Scenario weighting in the Integrated System Plan

Stakeholder workshop

22 October 2021

We acknowledge the Traditional Owners of country throughout Australia and recognise their continuing connection to land, waters and culture.

We pay our respects to their Elders past, present and emerging.

Agenda

Item	Speakers
1. Welcome and explanation of meeting platforms	Nicola Falcon Oliver Derum
2. The five scenarios	Andrew Turley
3. About the Delphi Panel process	Oliver Derum
4. Results of the Delphi Panel	Andrew Turley

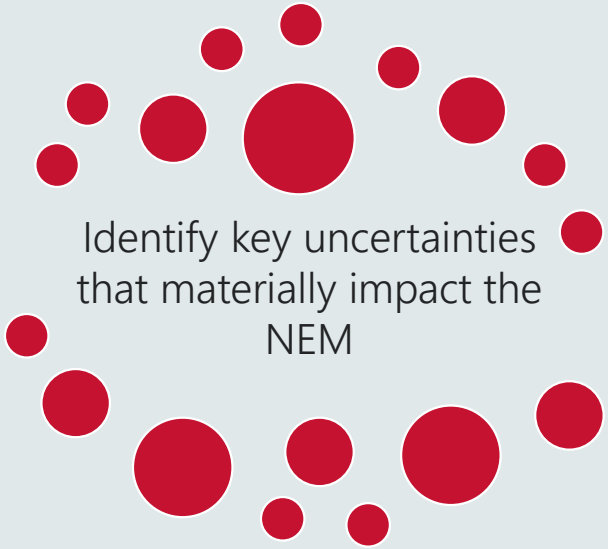
There will be opportunity for questions and comments as part of each agenda item.

Purpose of this forum: Process to determine scenario weightings

- The process to determine ISP scenario weightings was described in the ISP Methodology, published on 30 July 2021 (section 5.7.2).
- Views of experts sought through the use of a Delphi Panel (5 October 2021).
- Stakeholder views sought on scenario weights determined by the Delphi Panel, through survey and public forum (15 to 25 October).
- AEMO assigns final likelihood and provides explanation of decisions.

2. The five scenarios

Scenario development approach



Identify key uncertainties that materially impact the NEM

Survey stakeholders on importance of:

- Decarbonisation
- Decentralisation
- Relative cost of renewables and storage
- Electrification
- Broader economic activity and population

Combine uncertainties to create internally consistent and distinct scenarios

Workshop scenario narratives with stakeholders to test plausibility, breadth of future vision and world views (**weltanschauung**)

Refine scenarios based on stakeholder feedback

Attribute inputs to scenarios, aligning with scenario narratives

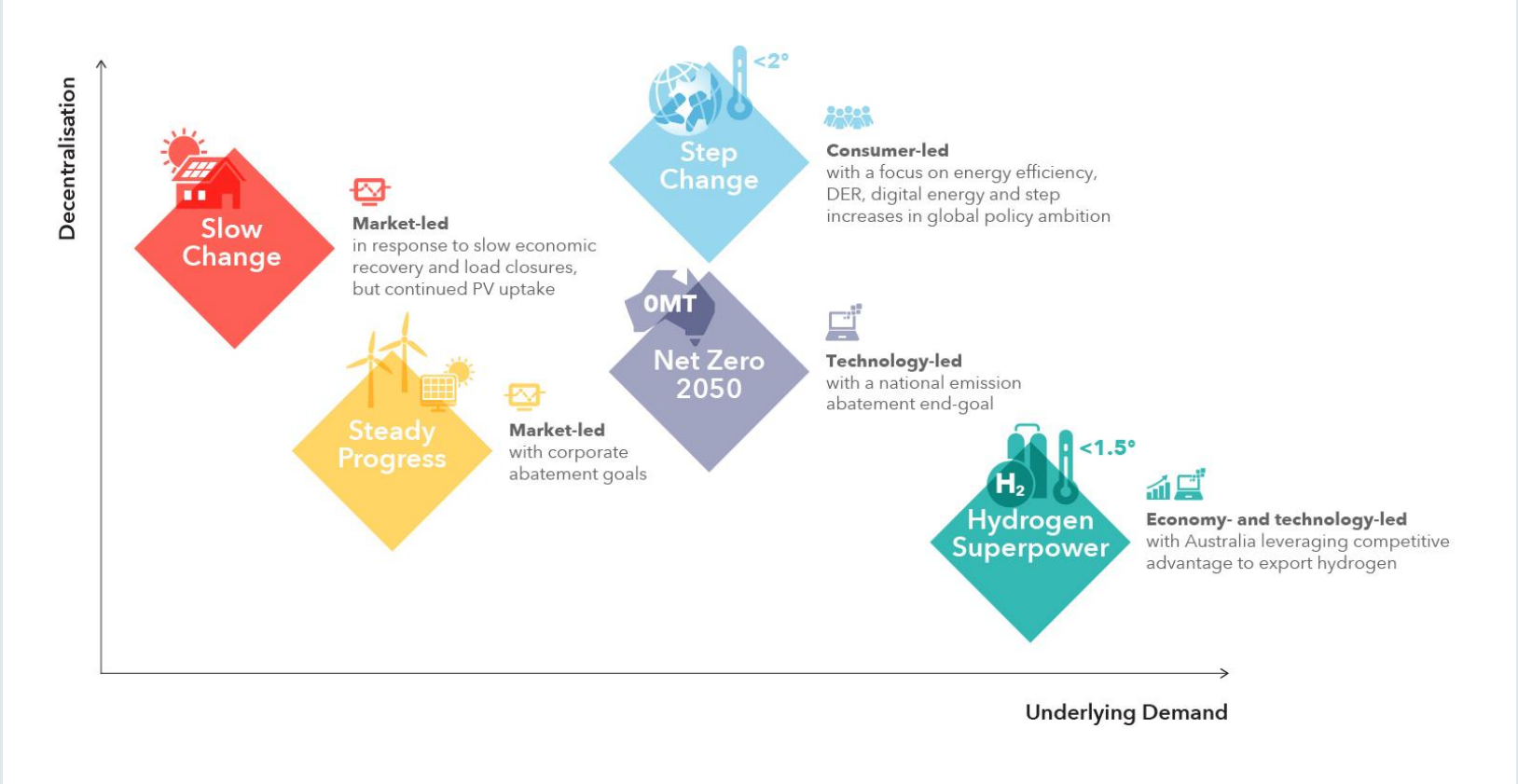
- Formally consult on inputs and scenarios via Draft IASR
- Extend inputs and assumptions based on Draft IASR stakeholder feedback. For example, CSIRO/ClimateWorks were deployed to explore electrification and decarbonisation influences.

Five scenarios for the future

- The five scenarios have been developed with industry participants and consumer representatives to cover a plausible range of energy futures. These scenarios assume different futures, depending on questions like:
  - **How much does the population and economy grow**, and **how much will we rely on electricity** for our energy needs?
  - **How much will energy supply keep decentralising**, as homes and businesses invest in their own rooftop PV and storage systems?
  - What will be the impact of increasing digitalisation, changes in technology, and the **emergence and growth of new technologies such as electric vehicles**?
  - **How quickly will sectors, businesses and households seek to decarbonise**, and how much will they switch from other fuels to electricity as electrical power comes more from renewables and less from fossil fuels?
  - **Will we see the rise of alternative fuels like biofuels and hydrogen?**

In 20 years, what do the different scenarios look like for how people live and work in the NEM?

Scenarios influenced by extensive stakeholder consultation, research and analysis



The pace of economy-wide decarbonisation is a key element of the scenarios. The scale and pace of transition and degree of electrification will influence the near term and long term investment needs.

The scenario collection broadly captures a spread of decarbonisation futures, from current commitments to potential expanded commitments in future years.

Key Scenario Settings

Scenario Legend:

- Slow Change (SL)
- Steady Progress (SP)
- Net Zero 2050 (NZ)
- Step Change (ST)
- Hydrogen Superpower (HS)

The pace of transition of each scenario is an important influence on the scenario narratives. The 'end point' does not define the scenario; the whole journey must be considered.

Category	Description	2025	2030	2035	2040	2045	2050
Transport	A third of road transport are electric vehicles		HS ST		NZ SP SL		
	Half of all road transport sales are electric vehicles	HS	ST	NZ SP	SL		
Heating (building)	Primary source of heating comes from electricity			HS ST			NZ SP
Industrial energy consumption	Oil consumption falls to half of 2020's output	HS ST		NZ			
	Electrification accounts for >50 TWh of consumption		HS		ST		NZ
Distributed PV	Distributed PV supply triples from 2020's output.		HS ST	NZ SL	SP		
Home batteries	Batteries account for 75 GWh of storage.		HS	ST NZ	SP		
Natural gas consumption	Non-industrial gas usage falls to half of 2020's consumption		HS ST				NZ
	Industrial gas usage falls to half of 2020's consumption				HS		ST
Carbon sequestration	Carbon forestry absorbs >50 Mt of CO2e		HS	ST	NZ		
Technology Cost Reductions	Hydrogen PEM electrolysers are <$450/kW			HS ST		NZ SP SL	

Use of scenario weighting in the ISP

- Scenario likelihoods are material to the selection of the ISP Optimal Development Path (ODP).
- The Cost Benefit Analysis Guidelines require AEMO to apply a scenario-weighted average approach to the net market benefits of alternative candidate development paths, at a minimum.
- AEMO will also analyse the potential regret for consumers of different investments in different scenarios

3. About the Delphi Panel process

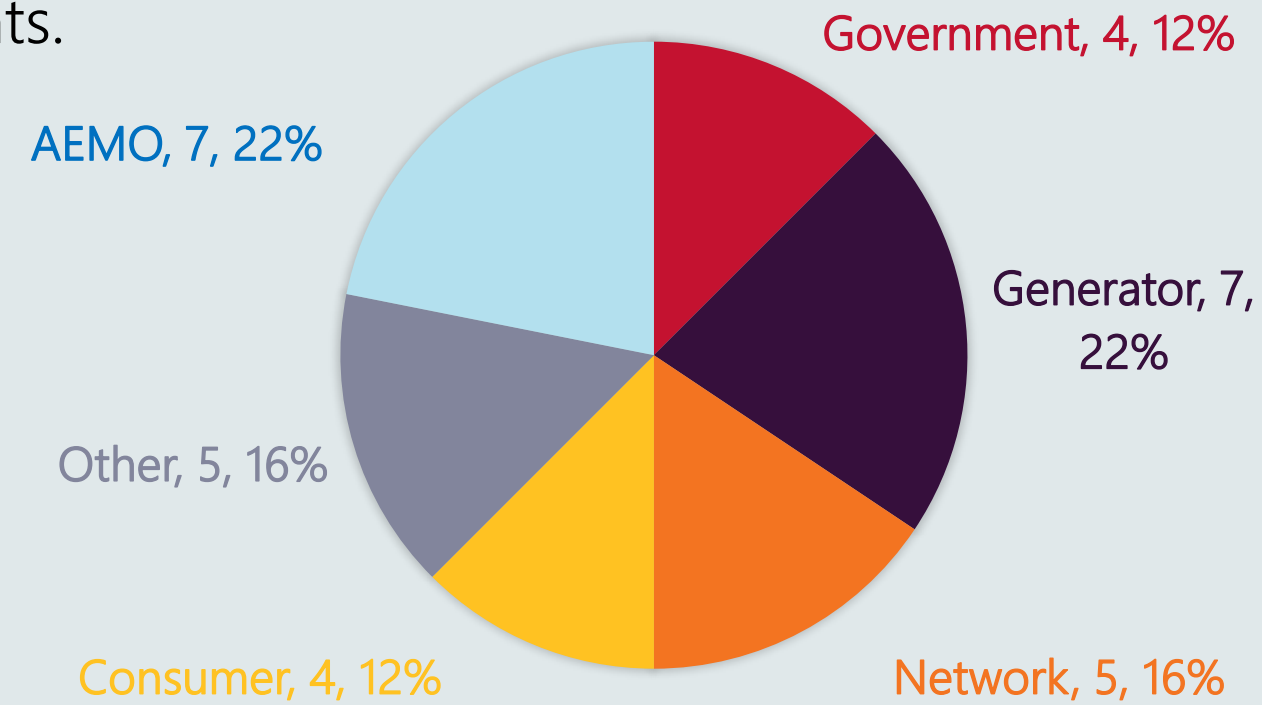
General characteristics

- Invented in the 1950s, named after the Ancient Greek Oracle at Delphi.
- Process seeks to synthesise and extract collective wisdom regarding complex considerations, especially the making of predictions about technological, social and economic change.
- Participants are anonymous, both during and after the event.
- Answers are shared with the group, with participants encouraged to consider the answers and reasons of others, and be open to adjusting their own responses.

The ISP scenario weighting Delphi Panel

- Individuals were invited based on their expertise in the issues under consideration.
- Participants were encouraged to provide their view of the likelihood of scenarios, rather than voting for the scenario that might best serve their organisations interests.
- Nonetheless, AEMO has segmented results by stakeholder cohort.
- The Panel consisted of 32 participants.

Government	4
Generator	7
Network	5
Consumer	4
Other	5
AEMO	7
Total	**32**



What were participants asked

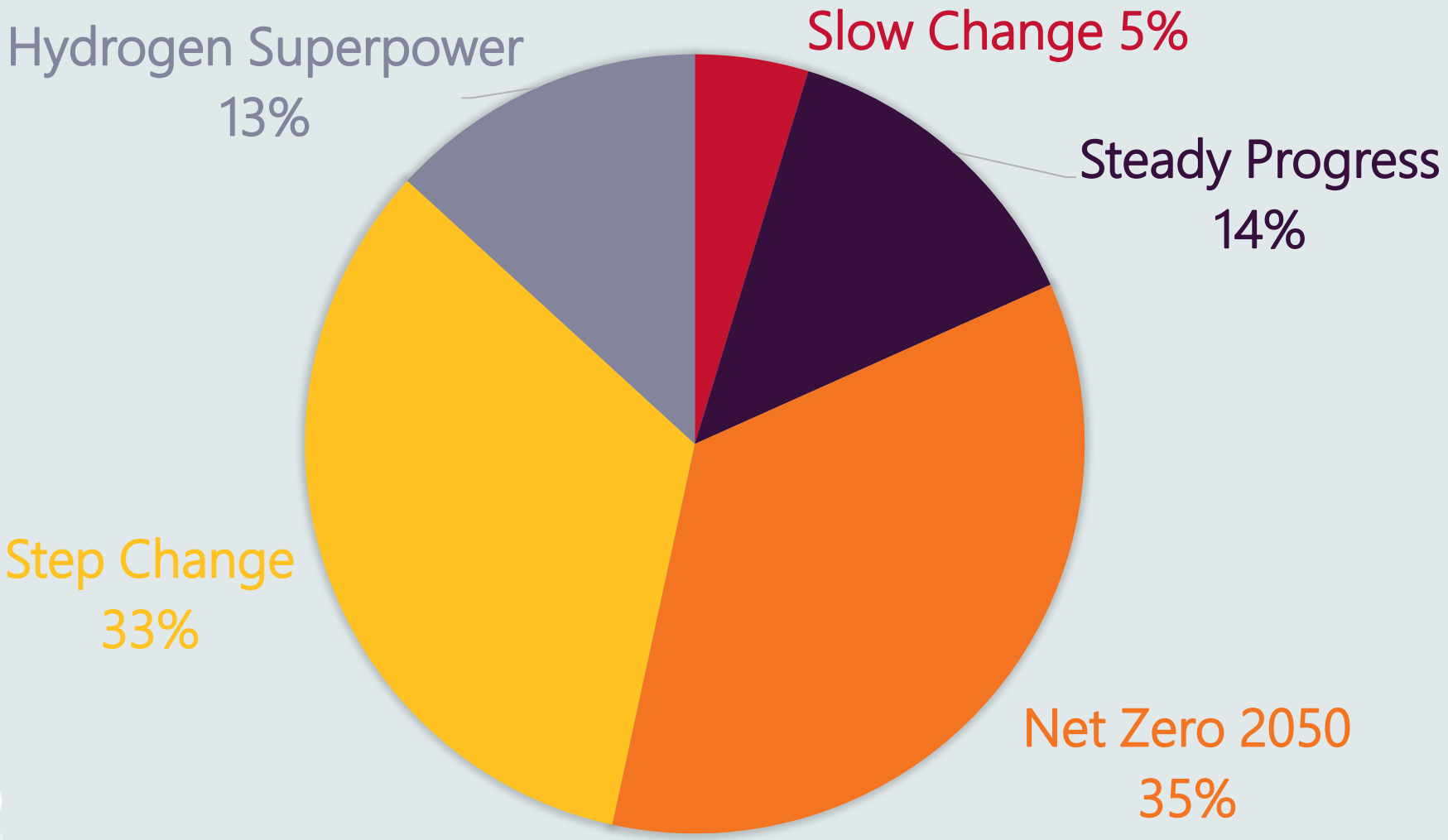
- *Based on your expectations for the future development of energy technology, policy and consumer investment preferences in the NEM, take yourself to 2040: what is the relative likelihood that the NEM is facing the world described by each of the five core scenarios?*

  Please indicate the relative likelihood of each scenario by allocating 100 percent across the five scenarios. The higher the percentage, the higher the likelihood.

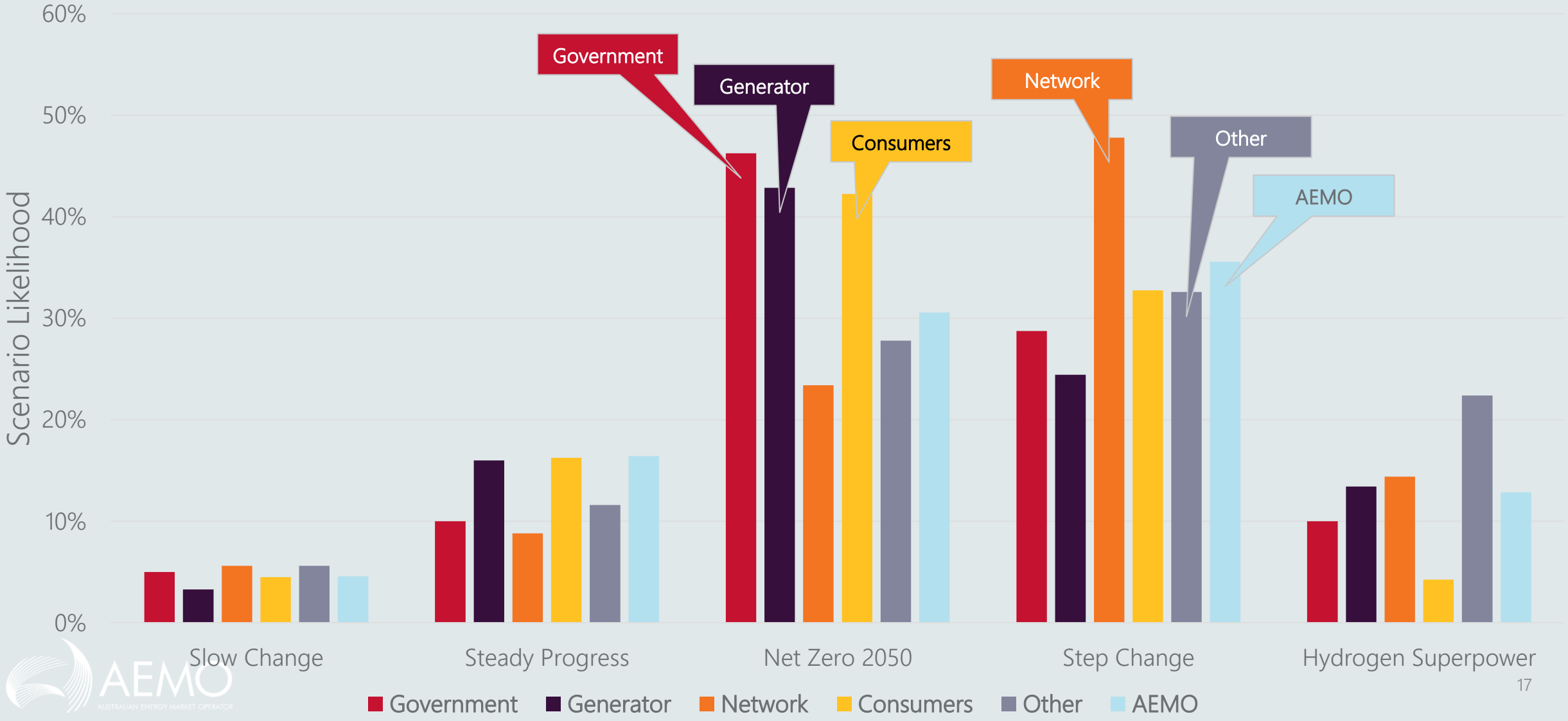
- Participants were guided through a series of rounds. Each round consisted of participants submitting answers, reviewing answers/comments from others, then reconsidering their own responses.

4. Results of the ISP scenario weighting Delphi Panel

Overall results – scenario likelihoods

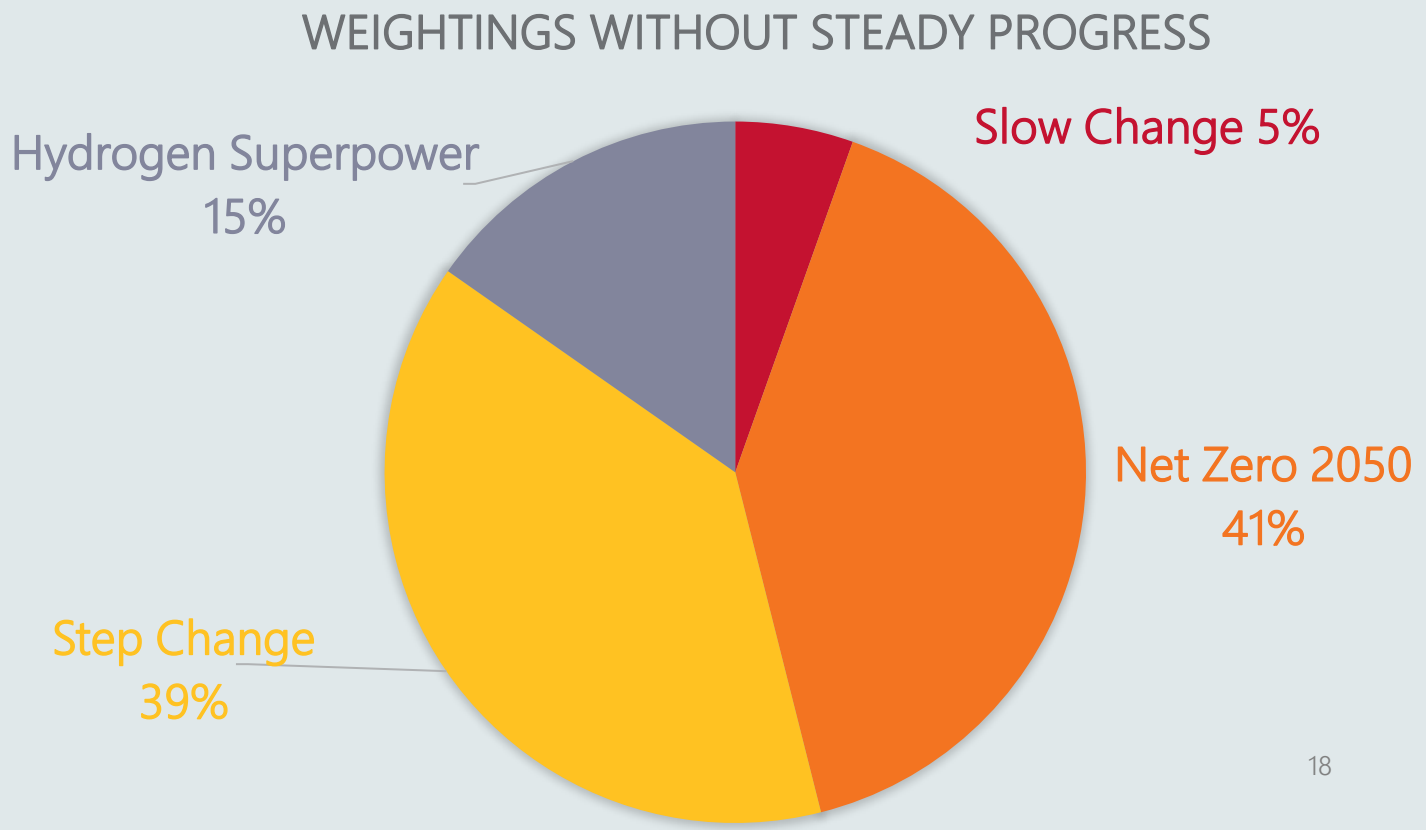


Scenario likelihoods by cohort



COP26 and impact on scenario weightings

- AEMO will re-assess appropriateness of scenario weightings after COP26 in Glasgow
- If a net zero 2050 commitment is made by Australia then AEMO proposes to:
  - Effectively remove (set to 0%) the Steady Progress scenario, and:
    - potentially reconvene the Delphi Panel to reconsider the remaining weightings, or
    - adjust the four scenario weights in proportion, as shown.



Seeking stakeholder views on scenario weighting

- AEMO is seeking stakeholder views on the results of the Delphi Panel.
- Comments can be made through a short structured survey:
  - The survey is open from straight after the forum (4pm AEDT 22 October) until 1pm AEDT on 29 October
  - The survey can be completed at: https://forms.office.com/Pages/ResponsePage.aspx?id=npkMMnY40Eq0AdJBBo6eYNFWDgojelNMubS8LTkt6TZUOE9YTEpFRTU4NzEwUU9TSkE3NkgxSEFTQy4u
- The survey is the opportunity for stakeholders to:
  - express views about the results of the Delphi Panel, for AEMO's consideration
  - Indicate preference regarding proposed options to adjust the weightings in view of any net-zero commitment by the Australian Government.

Questions?

Thank you for your attendance.

Please direct any questions to ISP@aemo.com.au.