rather than less detail, depending on the topic under discussion.
	
	For convenience, stakeholders asked for future workshops to be held virtually.
	
	Stakeholders expressed their support for the openness of the AusNet speakers and the facilitation of the workshop.
		AusNet confirmed for stakeholders that Workshops 2-4 will provide detailed review of the requested topics, and that future Collaboration Workshops will be held virtually.

Attendance

Participants

Stakeholder Name	Organisation	Attendance
Inushka Dassanayake	Total Eren	Attended
Gavin Dufty	St Vincent de Paul	Attended
David Headberry	Major Energy Users	Attended
Prajit Parameswar	Hydro Tas	Attended
Andrew Richards	EUAA	Attended
Jon Onley	Al Group	Attended
Adam Peterson	AER	Attended
Evan Lutton	AER	Attended
David Monk	AER	Attended
Mark Henley	AER CCP	Attended
Trevor Lim	Total Eren	Attended
David Prins	AER CCP	Attended
Jane Kelly	AER	Attended
Bridgette Carter	BlueScope Steel	Apology
Juilan Hales	DELWP	Apology
Tennant Reed	Ai Group	Apology
Bev Hughson	AER CCP	Apology
Thanh Bui	Jemena	Apology
Steve D Foster	DELWP	Apology
Ben Ferguson	DELWP	Apology
Jess Young	DELWP	Apology
Roshanth Sivanathan	United Energy	Apology
Ciara Sterling	Thriving Communities	Apology
Tom Parkinson	Clean Energy Council	Apology
Sarah Walsh	AEMO	Apology
Elizabeth Carlile	CitiPower / Powercor	Apology
Rudi Strobel	Jemena	Apology
Guillermo Alonso	GPG	Apology
Mark Grenning	EUAA	Apology
Lillian Patterson	Clean Energy Council	Apology
David Markham	Australian Energy Council	Apology
Nick Eaton	Alcoa	Apology
Simon Elias	Air Liquide	Apology
Aaron Tan	Air Liquide	Apology
Rodney Bray	United Energy	Apology
Joe Spurio	AEMO	Apology

Attendance

Facilitators and Observers

Stakeholder Name	Organisation	Attendance
Tom Hallam	AusNet	Attended
Robert Ball	AusNet	Attended
Martin Cavanagh	AusNet	Attended
Melanie Tan	AusNet	Attended
Stephanie Judd	AusNet	Attended
Matt Pearce	KPMG	Attended
Grace Smith	KPMG	Attended
Victoria Lloyd-Jones	KPMG	Attended

Contacts in relation to this document:

Inherent Limitations Disclaimer

This report has been prepared as outlined with AusNet Services in the Scope Section of the engagement letter/contract dated 25/02/2021. The services provided in connection with this engagement comprise an advisory engagement, which is not subject to assurance or other standards issued by the Australian Auditing and Assurance Standards Board and, consequently, no opinions or conclusions intended to convey assurance have been expressed.

The findings in this report are based on a qualitative study and the reported results reflect a perception of AusNet Services but only to the extend of the sample surveyed, being AusNet Services' approved representative sample of stakeholders. Any projection to the wider stakeholder group is subject to the level of bias in the method of sample selection.

No warranty of completeness, accuracy or reliability is given in relation to the statements and representations made by, and the information and documentation provided by KPMG stakeholder consulted as part of the process.

No reliance should be place by KPMG on additional oral remarks provided during the presentation, unless these are confirmed in writing by KPMG.

KPMG have indicated within this report the sources of the information provided. We have not sought to independently verify those sources unless otherwise noted within the report.

KPMG is under no obligation in any circumstance to update this report, in either oral or written form, for events occurring after the report has been issued in final form.

Third Party Reliance

This report is solely for the purpose set out in the Scope Section and for AusNet Services' information, and is not to be used for any purpose not contemplated in the engagement letter/contract or to distributed to any third party without KPMG's prior written consent.

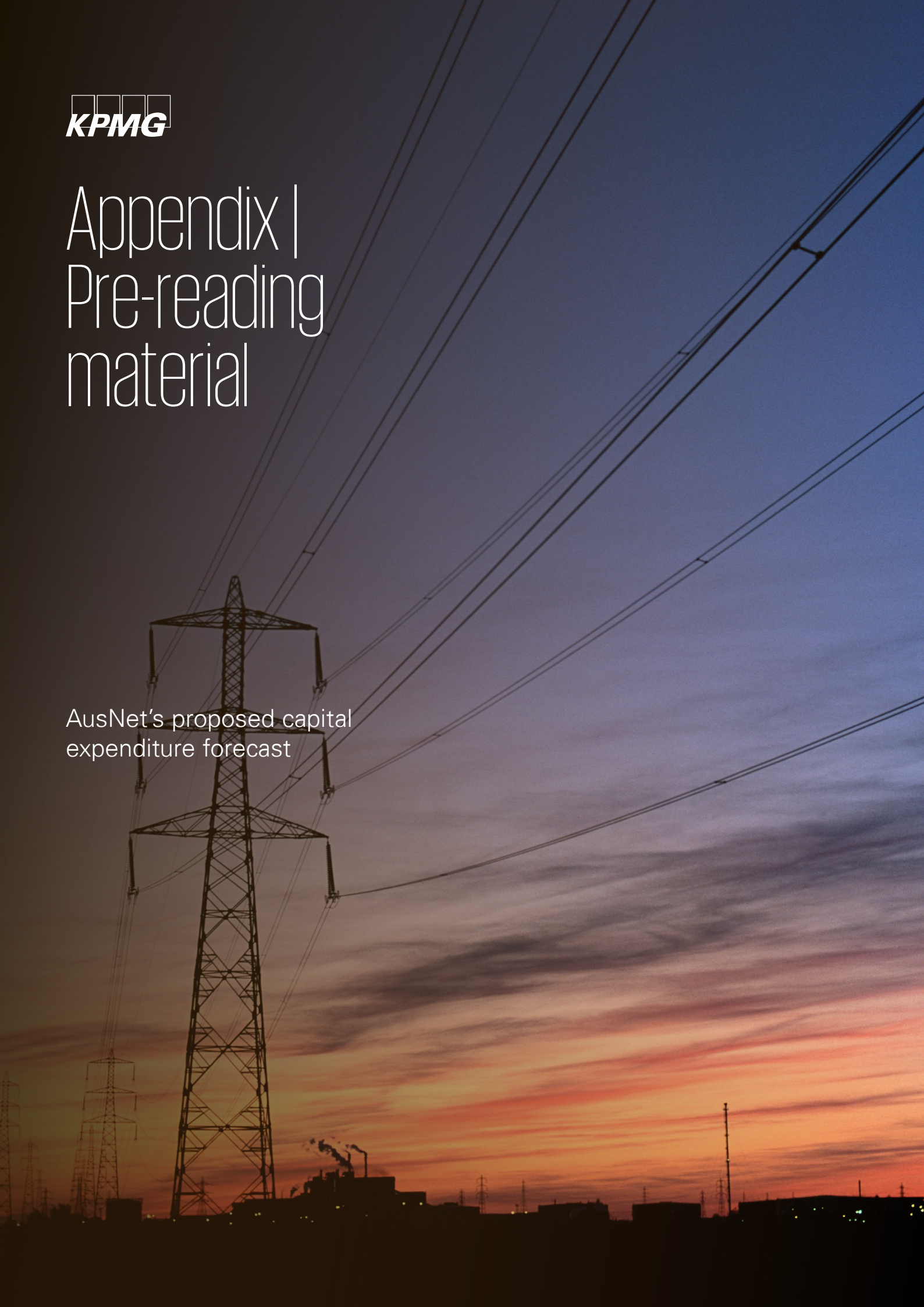
This report has been prepared at the request of AusNet Services in accordance with the terms of KPMG's engagement letter/contract dated 25/02/2021. Other than our responsibility to AusNet Services, neither KPMG nor any member or employee of KPMG undertakes responsibility arising in any way from reliance placed by a third party on this report. Any reliance placed is that party's sole responsibility.

KPMG.com.au

KPMG

Appendix | Pre-reading material

AusNet's proposed capital expenditure forecast



Pre-reading: Collaboration Workshop 1

Re-cap of proposed capital expenditure forecast and inputs

1 April 2021 (for Workshop 1)

Introduction

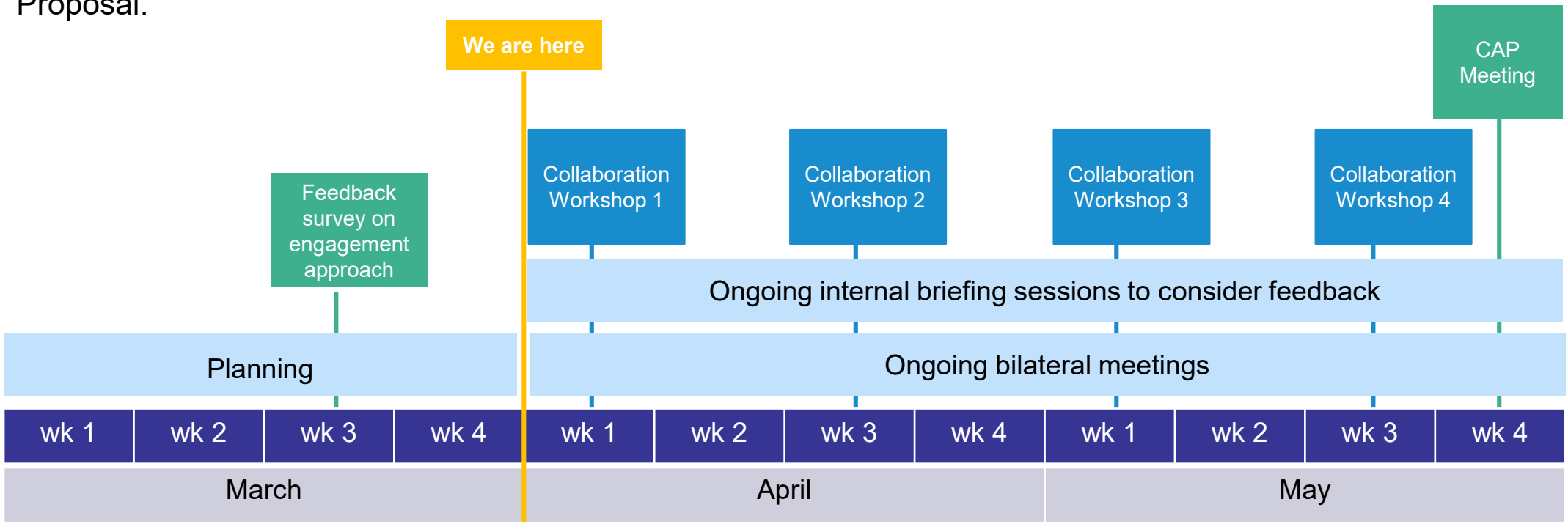
Table of Contents

Collaboration Workshop 1: Thursday 8 April

- At Workshop 1, we will seek to establish a strong, common foundation of knowledge about our Revenue Proposal and the impacts that new information may have.
- This will form the basis of collaboration with stakeholders on how to address these impacts, through coming workshops.
- This pre-reading is intended to provide the foundational knowledge to enable participants to fully engage in workshop discussion.
- While it will be assumed that participants have read this pre-reading, there will be opportunity for questions and discussion during the workshop.
- The workshop will also enable participants to provide input to the approach to collaboration and stakeholder engagement.

Post-lodgement engagement activities

- AusNet Services lodged its Revenue Proposal with the AER in October 2020, for the period from 1 April 2022 to 31 March 2027.
- Since the lodgement of its Revenue Proposal, new information has emerged and AusNet will submit a Revised Revenue Proposal to the AER in September 2021.
- Stakeholder consultation and collaboration is an important part of the approach to developing the Revised Revenue Proposal.



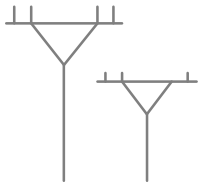
Re-cap: forecast capital expenditure

Summary of AusNet's Revenue Proposal

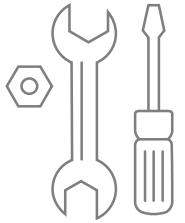
Overview of forecast capital expenditure (capex)

- Our proposed capex forecast seeks to maintain the reliability, security and safety of the Victorian Transmission Network while also balancing customers' affordability.
- Our capex forecast aims to:

Improve the resilience of the system to avoid interruptions to customers' energy supply



Replace projects at switching stations to form the backbone of the Victorian transmission network and support interconnectors



Complete condition-based, economic replacement of deteriorated assets that pose risks to the interconnected transmission systems

Forecast capital expenditure

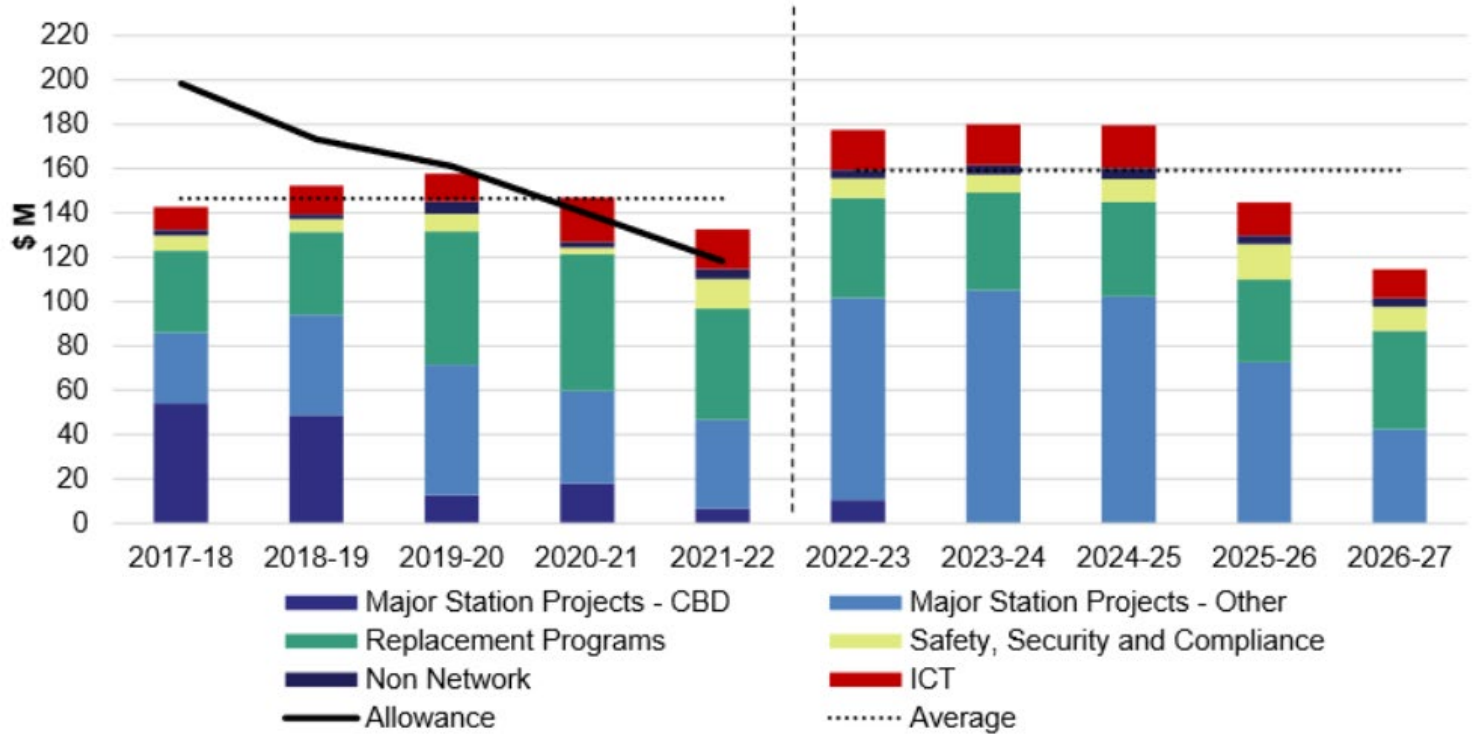
- The total capex forecast from our October 2020 submission is approximately $796.2M (2021-22), which is 9% higher than our actual/expected capex in the current period.
- The purpose of our collaboration workshops is to explore how recent changes may impact these forecasts.

The forecast reflects higher expenditure to:

- **replace terminal station assets and ground-wire and insulator line assets, based on their condition**
- **invest in technology, including cyber security.**

The original proposal was smoothed to help manage the delivery of projects and smooth impacts on prices, and any revised capex proposal will go through the same process.

Figure 4–1: Historical and forecast capex ($M, real 2021-22)

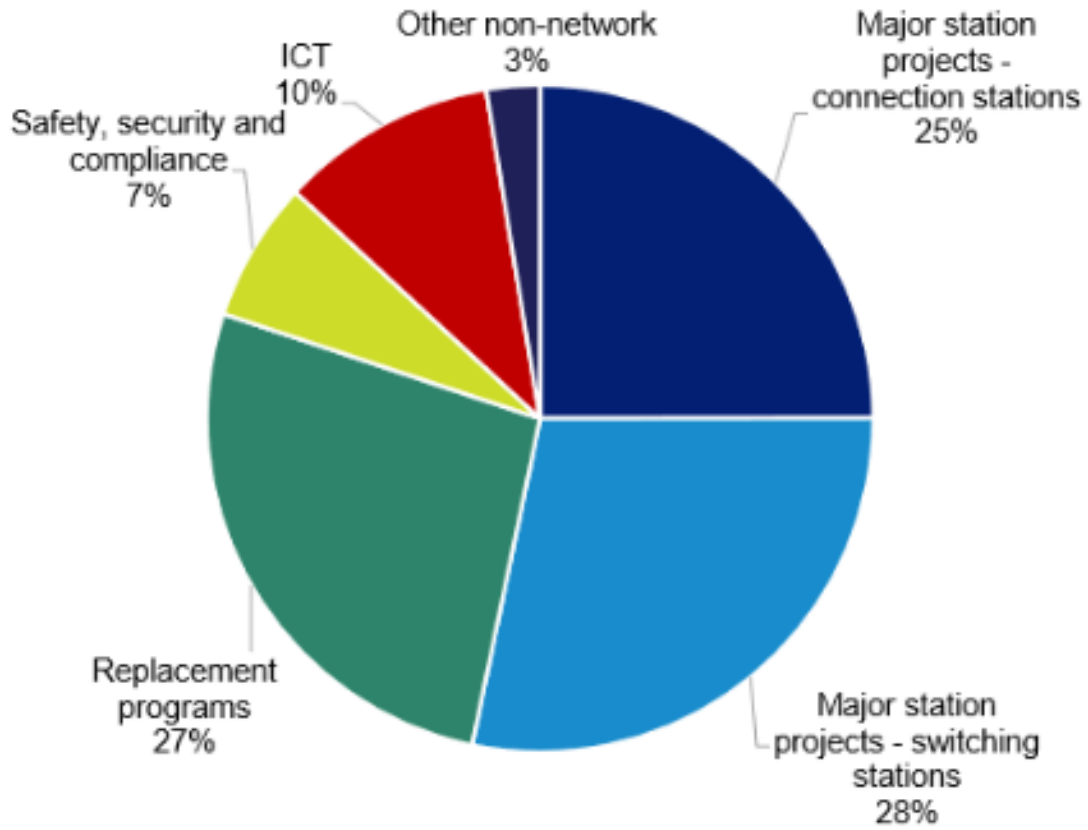


Source: AusNet Services

Forecast capital expenditure: composition

- More than half of our capex relates to major projects at terminal stations to replace assets.
- Of this expenditure, 50% is for works at switching stations – essential for network security and NEM competitiveness.
- These assets are also crucial to the transition to a lower carbon future, not least as they will allow us to efficiently integrate utility scale renewable generation.
- 32% of capex relates to condition-based asset replacement programs required to maintain reliability and safety.

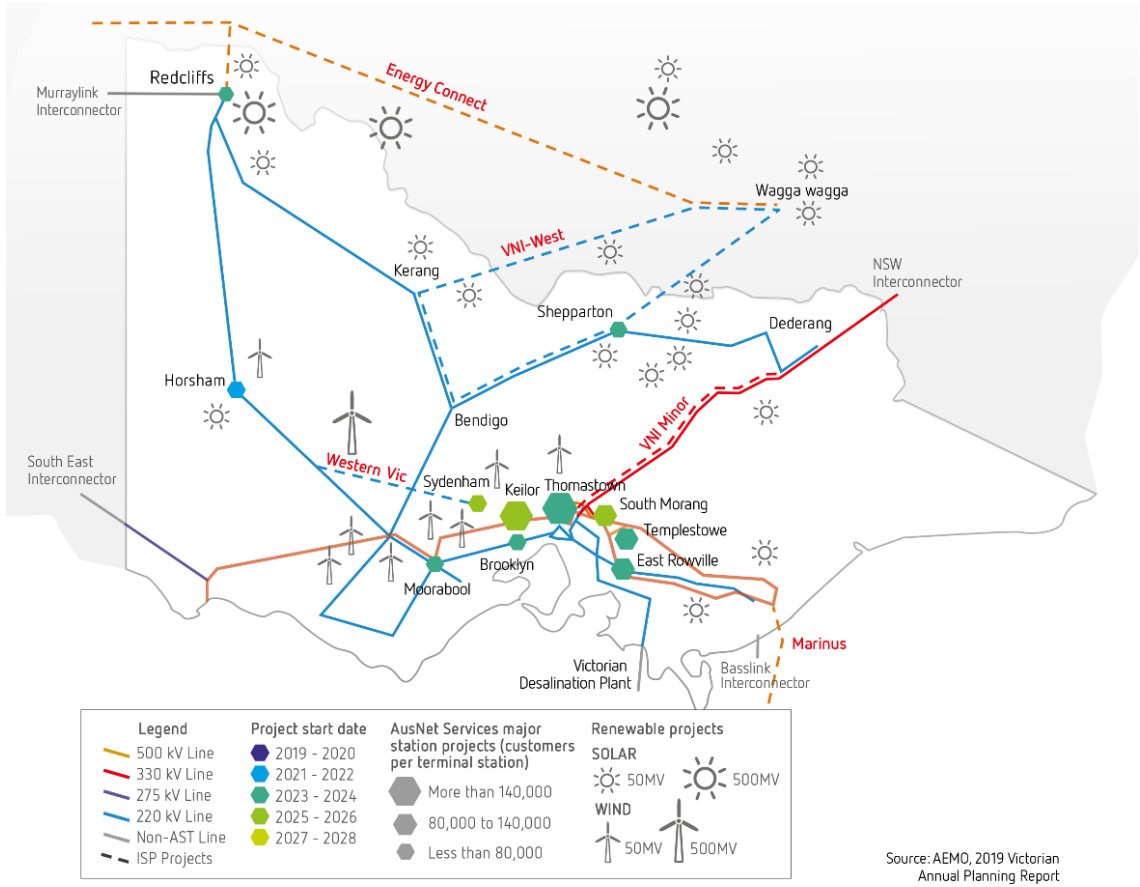
Figure 4–4: Composition of forecast capex 2023-27



Forecast capital expenditure: Major station projects

- Around one quarter of the capex forecast is for **replacement works at switching stations**.
- These stations are critical to the reliability and security of the national power system.
- All projects have undergone comprehensive cost-benefit analysis to ensure that the investment is in the long-term interests of customers.
- Our proposed major station projects are shown alongside the upgrade projects planned as part of the ISP, as well as the approximate location of planned renewable generation developments.
- Several of our proposed major station projects interact in some way with ISP upgrade projects. The timing, design and scope of these projects has been optimised to ensure the lowest long-term total costs to customers (e.g. deferral of a $33 million transformer replacement project at South Morang Terminal Station by more than five years due the VNI-Minor upgrade).

Location of AusNet Services' proposed major station replacement projects and ISP upgrade projects

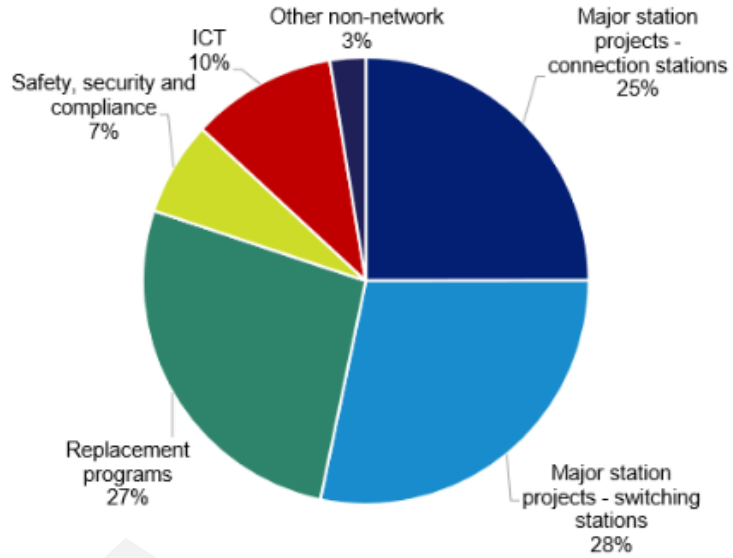


Source: AEMO, 2019 Victorian Annual Planning Report

Forecast capital expenditure: Asset replacement programs

- A significant portion of the network was established between 1955-1970 and is expected to reach the end of its useful life over the next regulatory period.
- Our approach to asset replacement is based on asset condition.
- As with major station projects, asset replacement programs are economic when the consequence of failure exceeds the cost of replacement. However, unlike major station projects, which target the replacement of deteriorated assets at a single location, replacement programs involve the replacement of individual types of asset across the entire network.
- To determine the economic volume of a particular type of asset to replace, we undertake an economic assessment of the costs and benefits (avoided risks). This considers both the condition and criticality (i.e. consequence of failure) of assets.

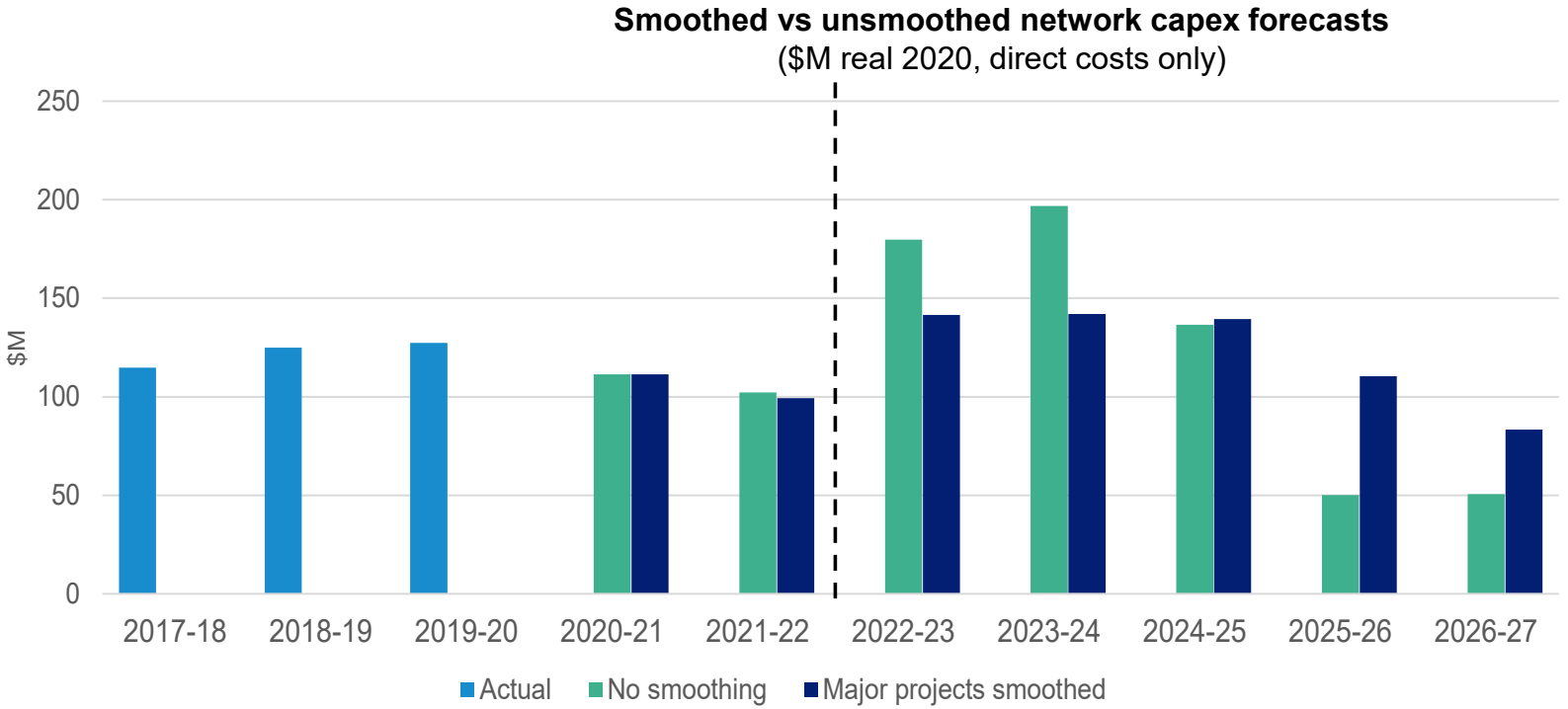
Figure 4–4: Composition of forecast capex 2023-27



The 27% of the capex forecast is allocated to numerous programs of work such as replacing components like insulators, ground wires, and circuit breakers.

Forecast capital expenditure: Smoothing

- With input from our customers, we identified several projects that could be deferred to improve deliverability, without creating unacceptable risk to reliable and safe supply. The unsmoothed and smoothed (as reflected in our proposal) forecasts are shown below.



Projects deferred

- RCTS Transformer and Switchgear Replacement (by 1 year)
- SMTS 330/220kV Transformer Replacement – Stage 2 (by 2 years)
- SMTS 500kV GIS Replacement (by 2 years)
- TTS 66kV Circuit Breaker Replacement (by 1 year)
- KTS A4 500/220kV Transformer Replacement (by 2 years)

Inputs for forecast capital expenditure

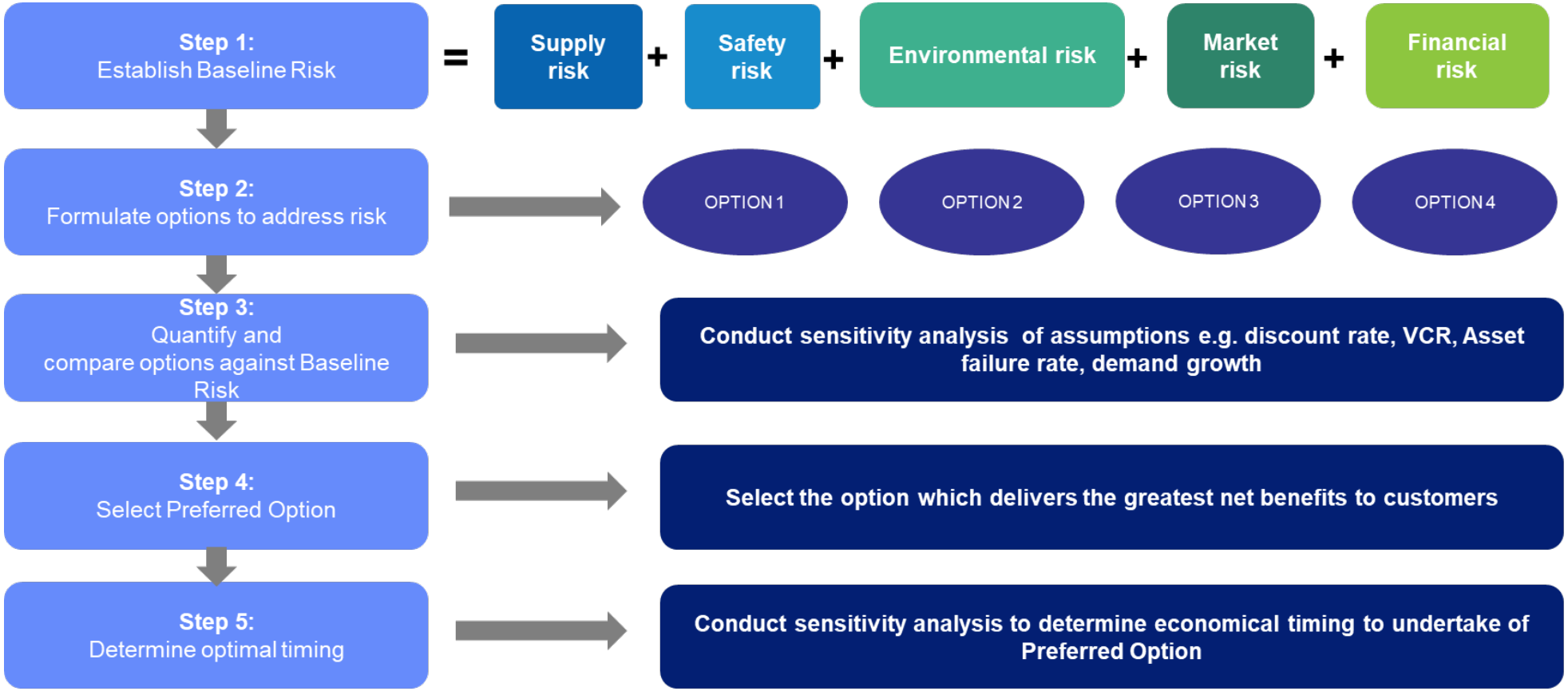
How we develop a prudent and efficient capex forecast

We use two types of assessments to develop a prudent and efficient capex forecast

- For major projects
  - We use an **economic assessment framework** to make investment decisions about major projects.
  - The framework considers costs and benefits (or avoided risks) of various asset renewal options and asset renewal investment decisions at each site.
  - This framework doesn't capture non-economic considerations, such as our ability to deliver a project. This is instead considered in a later step as part of considering the overall capex profile.
- For asset replacement programs
  - We use an **asset criticality vs. condition matrix**
  - This considers the probability of a failure, consequence of a failure, and the cost of replacement

Economic assessment framework for major projects

- The framework considers costs and benefits (or avoided risks) of various asset renewal options and asset renewal investment decisions at each site.



13

Economic assessment framework for major projects

Step 1: Establish the baseline risk

- Baseline Risk is defined as the risks that our network and customers would be exposed to under a 'Business As Usual' approach.

Risk component	Definition	Approach
Supply Risk	The risk of supply being lost to customers due to an asset failure	• Unserved energy is calculated using AEMO's demand forecasts to estimate the weighted probability of various forced outage scenarios • VCR is sourced from the latest AER data, and weighted by customer groups specific to each project
Safety Risk	The risk of explosion and fire due to asset failures (e.g. design issues), causing injury/fatality to employees or the public.	• Uses a value of statistical life,[2] value of lost time injury[3] and applying a disproportionality factor of 3 (see next slide for more information).
Environmental Risk	The risk arising from oil spills from plant (e.g. power transformers), resulting in costs due to clean-up and environmental impact costs.	• Potential oil spills are valued at $30,000 per event while risks from transformers with poly-chlorinated biphenyls (PCB) oil are valued at $100,000 per event
Market risk	The risk lower cost generators cannot supply the NEM, resulting in higher wholesale prices	• Value of substitute generation costs based on market modelling
Financial Risk	The failure rate-weighted cost of undertaking reactive maintenance or replacing failed assets given the ongoing need for energy	• Uses the cost of emergency asset replacements when major asset failures occur

- Some updates to the assumptions underpinning the safety risk of explosive failure have been made since the last reset.

Economic assessment framework for major projects

Step 2: Formulate options to address risk

- Once the Baseline Risk is established, we analyse different options in order to identify the Preferred Option
  - As part of this process, planning is done in conjunction with AEMO and Victorian distributors, taking into account the long term requirements of the network
- The options that we typically consider for individual projects are shown below

Option	Description
Baseline / Business as Usual	Used as a reference to quantify the relative benefits of options that address the baseline risk.
Deferred replacement	Defer replacement through asset refurbishment or operational measures. Develop contingency plans for asset failure events e.g. temporary load transfers, holding spares which can be used across a number of stations.
Integrated replacement	Conduct like-for-like replacement of all assets with poor condition score in a single project. In cases where a number of assets require replacement, major station rebuild takes advantage of project synergies not available for single asset replacement.
Staged replacement	Replace highest risk/poorest condition assets, followed by replacement of other deteriorated assets in subsequent years (e.g. 5-10 years later) as separate projects.
Non network alternatives	Use embedded generation and/or demand side response alternatives in combination with network options (hybrid options).

Economic assessment framework for major projects

Steps 3 & 4: Compare options against Baseline Risk and select Preferred option

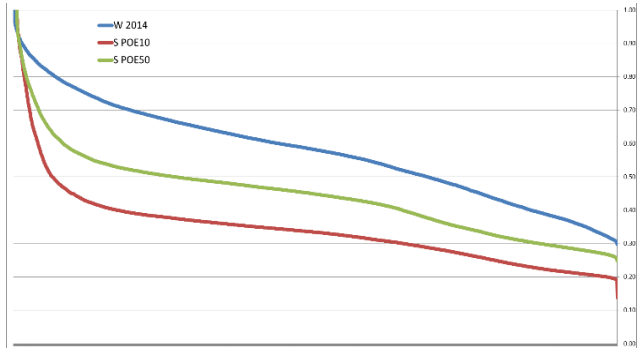
Step 3

- **After identifying all options in Step 2, we quantify their costs and benefits**
  - Costs are determined by:
    - Developing a technical scope of works
    - Applying our standard cost estimating process that utilises standard unit rates (based on recent projects and contracted procurement costs)
  - Benefits (avoided costs) are probability weighted and may include:
  - Supply: the value of energy not supplied to customers
  - Safety: risk cost of injury or death due to explosion
  - Market: risk of increased generation costs
  - Environmental: risk cost of oil spills requiring clean-up
  - Financial: risk costs associated with emergency asset works
  - Avoided costs: reduced maintenance expenditure from replacing existing assets
- **We then conduct net present value (NPV) analysis in order to compare options on an equal basis**

Step 3 cont.

- **To account for uncertainty, we conduct sensitivity analysis on the options:**
  - We do this by comparing the PV cost of each option for different input assumptions
  - Inputs tested include discount rate, VCR, Asset failure rate, demand growth, load profiles etc

Sensitivity analysis input



Load profiles of:
- Summer POE10,
- Summer POE50
- Winter load

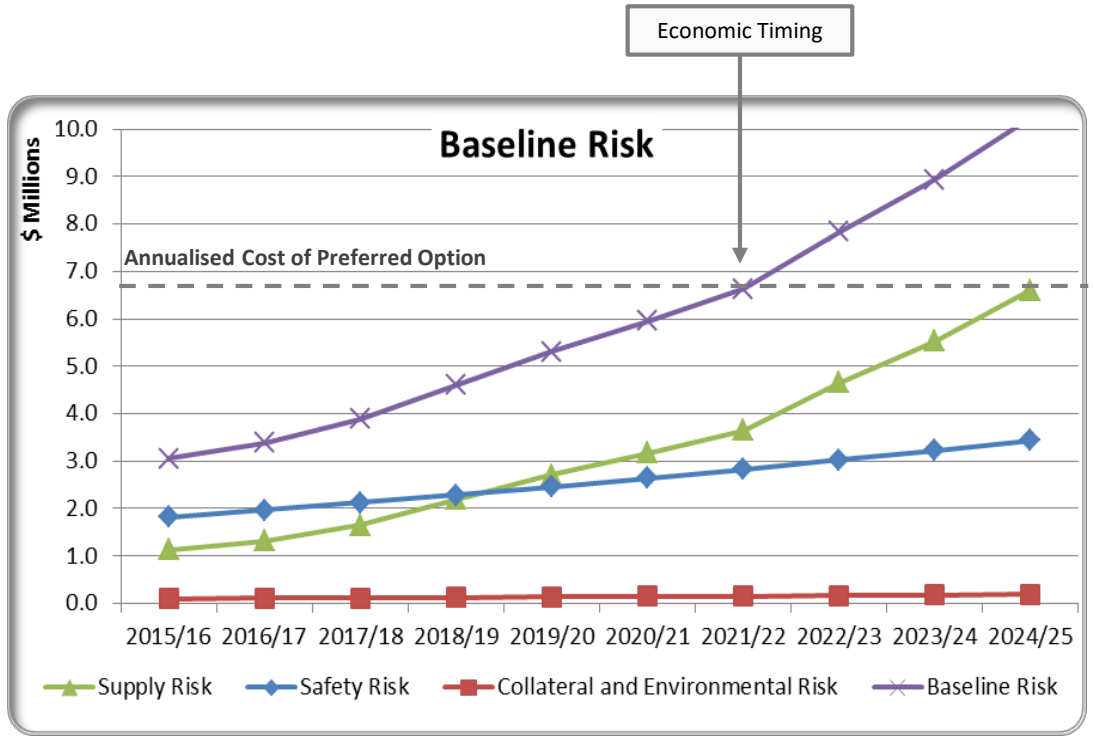
Step 4

- **We then compare the options and determine which option has the highest NPV (i.e. offers most benefit to customers) in order to identify the Preferred Option**

Economic assessment framework for major projects

Step 5: Determining the optimal timing of the Preferred Option

- We determine the economic timing to complete the Preferred Option project by identifying when the Baseline Risk is equal to the cost of implementing the preferred option
  - This is the point at which the benefits of the preferred option outweigh the annualised cost of the project[1]
- Following this, we conduct analysis to test the sensitivity of the economic timing of the Preferred Option
  - e.g. according to failure rate, demand growth, VCR and the project's capital cost
- Examples are provided on the next slide



1. Annualised cost refers to the cost of the project discounted to its present value and spread out over the life of the asset. This allows a comparison of projects with different lifespans on an equal basis.

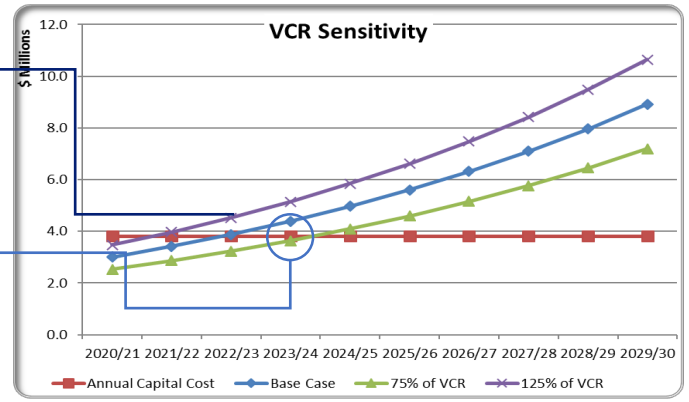
Economic assessment framework for major projects

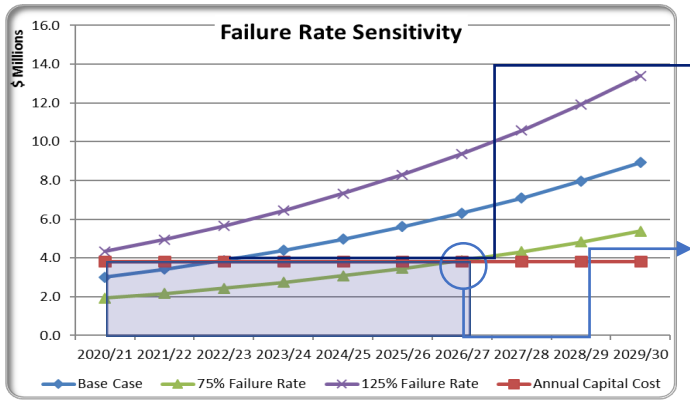
Step 5: Example of economic timing sensitivity analysis for Keilor Terminal Station

- We conduct analysis to test the sensitivity of the economic timing of the Preferred Option and validate our proposed timing for the project

‘Base case’ economic timing: 2022-23

A 25% reduction in the Value of Customer Reliability **(VCR)** would defer the project by one year to 2023-24. This reflects a reduction in the ‘supply risk’ benefits the project would provide.



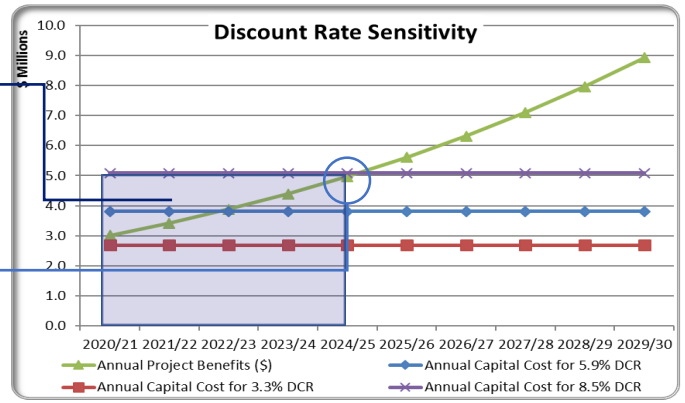


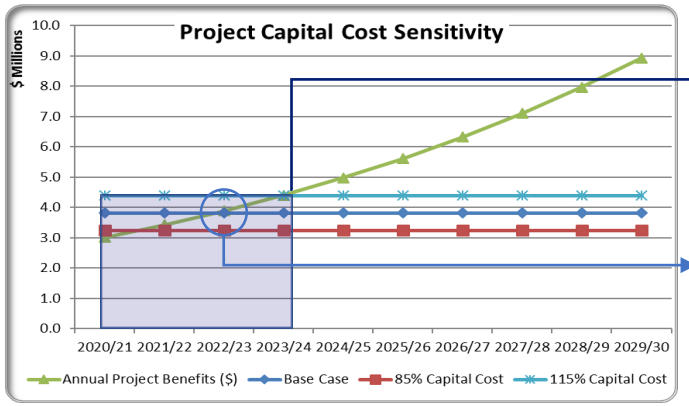
‘Base case’ economic timing: 2022-23

A 25% reduction in the Failure Rate Sensitivity (FSR) would defer this project by four years to 2026-27.

‘Base case’ economic timing: 2021-22

An annual capital cost for 8.5% of Discount Rate Sensitivity would defer this project by 3 years to 2024-25.





‘Base case’ economic timing: 2021-22.

A 15% reduction in the Project Capital Cost Sensitivity (PCCS) would bring this project forward by one year to 2022-23.

For asset replacement programs: asset criticality vs. condition matrix

- The methodology considers the probability of failure, consequence of a failure, and the cost of replacement in order to determine whether asset replacement is economic.
- Further detail on determining the economic volume of assets to replace is provided on the following page.

Probability of failure:
- expected life of the asset in different corrosivity zones
- remaining service potential based on GW condition score

Consequence of failure:
- value of unserved energy
- safety risk cost
- collateral damage
- bushfire risk cost

Cost of replacement:
- cost of replacement
- discount rate

Risk matrix (asset criticality vs. asset condition) for each individual GW span

Asset Criticality	C1	C2	C3	C4	C5	Grand Total
5	1155	3286	371	165	81	5058
4	1918	3588	260	86	14	5866
3	1171	4129	264	90	16	5670
2	1326	1185	51	29	0	2591
1	6	54	2	0	0	62
Grand Total	5576	12242	948	370	111	19247

Asset criticality vs. condition matrix

Economic impact (consequence) of failure

- The consequence of functional failures are estimated based on the four consequence types:
  1. Market impact and unserved energy
  2. Health and safety
  3. Collateral damage
  4. Bushfire ignition
- Consequences are quantified using a similar methodology to that applied to Major Station projects
- The asset criticality is scaled and grouped into five asset criticality bands and assigned to each span
- This allows us to determine the economic volume of assets to replace

Asset Criticality Band	Economic Impact
1	<= 0.3 x replacement cost due to failure
2	0.3 to1 x replacement cost due to failure
3	1 to 3 x replacement cost due to failure
4	3 to10 x replacement cost due to failure
5	>10 x replacement cost due to failure

Please contact us if you have any questions

Rob Ball
Principal Economist, AusNet
+61 (0) 400 195 737
robert.ball@ausnetservices.com.au