BOSTON CONSULTING GROUP

Consultation Workshop 2

AEMO Planning and Forecasting: 2019 Consultation Process

APRIL 2019

AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

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Welcome

Introductions

Mix-up

AEMO is committed to continually improving our suite of planning publications to better meet stakeholder needs

We respect your expertise and value all feedback, which is critical in guiding meaningful progress and developing a strategic vision for the future development of Australia's energy system

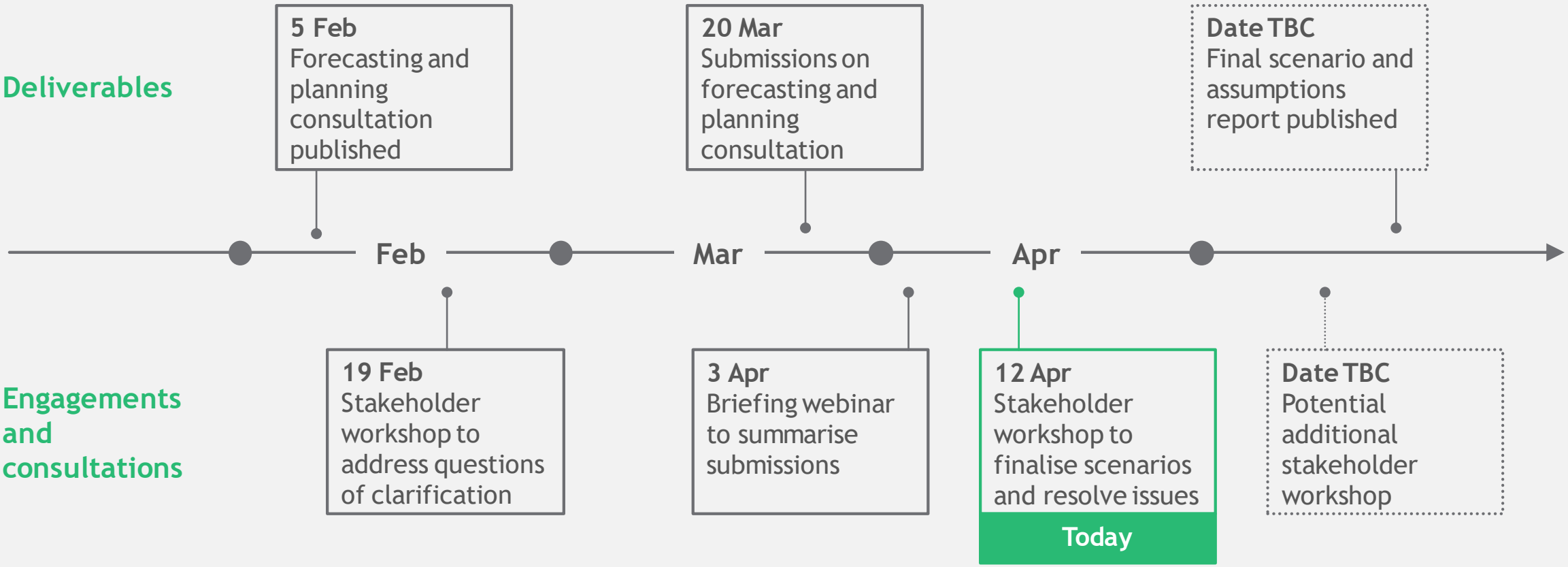
Thank you for joining us in this mission

We are listening and actively responding to and incorporating your feedback through this process

As a result of your feedback we have:

- Adopted expected closure dates for generators instead of the blanket 50 year end of life assumption
- Adopted the same commercial discount rate for both the WACC and the calculation of the net present value (NPV)
- Actively been considering the inclusion of a new Renewable Energy Zone (REZ) in central north Victoria, and also the inclusion of additional REZ in other regions
- Corrected the MLFs in Tasmania
- Adjusted build limits if they were less than the current known interest reported in the Generation Information Page
- Adjusted the mix of fuels considered in REZ if known interest exists
- Changed the correlation between DER uptake and the rate of change in the scenario definitions to remove potential internal inconsistency
- Proposed to change the generation cost trajectory in the Neutral scenario based on the CSIRO's two degree scenario
- Proposed to run a demand forecasting workshop with subject matter experts on April 29 to consider the merits of suggested methodology improvements and how they could be implemented

Today's workshop is part of our broader stakeholder engagement and consultation process



Objectives for today

Scenario narrative development

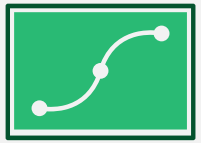
Develop a narrative for each of the scenarios and define key factors about the world we would need to believe

Designed in response to your feedback

Assumptions and inputs

Discuss and gather directional feedback on the key open assumptions and inputs that support each scenario

Designed to provide opportunity for additional feedback



Analyses to strengthen scenarios

Identify additional bespoke analyses required to strengthen scenarios, as well as how to perform them

Designed in response to your feedback

Agenda

Welcome	10:00 AM – 10:30 AM
Spotlight session	10:30 AM – 11:00 AM
Scenario narrative development	11:00 AM – 12:15 PM
Overview of modelling approach	12:15 PM – 12:45 PM
Session intro: Assumptions and inputs	12:45 PM – 01:00 PM
Lunch	01:00 PM – 01:30 PM
Assumptions and inputs	01:30 PM – 03:00 PM
Break	03:00 PM – 03:15 PM
Bespoke analyses to strengthen scenarios	03:15 PM – 04:30 PM
Next steps and reflection	04:30 PM – 04:45 PM

Norms of engagement:

1. Challenge your thinking
2. Set aside your organisation's hat
3. Respect the shared environment

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Spotlight session

What are the two most important things you want to shine a spotlight on?

An area you want to emphasise as critical going forward?

An area you think we may have missed, you disagree with, or could be improved?

An area you are glad was included, you agree with, or was done well?

Key themes

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Scenario narrative development

What is the probability that, five years from now, you will have to pay for a Google search?

We are developing a strategic vision for the future development of Australia's energy system

5

Scenarios

Slow Change

Gradual Change

Fast Change

High DER

Step Change

2040


The
Economist

Prompting questions…

- ? What does this future look like?
- ? What is it like to go to work, buy food, holiday, use technology?
- ? Are there winners and losers?
- ? What else can you tell us about this future and broader society?

- ? How did we get here?
- ? Which global and domestic trends contributed most to this future?
- ? Where are we heading next?

Your task…

Individually spend some time reflecting on the scenario jot down the main 10 points and headline idea for your article ~ 10min

As a group discuss as a group and capture your ideas on butcher's paper ~ 15 min

Decide on your group's top 10 ideas and write them on the Scenario Wall ~ 10min

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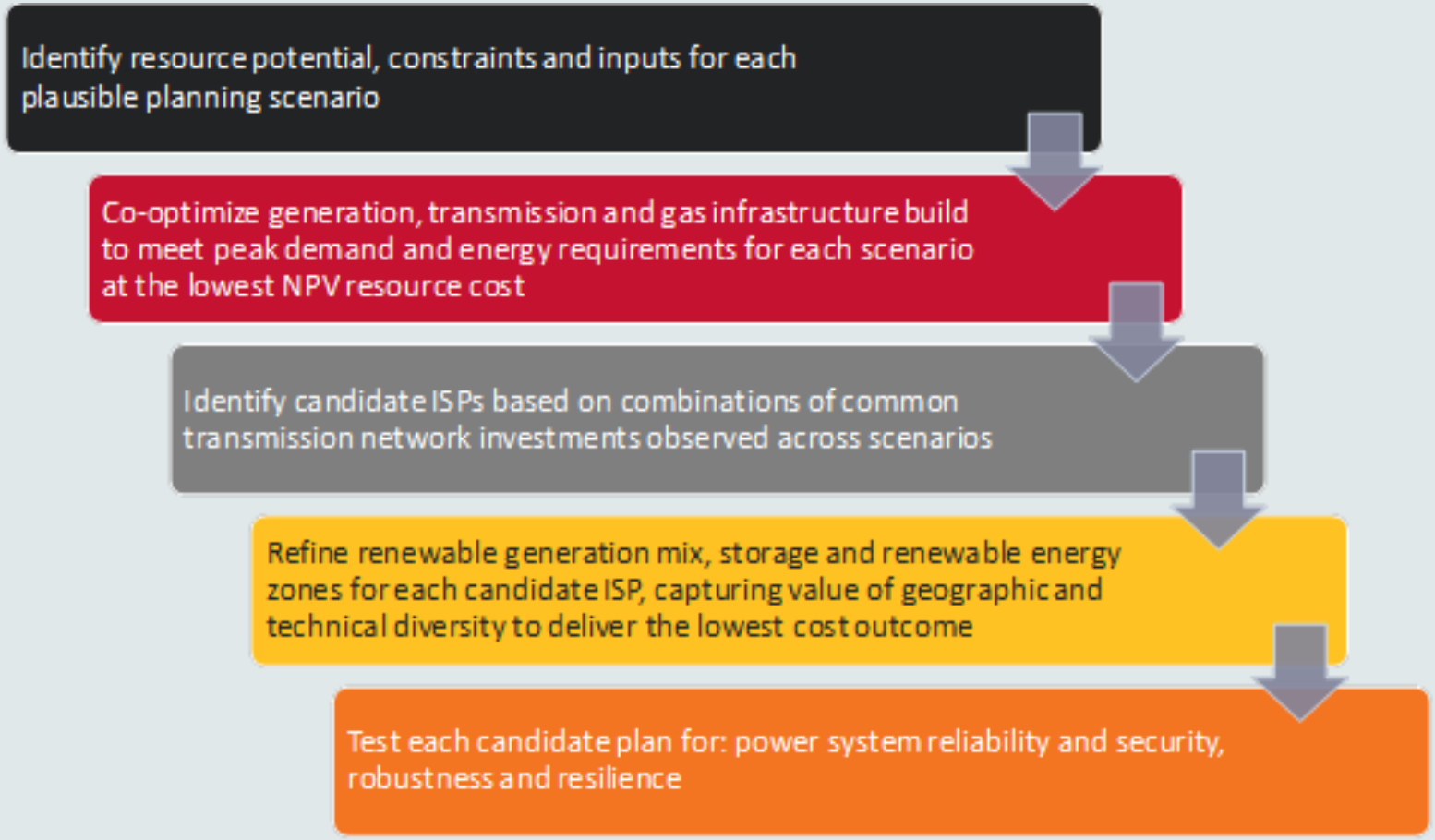
Overview of modelling approach

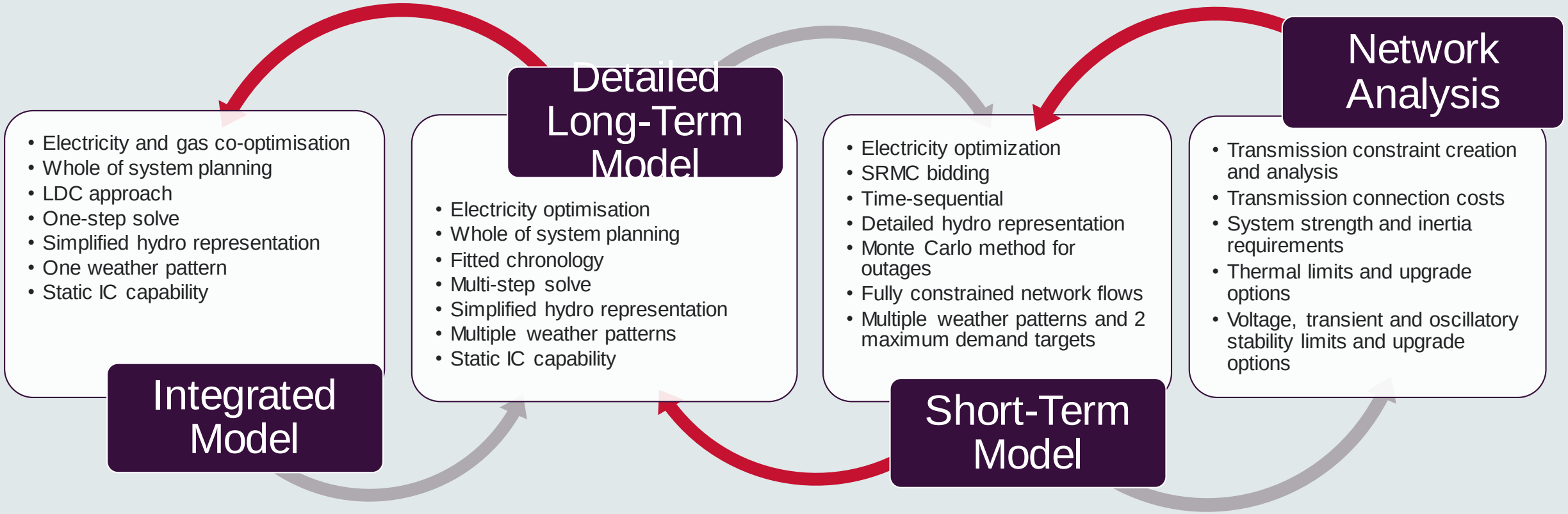
ISP modelling approach

Dane Winch and Lars Narushevich – AEMO

The Approach



Modelling Stages



Key Inputs

Resource Quality and Availability

- Wind resource data from DNV-GL
- Resource availability from DNV-GL and benchmarked against connection interest in accordance with AEMO's Generation Information releases

Technology

- Technology costs and forward projection of costs primarily from CSIRO
  - *"GenCost 2018"* project included significant consultation across industry
- Pumped storage costs from a range of sources; ANU, GHD, Entura and CSIRO
- Thermal generation fuel prices as sourced from:
  - Gas price forecasts from Core Energy Group
  - Coal price forecasts from Wood Mackenzie

Key Inputs

IC Capacity and Network Upgrades Options

- Forward and Reverse directions
- Single value at ‘critical’ time (typically max demand for region being supplied) for IM and DLT
- Soft constraints to capture REZ build costs

Constraints

- Reliability
- Inter-temporal
- Dynamic network constraints for Short-Term time-sequential market model

Key inputs – REZ Zones

REZ name	Solar quality	Wind quality	Spare Network capacity (MW)	Network losses	Priority for generator connections	Network upgrade timing				
						Neutral	Neutral with storage	Slow	Fast	High DER
Murray River (VIC)	C	C	300	E	2	2024	2024	2024	2024	2024
Western Victoria	E	A	0	D	3	2025	2024	2025	2020	2025
Moyne	E	B	2,000	C	1	2037	2037	>2040	2032	>2040
Gippsland	E	D	2,000	A		>2040	>2040	>2040	>2040	>2040
Ovens Murray	N/A†	N/A†	300	A		-	-	-	-	-

Key Inputs – Coal fleet operating life

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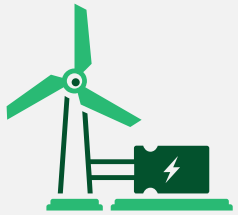
Session intro: Assumptions and inputs

We will be focusing on four main assumption groups

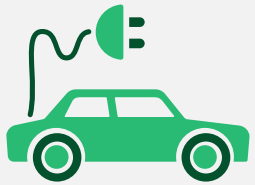
Emissions summary

- Global action
- National action
- Electricity sector action



Large-scale renewable build cost trajectories

- Solar PV
- Wind
- Pumped hydro
- Battery



DER uptake

- Rooftop PV and battery
- Electric vehicles

Demand summary

- Consumption

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Lunch

90
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Assumptions and inputs

What do you think about the key assumptions and inputs for each scenario?

You will have 20min with each scenario…

Facilitator provides overview of scenario narrative and key assumptions ~ 5min

Group discusses assumptions and inputs, and provides feedback on each choice using coloured dots ~ 10min

Use sticky notes to give additional comments invited in call-out boxes if required

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Break

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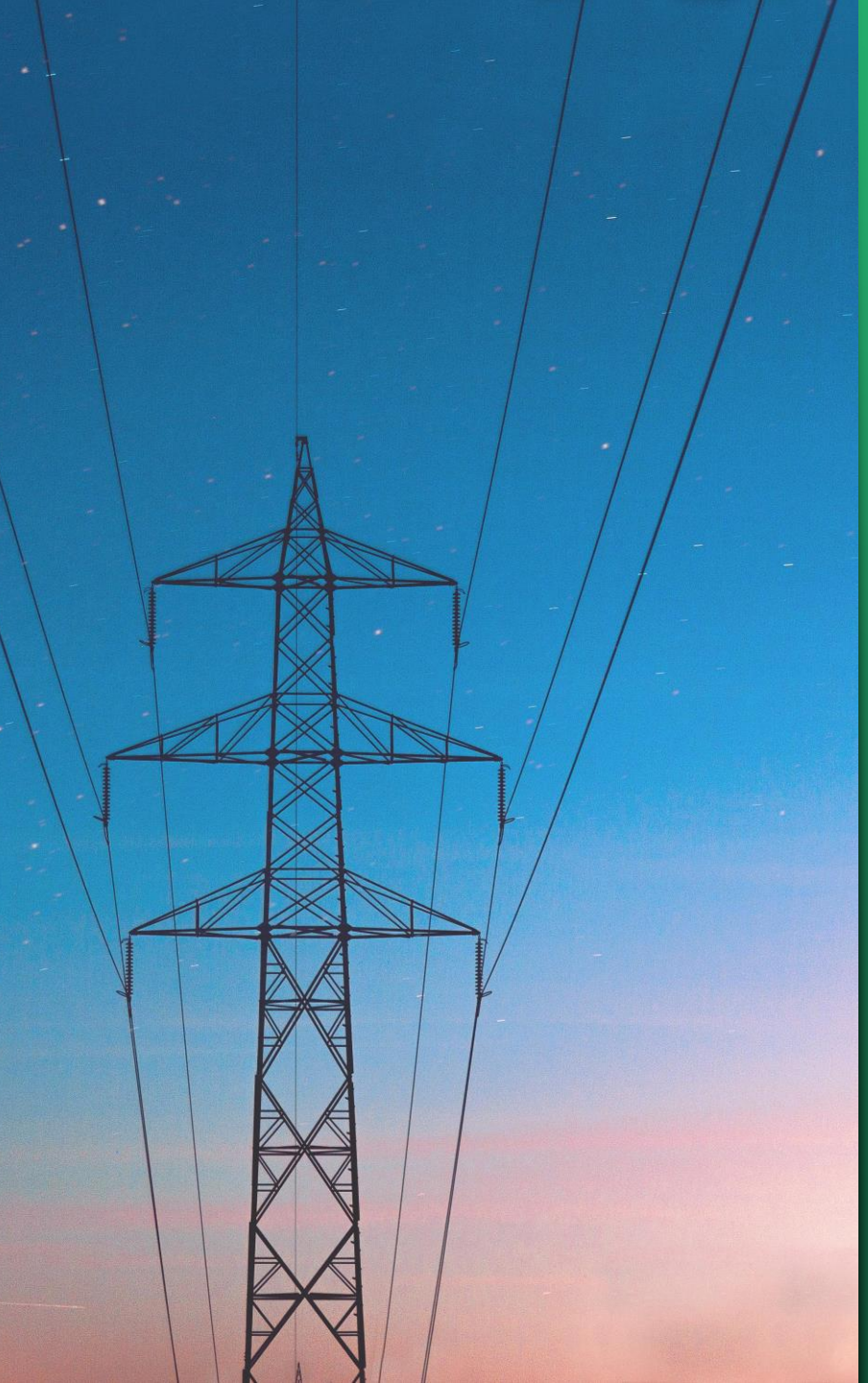
Bespoke analyses to strengthen scenarios



In response to your feedback AEMO is considering select bespoke analyses to support certain scenarios

Opportunities

What opportunities may this future world present to get more out of our energy system?

Bespoke Analyses

Risks

What risks may this future world present to our energy system?

Guiding questions…

1. What's not going to be captured in the general modelling that is important for this scenario?
2. How do you want us to capture this through bespoke modelling so that we can understand this scenario in more detail?
3. Does this apply to other scenarios? If so, which ones?

Your task…

Select the first scenario you would like to provide feedback on

Individually jot down ideas ~ 5min

Discuss as a group, your facilitator will capture ideas on stickies and then place them on the graph ~ 10min

Decide on top three ideas and transfer to Scenario Wall ~ 10min

Playback

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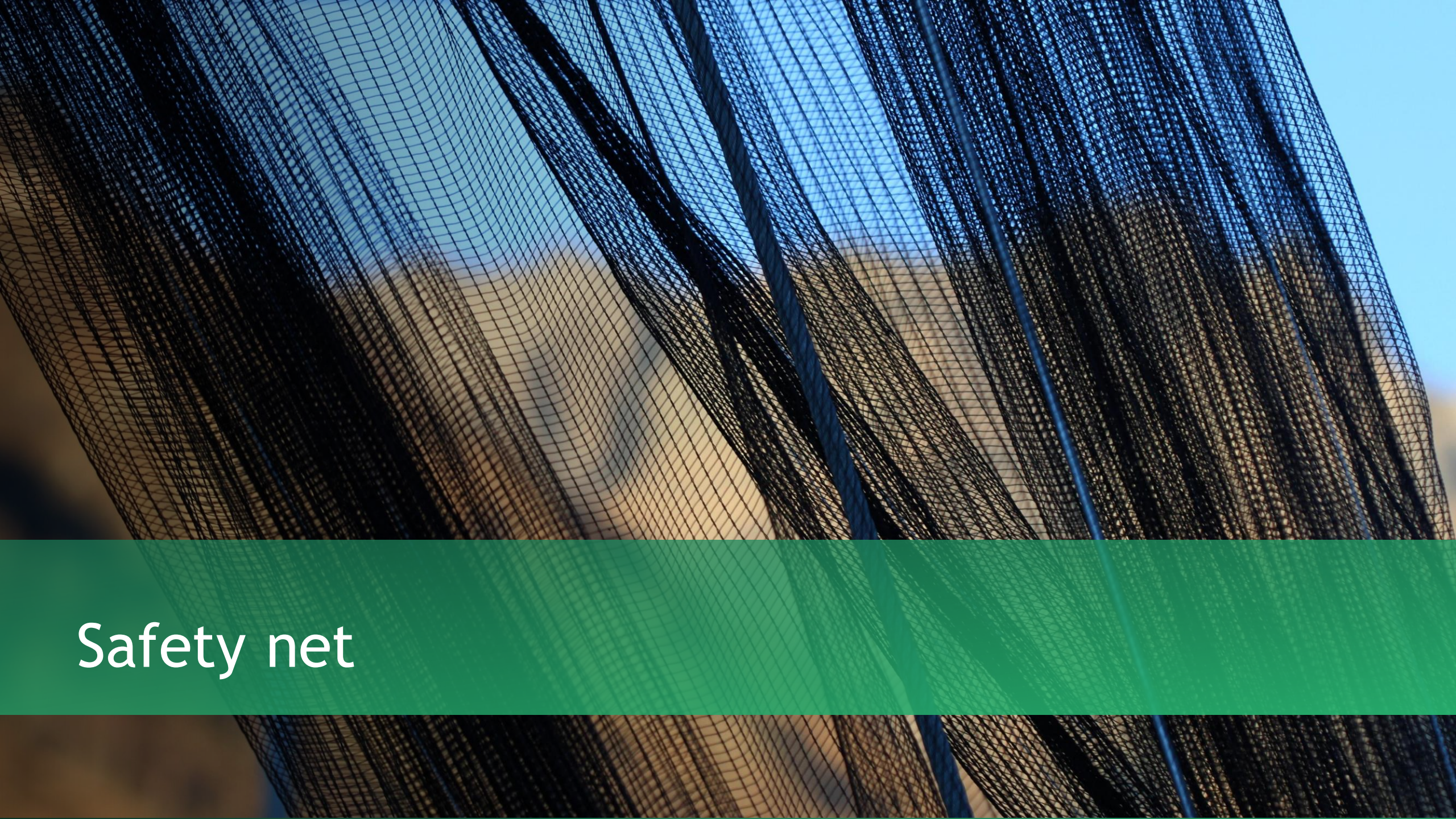
Next steps and reflection



Safety net

Thank you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