

Australian Energy Market Commission

CONSULTATION PAPER

**REGULATORY SANDBOX
ARRANGEMENTS TO SUPPORT
PROOF-OF-CONCEPT TRIALS**

20 DECEMBER 2018

REVIEW

INQUIRIES

Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

E aemc@aemc.gov.au
T (02) 8296 7800
F (02) 8296 7899

Reference: EPR0068

CITATION

AEMC, Regulatory sandbox arrangements, Consultation paper, 20 December 2018

ABOUT THE AEMC

The AEMC reports to the Council of Australian Governments (COAG) through the COAG Energy Council. We have two functions. We make and amend the national electricity, gas and energy retail rules and conduct independent reviews for the COAG Energy Council.

This work is copyright. The Copyright Act 1968 permits fair dealing for study, research, news reporting, criticism and review. Selected passages, tables or diagrams may be reproduced for such purposes provided acknowledgement of the source is included.

CONTENTS

1	Introduction	1
1.1	Background	1
1.2	Request from the Senior Committee of Officials	2
1.3	Energy Market Transformation Project Team paper	3
1.4	Consultation process and next steps	3
1.5	Document structure	4
2	The regulatory sandbox approach	5
2.1	What is a regulatory sandbox?	5
2.2	Potential benefits of regulatory sandbox arrangements	5
2.3	Implementation by OFGEM	5
2.4	Implementation by ASIC	8
3	What are the current arrangements in the NEM?	10
3.1	Market bodies	10
3.2	Non-market bodies	13
3.3	Trials conducted recently or under way	14
4	Is there a need?	16
4.1	Access to guidance	16
4.2	Formal regulatory sandbox arrangements	18
4.3	Trialling innovative regulatory approaches	21
5	Lodging a submission	23
	Abbreviations	24
	FIGURES	
	Figure 2.1: OFGEM’s regulatory sandbox process	7

1 INTRODUCTION

This consultation paper explores potential regulatory barriers to proof-of-concept trials and the need for formal regulatory sandbox arrangements in the National Electricity Market (NEM). The paper has been prepared to facilitate public consultation on regulatory tools to support proof-of-concept trials within the regulatory framework. Stakeholder submissions are requested by 31 January 2019.

This consultation is conducted as part of the 2019 *Electricity network economic regulatory framework review*, however considers the need for regulatory sandbox arrangements in other parts of the regulatory framework, for example, relating to wholesale electricity markets and consumer protections. The Council of Australian Governments (COAG) Energy Council has requested that the Australian Energy Market Commission (AEMC or the Commission) conduct the economic regulatory framework review to monitor market developments on an annual basis and consider whether the economic regulatory framework for electricity networks is sufficiently robust and flexible to continue to support the long term interest of consumers in a future environment of increased decentralised energy supply. The 2019 review is the Commission's third such annual review under a standing terms of reference. The Commission intends to publish a paper outlining the approach to the 2019 review in mid-January 2019.

1.1 Background

The emergence of innovative technologies and business models in the NEM can bring significant benefits to consumers. This was highlighted in the *Independent Review into the Future Security of the National Electricity Market (Finkel review)*, which noted that innovative technologies can help reduce the costs of providing secure and reliable electricity supply and also contribute to reducing emissions.¹ As such, it is important that the regulatory framework and processes support potentially beneficial emerging technologies and business models.

The Finkel review recommended updating the proof-of-concept testing framework, to facilitate innovation in the NEM. The review noted that new concepts that are inconsistent with the National Electricity Rules (NER) need to be proven to the point where a rule change can be made prior to being used in the NEM. Recommendation 2.8 was that the Commission review and update the regulatory framework to facilitate proof-of-concept testing of innovative approaches and technologies. The review also suggested investigation of mechanisms adopted by other jurisdictions, such as those adopted by the Office of Gas and Electricity Markets (OFGEM) in the United Kingdom (UK). Recommendation 2.8 was accepted by Energy Ministers.

¹ Dr Alan Finkel et al., *Independent Review into the Future Security of the National Electricity Market*, June 2017, p.66.

In February 2018, the Energy Market Transformation Project Team (EMTPT)² agreed that a working group made up of officials from the Commonwealth and other interested jurisdictions would undertake further research on the case for introducing a regulatory sandbox.

In our 2018 *Electricity network economic regulatory framework review*, the Commission outlined the regulatory sandbox arrangement that has been adopted by OFGEM in the UK. The review highlighted that where innovation may benefit consumers, there may be merit in applying a regulatory sandbox arrangement so that any changes to the regulatory framework can be fast tracked. However, the Commission noted that trials and other forms of regulatory innovation can be facilitated under the current NEM regulatory framework through the AER exercising its enforcement discretion and the use of its power to issue “no action letters”. The Commission noted it was interested in stakeholder views on the need for more formal arrangements for regulatory sandboxes and would consider this further in the 2019 *Electricity network economic regulatory framework review*.

On 24 October 2018, the Commission received a request from the Senior Committee of Officials (SCO) of the COAG Energy Council to further investigate a formal approach for facilitating proof-of-concept testing in the NEM. The request was informed by research carried out by the working group of Commonwealth and state officials and reported in the EMTPT paper attached to the SCO request.

1.2 Request from the Senior Committee of Officials

The Senior Committee of Officials (SCO) believes that there is merit in looking at a more formal and systematic approach to supporting experimentation within the regulatory framework where there are potential benefits to energy consumers. In its request to the Commission, SCO noted that it would be useful to be able to perform in-market trials of wholesale demand response to inform the current rule change process. SCO considers that a regulatory sandbox could also help to test a range of technologies and business models to inform the Distributed Energy Integration Program (DEIP). The DEIP is a collaboration of government agencies, market authorities, industry and consumers associations aimed at maximising the value of customers’ distributed energy resources for all energy users.³

The Commission has been requested to provide interim advice by February 2019 as part of the 2019 *Electricity network economic regulatory framework review* on how to best facilitate co-ordination of proof-of-concept trials and the need for formal regulatory sandbox arrangements to support innovative projects offering benefits to customers while managing any risks. In providing this advice the Commission is requested to:

- consider whether existing or proposed projects could be used as a sandbox trial
- engage closely with Australian Energy Regulator (AER), Australian Energy Market Operator (AEMO), Energy Consumers Australia (ECA) and Australian Renewable Energy Agency (ARENA)

2 The EMTPT was established by the COAG Energy Council in December 2015 to consider issues related to the ongoing energy sector transition driven by changing technologies, increasing consumer engagement, new energy products and services. It is made of officials from each jurisdiction.

3 ARENA 2018, viewed 6 December 2018, <https://arena.gov.au/where-we-invest/distributed-energy-integration-program/>.

- consider the need for regulatory sandbox arrangements in other parts of the national electricity framework e.g. relating to consumer protections.

1.3 Energy Market Transformation Project Team paper

A research paper from the EMTPT on regulatory sandbox arrangements was attached to the request from SCO (EMTPT paper). A working group made up of Commonwealth, Victoria, Queensland and New South Wales representatives undertook research and consultation on the case for introducing a regulatory sandbox and options for next steps to progress implementation of the Finkel review recommendation 2.8. The consultation involved a range of stakeholders including the energy market bodies, ARENA, the Australian Securities and Investment Commission (ASIC), network businesses, new entrants, and consumer representatives. Consultation with market bodies was undertaken on an unofficial basis.

The EMTPT paper provides an introduction of regulatory sandboxes, the current arrangements for proof-of-concept testing, an assessment of the need for a sandbox arrangement and a suggested approach for adoption of a regulatory sandbox arrangement. The paper notes that the Commission along with AEMO, AER and ARENA have been working together to support proof-of-concept trials within the existing regulatory framework and that the approach appears to be adequate to deal with the current demand. However, EMTPT considers that there is merit in a more structured process to facilitate experimentation within the regulatory settings as a tool that could support major future reforms. According to EMTPT, it would also enable energy market bodies to identify key priorities, and develop trials which address particular problems or help define the design of reforms. EMTPT suggests that further work be undertaken on designing a regulatory sandbox initiative, coordinated across all market bodies, as a pilot to support future reforms with a specific and limited project scope.

The stakeholders responding to the EMTPT consultation took a broad view of what could be tested in a NEM sandbox to include both new technologies and business models, and also new regulatory approaches or market design. The stakeholders also saw potential application of a regulatory sandbox across a number of areas including network regulation, wholesale markets and retail. ARENA's response to EMTPT consultation considered that a range of tools could exist within the concept of a regulatory sandbox, including regulatory exemptions and/or a wide range of complementary activities such as technical advice, industry capacity building or funding.

Throughout this consultation paper, the Commission has drawn on the work carried out and reported in the EMTPT paper. The SCO request and the EMTPT paper can be accessed from the AEMC website.

1.4 Consultation process and next steps

Through this consultation paper and initial stakeholder engagement, the Commission seeks to examine how to best facilitate co-ordination of proof-of-concept trials and clarify the need for formal regulatory sandbox arrangements in the NEM. It will form the basis of the interim advice to be provided to SCO by February 2019. If the need for formal sandbox

arrangements is established, a second step of the process would be to consider their design. This would involve further stakeholder consultation, with further advice to be included in the 2019 *Electricity network economic regulatory framework review*.

1.5 Document structure

This document builds on the work on regulatory sandbox arrangements carried out by the Commission in its 2018 *Electricity network economic regulatory framework review*. It:

- outlines the concept of a regulatory sandbox and its adoption by other regulators
- sets out the approach to proof-of-concept testing under the current framework and some recent and current trials that may be relevant
- seeks stakeholder views on whether there is a need for regulatory sandbox arrangements and, if considered necessary, its objective and high level design.

2 THE REGULATORY SANDBOX APPROACH

This chapter provides an overview of the regulatory sandbox approach. It introduces the concept of a regulatory sandbox and its potential benefits. It then follows on to explain the sandbox approach adopted by OFGEM in the UK and by ASIC for the Australian finance sector.

2.1 What is a regulatory sandbox?

A regulatory sandbox was first adopted by the Financial Conduct Authority (FCA) in the United Kingdom in June 2016.⁴ The approach has since been adopted by regulators across different industries and jurisdictions seeking to facilitate innovation. Broadly, a formal regulatory sandbox is a framework within which participants can trial innovative business models, products and services in the market under relaxed regulatory requirements on a time-limited basis and with appropriate safeguards in place. There are a variety of other regulatory tools that could be used to facilitate proof-of-concept trials, such as provision of information, exemptions and waivers, a number of which are already in place in the NEM (see Chapter 3).

2.2 Potential benefits of regulatory sandbox arrangements

Regulatory sandbox arrangements are expected to support innovative projects in several ways including through:

- improved access to finance for projects through increased regulatory certainty⁵
- enabling testing and fine-tuning in a controlled testing environment⁶
- allowing regulators to work with innovators to build appropriate consumer protection safeguards into new products and services⁷
- helping regulators identify the need for reform to the existing regulatory framework.⁸

These benefits have been reported by regulators in different industries and jurisdictions. Most of the listed benefits arise from reporting by the FCA for the UK financial sector. At this stage, it is not yet known if these benefits will be realised if a regulatory sandbox approach is adopted for the NEM.

2.3 Implementation by OFGEM

OFGEM offers a one stop shop called “innovation link” for businesses seeking to introduce innovative or significantly different propositions to the UK energy sector. Innovation link offers two main services that includes “fast, frank feedback” and a regulatory sandbox.

4 Ernst & Young, *As FinTech evolves, can financial services innovation be compliant?*, 2017, p.13.

5 Financial Control Authority, *Regulatory sandbox lessons learned report, October 2017*, pp.5-6.

6 Ibid.

7 Ibid.

8 OFGEM, *Insights from running the regulatory sandbox, October 2018*, p.1.

The fast, frank feedback service is available throughout the year to businesses meeting the eligibility criteria. Under the criteria the proposition:

- must be ground-breaking or significantly different
- must have a good prospect for consumer benefit
- must demonstrate a genuine need for support
- may be required to show they have undertaken a reasonable amount of background research and thinking.

The service can provide an “informal steer” to innovating businesses on the regulatory implications of their propositions, however it is not a binding response. The advice provided by the innovation link team does not represent an official view from OFGEM, and the feedback is subject to a legal disclaimer.⁹ It can help innovating businesses to navigate the regulatory challenges being faced, identify the regulatory barriers affecting the proposition and provide input to long term policy development. It can be accessed by innovators through an application to OFGEM.

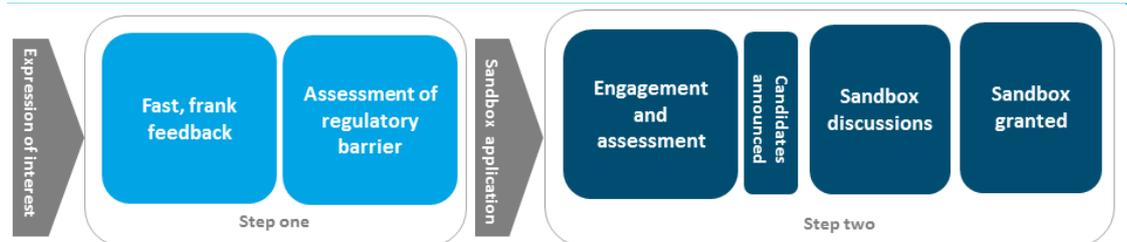
OFGEM grants regulatory sandboxes to eligible innovative projects under a process carried out periodically through a round for applications. OFGEM initiates the process by requesting expressions of interest from energy innovators aiming to trial a proposition that may benefit from a regulatory sandbox. OFGEM engages with all project proponents who apply to discuss their proposition in the context of the sandbox eligibility criteria as well as to understand their product, service or business model. For the innovative projects to be able to receive regulatory sandbox support, the proposal needs to meet the following criteria:

- the proposal is genuinely innovative
- the innovation will deliver consumer benefits and consumers will be protected during the trial
- a regulatory barrier inhibits innovation
- the proposal can be trialled.

Step one of the process involves OFGEM providing the fast, frank feedback service to support innovators to assess whether their business model could operate within the current regulatory framework and whether a sandbox is necessary. Where fast, frank feedback identifies regulatory barriers and the eligibility criteria are met, the process can progress to the next stage and OFGEM asks those qualifying to apply for a sandbox by completing a detailed application form. OFGEM works with the applicants to assess details of their proposition and announces regulatory sandbox candidates thereafter. Regulatory sandboxes for the trials can be subsequently granted for a period of up to 24 months following discussions on matters such as regulatory arrangements and consumers protections for the duration of the trial. The process is depicted in figure 2.1 below.

⁹ OFGEM 2018, viewed 4 December 2018, <https://www.ofgem.gov.uk/about-us/how-we-engage/innovation-link>.

Figure 2.1: OFGEM’s regulatory sandbox process



Source: AEMC’s interpretation of the OFGEM regulatory sandbox process

The regulatory sandbox candidates can receive any or all of the following support:¹⁰

- bespoke guidance: guidance on the interpretation of or compliance with regulatory requirements, which innovators can rely on for the duration of the trial
- indication of approach to enforcement: guidance on how OFGEM might enforce particular regulatory requirements valid for a particular period of time
- derogations or exemptions from certain regulatory requirements.

For OFGEM to offer sandbox support it needs to be satisfied that the innovation will deliver consumer benefits and consumers will be protected during the trial and that the barrier faced is one that arises from requirements or provisions overseen by it. OFGEM can only provide relief from the parts of the regulatory framework that it administers.

2.3.1

OFGEM’s insights from running the regulatory sandbox

OFGEM has run two rounds of the regulatory sandbox process since launching the service in February 2017. It has compiled and published its insights from running these processes:¹¹

- Innovators commonly needed advice, and not a sandbox. It is not always clear to innovators what they can and can’t do. OFGEM originally imagined that the sandbox requests would be made by innovators who were looking to run a trial but were being blocked by a specific rule that they were aware of. OFGEM found that in practice many innovators needed help navigating the regulatory framework and that the projects went ahead without needing a sandbox.
- If an innovative proposition isn’t possible, it is usually because of a complex mix of requirements including industry norms, systems, charging arrangements, codes and licenses.
- Innovators are focused on launching businesses, not trials. OFGEM’s regulatory sandbox is designed to facilitate time limited trials, however it found that most innovators wanted to launch enduring businesses and are less focused on trials. For OFGEM, it is important that the relaxation of the rules is temporary as it differentiates a sandbox from a permanent rule change.

¹⁰ OFGEM, *What is a regulatory sandbox?*, September 2018, pp.1-2.

¹¹ OFGEM, *Insights from running the regulatory sandbox*, October 2018, pp.1-4.

- Start-ups want to signal low regulatory risk to investors. OFGEM found that a significant number of sandbox applicants were looking for OFGEM to review their business idea and confirm that it faced no regulatory issues.
- Innovators have to operate within existing structures. Innovative projects and trials may not be able to get exemptions from some requirements. OFGEM found that it may need to be more precise about what relief a sandbox is capable of providing.
- Innovation is happening across the energy sector in the UK. OFGEM found that start-ups working on the local electricity supply theme featured strongly in the sandbox applications.

2.4 Implementation by ASIC

ASIC has launched an innovation hub to foster innovation in the finance sector. Services of the hub can be accessed by “fintech”¹² start-ups meeting the relevant criteria.¹³ Similar to OFGEM arrangements, the ASIC innovation hub can provide assistance to eligible innovative projects by providing them advice and regulatory sandboxes.

The innovation hub initiative allows for start-ups to seek advice from ASIC. If eligible, a start-up can receive informal guidance from ASIC on the licensing process and key regulatory issues that need to be considered by the start-up. The information from ASIC is designed to help the projects understand their options and, if relevant, prepare their applications for licences or waivers from the relevant law.¹⁴

The ASIC’s regulatory sandbox arrangements allows for fintech products and services to be tested without the licenses that would normally be required.¹⁵ Generally for a business to be able to release a new financial product or service, or engage in a credit activity it must obtain an Australian financial services licence and credit license from ASIC. ASIC’s regulatory sandbox framework consists of three broad options for testing a new product or service without a licence:

1. Existing flexibility in the regulatory framework and exemptions provided by the law. There are some situations where start-ups do not need to hold the usual licenses to provide financial services or engage in credit activities, such as, if the service is not subject to licensing requirements or the product falls in a category exempted by ASIC through use of its relief powers.
2. Fintech licensing exemption for service testing. This a conditional relief that allows start-up businesses to test certain products and services for 12 months without holding the licenses usually required. The licensing exemption only applies to certain specified activities that have been listed by ASIC and not all financial services or credit activities. Additionally, the exemption only applies if the start-up business complies with the conditions set out by ASIC to reduce the risk of poor consumer outcomes and to maintain

12 A technology company developing financial products or services

13 ASIC 2018, viewed 28 November 2018, <https://asic.gov.au/for-business/your-business/innovation-hub/eligibility-for-assistance/>.

14 ASIC 2018, viewed 28 November 2018, <https://asic.gov.au/for-business/your-business/innovation-hub/>.

15 ASIC, *Regulatory guide 257: testing fintech products and services without holding an AFS or credit license*, August 2017, p.8.

consumer trust and confidence. There is no application required to access the exemption, a start up can access it by providing a written notice to ASIC and providing the required minimum information.

3. Tailored individual licensing exemptions. Innovative projects that are not able to rely on the existing flexibility in the framework or the fintech licensing exemption can seek individual relief by applying to ASIC. This provision is underpinned by ASIC's discretionary powers to grant relief from the provisions of certain acts.¹⁶

QUESTION 1: OTHER SANDBOX EXAMPLES

Are there other examples of regulatory sandbox arrangements that are relevant when considering these arrangements for the NEM?

¹⁶ ASIC, *Applications for relief*, December 2009, p.4.

3 WHAT ARE THE CURRENT ARRANGEMENTS IN THE NEM?

This chapter sets out the current regulatory tools, arrangements and processes administered by different institutions that may support proof-of-concept trials in the NEM and provide flexibility within the regulatory framework. It also outlines examples of some trials that have been conducted recently or are currently under way in the market.

3.1 Market bodies

3.1.1

AER

Under the current regulatory framework, trials and other forms of innovation can be facilitated by the AER exercising its enforcement discretion, including its powers to issue “no action letters”. The AER has a range of compliance tools and discretion in deciding whether to take enforcement action. It undertakes a risk assessment to target and prioritise its monitoring and enforcement activities based on several factors including the potential impacts and probability of breaches.¹⁷ The AER is able to issue a no action letter in a wide range of circumstances, however they generally avoid using them except in special circumstances where they are appropriate.

The Commission understands that no action letters are generally developed by the AER on a case-by-case basis after discussions with the affected party. They are generally in relation to a specific rule or rules, are subject to certain conditions being met and the AER can withdraw its commitment to not take action if new information comes to light. They are generally confidential between the AER and the affected party and agreed to by the affected party. They provide a statement that the AER will not take action in the circumstances listed in the letter however they do not prevent a third party taking action against a breach of the rules. An example of a no action letter includes the no action request to AEMO that was granted by the AER on 30 July 2018 in respect to any non-compliance with the NER clause 2.2.2(a) following a change in registration for two generators that are used in emergencies only.¹⁸

No action letters can be used when a new rule is coming into effect and circumstances mean businesses are not in a position to comply in time. A related example is a notification of transitional arrangements made by the AER, in relation to embedded networks.¹⁹ Many holders of a network exemption in relation to an embedded network were required to appoint or become an embedded network manager, in accordance with clause 2.5.1(d1) of the NER, from 1 December 2017. In November 2017 the AER’s view was that there were not enough accredited embedded network managers for this requirement to be met by all relevant

17 AER, *Compliance and Enforcement: Statement of Approach*, April 2014. For further details, please see: <https://www.aer.gov.au/system/files/AER%20Compliance%20and%20Enforcement%20-%20Statement%20of%20Approach%20-%20April%202014.pdf>.

18 AER, *Quarterly compliance report: national electricity and gas laws*, 1 April-30 June 2018, pp.11-12.

19 AER, *Notification of transitional arrangements, National Electricity Rules: requirement for embedded network operators to become or appoint an Embedded Network Manager*, November 2017. For further details, please see: https://www.aer.gov.au/system/files/Notification%20of%20transitional%20arrangements%20-%20National%20Electricity%20Rules%20-%20Compliance%20with%20the%20requirement%20to%20appoint%20an%20ENM_1.pdf.

parties. The AER announced that it would allow an initial transitional period from 1 December 2017 to 31 March 2018. During this time the AER stated that where an embedded network operator can demonstrate they are taking active steps to appoint an Embedded Network Manager, the AER will focus on education and not actively pursue enforcement of compliance issues in respect to the NER requirement.

The AER also has the ability to provide a range of exemptions and waivers, including under its network service provider registration exemption guideline²⁰, retail exempt selling guideline²¹ and ring-fencing guideline²², and is able to provide individual exemptions if existing guidelines do not cover the situation.

The National Energy Retail Law (NERL) requires that anyone selling energy to customers must either hold a retailer authorisation or a retail exemption.²³ While most sellers of energy will hold an authorisation, there will be some circumstances where an authorisation is not appropriate. The NERL allows these types of entities to be exempted from the requirement to hold a retailer authorisation and sets out the exemptions framework. The AER is responsible for regulating exempt persons and determining appropriate exemption conditions.

Similarly, under the NEL and the NER a party that engages in the activity of owning, controlling or operating a transmission or distribution system that forms part of the interconnected national electricity system must either be registered with AEMO as an electricity distributor or gain an exemption from the AER from the requirement to be a registered network service provider.²⁴

The AER publishes the electricity distribution ring-fencing guideline, which sets out the obligations a distribution network service provider (DNSP) must meet to separate its regulated monopoly services from any services it may seek to offer to contestable market.²⁵ DNSPs can apply for waivers from a number of obligations set out in the guideline.²⁶ The AER applies a number of tests in assessing waiver applications.²⁷ For example, waivers may be granted if there is no adverse impact on electricity consumers from granting the waiver, or if there is an adverse impact, there is a net benefit to electricity consumers.

The AER encourages DNSPs to undertake research and development and explore efficient demand management, including through its demand management incentive scheme (scheme) and innovation allowance mechanism (mechanism). The scheme's objective is to provide electricity distribution businesses with an incentive to undertake efficient expenditure

20 AER, *Electricity network service provider registration exemption guideline*, version 6, March 2018. For further details, please see: <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/network-service-provider-registration-exemption-guideline-march-2018>.

21 AER, *AER (retail) exempt selling guideline*, version 5, March 2018. For further details, please see: <https://www.aer.gov.au/retail-markets/retail-guidelines-reviews/retail-exempt-selling-guideline-march-2018>.

22 AER, *Ring-fencing guideline - electricity distribution*, version 2, October 2017. For further information, please see: <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/electricity-ring-fencing-guideline-october-2017>.

23 Section 88 of the NERL.

24 Section 11(2) of the NEL.

25 AER 2017, viewed 10 December 2018, <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/electricity-ring-fencing-guideline-october-2017>.

26 The AER has made decisions on a number of ring-fencing waiver applications these can be found here: <https://www.aer.gov.au/networks-pipelines/ring-fencing/ring-fencing-waivers>

27 AER, *Ring-fencing guideline electricity distribution*, version 2, October 2017, section 5.3.2.

on non-network options relating to demand management.²⁸ The separate mechanism's objective is to provide distribution businesses with funding for research and development in demand management projects that have the potential to reduce long term network costs.

3.1.2

AEMO

As the independent market and system operator AEMO is involved in trials in a range of capacities. AEMO is currently involved in several trials of new energy technologies and systems.

Proof-of-concept trials can play an important role in understanding and responding to the challenges and opportunities new technologies and solutions present. In response to these changes, AEMO seeks to run trials under conditions that are as close to the real-world, "in-market" scenario as possible. A number of proof-of-concept trials are scheduled to commence in 2019, especially on virtual power plants (VPP) and aggregated demand response (see Section 3.3).

AEMO engages with scientific and funding bodies such as the Commonwealth Scientific and Industrial Research Organisation (CSIRO), ARENA and Bureau of Meteorology (BOM) to develop and trial new technologies. AEMO has entered into formal relationship (e.g. memoranda of understanding (MOU)) with these bodies to support collaboration, facilitate prioritisation and value maximisation of trials. In addition, AEMO has a formal advisory role with other research and development bodies.

AEMO is also regularly approached by registered or prospective market participants seeking to progress new concepts and innovations. AEMO's Centre for Innovation helps providers understand the relevant requirements to participate in the market, as well as exploring avenues to maximise the value of these new technologies and concepts, and the design of proof-of-concept trials to test and demonstrate the purported benefits.

3.1.3

AEMC

While the AEMC does not have a formal role in facilitating trials, it can consider innovative rule changes that facilitate new business models where they are in the long term interests of consumers. For example, the AEMC completed the 5-minute settlement rule change in November 2017 which aligns financial incentives with physical operation and will more accurately reward those who can deliver supply or demand side responses when they are needed by the power system. The AEMC is currently considering the wholesale demand response rule change. AEMO and ARENA are assisting this rule change process through trials or studies that leverage existing ARENA projects or the knowledge of ARENA project participants.²⁹

The AEMC also has an expedited rule change process, under which non-controversial or urgent rule changes can be made within eight weeks. It could allow for prompt changes to

²⁸ AER 2017, *Ring-fencing guideline - electricity distribution*, version 2, October 2017. For further information, please see: <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/demand-management-incentive-scheme-and-innovation-allowance-mechanism>.

²⁹ AEMC, *Wholesale demand response mechanisms*, Consultation paper, 15 November 2018.

the rules to bring new products and services to the market under certain circumstances. The rule change process can therefore be an avenue to facilitate innovative ideas and new business models.

3.1.4 Information for new entrants

The market bodies publish a range of information that can help new entrants understand the energy markets and rules such as the AER's annual *State of the energy market* reports, AEMO's *Electricity statement of opportunities* and the AEMC's information sheets and infographics that accompany reviews and rule change determinations. AER and AEMO engage directly with new retail and generation market entrants as they go through the relevant authorisation and registration processes. The market bodies each have general information lines that can be used by members of the public to ask questions about the regulatory framework.

3.2 Non-market bodies

3.2.1 ARENA

ARENA was established in 2011 with the objective of improving the competitiveness of renewable energy technologies and increasing the supply of renewable energy in Australia.³⁰ ARENA provides funding to researchers, developers and businesses that have demonstrated the feasibility and potential commercialisation of their project. ARENA also builds and supports networks, and shares the knowledge, insights and data from funded projects.

ARENA has established the A-lab initiative³¹ to create cross-sector partnerships and world-first projects to transform Australia towards a clean energy future. AEMC, AEMO, Energy Consumers Australia and AER have participated in this process to help participants develop their ideas into new projects, trials and other initiatives.

ARENA is collaborating with the market bodies, consumer representatives and industry on the Distributed Energy Integration Program (DEIP) to better coordinate DER integration activities.³² DEIP's mission is to collaborate to maximise the value of customers' distributed energy resources to all energy users.

3.2.2 Energy Consumers Australia

Energy Consumers Australia (ECA) is an independent organisation set up by the COAG Energy Council in 2015 and seeks to promote the long term interest of consumers with respect to price, quality, safety, reliability and security of supply of energy services. ECA is a member of the DEIP steering group and has been involved in the early discussions regarding regulatory sandboxes.

30 Australian Renewable Energy Agency Act 2011, s.3.

31 ARENA 2018, viewed 10 December 2018, <https://arena.gov.au/a-lab-energy-system-innovation/>.

32 ARENA 2018, viewed 6 December 2018, <https://arena.gov.au/where-we-invest/distributed-energy-integration-program/>.

3.3 Trials conducted recently or under way

A range of propositions have gone under trial across the energy sector and they vary in terms of size of the trial, the duration, proponents of trials, the matter being tested and potential impacts of the trial. Some of these trials include:

- **Hornsedale wind farm Frequency control ancillary services trial:** The Hornsdale Wind Farm 2 (HWF2) trial is the first in-market technical demonstration of a wind or solar farm providing frequency control ancillary services (FCAS) in the NEM. It was undertaken by AEMO and ARENA in conjunction with NEOEN³³ and Siemens-Gamesa Australia³⁴. As a result of the trial, HWF2 is the first Australian wind farm to be registered and offering FCAS in the NEM. The trial ran from August 2017 until February 2018. The trial was underpinned by a MOU signed between ARENA and AEMO in May 2017.³⁵
- **CONSORT Bruny Island Battery Trial:** The trial aims to explore how the residential batteries can be used by households to manage their energy while simultaneously assisting network operators with ongoing network issues by providing improved network visibility, improved reliability and up-time, and managing voltage levels and load flows across the network and by doing so deferring or avoiding costly network upgrades. The trial involves 40 battery systems and smart controllers installed in homes on Bruny Island in Tasmania's south-east. The trial received funding from ARENA and it involves several parties.³⁶
- **New Reg process trial by Ausnet:** The AER, Energy Networks Australia and Energy Consumers Australia have launched a project to aimed at improving engagement on network revenue proposals, and to identify opportunities for regulatory innovation.³⁷ The organisations proposed a draft process aimed at enabling consumer processes to be better reflected in regulatory proposals in advance of lodging those proposals for the AER's assessment called New Reg.³⁸ Under the draft New Reg process a Customer Forum negotiates aspects of the regulatory proposal in advance of lodgement with the AER. AusNet Services is conducting the trial of the New Reg Process in the development of its regulatory proposal for the 2021-25 period.³⁹
- **AGL Virtual Power Plant (VPP):** The project by AGL aims to create a prototype VPP by installing and connecting a large number of solar battery storage systems across residential and business premises in Adelaide, South Australia. When complete, the 5 MW VPP will consist of 1,000 distributed energy storage systems capable of dispatching more than 9 MWh of stored energy. The VPP can potentially provide a cost-effective solution in the medium term to smoothing out intermittent renewable energy generation and

33 Wind farm owner and operator.

34 Equipment provider for the Hornsdale group of wind farms.

35 AEMO, *Hornsedale Wind Farm 2FCAS trial: Knowledge Sharing Paper*, July 2018, pp.1-4.

36 Australian National University, Reposit Power, The University of Sydney, University of Tasmania and Tasnetworks.

37 AER ECA ENA, *New Reg - towards consumer centric energy network regulation*, March 2018, p.3.

38 AER, viewed 30 November 2018, <https://www.aer.gov.au/networks-pipelines/new-reg>.

39 AER, viewed 30 November 2018, <https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/consultation-on-the-new-reg-process>.

avoiding expensive upgrades to network infrastructure to meet peak demand.⁴⁰ The project seeks to demonstrate the role of distributed smart energy storage in enabling higher penetrations of renewable energy generators in the grid.⁴¹

- **AEMO-ARENA joint Demand Response Trial:** ARENA and AEMO have partnered to trial demand response services using the Reliability and Emergency Reserve Trader (RERT) arrangements. The trial serves several objectives including to:⁴²
 - evaluate the performance of various demand response resources in electricity supply contingency events
 - provide a benchmark for the cost of procuring demand response in the NEM
 - improve the commercial and technical readiness of innovative approaches such as engagement with mass market customers, or behavioural demand response
 - provide an evidence base to inform the design of a new market, or other mechanisms, for provision of demand response to assist with grid reliability and security.

Ten demand response proposals representing a broad range of technical and commercial solutions have been funded through the trial. The program has delivered 141 MW in year one, and will deliver 190 MW in year two and 202 MW in year three, across New South Wales, Victoria, and South Australia.⁴³

- **Virtual power plant demonstrations:** The AEMC, AEMO, AER and members of the Distributed Energy Integration Program (DEIP) are collaborating to establish VPP demonstrations. Currently the ability of VPPs to deliver the full range of their potential value streams is in the early stages and AEMO has no visibility of how VPPs operate which could potentially give rise to system security risks. The trial of VPPs is intended to:⁴⁴
 - allow VPPs to demonstrate their capability to deliver the full value stack
 - provide AEMO with operational visibility to help AEMO consider how to integrate VPPs effectively into the NEM
 - allow the AEMC and AEMO to make informed changes to the regulatory frameworks, systems and processes required to facilitate the smooth integration of VPPs as they ramp up in size.

QUESTION 2: OTHER RELEVANT TRIALS

What other proof-of-concept trials are relevant when considering formal regulatory sandbox arrangements for the NEM?

40 ARENA, viewed 30 November 2018, <https://arena.gov.au/projects/agl-virtual-power-plant/>.

41 AGL, *Virtual power plant in South Australia: Stage 1 milestone report*, July 2017, p.2.

42 ARENA/AEMO, *Joint response to AEMC Directions Paper Section 5: Wholesale Demand Response*, May 2018, p.5.

43 ARENA/AEMO, *Joint response to AEMC Directions Paper Section 5: Wholesale Demand Response*, May 2018, p.5.

44 AEMO 2018, viewed 5 December 2018, <http://aemo.com.au/Electricity/National-Electricity-Market-NEM/DER-program/Virtual-Power-Plant-Demonstrations>.

4 IS THERE A NEED?

While there are a number of trials being conducted in the NEM under existing regulatory arrangements, the question remains whether a regulatory sandbox arrangement could make it easier for additional proof-of-concept trials to take place that help achieve better consumer outcomes.

To address this question we are interested in stakeholder views on whether trials are currently being inhibited, and if so, what barriers exist that a sandbox initiative could help address.

The rapid physical changes currently occurring within the NEM, including the shift to more variable renewable energy and distributed energy resources, can require business models to also evolve. Proof-of-concept trials can play an important role in demonstrating new technology and accelerating their integration into the NEM.⁴⁵

The EMTPT paper noted that AEMO, AEMC, AER and ARENA have been working together to support proof-of-concept trials within the existing regulatory framework, and acknowledged that this appears to be adequate to deal with current demand, however saw “merit in a more structured process to facilitate experimentation within the regulatory settings as a tool that could support major future reform”. The paper also noted that some stakeholders thought a regulatory sandbox initiative may help to bring new products and services to market.

There are two key barriers discussed in the Finkel Review and EMTPT paper that innovators might face in proving a business model that a regulatory sandbox initiative might address:

- a lack of experience with the regulatory framework and access to guidance
- proving a business model or concept that is inconsistent with the current Rules, before commencing a rule change process.

Further, the Finkel review and EMTPT paper noted the merit in trialling innovative regulatory processes prior to actual rules being made.

QUESTION 3: BARRIERS TO PROOF-OF-CONCEPT TRIALS

(a) Are proof-of-concept trials being inhibited by current market regulations or processes?

(b) If so, what are the potential barriers to proof-of-concept trials that might be addressed by a regulatory sandbox initiative?

4.1 Access to guidance

A lack of experience with the regulatory framework and challenges finding the required information are potential barriers to innovators. Provision of information and guidance is a key regulatory tool used by OFGEM and ASIC to facilitate trials (see chapter 2).

⁴⁵ Finkel, A. et al., *Independent Review into the Future Security of the National Electricity Market*, June 2017, p.66.

The EMTPT paper notes that “the complexity of the electricity system and the underpinning regulatory framework appears to be one of the key barriers with innovators pointing at the regulatory culture and cost of complying.”

The EMTPT notes that a proof-of-concept trial might involve the provision of “specialist advice to help shape the services to work around regulatory obligations”.

Guidance provided by market bodies would need to be based on publicly available information and could not be a substitute for legal advice. Market bodies may be able to guide innovators to important rules or recent rule changes that could have a material impact on their business model.

There may be some overlap with broader government initiatives aimed at supporting and guiding new and small businesses which are not limited to the energy sector. These initiatives may be able to assist innovative projects in the energy sector in navigating the energy regulatory framework and developing their business models. Examples include the New South Wales’ business connect services, the Commonwealth government’s grants, assistance and other support.^{46 47}

If there is a need to provide further guidance, who should provide this guidance and how would need to be addressed. Further guidance could be provided by each market body separately, centrally coordinated through one market body or a provided by an external party with appropriate expertise (e.g. a funded independent consultancy). A more formal form of guidance from the AER or AEMO could be binding advice that sets out how a certain part of the regulatory framework applies to an innovative business model, either for the length of trial or in a more ongoing way. Detailed guidance would involve a significant investment of staff time by the market bodies, which would need to be funded.

A side benefit of providing guidance noted by EMTPT is that it can help market bodies understand emerging trends in the sector and identify areas in which regulation may need to adapt to sustain innovation.

QUESTION 4: ACCESS TO GUIDANCE ON THE REGULATORY FRAMEWORK

(a) Is there a lack of access to guidance for innovative new entrants on navigating the energy regulatory framework?

(b) If so:

- What type of guidance is needed?
- Who should provide it?
- Should guidance be coordinated across the AER, AEMO and AEMC?
- How should the provision of guidance be funded?

46 Department of Innovation Industry and Science 2018, viewed 11 December 2018, <https://www.business.gov.au/assistance>.

47 New South Wales Department of Industry 2018, viewed 11 December 2018, <https://www.industry.nsw.gov.au/business-and-industry-in-nsw/businessconnect>.

- Should an application be required in order to gain access to detailed guidance? If so, what criteria should apply?
- (c) Is there a role for binding advice from market bodies on certain aspects of the regulatory framework to support proof-of-concept trials?

4.2 Formal regulatory sandbox arrangements

The Finkel review suggested that there would be merit in formal proof-of-concept provisions in the rules to facilitate trials within the NEM. It noted that at present, “new concepts that are inconsistent with the NER must be proven to the point where a rule change can be made prior to being used in the NEM.”⁴⁸ If there was a need to complete a rule change process prior to trialling a new business model this may be a barrier to innovation. The review suggested that “formal proof-of-concept provisions in the rules would help.”

As discussed in Chapter 2, formal proof-of-concept provisions or regulatory sandbox arrangements generally involve trialling an innovative new business model under relaxed regulatory requirements on a time-limited basis, with appropriate safeguards in place. These arrangements are generally intended to make it easier for innovators to trial new approaches in the market while consumers continue to be appropriately protected. There are a variety of other regulatory tools that might be used to facilitate proof-of-concept trials.

In the 2018 *Electricity network economic regulatory framework review*, the Commission noted that under the current framework trials and other forms of regulatory innovation can be facilitated by the AER exercising its enforcement discretion, including its powers to issue “no action letters”. The AER also has the ability to provide a range of exemptions and waivers.

The EMTPT paper highlighted concerns from some stakeholders that the current provisions may not be sufficient for facilitating trials. The EMTPT paper highlights concerns that no action letters do not provide protection from third party legal action, must be specific, limit flexibility, and are opaque for the market, which creates investment and regulatory risk.

QUESTION 5: TRIALS UNDER AER ENFORCEMENT DISCRETION

- (a) Is the AER’s ability to issue no action letters, provide waivers and exemptions, and use its enforcement discretion sufficient to facilitate proof-of-concept trials in the NEM? If not, why?
- (b) Is there a need for a more formal process for proponents of proof-of-concept trials to seek a no action letter?
- (c) Should no action letters that facilitate innovation or proof-of-concept trials be made public?

⁴⁸ Finkel, A. et al., *Independent Review into the Future Security of the National Electricity Market*, June 2017, p.66.

If there are barriers to proof-of-concept trials in the current regulatory arrangements that may be addressed with the adoption of additional regulatory tools and/or a formal regulatory sandbox arrangement, these should be considered further.

The EMTPT paper highlighted some stakeholder views that a sandbox initiative may help cut through a range of barriers that prevent new products and services from coming to the market. On an informal basis, AEMO considered that, based on first-hand experience of developing in-market trials, a robust regulatory sandbox would facilitate trials. EMTPT highlighted that a sandbox arrangement would provide the benefit of addressing potential opportunities, impacts and risks of new business models before that rolled out to the wider market (e.g. impacts on customers, impacts on infrastructure, benefits for consumers etc.)

Trials can vary in terms of their size, potential benefits, impacts on consumers, market participants and stakeholders and in other ways. The suitability of a formal regulatory sandbox may depend on the nature of trials being conducted. For some trials, that have no impacts on consumers or other participants, relaxing existing regulatory requirements may be of limited concern. Further consideration needs to be given to whether such trials would be better facilitated by a no action letter or a sandbox. In contrast, trials with a large impact on consumers (e.g. trials of new consumer-facing products which affect consumer protections) or on other participants (e.g. in-market trials that impact on wholesale market settlement) may find it challenging to attain a sandbox due their large impacts on the market. Further consideration may need to be given to the type of trials that will be assisted by a sandbox arrangement.

A formal regulatory sandbox arrangement may also have associated costs such as greater resourcing requirements for regulators and trial proponents having to go through a formal process.

As such, the benefits and costs of a formal regulatory sandbox arrangements need to be identified to determine whether the arrangement can serve to better facilitate proof-of-concept trials in the NEM and help achieve better long-term outcomes for consumers.

QUESTION 6: THE NEED FOR A FORMAL REGULATORY SANDBOX

(a) Would formal regulatory sandbox arrangements, where some regulatory requirements are relaxed on a time-limited basis whilst appropriate safeguards remain in place, serve to better facilitate proof-of-concept trials in the NEM?

(b) What other regulatory tools are needed to facilitate proof-of-concept trials?

The success of a formal sandbox arrangement in facilitating proof-of-concept trials whilst maintaining consumer protections will depend on the design of the arrangements. The design will impact the level of uptake by innovators, consumer experience during trials, the type of trials that get carried out and other outcomes.

There could be many ways of designing formal sandbox arrangements in the NEM regulatory framework. The arrangements could differ in terms of the eligibility criteria for projects, the

type of relief that can be provided by the arrangements, process for seeking access to a sandbox, the parties involved and other factors.

For example, there are some differences in the design of regulatory sandbox arrangements made by OFGEM and ASIC. The OFGEM regulatory sandbox arrangements do not appear to be limited to innovations of a certain kind, whereas the ASIC arrangements are limited to start-ups falling in the fintech category. That is, the arrangements are limited to projects in a “priority area”. The ASIC arrangements also offer clear and firm regulatory exemption for projects that meet the listed criteria which can be accessed by notification to ASIC under the exemption for service testing. OFGEM’s sandbox arrangement appear to require more engagement and deliberation from the project proponent and the regulator to grant a regulatory sandbox.

The EMTPT paper highlighted initial stakeholder views on the design of a sandbox arrangement for the NEM. Some possible design requirements identified by stakeholders in the paper included:

- a more formal prioritisation process for trials
- avoiding proponents using the sandbox as a way of avoiding appropriate regulation
- equivalent protections for consumers
- coordination between market bodies
- provisions for a funding source.

If a formal regulatory sandbox arrangement is required, the first step to determine its design would be to clearly define its objective, including considering how success might be measured. Following this, consideration would need to be given to who could access the regulatory sandbox arrangements, the criteria for access, how participants are expected to benefit, obligations of participants and safeguards for consumers.

For example, the detailed design would need to consider the scope of the regulatory arrangements that could be relaxed and the consumer protections that must remain in place. Also, suitable trials may need a plan in place in the event the trial is unsuccessful, such as an ability to revert to pre-existing arrangements. Projects that involve significant infrastructure that is difficult to remove may not be appropriate for trials.

There are a number of ways that a formal regulatory sandbox arrangement could be implemented, which would vary depending on its objectives and scope. Formal regulatory sandbox arrangements may require changes to the NEL and the NER.

The Commission is interested in views from stakeholders that consider there is a need for formal regulatory sandbox arrangements on the objective of such arrangements and its high-level design. If a clear need for formal regulatory sandbox arrangements is identified in the interim advice to SCO in February 2019 then more detailed consultation and consideration on the design of sandbox will be undertaken and further advice included in the 2019 *Electricity network economic regulatory framework review* to be published in July.

QUESTION 7: DESIGN OF A FORMAL REGULATORY SANDBOX ARRANGEMENTS, IF REQUIRED

(a) If required, should the objective of the formal regulatory sandbox arrangements be to facilitate further proof-of-concept trials in the NEM? If not, what should the objective be?

(b) If required, what metrics should be used to measure the success of a formal regulatory sandbox arrangement?

(c) If required, what should be the high-level criteria for accessing a regulatory sandbox arrangement?

(d) How could fairness be addressed in the case where proponents of similar trials apply to access sandbox arrangements but only a limited number of trials can be accepted?

(e) If required, what should be the key features of a formal regulatory sandbox arrangement for the NEM?

- What regulatory arrangements should be within scope to consider for relaxation?
- What should be the safeguards for consumers?
- What obligations should be placed on the participants (e.g. knowledge sharing requirements)?

4.3 Trialling innovative regulatory approaches

The EMTPT paper noted that "Several stakeholders, particularly those involved in network services, saw merit in enabling the trialling of innovative regulatory approaches prior to actual rules being set in stone, particularly for major reforms, such as introducing an 'off-grid' regulatory framework or introducing new market mechanisms." The Finkel review noted there was "merit in trialling new regulatory approaches on a 'sand-boxed' basis" and that the AEMC should be empowered to make "time-limited rules".⁴⁹

Although there may be potential benefits associated with trialling reforms before rule changes are finalised, the ability of the Commission to make "trial rule changes" is limited. Under the rule change powers granted to the Commission by legislation, the Commission may only make a rule if it is satisfied that a rule will or is likely to, contribute to the achievement of the National Electricity Objective, the National Energy Retail Objective or the National Gas Objective. If the Commission is not convinced that a rule change will or is likely to contribute to achievement of the objectives until it's benefits have been successful demonstrated in a trial, then it is difficult for the Commission to argue that the rule change implemented to serve as a trial will or is likely to, contribute to the achievement of the objectives. It could also be difficult to demonstrate long-term interest of consumers when trials are necessarily done on a time limited basis.

⁴⁹ Finkel, A. et al, *Independent Review into the Future Security of the National Electricity Market*, June 2017, p.175.

In scenarios where a rule change can offer potential or uncertain benefits at low or no likely costs, it may be possible to meet the objectives. If a trial could impose significant costs on others or system costs on AEMO that it will recover from other participants, or has potential risks for consumers the rule change objectives will be more difficult to meet.

There may be other approaches to trialling changes to the regulatory arrangement. For example, some rule changes made by Commission have included a sunset clause, meaning the rule is in effect temporarily.⁵⁰

Further, proof-of-concept trials, which may be facilitated by formal regulatory sandbox arrangements, could be used to inform consideration of regulatory changes before adoption of reforms across the market.⁵¹

QUESTION 8: TRIALLING INNOVATIVE REGULATORY PROCESSES

How could formal regulatory sandbox arrangements be used to trial changes to regulatory arrangements to guide adoption of reforms across the market?

⁵⁰ For example a sunset clause was previously included in the Reliability and Emergency Reserve Trader (RERT) arrangements, but was removed in a 2016 Rule change, see: <https://www.aemc.gov.au/rule-changes/extension-of-the-reliability-and-emergency-reserve>

⁵¹ AEMC, *Wholesale demand response mechanisms*, Consultation paper, 15 November 2018

5 LODGING A SUBMISSION

Written submissions on this consultation paper must be lodged with Commission by 31 January 2019 online via the Commission's website, www.aemc.gov.au, using the "lodge a submission" function and selecting the project reference code EPR0068.

The submission must be on letterhead (if submitted on behalf of an organisation), signed and dated.

Where practicable, submissions should be prepared in accordance with the Commission's guidelines for making written submissions. The Commission publishes all submissions on its website, subject to a claim of confidentiality.

All enquiries on this project should be addressed to Owen Pascoe, Director on (02) 8296 7856 or owen.pascoe@aemc.gov.au.

ABBREVIATIONS

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ARENA	Australian Renewable Energy Agency
ASIC Commission	Australian Securities and Investments Commission See AEMC
DNSP	Distribution network service provider
ECA	Energy Consumers Australia
EMTPT	Energy Market Transformation Project Team
NEL	National Electricity Law
NEM	National Electricity Market
NEO	National electricity objective
NERL	National Energy Retail Law
NERO	National energy retail objective
NGL	National Gas Law
NGO	National gas objective
OFGEM	Office of Gas and Electricity Markets (UK)
SCO	Senior Committee of Officials
VPP	Virtual power plant