

# Review into the Long Duration Storage requirements of NSW

---

Stakeholder  
Briefing Session

Department of Climate Change, Energy, the  
Environment and Water

30 May 2024

# Acknowledgement of Country

The Department of Climate Change, Energy, the Environment and Water acknowledges that it stands on Aboriginal land.

We acknowledge the Traditional Custodians of the land and water, and we show our respect for Elders past, present and emerging.

We do this through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

Artist and designer Nikita Ridgeway from Aboriginal design agency Boss Lady Creative Designs, created the People and Community symbol.

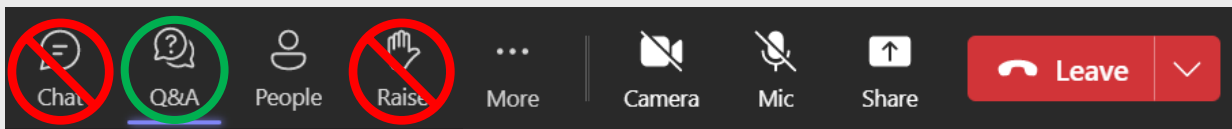
# Agenda



No.	Item	Speaker	Time
	<i>Introduction</i>	Kate Norris, Director Strategic Policy & Projects, Strategy & Implementation DCCEEW	5 mins
1	Consultation Overview	Kate Norris, DCCEEW	10 mins
2	AEMO Services modelling on LDS	Nicholas Furner (né Gurieff), Senior Policy Analyst System Planning and REZs, AEMO Services Limited	20 mins
3	Consultation Questions	Julia Spragg, Acting Manager, Energy Policy & Strategy, Strategy & Implementation, DCCEEW	20 mins
4	Q&A	Ben Cirulis, Director Energy Data & Analytics, Strategy & Implementation, DCCEEW	30 mins
5	How to make a submission	Kate Norris, DCCEEW	5 mins

# House Keeping

- During today's presentation, all participants will be on mute to avoid interruptions.
  - This session is not being recorded.
  - A copy of the slides will be made available on the Roadmap consultation webpage.
  - Please post questions in the Q&A channel.
- There is an opportunity for Q&A at the end of the session.
  - If your question is not answered, we will take it on notice and email all attendees a response.
  - If you have any additional questions during the consultation period, please email [lds.review@dpie.nsw.gov.au](mailto:lds.review@dpie.nsw.gov.au)



# 1

## Consultation Overview

# The NSW Electricity Infrastructure Roadmap

Consultation Overview

Consultation Questions

AEMO Services modelling

Q&A

Submissions

## The Roadmap

The Electricity Infrastructure Roadmap is a legislated plan to transform the NSW electricity sector into one that is cheap, clean and reliable.

## The EII Act

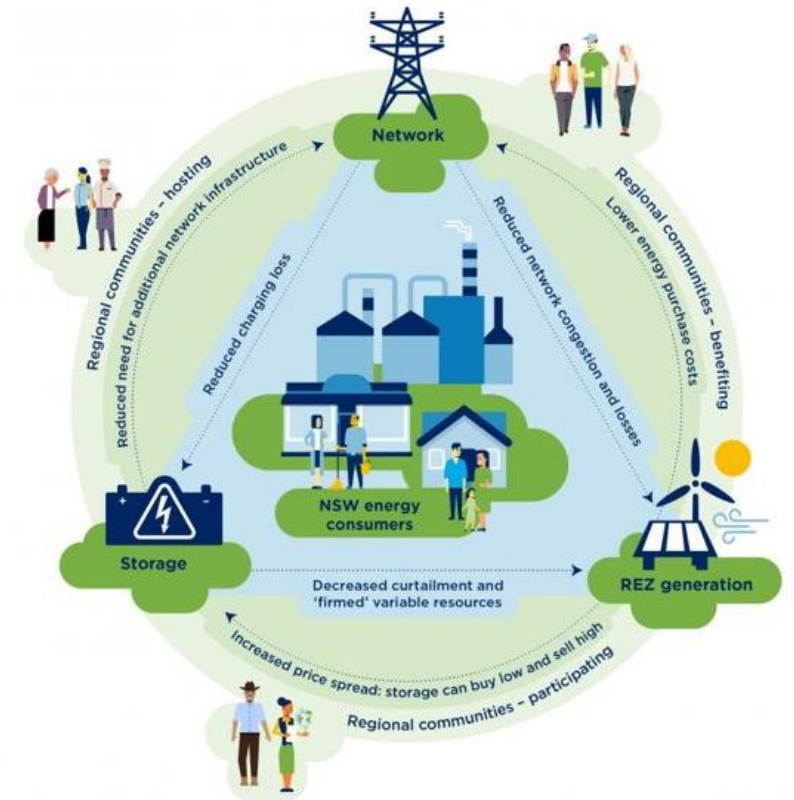
The *Electricity Infrastructure Investment Act 2020* (EII Act) sets objectives and support mechanisms

Minimum by 2030 infrastructure investment objectives for construction of:

- Long duration storage (LDS) with least capacity of 2 GW and storage of 16 GWh.
- Renewable energy generation infrastructure that generates at least 33,600 GWh in a year (the equivalent of 12 GW).

Overall ongoing objectives for construction of:

- Generation infrastructure that is necessary to minimise electricity costs for NSW electricity customers.
- Long-duration storage infrastructure that is necessary to meet the reliability standard.
- Firming infrastructure that is necessary to meet the energy security target and the reliability standard.



# Electricity Supply and Reliability Check Up

Consultation Overview

Consultation Questions

AEMO Services modelling

Q&A

Submissions

May  
2023

NSW Government commissioned an independent Electricity Supply and Reliability Check Up (the Check Up) by Marsden Jacob Associates.

Marsden Jacob Associates delivered its Check Up report which made 54 recommendations to ensure that the Roadmap delivery was kept on track.

Aug  
2023

The Check Up found that based on the current delivery trajectory for long duration storage projects it is unlikely that the minimum objectives will be achieved if this is based solely on pumped hydro projects only.

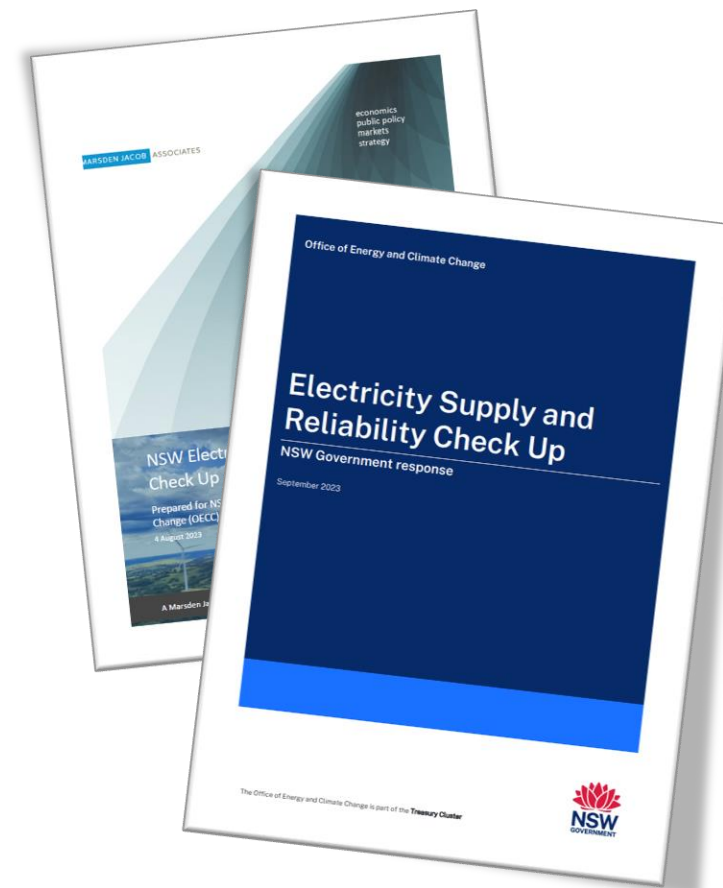
More consideration is likely needed to encourage greater technology diversification to meet NSW's needs.

The NSW Government responded, including accepting:

Sep  
2023

## Check Up Recommendation No. 28

That considering the slow development of long-duration storage (LDS), the Government commission a review by the Consumer Trustee (CT) into the storage requirements of the NSW market and consider amendments to the definition of LDS in the Roadmap legislation.





# Current definition of LDS under the EI Act 2020

In NSW, **long duration storage** infrastructure is defined under Part 6, Division 1, Section 43(1)(b) of the EI Act.

## 43 Application of Part

(1) This Part applies to the following infrastructure—

- (a) generation infrastructure that involves generation from a renewable energy source and that has a generation capacity of not less than 30 megawatts,
- (b) long-duration storage infrastructure for storage of electricity that—
  - (i) consists of storage units with a registered capacity that can be dispatched for at least 8 hours, and
  - (ii) is scheduled by AEMO in the central dispatch process under the *National Electricity Rules*,
- (c) firming infrastructure that is scheduled by AEMO in the central dispatch process under the *National Electricity Rules*.

(2) This Part does not apply to infrastructure that is part of a committed infrastructure project.

(3) In this Part—

**committed infrastructure project** means a project that was identified as committed or existing in a generation information page published by AEMO under the *National Electricity Rules* on or before 14 November 2019.

**registered capacity** has the same meaning as in Chapter 4A of the *National Electricity Rules*.

**reliability standard** means the reliability standard implemented by AEMO under the *National Electricity Rules* that is prescribed by the regulations.

The National Electricity Rules define central dispatch and scheduled capacity.

**central dispatch** means the process managed by AEMO for the dispatch of scheduled generating units, semi-scheduled generating units, wholesale demand response units, scheduled loads, scheduled network services and market ancillary services in accordance with NER Rule 3.8.

**scheduled capacity** means Scheduled Generators and Market Participants must notify AEMO of the available capacity of each scheduled generating unit, wholesale demand response unit, scheduled network service and/or scheduled load for each trading interval of the trading day.



# Purpose of this consultation

Consultation Overview

Consultation Questions

AEMO Services modelling

Q&A

Submissions

## Consultation

We are seeking feedback to support the review of long duration storage requirements and definition.

Your submissions will inform potential amendments to the definition of long duration storage under the EII Act.

## Advice

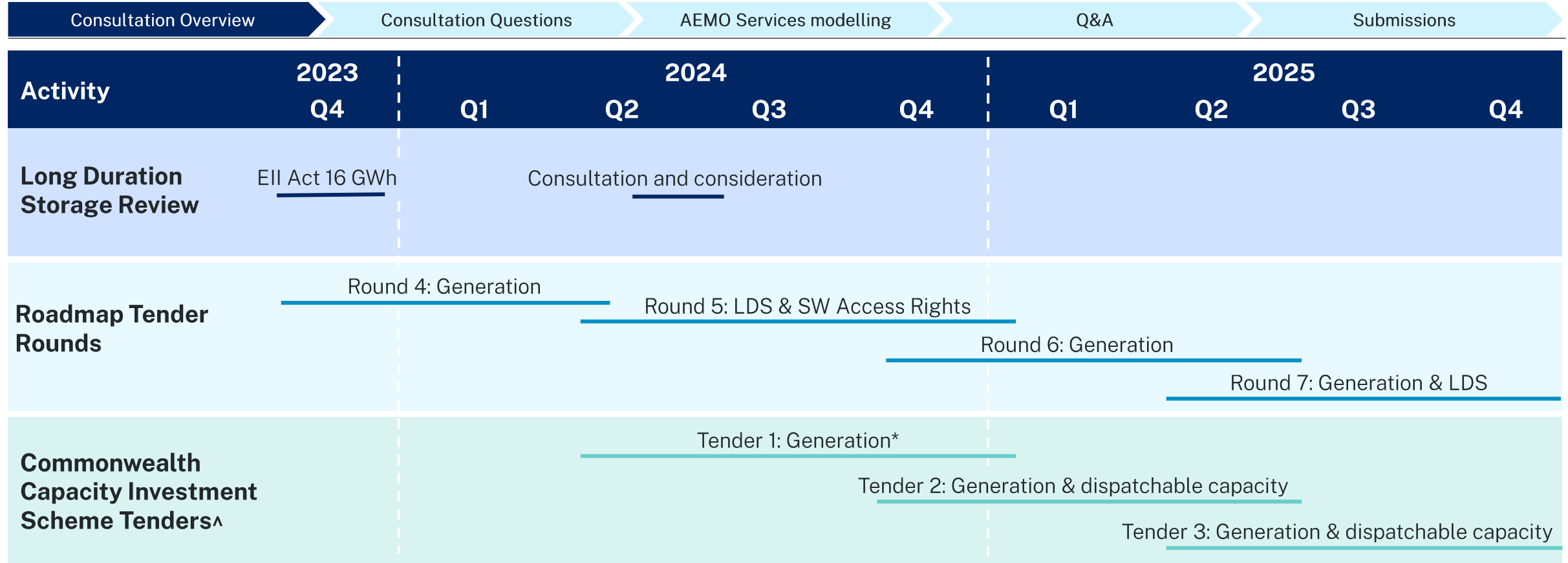
To support this review, we engaged AEMO Services to provide advice on the storage infrastructure requirements of the NSW market.

## Potential reforms for consultation:

1. Potentially reducing the minimum duration of LDS infrastructure (e.g. to 4 hours) to lower the cost to consumers of achieving the Roadmap's 2030 infrastructure objectives.
2. Mechanisms to encourage longer duration storage infrastructure to mitigate against future reliability gaps.
3. Options to aggregate infrastructure to accelerate additional storage infrastructure.

**Any potential changes from this review will not impact eligibility or merit assessment in NSW Roadmap Tender 5**

# Timeline



<sup>^</sup> NSW is working with the Commonwealth to advance a single CIS-Roadmap tender process for generation infrastructure to apply from November 2024 onwards.

\* Tender 1 includes at least 2.2 GW generation for NSW. Note: CIS tenders planned are for Western Australia's Wholesale Electricity Market are not represented here.

# 2

## AEMO Services modelling on LDS



# Review of storage infrastructure requirements for NSW

Industry Briefing

30 May 2024



# AEMO Services

## Mission

Australia's energy needs are changing rapidly, driven by two key imperatives:

- Commitments to reduce emissions
- New technologies which harness our advantage in renewable energy.

## Purpose

AEMO Services provides independent expertise to transform the energy sector.

We deliver innovative processes, products and partnerships that fast-track tomorrow's energy infrastructure.

## Services

We provide services to NSW under the Electricity Infrastructure Roadmap in our role as the Consumer Trustee.

## Delivery

Resilient and adaptive planning.

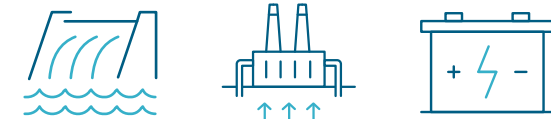
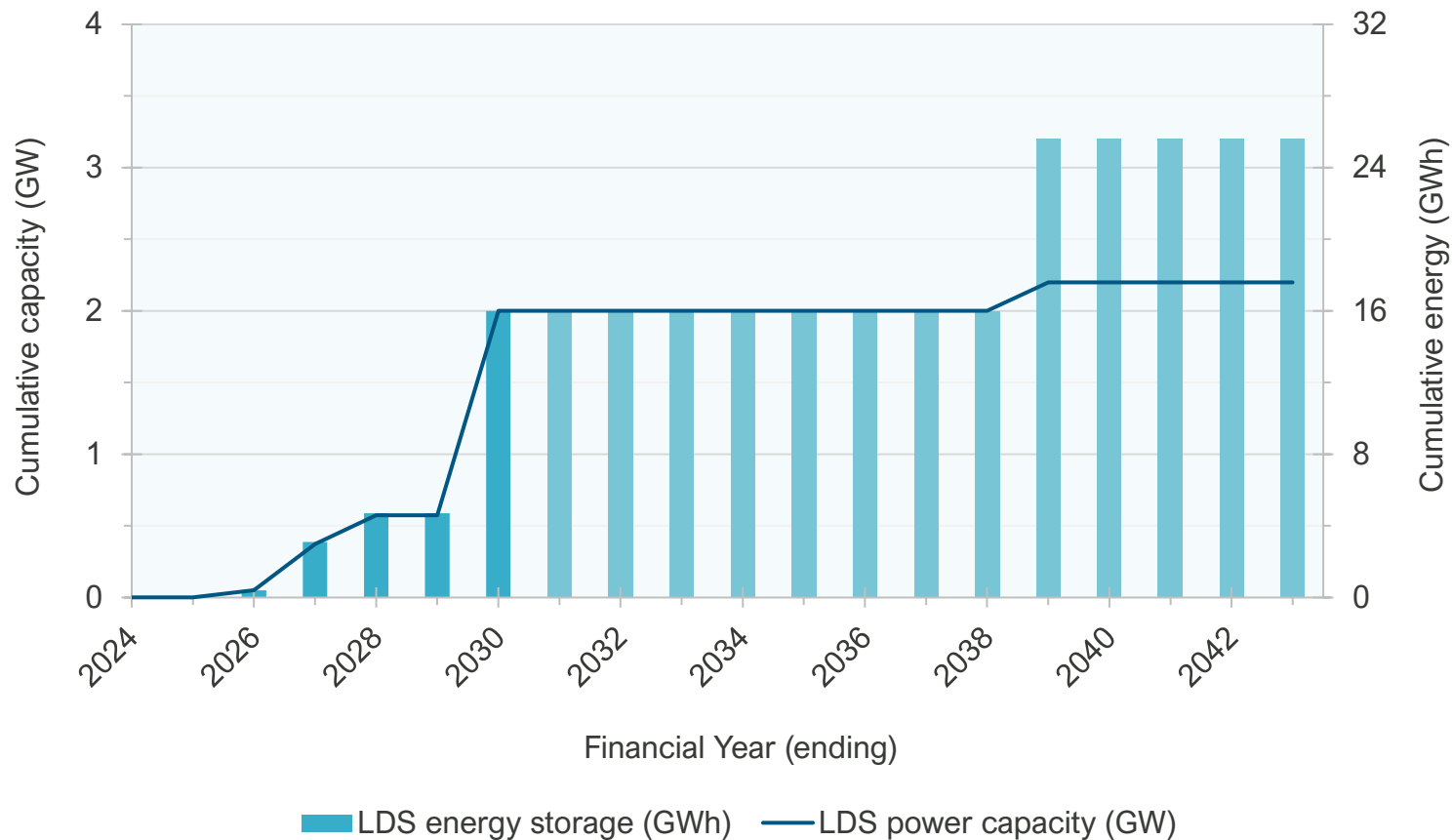
Accelerating energy infrastructure delivery.

Product innovation accepted by the market.

Expert governance & risk management.

# Development Pathway for LDS

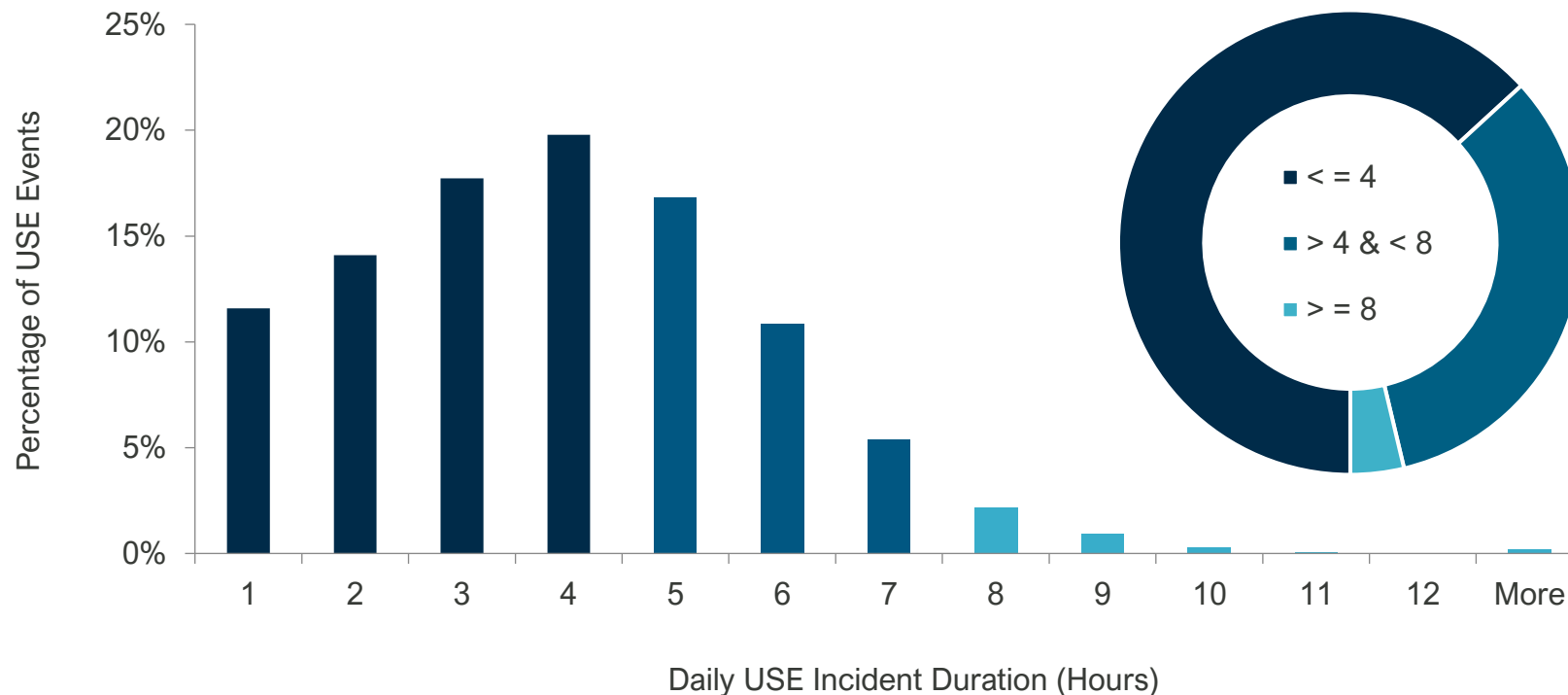
AEMO Services' 2023 IIO Report published the Development Pathway, with **cumulative capacity of long-duration storage over 20-years** reflecting the latest tender outcomes (including Tender Round 3).



Build trajectory is driven by costs and lead times associated with different long-duration storage technologies, with the model showing a preference for **later lower-cost projects, balanced by shorter delivery lead time projects** to achieve the minimum objective of 2 GW and 16 GWh by 2030.

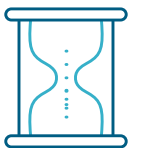
# Duration of modelled USE events

**Modelled distribution of unserved energy (USE) events in 2030** under the Central scenario from AEMO's 2023 ESOO, where only existing, committed and anticipated projects proceed.



Under this scenario, the majority (63%) of the modelled events are less than or equal to 4 hours and almost all (96%) are less than 8 hours.

**Only 4% of modelled events are greater than or equal to 8 hours.**



Note: since analysis was completed for this advice in March 2024, the AEMC released a Draft Report from the Reliability Panel's [Review of the form of the reliability standard and APC](#) in April 2024, and AEMO released an [Update to the 2023 ESOO](#) in May 2024.



# Forecast storage to meet the IRM

Forecast storage infrastructure required to address unserved energy (USE) events in 2030 under the Central scenario from AEMO's 2023 ESOO to meet the Interim Reliability Measure (IRM).

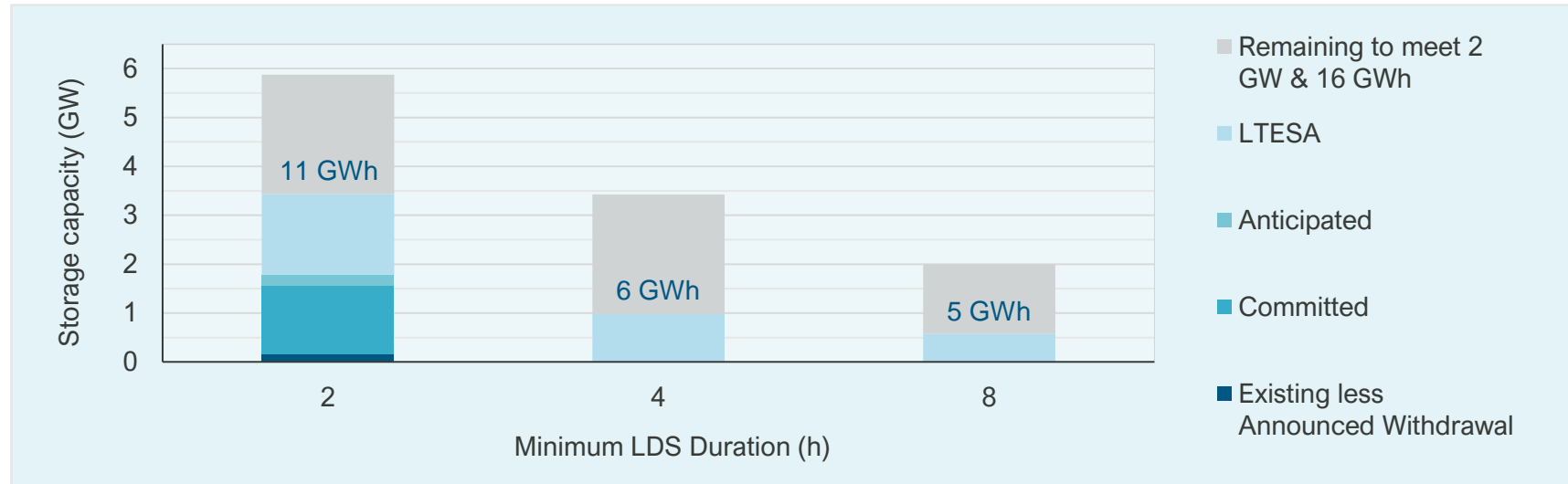
Configuration			Capacity		Build cost	
energy storage system			to meet IRM		to meet IRM	
percentage, capacity (MW) basis			Capacity	Energy	Absolute	Normalised
2 hour	4 hour	8 hour	GW	GWh	\$ b	\$ m/GWh
100%	-	-	5.77	11.54	7.05	611
50%	50%	-	3.39	10.18	5.35	525
-	100%	-	2.43	9.71	4.68	482
-	<b>95%</b>	<b>5%</b>	<b>2.33</b>	<b>9.77</b>	<b>4.66</b>	<b>476</b>
-	80%	20%	2.11	10.14	4.68	461
-	70%	30%	2.02	10.50	4.76	453
-	-	100%	1.77	14.16	5.93	418

Portfolios comprised of mostly or entirely short durations (2-hour battery systems) represent higher build costs using this methodology.

Long-duration storage portfolios comprised of **4- and 8-hour storage systems represent lower build costs** as they provide a balance of rated capacity with energy storage.

# Storage to meet the objectives

Capacity that has received an LTESA via an AEMO Services Tender (Rounds 1, 2 and 3) or is existing, committed, anticipated based on **AEMO's Generation Information** page (as of January 2024).



While capacity currently secured under a 2-hour minimum duration threshold (3.4 GW) substantially exceeds 2 GW, there is still a gap (4.9 GWh) to meet the 16 GWh of total energy storage required by 2030 to meet the minimum objective.

Configuration			Additional build cost to meet 2030 minimum objectives (A)	Additional build cost to meet IRM in 2030 (B)	Additional cost to meet IIOs by 2030 (greater of A & B)
2 hour	4 hour	8 hour	\$ b	\$ b	\$ b
100%	-	-	2.99	7.05	7.05
-	100%	-	4.70	4.68	4.70
-	-	100%	4.77	5.93	5.93

Note: this assumes the duration criteria is changed under the EII Act but the eligibility date for long-duration storage infrastructure projects remains the same.

# Long-term financial interest

- The **overall objective** for long-duration storage (LDS) is the construction of infrastructure necessary to meet the **reliability standard**.
- The **minimum objective** for LDS is the construction of infrastructure with at least 2 GW capacity and **16 GWh storage** by 2030.
- What does analysis of reliability modelling and cost analysis suggest for revisions to the EII Act storage duration definition?

AEMO Services considers reducing the definition of long-duration storage to 4 hours minimum dispatchable capacity, while retaining a preference for deeper storage alongside the 16 GWh target, is in the long-term financial interest of NSW electricity customers.

Shorter duration storage is more cost effective to meet the overall objective.

Portfolios comprising mostly 4 hours (with small amounts of 8 hours) are the lowest cost way to reduce USE in meeting the reliability standard (IRM) in 2030.

Mix of shorter and longer duration more cost effective to meet minimum objective.

Portfolios comprising mostly 4 hours (with small amounts of 8 hours) are the lowest cost way to meet 2 GW & 16 GWh using IASR assumptions.

Revised definition has the potential to increase participation in tenders.

A more flexible definition could expand AEMO Services' visibility to a wider range of projects, supporting delivery of storage at lower cost to consumers.

^ AEMO Services considers that there are **tail-risks to meeting the reliability standard** beyond 2030 that suggest any increased flexibility should be balanced by a requirement to value longer-duration storage where practicable, so as not to write-off **investment and innovation in deeper storage** that is likely to be required over time.





For more information visit

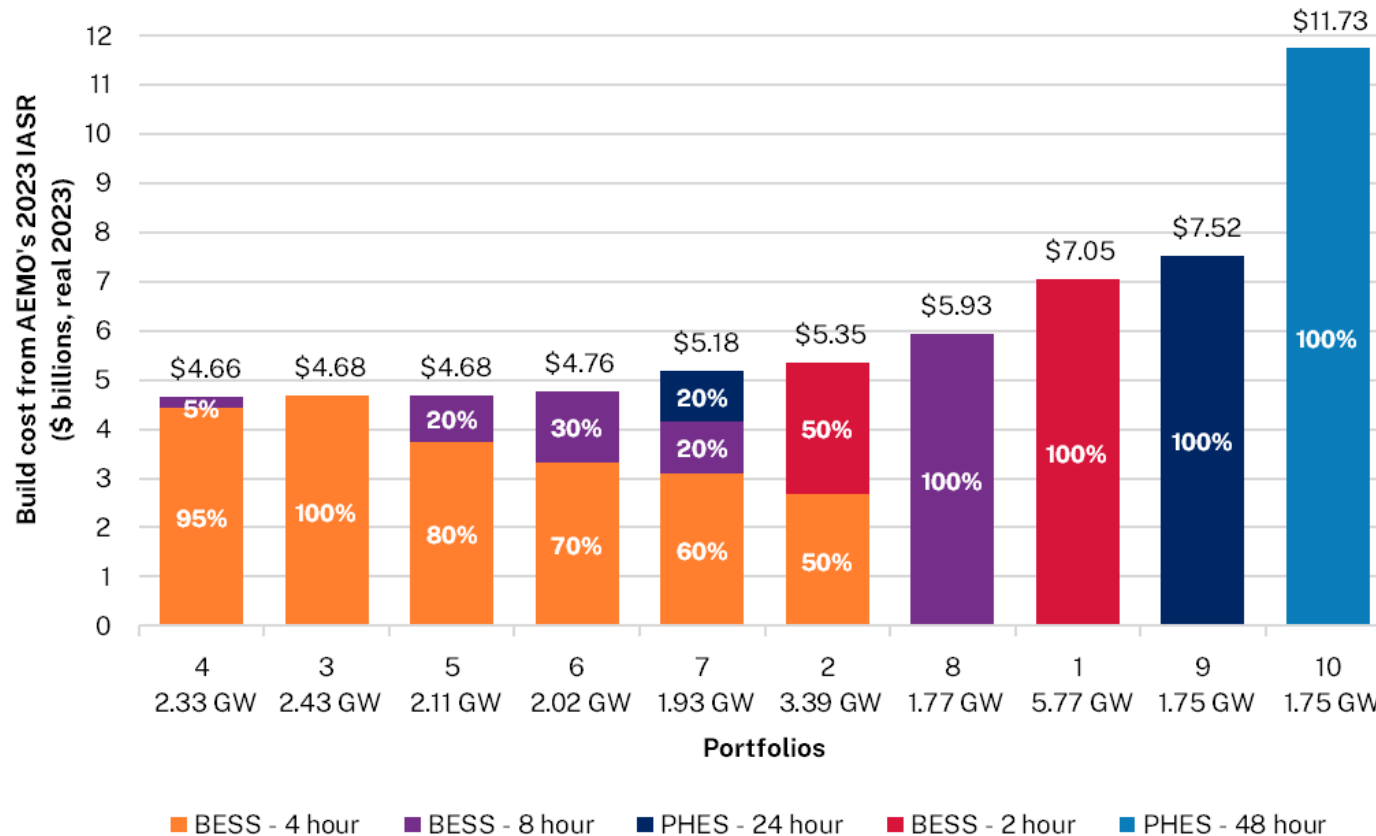
[aemoservices.com.au](https://aemoservices.com.au)

# 3

## Consultation Questions

# Storage portfolio build costs to meet the IRM

## Build cost of forecast storage infrastructure requirements to meet the Interim Reliability Measure (IRM) in 2030\*



Overall, AEMO Services' results indicate that greater flexibility in the duration of LDS infrastructure could meet reliability standards at a lower cost to consumers.

# Consultation Questions 1 & 2



Consultation Overview

Consultation Questions

AEMO Services modelling

Q&A

Submissions

## Question 1:

What is an appropriate minimum duration for long duration storage infrastructure in NSW?

Please outline why.

## Question 2:

Should the Minister have regulation making powers to change the minimum duration of long duration storage infrastructure over time?

Please outline why or why not.



# Encouraging investment in LDS

Consultation Overview

Consultation Questions

AEMO Services modelling

Q&A

Submissions



**An objective of the EII Act is to provide greater investment certainty**

The challenge NSW faces is finding a cost-efficient path between addressing near-term system needs in meeting 2030 targets, and building infrastructure required for a system with high penetration of variable renewable energy in the 2030s.



LDS arguably provides more benefits to NSW electricity consumers than considered to date, including system resilience to unserved energy events.



Discounting shorter duration projects in AEMO Services' merit assessment could provide a competitive advantage to longer duration projects.

In simplistic terms, this focuses the assessment on energy stored rather than capacity.



Beyond 2030, the overall objectives under the EII Act include the construction of LDS infrastructure necessary to meet the reliability standard.

There is potential for the NSW Government to make the investment need for LDS beyond 2030 more certain.

# Consultation Question 3

## Question 3:

How can the infrastructure objectives and LDS tenders be improved to support a diverse range of long duration storage projects? Are new measures required, such as:



Requiring the Consumer Trustee to explicitly consider the benefits of duration in calculating financial value to consumers.



Requiring the Consumer Trustee to discount the capacity of projects with duration less than 8 hours (if allowed) as though the duration is 8 hours when calculating financial value to consumers.



Establishing a minimum LDS objective for 2035 to provide more certainty for proponents with long lead time projects.

# Aggregation of storage infrastructure

## To further accelerate community batteries and maximise their contribution to firm capacity...

- Projects with less than 5 MW registered capacity (such as community batteries):
  - ✗ Are not normally registered with AEMO in the NEM Registration and Exemption List (optional)
  - ✗ Are not scheduled in central dispatch, even when registered with AEMO
- However, interest in community battery projects is rapidly growing.
- And the AEMC is currently progressing a rule change to integrate non-scheduled price responsive resources (such as VPPs) into the central dispatch.

## .... Small storage units could be aggregated to form > 5 MW aggregated capacity and potentially meet the scope of LDS

- Storage units with individual asset capacity of less than 5 MW could be aggregated to form an aggregated storage unit of greater than 5 MW.
- If storage projects with aggregated registered capacity of greater than 5 MW were to:
  - ✓ Register with AEMO in the NEM Registration and Exemption List
  - ✓ Be scheduled by AEMO in the central dispatch
  - ✓ Dispatch for the minimum duration
- ... Then aggregated storage projects could arguably meet the scope of LDS.

# Consultation Question 4



Consultation Overview

Consultation Questions

AEMO Services modelling

Q&A

Submissions

## Question 4:

Should the NSW Government introduce amendments to the LDS definition to clarify it can include aggregated LDS infrastructure across multiple sites?

Should aggregated LDS infrastructure need to register on AEMO's NEM Registration and Exemption List and participate in central dispatch?

Please outline why or why not.

# 4

## Question & Answer

# 5

## How to make a submission

# How to make a submission



Consultation Overview

Consultation Questions

AEMO Services modelling

Q&A

Submissions

## Consultation Period

- Opened at 9:00 AM AEST on Wednesday 22 May 2024
- Closes at 11:59 PM AEST on Tuesday 18 June 2024

## Confidentiality

All consultation submissions will be made publicly available on the DCCEEW website, except where it has been requested that the submission remain confidential.

## Submissions

All submissions must be in written format (Word or PDF) and emailed directly to [lds.review@dpie.nsw.gov.au](mailto:lds.review@dpie.nsw.gov.au).

## Further Questions?

If you have any further questions, please email [lds.review@dpie.nsw.gov.au](mailto:lds.review@dpie.nsw.gov.au)



# Thank you

If you have any additional questions, please email [lds.review@dpie.nsw.gov.au](mailto:lds.review@dpie.nsw.gov.au).

© 2024 State of NSW and Department of Climate Change, Energy, the Environment and Water

With the exception of photographs, the State of NSW and Department of Climate Change, Energy, the Environment and Water (the department) are pleased to allow this material to be reproduced in whole or in part for educational and non-commercial use, provided the meaning is unchanged and its source, publisher and authorship are acknowledged. Specific permission is required to reproduce photographs.

Learn more about our copyright and disclaimer at [dcceew.nsw.gov.au/copyright](https://dcceew.nsw.gov.au/copyright)