

# Energy Storage Registration

## Consultation Paper

Energy Market Transformation Project Team

19 August 2016

Submissions are invited on this consultation paper by 20 September 2016. Electronic submissions are preferred and can be sent to the COAG Energy Council Secretariat at [energycouncil@industry.gov.au](mailto:energycouncil@industry.gov.au).

Those who wish to provide hard copies by post may do so by addressing their submissions to:

COAG Energy Council Secretariat  
GPO Box 9839  
Canberra ACT 2601

All submissions will be published on the Energy Council website ([www.coagenergycouncil.gov.au](http://www.coagenergycouncil.gov.au)) unless stakeholders have clearly indicated that a submission should remain confidential, either in whole or in part.

Please note that this paper does not provide legal advice about any of the laws discussed in it, and it should not be relied on for any purpose. It is intended as a consultation paper only. It does not reflect the final views of officials or Energy Council policy.

The Energy Market Transformation Project Team consists of officials from the state, territory and Commonwealth agencies with responsibility for energy policy. It operates under the COAG Energy Council framework.



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# 1 Introduction

Interest in energy storage, in particular lithium-ion batteries, has grown strongly in Australia in the last few years. With technological advances, energy storage will become cheaper and more accessible to a wider range of users. The potential range of storage applications and penetration of storage are also expected to increase.

This expected energy market change has led to questions as to whether the existing national and jurisdictional regulatory frameworks are sufficiently flexible to support the take-up of energy storage.

The Energy Market Transformation Project Team (EMTPT) of the Energy Council of Australian Governments (COAG) Energy Council has initiated a work program to identify and understand key regulatory and policy issues in the context of energy storage including safety, installation, connection, maintenance, operation, and disposal.

There is currently no sufficient mechanism to register energy storage devices with relevant authorities. This information may be important in the areas of:

- Power System Planning and Operation
- Emergency Response
- Safety and Industry Integrity.

## 1.1 Purpose

The EMTPT has prepared this paper and is seeking stakeholders' feedback on:

- the need to establish an energy storage register
- the governance, regulatory and cost implications of proposed register options
- the links between any new data register and existing sources of data.

## 1.2 Scope of this paper

### *Technology*

Energy storage technologies are available in many forms, including mechanical (e.g. pumped hydro), chemical (e.g. batteries), and thermal energy storage (e.g. molten salt). This paper considers all storage types, although particular issues arise in the area of battery storage.

### *Application*

With regard to applications of energy storage, this paper considers:

- behind-the-meter storage devices
- stand-alone energy storage systems ("off-grid")
- grid-connected storage excluding utility-scale storage installed for the purpose of network support and/or ancillary services.

### *Regulatory framework*

By existing regulatory frameworks, we are referring to the National Electricity Law, National Electricity Rules (NER), jurisdictional licencing frameworks for distribution businesses, as well as safety and technical legislation.

### *What is not included within the scope of this paper?*

Cost-benefit analysis: this paper intends to facilitate high-level discussion on options proposed in this paper; hence, it doesn't include detailed cost-benefit analysis of these options, but aims to discuss potential costs and benefits which should be considered when evaluating different options. Following this consultation process, necessary analysis and legal advice will be obtained for preferred options that stakeholders consider feasible and worth investigating further.

Register implementation mechanism: this paper does not discuss the implementation mechanism for any proposed register options as, without an agreement on the structure of the register (e.g. national or state based, government owned or industry led), it doesn't add value to discuss implementation issues in detail at this stage.

Privacy issues: the EMTPT acknowledges the importance of ensuring privacy protection in collecting and managing storage data. However, it is not specifically discussed in the paper, as privacy is an issue relevant to all register scenarios proposed.

### **1.3 Why conduct this consultation now?**

As technology costs fall, the Australian energy storage market is expected to grow rapidly in the coming years. It is important to ensure appropriate government policies and regulatory frameworks are in place to support and accommodate the mass deployment of energy storage in Australia.

### **1.4 Making a submission**

Stakeholders are invited to provide written submissions on the consultation paper by close of business on **Tuesday, 20 September 2016**.

All stakeholder submissions will be published on the Energy Council website unless stakeholders have clearly indicated that a submission should remain confidential, either in whole or in part. Electronic submissions are preferred and can be sent to the COAG Energy Council Secretariat at [energycouncil@industry.gov.au](mailto:energycouncil@industry.gov.au).

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### **1.5 What will happen after this consultation?**

Submissions on this consultation paper will be considered to inform a report to be presented to Ministers at the COAG Energy Council meeting in December 2016. The report will identify priorities for regulatory reform that officials consider need further investigation and could be addressed in registering energy storage systems.

## 2 Energy Storage Register

### 2.1 Why a register is needed

In consultation with key industry and government stakeholders, the EMTPT has come to the conclusion that it may be necessary to set up an energy storage register so that relevant authorities and organisations have access to critical data to fulfil their regulatory obligations. The EMTPT considers that energy storage data should be collected and made available for the following reasons:

- Power System Planning and Operation
- Emergency Response
- Safety and Industry Integrity.

#### *Power System Planning and Operation*

The Australian Energy Market Operator (AEMO) operates the National Electricity Market (NEM) and the east coast transmission system, and also delivers planning advice in eastern and south-eastern Australia. AEMO has two core operational roles in the NEM: power system operator and market operator.

As more distributed energy devices (such as household solar systems) connect to the electricity network, AEMO needs to be able to understand the impact of these devices on the power system on an ongoing basis. With the take-up of energy storage, owners of storage devices and service providers operating their equipment on their behalf will be able to respond more actively to market signals or network needs by shifting their energy consumption. Meanwhile, the characteristics of load are also changing. AEMO needs to account for this in its operational models and processes. In order to do so, AEMO requires a certain level of data on installed distributed energy devices, including energy storage.

Greater penetration of distributed energy reduces the amount of generation over which AEMO has visibility and control to operationally manage the power system. In the absence of any information, AEMO may suffer a reduced ability to predict the energy flow behaviour at transmission connection points, and potentially face challenges in adequately informing the market to facilitate the efficient and secure operation of the power system.

AEMO has indicated to the EMTPT that at present, there is no means for AEMO to fully gather data on installed distributed energy storage devices, nor on how those systems are being utilised.

The recent Australian Energy Market Commission (AEMC) rule determination, *National Electricity Amendment (Registration of proponents of new types of generation) Rule 2016 No.4*, states that under the NEM the rules for eligibility for registration as a Generator are technology-neutral, which means non-traditional generation like battery storage can be registered with AEMO as a *Generator*. However, this rule change does not capture energy storage devices that fall below the 5 MW registration exemption threshold.

#### *Emergency Response*

Research conducted by CSIRO (commissioned by the Clean Energy Council (CEC))<sup>1</sup> finds that, for established battery chemistries such as lead-acid batteries, there are clear and understood actions to be taken in an emergency situation such as a fire. However, with emerging technologies such as lithium-ion batteries, the appropriate steps to be taken in response to an incident are less clear. Lithium-ion battery cells are known to contain flammable electrolytes, which have high energy density and raised potential for fire or explosion compared to lead-acid batteries.

With the emerging battery chemistries, emergency response agencies (fire brigade, police and ambulance) currently have limited knowledge as to appropriate methods and procedures that they

<sup>1</sup> Storage Safety Performance Study (November 2015): <http://fpdi.cleanenergycouncil.org.au/reports/storage-safety-study.html>

should follow in the event of an incident (e.g. fire, electrical shock, or chemical exposure). When emergency response teams are called to respond to an incident, it is critical to inform them of the location and chemistry type of both grid-connected and off-grid storage devices.

### **Case study: Emergency response in a Victorian context**

The EMTPT consulted with stakeholders in Victoria to understand what is important to emergency service responders. The following elements have been suggested essential and an effective framework to respond to incidents relating to energy storage:

#### **Energy storage warnings**

The Emergency Services Telecommunication Authority (Victoria), also known as Triple Zero (000) center, is the best place to warn emergency response teams of the presence of an energy storage system when they are called to extinguish a fire or other incidents related to storage. The Triple Zero call-takers are the first to be informed by callers when emergency help is needed, and they dispatch information to emergency teams for action.

Triple Zero has a robust database to provide warning notes for various items that could impose safety risks to the emergency team, and energy storage data can be easily incorporated in the Triple Zero dataset.

However, energy storage data needs to be provided to Triple Zero from a credible source, and be updated on a regular basis to ensure accuracy and relevance of the data.

#### **Best practice guidelines**

The chemistry the battery system comprises may have implications for the best way to manage an incident. The breadth of types of emerging lithium and other battery chemistries mean that there is no standard way to respond to an emergency incident such as fire or chemical leaks.

It is clear that there is a need to develop guidelines and best practice for these various battery systems.

#### **Safety signage**

Safety signage will also be helpful in warning the emergency response teams of the presence of a battery system on the premise (in addition to the warnings provided to first responders). It is understood that the new energy storage safety installation standard being developed by Standards Australia, requires battery storage systems to display safety signage.

### **Safety and Industry Integrity**

Current market storage products have a lifespan of 10 years at a minimum, with some having a longer lifespan up to 15 or 20 years. Information about the storage system (such as technical and safety specifications) is currently held and managed by households or system owners. This information could be lost over time and the absence of it could impose safety risks to installers who modify or decommission the system.

The CEC is considering developing a storage tracking and monitoring system<sup>2</sup>. This tracking system will be designed to track and update energy storage information at the point of installation, system modification, and end of life or removal of storage devices. This system is proposed to take the form of a live database containing site-specific data including battery technology, battery

<sup>2</sup> A concept proposal to the EMTPT – at the time this paper is prepared, the CEC has no funding to develop this tracking system.

capacity, model numbers, circuit arrangement, installer details, and installation date.

Having a register, similar to the CEC's tracking system that keeps energy storage information throughout its lifespan, could minimise safety risks to installers. From this centralised database, installers could obtain critical information such as electrical wiring/setting before conducting any activities. It will protect the integrity of the industry by preventing incidents including electrical shocks due to lack of information.

In addition, the register could collect information which supports how battery devices are disposed or recycled at the end of their lives. It would be beneficial to provide this information to environmental protection authorities to manage any environmental risks that could be caused by inappropriate disposal of batteries. Some battery devices contain heavy or toxic metals such as nickel, cobalt, cadmium and lead, which can be harmful to the environment if disposed of in a landfill.

**Consultation questions:**

***Do stakeholders agree an energy storage register is needed in Australia?***

***Are there any other reasons energy storage data should be collected?***

***Given large-scale energy storage systems are now required to be registered as a Generator under NER, should a register be established for distributed energy storage (less than 5 MW generating capacity)?***

***Do stakeholders agree the Victorian Case Study is an effective framework for storage emergency response?***

## 2.2 Data and access

### *What data/information needs to be collected?*

AEMO has indicated to the EMTPT that the broad areas that require data input are planning, forecasting, real-time operations, and systems capability. These areas cover time horizons from dispatch and pre-dispatch (5 minutes) through to long-term forecasting and planning over 20 years.

Data that AEMO anticipates to be highly necessary for system security purposes include installation details and technical specifications, such as postcode, NMI, demand side participation contract, capacity (continuous kW and storage kWh), manufacturer, make, model number, and trip settings (frequency and voltage).

Data on real-time output of peak power and the total stored energy available in batteries is desirable but not critical. Real-time data is valuable in understanding how the battery actually operates under normal conditions and in response to system events. However, the EMTPT notes that the costs associated with collecting and hosting real-time interval data, and whether these costs would outweigh the expected benefits of this activity, need to be carefully considered.

As mentioned previously, consultation with relevant stakeholders indicates that having information available on energy storage installation and technical specifications are sufficient for safety and emergency response purposes.

How data is collected is another issue worth considering. Energy storage installers and project proponents are best placed to collect basic storage data at the point of installation, and send collected data straight to the register. This data could be updated by installers when system modification or decommission is required. There also needs to be consideration of what obligations could be imposed to provide data collectors with an incentive to collect and submit data.

### *Data access*

If it is agreed to establish an energy storage register, consideration also needs to be given to who should have access to the data. AEMO and emergency service providers have specific requirements to access and use the data. A data register may also be useful for other parties such as retailers, installers or networks. This paper is seeking feedback on the types of users who could access the data, for what purposes and how this might relate to conditions of access.

**Consultation questions:**

***Given the needs of AEMO, emergency response and other potential users, what is the “must have” data which should be collected? What are the likely costs of this data and do the impacts outweigh benefits?***

***What is the “nice to have” data, and does the cost of this additional data collection merit its collection?***

***How would data be collected and provided to a central register?***

***What arrangements and requirements should be put in place to ensure data is collected and supplied in a timely manner?***

***Could a national register be linked to other databases e.g. data collected by distribution businesses? Are there other databases which should be considered?***

***Beyond AEMO and emergency response providers, what other parties should be able to access the data register and on what grounds? Are there particular conditions which should apply to these users?***

## 2.3 How the register should be set up

This section discusses three possible options as to the ownership and governance of an energy storage register:

- a register led by a national body
- a register led by an industry body
- state-based registers.

### 2.3.1 A register led by a national body

A national register enables consistency in types of data being collected and made available to relevant authorities. It also allows other users to request storage information in other states or territories.

In addition, setting up one national system is expected to be more cost effective, compared to establishing individual state-based registers.

The challenge with this option is that there is no existing regulatory body that is readily suitable for this role and hosting the register. Three options are discussed below for stakeholder feedback.

#### *Clean Energy Regulator (CER)*

The Small-scale Renewable Energy Scheme (SRES), governed by the Commonwealth Clean Energy Regulator (CER), is a financial incentive scheme for individuals and small businesses to install eligible small-scale renewable energy systems such as household solar systems. Project proponents or installers are required to register eligible systems with the CER in order to claim small-scale technology certificates under the scheme.

There is currently no such scheme existing for energy storage, as there is no recognition of distributed storage systems under the SRES. The CER has advised the EMTPT that if jurisdictions

decided to mandate provision of energy storage data to the CER, amendments to the Renewable Energy (Electricity) Act 2000 would be required, but presumably such changes could only be made if they were determined consistent with the objectives of that Act.

With its experience with registering distributed solar systems, the CER could potentially host the energy storage register, building upon its existing data management systems.

It is worth noting that the regulatory incentives for solar PV are expected to progressively decline from 2017. As a result, the quality of data on solar installations is also likely to decline, as the number of proponents applying for the SRES declines. While this paper focuses on energy storage, the EMTPT welcome stakeholders' views on how data on distributed solar installations could be maintained on an ongoing basis.

### *AEMO*

As the national energy system operator, AEMO can potentially host the national register. However, AEMO's system may not be able to accommodate safety and emergency response data, given this data is not required as part of AEMO's role in the market.

### *A new energy storage register*

If there is no existing suitable organisation to host and govern the national register, a new registration body could be established. With a new database, it could be designed to collect and host energy storage data needed for various purposes, including safety, emergency response and power system operation.

#### ***Consultation questions:***

***Do stakeholders agree with setting up a register led by a national body? Are there any other key benefits or concerns that the Energy Council should be aware of for this approach?***

***Can CER, AEMO or a new register be a feasible option? If yes, how can the barriers or challenges discussed be overcome?***

***Are there other organisations suitable to host a national energy storage register?***

***What are stakeholders' views on maintaining information on distributed solar after the scheduled decline in SRES incentives for solar installations from 2017?***

### **2.3.2 A register led by an industry body**

As mentioned previously, the CEC is interested in developing an energy storage tracking and monitoring system and database. In addition, the CEC provides accreditation programs for storage designers and installers, and is developing a product list for energy storage, similar to the list CEC has developed for solar panel systems.

The Australian Energy Storage Council (AESC) is also developing a location database and a product list for energy storage.

In April 2016, both CEC and AESC released industry guidelines<sup>3</sup> for storage products, installations and maintenance. These materials aim to provide guidance for storage developers, installers and consumers.

There is a potential role for industry to manage an energy storage register. However, industry-led initiatives are generally voluntary and may not be able to require or compel all parties to provide

<sup>3</sup> CEC - Grid-Connected Energy Systems with Battery Storage : <https://www.cleanenergycouncil.org.au/news/2016/April/install-guidelines-battery-storage-grid-connected.html>

AESC - the Australian Battery Guide: <http://www.energystorage.org.au/the-australian-battery-guide/>

data. For instance, the CEC may only be able to require their accredited installers to register energy storage systems with CEC. Requiring installers to become members of the industry body in order to register information would also be inappropriate.

**Consultation questions:**

***Is an industry-led register a feasible option? Who can lead this register?***

***Are there examples of industry-led initiatives or industry operated schemes that are underpinned by a regulatory framework / minimum regulatory requirements?***

***What are the other benefits and challenges of an industry-led approach?***

### 2.3.3 State-based registers

In Australia, most jurisdictions have an electrical safety regulator/office responsible for safety and technical regulation with regard to electrical device installation.

Electrical safety regulators can potentially host a state-based register in each state and territory. While there may be opportunities in the safety inspection process to collect information, their key responsibility is to inspect and approve the installation of electrical devices with respect to electrical safety. Hence, collecting and hosting data on location, battery type and capacity may not align with an electrical safety regulator's core regulatory responsibilities.

In addition, a state-based approach is very likely to cause issues of inconsistency in data collection and system management, which will be challenging when national organisations such as AEMO require access to regularly updated data.

**Consultation questions:**

***Is a state-based energy storage register a feasible option?***

***Are there other organisations (apart from electrical safety regulators) that can host this register?***

## 3 Other registration requirements

This section outlines other issues specifically related to registration of energy storage systems and considers how these issues might relate to the setup of an energy storage register.

### 3.1 National Electricity Rules (NER)

Under the NER, anyone that owns, controls or operates a generating system that is connected to the national electricity system must register as a generator unless exempted by AEMO, as is currently the case for systems less than 5 MW in generating capacity.

However, there had been confusion about whether the current NER definition of "generating unit" captures energy storage and, hence, whether the "generator" registration category would apply to persons/participants seeking to use storage capability for participation in the NEM.

On 26 May 2016, AEMC released a rule determination, *National Electricity Amendment (registration of proponents of new types of generation) Rule 2016 No. 4*, that amends the definition of "generating unit" to:

*The plant used in the production of electricity and all related equipment essential to its function as a single entity.*

This amendment ensures that the rules for eligibility for registration as a *Generator* are technology-neutral, so that non-traditional generation like battery storage is being appropriately included. This

rule change would support registration of energy storage devices above the 5 MW registration exemption threshold.

Consideration needs to be given to how a proposed data register would relate to, or link to other registration systems for large-scale battery storage systems.

### 3.2 State and Territory Laws and Regulations

Jurisdictions including South Australia, Queensland, Australian Capital Territory, Victoria, NSW and Tasmania also regulate access of energy generators to state or territory electricity networks through their licensing frameworks.

Distribution businesses generally require system information and in some cases approval before a generator can be connected to their networks. However, whether these requirements apply to energy storage depends on whether the definition of “generating unit” in the relevant legislation, captures energy storage. Due to uncertainty around this definition, energy storage systems installed to date in Australia have generally not been recorded with local distribution businesses.

#### *Current practice undertaken by distribution businesses*

As with other sources of electricity, the export of electricity from energy storage devices could impose safety risks on the network, line workers and the local community, especially during a network outage. Distribution businesses across Australia are currently undertaking a number of practices to manage this risk, including:

- In Victoria, distribution businesses generally take the view that energy storage should be considered as an embedded generator, and are in the process of modifying their Embedded Generator Connection Agreement to capture installation of energy storage.
- In South Australia, any device that is connected to the distribution network must be brought to the attention of and approved by the distribution network owner and operator, South Australia Power Networks (SAPN). SAPN views energy storage devices as embedded generators and, as a result, any storage connection applications need to be assessed in accordance with SAPN’s established embedded generator connection process.
- In Queensland, the Electricity Regulation 2006 states “a customer must not install generating plant for interconnection with a supplier’s supply network without the supplier’s agreement”. Since the term “generating units” (and therefore the “generating plant” previously mentioned) as it applies to storage is unclear, Queensland distribution businesses have adopted the practice of seeking a connection application for all inverter-based embedded generation systems (including energy storage systems).

The EMPT’s view is that it is critical for distribution businesses to have access to necessary information to protect line workers and the network. If there was a regulatory obligation to register energy storage devices, however, distribution businesses would need clarification from relevant jurisdictional regulators in relation to:

- whether the definition of “generating unit” includes energy storage devices
- what data needs to be collected
- informing customers and installers regarding storage data collection.

Given distribution businesses are currently collecting or in the process of collecting data on battery storage, consideration should also be given to whether data from distribution businesses could be shared with the register, whether there are ways to streamline collection of data and whether network companies should have access to data within the register to support their operations.

#### **Consultation questions:**



***Are there opportunities to leverage data collection under other frameworks into a national register?***

***Should relevant jurisdictional licensing frameworks be reviewed and amended to require registration of energy storage devices? Are there other alternatives?***

***It is understood that off-grid distributed generation, including energy storage, is not currently captured under both national and state/territory registration frameworks. Should consideration be given to registration of off-grid storage systems for emergency purposes or other uses?***