

# Connecting Battery Storage in the NEM: Opportunities and challenges

20 FEBRUARY 2019

# Energy Storage Systems

## TECHNOLOGIES

### Batteries



#### Stand alone

- Hornsale (100MW/129MWh)
- Ballarat (30MW/30MWh)
- Dalrymple (30MW/8MWh)

#### Integrated with renewable generation

- Gannawarra (25MW/50MWh)

### Pumped hydro



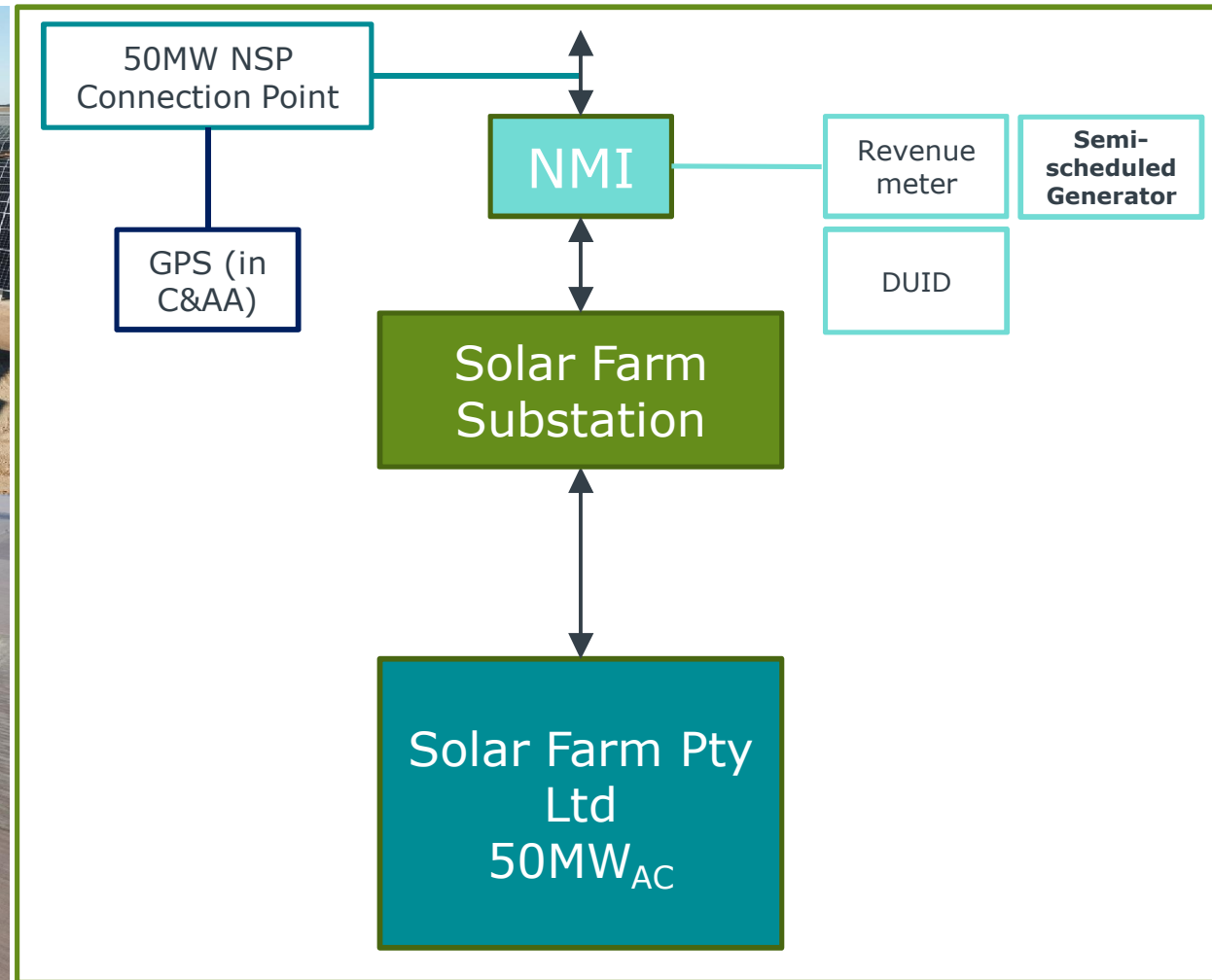
### Other technologies



- Compressed air energy
- Liquid air energy
- Solar thermal

# Gannawarra Solar Farm

## INTEGRATED BATTERY



# Key issues

## NEM REGISTRATION

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Energy storage can participate in the NEM in the following categories:

**Market Generator** to dispatch - receives NEM spot payments

**Market Customer** to charge - pays NEM spot payments to AEMO

**Market Ancillary Services Provider** - for both generation and load

# Key issues

## NEM REGISTRATION

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### **AEMO Classification Guidelines**

- 5MW + battery – Scheduled
- 30MW + renewable – Semi-Scheduled

### **Combined facility**

- For an integrated facility – both are scheduled
- Solution - separate

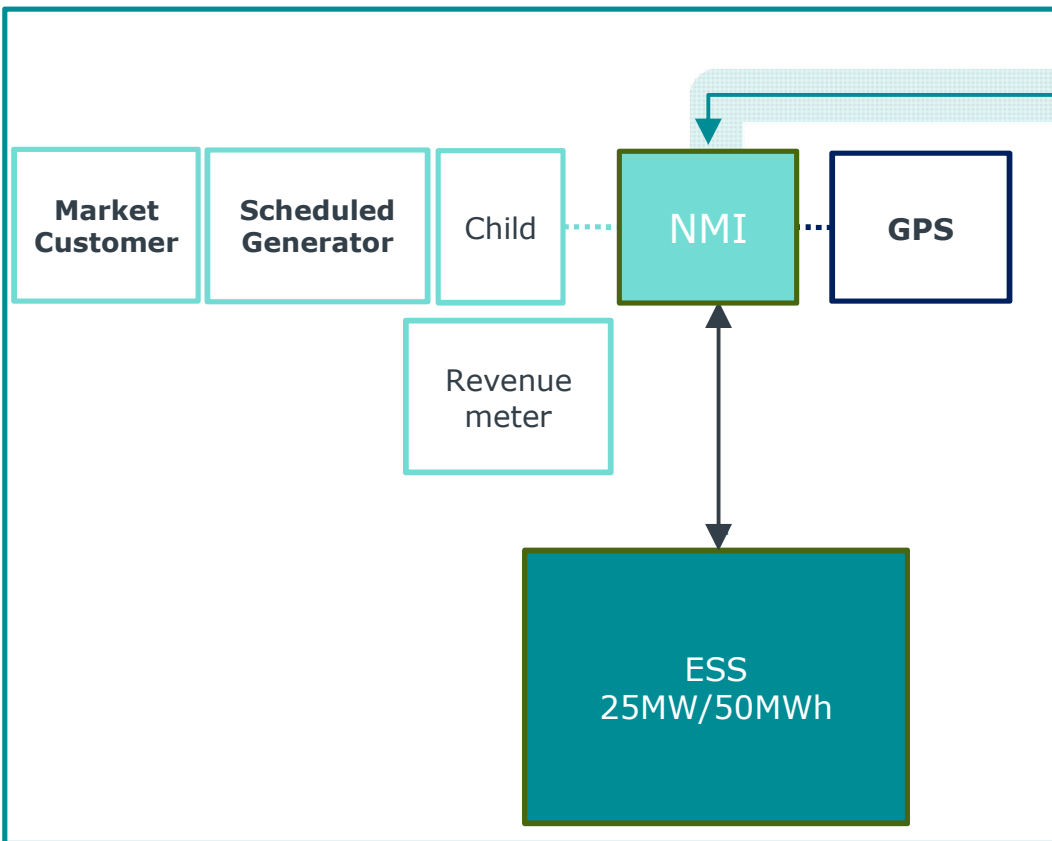
# Energy Storage System

## CURRENT STRUCTURE (GANNAWARRA)

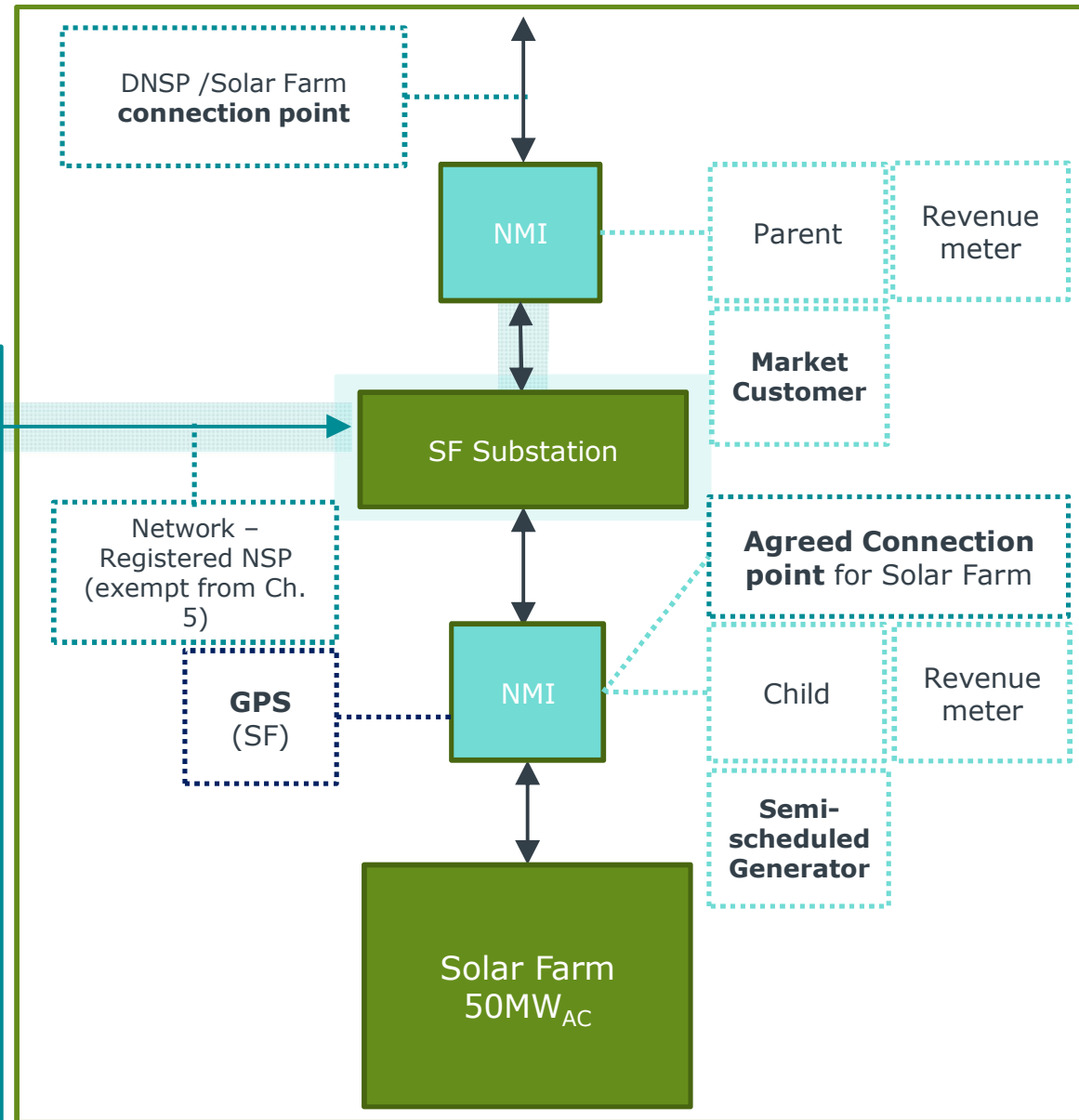
Network – Registered NSP (exempt from Chapter 5)

This is owned by Gannawarra Solar Farm Pty Ltd

### Gannawarra Energy Storage System



### Gannawarra Solar Farm



# Key issues

## NETWORK CONSIDERATION

### TUOS + DUOS

- Pumped hydro vs battery
- Direct connect to grid vs embedded network (supply within the embedded network)

### Embedded network issues

- Why seek exemption?
- "NRO2 exemption" – no longer available
- GPS issues when connecting generators to the NEM via an embedded network
- Use of "Registered but exempt from Chapter 5"
- New GPS negotiation as moved connection point

# Key issues

## COMMERCIAL CHALLENGES

### Retrofit

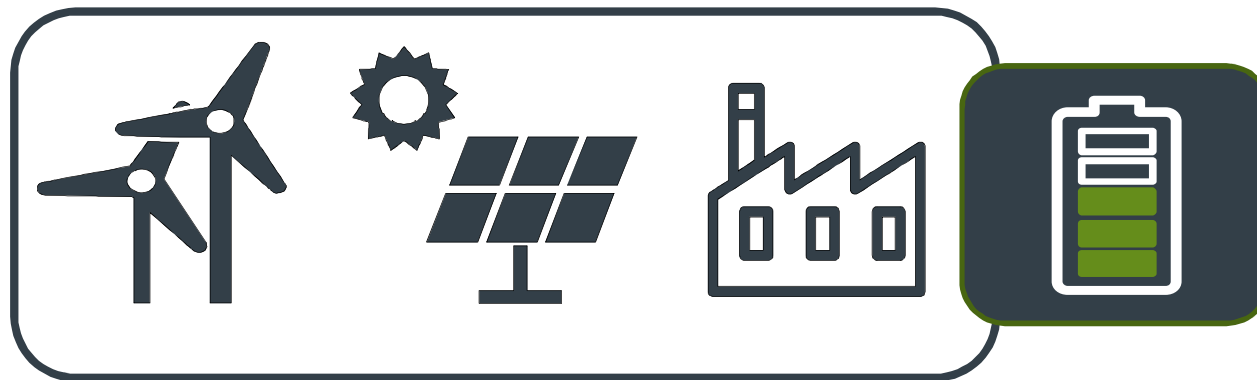
- Project financed
- Existing commercial arrangements
- No alteration of existing risk profile

### TUOS

- Avoided TUOS

### RET

- RET treatment of battery
- Clean Energy Regulator interim guidance November 2017



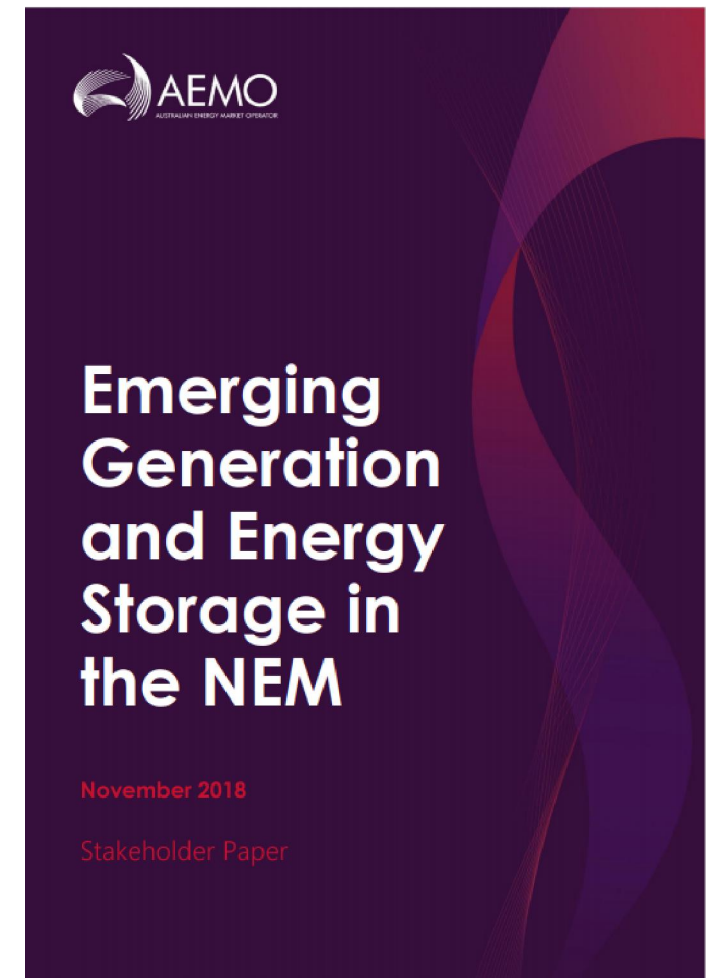


# Where to from here?

## REVIEWS AND POTENTIAL REGULATORY CHANGES

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- **Registration and classification**
  - AEMO Stakeholder Paper considered the following options:
    - a category for grid-scale energy storage systems;
    - a 'hybrid' Registered Participant category;
    - bi-directional Resource Provider Registered Participant category that allows a person to register to provide a 'hybrid' system including grid-scale energy storage systems, generation or load (system with an ESS would be scheduled) – **AEMO preferred**; and
    - amending the Generator or Customer Registered Participant category to include energy storage systems as a classification.
  - Rule Change process by end of March



# Where to from here?

## REVIEWS AND POTENTIAL REGULATORY CHANGES

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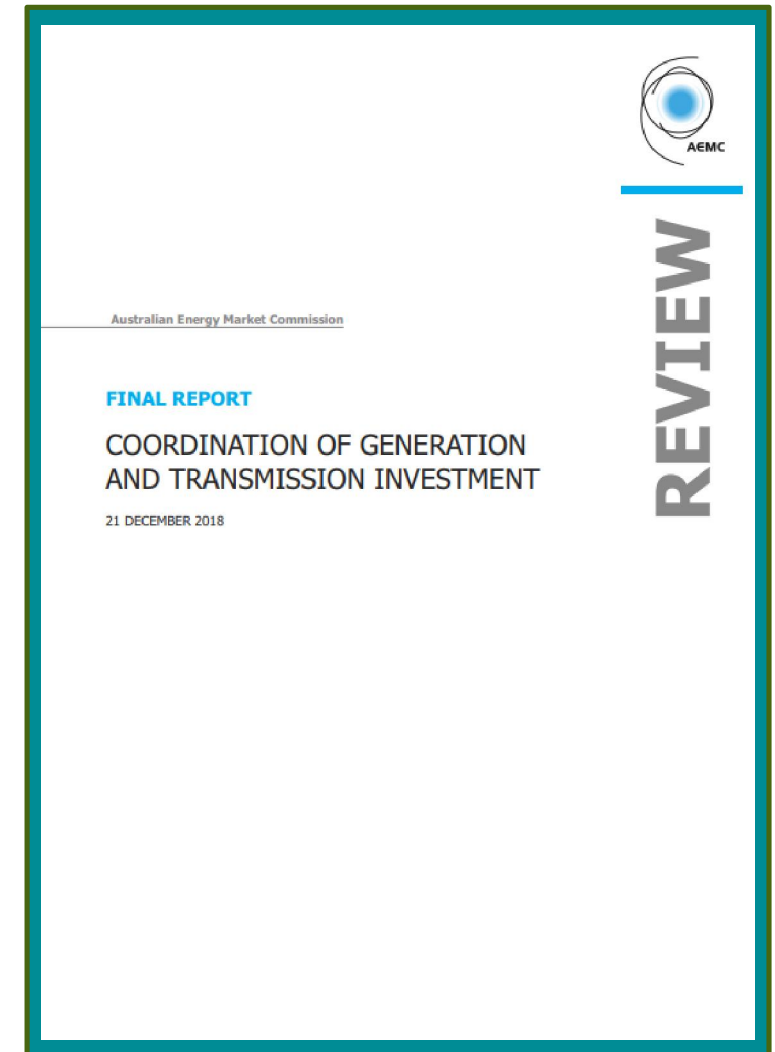
- **Exempt networks**



- Connecting a generating system or load to the grid via an exempt network
- Unclear whether performance standards are enforceable by AEMO or AER
- AEMO Stakeholder Paper options:
  1. Amend NER to ensure Chapter 5 clauses and rule 4.14 apply to ensure plant connection to exempt networks by Registered Participants will have agreed access standard that apply as performance standards for the purposes of the NER (**preferred option**)
  2. Amend the definition of NSP to include the owners of exempt networks in appropriate cases (excluding Chapter 6A and 6)
  3. Amend definition of connection agreement so it is not restricted to registered networks
  4. Amend the NEL and NER to ensure AER's exemption only related to economic and access regulation, rather than the technical requirements of the NER.
- This is also an AER issue

# Where to from here?

## REVIEWS AND POTENTIAL REGULATORY CHANGES

- **AEMC - Coordination of Generation and Transmission Investment Final Report – Chapter 8 Treatment of ESS**
  - Registration/classification of ESS – leaving it to AEMO
  - TUOS for ESS
    - Inconsistency between energy storage system types – should be technology neutral
    - Relationship with:
      - dynamic regional pricing
      - access to networks
- **Avoided TUOS – not addressed**





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