

REVIEW

Australian Energy Market Commission

DISCUSSION PAPER

Strategic priorities for the Australian energy sector

12 September 2017

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Reference: EMO0032

Citation

Australian Energy Market Commission, Strategic priorities for the Australian energy sector, discussion paper, 12 September 2017, Sydney.

About the Australian Energy Market Commission (AEMC)

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

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Foreword

In December 2016, the COAG Energy Council (Council) tasked the Australian Energy Market Commission (AEMC) with providing targeted strategic advice to inform the Council's priority setting process. The request was in response to the *Review of Governance Arrangements for Australian Energy Markets* (the Vertigan report), which recommended:

[t]hat the focus of the work of the Council be the determination of strategic direction and the associated work programme to support this direction, with appropriate assignment of tasks to SCO [the Senior Committee of Officials] and the AEMC.¹

To support Council's strategic focus, the Vertigan report recommended that SCO present to Council recommendations on strategic direction and a supporting work programme, aided by advice from the AEMC.² Council agreed with both Vertigan recommendations.³

In December 2016, Council issued terms of reference to the AEMC requesting a periodic review of sector priorities.⁴ The terms of reference require:

- The AEMC to deliver strategic advice, in the form of a report, to Council secretariat by October 2017 and every three years thereafter.
- The advice is a broad, concise and high level analysis rather than a detailed examination of individual issues.
- Annual updates on the previous advice in between the triennial reports.
- That in developing the advice, the AEMC consult with the SCO, the energy market institutions (the Australian Energy Regulator, the Australian Energy Market Operator) and Energy Consumers Australia.
- The AEMC hold a workshop with the SCO to consider the strategic advice following delivery of each report.

Since Council issued the terms of reference to the AEMC, the *Independent review into the future security of the National Electricity Market* (the Finkel review) examined sector governance in the context of power system security and reliability, reporting in June

¹ M. Vertigan, Prof. G. Yarrow, E. Morton, *Review of Governance Arrangements for Australian Energy Markets Final Report*, October 2015, Canberra, recommendation 2.2, p. 11.

² M. Vertigan, Prof. G. Yarrow, E. Morton, *Review of Governance Arrangements for Australian Energy Markets Final Report*, October 2015, Canberra, recommendation 2.3, p. 11.

³ COAG Energy Council, *Review of Governance Arrangements for Australian Energy Markets – Table of Responses*, January 2016, p.1. COAG stated that '[t]he COAG Energy Council is the appropriate forum to determine the strategic direction and specification of specific priorities and work plans flowing out from these priorities'; and that Council 'recognises that the AEMC plays an important role in developing advice on strategic priority setting and associated work plans. AEMC's advice will be provided to SCO for consideration [and] SCO and AEMC will work collaboratively to develop the new work plan.'

⁴ COAG Energy Council, *Terms of reference. Request for advice: Energy sector strategic priorities*, Canberra, December 2016, available at <http://www.aemc.gov.au/getattachment/96d4d459-1f11-45a0-bd07-e3fc17040768/Terms-of-reference-2017-Energy-sector-strategic-pr.aspx>

2017. Council initiated the Finkel review on 7 October 2016 to take stock of security and reliability in the national electricity market following the September system black event in South Australia.⁵

The Finkel review recommended that a new Energy Security Board be established, and its responsibilities include implementing the 'Finkel blueprint'.⁶ The Finkel review also recommended that COAG develop a **strategic energy plan**:

[b]y mid-2018, the COAG Energy Council should develop and maintain a strategic energy plan informed by the Panel's blueprint to guide the operation and evolution of the National Electricity Market.⁷

On the relationship between the Finkel blueprint and the strategic energy plan:

[t]he COAG Energy Council should agree on a strategic energy plan for the NEM [national electricity market], building on the recommendation of this blueprint, reflecting government priorities.⁸

In other words, the Finkel review considered that its recommendations would form part of the strategic energy plan.

The governance recommendations were adopted by Council on 14 July 2017.⁹

It is envisaged that the Finkel-recommended strategic energy plan will be the mechanism through which the Council will articulate the sector's strategic direction, and identify priorities and related work plans (i.e. address the Vertigan recommendation). The Energy Security Board will prepare advice to Council on the strategic energy plan. As such, this AEMC review will be an input to the Energy Security Board's consideration of advice to Council.

⁵ COAG Energy Council, *COAG Energy Council Meeting Communique Friday, 7 October 2016* <http://www.coagenergycouncil.gov.au/sites/prod.energycouncil/files/publications/documents/Energy%20Council%20Communique%20-%207%20October%202016.pdf>

⁶ Dr A. Finkel, K. Moses, C. Munro, T. Effeney, Prof. M. O'Kane, *Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future*, Commonwealth of Australia, 2017, Recommendation 7.2, p. 26.

⁷ Dr A. Finkel, K. Moses, C. Munro, T. Effeney, Prof. M. O'Kane, *Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future*, Commonwealth of Australia, 2017, Recommendation 7.1, p. 26.

⁸ Dr A. Finkel, K. Moses, C. Munro, T. Effeney, Prof. M. O'Kane, *Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future*, Commonwealth of Australia, 2017, p. 6.

⁹ COAG Energy Council, *COAG Energy Meeting, Meeting Communique, 14 July 2017*.

Executive summary

Energy is at the core of economic and social activity in all industrialised countries. It is an important input into the prices of goods and services paid by consumers, both large and small. Increasing energy prices negatively impact on consumers through higher energy bills, and higher prices for goods and services.

In Australia, energy is an important input for commercial and industrial users, who account for around 87 per cent of final energy consumption. Changes in energy prices impact the costs of all industry sectors including international exposed industries such as agriculture, mining, and manufacturing.

The energy sector in Australia is undergoing significant change. There are challenges, both current and in the future, in delivering secure and reliable energy to consumers at the lowest possible cost, while meeting environmental commitments. There are also significant opportunities that can be realised, provided a strategic approach is taken to the decisions the sector faces today.

Strategic priorities advice

The purpose of this advice is to assist the Council and the market institutions make decisions and adapt to change, at a time when the sector faces many uncertainties and drivers of change. It does this by proposing:

- **An analytical framework** – to analyse and map all the issues facing the sector.
- **Goals** – that establish the outcomes sought for the sector.
- **Initiatives and work programs** – that are needed to achieve each of the goals.
- **Sequencing and prioritisation** – to establish the goals and initiatives/work programs that should be the primary focus.

This review builds on the endorsed recommendations of the Finkel review, while also addressing those areas covered less extensively, such as those relating to gas markets, effective markets and network regulation, and consumer protections.

Each component has been developed in response to the current and emerging trends and changes in the sector.

The advice will enable the Council to manage the sectoral issues holistically and adapt to changes as required. The process will allow progress towards the key outcomes sought – prices as low as possible, increased investment, secure and reliable energy, emissions reductions – to be measured and managed over time.

Strategic review cycle

The Council's Terms of Reference for this review differs from other recent reviews as it is of a recurring nature, with an annual 'refresh'. Every three years the review is to assess energy market priorities. In each of the intervening years, the priorities and work programs can be updated (where appropriate).

An annual report will assess:

- progress towards meeting the goals
- whether the programs and initiatives remain sufficient to deliver on those goals
- whether the relative priority of the goals needs to be modified. For instance, if the market develops in ways that were not originally assumed, then this should prompt the reassessment of priorities and sequencing.

Regular sectoral reports, like the upcoming *Health of the NEM*, should inform the annual review process.

How this review is being conducted

This initial three-year review is being undertaken by the AEMC together with the other market bodies - the Australian Energy Market Operator (AEMO) and the Australian Energy Regulator (AER) - Energy Consumers Australia (ECA), and the Energy Security Board (ESB).

This discussion paper sets out an analytical framework, goals, and initiatives and work programs, for stakeholder comment. It also seeks stakeholders' views on the appropriate sequencing and prioritisation of the goals, initiatives and work programs.

A sector in transition

In electricity, the national electricity market is moving from large-scale synchronous generation to include non-synchronous, intermittent generation, and from centralised generation to greater amounts of smaller, distributed generation. This change in generation technologies is being driven by the changing cost structures of new and thermal generators, and government policies.

In relation to cost structures, the cost of renewable technologies is falling. There is also instability and uncertainty regarding key inputs such as gas and coal for thermal generators. Government policies have encouraged more renewable generation which has contributed to the retirement of some thermal generators.

The growth of large-scale intermittent generation is changing how the power system needs to be managed to maintain security and deliver a reliable supply to consumers. These technologies do not generally have the same attributes as the generators that are exiting, such as synchronicity and dispatchability. The entry of these intermittent generators is driven by financing mechanisms that are not integrated with the design of the national electricity market.

Households and businesses are changing the way they use electricity. For example, consumers are playing an increasingly important role in generation with 20 per cent of Australian households now using solar panels. There is also increased interest in

batteries and smart home technologies. These trends will affect how the power system is managed, in particular greater complexity in forecasting demand and in managing demand variability.

The increase in distributed energy resources may also change the future role of distribution networks; from facilitating one-way electricity flows to more dynamic, two-way flows. Distribution and transmission network operators may also meet their reliability and security obligations in new ways, including using non-network solutions.

Given these changes, coordinating the generation and consumption of electricity is becoming more complex and will require new approaches to maintain system security and reliability of supply.

There are also significant changes underway in the gas market.

Gas prices have increased materially in the past couple of years, driven by a combination of demand for gas from liquefied natural gas (LNG) export facilities and restrictions on domestic gas supply. This has directly impacted consumers who rely on gas for heating or industrial processes. Higher gas prices have also increased the cost of gas-powered electricity generation, affecting all electricity consumers. In response, the Council is considering how the domestic gas supply can be increased, and the Commonwealth has implemented measures to restrict gas exports to ensure sufficient domestic supply.

In addition gas pipeline infrastructure has evolved into an interconnected network, creating a series of increasingly inter-linked wholesale gas markets. A package of mutually reinforcing reforms to improve the operation of these markets is being undertaken, and includes initiatives related to wholesale gas trading markets, pipeline access and information provision. These reforms to the east coast gas markets should improve the transparency of supply and pricing outcomes for gas consumers and gas generators, and have the potential to increase Australia's GDP by \$8.7 billion in net present value terms by 2040.

Gas is often considered a suitable fuel to aid the national electricity market's transition from thermal generation to more renewable generation. Gas generators:

- can quickly vary their output, making them a useful complement to the intermittent output of wind and solar generation
- are both dispatchable and synchronous, and so can contribute to the maintenance of power system reliability and security even as coal generators exit the market.

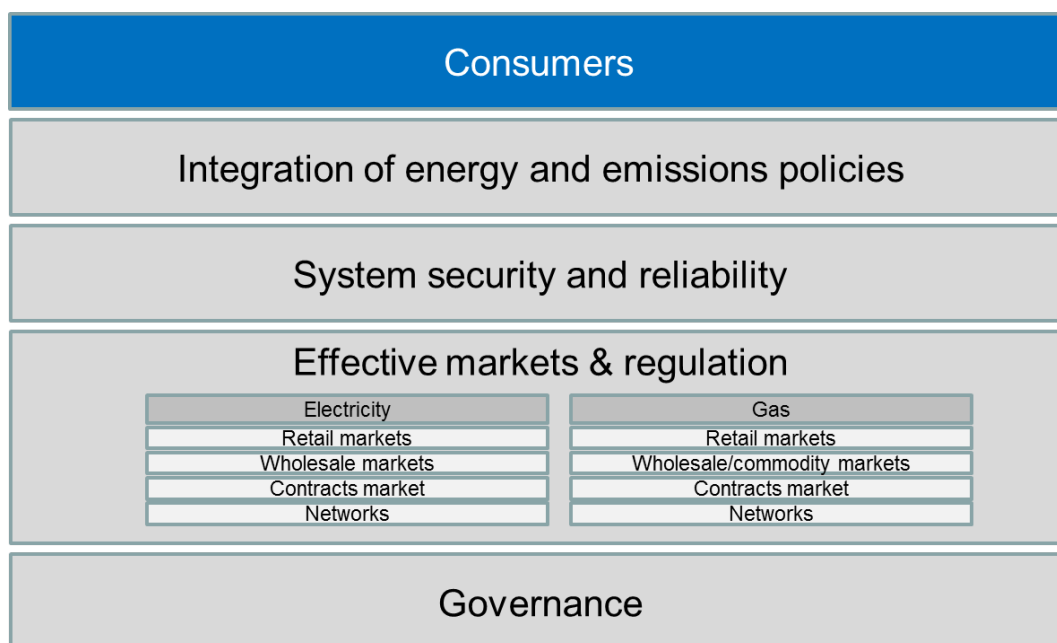
However gas price increases have further highlighted the need for gas market reforms amid concerns about whether gas can play the role of a 'transitional fuel'.

These trends and changes across the energy sector are linked. The linkages need to be understood so policy and regulatory decisions deliver optimum outcomes on pricing, investment, system security, reliability and emissions reductions.

Analytical framework

This discussion paper proposes an analytical framework to map and assess all the key issues facing the energy sector. Given this review is to provide advice on the entire energy sector, a broad framework is proposed (see Figure 1).

Figure 1 Analytical framework for COAG advice



The top layer of the analytical framework relates to consumers, indicating the primary importance of the industry operating in such a way as to deliver the outcomes, energy services and protections that consumers require, whether the consumers are residential, commercial or industrial.

Integration of energy and emissions reduction policies relate to commitments made by Australia to reduce its carbon dioxide emissions, and how mechanisms to achieve emissions reductions in the electricity sector should be aligned and integrated with the design and operation of the energy market. Emissions reduction goals constitute constraints within which the energy market and power system must be operated and managed. Making investment decisions today without clarity and confidence in what emissions reduction policy mechanism if any will be in place post 2020 is extremely problematic.

The system security and reliability category relates to actions that maintain appropriate standards for power system security and reliability, which were a prime focus of the Finkel review. These actions could be interpreted as relating to the 'quality' of the electricity services provided to consumers. As with the emissions reduction goals these constitute constraints within which the energy market and power system must be operated and managed. This raises the question as to what may be necessary to give confidence that reliable supply can be provided in the event that a settled emissions policy reduction mechanism is unable to be achieved.

The effective markets and regulation grouping relates to the set of institutional and market arrangements that influence the extent to which energy prices are, or can be, set at economically efficient levels.

The last classification, governance, relates to policy and management of the sector, including issues related to the clarity of roles and responsibilities of the various regulatory and government agencies, and better co-ordination of actions between these agencies and bodies. This group includes jurisdictional (including the Commonwealth) representatives, pricing regulators, the three market bodies, and the ESB.

The framework is considered a suitable basis for the advice as it is:

- **broad** – it encompasses all aspects of the energy sector.
- **actionable** – provides a basis for categorising goals and initiatives/work programs, identifying the outcomes to be achieved, and evaluating progress.
- **durable** – as there may be a delay between when policy decisions or market reforms are made and when their impacts become apparent, the analytical framework used to manage the sector must remain constant to observe and evaluate changes over time.

We seek stakeholder views on the proposed analytical framework.

Goals

This discussion paper proposes a number of goals for the sector, categorised into the analytical framework described. Figure 2 summarises the proposed goals.

Figure 2 Proposed suite of goals

Consumers <ul style="list-style-type: none"> • Efficient prices and affordability • Accessible information • Engagement and participation • Protection 			Social		
Integration of energy and emissions policies <ul style="list-style-type: none"> • Sustainable national emissions reduction strategy • Coordinated emissions reduction trajectory for the NEM • Credible long-term emissions reduction mechanism 			Environmental		
System security and reliability <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> System security <ul style="list-style-type: none"> • Resist frequency changes • Better frequency control • A stronger system • An adaptable & flexible system </td> <td style="width: 50%; vertical-align: top;"> Reliability <ul style="list-style-type: none"> • Efficient market-based approach • Appropriate intervention mechanisms </td> </tr> </table>			System security <ul style="list-style-type: none"> • Resist frequency changes • Better frequency control • A stronger system • An adaptable & flexible system 	Reliability <ul style="list-style-type: none"> • Efficient market-based approach • Appropriate intervention mechanisms 	Physics
System security <ul style="list-style-type: none"> • Resist frequency changes • Better frequency control • A stronger system • An adaptable & flexible system 	Reliability <ul style="list-style-type: none"> • Efficient market-based approach • Appropriate intervention mechanisms 				
Effective markets & regulation <ul style="list-style-type: none"> • Market participation • Transparent and efficient prices • Market reforms 	Electricity networks <ul style="list-style-type: none"> • Efficient regulation • An efficient platform for energy services 	Gas <ul style="list-style-type: none"> • Access to gas • Access to pipelines • Market information • Gas market reforms 	Economics		
Governance <ul style="list-style-type: none"> • Leadership and strategic direction • Role clarity and coordination • Responsiveness to market changes 			Management		

The goals for the sector proposed in this review build on sector outcomes already expressed in legislation, policy and recent reviews. They:

- encompass the “policy trilemma” that sets out the goals of affordability, emissions reductions, and security and reliability.
- address the objectives of the Australian Energy Market Agreement (AEMA), the National Energy Objective (NEO), the National Gas Objective (NGO) and the National Energy Retail Objective (NERO).
- include and build on the outcomes sought by the Finkel review.

In formulating the goals we have aimed to achieve the following three principles:

- sufficiently detailed – striking a balance between a high-level view and a detailed work-program view
- comprehensive – they address the breadth of issues
- durable – resilient over time.

We seek stakeholder comment on the proposed suite of goals.

Initiatives and work programs

This review will recommend the initiatives and work programs needed to achieve each of the goals. In the following table we have mapped the key initiatives and work programs that are currently underway, or recommended, to achieve each goal. In particular, we have included the set of actions and initiatives that Council has agreed in response to the Finkel review.

Where agreed, the completion deadlines are included in the attached summary table of the key initiatives and work programs, and in the more detailed listing of initiatives / work programs available on the AEMC's website. For other initiatives, the detail and timing will be proposed during the development of this strategic advice.

There are three broad categories of issues in the discussion paper.

- The market bodies have been working with the SCO and Council on an implementation plan for the agreed Finkel recommendations. There is a greater level of detail and more specific timing associated with these initiatives compared to others at this stage.
- Other initiatives/work programs reflect work being led by the market bodies.
- There are initiatives that have been recommended, but have not yet been agreed by Council.

We invite stakeholder comment on whether the initiatives and work programs listed are sufficient to deliver on the goals, and whether there are any gaps.

Sequencing and prioritisation

This review will advise Council on the goals and initiatives/work programs that should be their primary focus.

While all the goals identified are important, to the extent there are sequencing considerations or resourcing constraints, clear priorities are important.

Stakeholder comment is invited on the sequencing and prioritisation of goals and initiatives / work programs.

Next steps

The AEMC is seeking public comment on all aspects of this discussion paper. The AEMC will:

- launch the discussion paper at a public forum in Melbourne that will be webcast on 12 September
- take submissions on the discussion paper up until 10 October 2017.

Please provide your submissions via the Commission's website, or by mail, quoting reference "EMO0032". All submissions will be published on the Commission's website, subject to any request for confidentiality

Following the forum and receipt of submissions, the AEMC in collaboration with the ESB, AER, AEMO and the ECA, will consider the views presented and prepare a final report for Council by late October 2017.

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1 Introduction

1.1 The task

In December 2016, the Council tasked the AEMC with providing advice to inform the Council's strategy and priority setting process.

Under the terms of reference, the AEMC's advice is to be both high level and broad in scope.¹⁰ It is to describe the major challenges, risks and opportunities relating to energy policy, the regulatory framework, and the operational environment. The advice should highlight current and potential future issues that could impact on the achievement of the statutory objectives articulated in the National Electricity Law, National Gas Law, National Energy Retail Law, and the Australian Energy Markets Agreement.¹¹ The AEMC is to consider matters arising in all parts of the energy sector; affecting electricity, natural gas and energy retailing, across the states and territories.

The purpose of this discussion paper is to obtain stakeholder input on the strategic priorities for the energy sector.

1.2 Approach

The AEMC outlined how we will develop the advice to Council in an Approach paper, published in April 2017.¹² Key principles in our approach were that the advice would:

- (a) draw broadly from work recently completed, underway or planned across the industry
- (b) be developed in consultation with the SCO, AEMO, AER and the ECA¹³
- (c) reflect stakeholder views.

Draw on existing and planned work

Since the terms of reference were issued there have been numerous developments in the energy sector. Recent decisions, announcements and reviews have been incorporated in the proposed goals, and initiatives and work programs identified in this discussion paper, consistent with principle (a) above.

¹⁰ The 2017 Energy Sector Strategic Priorities review terms of reference can be viewed at: <http://www.aemc.gov.au/Markets-Reviews-Advice/2017-Energy-sector-strategic-priorities>

¹¹ <http://www.coagenergycouncil.gov.au/publications/australian-energy-market-agreement-amended-december-2013>

¹² The Approach Paper: 2017 Energy sector strategic priorities review, 19 April 2017, is available at: <http://www.aemc.gov.au/Markets-Reviews-Advice/2017-Energy-sector-strategic-priorities>

¹³ The COAG Energy Council is supported by the SCO which is composed of senior officials at head of department/agency level from each of the participating jurisdictions. SCO advises the Energy Council and develops and progresses issues to achieve the Energy Council's priorities. The Commonwealth also serves as the permanent Chair of SCO, and by convention its decision making processes and protocols mirror those of the Energy Council and are set out in its Terms of Reference.

Consideration has been given to the following reviews, amongst others:

- Electricity Network Transformation Roadmap – Final Report, CSIRO and Energy Networks Australia, April 2017.
- Blueprint for the Future, the Independent Review into the Future Security of the National Electricity Market (the Finkel review), Commonwealth of Australia, June 2017.
- 2017 Retail Energy Competition Review, AEMC, July 2017.
- Empowering disadvantaged households to access affordable, clean energy, Australian Council of Social Service (ACOSS), the Brotherhood of St Laurence and the Climate Institute, July 2017.

Various governments have announced policies and programs related to the energy sector and markets, all of which form the context within which the strategic priorities have been developed in this paper.

The Commonwealth government announcements include:

- 15 March 2017 - expansion of the Snowy Hydro scheme
- 27 April 2017 - the creation of a domestic gas supply guarantee
- 20 June 2017 - the introduction of reverse auctions for baseload capacity, the removal of limited merits review (LMR), licensing power to control gas exports.

On 14 March 2017 the South Australian government released its ourenergyplan.sa.gov.au. The plan includes initiatives for a state owned gas plant, battery storage and a renewable technology fund, incentives for more generation in South Australia, local powers over the national market, and an energy security target.¹⁴

On 5 June 2017 the Queensland government released its Powering Queensland Plan. This Queensland plan includes directions to state owned generators to change their bidding practices, a possible restructure of the government owned generators, and the establishment of CleanCo., a corporation to run renewable and low emission power stations.¹⁵

On 14 July 2017 Council accepted 49 of the 50 recommendations from the Finkel Review. The Market Bodies Forum has been working with the Standing Committee of Officials on an implementation plan for these recommendations.¹⁶

On 9 August 2017 the Prime Minister met with retailers to examine how retailers could ensure consumers are on appropriate market contracts, and are informed of the outcomes when those contracts expire. A follow up meeting was held on 30 August 2017 to progress these issues.

On 13 August 2017 the Victorian government's independent Review of electricity and gas retail markets in Victoria was released, advocating the creation of a basic service

14 <http://ourenergyplan.sa.gov.au/assets/our-energy-plan-sa-web.pdf>

15 <https://www.dews.qld.gov.au/electricity/powering-queensland-plan>

16 On 7 June 2017, the AEMC, AEMO and AER created the Market Bodies Forum to enhance the quality of advice coming from the market institutions and the coordination between institutions.

offer that is not greater than a regulated price, and a series of recommendations to protect consumers and lower prices. The Victorian government had not responded to the report or recommendations at the time this paper was finalised.

On 14 August the South Australian government announced the construction of a \$650 million 150 MW solar thermal power plant in Port Augusta. The government will pay a maximum of \$78 per MWh, and the plant will meet 75 per cent of its long term power supply.

Develop collaboratively with SCO, other market bodies and the ECA

The advice to Council will be developed in consultation with SCO, AEMO, the AER and ECA. The advice will be developed in stages. This discussion paper was primarily drafted by the AEMC, with some commentary provided by the AER, AEMO and the ECA. The AEMC has kept SCO informed of progress.

Reflect stakeholder views

Stakeholders' insights are essential for providing quality advice to Council on our sector's strategic priorities. The AEMC intends to consult broadly in conducting this review.

1.3 Consultation process and submissions

Stakeholders will have several opportunities to provide input to the advice to COAG.

Box 1.1 Issues for comment

Comment is invited on any aspect of this discussion paper. In particular, your views on the following questions would be appreciated:

- Is the proposed analytical framework comprehensive and workable?
- Are the goals set out for each area the right goals (i.e. comprehensive, relevant and accurate)?
- Are the initiatives and work programs sufficient to deliver on the goals, and are there any gaps?
- What are the highest priority goals, and do the goals or initiatives / work programs have to be pursued in a particular sequence to achieve the best results?

The summary of the key initiatives and work programs that is available at the end of each issues chapter and in summary in Appendix B may be useful reference tools for answering these questions. More details on the goals and initiatives/work programs are available on the AEMC's website.¹⁷

The AEMC will launch this discussion paper at a public forum in Melbourne that will be webcast on 12 September. Submissions on the discussion paper can be made up until 10 October 2017.

¹⁷ <http://www.aemc.gov.au/Markets-Reviews-Advice/2017-Energy-sector-strategic-priorities>

Submissions can be lodged online via the Commission's website, or by mail, quoting reference "EMO0032". All submissions will be published on the Commission's website, subject to any request for confidentiality

Following the forum and receipt of submissions, the AEMC in collaboration with AER, AEMO and the ECA, will consider the views presented and look to develop the strategic advice by late October 2017. As the Finkel review contemplated a role for the ESB in developing a strategic energy plan, the final report of this review will be prepared for the ESB as an input for the ESB's advice to Council.

1.4 Structure of this paper

The remainder of this paper is structured as follows:

- Chapter 2 discusses the analytical framework we are using to organise the strategic priorities for the sector and the proposed suite of goals for the sector. The analytical framework builds on those used by the Finkel review and the AEMC's previous strategic priorities work. The proposed goals are more detailed than the 'trilemma', with specific goals articulated for each area of the analytical framework.
- Chapter 3 describes the many links between the issues and processes in the energy sector. Understanding these links, and the multiple outcomes being pursued in the sector, is critical if policy and regulatory decisions are to deliver optimum outcomes on pricing, investment, system security, reliability and emissions reductions.
- Using the analytical framework, the remaining chapters address each component of the sector in turn. The challenges and opportunities in each are described, goals proposed, and initiatives and work programs underway (or recommended) outlined.
- Appendix A presents a summary of the goals for each sector component, and the current and recommended initiatives / work programs to deliver on each goal. A more detailed spread-sheet is available on the AEMC web-site.¹⁸

¹⁸ <http://www.aemc.gov.au/Markets-Reviews-Advice/2017-Energy-sector-strategic-priorities>

2 Goals for the sector

2.1 Goals and strategic priorities

In its approach paper, the AEMC adopted a definition of strategy as a planned series of actions towards the achievement of identified goals.¹⁹ A pre-requisite for this review is therefore the identification of the goals that are being sought.

This chapter describes:

- the characteristics of effective goals
- existing expressions of goals for the energy sector
- a suite of proposed goals.

2.2 Characteristics of effective goals

In defining the goals for the energy sector there is a balance to be struck between an articulation of goals that is too high level or non-specific to be used in a strategic prioritisation process, and too many goals such that the overall direction and relative importance of different goals is lost in too much detail.

A further requirement is that the goals should cover the breadth of the issues in the industry.

Finally, sector goals should be durable or resilient over time. They should enable an assessment of the effectiveness of actions towards a goal, withstand new or modified challenges, risks and opportunities, and facilitate the identification of new or amended actions that are required. Durability of goals is important as the AEMC is to provide Council with a multi-year perspective on the industry, with subsequent advice providing annual 'refreshes'.

2.3 Existing expressions of goals

The policy trilemma and statutory objectives

At a high level, there are several expressions of goals for the energy sector, namely the:

- policy trilemma
- objectives of the AEMA, and NEO, NGO and NERL.²⁰

On 1 February 2017 the Prime Minister Malcolm Turnbull articulated the policy goals for the Australian energy sector:

Australia should be able to achieve the policy trifecta of energy that is affordable, reliable and secure and that meets our substantial global emissions reduction commitments as agreed in the Paris Climate Change Treaty last year. And all

¹⁹ AEMC, *Approach Paper*, 22 August 2017, p3. <http://www.aemc.gov.au/Markets-Reviews-Advice/2017-Energy-sector-strategic-priorities>

²⁰ The term 'trilemma' has been adopted in this discussion paper, noting that other equivalent terms such as 'trifecta' are also used in discussions about the sector.

governments and industry must work together to achieve those three goals. Security, affordability and emissions reduction - that's what we need to achieve.

The next incarnation of our national energy policy should be technology agnostic. Its security and cost that matters most, not how you deliver it.²¹

Similar expressions are also found in the Australian Energy Market Agreement²², the National Energy Objective, the National Gas Objective and the National Energy Retail Objective (see figure 2.1).

Figure 2.1 Policy objectives

<p>Australian Energy Market Agreement The objectives of this agreement are: (a) the promotion of the long term interests of consumers with regard to the price, quality and reliability of electricity and gas services; and (b) the establishment of a framework for further reform to: (vi) address greenhouse emissions from the energy sector, in light of the concerns about climate change and the need for a stable long-term framework for investment in energy supplies.</p>	<p>The National Electricity Objective is to promote efficient investment in, and efficient operation and use of, electricity services for the long-term interests of consumers of electricity with respect to price, quality, safety, reliability, and security of supply of electricity; and the reliability, safety and security of the national electricity system.</p>
<p>The National Gas Objective is to promote efficient investment in, and efficient operation and use of, natural gas services for the long-term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.</p>	<p>The National Energy Retail Objective is: to promote efficient investment in, and efficient operation and use of, energy services for the long term interests of consumers of energy with respect to price, quality, safety, reliability and security of supply of energy.</p>

There are several important differences between the trilemma and the statutory objectives. The goals expressed in the trilemma are broader in scope than those in the statutory objectives. They encompass issues and actions that can be managed or undertaken outside the energy sector. Two areas of note are affordability and emissions reduction.

Where the trilemma refers to affordability, the statutory objectives refer to prices that are efficient and in the long-term interest of consumers. Affordability usually refers to the price of a good or service being low, or that the good or service is within the financial means of the consumer. As such it is a term that relies on value judgements as to the appropriate level of pricing, or the level of pricing that is within the financial means of the consumer. The difference between affordability and efficient pricing is important to note. The statutory objectives, which guide the operation of the national

²¹ <https://www.pm.gov.au/media/2017-02-01/address-national-press-club1>

²² This is the agreement that underpins the national energy market. The agreement can be found here: <http://www.coagenergycouncil.gov.au/publications/australian-energy-market-agreement-amended-december-2013>

electricity market, only apply to participants and institutions within the national electricity market. Well-designed and functioning industry processes can deliver the lowest and most efficient pricing. This may or may not also be considered affordable by governments or community sectors, particularly in relation to specific consumer groups. In relation to defining goals for the energy sector it is therefore proposed that there is clear distinction between the efficient pricing goals that may be applied to the national electricity market institutions and processes, and any additional actions that governments consider necessary for achieving affordability.

Similarly, where the trilemma refers to emissions reductions and the AEMA refers to having a framework that enables reductions in “greenhouse emissions”, the other statutory objectives for the sector do not mention emissions reduction. This was a deliberate exclusion given environmental policy and emissions reduction targets are broader than the energy sector per se, although clearly the sector has a role to play in meeting any national reduction targets. This discussion paper recommends emissions reduction requirements applying to the energy sector be clearly identifiable within the broader national emissions reduction objectives.

The Finkel blueprint

The most recent articulation of goals was that presented in the Finkel review. The recommendations of the Finkel review sought to achieve four key outcomes for the national electricity market, with three key pillars. Figure 2 presents the Finkel review’s framework alongside that used by the AEMC in its 2015-2016 work program (that identified four strategic priority areas and two enablers).

Figure 2.2 Recent goals frameworks

Finkel blueprint	AEMC 2016 work program
Increased security	System security as market transitions
Future reliability	Re-designed gas market
Reward consumers	Engaged and informed consumers
Lower emissions	Integration of energy & emissions policy
Three key pillars	Enablers
Orderly transition	Contracts market
System Planning	Strong governance
Stronger governance	

The two frameworks share many similarities. Both focus on security and reliability; consumers; emissions policy; and governance. The Finkel review had a stronger headline focus on planning and transition, whereas the AEMC framework highlighted the gas and contracts markets.

Both frameworks were fit-for-purpose for the tasks they were intended to achieve. The Finkel review was primarily focused on ensuring system security and reliability in the national electricity market into the future, within the context of achieving the

trilemma.²³ The AEMC’s 2015-2016 framework communicated the priorities in the organisation’s work-program at that time.

The analytical framework used for providing advice to Council builds on this previous work. However, the scope of this advice involves a broader and more holistic set of priorities for Council, to complete the ‘picture’ for the entire energy sector. The next section presents the analytical framework that forms the basis for this discussion paper.

2.4 Analytical framework for advice to Council

The following analytical framework (Figure 2.3) is proposed for this review. It is considered a suitable basis for the advice to Council as it is:

- encompasses all aspects of the energy sector
- provides a basis for clearly organised goals and actions
- durable even as the industry and specific actions evolve.

Figure 2.3 Proposed analytical framework for Council advice

Consumers	Social										
Integration of energy and emissions policies	Environment										
System security and reliability	Physics										
Efficient markets & regulation <table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Electricity</th> <th style="padding: 2px;">Gas</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">Retail markets</td> <td style="padding: 2px;">Retail markets</td> </tr> <tr> <td style="padding: 2px;">Wholesale markets</td> <td style="padding: 2px;">Wholesale/commodity markets</td> </tr> <tr> <td style="padding: 2px;">Contracts market</td> <td style="padding: 2px;">Contracts market</td> </tr> <tr> <td style="padding: 2px;">Networks</td> <td style="padding: 2px;">Networks</td> </tr> </tbody> </table>	Electricity	Gas	Retail markets	Retail markets	Wholesale markets	Wholesale/commodity markets	Contracts market	Contracts market	Networks	Networks	Economics
Electricity	Gas										
Retail markets	Retail markets										
Wholesale markets	Wholesale/commodity markets										
Contracts market	Contracts market										
Networks	Networks										
Governance	Management										

The top layer of the framework relates to **consumers**, indicating the primary importance of the industry operating in such a way as to deliver the outcomes and energy services that consumers require, whether the consumers are residential, commercial or industrial. This layer can essentially be considered as relating to social (or societal) outcomes.

²³ The Finkel review suggested the “COAG Energy Council should agree on a strategic energy plan for the national electricity market, building on the recommendations of this blueprint, reflecting government priorities.” See *Independent Review into the Future Security of the National Electricity Market, Blueprint for the Future*, p.6

Integration of energy and emissions reduction policies relates to commitments made by Australia to reduce their carbon dioxide emissions, and that mechanisms to reduce emissions in the electricity sector should be integrated with the design and operation of the energy market. Emissions reduction goals constitute constraints within which the energy market and power system must be operated and managed.

The **system security and reliability** category relates to actions that maintain appropriate standards for power system security and reliability. They could be interpreted as actions that relate to making sure there is enough electricity that can be provided to consumers. These are also constraints within which the energy market and power system must be operated and managed.

The **efficient markets and regulation** grouping relates to the set of institutional and market arrangements that influence the extent to which energy prices are, or can be, set at economically efficient levels.

The last classification, **governance**, relates to policy and management of the sector, including issues related to the clarity of roles and responsibilities of the various regulatory and government agencies, and better co-ordination of actions between these agencies and bodies. This group includes jurisdictional (including the Commonwealth) agencies, pricing regulators, and the three market bodies.

The dimensions of the framework can broadly be described as relating to:

- social or societal outcomes
- the environment
- physics
- economics
- management.

By categorising issues into this broad analytical framework, it is possible to define goals and map initiatives for each area in the sector. There should be a clear place for all issues, and the framework itself should be durable over time as it can accommodate new issues. This is particularly important, as the strategic priorities process provides a multi-year perspective on the industry with annual refreshes.

Furthermore the design of the framework illustrates that while consumer interests are advanced when the goals are achieved for each individual goal, the greatest benefit accrues when the goals are achieved collectively. In other words, the aggregate benefit is greater than the sum of the parts.

2.5 Proposed suite of goals

The goals proposed in this discussion paper have been formulated using this analytical framework. The proposed suite of goals for the sector is shown in figure 2.4. They encompass the three goals expressed in the trilemma, the objectives of the energy laws and AEMA, and the outcomes sought in the Finkel review. Within the grouping 'effective markets & regulation', the categories 'electricity networks' and 'gas' have been addressed in the goals as distinct categories. The rationale for the choice of each of these goals is detailed in the chapters specifically addressing that aspect of the sector.

Figure 2.4 Proposed suite of goals

Consumers <ul style="list-style-type: none"> • Efficient prices and affordability • Accessible information • Engagement and participation • Protection 			Social		
Integration of energy and emissions policies <ul style="list-style-type: none"> • Sustainable national emissions reduction strategy • Coordinated emissions reduction trajectory for the NEM • Credible long-term emissions reduction mechanism 			Environmental		
System security and reliability <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> System security <ul style="list-style-type: none"> • Resist frequency changes • Better frequency control • A stronger system • An adaptable & flexible system </td> <td style="width: 50%; vertical-align: top;"> Reliability <ul style="list-style-type: none"> • Efficient market-based approach • Appropriate intervention mechanisms </td> </tr> </table>			System security <ul style="list-style-type: none"> • Resist frequency changes • Better frequency control • A stronger system • An adaptable & flexible system 	Reliability <ul style="list-style-type: none"> • Efficient market-based approach • Appropriate intervention mechanisms 	Physics
System security <ul style="list-style-type: none"> • Resist frequency changes • Better frequency control • A stronger system • An adaptable & flexible system 	Reliability <ul style="list-style-type: none"> • Efficient market-based approach • Appropriate intervention mechanisms 				
Effective markets & regulation <ul style="list-style-type: none"> • Market participation • Transparent and efficient prices • Market reforms 	Electricity networks <ul style="list-style-type: none"> • Efficient regulation • An efficient platform for energy services 	Gas <ul style="list-style-type: none"> • Access to gas • Access to pipelines • Market information • Gas market reforms 	Economics		
Governance <ul style="list-style-type: none"> • Leadership and strategic direction • Role clarity and coordination • Responsiveness to market changes 			Management		

Overall the goals are considered a suitable basis for advice to Council as they meet the characteristics of effective goals, described earlier, of being:

- sufficiently detailed – balancing high level and detail
- comprehensive – covering the breadth of issues
- durable – resilient over time.

While the framework and goals are considered encompassing, they do not explain the many complex inter-relationships between issues. Understanding these links is critical to implementing successful policy, regulation and work-programs, and the subject of the next section.

3 The links between energy market issues

3.1 Introduction

As previously discussed, there are multiple goals for the energy industry, such as affordability, reliability and security, and emissions reductions. A way of categorising these goals, and relating them to one another, was proposed in the previous chapter.

It is important to recognise that these goals cannot all be fully achieved simultaneously. For example reliability could be augmented to a level where there would be no reliability shortfall under any circumstances, but that would jeopardise the achievement of affordability. Further, even if the proposed goals could be fully achieved simultaneously, finite industry resources means not all the goals could be concurrently achieved. Effective strategy therefore requires prioritisation of the individual goals.

The purpose of this chapter is to help stakeholders formulate their views about what Council's priorities should be, by examining the interdependencies between various goals for the sector. The chapter discusses the trade-offs between goals, as well as opportunities for sequential action. This provides a platform for recognising the constraints within which the strategic priorities can be designed.

The chapter describes the following inter-relationships:

- the electricity spot market and the contracts market
- power system reliability and security, and the electricity spot and contracts markets
- the energy market and the Renewable Energy Target
- the link between gas and electricity prices
- the energy market and demand response

3.2 The electricity wholesale spot market and the contracts market

In interconnected power systems, the amount of electricity being produced from multiple supply sources needs to continuously match the amount of electricity being consumed. Because of the need to co-ordinate supply and demand in real time, the mechanisms for buying and selling electricity at the wholesale level is divided into the following two parts:

- A **spot market**, which co-ordinates the operation of the power system.
- A **contracts market**, which pays for capacity, determines retailers' wholesale electricity purchase costs, and allows new investment to be financed.

An individual generator's revenues, and a retailer's costs, are determined by their net exposure to these two markets.

The wholesale spot market balances the physical supply of electricity and the demand for electricity every five minutes.²⁴ The balancing occurs in the central dispatch process where generators²⁵ offer capacity at different pricing levels for every five minute dispatch interval, and the price is set by the marginal generator. Prices can vary between a market cap of \$14,200/MWh and a market floor of -\$1,000/MWh. The spot price is the average of the dispatch-interval prices achieved over 30 minutes (i.e. the average price over six of the five minute dispatch intervals).²⁶

The uncertain and variable nature of spot prices introduces significant risks to generators and retailers. For generators, these risks arise from uncertain future revenues, while for retailers these risks are associated with uncertain costs while offering their customers fixed-price tariffs. These risks can be mitigated by either vertically integrating (forming a so-called 'gentailer') or by utilising the contracts market.

The contracts market serves the following four purposes:

1. It provides a mechanism for retailers and generators to manage their exposure to spot prices, by allowing participants to trade uncertain and variable spot market prices for fixed prices going forward.
2. On a short-term operational timescale (e.g. hourly), contracts provide certainty for participants allowing them to make decisions in the face of risky market conditions. Entering contracts incentivises generators to be available when needed in an operational timeframe, which provides certainty to investors that the value of their investments can be recouped, and therefore supports reliability. For example, a generator that is protected from low prices by a swap contract is more likely to be operational and fuelled to supply when needed.
3. It enables the financing of investment in generation capacity, and therefore facilitates the achievement of system reliability, further discussed in section 3.3. Contracts provide generators a steadier stream of income compared to taking spot exposure (see Box 3.1 for more details).
4. It underwrites retailers' fixed-price offers to end-consumers, such as households and small businesses. Contracts provide retailers with a consistent price for electricity, which in turn allows them to offer longer-term contracts, with stable prices, to their retail customers.

²⁴ For discussion of the central dispatch process, please refer to <http://www.aemc.gov.au/getattachment/87421838-5b24-4877-833f-f242fa51e234/Fact-sheet-How-the-spot-market-works.aspx>

²⁵ Scheduled loads also bid quantity and price information into the market, however most loads are unscheduled.

²⁶ Note the AEMC is currently considering a rule change to introduce a 5 minute settlement process, so that the dispatch and trading intervals would be the same duration.

Box 3.1**The types of hedge contracts available in the national electricity market**

Generators use hedging contracts to mitigate their revenue risk, pay for their capacity and finance their businesses. Revenue risk can be disaggregated into price risk (the chance of unexpectedly high or low prices), and volume risk (the chance of actual output differing from what is expected). There are three broad types of hedging contracts offered by generators and purchased by retailers:

1. Fixed-output hedges: these relate to a pre-specified quantity of electricity (in number of MWs). The most common forms of contracts are swaps and caps. Swaps are where a generator and retailer agree to set a strike price for this quantity for a given period. If the actual spot price is higher than the strike price, the generator (i.e. the swap seller) pays the retailer (i.e. the swap buyer) the difference between the spot price and the strike price. Conversely, if the spot price is lower than the strike price, then the retailer would pay the generator the shortfall.

For a cap, the generator will provide a given quantity of output for a fixed price when the spot price exceeds a specified amount (\$300/MWh is a common cap in the market). If the spot price is higher than the cap, the generator pays the difference to the buyer of the cap (the retailer), but no additional payments occur if the price remains below the cap level. A cap is therefore a form of insurance against high spot market prices for retailers and other buyers of caps. In return for providing this insurance, a retailer pays a premium to the generator, which finances the entry of 'peaking' generators such as hydro and open-cycle gas turbine plant.

2. Load-following hedges: in these contracts, the quantity of energy is not pre-specified. Instead, the amount of energy that is settled under the hedging contract depends on (or 'follows') the load of the buyer of the hedge contract. Any risk associated with uncertain demand, such as the reduction in demand due to a customer's increased reliance on their rooftop solar system, is transferred from the retailer to the generator. This type of contract is important for sustaining retail competition, as it mitigates the risks faced by a retailer in managing loads that are of an uncertain size.
3. Generation-following hedges: these contracts also do not pre-specify the quantity of energy under contract. Instead, the amount of energy that is settled under the contract depends on (or 'follows') the output of the seller of the contract. Any risk associated with uncertain output is transferred from the generator to the retailer.

The first two types of hedging contracts are 'firm', in the sense that the amount of generation output is either available when specified (fixed-output) or when needed by a customer (load-following).

All three types of hedge contracts mitigate generators and retailers' wholesale spot price risk by fixing the electricity price. For the parties to these contracts, their exposure to the spot price is explained by the price of the contract.

However, each type of hedging contract provides differing degrees of volume risk mitigation, and therefore revenue risk mitigation. The third type of hedging contract (generation-following hedge) provides the greatest revenue risk mitigation to a generator, as this type of hedging contract matches the generator's actual output. While this is beneficial to all types of generators, it is particularly so for generators with intermittent output. In contrast, conventional generators like coal, gas and hydro are able to offer firm contracts at a lower cost than intermittent generators, due to their dispatchability.

The predominant type of generation-following hedge is a power-purchase agreement (PPA).

The characteristic that makes the wholesale electricity market a "market" is the existence of multiple buyers and sellers of hedge contracts. As swaps and caps are cash-settled, the range of participants that can trade swaps and caps includes banks and others who do not have, or need to have, a physical electricity position. This feature of swaps and caps adds to the liquidity of the contracts market, which lowers the cost of mitigating the spot market risks faced by retailers.

In contrast, a PPA is physically settled: electricity is sold to the buyer of the PPA at the point of connection. The need to have a physical electricity position means that the range of parties that can supply PPAs is narrower than for swaps and caps. This reduces the liquidity of PPAs compared to that of swaps and caps.

An increasing share of intermittent generation in the generation mix is likely to lead to a reduction in contract market liquidity, as PPAs increasingly replace more liquid swaps and caps. This is likely to increase the cost to retailers of mitigating spot market risks, impacting both retail prices and the extent of competition in the retail market.

In contrast to firm hedge contracts, generation-following hedges create different incentives on generators to have their capacity available to the system when the system values it the most (i.e. during periods of high spot prices). These different incentives, and the consequences for system reliability, are discussed in Box 3.2.

To the extent a generator's position is hedged, that generator will be indifferent to the spot price in any particular dispatch interval. It does have an incentive to price its bids low enough to ensure its generation is dispatched (at least to a quantity matching its contracts). The generator may have an incentive to see spot prices high if a proportion of its generation is not contracted, or it is not contracted for a given dispatch or trading interval. Its ability to achieve a high price will then depend on whether it has market power; that is, its ability to influence prices will depend on the size of the generator's uncontracted position relative to the size of other generators' positions (contracted or uncontracted).

Vertical integration is an alternative or additional way for generators and retailers to manage their risk. To the extent a vertically integrated operator generates energy to meet its own demand, it has no net exposure to variability in the spot price. Major retailers now own approximately 50 per cent of the generation capacity in the national

electricity market.²⁷ Vertical integration provides a natural hedge against high spot prices, but also reduces the potential supply and trade of contracts in the market.

For retailers and other purchasers of wholesale electricity, two other ways to manage price risk are via demand response, and utilising generation behind the meter (e.g. via installing solar panels). In the context of managing price risk in the wholesale market, demand response involves customers changing their electricity usage in response to price signals in the wholesale market, by purchasing less electricity than originally desired when wholesale spot prices are high, and purchasing more electricity when prices are low. Demand response is discussed in more detail in section 3.6.

3.3 System security and reliability, and the electricity spot and contracts market

A further consequence of the change in the generation mix in the national electricity market relates to system security and reliability.

To achieve a reliable electricity system, the potential supply of electricity must be at least sufficient to meet demand, even as both fluctuate over time. From a short-term, operational perspective, it is not sufficient to just have supply meet demand, there also needs to be an adequate level of reserve over demand levels at a particular point in time in order to make sure that it is a secure system. This requires two conditions to be met:

- There must be adequate dispatchable capacity for supply to both meet demand, and provide some reserves. This can include both generation and demand response.
- There must be systems to make sure capacity is actually dispatched when needed.

Thermal generators have a number of characteristics that contribute to the maintenance of power system reliability and security.

First, they are dispatchable, meaning they can generate when required without being constrained by weather conditions which are typically harder to forecast than the types of constraints facing thermal generators.²⁸ This makes their output more predictable and therefore more reliable. In contrast, intermittent generation sources, such as wind and solar, are non-dispatchable. In other words, the availability of these technologies is largely not at the discretion of the party who controls them. Instead, generation is driven by the time of year, weather conditions and time of day.

Secondly, thermal generation can be synchronised to the frequency of the power system, and they have physical inertia provided by their large rotating masses. Both of these contribute to system security by helping to both maintain stable frequency and dampen the effects on frequency of any sudden imbalances in supply and demand.

²⁷ AER, *State of the Energy Market* report, 2017, p.47. The three largest retailers supply 70% of retail electricity customers, and their generation ownership has increased from 15 per cent in 2009 to 48 per cent in 2017.

²⁸ The availability of thermal generators is subject to maintenance schedules, outages and ramp rates (ie the period of notice required to commence generation). The availability of fuel is a further requirement.

Synchronous generators also assist with system strength, and therefore with maintaining voltage at appropriate levels.

Renewable generators do not have these characteristics inherently. Therefore as the generation mix changes with thermal generator retirements and growth in renewable generation, there is a requirement to ensure there are mechanisms for delivering system security and reliability where required. It is also important that these mechanisms are designed in a manner that delivers system security and reliability at the lowest long-term cost to consumers. Promoting market-based mechanisms where it is practicable, and having well-designed regulatory arrangements where it is not, can allow for the achievement of system security and reliability objectives at the lowest long-term cost to consumers.

The contract market and power system reliability

For markets to succeed in providing reliability there needs to be a framework in place to provide:

- incentives for efficient investment in, and operation of, both dispatchable and non-dispatchable energy resources
- information to guide investment and operation
- sufficient certainty for investment.

The buying and selling of electricity, as well as associated financial products, via contract and spot markets is the main mechanism through which reliability is delivered. Based on these market signals, market participants make investment, retirement and operational decisions. These markets create a financial incentive for adequate generation and demand-side resources to be built and dispatched. Prices in these markets provide information about the balance of supply and demand for electricity at different places and times. In particular, contract markets support investment in capacity, as well as providing incentives to be available when needed in an operational timeframe. In turn, this supports reliability, by providing certainty to investors that the value of their investments can be recouped.

The contract market has been an integral part of the national electricity market design since its inception and makes a major contribution to reliability. Unlike the spot price, the contract market does not directly drive dispatch. A liquid contract market promotes reliability in two ways. First, on an operational timescale (typically, hourly), contracts provide certainty for participants allowing them to make decisions in the face of risky market conditions. This affects their operational decisions to offer (or not offer) energy, or when to undertake maintenance. For example, a generator that is protected from low prices by a swap contract is more likely to be operational and fuelled to supply when needed. A highly stylised example is provided in Box 3.2, based on an hourly timescale.²⁹

Contracts can also underpin participants' ability to make short- or medium-term decisions with regard to making capacity available which go beyond its offers into the

²⁹ The example in Box 3.2 is adapted from Chapter 2 of AEMC, *Reliability Frameworks Review, Issues paper*, 22 August 2017.

wholesale market. For example, a generator protected through a swap may find it easier to enter into contracts for fuel.

Therefore, a second way in which a liquid contract market promotes reliability is by facilitating efficient generation investment and retirement decisions over longer timeframes (months and years) than for operational decisions. It does this by providing information on expected future market prices, and by providing a mechanism through which new generation can be financed.

Contract prices provide information about expected future spot prices, which in turn reflect participants' views of future wholesale market demand and supply conditions. These prices help inform existing and prospective investors about what are likely to be profitable and unprofitable decisions. For example, if spot prices are expected to be elevated for a large proportion of the year, this would translate to swap strike prices being relatively high, which would provide a signal that new capacity is likely to be profitable and efficient.

Furthermore, investors are often unwilling to provide finance to a generator unless contracts are used to hedge anticipated spot market exposures to at least a minimum extent. As discussed, hedging provides greater revenue certainty and thereby reduces the risk that a generator faces significantly positive or negative profits in any given year. This, in turn, makes investors more willing to provide funds at a lower cost to underwrite capacity.

The role of contracts in supporting investment is particularly important when conditions in the market are changing rapidly or otherwise more uncertain than usual. Observed or expected spot prices cannot translate into new capacity without some degree of confidence that these prices will be sustained long enough for investors to recoup the value of their investment. Contracting can provide this confidence by (for example) enabling investors in new generation capacity to 'lock in' a particular price for their generation.

Box 3.2 Role of contracting in promoting system reliability

A generator and smelter have entered into a swap for 1 MWh of electricity at hour t with a strike price of \$50/MWh. The generator takes two hours for its plant to turn on. Its marginal cost (including fuel) is \$30/MWh.

At hour $t - 2$, the generator forecasts, based on information from AEMO and its own expectations, that the spot price at hour t will be between \$20/MWh and \$90/MWh. If the generator is unavailable at hour t it will neither incur costs nor earn revenue from the spot market. However, it can expect a range of outcomes under the swap. At one end of the spectrum, if the spot price at hour t is \$20/MWh, it will receive \$30/MWh from the smelter (\$50-\$20) under the swap. The generator being unavailable to be dispatched is also an efficient outcome for the system as for this period the generator's marginal cost is greater than the spot price.

At the other end of the spectrum, if the spot price at hour t is \$90/MWh, is a payment by the generator to the smelter of \$40/MWh (\$90 - \$50). As the generator is not receiving spot revenue at this time, they will incur a loss.

If the generator decides, instead, to make itself available and makes an offer into the spot market that results in it being dispatched, it receives \$90/MWh in spot revenue, pays \$40/MWh to the smelter, and incurs \$30/MWh in operating costs. The generator therefore receives \$20/MWh in net revenue, which is used to pay the generator's fixed costs (which include a return on capital to its investors).

If the swap contract is the result of a competitive process between multiple buyers and sellers, the \$20/MWh represents the value to the system of the generator's capacity under the contract.

The higher the expected spot price, the stronger the incentive for the generator to have its capacity available and to offer a price into the spot market low enough to result in it being dispatched. If there is a tight demand-supply balance with very high spot prices, the generator faces very large losses if it is not generating.

Continuing the above example, but with the spot price at the market price cap (currently, \$14,200/MWh), the generator would have to pay \$14,150/MWh (\$14,200 - \$50) to the smelter under the swap contract. If the generator is not dispatched at this time, they face a loss of \$14,150 per hour for each MW of generation capacity. This equates to \$1.415 million per hour for a 100MW generator, and to \$7.075 million per hour for a 500MW generator. Losses of this magnitude would quickly bankrupt the generator.

The risk of facing large, potentially bankrupting losses incentivises generators to be dispatched and receive spot market revenue. In turn, this generator's output contributes to the reliability of the system at a time when the system most values that generation.

In these ways, the contract market supports reliability by enabling investment in, and operational decisions to provide, capacity to meet future demand.

Some commentators have questioned whether a centrally-planned market for capacity needs to supplement the design of the national electricity market in order to maintain system reliability. It is important to note that the contracts market is a capacity market.

Between 1998 and 2017, around 11,101 MWs of dispatchable thermal generation capacity was added to the NEM. This investment included new baseload stations (e.g. Kogan Creek) and expansions to existing baseload capacity (e.g. the Eraring Upgrade). However, the majority of this investment was in peaking and mid-merit capacity, given underinvestment in this type of capacity prior to the start of the NEM. This change in the generation mix was a move to a more economically efficient mix.

A key difference between the national electricity market and centrally-planned capacity 'markets' is that in the national electricity market the volume, type and cost of new investment is driven by competition between market participants, in meeting their customers' electricity demand. In contrast, in centrally-planned capacity 'markets', the volume and type of new investment is determined by a central authority based on its forecasts of future demand. It is a monopoly "contracting-out" model, in which taxpayers and consumers directly bear the cost of the inevitable errors that arise when future demand turns out to be different from the central authority's forecasts.

The Large-scale Renewable Energy Target has a central authority, the Commonwealth Government, determining the volume and type of new investment required under the scheme. This makes the scheme akin to a centrally-administered capacity market.

The role of the market operator

The statutory functions of AEMO in relation to the national electricity market are set out under section 49 of the National Electricity Law. These functions include to:

- operate and administer the wholesale exchange (i.e. the wholesale spot market)
- promote the development and improve the effectiveness of the operation and administration of the wholesale exchange
- maintain and improve power system security.

AEMO has very broad powers to enable it to maintain a secure power system (i.e. a system that operates within defined technical parameters).

The reliability of the system is largely driven by the decisions of market participants responding to economic incentives in a competitive wholesale and retail market.

AEMO issues publications which provide information to the market, over and above that conveyed by the contract and spot markets. The purpose of these publications is further discussed in chapter 6.

3.4 The energy market and the Renewable Energy Target

The Renewable Energy Target (RET) is a scheme to encourage additional generation from renewable sources. The target is for an additional 33,000GWh of electricity to come from renewable sources by 2020.³⁰

The Large-scale Renewable Energy Target (LRET) creates incentives for the production of renewable energy generation, such as wind and solar. Renewable generators receive Large-scale Generation Certificates (LGCs) for each MWh of electricity generated over a calendar year. The LGCs are then traded or sold to liable entities (usually retailers) that must purchase and surrender a specified number of certificates based on the quantity of energy they consume over the calendar year. The retailers pass the cost of the LRET on to consumers.³¹

Changes in economics, pricing and technical characteristics

The LRET has driven an increase in the quantity of renewable generation in the national electricity market. This generation has different economics and technical characteristics than traditional thermal generation such as coal and gas. Given the design of the LRET, this generation also has different pricing incentives.

The economics of renewable and non-renewable generators are different, which affects their ability to be dispatched ahead of coal and gas generators. As renewable generators have negligible short-run marginal costs, they bid in low values and thus

³⁰ In 2001 a Mandatory Renewable Energy Target of 9,500MWh by 2010 was set. The target was then increased to 41,000MWh by 2020. In 2012 this was split into a small scale renewable energy scheme (SSRES) and the large scale renewable energy target (LRET). In 2015, the target was reduced to 33,000MWh.

³¹ Retailers also have to purchase and surrender a volume of small scale technology certificates (STCs).

are dispatched ahead of coal and gas generators, which have higher short-run marginal costs. Prioritisation in dispatch for these generators is also assured by the nature of their generator classification, which is either 'semi-scheduled' or 'non-scheduled'. 'Semi-scheduled' means that their generation output can only be limited in response to network constraints; at all other times renewable generators can supply up to their maximum registered capacity regardless of prevailing wholesale spot prices or demand levels.³² A non-scheduled classification gives even greater prioritisation in dispatch.

LGCs are a material source of revenue for renewable generators that is additional to spot market revenue and unavailable to thermal generators.³³ This therefore reduces the revenue that renewable generators need to recover from the spot or contracts market. The revenue gained from certificates makes these generators less incentivised to incur the costs associated with firming and therefore to provide firm hedge contracts. In the absence of this certificate revenue, renewable generators would trade-off the costs of firming against the benefit of being able to earn a higher strike price under a firm contract than under a PPA. The strike prices in firm contracts are estimated to be around 25 per cent higher than PPA strike prices in South Australia over the next 20 years.³⁴

As explained in section 3.3, the operation of the spot and contracts market together create a direct link between a generator's incentive to have its capacity available and dispatchable when the system needs it most. As LGCs relate to electricity produced over a year, the link between the needs of a reliable power system and the incentives on generators financed from LGC revenue is broken.

Given the importance of 'firm' hedging contracts for the reliable supply of electricity, it is important to consider the potential impacts on generators' incentives to supply firm contracts when designing and evaluating alternative mechanisms to deliver on emissions reduction policy objectives. This is discussed further in chapter 5.

Market consequences

These differences in the economics, pricing incentives and technical characteristics of renewable generators have significant market consequences.

The LRET has driven an increase in the proportion of intermittent renewable generation in the national electricity market, by providing investment incentives additional to those coming from the electricity market (namely, the ability to earn revenues from selling certificates). This means the quantity, timing and location of investment based on the LRET may not be efficient as the certificate price, rather than wholesale electricity prices, has been signal for new investment. The consequent loss of

³² AEMO forecasts the output of renewable generators in the *Australian Wind Energy Forecasting System* and the *Australian Solar Energy Forecasting System*. Semi-scheduled generators are then required to bid a price for the quantities AEMO has forecast. If their price is less than the marginal generator, and there are no network constraints, then they can supply all of their generation output into the market.

³³ As at 11 August 2017, the LGC price was approximately \$85/MWh, see greenmarket.com.au/resources/lgc-market-prices

³⁴ See Box 6.3 from AEMC, *Reliability Frameworks Review, Issues paper*, 22 August 2017.

revenues for thermal generators has hastened generator retirements. With a reduction in the quantity of dispatchable generation, there has been a consequent reduction in the liquidity of firm hedging contracts, as fewer generators are available to offer such contracts. This has increased the price and reduced the availability of these types of contracts.

The increase in vertical integration between retailers and generators has further reduced contract availability, as the internal hedge that a 'gentailer' (i.e. a generator that owns a retailer) creates reduces their ability and incentive to offer contracts into the market.

For retailers that are not vertically integrated, the reduction in contract availability increases their exposure to the volatility of wholesale spot prices. This can put their competitiveness and viability at risk, and as such the reduced availability of contracts can reduce the level of retail competition in the market and raise barriers to market entry. Additionally, as gas prices have increased significantly recently, and gas generators regularly set the market price (as the marginal generator), the pressure on stand-alone retailers is material.

Some retailers are trying to manage risk exposure to high spot prices by identifying consumers willing to undertake demand response. Other ways to hedge exposure to high spot prices include retailers' utilising energy resources like battery storage and rooftop solar PV that are located behind a customer's meter. These initiatives have the potential to be cost-effective alternatives to purchasing firm hedge contracts.

The uncertainty over environmental policy, particularly after 2020 when the LRET becomes closed to new generation, is also discouraging investment in generation. Given the electricity sector's share of economy-wide emissions (around one-third), market participants expect the electricity sector to contribute to Australia's emissions reduction goals for 2030. However, uncertainty exists in relation to the identity, design and operation of a mechanism to reduce emissions in the electricity sector. This uncertainty is having a dampening effect on generation investment, is offsetting the signals for new investment coming from the increase in wholesale prices, and is likely to reduce the level of installed capacity required to deliver a reliable supply to consumers.

3.5 The role of gas in the energy market

Gas serves several roles in the Australian energy market. It is:

- a major export commodity
- a fuel source used by commercial and residential consumers
- an input fuel for electricity generation.

Gas-powered electricity generation has a high ability to ramp up or down (i.e. to vary output in a short timeframe). This makes it a useful complement to the variable output of renewable energy. Furthermore, like coal, gas generators are both dispatchable and synchronous, and therefore can contribute to the maintenance of power system security and consumer reliability. For these reasons, gas is seen as a fuel to aid the

transition from a system dominated by fossil fuel generation to one with a high penetration of renewables with storage.

The commencement of the LNG export industry, and the consequent increase in demand for gas from LNG facilities, coupled with restrictions on gas supply, has seen gas prices increase significantly for domestic users, including gas-powered electricity generators. The unexpectedly high demand for gas, and the muted supply response, has raised concerns about the availability of gas for domestic users and raised concerns about whether gas can play the above-mentioned 'transitional' role.

3.6 Demand response

Demand response involves customers – industrial, commercial and/or residential – changing their electricity usage in response to signals such as the spot price or the price of ancillary services.

Demand response potentially serves an important function in the energy sector; it provides an opportunity for meeting electricity demand through the lowest cost combinations of demand and supply options. Other demand side participation options enable typically larger consumers to use their load in a way that maximises its commercial value.

There are currently low levels of demand response in the national electricity market in comparison to load that is potentially price responsive. Currently approximately 235 MW of demand response is under contract to retailers and 310 MW contracted to specialist demand side management companies.³⁵ It is estimated that up to 2,000 MW of load in the national electricity market is price responsive. A recent ARENA request for information found that, in terms of demand response capacity, by 1 December 2018 1939 MW (excluding diesel) could be provided. In terms of the customer types with price responsive loads, respondents were relatively evenly spread across industrial (30%), commercial (20%) and residential (35%).

Technological, market and regulatory developments, and innovation by demand side management providers over the past decade have made it easier for consumers adapt their consumption patterns and so have facilitated a potential future uplift in demand response. Opportunities arise from:³⁶

- **Automated home energy management systems** - can reduce load in homes in a way that goes largely unnoticed by the customer.
- **Price signals** - either in the form of cost-reflective retail pricing or direct incentives (such as rebates) that encourage customers to shift energy use away from peak times.

³⁵ <http://www.aemc.gov.au/getattachment/ea3b6214-a288-460d-90a6-07985a9ea0cf/Oakley-Greenwood-Survey-Report.aspx>

³⁶ Reforms flowing from the AEMC's *Power of choice review* have laid foundations for an energy system where more engaged and better informed energy shoppers have greater access to new products and services like solar, storage, electric vehicles and smarter consumption management. Key reforms include new rules to support competition in metering and cost-reflective prices.

- **Incentives** – where appropriately set can facilitate commercial and industrial users to voluntarily reduce load as an alternative to involuntary load shedding to address lack of reserve conditions.

There are four different types of demand response: ancillary services demand response; network demand response; reliability demand response; and wholesale demand response.

Ancillary services demand response

Demand response can be used to provide the Frequency Control Ancillary Services (FCAS) that AEMO uses for maintaining system frequency within the bounds specified by the frequency operating standards.³⁷ From 1 July 2017, a new type of market participant was established in the Rules – a market ancillary service provider – to offer customers’ loads into the FCAS markets. All loads will be eligible to be used for ancillary services. The market bodies are also considering how demand response could provide fast frequency response services to support the power systems security.

Network demand response

Network demand response involves demand that responds to network prices, used to increase network capacity utilisation and manage peak demand within a transmission or distribution network. Network service providers now have a wider range of non-network solutions compared to the traditional network options. When peak demand may exceed the network capacity, consumers can reduce their demand so the resulting lower demand can be accommodated within the existing network capacity. If sustainable, this mechanism can in some cases avoid the costs of increasing network capacity. There is a geographic element to network demand response i.e. in order for demand response to be successful at managing peak demand, it needs to be located in the right part of the network.

There are a number of examples under the current regulatory framework where demand response is being used for network demand response, most notably Reposit’s energy management software, as well as the deX platform for the trading of decentralised energy resources.

Reliability demand response

Demand response can be employed as an emergency lever during supply shortfalls, dispatched to avoid involuntary load shedding and rolling blackouts. The current National Electricity Rules allow for reliability demand response; demand response providers can participate in the Reliability and Emergency Reserve Trader (RERT) mechanism. Nonetheless considerable work, including an AEMO/ARENA pilot program, is underway to examine the relative cost-effectiveness and potential use of demand response compared with involuntary load shedding.³⁸

³⁷ Both under normal operating conditions and/or to restore frequency following a contingency event such as loss of a major generating unit or transmission line.

³⁸ To illustrate, in South Australia on 8 February 2017, AEMO requested 100 MW of load shedding to address a demand/supply imbalance during a heatwave. In NSW on 10 February 2017, AEMO requested 290 MW be shed from the Tomago aluminium smelter. These two instances of load shedding represented 3.2 per cent and 2 per cent of peak demand respectively in those states on

Wholesale and retail demand response

Wholesale demand response is demand response used to avoid buying electricity when the wholesale spot prices are high. Recently there has been increasing focus on how to better incorporate renewable, intermittent generation into the power system. Better incorporation of the demand-side could help address the variability of these generation sources and any potential (or perceived) reliability problems in the national electricity market. Such issues, including a wholesale demand response mechanism, are being considered by the AEMC through the *Reliability frameworks review*.³⁹

One way that wholesale demand response can occur is by a market participant becoming a scheduled or a non-scheduled load in the spot market. They would then have direct exposure to the spot price. If spot prices were high, their spot price exposure could be reduced by reducing their consumption, thereby providing demand response at the wholesale level. If the participant's spot price exposure was largely covered by a hedge contract, then when the spot price is above the value of energy to them, they could make more money by curtailing their consumption and retaining the contract payments.

A way to provide demand response at the retail level is by a customer choosing to be exposed to the wholesale spot price through their retail contract. For example, a retail contract may include a wholesale spot price pass-through arrangement. This exposure is then managed either by the customer or by the retailer. For example, a customer may engage energy management experts to manage the customer's spot price exposure.

Another, albeit weaker, form of retail demand response is for a customer to be on a time-of-use tariff with the retailer. Under this option, customers are incentivised to shift their load from peak (high price) time periods to off-peak (lower price) periods. This form of demand response is weaker as the retail price under the contract does not vary as much as wholesale spot prices. For example, the 'peak period' under a time-of-use tariff is typically for a few hours, with the retail price the same during the duration of the peak period. This weaker price signal reduces the incentive on customers to shift their load and thereby provide demand response, compared to the incentive to provide demand response under a retail contract that provides wholesale spot price exposure.

those days. Demand response would allow certain consumers, rather than central planners, to compare the cost of reducing their electricity usage against the financial benefit of doing so.

³⁹ <http://www.aemc.gov.au/Rule-Changes/Demand-Response-Mechanism>. In 2016 the Commission considered rule change request in relation to a wholesale demand response mechanism. In its determination, the Commission expressed the view that there are no regulatory barriers preventing customers from contracting with retailers or specialist providers, via their retail contract, to provide demand response. In the final determination, the Commission acknowledged that there may be commercial reasons that complicate access to demand response for some consumers, but implementing a market-wide mechanism in the Rules, at considerable cost to all consumers, is not the appropriate vehicle to address these reasons, nor would it encourage an efficient level of demand response.

4 Consumer

Energy is at the core of economic and social activity in all industrialised countries. It is an important input into the prices of goods and services paid by consumers, both large and small. Increasing energy prices negatively impact on consumers through higher energy bills, and higher prices for goods and services.

In Australia, energy is an important input for commercial and industrial users, who account for around 87 per cent of final energy consumption. Changes in energy prices impact the costs of all industry sectors including international exposed industries such as agriculture, mining, and manufacturing. High energy prices adversely affect Australia's competitiveness on international markets, reduce its gross domestic product and can reduce employment.

New technologies are giving consumers a broader set of options for meeting their energy needs. In addition to the traditional supply of energy services, consumers can now:

- generate their own electricity through solar PV
- manage their consumption with smart devices and storage
- sell excess energy
- understand and control their energy generation and consumption via mobile apps and digital interfaces.

While these developments are significant, it is the case that not all consumers are equally able or interested in actively participating in the energy markets. Commercial, industrial and residential consumers can have significantly different requirements and willingness to engage or participate. The industry must accommodate this breadth of consumer interests and requirements.

This chapter sets out:

- **Goals** - proposed outcomes for this area of the energy sector.
- **Initiatives and work programs** - a summary of the key initiatives and work programs currently underway, or recommended, to achieve the proposed goals (including the Finkel review's recommendations).
- **Measuring progress** - the proposed metrics and reports that will enable progress towards the achievement of the goal to be measured and reported over time.

We invite stakeholder comment on all of these aspects, as well as their sequencing and prioritisation.

Box 4.1 Goals

For consumers there are four key goals that, if achieved, would deliver on meeting consumer requirements and expectations. These are:

- **efficient prices and affordability**
- **accessible information**
- **engagement and participation**
- **protections.**

4.1 Efficient price outcomes and affordability

Affordability reflects the social importance of having essential services that are available to all consumers.

In terms of delivering consumer outcomes, it is important to distinguish between:

- efficient price outcomes that reflect the cost to the economy of supplying energy
- additional initiatives to deliver on affordability.

Importantly, if prices are not efficient, then general measures to improve efficiency will also improve affordability. While the concepts differ they are related.

Efficient price outcomes

Consumers will achieve **efficient price outcomes** when:

- they are informed and enabled to make the most efficient service and price decisions
- when competitive markets operate effectively and the regulation of non-competitive services is efficient.

In order for consumers to make the best service and pricing decisions they must have accessible information that is appropriate and useful to making the best choices as to their service, supplier, and plan. The best choice may not be the lowest headline price if the price is dependent on a consumer paying their bill on time but the consumer does not always do so. These issues are discussed further in the following section on *Accessible information*.

The primary means of delivering best price outcomes for consumers is through the interaction of competitive markets, and efficient regulation of non-competitive services.

The national electricity market was designed to allow competitive processes to be the primary method of delivering service outcomes to consumers. Specifically:

- The wholesale market relies on a competitive industry structure on both the demand and supply side and effective contract and spot markets.

- The retail market relies on low barriers to entry and competitors offering services and pricing to attract or retain consumers.
- Competitive markets for new energy services⁴⁰ include:
 - smart appliance and home automation providers, such as Telstra, Google, Apple
 - solar PV suppliers
 - storage providers, such as battery makers Tesla or Sonnen, or electric vehicle suppliers (which can be considered as mobile storage)
 - energy service managers, such as Reposit or Habidapt.

Issues associated with markets, and initiatives underway to improve the efficiency of markets, are discussed in the *Effective markets* section of this paper.

In areas where competition does not exist, such as in networks, the achievement of best price outcomes for consumers depends on efficient regulation. Such regulation aims to approximate the outcomes that would occur in a competitive market, in terms of returns to investors and outcomes for customers.

Issues associated with network regulation are discussed in the *Networks* section of this paper.

Affordability

Affordability usually refers to the price of a good or service being low, or that the good or service is within the financial means of a consumer. It is therefore a term that relies on value judgements as to the appropriate level of pricing, or the level of pricing that is within consumers' financial means. Affordability needs to be distinguished from efficient pricing outcomes as it is the case that, for some consumers, even if prices are efficient they may not be affordable.

Recent increases in energy prices have increased the focus on services affordability.

On 1 July 2017, large increases in retail electricity *standing offer*⁴¹ prices came into effect in a number of states. For customers of the Big 3 retailers this meant consumer bill increases:

- in the range of 15 to 21 per cent in New South Wales
- in the range of 16 to 21 per cent in South Australia
- between 4 to 9 per cent in Queensland.

In Victoria, while most retailers announced standing offer price increases in January 2017 of around 10 per cent, there were no further increases in standing offer prices in 1 July 2017 announced by either the Big 3 retailers or the vertically-integrated retailers Simply and Lumo/Red Energy. There were, however, very large increases in standing

⁴⁰ New energy services refer to a broad range of products and services that are additional to the traditional electricity supply model. They include a broad range of products and services related to distributed energy resources, IT services and digital interaction channels.

⁴¹ Retailers are required to offer standing offers to consumers. These are generally higher priced offers from which retailers discount for their more competitive market offers.

offer rates announced by a number of the second tier retailers with more limited or no generation assets, with price rises ranging from 3 to 43 per cent across these retailers.

The reasons for these price increases are discussed in the *Efficient markets* section of the paper.

Industry analysis indicates that not all consumers are on the best deal for their circumstances.⁴² While this paper distinguishes between the concepts of best pricing outcomes from market mechanisms and affordability, that distinction does not translate clearly at a consumer level. For example a consumer who has difficulty paying their bill may be on the wrong plan for their circumstances, and not know about concession or assistance programs they are eligible for. The issues associated with consumers on the wrong plans and related to the awareness of affordability programs are discussed in the *Accessible information* section of this document.

There are multiple dimensions to the issue of affordability.

- Some consumers are not on the optimum pricing plan for their circumstances and either need better information to make better decisions, or assistance in switching to the most appropriate plan.⁴³
- Some consumers are not aware of energy concession schemes that they are eligible for, while other may be embarrassed to ask for assistance. The issue of awareness is also complicated by the fact that concession schemes are available from the Commonwealth and jurisdictions. While various social organisations assist consumers in navigating this territory, not all vulnerable consumers seek assistance from these organisations.
- Some consumers who are beneficiaries of energy concession schemes may not need them. For example around four in ten of the “financially secure retired” segment may be accessing rebates on their energy bills.

This indicates the need for increased awareness and better targeting of concession schemes.

A further issue identified is that the cost savings from energy efficiency or distributed energy resources are potentially not available to lower income groups, most particularly if there are large up-front costs associated with obtaining such benefits. As lower income groups could benefit greatly from such initiatives it suggests there is benefit in developing or improving programs to help low income consumers access these benefits.

In relation to affordability, there are a number of initiatives that are underway or recommended.

The Finkel review made a number of recommendations related to affordability. These were subsequently endorsed by Council, and included:

⁴² For example, see AEMC, *2017 Retail Competition Review*

⁴³ For example, research conducted by the AEMC in 2016 found some consumers in the middle income segment miss on average 2.7 bill payments a year. These consumers do not receive conditional discounts dependent on paying on time, and their bill may therefore be close to a standing offer rather than reflecting the savings available from market offers.

- Relevant portfolio areas, and with state, territory and local governments, should identify opportunities for low income consumers to access
 - distributed energy resources and improvements in energy efficiency
 - subsidised funding mechanisms for the supply of energy efficient appliances, rooftop solar photovoltaic and battery storage systems.
- Governments should accelerate the roll out of broader energy efficiency measures.

The AEMC has also recommended:⁴⁴

- Retailers, jurisdictions and consumer advocates work to transition vulnerable consumers away from higher priced standing offers or market offers with expired fixed benefit periods.
- Jurisdictions review the application of their energy concession schemes to improve awareness of energy concession schemes among different consumer segments.

The preceding discussion focused on small business and residential consumers. However affordable energy services are also a key input to industrial and commercial consumers, most particularly for businesses whose energy costs represent a large proportion of their overall cost base. Some of these businesses, such as the Portland aluminium smelter, have received assistance with energy affordability based on an assessment of the broader economic benefits associated with their operations. Although these arrangements do reduce energy costs for the assisted businesses these policies are more related to industry policy than energy policy, and they are not discussed in this paper.

4.2 Accessible information

Consumer choices about how to participate in the energy markets are becoming more complicated due to an increasing number of retailers, a broadening range of offers, and an expanding set of options for self-supply of generation and active consumption management. In order to make good choices, consumers need:

- awareness about the savings that can be achieved in the market by shopping around or modifying their consumption behaviour
- clear information in accessible forms on their energy options.

In relation to the awareness of savings that can be achieved in the market, a range of analyses indicate consumers can achieve significant benefits by switching plan or supplier, but that many consumers do not actively or regularly choose their plan or retailer.

- The AEMC's 2017 Retail competition review found publically available discounts range from 12 to 38 per cent (or \$170 to \$507) for electricity and 5 to 30 per cent or

⁴⁴ AEMC 2017 Retail Competition Review, recommendations 5 and 6.

(\$44 to \$285) for gas.⁴⁵ The AER has made similar findings.⁴⁶ Retailers have also noted that there may even be higher discounts available than those that are publicly listed on comparator websites.

- Around 50 per cent of consumers have not switched retailer or energy plan in the past five years.⁴⁷ Market offer benefit periods typically apply for around 12 months from when consumers sign up with a retailer, whereas most consumers generally stay with their retailer for longer periods.

In relation to the availability of clear information in accessible forms to consumers on their energy options, there are multiple layers to consider.

Consumers in competitive markets can choose from hundreds of offers, depending on their fuel use (electricity only or dual fuel), their preferred structure of pricing (e.g. flat rate, block, time of use), whether they interact online, whether they choose green options, or whether they have solar PV, among other factors. To determine their best option, consumers need to be aware of the possible benefits and motivated enough to work through the large number of options. This can be a daunting task, which consumer research suggests is further complicated by the confusing array of terms used in the industry (e.g. kWh, different tariff structure descriptions).

A large proportion of the industry currently markets offers on the basis of discount percentages that consumers can achieve. The difficulty for consumers is that these discounts are referenced from each retailer's standing offer rates, and as such do not provide a consistent basis for comparison. This means that larger discounts do not always translate into cheap bill outcomes for consumers. It is also the case that the discounts can be conditional on certain factors, such as paying on time or receiving online bills. If the conditions are not met, then the impact on consumer bills can be material. This type of marketing contributes to the difficulty consumers have in comparing offers, and contributes to the number of customers that do not regularly shop around for better deals.

There are a number of tools available to consumers to compare offers, including the AER's Energy Made Easy, the Victorian Government's Victorian Energy Compare, and commercial comparison sites. Consumers trust and use the government websites when they know about them, but awareness of the websites remains low. Consumers have a higher level of awareness of commercial comparison sites, but have expressed scepticism about whether these sites receive "kickbacks" and include all offers in the market.

It is the case that most market offers are in place for one year, but consumers stay with their retailer for significantly longer periods. Communication with consumers at the end of their contract period does not always clearly explain the change in the consumers' plan that will occur at expiry. The observed risk is that at the expiry of their original contract many customers transition to a market offer that is not the best offer for their circumstances.

⁴⁵ These discounts are based on moving from an average standing offer to the best market offer available in each relevant jurisdictional distribution area as at January/February 2017.

⁴⁶ AER, *State of the Energy Market*, May 2017, p.147

⁴⁷ AEMC, *2017 Retail Competition Review*, pii

Beyond these retail pricing issues, consumers have new information requirements in relation to their new energy options, these include: energy efficiency options, efficient appliance options and programs, energy management software, and the costs and capabilities of distributed energy resources. While there is information available on these choices, in particular in relation to the commercial options consumers have, more broadly available information may assist a broader range of consumers make good energy choices.

One critical source of information for consumers is access to their metering data. This data can inform their decisions about the right pricing plan to be on in addition to helping them manage their consumption efficiently and invest in efficiency initiatives or distributed energy resources. This data will be particularly valuable with the introduction of cost reflective network prices in December 2017. Although metering data is available today, the processes and format of data can vary and it is not easy for consumers to share the data with other retailers or energy services providers. Streamlining the processes enabling metering data availability will benefit consumers.

Finally, it is also the case that with the right information and market incentives large and small consumers can more actively participate in the market, through initiatives like demand response or peer-to-peer trading.

In relation to consumer information there are a number of initiatives underway or recommended.

The following Finkel review recommendations have been endorsed by Council.

- The Australian Competition and Consumer Commission (ACCC) should make recommendations on improving the transparency and clarity of electricity retail prices to make it easier for customers to:
 - understand and compare prices
 - be aware when the terms of their offer change or their discounts expire
 - make more informed decisions about investing in rooftop solar photovoltaic, batteries or energy efficiency measures.

The ACCC should also consider whether the Australian Energy Regulator requires further powers to collect and publish and share retail price data. The ACCC's initial report is due in September 2017.

- The Energy Security Board's annual Health of the national electricity market report should include the impact of changes in the market on the price and availability of long-term retail contracts for commercial and industrial customers.
- By mid-2020, Council should facilitate measures to remove complexities and improve consumers' access to, and rights to share, their energy data.

The AEMC has also recommended:

- The ECA and jurisdictions develop a broad information campaign to support consumer awareness and confidence in the options that are available to manage energy bills.
- The AER is resourced to run an effective awareness campaign of their Energy Made Easy website and to maintain and develop the site.

- The AER consider opportunities to improve the information provided by retailers to consumers for comparing market offers, and the transparency of information provided to consumers at the expiry of the fixed benefit period in market offers.
- As a priority, retailers, the ECA and distributors make it easier and faster for consumers to access their metering data, including by having streamlined information requirements from consumers.

The Commonwealth also met with retailers on the 9th and 30th August 2017 to explore how retailers could undertake action to improve electricity pricing outcomes for consumers. The outcomes of these meetings have indicated that retailers will be required to:

- Contact customers on expired discounts and tell them how much they can save on a better deal. This will be supported by a change to the national electricity rules requiring companies to inform customers when their discount benefits end, setting out the dollar impact of doing nothing.
- Report on actions to get families on a better deal and the number on expired deals.
- Develop simple, plain English, fact sheets with understandable comparison rates.
- Ensure consumers on hardship programs do not lose benefits or discounts for late payment.

4.3 Engagement and participation

Consumer preferences and expectations are changing in line with technological changes. These allow consumers more options and greater flexibility in how they engage with and participate in the energy market.

In terms of engagement there are varying layers of consumer interaction, in addition to any actions taken to inform their energy choices. Many retailers and energy service providers are providing digital platforms, online capabilities and mobile apps to provide consumers with broader choices in how they engage with the market. These options are in addition to the traditional physical and telephony methods of interaction. For consumers, digital interactions may be simply a choice of convenience, but it may also provide valuable information (such as usage data) that improves their ability to manage their energy use. Importantly however, digital platforms and services also give retailers the opportunity to engage more regularly and in ways more tailored to the individual consumer (e.g. regular energy efficiency tips, special offers on products and services, online billing or account queries).

There are also more opportunities for consumers to participate -- to a greater or lesser extent -- in the energy market, as shown in the following table.

In relation to engagement and participation there are a number of initiatives underway and recommendations.

The Finkel review recommended, and Council agreed, that the AEMC will propose a mechanism that facilitates demand response in the wholesale energy market by mid-2018. While this will potentially enable consumers to benefit from their generation and

storage technologies, there are additional opportunities for demand response including in relation to ancillary services, networks and reliability. These are all potentially beneficial to consumers.

Various jurisdictions also have incentive programs to encourage appliance replacements (e.g. hot water replacement rebates, fridge replacement programs) or the uptake of solar PV through feed-in-tariff payments (noting that the more generous of these have been or are being phased out).

4.4 Protection

A strong consumer protections framework is important in fostering and developing trust and confidence in competitive markets. Where consumer protections enhance the trust that consumers have in markets, consumer participation increases.

The main mechanism of consumer protection in the national electricity market is the National Energy Customer Framework (NECF). The NECF:⁴⁸

- Establishes the consumer protections and obligations regarding the sale and supply of electricity and natural gas to consumers, with a particular focus on residential and small customers.
- Defines the rights, obligations and protections relating to the relationship between customers, energy retailers and energy distributors.
- Complements and operates alongside the generic consumer protections in the Australian Consumer Law⁴⁹, and state and territory safety and concession regimes.

The main types of consumer protections provided under the NECF are:

- Energy as an 'essential service': for example, the right to access energy services, the ability to enter into a retail contract and obligations towards life support customers.
- Empowering consumers: for example, retailers and distributors must inform consumers of their risks and rights, including through: informed consent requirements, requiring businesses to have dispute resolution procedures and mandating access to free and independent dispute resolution schemes.
- Minimum standards: for example, pre-contractual duties of retailers and the requirement to give notice to customers of any variation in tariffs and charges.
- Billing, tariffs and payment: for example, minimum requirements regarding the contents of bills, notification requirements on tariffs and charges applicable to

⁴⁸ The NECF currently applies, with jurisdictional specific amendments, in Queensland, New South Wales, South Australia, Tasmania and the Australian Capital Territory. The NECF only applies in a limited manner in Victoria.

⁴⁹ The ACL offers protections for consumers in the areas of consumer rights when buying goods and services, product safety, unsolicited consumer agreements including direct marketing, unfair contract terms law, and enforcement remedies amongst others. The ACL prohibits misleading, deceptive and unconscionable conduct.

consumers, obligations in relation to overcharging and undercharging and payment methods.

- Vulnerable customers: for example, retailers must have hardship policies and payment plans.

Since the NECF was developed the energy market has undergone significant transformation due to new technology, innovation in products and services, and changes in consumer preferences. The evolving nature of the market and the technology changes provide an opportunity to consider whether or not the existing energy specific consumer protection framework should continue to apply, what needs to be amended, and what could be removed.

The NECF was developed when retail energy markets were being opened up to competition and reflected the view that all consumers would be supplied through the interconnected electricity system, supported by a retail contract. However the market has developed significantly since then and there are a number of issues related to consumer protections.

The increasing range of energy services and consumer options have implications for how consumers participate in the market, the information required to make informed choices and how they are protected. In August 2016, the Council released a consultation paper on what consumer protections should apply to behind-the-meter products and services (i.e. distributed energy resources). Council also published a consultation paper on stand-alone energy systems and the potential consumer protections required for those systems. This analysis and any requirements for reform need to be finalised to enable consumer protections to cover the range of new and emerging products and services.

Embedded networks have experienced strong growth in recent years, and this growth is likely to continue. Customers of these networks do not have access to competitive retail market offers and the same consumer protections that apply under the NECF. This is currently being examined in an AEMC review.

The NECF does not apply consistently across all jurisdictions. The risk for consumers is that jurisdictional specific arrangements add costs to retailers and this contributes to higher consumer prices. Such arrangements can also act as a barrier to entry for smaller retailers in some markets. There is potential benefit to consumers in a harmonisation of consumer protection requirements across jurisdictions.

In relation to consumer protections, there are a number of initiatives underway and recommended:

- The AEMC has recommended that jurisdictions harmonise their customer protection arrangements to reduce barriers to entry and costs for retailers, and that Council ask the AEMC to provide advice on the existing suite of modifications that have been made by jurisdictions to the NECF and the differences between NECF jurisdictions and Victoria. An assessment of the costs associated with diverging consumer protection schemes in different jurisdictions could be provided as part of that assessment.

- The AEMC is also progressing a rule change (proposed by the AER) on strengthening protections for customers with life support equipment. This is due for completion in December 2017.
- The Finkel review recommended that Council should accelerate its work on applying consumer protections under the National Energy Retail Law and the National Energy Retail Rules to new energy services, and also consider safety issues as part of that work. One particular aspect of safety that was noted in the Finkel report concerns standards for the installation of batteries. Given the anticipated rapid growth in battery take-up by consumers, such standards are required. Standards Australia is currently examining the issue and has released a draft voluntary standard for public consultation until 15 August 2017. This is consistent with the AEMC's recommendation for Council to continue to consider how the NECF can be reformed given the diversity of new retailers, service providers and product and service offering available in the retail energy market.
- The AEMC's embedded networks review will release a draft in September and a final report in November 2017.
- A further rule change is also underway considering alternatives to grid supplied network services, including the implications for consumers. This work is scheduled for completion in December 2017.
- Another rule change has been proposed by the Minister requiring retailers to provide notification to consumers at the end of their benefit period, to ensure customers are aware of the change to their service pricing.

4.5 Measuring progress

Reports

There are a number of one-off and regular reports that will enable progress towards the achievement of the consumer goals to be measured over time.

- In terms of one off inquiries, the Finkel review has just reported, and the ACCC inquiry into electricity supply and prices is due to provide a preliminary report on 27 September 2017 and a final report by 30 June 2018. The ACCC will provide advice on measures to improve consumer pricing outcomes.
- The Finkel review also recommended the ESB should provide an annual Health of the national electricity market report to Council reporting on affordability issues.
- There are a range of regular reports on consumer outcomes and pricing, including:
 - The AER provides quarterly updates and annual retail energy market performance reporting⁵⁰, which includes monitoring on a range of indicators including: customer numbers; contract types; complaints; energy

⁵⁰ Australian Energy Regulator, 2017, <https://www.aer.gov.au/retail-markets/performance-reporting>

debt; payment plans; hardship programs; disconnections and reconnections.

- The AER provides an annual State of the Energy Market report⁵¹ which provides a market overview and the trends and issues in the electricity and gas industries.
 - The AEMC's annual retail competition review (last published in July 2017).
 - The AEMC's annual residential price trends report (published in Q4).
 - The Essential Services Commission of Victoria publishes an annual Victorian Energy Market Report⁵² in Q3 that covers retail prices for electricity and gas for the year ending 30 June, and the performance of Victorian energy retailers and distributors.
 - The NSW Independent Pricing and Regulatory Tribunal (IPART) provide an annual report in Q4, Monitoring the NSW retail electricity market⁵³, that looks at the performance and competitiveness of the retail electricity market in NSW.
 - The Essential Services Commission of South Australia publishes an annual report in Q3, Energy retail offer prices in South Australia⁵⁴, which looks at the electricity and gas standing and market offer prices that were generally available to small customers in the previous financial year.
 - The Queensland Competition Authority (QCA) provides a Market monitoring report⁵⁵ by October on the retail electricity market in South East Queensland.
 - The Office of the Tasmanian Energy Regulator provides a 6 monthly report, Standing offer energy prices⁵⁶, comparing electricity and gas standing offers in each jurisdiction.
- There are also a range of reports produced by consumer and social organisations that contribute additional perspectives on the operation of the market and outcomes for consumers.

51 Australian Energy Regulator, May 2017, <https://www.aer.gov.au/publications/state-of-the-energy-market-reports>

52 Essential Services Commission 2017, <http://www.esc.vic.gov.au/project/energy/36572-victorian-energy-market-report-2015-16>

53 Independent Pricing and Regulatory Tribunal of New South Wales, Review of the performance and competitiveness of the retail electricity market in NSW, from 1 July 2015 to 30 June 2016, November 2016

54 Essential Services Commission of South Australia, 2017, <http://www.escosa.sa.gov.au/industry/electricity/reporting-compliance/energy-retail-offer-prices>

55 Queensland Competition Authority 2017, <http://www.qca.org.au/Electricity/Consumer/Market-Monitoring/In-Progress/Market-Monitoring-Report>

56 Office of the Tasmanian Economic Regulator 2017, <http://www.energyregulator.tas.gov.au/domino/otter.nsf/8f46477f11c891c7ca256c4b001b41f2/db69ef3e7e82500fca2575d60007ebb9?OpenDocument>

Metrics

Metrics that inform whether progress is being made towards the achievement of the consumer goals are as follows.

Best pricing metrics

- Household energy spend, and spend as a percentage of household disposable income.
- Changes in the cost components that contribute to retail pricing, including nominal and real price changes for wholesale, networks and green schemes over time.

Affordability measures

- Assistance measures: the number of consumers receiving assistance, and value of assistance provided by Commonwealth and State/Territory assistance schemes by consumer segment.
- Disconnections by jurisdiction.

Protection measures

- Ombudsman data on number and type of issues.

4.6 Summary of consumer goals and initiatives

Goals	Initiatives	Programs and recommendations	12 months 31-Dec-18	24 months 31-Dec-19	36 months 31-Dec-20
Efficient price outcomes and affordability	Efficient price outcomes	Delivered by effective market outcomes and network regulation			
	Affordability	<p>Government actions:</p> <p>Review the application of energy concession schemes and improve awareness of energy concession schemes</p> <p>Transition vulnerable consumers away from higher priced standing offers and expired fixed benefit market offers</p> <p>Require retailers to report on action to improve customer affordability</p>			
Accessible information	Awareness of potential savings	<p>Develop a broad information program on consumer awareness and options to manage energy bills</p> <p>Retailers to provide understandable comparison rates and inform customers on expired discounts how much they can save.</p>			
	Clear information on prices and contracts	<p>Improve the clarity of customer information on pricing offers, and what happens when their contracts expire</p> <p>The Health of the NEM report to include price and availability of long-</p>	end 2017		

Goals	Initiatives	Programs and recommendations	12 months	24 months	36 months
		term retail contracts for commercial and industrial customers			
		Resource the AER to run an effective awareness campaign and maintain the use of Energy Made Easy			
	Access to metering data	Improve consumers' access to, and rights to share, their energy data			mid 2020
Engagement and participation	Ability to participate in the market (e.g. distributed energy resources, demand side participation, peer-to-peer trading)	Facilitate consumer participation in the market via demand response opportunities	mid 2018		
	Government incentives and programs (e.g. appliance replacement, energy saving schemes)	Jurisdictional programs for energy savings and efficient appliances Measures will be collated and reported with the National Energy Productivity Plan.			
Protections	NECF and Australian Consumer Law	Harmonise energy consumer protection arrangements across the national electricity market		mid 2019	
		Council has agreed to extend the NECF or otherwise protect consumers dealing with new energy service providers and new product/service offerings, including embedded networks	mid 2018		
		Strengthen protections for customers with life support equipment	end 2017		

5 Integration of energy and emissions policies

Australia has committed to reducing its emissions by 26-28 per cent on 2005 levels by 2030.⁵⁷ As the wholesale electricity generation sector accounts for around one-third of Australia's emissions, meeting our emissions reduction commitments at the lowest possible cost will involve reducing emissions in the electricity sector. Therefore, energy policy and emissions reduction policy are linked.

Mechanisms to reduce electricity sector emissions need to be designed in a manner that aligns and integrates with the design of the national electricity market in order for both these policy objectives to be met at the lowest long-run cost to consumers.

There are a number of policy design principles that should be considered when designing emissions reduction policies that can successfully integrate with the design of the national electricity market. A mechanism that is designed in a manner consistent with these principles will help contribute to the regulatory certainty that is critical for all investors in the energy sector, and hence system reliability.

This chapter sets out:

- **Goals** - proposed outcomes for the integration of energy and emissions policy.
- **Initiatives and work programs** - a summary of the key initiatives and work programs currently underway, or recommended, to achieve the proposed goals (including the Finkel review's recommendations).
- **Measuring progress** - the proposed metrics and reports that will enable progress towards the achievement of the goal to be measured and reported over time.

We invite stakeholder comment on all of these aspects, as well as their sequencing and prioritisation.

Box 5.1 Goals

The three proposed goals for integrating energy and emissions policy are:

- **a sustainable national emissions reduction strategy**
- **a coordinated emissions reduction trajectory for the national energy market**
- **a credible long-term emissions reduction mechanism.**

5.1 A sustainable national emissions reduction strategy

Australia committed to the Paris Agreement on climate change in November 2016. It has committed to reducing its emissions by 26-28 per cent on 2005 levels by 2030. Additionally it has committed to the goal of limiting global temperature rises to less than two degrees Celsius above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5 degrees. The Agreement indicates what this requires for

⁵⁷ Commonwealth of Australia, Australia's 2030 climate change target, 2015.

emissions; that global emissions need to peak as soon as possible, to then rapidly reduce, and to reach ‘net zero’ emissions between 2050 and 2100 (net zero emissions means that any remaining emissions are matched by removals of greenhouse gases from the atmosphere).

Consistent with those commitments, the Finkel review recommended that the Australian Government implement a national emissions reduction strategy for 2050. This would provide a platform from which the emissions reductions required from the national electricity market could occur.

A target that extends beyond 2030 is also an important element in providing investment certainty. Many generation assets have long asset lives, certainly longer than the current 13 year period to 2030. This is an additional and reinforcing reason why there is merit to establishing a longer term national emissions reduction target.

5.2 A coordinated emissions reduction trajectory for the national electricity market

In the absence of a longer term emissions reduction target, and clarity in the emissions reduction expected from the energy sector and the individual national electricity market jurisdictions, emissions policy in Australia has become increasingly fragmented. States and territories have introduced environmental or industry policies that impact on both emissions and the electricity sector.

These policies have generally taken the form of renewable energy targets and have the creation of jobs in renewable energy industries as an objective, as well as emissions reductions. The risk with such policies is that they may deliver emissions reductions at a higher cost to consumers because they are neither technology neutral, as they favour particular technologies, nor geographically neutral, as they favour projects that are located in a particular state or territory.

Coordination between governments would mean that one overarching policy, and one overarching mechanism, could be introduced across the national electricity market and the individual state and territory targets would be incorporated into the national target.

5.3 A credible long-term emissions reduction mechanism

It is the role of governments to set environmental policy objectives and to consider the trade-offs between these objectives and energy policy outcomes. Lowering emissions requires governments to make value judgements using information on the economy as a whole and the welfare of the population. Governments need to decide on emissions reduction targets, and have an important role in implementing a credible and long-lived emissions reduction policy to support the transition of the energy market while minimising the cost of this transformation to consumers.

The role of market bodies is to advise government on the features and impacts of alternative emissions reduction mechanism that can achieve a particular emissions reduction target set by governments. When comparing different mechanisms, the AEMC considers their ability to maintain the efficient operation of the energy markets and promote the long-term interests of consumers. However, energy and

environmental policies have different objectives and it is vital that they are developed in a manner where any efficiency trade-offs and costs are clearly understood by policy makers.

In Australia, emissions reduction policy objectives and supporting mechanisms have been characterised by frequent changes in direction and uncertainty in recent years. The result of this uncertainty has been delays in investment and consequent increasing electricity prices and risks to the security and reliability of the system.

The Finkel Review highlighted the issue of policy uncertainty and the need to act so that there are “adequate incentives [in place] to bring forward the right mix of generation capacity, in the right place, at the right time, to maintain a reliable system.”⁵⁸ As highlighted in submissions to the Finkel Review, a wide range of stakeholders are of the view that the electricity sector will play an important role in the transition of the Australian economy to a low carbon future.

There is therefore an opportunity for state and federal governments to work together to put in place a credible and coordinated emissions reduction policy, and implementation mechanism, which will provide increased certainty for investment in the electricity sector. The wholesale electricity generation sector is characterised by capital-intensive, long-lived assets. Given the high costs involved in generation infrastructure, a sustainable and credible policy environment is crucial to the ability of the sector to achieve energy and emissions reduction policy objectives.

The lack of a credible, long-term mechanism to achieve Australia’s emissions reduction commitments has created uncertainty and deterred investment in the sector. This uncertainty, around incentives for renewable energy or penalties for emissions, has counter-acted the signals for new investment coming from recent high wholesale prices. Indeed, some commentators have identified policy uncertainty to itself be a driver of recent wholesale electricity price increases.⁵⁹

The Finkel review made a number of recommendations with respect to emissions reduction policy, which have not yet been endorsed by COAG. The Panel recommended that:

- the Australian and State and Territory governments agree to an emissions reduction trajectory for the national electricity market
- a Clean Energy Target (CET) for the electricity sector be adopted.

The implementation of these recommendations is a matter for governments, in cooperation and consultation with industry and market bodies.

In the absence of COAG agreement to adopt a CET or another emissions reduction mechanism, the AEMC has been commissioned by the Queensland, Victorian, South Australian and Australian Capital Territory to provide advice on the design and potential impacts of the CET. This work is underway.

⁵⁸ Finkel review, p75

⁵⁹ Centre for International Economics, *Review of economic modeling exercises & assessment of the impact of uncertainty*, a report prepared for the Climate Change Authority, 31 May 2017.

Design principles for an emissions reduction policy for the national electricity market

It is important that emissions reduction mechanisms are designed in a way that is consistent with the National Electricity Objective. In this respect the following principles are worthy of consideration:

- **Adaptability within a sustainable design:** the overall design of the policy mechanism should be durable and consistent over time to provide the investment certainty that is important for investment in long lived assets. However there needs to be adaptability within that design so that inevitable market developments – such as changes in demand, fuel prices, technology costs or other factors do not undermine the effectiveness of the policy mechanism.
- **Technology neutral:** an emissions reduction policy that recognises abatement from the greatest variety of technology options will help minimise the long term costs of meeting the emissions target, and hence achieve the lowest cost abatement for consumers.
- **Geographically neutral:** a mechanism that is indifferent to where generation or demand-side technology options are located in the energy system and that allows those locations to be selected as a result of a trade-off between economic costs and benefits is likely to minimise costs and benefits to consumers.
- **Contract market liquidity:** an emissions reduction mechanism that, through its effect on the technology of the generation stock, preserves or enhances contract market liquidity will assist participants to manage risks efficiently for the long-term benefit of consumers. In particular, physically-firm hedging contracts, such as caps, swaps, and load-following hedge contracts, underpin the fixed-price retail offerings provided to end-consumers. It is the liquidity in these types of hedging contracts that need to be preserved when the generation mix changes. A reduced availability of these contracts has the potential to reduce retail market competition and increase prices for consumers.⁶⁰ It is therefore important, when designing and evaluating alternative emissions reduction mechanisms, to consider the potential impacts of alternative mechanisms on generators' incentives to supply firm contracts.
- **Allocation of risk:** an emissions reduction mechanism that allocates risks to those parties best-placed to identify and respond to risks in an efficient manner will be consistent with the NEO. The national electricity market is designed in a manner such that generators make investment and retirement decisions based on price signals in the spot and contract markets, and face the outcomes of their decisions. If electricity demand, fuel costs, or other variables are higher or lower than expected, the primary implications for generator profitability are borne by generators, rather than consumers or taxpayers. This is appropriate because generation businesses have the expertise, information and commercial incentives to manage such risks efficiently. Risk to consumers is usually evidenced in higher prices, whereas risk to industry is only seen as higher prices to consumers to the extent permitted by competition in the sector.

⁶⁰ For more discussion see AEMC, *2017 Retail Competition Review*, Final Report, 25 July 2017.

Evidence from international markets suggests that if policy integration does not occur, the impact on the efficacy of price mechanisms, together with uncertainty and policy risk, will likely require ongoing government intervention in otherwise well-functioning energy markets, transferring investment risk and costs onto consumers.⁶¹

The current Renewable Energy Target (RET) policy provides an example of an environmental policy that has not been successfully integrated with energy policy. A key problem with the existing LRET is the impact of its design on risk allocation and incentives faced by existing generators, consumers and new entrant renewable generators. Under the LRET, the wholesale market price is no longer the primary signal for new investment in renewable energy generation. Instead, the price signal is provided by the LGC price in addition to wholesale market revenue. It has also incentivised technology that is not technically able to offer firm hedge or cap contracts that underwrite the reliability of supply.

5.4 Measuring progress

Progress for these goals can be measured by:

- a national emissions reduction target to 2050 being implemented
- an emissions reduction trajectory for the national electricity market being agreed by the Commonwealth and the states and territories
- an emissions reduction mechanism that is consistent with the design of the national electricity market being implemented.

5.5 Summary of goals and initiatives for the integration of energy and emissions policies

Goals	Initiatives	Programs and recommendations	12	24	36
			months	months	months
			31-Dec-18	31-Dec-19	31-Dec-20
Government implement a long term national emissions reduction target		By 2020, the Australian Government implement a national emissions reduction strategy for 2050			2020
Coordinated approach between the Commonwealth and jurisdictions		Commonwealth and jurisdictions agree to an emissions reduction trajectory for the national electricity market	"urgent need"		
Emissions reduction mechanisms to integrate with energy policy		Implement an emissions reduction scheme that is consistent with energy policy	"urgent need"		

Note: the phrase "urgent need" was used in the Finkel review, recommendation 3.2.

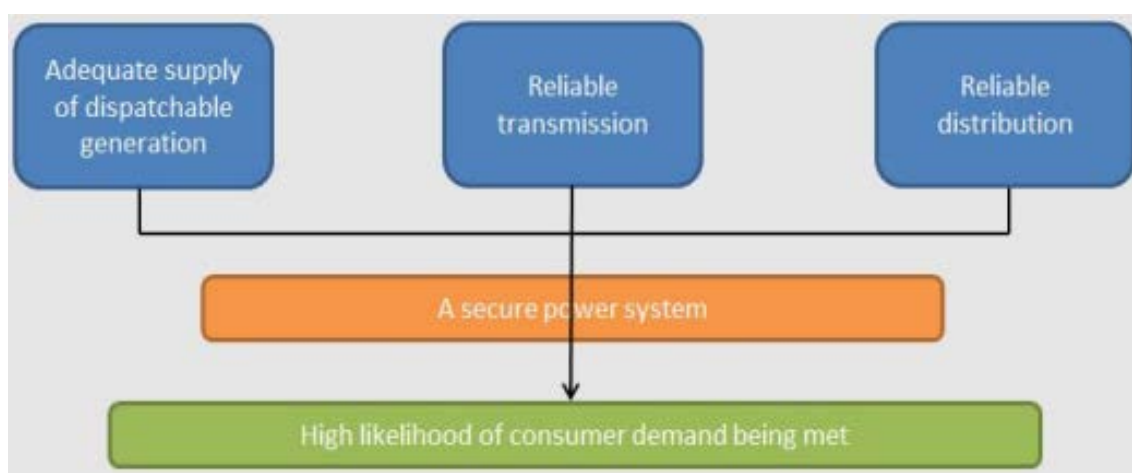
⁶¹ See G Yarrow, 'Regulatory Policy Institute, Energy and environment policy: the GB experience', A report for the AEMC, February 2017.

6 System security

The shift in the generation fleet being driven by the RET and technological advances is having profound implications for the management of system security in the national electricity market.

System security is distinct from reliability. A secure operating system is a necessary condition for meeting consumer electricity needs. Security of supply is a measure of the power system's capacity to continue operating within defined technical limits, even in the event of the disconnection of a major power system element such as an interconnector, large generator or large load (see Figure 6.1)

Figure 6.1 Components of system security and reliability



Historically, many of the services needed to maintain power system security were provided as a matter of course by conventional synchronous and dispatchable generators, such as coal, gas and hydro, when producing energy. New forms of non-synchronous generation, such as wind and solar photovoltaics (PV), being connected to the power system through inverters, cannot provide these services. They can, however, often offer new services that have yet to be accommodated in the national electricity market design.

Under the National Electricity Law, responsibility for maintaining and improving power system security rests with AEMO. In response to the challenges emerging in the market, AEMO established its Future Power System Security (FPSS) program in December 2015. It also convened a Power System Issues Technology Advisory Group (PSI TAG) of technical experts to assist in the qualitative identification and prioritisation of the technical challenges.

To complement this technical work, the AEMC conducted a System Security Market Frameworks Review to identify and develop the changes to market and regulatory arrangements required to address the technical issues highlighted by AEMO. This review concluded in June 2017, with many of the recommendations made now being in the process of being implemented.

The challenges associated with maintaining system security in a transitioning market were also a key focus of the Finkel review. The findings of this review were mostly

consistent with the recommendations made by the AEMC, and therefore there are very few new processes required to progress them.

The overarching goal of system security is to allow the power system to continue to meet the needs of consumers and society in a manner that limits the risk of damage to equipment or to people.

This chapter sets out:

- **Goals** - proposed outcomes for system security.
- **Initiatives and work programs** - a summary of the key initiatives and work programs currently underway, or recommended, to achieve the proposed goals (including the Finkel review's recommendations).
- **Measuring progress** - the proposed metrics and reports that will enable progress towards the achievement of the goal to be measured and reported over time.

We invite stakeholder comment on all of these aspects, as well as their sequencing and prioritisation.

Box 6.1 Goals

Four goals are proposed for system security:

- **an ability to resist large frequency changes**
- **better frequency control**
- **a stronger system**
- **an adaptable and flexible system.**

There are likely to be further system security challenges resulting from the ongoing transformation in energy markets that will need to be addressed over the longer-term in order to achieve the overarching objective. These could include issues such as the impact on system restart ancillary services of decreasing levels of synchronous generation, and the adequacy of current voltage control arrangements and other issues AEMO identifies. Any new initiatives and work programs can be incorporated through AEMC's annual review and advice to Council.

6.1 Resisting large frequency changes

Managing frequency involves balancing the supply of electricity against demand on an instantaneous basis. Large deviations from the normal frequency range (in Australia, 50Hz +/- 0.15Hz) or high rates of change of frequency (RoCoF) can cause the disconnection of generation or load, and have the potential to lead to cascading system failures.

A disturbance to the power system, such as a large generator disconnecting, would cause a sudden imbalance in the amount of supply and demand, causing frequency to diverge from the normal level. The speed at which this divergence occurs, the RoCoF,

is determined by the level of inertia in the system and the size of the supply-demand mismatch. Inertia acts to dampen, or slow, the change in frequency.

Inertia is provided by large rotating masses, such as the turbines in synchronous generators, which are synchronised to the frequency of the power system. In contrast, non-synchronous generators are not synchronised to the frequency of the power system and thus do not provide the same damping effect on the change in frequency. The growing penetration of non-synchronous generation in the national electricity market has led to a decline in the level of inertia.

Substantial work is currently underway in relation to resisting frequency changes.

In the *System Security Market Frameworks Review*, the AEMC made a number of recommendations regarding frequency control.⁶² With regards to inertia, the Commission recommended mechanisms for both the provision of a base level of inertia associated with the maintenance of system security, and for additional inertia that would result in economic benefits by allowing for the less constrained dispatch of generation in the market. In respect of the first of these, the Commission made draft rules on 27 June 2017 and, in respect of the second, the Commission intends to make draft rules on 7 November 2017.

The Reliability Panel is reviewing the Frequency Operating Standard (FOS) in the national electricity market, to determine whether the existing FOS remains appropriate in light of the technical issues and changes stemming from the *Emergency Frequency Control Schemes* rule change.⁶³ This rule change was made by the AEMC in March 2017 as part its system security work program.⁶⁴ The second stage of the FOS review will consider the various components of the FOS in a more fundamental manner, including the settings of the frequency bands and the time requirements for the maintenance and restoration of system frequency.

6.2 Better frequency control

High levels of inertia act to increase the amount of time before the frequency moves outside of the acceptable bands. However, inertia does not act to arrest the frequency change or revert frequency back to normal operating levels.

The rapid injection or withdrawal of power required to rebalance supply and demand is effected in the national electricity market through the provision of Frequency Control Ancillary Services (FCAS). In particular, “contingency FCAS” is used to control frequency in response to major variations in frequency caused by contingency events. There are a number of FCAS markets defined by the speed of response, with the quickest acting being a six second service (that is, the service responds in no more than six seconds).

⁶² In some cases, the Commission had already received relevant rule change requests, with these providing the means for the recommendations to put in place without the need for further implementation processes. In other cases, further investigation and consideration are required.

⁶³ Reliability Panel, *Review of the frequency operating standard*, Issues Paper, 14 July 2017.

⁶⁴ AEMC, *Emergency frequency control schemes*, Rule Determination, 30 March 2017

A key piece of work underway is the AEMC's Frequency Control Frameworks Review. This is a review into the frameworks underpinning frequency control, including the existing structure of FCAS markets. Many new generating technologies can offer frequency response services that are much quicker than the existing six-second FCAS service, and this review will allow the Commission to consider how these can best be integrated into FCAS markets.⁶⁵

The review will complement the technical work being undertaken by AEMO to understand the causes of a recent deterioration in frequency control performance in the national electricity market, including whether the removal of mandatory governor response requirements has been a contributing factor.

Finally, the AEMC recently received from AEMO a rule change requesting changes to generator performance standards. This will allow the Commission to further consider, and potentially implement, its recommendation that new generating plant should have fast active power capabilities, such that their active power output can be made automatically sensitive to system frequency or be directly controlled over very short timeframes.

6.3 System strength

A stronger system

Another challenge is system strength. System strength relates to the size of the change in voltage for a change to the load or generation at a connection point. When system strength is high, the voltage will change less for a change in load (or generation) than it would if the system strength was low. System strength is commonly referred to as the fault level. This is because the current that flows into a fault is larger with higher system strength.

Reduced system strength in certain areas of the network may mean that generators are no longer able to meet technical standards and may be unable to remain connected to the power system at certain times. Maintaining voltage stability and ensuring network protection equipment continues to function effectively present further challenges.

The system strength at any point depends on the surrounding network. The system strength will be higher when:

- there are a number of synchronous generating units connected nearby
- that point in the network is connected to the generating by more transmission and/or distribution lines.

Non-synchronous generators do not contribute to system strength as much as synchronous generating units. However, some modern inverter-based generation can provide a limited contribution to system strength, and it is possible that this capability may increase in the future.

System strength was addressed in the *System Security Market Frameworks Review*, with two recommendations made in regards to system strength. Similar to inertia, the AEMC made draft rules on 27 June 2017 in relation to the management of power

⁶⁵ AEMC, *Frequency control frameworks review*, Terms of Reference, 07 July 2017.

system fault levels. The draft rules allocate responsibility for management of system fault levels to network service providers, and introduced a new mechanism to require new-entrant generators not to cause a deterioration of system strength where it causes harm to others.

The Commission also made a recommendation that inverters for new connecting generators should be able to operate correctly down to specified system strength levels. This could significantly reduce future costs associated with maintaining an inefficiently high level of system strength where a new generator connects to part of the network that currently has plentiful fault levels. The AEMC will be able to further consider, and potentially implement, this recommendation through the rule change requesting revisions to generator performance standards expected from AEMO by the end of August 2017.

6.4 An adaptable and flexible system

Integrating distributed energy resources

There are challenges and opportunities associated with integrating distributed energy resources in the national electricity market. The opportunities revolve around consumers having more options to participate in the market, in particular in relation to demand-side response services. Some of the challenges relate to security.

In order to understand the issues associated with distributed energy resources, the AEMC undertook a review – the Distribution Market Model – to examine how such services can participate in the national electricity market. A final report was published on 22 August 2017. AEMO also conducted a review – the Visibility of Distributed Energy Resources (DER) – which examined how AEMO can identify such resources and continue to successfully manage national electricity market operations as the volume of DER grows. This review was published in January 2017.

The Finkel review also made specific recommendations related to reviewing the regulatory framework for DER, encouraging DER to participate in services such as frequency and voltage control, and that there should be a database of DER information in the national electricity market.

System resilience to threats

An additional set of issues related to security focus on threats to the system.

The Reliability Panel made recommendations with regard to black start plans⁶⁶, and AEMO has revised its black start system plan and is updating the System Restart Ancillary Services guidelines. AEMO's guidelines should be complete in November 2017.

The Finkel review also made a series of recommendations, including:

- For the Australian government to assess the national electricity market's resilience to human and environmental threats.

⁶⁶ The AEMC's *System Restart Ancillary Services review* also addressed restart actions to restore electricity supply after a system blackout.

- For the ESB to provide an annual report on the cyber preparedness of the national electricity market. An initial report is due in December 2018, with a final scheduled for July 2020.
- To develop a strategy to improve the integrity of energy infrastructure and the accuracy of supply and demand forecasting, in recognition of the increased severity of extreme weather.
- To conduct a national assessment of the workforce requirements of the energy sector.

6.5 Measuring progress

There are several reports that will enable progress towards the achievement of **system security**. These reports include:

- The *Managing the rate of change of power system frequency* and *Managing power system fault levels* rule change requests relate to requirements placed on TNSPs to procure inertia and fault level required to meet minimum levels of performance. The final determination for each of these rule changes is due to be published on 19 September 2017.
- The *Generating System Model Guidelines* rule change request relates to circumstances and conditions under which parties must provide model data to AEMO and where relevant, network service providers. Model data are key inputs into power system studies, which are used by AEMO, generators and network service providers to examine how the power system will function under different conditions. These studies then inform how AEMO operates the power system and how generators are connected.
- *Review of the frequency operating standard* to address technical issues and changes from the recent Emergency Frequency control schemes rule change. This review is proposed to be completed in two stages, due to various ongoing reviews of market and regulatory arrangements that are likely to impact the ability to effectively assess the FOS. The draft report for the first stage is due to be published in September 2017 and the final report in early November 2017. Stage two, is proposed to be completed by July 2018.
- The *Frequency Control Frameworks Review* will review the frameworks underpinning frequency control, including the existing structure of FCAS markets. This review will consider how frequency response services that are much quicker than the existing six-second FCAS service can best be integrated into FCAS markets. A consultation paper, to be published later in 2017, will inform a progress update to Council prior to its December 2017 meeting, and a final report is scheduled to be published prior to Council meeting in mid-2018.
- *Review of the system black event in South Australia on 28 September 2016*. This AEMC review will build on the work undertaken by AEMO and the AER, in their respective reviews of the system black event, by identifying any systemic issues that contributed to the event or affected the response. The final report is due to Council six months after the finalisation of both AEMO's Black System South

Australia 28 September 2016 – Final Report (published in March 2017) and the AER’s compliance report, which is not yet published.

- The *Inertia Ancillary Service Market* rule change, which is considering the design and a market-based mechanism to procure inertia in excess of the prescribed minimum level of inertia. This additional inertia would allow for a more unconstrained operation of the system, thereby improving secure operation under a much larger range of system conditions. . The draft rule determination is due to be published on 07 November 2017.
- AEMO to ensure the black system restart plan for each national electricity market region identifies the roles of parties at each stage of the restoration process, and includes regular testing of black system start equipment and processes. This is to be done by mid-2018.
- The Reliability Panel’s *Annual Market Performance Review* monitors and reviews security outcomes in the national electricity market, including a review of the key power system incidents that lead to interruptions in supply to consumers, including whether system restart ancillary services were not drawn upon and when the system was not in a secure operating state.

Metrics

Ultimately, a measure of whether the goal of system security is being achieved is whether the number, duration, and extent to which the power system is not in a secure operating state, over say a year, falls over time. Under the National Electricity Rules, AEMO must operate the power system such that, to the extent practicable, it is and will remain in a secure operating state.⁶⁷ Below this high-level metric are various measures of progress such as:

- Monitoring whether inertia and fault (system strength) levels in the power system do not fall below minimum required levels in real time, that is, before a shortfall in either is proactively identified by AEMO under the frameworks being developed by the AEMC. Identification of shortfalls will then allow TNSPs to procure the relevant services to address such shortfalls and so avoid either minimum inertia or fault levels dropping below the minimum required levels.
- Trends in the number of times the frequency exceeds the normal operating frequency band. Since October 2013, there has been a sharp rise in the number of exceedances, with over 150 mainland exceedances in December 2016 compared to less than 10 during 2013.^{68,69} This metric will provide a guide to the quality of the frequency performance and potentially highlight consequences arising from it.

⁶⁷ Clause 4.2.6(a) of the National Electricity Rules

⁶⁸ See Appendix G of Reliability Panel, *Review of the frequency operating standard, Issues Paper*, 14 July 2017.

⁶⁹ See Appendix G of Reliability Panel, *Review of the frequency operating standard, Issues Paper*, 14 July 2017.

- Trends in the RoCoF and trends in inertia levels, both national electricity market-wide and in individual regions (particularly those with limited AC interconnections such as South Australia).

6.6 Summary of system security goals and initiatives

Goals	Components	Programs and recommendations	12 months	24 months	36 months
			31-Dec-18	31-Dec-19	31-Dec-20
Frequency control	Resist frequency changes	Final determination to deliver minimum level of inertia and initial Fast Frequency Response (FFR)	19-Sep-17		
		Minimum initial inertia level set	Apr-18		
		Final determination on generator performance standards rule request	mid 2018		
		Final determination on generator system model guidelines	12-Sep-17		
		Final determination on system strength	19-Sep-17		
		Draft rule considering mechanisms to deliver additional inertia	07-Nov-17		
		Review of the frequency operating standard (FOS)	mid 2018		
		Energy security obligations. The AEMC should require transmission network service providers to provide a sufficient level of inertia for each region or sub-region, including a portion that could be substituted by fast frequency response	mid 2018		
	Better frequency control	Frequency Control Frameworks Review: faster response services for FCAS; recent deterioration in frequency control performance.	30-Jun-18		
	System strength	A stronger system	Draft rules on the management of power system fault levels	27-Jun-17	
AEMC review and update the connections standards. A comprehensive review of connections standards should occur every 3 years.			mid 2018		
An adaptable and flexible system	Distributed energy resources	AEMC's final report on the Distribution Market Model	22-Aug-17		
		AEMC to review the regulatory framework for power system security related to distributed energy resources participation	mid 2018		
		AEMC to advise COAG EC on rule change options to incentivise and orchestrate distributed energy resource participation in services such as frequency and voltage control		mid 2019	
		COAG EC has agreed to develop a Distributed Energy Resources Register	mid 2018		
		System resilience to threats	AEMO ensure the black system restart plan identifies the roles of parties at each stage of the restart process, and includes regular testing of equipment and processes	mid 2018	

	<p>Australian government to assess the national electricity market's resilience to human and environmental threats. The assessment should be updated every 3 years.</p>	<p>mid 2019</p>
	<p>The ESB provide an annual report on the cyber preparedness of the national electricity market.</p>	<p>end 2018</p>
	<p>Develop a strategy to improve the integrity of energy infrastructure and the accuracy of supply and demand forecasting</p>	<p>end 2018</p>
	<p>Develop a national assessment of the future workforce requirements for the electricity sector</p>	<p>mid 2019</p>

7 Reliability

Over the past year, changes in the energy sector on both the demand and supply side, load shedding events on low reserve days, pre-emptive action and announcements from jurisdictional governments, and recommendations made by the Finkel Panel in the Independent Review into the Future Security of the National Electricity Market, have led to a greater focus on reliability in the national electricity market.

AEMO's latest Energy Supply Outlook publication concluded that all national electricity market regions will meet the reliability standard set in the National Electricity Rules over the next two years based, on the generation and storage expected to be available. There is, however, still a risk of electricity supply falling short of demand, especially in extreme conditions. South Australia is considered most at risk of breaching the reliability standard.⁷⁰

Subsequent to the Energy Supply Outlook, in September AEMO released the 2017 Electricity Statement of Opportunities, which concluded that there is a heightened risk that the current reliability standard will not be met. In particular, the report noted under certain conditions,⁷¹ the reliability standard may be exceeded in Victoria and South Australia this coming summer.⁷² The Electricity Statement of Opportunities also stated that there is a heightened risk in New South Wales of up to 0.0015 per cent unserved energy⁷³ after Liddell Power Station's planned closure in 2022, under a scenario of higher-than-expected demand or if only existing generators and generation projects that meet AEMO's commitment criteria were operating.

What is reliability?

A reliable power system is one which has enough capacity (generation, demand-side and network) to supply customers. That is, a reliable system is one where there is a high likelihood of consumer demand being met. This requires: efficient investment, retirement and operational decisions by market participants resulting in an adequate supply of energy; a reliable transmission and distribution networks, as well as a secure system. This section of the paper focuses on efficient investment, retirement and operational decisions by market participants resulting in an adequate supply of energy (involving generation, demand-response and inter-connectors).⁷⁴

Drivers of change

There are a number of persistent and emerging trends in the physical system and the market that are particularly relevant to reliability.

⁷⁰ AEMO, *Energy Supply Outlook*, June 2017, p. 3. A new report is expected in September 2017.

⁷¹ For example, if there is any material reduction in peak capacity over the summer months or if demand is higher than expected. See AEMO, *Electricity Statement of Opportunities*, September 2017, p. 2

⁷² AEMO, *Electricity Statement of Opportunities*, September 2017, p. 2

⁷³ *Ibid*, p. 22

⁷⁴ State and territory governments set the level of reliability that must be provided by transmission and distribution networks within a region; see Chapter 9.

The mix of generation technologies is changing in the national electricity market. There has been a trend towards entry of intermittent generation (to date predominantly wind farms and small scale solar), and the exit of older, higher-emissions base-load thermal generation. These trends are expected to continue. AEMO is tracking 19,102 MW of proposed new generation capacity: 65 per cent wind, 25 per cent gas, 9 per cent solar and 1 per cent other generation.⁷⁵ More thermal generation is expected to retire, for example with AGL committing to not extending the operating life of Liddell beyond 2022.

On the demand side, falling technology costs and the uptake of distributed energy resources are changing how consumers interact with the energy sector.

The characteristics of power generation are diversifying as a result of these trends, with implications for reliability. The output of renewables is determined by the weather, rather than the generating business being able to vary generation in response to wholesale spot prices, as is typically possible for thermal or hydro electric generators. A key issue for the sector is how these trends in the supply and demand side of the market will affect system reliability, particularly at times when renewable, intermittent generation output is low relative to demand. Residual demand (demand net of wind and solar PV generation) becomes an increasingly important consideration.

The global and Australian commercial environments impact on investment decisions in the national electricity market, and thereby reliability. The following trends are particularly pertinent to reliability into the future:

- A high degree of uncertainty. Investment in new generation is being dampened due to the prolonged absence of an integrated emissions and energy policy (see section *The integration of energy and emissions policy* in this paper). Direct government funding of generation projects is also likely to influence private investment decisions.
- Changes in the relative costs of generation technologies. The costs of renewable technologies are falling rapidly. This trend is expected to continue with some uncertainty regarding the timing and extent of reductions. Additionally, in the absence of a price of carbon, subsidies to renewable technologies, driven by the RET, impact on the comparative revenue streams of technologies. At the same time the price of gas has risen sharply, impacting on the operational costs and availability of OCGT and CCGT plants.
- In addition the liquidity of firm swap and cap contracts is being limited by the intermittent technologies being driven by the LRET and falling costs of that technology. These contracts play an important role in delivering a reliable supply to the national electricity market.

This chapter sets out:

- **Goals** - proposed outcomes regarding reliability.
- **Initiatives and work programs** - a summary of the key initiatives and work programs currently underway, or recommended, to achieve the proposed goals (including the Finkel review's recommendations).

⁷⁵ AEMO, *Energy Supply Outlook*, June 2017, p. 3

- **Measuring progress** – the proposed metrics and reports that will enable progress towards the achievement of the goal to be measured and reported over time.

We invite stakeholder comment on all of these aspects, as well as their sequencing and prioritisation.

Box 7.1 Goals

The proposed goals regarding reliability are:

- **an efficient market-based approach**
- **appropriate intervention mechanisms.**

7.1 An efficient market-based approach

The regulatory framework for reliability in the national electricity market can be described as market based, but with specific mechanisms for interventions to account for market limitations.

To date, an adequate supply of energy has typically been provided in the national electricity market through investment, retirement and operational decisions in both the short- and long-term by market participants on the basis of market signals, largely expectations of future spot prices shown through the contract market. The contract market has been an integral part of the market design since the inception of the national electricity market, and makes a major contribution to reliability. Contracts exist to hedge uncertainty and manage risk, although participants may also manage their risk to high prices by entering into natural hedges via vertical integration.

The contract market, which is derived from the spot market, allows market participants to manage exposure to the spot market.⁷⁶ A liquid contract market provides longer-term price signals for market participants to make efficient investment, retirement and operational decisions for energy by providing information on expected future market prices as well as providing a mechanism through which new generation can be financed. This in turn, contributes to the long-term reliability of the national electricity market.

The contract market also assists with reliability in the short-term, since market participants' contract positions will affect operational decisions to provide (or not provide) energy supplies. For example, a generator's contract position will drive maintenance decisions, as well as its offers into the wholesale market.

In the very short-term, the spot market can also provide price signals for market participants to make (or not make) capacity available. The reliability settings form the key price envelope within which the wholesale spot market seeks to balance supply

⁷⁶ Although contracts can take a number of different forms – both in the structure of the contract, as well as the time frame.

and demand, and deliver generation capacity to meet the reliability standard with the aim of avoiding unreasonable risks for market participants.

The standard is underpinned by the four reliability price settings, namely: the market price cap, the cumulative price threshold, the administered price cap, and the market floor price. These parameters are set through consideration of what they would need to be for the reliability standard to be met. AEMO is responsible for operationalising the reliability standard across the power system in accordance with standards and guidelines (e.g. it is a measure which when translated into reserve margins provides operational guidance for AEMO to engage in medium-term intervention).

Reliability of the system is maintained through market participants making efficient investment, retirement and operational decisions resulting in – at a particular point of time – a certain level of energy, such as generation (e.g. gas, hydro and coal), load (e.g. large smelters or demand response), interconnectors and storage.

The reliability standard and reliability settings

In a perfectly competitive market, contract and spot price signals might be adequate to deliver an efficient level of reliability on their own. Since wholesale electricity markets fall short of this scenario, the National Electricity Rules set limits on the extent to which the wholesale price can rise and fall. These are part of the reliability standard and settings, which are recommended by the Reliability Panel. The Panel uses the reliability standard (along with other inputs) to determine what is an appropriate level for the market price cap and the cumulative price threshold, which cap prices in the wholesale market, limiting market participants' exposure to temporary and sustained high prices (respectively).

AEMO uses the reliability standard to forecast the potential for unserved energy (the amount of energy that is required by customers but cannot be supplied). The outcomes of AEMO's forecasts then serve as a signal to the market that it should deliver enough capacity to meet a certain level of reliability, to avoid expected unserved energy (see the discussion that follows on the operationalisation of the reliability standard).

Currently, the reliability standard is set at 0.002 per cent expected unserved energy that is, that at least 99.998 per cent of annual demand for electricity is expected to be supplied. In considering the appropriate level of the standard, the Reliability Panel has regard to the costs associated with higher reliability and the costs of unserved energy. Having the standard set at this level reflects the fact that the most efficient level of reliability is not 0% unserved energy. Such an approach would be inefficient: the cost of the provision of a supply of energy at all times would exceed the value placed on it by consumers, given this value is not a constant and varies over time and with the duration and frequency of interruptions.

Box 7.2 Operationalisation of the reliability standard

In relation to planning and operationalising the reliability standard, AEMO performs the following functions:

- Assess whether the power system meets, and is projected to meet, the reliability standard.

- Identify and quantify any projected failure to meet the reliability standard.
- Publish forecasts regarding reliability and its components to inform market participants, NSPs and potential investors, over different time intervals, including ten-year, two-year and six-day outlooks and for shorter time periods including one day and one hour ahead via pre-dispatch.
- Monitor demand and generation capacity, and if necessary, initiate action to maintain the reliability of supply and power system security where practicable. This may include:
 - publishing information about the potential for, or the occurrence of, a situation that could significantly impact, or is significantly impacting, on power system security
 - declaring a low reserve condition when AEMO considers the balance of generation capacity and demand for the assessment period does not meet the reliability standard
 - declaring a lack of reserve level 1, 2 or 3 to advise whenever capacity reserves reduce below the level required to manage credible contingency events
 - following the processes set out in the National Electricity Rules if AEMO declares a lack of reserve or low reserve condition event, including publishing any unforeseeable circumstances that may require AEMO to implement an intervention event (for instance issuing an instruction or direction, or exercising reliability and emergency reserve trader powers).

While most reliability aspects are left to the market, the day-to-day operationalisation of the reliability standard is primarily AEMO's responsibility as system operator. AEMO provides additional information to the market in a number of formats and time frames ranging from long-term projections (more than 10 years) that are published annually, through to the detailed five- and thirty-minute pre-dispatch price and demand projections. This helps guide market participants' expectations of the future, enabling more efficient investment and operation decisions. Some of these publications include:

- Electricity Statement of Opportunities: projects whether there will be adequate supply of electricity over a ten year-period.
- Projected Assessment of System Adequacy (PASA): projects whether there will be short-term balance of supply and demand for different forward intervals (for example, over the next two years, six days or over the next day).
- Pre-dispatch schedules: forecasts 30-minute pre-dispatch data by region to the end of the next market day and is updated half hourly and also includes a 5-minute pre-dispatch which forecasts one hour ahead.
- Energy Adequacy Assessment Projection (EAAP): provides information on the impact of potential energy constraints, particularly those relating to inputs to production (for example, water shortages or constraints on fuel

supply).

AEMO may also publish notices when it declares a low reserve condition (LRC) and lack of reserve (LOR) to advise participants when reserves are projected to be or are below critical levels. These notices are intended to induce a market response – for example, generators may come online in response to a LOR in anticipation of high spot prices.

Current initiatives

Every four years, the reliability standard and reliability settings are reviewed by the AEMC's Reliability Panel to make sure they are set at a level appropriate for expected market conditions and consumer expectations. The 2018 Reliability standards and settings review is currently underway. The Panel will consider whether the standards and settings remain suitable for the market from 1 July 2020. If the Panel decides that a change to the reliability standard or any of the settings is required, it may propose a rule change request to the AEMC to implement this change in the rules. The final report will be published by 30 April 2018.

In addition, the Commission has recently announced a *Reliability Frameworks Review*. This Review will consider what changes to existing regulatory and market frameworks are necessary to provide an adequate amount of dispatchable energy in the national electricity market to meet the reliability standard. This involves longer-term considerations such as having the right amount of investment, as well as shorter-term operational considerations to make sure an adequate supply is available at a particular point in time. The Review will assess both existing market based elements of existing or new reliability mechanisms, as well as considering how these elements could address reliability in both the short- and long-term.

The Review will also incorporate, and be informed by, any existing work on implementing the recommendations that relate to the market-based approach from the Finkel review such as:

- the recommendation for a Generator Reliability Obligation
- the suitability of a 'day-ahead' market
- a mechanism that facilitates demand response in the wholesale energy market.

AEMO is also providing advice to the Federal Energy Minister on the:

- adequacy of current and forecast levels of dispatchable resources to meet the national electricity market reliability standard over the next 10 years, given forecast exit of base-load generation.
- options to deliver adequate levels of dispatchable power into the future
- mechanisms to stabilise wholesale electricity prices.⁷⁷

The AEMO advice was provided to the Federal Energy Minister on 4 September 2017 and publicly released on 6 September 2017. Building on the findings of the Electricity

⁷⁷ See <http://www.afr.com/news/politics/aemo-to-urgently-assess-impact-of-coal-power-plant-closures-20170628-gx07sp>

Statement of Opportunities, AEMO made the following recommendations in the advice:⁷⁸

- The development of a strategic reserve mechanism to mitigate the near-term risks of unserved energy and avoid supply disruption from summer 2018-19 to summer 2020-21. AEMO states that such a mechanism would provide a level of assurance for the increased uncertainty in the power system.
- The development of a longer-term approach to retain existing investment and incentivise new investment in flexible dispatchable capability in the national electricity market, to be in place by the time of Liddell's planned retirement.

The advice and subsequent work will inform the AEMC's assessment of the issues, as well as potential solutions, and the AEMC will work closely with AEMO.

7.2 Appropriate intervention mechanisms

Although the reliability framework is based around market-driven investment and operational decisions, it also provides AEMO with the ability to intervene in the market to address potential shortfalls of supply, in case the market fails.

The intervention mechanisms were designed to, in the first instance, elicit a market response. Should the market fail to respond or should the response be inadequate, AEMO may then intervene in the market in order to minimise involuntary load shedding.

The main intervention mechanisms are the RERT, which allows AEMO to contract for additional reserves, directions (for example, AEMO directing a generator to increase output) and clause 4.8.9 instructions (for example, AEMO instructing a transmission network service provider to shed customer load).

In addition to assessing the existing market-based frameworks for delivering reliability, the Reliability frameworks review, outlined above, will consider what changes if any are required to existing regulatory (or intervention) mechanisms. The Commission will incorporate, and be informed by, any existing reliability work or recommendations that relate to regulatory or intervention frameworks, including recommendations from the Finkel Panel that are within the scope of the review, such as the need for a strategic reserve to act as a safety net in exceptional circumstances as an enhancement or replacement to the existing RERT mechanism.⁷⁹

It will also take into account learnings from existing initiatives such as the demand response pilot program being trialled by ARENA and AEMO, and any other trials that ARENA and AEMO may undertake through their MOU that are relevant to reliability.

⁷⁸ AEMO, *Advice to Commonwealth Government on Dispatchable Capability*, September 2017, p. 4

⁷⁹ The Commission also notes that one of the other recommendations was a requirement for all large generators to provide at least three years' notice prior to closure. AEMO should also maintain and publish a register of long-term expected closure dates for large generators. The Commission notes that this recommendation is, in part, related to information requirements about reliability, and so will also consider this recommendation to the extent it has not otherwise been further progressed or implemented in other work-streams.

Clear and transparent information

In the current environment, identifying and clearly communicating information regarding expected levels of reliability underpins the effectiveness of the market mechanisms for reliability and the successful implementation of intervention mechanisms. Clear, transparent and robust forecasts about reliability are fundamental for signalling potential investment opportunities and for assessments of the adequacy of existing mechanisms and the need for additional mechanisms in the future.

Information in relation to reliability, such as forecasts, needs to:

- address complexity and changes in the system
- be timely
- target different time periods (short, medium and long term)
- be easy-to-understand
- clearly articulate assumptions and limitations.

AEMO has responsibility for modelling, analysing and publishing information on the adequacy of supply in each region of the national electricity market, as set out in Box 7.2.

In addition, every four years as part of the Review of the reliability standard and settings, the AEMC's Reliability Panel publishes information regarding the reliability outlook for the medium-term.

AEMO has recently submitted a rule change request to the AEMC to replace the current contingency-based definitions of lack of reserve conditions with a system triggered by a wider range of risks than those presently allowed for in the definitions.

7.3 Measuring progress

The Reliability Panel's Annual Market Performance Review monitors and reviews security outcomes in the national electricity market, including a review of the key power system incidents that lead to interruptions in supply to consumers, including whether system restart ancillary services were not drawn upon and when the system was not in a secure operating state.

The review uses two metrics to assess reliability:

- Unserved energy: per region per financial year.
- Reserve levels: this was a new indicator introduced in the 2016 review. Low reserve levels may indicate a heightened risk that there is insufficient generation supply available to meet demand which could result in unserved energy. Lack of reserve notices, issued by AEMO, are also analysed.

Care needs to be taken in interpreting the level of unserved energy as a metric of system performance in relation to reliability.

The reliability standard specifies the maximum expected unserved energy or the amount of electricity demanded by customers which is at risk of not being supplied. It is currently set at 0.002 per cent of each region's annual energy consumption in a financial year. In other words, the standard requires that there be sufficient generation

and transmission interconnection such that 99.998 per cent of annual demand for electricity is expected to be supplied. It is important to note that by “expected” we mean a forward looking concept applied to each year as a discrete interval. It is not a test against which the market is formally assessed after the fact⁸⁰ in which the system either “succeeds” or “fails” in meeting in any given period. For example, if one year the level of unserved energy in a region were to exceed the level of the reliability standard, this does not mean the standard has “failed”. Rather, it indicates that actual supply outcomes for consumers did not align with the expected outcomes in the reliability planning and operational processes.

⁸⁰ Neither is it a regulatory or performance standard that is ‘enforced’.

7.4 Summary of reliability goals and initiatives

Goals	Components	Programs and recommendations	12 months	24 months	36 months
			31-Dec-18	31-Dec-19	31-Dec-20
Efficient market-based approach		The Reliability Standard and Settings review to consider the reliability standard and settings to apply from 1 July 2020	30-Apr-18		
		Reliability Frameworks Review to assess changes necessary to provide adequate dispatchable energy in the national electricity market	Report to Council June 2018		
		The Reliability Frameworks Review will address various Finkel review actions a. the suitability of a 'day-ahead' market to assist in maintaining system reliability. b. the need for a Strategic Reserve as a safety net in exceptional circumstances c. a Generator Reliability Obligation.	Report to Council June 2018		
		AEMO advice on the adequacy of current and forecast levels of dispatchable resources to meet the reliability standard over the next 10 years	01-Sep-17		
		AEMO advice on South Australia licensing arrangements	01-Aug-17		
	Information	AEMO to publish its short term demand forecast methodology, FY2018 summer forecast, preparedness for FY2018 summer	Sep-17		
		Rule change to replace the contingency-based definitions of lack of reserve conditions with a system triggered by a wider range of risks			
		AEMO's statement of opportunities, energy adequacy assessment program, and projected assessments of system adequacy	ongoing	ongoing	ongoing
		Generators to provide information on their fuel resource adequacy and fuel supply contracts	01-Dec-17		
	Appropriate intervention mechanisms		Reliability Frameworks Review will consider intervention mechanisms required, including the need for a Strategic Reserve.	Report to Council June 2018	
		AEMO last resort power to have gas fired generators available to maintain reliability in emergencies	01-Sept-17 initial response		

8 Effective markets

The national electricity market was established to introduce competition in the electricity sector with the objective of increasing economic efficiency and lowering prices, by decentralising operational and investment decisions to commercial parties who are best placed to bear the costs and manage the risks of those decisions. The establishment of the national electricity market was part of a broader reform agenda during the 1990s that aimed to enhance the productivity of capital-intensive utility services such as energy.⁸¹

When markets operate effectively they offer the most efficient and lowest cost way of discovering what technologies and services work best for consumers, and shepherding change in that direction. If markets are not working effectively, then some adjustment to the mechanisms or some other form of regulation or intervention may be required.

This chapter sets out:

- **Goals** - proposed outcomes for this aspect of the energy sector.
- **Initiatives and work programs** - a summary of the key initiatives and work programs currently underway, or recommended, to achieve the proposed goals (including the Finkel review's recommendations).
- **Measuring progress** - the proposed metrics and reports that will enable progress towards the achievement of the goal to be measured and reported over time.

We invite stakeholder comment on all of these aspects, as well as their sequencing and prioritisation.

Box 8.1 Goals

In relation to markets the key goals are:

- **market participation**
- **transparent and efficient prices**
- **market reforms to facilitate and adapt to change.**

8.1 Market participation

The significant changes in generation technology, and consumer preferences and capabilities, raise issues associated with market participation. There are a number of issues being considered which may modify market participation in wholesale and retail markets.

The most significant initiative that is relevant to both the wholesale and retail markets is the analysis around DER. The AEMC and AEMO are undertaking work to assess

⁸¹ A discussion of these reforms is provided in KPMG, *National Electricity Market: A case study in successful microeconomic reform*, a report prepared for the AEMC, December 2013.

how DER can participate in markets. There are opportunities for these resources to contribute to the energy market, FCAS market and network services. They can also facilitate more active consumer participation, and be used by retailers as part of their risk management strategies. Given the anticipated growth in the quantity of DER this work is fundamental to the future operation of the energy markets.

An additional current issue that is relevant to wholesale market participation is a rule change process that is considering whether to extend the requirements to participate in the central dispatch process to generators between 5MW and 30MW capacity, and to large industrial consumers.

In relation to the retail market, there is a risk to the competitiveness and viability of smaller retailers associated with the reduced availability of hedging contracts. As discussed in the *Links between energy market issues* section of this paper, the reduction in contracts is driven by a range of factors including the design of the LRET, an increase in vertical integration, and the fact that storage and demand response options are not yet sufficiently developed to offset the reduction in contracts. In order to improve the visibility of contract availability the AEMC has recommended that the industry make contracting data available, or that they should be required to do so.

8.2 Transparent and efficient prices

Transparent and efficient prices are critical to the energy sector. They facilitate efficient investment in both large and small-scale generation, and help consumers make efficient decisions.

Initiatives underway or recommended for improving the transparency and efficiency of prices are listed below.

- A rule change process is considering aligning the time interval for settlement with the time interval for dispatch in the wholesale market. If this rule change proceeds, the settlement period would be reduced from 30 minutes to five minutes, which is the duration of the actual dispatch interval. The AEMC made a draft rule on 5 September 2017 to change the settlement period for the electricity spot price from 30 minutes to five minutes.⁸²

The rationale for the change relates to the improved price signals that would be provided to the market, thereby enabling the efficient use of and investment in generation and demand-side technologies. In particular, it would signal the physical value of when a demand or supply response is needed by the power system, and reward more accurately those who can deliver that response. However the potential benefits are being considered against the costs of implementing such a change, which include direct costs associated with systems changes in addition to consequent impacts on market incentives and the contracts market.

The AEMC's current view is that, while the adoption of five minute settlement would result in benefits that are likely to outweigh the costs, it would be

⁸² See <http://www.aemc.gov.au/Rule-Changes/Five-Minute Settlement>

necessary to have a transition period to manage and mitigate the risks and costs associated with implementation.⁸³

- Initiatives are underway to create transparent pricing mechanisms for the provision of inertia and for fast frequency response services.

While traditional thermal generators produced inertia as a by-product of their operation,⁸⁴ the changing generation mix means this is no longer the case. Work is therefore underway to identify the services needed for system security reasons, and to ensure transparent pricing mechanisms for these services.⁸⁵

Fast frequency response (FFR) refers to the ability of generators to respond to frequency deviations in very short time intervals. New technologies, such as wind farms and batteries, offer the potential for frequency response services that act much faster than traditional services, perhaps as quickly as a few hundred milliseconds. Although such FFR could be procured through the existing six second FCAS contingency service, this would not necessarily recognise any enhanced value that might be associated with a faster response, which is why this issue is being examined (see the *Reliability and system security* section of this paper).

- As discussed in the *Networks* chapter, networks are being required to implement more cost-reflective retail tariff structures. This should enable retailers and consumers make more efficient consumption decisions.

At a broader level, as previously described, the ACCC is conducting an inquiry into retail electricity prices in the national electricity market. The inquiry's scope is broad; it will examine the component parts that make up retail prices. As such, the issues of vertical integration and market power in wholesale markets may also be part of the inquiry. An initial report of findings is due in September 2017. Additional recommendations on transparency and pricing efficiency may come from this review. The review may also feed into the AER's work-program. Since December 2016, the AER has had powers to analyse whether there is effective competition in wholesale markets.

8.3 Market reforms

The Finkel review recommended a trial scheme be introduced to test new technologies and accelerate their integration into the competitive market.

There are also a number of recent government interventions in markets that modify the operation of those markets and the incentives of market participants.

- The Commonwealth government has announced the expansion of the Snowy Hydro scheme⁸⁶, the establishment of the domestic gas supply guarantee, the

⁸³ For more details, see AEMC, *Five Minute Settlement*, Draft determination, 5 September 2017.

⁸⁴ Inertia is created by the large rotating masses in synchronous generators

⁸⁵ For more details, see AEMC, *System Security Market Frameworks Review*, Final Report, 27 June 2017.

⁸⁶ A feasibility study is currently underway by the Snowy Mountains Engineering Corporation, with a report due in December 2017.

introduction of reverse auctions for baseload capacity, the removal of limited merits review (LMR), and measures to improve retail pricing outcomes.

- The South Australian government's *ourenergyplan.sa.gov.au*⁸⁷, included initiatives for a state owned gas plant, battery storage and a renewable technology fund, incentives for more generation in South Australia, local powers over the national market, and an energy security target.
- The Queensland government's Powering Queensland Plan, includes directions to state owned generators to change their bidding practices, a possible restructure of the government owned generators, and the establishment of CleanCo., a corporation to run renewable and low emission power stations.

The challenge for the industry is to incorporate these interventions and other programs of change in a way that does not increase industry supply costs, and in turn consumer prices, and does not distort incentives for market investment and innovation.

8.4 Measuring progress

There are a number of regular reports, by the AEMC and AER in particular, that analyse the state of the retail and wholesale markets.⁸⁸

The progress of individual reviews, initiatives and interventions can be tracked, but the most important metrics for the efficiency of markets relate to the long term outcomes for consumers, in particular:

- consumer pricing outcomes
- service quality measures
- product and services innovation.

⁸⁷ <http://ourenergyplan.sa.gov.au/assets/our-energy-plan-sa-web.pdf>

⁸⁸ The AEMC produces an annual *Retail Competition Review* and *Price Trends review*. The AER produces quarterly and annual views on the State of the national electricity market.

8.5 Summary of goals and initiatives for effective markets

Goals	Initiatives	Programs and recommendations	12 months	24 months	36 months
			31-Dec-18	31-Dec-19	31-Dec-20
Market participation	Participation	Determine how distributed energy resources can be integrated into and participate in the national electricity market	22-Aug-17		
		Develop a mechanism that facilitates demand response in the wholesale market	mid 2018		
	Information on market participation	Develop a credible survey on electricity trading hedging products, or remove exemptions from derivative trade reporting requirements			
		Health of the NEM report to include information on the price and availability of long-term retail contracts for commercial and industrials	end 2017		
Transparent and efficient prices	Market overview	ACCC inquiry into retail electricity prices in the national electricity market, including issues associated with vertical integration and market power	draft Sept 2017		
			Final Jun 2018		
	Specific initiatives	Rule change process on whether to align the settlement time period (currently 30 minutes) with the 5 minute dispatch period	28-Nov-17		
		Creation of pricing mechanisms for the provision of inertia and fast frequency response			
	Implementation of cost-reflective network tariffs	01-Dec-17			
Market reforms to facilitate and adapt to change	Trial programs	AEMC to review and update the regulatory framework to facilitate proof-of-concept testing of innovative approaches and technologies	31-Dec-18		
		A funding source for trials by AEMO and the Australian Renewable Energy Agency should be assured for the long term			

9 Networks

Networks provide the link between the generators and the consumers of electricity. Transmission networks provide the secure integration of the power system and transport electricity over long distances from generators to large loads or distribution networks, and between regions in the national electricity market. Distribution networks deliver electricity from points along the transmission networks to homes and businesses in their operating region. Networks have regulatory obligations to deliver a reliable supply of electricity to consumers.

The regulatory framework that governs transmission and distribution network service providers (NSPs) spans both economic and non-economic regulation.

The economic regulatory framework determines which services are to be:

- economically regulated (i.e. regulating the price and/or revenue of these services)
- subjected to a negotiate/arbitrate framework
- left to contestable service provision, and therefore not economically regulated.

Incentives-based regulation is the key form of economic regulation of networks in the national electricity market. This form of economic regulation is based on incentivising NSPs to provide services as efficiently as possible, whilst fulfilling their reliability and security obligations. It does so by locking in NSPs' revenue allowances prior to each regulatory control period. With revenue locked in, NSPs are incentivised to provide services at the lowest possible cost because their returns are determined by their actual costs of providing services. If NSPs reduce their costs to below the estimate of efficient costs, the savings are shared with consumers in future regulatory periods. Since NSPs are incentivised to provide services efficiently, they are provided with discretion to choose how they provide network services.

The significant changes underway in the energy sector impact on networks and their regulation, including:

- the move away from synchronous and dispatchable generation to non-synchronous and intermittent generation in the wholesale market
- changes to the way households and businesses manage and use electricity, supported by a growing range of technologies, energy service options and business models, which impact both the retail market and networks (particularly, distribution).

This chapter sets out:

- **Goals** - proposed outcomes for this area of the energy sector.
- **Initiatives and work programs** - a summary of the key initiatives and work programs currently underway, or recommended, to achieve the proposed goals (including the Finkel review's recommendations).
- **Measuring progress** - the proposed metrics and reports that will enable progress towards the achievement of the goal to be measured and reported over time.

We invite stakeholder comment on all of these aspects, as well as their sequencing and prioritisation.

Box 9.1 Goals

Two goals are proposed for the network regulatory framework :

- **Efficient regulation of monopoly infrastructure**
- **Evolution of networks as efficient platforms for energy services.**

9.1 Efficient and effective regulation

This goal relates to the ability of network regulation, both economic and technical, to provide a combination of appropriate incentives and technical obligations that result in NSPs achieving their reliability and security obligations at the lowest long-term cost to consumers.

Delineation between competitive and regulated services

An important area of focus within network regulation is the delineation between regulated and competitive services. Distribution networks are evolving from one-way energy delivery systems in a growth environment into multi-directional “smart grids”. In this environment, a key question is where to draw the line between what is regulated and what is not regulated – open to competition.

It is important to keep in mind that our network regulatory framework attempts to replicate, to the extent possible, the incentives that businesses in competitive markets face. However, it cannot fully replace the dynamic forces that competitive markets provide and the benefits that flow to consumers from such forces. It is therefore important that only those products and services where effective competition is unlikely to be possible – those which can be most efficiently supplied by a monopolist – are economically regulated.

Furthermore, in instances where network businesses or their affiliates compete to provide products and services in unregulated, competitive markets, they should be required to do so on a level playing field. Regulated network businesses should not be able to use their regulated revenues, the information they gain through regulated network services, or their control of access to the network to gain an advantage in the supply of unregulated services. To do otherwise will stifle the development of these competitive sectors and will not be in the long term interests of consumers.

This issue has been raised in a number of important areas, such as:

- *Expanding competition in metering and related services*⁸⁹: By putting in place a competitive framework for providing metering and related services to retailers and customers, the final rule provides a clear and open framework for the

⁸⁹ AEMC, *Expanding competition in metering and related services*, Rule Determination, 26 November 2015.

contestable supply of services from advanced meters to retailers and customers. This is important as electricity meters are no longer the simple total energy use measurement tool for networks that they used to be. Instead, they can assist the supply of a variety of products and services which consumers value and can be provided by any business with the skills and motivation to do so.

- *Ring-fencing*: the *Expanding competition in metering and related services* rule required AER to put in place new national distribution ring-fencing guidelines by 1 December 2016. The AER has completed the ring-fencing guidelines and the DNSPs are now in the process of implementing the requirements for full compliance on 1 January 2018.
- *Transmission connections and planning arrangements*: the final rule implements an approach that allows contestability for as many connection services as possible, while making it clear that incumbent TNSPs remain accountable for outcomes on the 'shared' transmission network, including access to, and operation and maintenance of, that network.⁹⁰
- *Contestability of energy services*: two rule changes are currently being considered, one from Council⁹¹ and the other from the Australian Energy Council (AEC)⁹², related to which services should be economically regulated. In particular, Council seeks to reinforce the principle that only services which exhibit natural monopoly characteristics should be economically regulated. The AEC rule change also seeks to introduce contestable frameworks for some of the inputs (e.g. network support) that DNSPs use in providing economically-regulated services.
- *Alternatives to grid-supplied network services*: Western Power proposed a rule change request relating to distributors using off-grid supply models to supply customers with electricity.⁹³ This seeks to remove what Western Power considers to be a regulatory barrier to distributors providing an off-grid supply to remote consumers instead of maintaining and/or replacing the network assets through which those consumers were previously supplied. Under Western Power's proposal, the AER would be responsible for determining whether such supply is economically regulated or contestably provided.

Use of network vs. non-network solutions

As mentioned, the objective of incentives-based regulation to incentivise NSPs to meet their network reliability and security obligations as efficiently as possible. It is not the role of the economic regulatory framework to determine the efficient mix of network and non-network solutions. Rather, the framework provides a number of incentives and obligations for non-network options to be adopted where it is efficient to do so. NSPs are provided some discretion within the regulatory framework to choose the optimal mix of network and non-network solutions in meeting their obligations.

⁹⁰ AEMC, *Transmission connections and planning arrangements*, Rule Determination, 23 May 2017.

⁹¹ <http://www.aemc.gov.au/Rule-Changes/Contestability-of-energy-services>

⁹² <http://www.aemc.gov.au/Rule-Changes/Contestability-of-energy-services-demand-response>

⁹³ <http://www.aemc.gov.au/Rule-Changes/Alternatives-to-grid-supplied-network-services>

For example, regulatory investment tests for distribution and for transmission require DNSPs and TNSPs, respectively, to assess the costs and benefits of each credible investment option (e.g. network build, or a non-network option) to address a specific network problem. The NSP is then able to identify the option which maximises net market benefits (or minimises costs where the investment is required to meet reliability standards).

The incentive on NSPs to use network vs. non-network solutions under the existing economic regulatory framework was discussed in the Finkel Review.⁹⁴ The Finkel Review questioned whether the incentive on NSPs to undertake capital expenditure (capex), such as a traditional network build, was greater than their incentive to undertake operating expenditure (opex), by for example investing in network demand response. Such an incentive, if it existed, may result in an NSP meeting their reliability and security obligations at an inefficiently high cost to consumers.

The Finkel Review recommended that either Council or the AEMC commission financial modelling of the incentives for investments by distribution network businesses, to test if there is a preference for capital investments in network assets over operational expenditure on demand-side measures.

The need to balance incentives to undertake capex relative to opex go to the heart of the design of the economic regulatory framework, and these issues will be addressed by the Commission in its 2018 Electricity network economic regulatory framework review.

Changes to merits review

In determining an NSP's regulated revenues, the AER determines the estimated operating costs based on the efficient costs a prudent network business would incur. The NER provide the AER with discretion to use a range of methods and information to determine efficient operating expenditures. The AER also has discretion within the current economic regulatory framework to adapt how it regulates in light of any changes in the market.

In June 2017, the Commonwealth Government introduced a bill under which the limited merits review (LMR) regime is to be abolished. Under the LMR regime, parties, including network businesses and consumers affected by AER decisions that determine revenue or access arrangements for monopoly electricity and gas networks, can seek merits review by the Australian Competition Tribunal. At this time, it is unclear whether and when the LMR regime is to be abolished, and the impact of any abolition on the economic regulatory framework.

Obligations on TNSPs to provide system security obligations

The regulatory framework needs to be sufficiently flexible to facilitate and keep pace with the transition occurring throughout the national electricity market. A key priority within network regulation is therefore the ability for network service providers to assist and contribute towards system security measures. As discussed in Chapter 6, two recent examples of AEMC work in this area are:

⁹⁴ See Section 6.5 of Finkel et al., *Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future*, June 2017.

1. Managing the rate of change of power system frequency: the technical obligation placed on TNSPs, in combination with the incentives-based economic regulatory framework, would offer certainty that the minimum required inertia levels would be made available at the lowest possible cost to consumers.
2. Managing power system fault levels: this obligation requires the TNSP to use existing planning and regulatory arrangements when acquiring or providing services to assist in the maintenance of system strength above the registered levels in a technology-neutral way. The ability to rely on existing arrangements, in combination with technology neutrality, provides for TNSPs to meet their obligations at the lowest possible cost to consumers.

An economic framework for network reliability standards

In most national electricity market jurisdictions, the regulation of (intra-region) transmission and distribution network reliability is currently the responsibility of the relevant government, which sets explicit reliability or redundancy targets.⁹⁵ In Victoria, however, reliability levels are not determined in advance, but as an outworking of an economic assessment process for each project that compares the expected cost of each project against the value placed on reliability by customers.

In 2013, the AEMC developed a framework for setting and regulating transmission reliability, and a framework for setting and regulating distribution reliability, in the national electricity market, in response to a request from the then Standing Council on Energy and Resources (SCER).⁹⁶ The frameworks included an economic assessment process to inform setting of reliability targets, and a transparent and public process for setting reliability targets which requires the assessment and considerations used in setting reliability targets to be published. The adoption of the framework would deliver three key benefits for customers, including:

- Economically-determined reliability standards, similar in methodological approach to that for the national electricity market, so that customers, as a group, pay for a level of reliability consistent with their preferences.
- Transparency around the reliability standard setting process to facilitate stakeholder understanding and enable customers to contribute to the process of determining the appropriate level of reliability.
- Consistency in how reliability performance is reported to improve understanding and facilitate benchmarking.

In its response to the AEMC recommendations, the SCER (now Council) noted the AEMC's advice and stated that it was more appropriate to adopt a set of high level principles to guide a high level national approach to reliability rather than endorse a detailed national framework in the National Electricity Rules. These principles reflect

⁹⁵ The reliability standard for the inter-region transmission network (i.e. the interconnectors between jurisdictions) is part of the reliability standard for the national electricity market. See Chapter 6 for more details.

⁹⁶ AEMC, *Review of the national framework for distribution reliability*, Final report, 27 September 2013; and AEMC, *Review of the national framework for transmission reliability*, Final report, 1 November 2013.

some of the elements of the framework developed by the AEMC in 2013. However, they remain to be implemented.

It is important that the recommendations on adopting the reliability framework be implemented by jurisdictions, in light of the benefits it would provide to consumers. Several commentators have mentioned that existing network reliability standards are too prescriptive and not economically-determined, and this has resulted in network over-investment and therefore higher costs to customers.⁹⁷

9.2 Networks as efficient platforms for energy services

Distribution

The uptake of rooftop solar photovoltaic systems, battery storage, electric vehicles and other technologies at the distribution level in Australia's electricity sector is having a significant impact on the way that consumers use electricity and distribution NSPs (DNSPs) manage their networks. Technological innovation is making the functions these devices perform smarter, cheaper and more accessible to a wider range of users. This change is greatly expanding the choices that consumers have to manage their energy needs and can potentially deliver significant efficiency benefits as well as improvements to the price, safety, reliability and security of the distribution network.

These 'distributed energy resources' are capable of providing a range of services to a number of different parties. For example:

- a consumer may use a battery storage system to maximise the value of its solar PV system
- the DNSP may procure the services provided by that system to manage network congestion
- an energy service company may, on the consumer's behalf, use the system to provide frequency control ancillary services to the AEMO.

A focus area relates to considerations on whether the existing regulatory framework:

- facilitates the efficient uptake and use of distributed energy resources
- adapts as the uptake of distributed energy resources increases
- facilitates the optimisation of the various value streams that such devices are capable of providing.

The Commission analysed these issues in its *Distribution market model* work⁹⁸. The report highlights a number of key areas for reform and further analysis:

- Continued implementation of network tariff reform; new network pricing rules were introduced in 2014 through the Distribution network pricing arrangements final rule. The rule put in place a framework for the movement away from the existing flat energy based tariffs to tariffs that vary by time and location to reflect

⁹⁷ For example, IPART, *Electricity transmission reliability standards: Unserved energy allowances for Inner Sydney and Broken Hill, Molong, Mudgee, Munyang and Wellington Town*, Draft Report, September 2016.

⁹⁸ AEMC, *Distribution Market Model*, Final report, 22 August 2017

the costs of using the network. These rules are now all fully implemented, with the AER having finalised the tariff structure statements for DNSPs.

- Gathering and publication of information; as more distributed energy resources are connected to distribution networks it will become increasingly important for DNSPs to gather and publish more dynamic information about congestion and technical issues at localised levels on their networks. Gathering and sharing of this information will allow consumers and market participants to optimise use of distributed energy resources and provide services back to network businesses to reduce the need for additional network expenditure.
- Information gathering; it will also be important AEMO continue to identify any information gaps for the purposes of maintaining power system security through its Future Power System Security work program, such as technical assessments of whether, and if so at what level of aggregation, what data about the investment in and operation of distributed energy resources is needed to support power system security.
- Connection and access arrangements; while the connection and access arrangements (highlighted below) for the coordination of generation and transmission investment are well known and the appropriate regulatory arrangements have been reviewed at length at the transmission level, there has been significantly less attention to these arrangements at the distribution level. In the past this has been because generation was largely located on the transmission network, however with the proliferation of distributed energy resources DNSPs are starting to deal with constraints at the distribution level, particularly on the lowest voltage areas. The Commission will be analysing these issues within its 2018 Electricity network economic regulatory framework review.
- DNSP financial incentives; as more controllable distributed energy resources are located on distribution networks, there will be a wider range of available solutions for DNSPs when network constraints arise. In this context, it is important that DNSPs are provided with balanced financial incentives when choosing between traditional network solutions and solutions capable of being provided by distributed energy resources. This issue was also raised by the Finkel Review, who recommended that Council or the AEMC commission financial modelling of the incentives for investments by distribution network businesses, to test if there is a preference for capital investments in network assets over operational expenditure on demand-side measures.⁹⁹ The issues raised in this recommendation will be addressed by the Commission in its 2018 Electricity network economic regulatory framework review.

A related issue is how DER can be employed in the supply of off-grid power systems. Off-grid power systems comprise:

- individual power systems – individual customers with their own supply of electricity

⁹⁹ See Recommendation 6.8 in Finkel et al., *Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future*, June 2017.

- microgrids – two or more customers connected to one another by an electricity network that is not physically connected to the national electricity market.

Over time, as the costs of solar PV and batteries continue to fall, it is increasingly likely that customers in remote areas would be most efficiently supplied by off-grid power systems rather than through connection to the national electricity market. These issues have been raised in the Alternatives to grid supplied network services rule change request submitted by Western Power. In the consultation paper, the AEMC noted the existence of several barriers to the efficient movement of customers from national electricity market-connected electricity supply to off-grid power systems.¹⁰⁰ A draft determination is due in September 2017 and will include recommendations on ways to remove these barriers to facilitate the efficient uptake of off-grid power systems.

Transmission

Another network regulatory framework issue relates to whether generation and transmission investments are efficiently co-ordinated under existing arrangements. Historically, the consequences of whether or not transmission and generation investment was coordinated were less material, as investment in the bulk of the existing infrastructure occurred prior to the deregulations of the 1990s, and was therefore driven by governments or government utilities making investment decisions.

However, a need for greater co-ordination is likely going forward as the shape of the transmission network may need to change to reliably supply consumers from a higher penetration of intermittent renewables. These generators locate in areas where resources (e.g. wind and sun) are high, which are typically in the outer-edges of the existing transmission network. Significant numbers of large scale, renewable generators are now also seeking to connect to the higher-voltage ends of the distribution network, meaning that DNSPs are now starting to consider similar issues.

The Commission is currently analysing these issues through its *Reporting on drivers of change that impact transmission frameworks* review.

Under the existing national electricity market frameworks:

- Generation investment is determined by market participants on the basis of market signals: expectations of future spot prices and retailers' willingness to enter into contracts to hedge against future price risk. Investment in generation assets in the national electricity market is intended to be market-driven taking into account – amongst other things – expectations of future demand, the location of the energy source, access to land and water and proximity to transmission infrastructure.
- Transmission NSPs (TNSPs) are responsible for making investment decisions to deliver a reliable supply to consumers, in accordance with their planning activities (set out below). TNSPs must make investments in order to meet the relevant jurisdictional reliability standard. Any investments made by TNSPs are funded from revenue received from consumers. TNSPs are also permitted, but not obliged, to undertake capital expenditure to reduce congestion – within their own region or between two regions – when this passes the RIT-T.

¹⁰⁰ AEMC, *Alternatives to grid-supplied network services*, Consultation Paper, 14 June 2017.

The differences in generation and transmission investment processes have the potential to result in a development path that does not minimise the total system costs faced by consumers.

The *Reporting on drivers of change that impact transmission frameworks* review analyses the factors that influence the co-ordination of transmission and generation investment. The review examines whether these identified drivers have changed significantly, whether there is an environment of major transmission and generation investment and whether this investment is uncertain in its technology or location. It is designed to assess whether changes that introduce more commercial drivers into transmission and generation development could be made to the frameworks, and so better promoting the coordination.

The *Reporting on drivers of change that impact transmission frameworks* review is being undertaken in a two stage process. The Stage 1 report was published on 18 July 2017¹⁰¹, providing analysis that there is sufficient uncertainty regarding transmission and generation investment in the future that a more coordinated approach to the frameworks warrants further investigation, to be set out in a Stage 2 report. An approach paper for the Stage 2 report was published in August 2017.¹⁰²

9.3 Measuring progress

Reports

There are a number of one-off and regular reports that will enable progress towards the achievement of the **efficient and effective regulation** goal. These reports include:

- The Contestability of energy services rule change requests, and the Alternatives to grid-supplied network services rule change request, raise issues related to the delineation between competitive and regulated services. The AEMC's views on these issues were provided in the Contestability of energy services draft determination, published on 29 August 2017. The Alternatives to grid-supplied network services draft determination is to be published on 26 September 2017.
- The AEMC's 2018 Electricity network economic regulatory framework review, to be published in July 2018, will address whether NSPs face balanced incentives when deciding whether to use network or non-network options to meet their reliability and security obligations. This is an annual review that started in July 2017.
- The Managing the rate of change of power system frequency and Managing power system fault levels rule change requests relate to requirements placed on TNSPs to meet their system security obligations. The final determination for each of these rule changes is due to be published on 19 September 2017.
- An economic framework for network reliability standards: progress on this goal is to be measured by whether Council continues to advance this goal, drawing on the work undertaken by the AEMC in 2013. The COAG Energy Council

¹⁰¹ AEMC, *Reporting on drivers of change that impact transmission frameworks*, Final stage 1 report, 18 July 2017

¹⁰² AEMC, *Coordination of generation and transmission investment*, Approach Paper, 22 August 2017.

establishing a timeline of clearly-defined deliverables is an important way by which to measure the progress made in achieving this goal.

The networks as **efficient platforms for energy services** goal is to be progressed in the following ways:

- Publication of the Distribution market model final report by the AEMC, on 22 August 2017. This report focuses on whether the existing regulatory framework facilitates the efficient uptake and use of distributed energy resources now and into the future.¹⁰³
- Application of tariff structure statements that comply with the Distribution network pricing arrangements final rule: the AER has finalised the tariff structure statements for all DNSPs. These statements have been published in accordance with the AEMC's rule to make distribution network pricing more cost-reflective.
- Publication of the 2018 Electricity network economic regulatory framework review, in July 2018. This report will examine a range of issues, including the efficient uptake of distributed energy resources and whether the existing regulatory framework provides balanced financial incentives for NSPs when choosing between network vs. non-network options (such as services provided by distributed energy resources) in meeting their reliability and security obligations.

Metrics

Quantitative measures of progress may include the following:

- Measures of network performance (so-called 'partial performance indicators'), which are monitored by the AER and the AEMC's Electricity network economic regulatory framework review reports, including network capacity utilisation and cost per customer. These indicators are likely to be impacted by the above-mentioned goals in different ways. For example, distribution network capacity utilisation should be expected to increase under cost-reflective distribution network pricing, all else equal.
- Trends in capex and, within capex, trends in augex and repex and the drivers of changes in each of these expenditure categories. For example, to the extent that the introduction of cost-reflective distribution network pricing leads to a decline in peak demand, this should result in a lower level of augex.
- Trends in the ratio of capex to opex are also worth tracking. As the uptake of distributed energy resources increases, and is projected to continue increasing in future, it is reasonable to expect the demand for traditional network services to decrease relative to non-network solutions. In this scenario, capex would be expected to decline, and opex would be expected to increase
- The amount spent by NSPs on non-network solutions relative to the amount spent on network solutions. An example of such a metric could be the amount spent by DNSPs on demand management, such as the Demand Management Incentive Allowance, relative to their capex.

¹⁰³ AEMC, *Distribution Market Model*, Final Report, 22 August 2017.

- Monitoring whether actual inertia levels in the power system are no lower than minimum required levels, and monitoring the system strength at generator connection points are at or above an agreed minimum level, under a defined range of conditions. This would provide insights into whether TNSPs are complying with their obligations under the recent security-related rule changes.

9.4 Summary of networks goals and initiatives

Goals	Components	Programs and recommendations	12 months	24 months	36 months	
			31-Dec-18	31-Dec-19	31-Dec-20	
Efficient regulation of monopoly infrastructure	Delineation of competitive and regulated services	Introduction of metering competition (except Victoria).	1-Dec-17			
		Distribution network service providers (DNSPs) implementing AER guidelines on ring-fencing	Jan-18			
		Rule change to allow contestability of connection services while keeping TNSPs responsible for network outcomes				
		Rule change processes on contestability of energy services (limiting NSPs' control of behind-the-meter assets)	21-Nov-17			
		Rule change process on whether distributors can use off-grid supply models to provide electricity, instead of maintaining/replacing existing network assets	19-Dec-17			
		Economic regulation	Test if capital investments in network assets are preferred over operational expenditure on demand-side measures.	mid 2018		
		If capex bias demonstrated, examine alternative models such as total expenditure approach		mid 2019		
		Finalise and implement the agreed reforms to Limited Merits Review	end 2017			
		Agreement to set binding rate of return guidelines with advice from independent panel	Jul-17			
		Review the Regulatory Investment Test for Transmission and for Distribution			mid 2020	
		Ensure DNSPs financial incentives allow distributed energy resources to contribute to the management of network constraints				
	Evolution of networks as efficient platforms for energy services		Cost reflective network tariffs are being implemented	01-Dec-17		
		Distribution	The AEMC's Distribution Market Model review and subsequent work, among other things, is considering how to efficiently integrate DER into the national electricity market	22-Aug-17		
Transmission		Review is underway on whether generation and transmission investments are efficiently coordinated	22 Aug 2017 Discussion paper			

10 Gas

Historically, gas has been traded through long term bilateral gas supply agreements (GSAs), and transported under long term gas transportation agreements (GTAs). This has supported the underwriting of investments in capital intensive, long-lived transportation assets. In that relatively stable environment, the role of trading markets was mostly to manage daily imbalances of gas in a transparent and competitive manner.

However, gas market participants are now finding it difficult to manage the risks associated with gas supply due to two main factors.

First, the commencement of an LNG export industry from Queensland has driven a substantial increase in overall gas demand on the east coast, from 709 PJ in 2014 to an expected 1,958 PJ in 2018.¹⁰⁴ This new linkage between the domestic and international markets has resulted in an upward pressure on gas prices towards the international price. The operation of the LNG export industry and associated production has also resulted in a more volatile and dynamic flow of gas around the east coast, and more volatile prices, making it more difficult for participants to manage risks.

Second, existing GSAs that need to be re-negotiated now tend to have more restrictive terms and conditions. In particular, there is significantly less flexibility for shippers¹⁰⁵ to vary the amount of gas they receive. As a result, shippers must now seek alternative means to manage the risks associated with variable demand, or pay additional costs to secure a contract with sufficient flexibility.

In addition, the ability of participants to manage supply risks has been somewhat limited by gas transportation arrangements. Pipeline capacity is often fully contracted and historically the secondary trading of capacity between participants has been minimal. This has made it difficult for some participants to respond to fluctuations in supply and demand by moving gas across the east coast to where it is needed.

The price of gas may also be higher than necessary due to some pipeline operators engaging in monopoly pricing for gas transportation, as found by the ACCC in its inquiry into the east coast gas market.¹⁰⁶

This chapter sets out:

- **Goals** - proposed outcomes for this area of the energy sector.
- **Initiatives and work programs** - a summary of the key initiatives and work programs currently underway, or recommended, to achieve the proposed goals (including the Finkel review's recommendations).
- **Measuring progress** - the proposed metrics and reports that will enable progress towards the achievement of the goal to be measured and reported over time.

¹⁰⁴ AEMO, *National Gas Forecasting Report*, forecasting dynamic interface, accessed June 2017.

¹⁰⁵ A gas shipper is an entity that contracts with pipeline owners to transport gas through the network from a producer to a supply point. A shipper is normally an energy retailer or large consumer.

¹⁰⁶ ACCC, *Inquiry into the east coast gas market*, April 2016.

We invite stakeholder comment on all of these aspects, as well as their sequencing and prioritisation.

Box 10.1 Goals

The goals proposed are:

- **access to efficiently priced gas**
- **access to efficiently priced pipeline infrastructure**
- **transparent market information**
- **gas market reforms, including gas trading and secondary capacity trading.**

10.1 Access to efficiently priced gas

The availability of gas at reasonable prices is a key issue for gas consumers, and for the role gas plays in electricity generation.

The supply of gas has tightened with the commencement of the LNG export industry, and options to expand domestic gas supplies have been constrained by some jurisdictional restrictions on on-shore exploration and unconventional gas extraction.¹⁰⁷

A number of initiatives are underway and other recommendations have been made to increase the domestic gas supply:

- In April 2017 the Commonwealth announced the Peak Supply Guarantee, which involves gas producers making gas available to meet peak demand periods in the national electricity market. This is expected to be in place by late 2017.¹⁰⁸
- A series of measures to improve domestic gas supplies were announced in the 2017 Budget including;
 - \$5.2 million national interest and cost-benefit analysis study into the construction of gas pipelines from the Northern Territory and Western Australia to the east coast, through Moomba in South Australia
 - \$30.4 million for the world leading Bioregional Assessments program to assess any potential impacts on waterways and aquifers from unconventional gas projects
 - \$26m has been allocated to the Gas Acceleration Program (GAP) to accelerate the development of onshore gas fields, with grants to favour projects that have prospects for delivering gas to east coast gas consumers within three years (year end 2020)

¹⁰⁷ Unconventional gas refers to the hydraulic fracturing process used to extract coal seam, tight and shale gas.

¹⁰⁸ This measure is closely linked to the Finkel review recommendation 1.1 on reliability – preparedness for the FY2018 summer. The independent assessment under recommendation 1.1 may indicate whether the Peak Supply Guarantee is likely to be invoked.

- \$500,000 to overcome regulatory barriers and inconsistent policies.
- On 20 June 2017, the Commonwealth announced the Australian Domestic Gas Security Mechanism which “is to ensure there is a sufficient supply of natural gas to meet the forecast needs of Australian consumers by requiring, if necessary, LNG projects which are drawing gas from the domestic market to limit exports or find offsetting sources of new gas.”¹⁰⁹ This measure was introduced on 1 July 2017 and the Minister for industry, Innovations and Science is scheduled to decide whether or not to invoke the mechanism for 2018 on 1 October 2017.
- The ACCC inquiry in 2015 and the Finkel review both recommended that supply could be increased by governments removing any blanket restrictions on onshore gas exploration, production, or hydraulic fracturing, and instead managing the risk of individual gas projects on a case by case basis. The Finkel review stated governments should adopt evidence based regulatory regimes and assess gas projects on a case by case basis.

These are primarily decisions for governments.

10.2 Access to efficiently priced pipeline infrastructure

The ability to access transportation capacity at prices consistent with those in a workably competitive market has the potential to reduce gas prices for consumers. It could also encourage more supply, or other alternatives such as storage options, as reducing transportation costs would make it more likely that a customer will enter into a long term contract with a producer to underwrite that production.

Initiatives underway related to pipeline capacity access are as follows:

- The Gas Market Reform Group recently developed an information and arbitration framework for non-scheme pipelines¹¹⁰, to provide a more level playing field for shippers negotiating access, and to provide an avenue for access where parties are unable to negotiate a transportation agreement. The arbitration framework commenced on 1 August 2017, with the information provision regime coming into effect from 1 February 2018.¹¹¹
- The AEMC is conducting a review into the economic regulation of covered pipelines, as requested by Council. This is expected to be completed in mid-2018.¹¹²
- In addition, Council has asked the Senior Committee of Officials (SCO) to report by the end of 2017 on further regulatory options to strengthen pipeline regulation.¹¹³

109

<https://industry.gov.au/resource/UpstreamPetroleum/AustralianLiquefiedNaturalGas/Pages/Australian-Domestic-Gas-Security-Mechanism.aspx>

110 These are unregulated pipelines

111 Part 23, National Gas Rules

112 Review into the scope of economic regulation applied to covered pipelines:

<http://www.aemc.gov.au/Markets-Reviews-Advice/Review-into-the-scope-of-economic-regulation-appli>.

These reforms and reviews are expected to identify any additional programs necessary to address issues with pipeline capacity access.

10.3 Market information

Significant work to enhance gas market information is already underway, including:

- gas supply and transportation prices
- gas pipeline flows, production and usage
- reserves information.

This additional information will improve transparency and assist with operational and investment decisions across the supply chain.

On 19 April 2017 the Australian Government directed the ACCC to inquire into the supply of and demand for wholesale gas in Australia. Focus areas of the inquiry include:

- the pricing and availability of offers to supply gas
- the volumes of gas supplied or available for current or future supply
- the pricing, volume and availability of gas for domestic supply compared to the pricing, volume and availability of gas for export
- the pricing, volume and availability of other goods or services, such as goods or services for drilling, storing or processing gas, that enable, assist or facilitate the supply of gas or gas transportation services in Australia.

The ACCC is required to publish six-monthly reports for the next three years, with the first report due in October 2017.

As recommended in the AEMC's east coast gas review, improvements are being made to AEMO's Gas Bulletin Board. This is being progressed in two rule change processes.

The first is to require information on (among other things) more granular gas flows around the market, forecasts and planned asset retirements and expansions. This will give AEMO a better idea of any constraints or events that may affect gas flows, and therefore the ability of gas powered generators (GPG) to generate electricity. The new information requirements are expected to commence in October 2018.¹¹⁴

The second rule change will introduce reporting obligations for large gas users¹¹⁵ (including LNG facilities), gas reserves, and compression facilities. It may also include reporting obligations identified through the Gas Market Reform Group (GMRG) on pipeline capacity trading or through the ACCC gas market inquiry. The timing of this is not clear at this time.

113 COAG Energy Council, Meeting communique, 14 July 2017, p. 2.

114 The expanded Bulletin Board information may assist with achieving the Finkel review recommendation 4.1: improving the accuracy of electricity supply and demand forecasting.

115 This is unlikely to include GPG as they are not typically large enough to meet the threshold for reporting requirements. However, under Finkel review recommendation 3.2, large generators (which would include GPG) would provide three years notice prior to closure, with AEMO publishing a register

AEMO has also been making improvements to the Bulletin Board that do not require a rule change, such as allowing participants to publish voluntary pricing information and providing links to relevant external resources.

The Commonwealth has asked AEMO to improve the publication of real time gas flows and market analysis to make it easier for the market operator, businesses and investors to make informed decisions about gas market operations.

The Finkel review has additionally recommended that Council bring together relevant data on gas (for example, on seismic activity, hydraulic fracturing fluid composition, aquifer purity and fugitive emissions) in an accessible format. Provision of this information is expected to help improve the social licence of coal seam gas operators and help bring more gas supply to the market. This information, or links to this information, could be published on the Bulletin Board.

10.4 Gas market reforms

There is a significant work program underway to reform wholesale gas and gas transportation markets on the east coast.

In relation to **wholesale gas market reforms**:

- In March 2017 AEMO completed its reforms to the Wallumbilla Gas Supply Hub, which introduced a single trading zone. This followed its introduction of a Gas Supply Hub at Moomba in June 2016.
- Consistent with the AEMC recommendations in the east coast gas review¹¹⁶ and Victorian gas market review¹¹⁷, the Victorian Government is currently implementing short term reforms to the Victorian gas market that will improve the ability of participants to manage price and volume risks. It is expected to submit rule change requests to the AEMC in mid- to late-2017.
- With regard to the forward work program, Council is expected to request the AEMC to provide a biennial report to monitor the growth in liquidity in wholesale gas and pipeline capacity trading markets.¹¹⁸ The first report is expected to be provided in mid-2018. This biennial report will be used to inform further development of the wholesale gas markets, as identified in the east coast gas review:
 - the potential for expanding the Wallumbilla Gas Supply Hub over a larger geographical area
 - whether more significant reforms to the Victorian gas market are necessary to improve pipeline investment signals and provide more consistency with the Northern hub at Wallumbilla
 - whether the Short Term Trading Markets should be simplified into balancing only markets.

116 AEMC, *East coast wholesale gas markets and pipeline frameworks review*, stage 2 final report, 23 May 2017, Sydney.

117 AEMC, *Review of the Victorian declared wholesale gas market*, final report, 30 June 2017.

118 COAG Energy Council, *Gas market reform package*, Bulletin two, August 2016, Attachment A, p.6

In relation to gas **transportation market reforms**:

- The GMRG is currently implementing a number of measures to improve secondary trading of pipeline capacity between market participants. This includes:
 - the standardisation of gas transportation contracts to facilitate short term trades
 - designing a capacity auction mechanism
 - developing a capacity trading platform.

These work programs are expected to be completed by the end of 2017, with implementation anticipated by late 2018.

10.5 Measuring progress

In relation to the **supply of gas**, the ACCC gas market inquiry will identify whether:

- supply contracts are being offered
- the price of the supply contracts is higher than LNG netback prices (that is, whether domestic customers are paying higher prices than international customers).

These findings can be used to inform whether any additional information is required for the market, or further reforms necessary.

In relation to **access to pipeline capacity**:

- The AEMC and SCO reviews will determine the access issues related to primary pipeline access and recommend a path for reform required.
- In addition, the success of the Gas Market Reform Group's information and arbitration framework for non-scheme pipelines can be provided by:
 - industry feedback on the framework
 - the use of that framework over the coming years
 - SCO's review of the framework two years after implementation.

In relation to **market performance and the need for further reforms**:

- The biennial review on liquidity in the wholesale gas and capacity trading markets is expected to be conducted by the AEMC from 2018. It will examine a number of quantitative and qualitative liquidity metrics to identify growth or changes in liquidity, and will be used to inform whether further market reforms are necessary.

10.6 Summary of gas goals and initiatives

Goals	Components	Programs and recommendations	12 months 31-Dec-18	24 months 31-Dec-19	36 months 31-Dec-20
Access to efficiently priced gas		2017 budget measures to improve domestic gas supplies include: study into the construction of gas pipelines from the Northern Territory and Western Australia; assessment to understand impacts on waterways and aquifers from unconventional gas projects; Gas acceleration program (GAP) for development of onshore gas fields.	GAP initiative is for 3 years		
		Australian Domestic Gas Security Mechanism to deliver natural gas to the domestic market, including limiting LNG exports if required	Decision on whether to invoke the mechanism is made each year		
		Case by case evidence based regime to assess individual gas projects, and fair compensation to landholders, to increase gas supply			
Access to efficiently priced pipeline infrastructure		Implementation of the Gas Market Reform Group's (GMRG) information and arbitration framework for non-scheme pipelines is underway	01-Feb-18		
		The economic regulation of covered pipelines is being reviewed	mid 2018		
		The Senior Committee of Officials (SCO) to report on regulatory options to strengthen pipeline regulation	end 2017		
Market information	Market assessment	ACCC inquiry into the supply of and demand for wholesale gas in Australia, including focus on pricing, volumes, domestic availability compared to export, the availability of goods or services that facilitate the supply of gas or gas transportation services	Reports every 6 months for next 3 years, commencing in October 2017		
	Gas Bulletin Board improvements	Gas Bulletin Board rule changes: information (among other things) on gas flows, forecasts, asset retirements and expansions – ie the ability of gas powered generators (GPG) to generate; increased reporting obligations for large gas users	30 Oct 2018 for GPG information		
		Additional AEMO improvements to the Gas Bulletin Board (e.g. publish voluntary pricing information)			
		AEMO to publish real time gas flows and market analysis to assist participants make operational decisions			
	Information	Relevant regulatory and scientific data on gas to be made available in an informative and easily accessible way			
Gas market reforms		Victorian government progressing rule change requests to improve the ability of participants to manage price and	mid - late 2017		

volume risks in the DWGM/Vic gas market	
AEMC to provide a biennial report to monitor the growth in liquidity in the wholesale gas and pipeline capacity trading markets	mid 2018
Measures to improve secondary trading of pipeline capacity are being implemented, including standardising gas transportation contracts, designing a capacity auction mechanism, and developing a capacity trading platform	late 2018 implementation

11 Governance

Effective governance arrangements are critical to the functioning of the energy sector, most particularly at a time when the industry is transforming in response to significant changes in technology, energy economics and consumer preferences. Good governance arrangements:

- recognise there are multiple goals being pursued in the sector
- facilitate the inter-relationship of issues being addressed in processes and decisions
- support timely, well informed and proportionate decisions
- establish, and are strengthened by, clearly defined and inclusive processes.

Governance arrangements have been assessed in two recent reviews. The first was the review conducted by Dr Michael Vertigan in 2015. Key findings and recommendations included the following:

- Current governance arrangements are generally sound.
- There is a lack of strategic focus and active and effective policy leadership by Council. As the body with overarching responsibility and policy leadership for the energy market, including for enabling cooperation between the Commonwealth and State and Territory governments, the effective functioning of the Council is critical to the effective operation of the market and the performance of the energy market bodies. A recommendation to address the 'strategic policy deficit' was for the Energy Council seek input from the AEMC on the strategic direction and priorities for the energy sector.
- The primary purpose of the Council was to pursue a nationally consistent approach to energy market reform. While deviations from common national policy are sometimes necessary and appropriate, they can also impact on the effective functioning of the national energy market and, in doing so, impose higher costs on consumers. It recommended the introduction of a formal process for jurisdictions seeking derogations from agreed national policy arrangements.
- Other recommendations were made to improve the transparency, timeliness, resources and clarity of functions and purpose for both the Council and the energy market bodies.

More recently the Finkel review identified energy market governance as a key theme in the design of a new blueprint for the energy sector.¹¹⁹ The Finkel review concluded that the current governance arrangements successfully balance the complex federal responsibilities with strong market bodies and, in doing so, have delivered sound and predictable outcomes. Nevertheless, it also made a number of observations and recommendations to improve governance arrangements, as follows:

¹¹⁹ Stronger governance was identified as one of the three key pillars (in addition to orderly transition and system planning) critical to the delivery of four key outcomes - increased security, future reliability, rewarding consumers and lower emissions.

- The energy market bodies could be better supported in their roles by clear strategic direction from governments on the integration of energy and emissions reduction policy, and through more effective policy leadership from the Council.
- Governments could strengthen existing governance arrangements by recommitting to the principles that underpin the national electricity market.
- A number of recommendations addressed the need to make governance more resilient, better coordinated and reflective of the pace of change in energy markets. These recommendations included agreement by the Council on a strategic energy plan for the national electricity market, as well as the establishment of an Energy Security Board (ESB).¹²⁰ To drive better overall system outcomes, the review also recommended enhancements to the AEMC's rule change process, to the funding arrangements for and market monitoring capabilities of the AER, and to the scope of AEMO's planning role.

This chapter sets out:

- **Goals** - proposed outcomes for this area of the energy sector.
- **Initiatives and work programs** - a summary of the key initiatives and work programs currently underway, or recommended, to achieve the proposed goals (including the Finkel review's recommendations).
- **Measuring progress** - the proposed metrics and reports that will enable progress towards the achievement of the goal to be measured and reported over time.

We invite stakeholder comment on all of these aspects, as well as their sequencing and prioritisation.

Box 11.1 Goals

The key goals in relation to governance are:

- **leadership and strategic direction**
- **role clarity and coordination**
- **responsiveness to market changes.**

11.1 Leadership and strategic direction

There are a number of actions that are underway and recommended that will contribute to stronger leadership and a clearer strategic direction in the sector.

¹²⁰ The purpose of the ESB is to drive implementation of the Finkel Review blueprint, and to coordinate whole-of-system monitoring of security, reliability and planning across the energy market bodies.

Establish a multi-year view of the strategic priorities for the energy sector

An effective governance framework requires clarity in the goals of the energy sector, a shared view of what needs to happen to achieve those goals and a shared commitment from all parties, including governments, to implement those actions.

Following the Vertigan review, and prior to the finalisation of the Finkel review, Council tasked the AEMC to work with the AER, AEMO and the ECA to provide advice on the strategic priorities for the energy sector. This document and consultation process contributes to the development of that advice.

The Finkel review recommended the establishment of the ESB and indicated it should have a role in developing a 'strategic energy plan' for the sector¹²¹. In relation to the development of strategic priorities advice, it is not envisaged that this is a separate process to the task already underway, in particular because the market bodies and ECA would be part of any ESB advisory process.

An important difference between the Vertigan and Finkel reviews, and the strategic priorities process, is that the reviews were one-off processes, whereas this advice feeds into the ongoing strategic management of the sector. Council has stated that the strategic priorities will be reviewed in depth every three years, with annual reviews in between. This means there will be a somewhat durable multi-year view, with an annual process to re-affirm or change the work needed to achieve the goals. The annual process will test what progress has been made, what is working well or not, what we have learned, and what has changed (ie new risks and opportunities). This information will then be used to review the work underway, including whether some programs need to speed up or slow down (for example given resource constraints, or to synchronise with other related programs).

Recommit to a national energy market

To date, the Council's ability to deliver effective and long lasting reforms has required a commitment by jurisdictional governments to the overall benefits to consumers of a national approach, and having in place the structure and processes necessary to deliver it. Where this has been achieved, for example, the creation and ongoing development of the electricity wholesale market arrangements, reforms have been effective and long-lasting. However, where national reforms are staggered, or where jurisdictions have sought derogations from national arrangements, success has been more limited. Implementation of the NECF, which commenced in 2012 in some jurisdictions, is an example. Similarly, there has been limited progress on the development of a national framework for setting distribution reliability standards, and for transmission planning.¹²²

121 Finkel review, executive summary, p6.

122 The measure of success in the implementation of these frameworks is not that the outcomes are the same across all the jurisdictions. In the example of the reliability standards, a standardised approach would mean that the jurisdictions would set reliability standards using the same economic framework, but the outcomes of the implementation of that framework would reflect the different characteristics of networks and the different preferences of consumers within those networks. This degree of standardisation helps to provide a good quality economic framework for setting the standards, while allowing for regional variations, which has the potential to bring benefits to consumers.

While all jurisdictions are 'on' the Council, its success depends on the extent to which all governments 'own' the Council as an institution, its strategic objectives and national work program. It is crucial that the Council remains effective as it is ultimately accountable for the performance of the national energy market.

In light of this, and consistent with the Finkel review recommendations, COAG leaders should agree to a new Australian Energy Market Agreement that reaffirms governments' commitment to taking a national approach to energy policy. Further, requiring jurisdictions to notify the Council if they propose to take unilateral action on any matter that falls within the scope of the AEMA will provide greater accountability and transparency on the likely impacts of that action. Indeed, if jurisdictions that wanted to take an alternative approach were to treat the derogation like a trial or pilot program, and assess its costs and benefits relative to the approach taken in the national electricity market, then derogations could be a source of learning and improvement for all national electricity market jurisdictions.

Box 11.2 Network reliability - opportunities for a national approach

In relation to network reliability, each state and territory government retains control over how transmission and distribution reliability is regulated and the level of reliability that must be provided. Investments in, and operational decisions about, transmission and distribution networks in order to meet these reliability standards are ongoing and involve a trade-off between the cost of building and maintaining the networks and the value placed on reliability by customers.

In 2013, the AEMC reviewed the national frameworks for distribution and transmission reliability. These recommended frameworks promoted greater efficiency, transparency and community consultation in how network reliability levels are set and provided across the national electricity market, while, preserving the key role for governments in being the appropriate parties to be responsible for determining the appropriate level of reliability for the consumers within their jurisdiction.

11.2 Role clarity and coordination

Role clarity

An effective governance structure requires well-defined roles, clarity in the division of responsibilities and levels of accountability of the market bodies, and effective coordination between governments, market bodies and industry.

Although the functional division of responsibilities between the market institutions is clear, the Finkel review has recommended that Council and ESB will issue new Statements of Expectations to the AER and AEMC, and a Statement of Role to AEMO, containing comprehensive, outcomes-based performance indicators.

The role and accountabilities of the ESB itself needs to be clearly defined and delineated from those of the existing market bodies in order to facilitate functional and operational clarity between the organisations.

The process of managing to a defined set of strategic priorities should also assist in identifying and maintaining clarity in the respective roles of governments and market institutions in implementing the strategic priorities work programs.

Coordination

There are opportunities to improve coordination at multiple levels in the sector.

At a government level, the identified opportunities are for:

- coordinated emissions policy between the Commonwealth and jurisdictions
- the improved management of derogations from national energy policy.

The coordination between government and the market institutions also needs to be carefully managed. For example, the GMRG was created to implement the roadmap for gas market reforms and development. It reports to the Council and comprises representatives of the three energy market bodies. As part of its work the GMRG is examining unregulated pipelines. Additionally the AEMC is examining regulated pipelines, and SCO is undertaking an overview function. Clear coordination between these organisations is critical to ensure an efficient use of resources and the progression of work in a logical order.

There are also opportunities to improve the coordination between the market institutions.

The Market Bodies Forum (MBF) was established in June 2017 by the AEMC, AEMO and the AER to improve co-ordination, collaboration and reporting of key market issues. The Finkel review recommended the ESB, and this was established in August 2017. These initiatives should improve coordination and resource efficiency in relation to:

- Reviews and consultation; where the opportunity is for similar processes to be conducted together. This would also reduce stakeholder fatigue.
- Industry reports: as highlighted in the Consumer chapter of this document, there are numerous reports from the market institutions and other jurisdictional bodies addressing similar issues. While each of these reports has a specific focus, the opportunity is to review and order these reports for better efficiency and impact.
 - In assessing report coverage, a 'MECE' framework¹²³ could be applied, which assesses whether the issues coverage is mutually exclusive and collectively exhaustive.
 - There may also be opportunities to order the reports for efficiency and timeliness so that data from one can feed into another or that the reports coincide with other relevant processes (e.g. corporate financial results, annual retailer price adjustment periods).

Additionally, the establishment of the strategic priorities and improved coordination between the market institutions should enable implementation to be carefully staged, for example, to avoid multiple systems changes from multiple bulletin board reforms.

¹²³ A MECE framework refers to a test of whether issues coverage between reports or issues is mutually exclusive and collectively exhaustive.

This will help to minimise the costs of reform for market participants and ultimately consumers.

11.3 Responsiveness to market changes

A number of reforms to improve market processes are underway or have been recommended.

Timely decision making process

Generally speaking, when stakeholders, including governments, consider that an aspect of the national energy rules could be improved and they are reasonably clear about how this should be achieved, they submit a rule change request to the AEMC for consideration. When governments, often informed by stakeholder views, have concerns about a particular issue but have not developed a clear view as to how best to address the issue, they can ask the AEMC to undertake a review. AEMC reviews often result in the submission of recommended changes to the rules for Council consideration.

It generally takes the AEMC around six months to complete the standard rule change process.¹²⁴ It also takes around nine months for the AEMC to conduct a review, with an additional nine months (on average) spent by the Council in considering the recommendations before formally submitting a rule change request.¹²⁵

Recommendations to improve the timeliness of decisions were made by the Vertigan and Finkel reviews. The recommended changes to review processes can be progressed without legislative change, however the recommended timeframe for expedited rule changes requires changes to the NEL, NGL and NERL. It should also be recognised that in relation to reviews, the ability to achieve timely reforms in practice relies on the Council, SCO and the secretariat also making changes to the way in which they consider and progress review recommendations. Overall, faster decisions require the SCO to facilitate, in a timely manner, the process of getting advice and recommendations to Ministers for consideration, and for the Council to agree (or otherwise) to the review recommendations faster than has historically been the case.

Institutional arrangements

A number of changes have been agreed to strengthen institutional arrangements.

- Council has agreed to adjust the resourcing and funding of the market bodies, in particular to review and progress the funding mechanisms for the AER and the ESB as a priority.

¹²⁴ In addition to the standard rule change process, a request to change the rules can be submitted through an expedited or fast-tracked rule change process. The fast-tracked rule change process takes approximately 17 weeks and requires the proposed change to have been either submitted by AEMO, the AER or the Reliability Panel and have been subject to consultation by those parties, or reflect a recommendation made in an AEMC review. The expedited rule change process takes approximately six weeks and requires the proposed change to be either “non-controversial” or “urgent” as defined in the Law.

¹²⁵ This is a typical time period and the actual length has varied significantly from a few months to a number of years.

- In line with the recommendations of the Finkel review, AEMO will review and update its Constitution, and will consider the proposed changes to arrangements for its Board of Directors so that the board is appointed on a skills, rather than a representative, basis.
- The establishment of a data strategy to support the strategic plan for the national electricity market has been agreed as a matter of priority. This is currently being led by the AER but may feed into the ESB process when the body is properly operational.

11.4 Measuring progress

Progress in governance arrangements can be measured in a number of ways, including:

- Council establishing the strategic priorities for the energy sector.
- Council re-committing to the AEMA, and improving the management of derogations.
- Statements of expectation and role provided to AEMC, AER and AEMO.
- Clear and specific examples of improvements in coordination (e.g. reports and timing), including industry and consumer feedback on these processes.
- AER and ESB resourcing addressed.
- AEMO's constitution and Board representation revised

Beyond these, the ultimate metric for governance is the long term outcomes for consumers as measured in the other priority areas. It is only if the individual and collective goals for each area of the industry are achieved that governance can be assessed as being successful and effective.

A Summary of governance goals and initiatives

Goals	Components	Programs and recommendations	12 months 31-Dec-18	24 months 31-Dec-19	36 months 31-Dec-20
Leadership and strategic direction	Strategic direction	Have a 3 year strategic plan in place, with annual refreshes and reporting against progress	mid 2018		
	Leadership	Establish the Energy Security Board to oversee the implementation of the blueprint, and system oversight of energy security and reliability	Jul-17		
		COAG Energy Council (Council) to issue Terms of Reference and Statement of Expectations to ESB	Dec-17		
	Recommit to a national energy market	COAG EC recommit to a new Australian Energy Market Agreement, with; a national approach to emissions reduction; jurisdictions give notice prior to taking any unilateral action	De-17 Council to consider draft AEMA		

		Assess the new licensing arrangements for generators in South Australia and whether they should be applied in other national electricity market regions				
Role clarity and coordination	Role clarity	Issue Statements of Expectations to the AEMC and AER, and a Statement of Role to AEMO	mid 2018			
	Coordination	Opportunities for improved coordination on reviews and reports by the market bodies.				
		Staging of reforms and changes, to minimise impacts on industry and stakeholders				
Responsiveness to market changes	National electricity rules	Complete a comprehensive review of the national electricity rules			end 2020	
	Functional improvements	Expedite the rule -making process, including through better prioritisation of work through the market bodies and COAG EC		end 2017		
		COAG EC issue a Statement of Policy Principles to the AEMC to provide clarification and policy guidance on applying the NEO in the rule making process		mid 2018		
		SCO and COAG EC to examine how to deal with recommendations in a more timely manner				
		COAG EC to ensure adequate funding for the AER and ESB				
		AEMO to update its Constitution by developing a new skills matrix for directors that will ensure appropriate representation of engineering or equivalent expertise		end 2017		
		The ESB and AER to develop a data strategy for the national electricity market		end 2017 first phase end 2018 strategy	annual review	annual review

A Summary of goals and initiatives¹²⁶

CONSUMER

Goals	Initiatives	Programs and recommendations	12 months 31-Dec-18	24 months 31-Dec-19	36 months 31-Dec-20
Efficient price outcomes and affordability	Efficient price outcomes	Delivered by effective market outcomes and network regulation			
	Affordability	Government actions:			
		Review the application of energy concession schemes and improve awareness of energy concession schemes			
		Transition vulnerable consumers away from higher priced standing offers and expired fixed benefit market offers Require retailers to report on action to improve customer affordability			
Accessible information	Awareness of potential savings	Develop a broad information program on consumer awareness and options to manage energy bills Retailers to provide understandable comparison rates and inform customers on expired discounts how much they can save.			
	Clear information on prices and contracts	Improve the clarity of customer information on pricing offers, and what happens when their contracts expire The Health of the NEM report to include price and availability of long-term retail contracts for commercial and industrial customers Resource the AER to run an effective awareness campaign and maintain the use of Energy Made Easy	end 2017		
	Access to metering data	Improve consumers' access to, and rights to share, their energy data			mid 2020
Engagement and participation	Ability to participate in the market (e.g. distributed energy resources, demand side participation, peer-to-peer trading)	Facilitate consumer participation in the market via demand response opportunities	mid 2018		
	Government incentives and programs (e.g. appliance replacement, energy saving schemes)	Jurisdictional programs for energy savings and efficient appliances Measures will be collated and reported with the National Energy Productivity Plan.			

¹²⁶ Please note this list is a summary only. A spread-sheet providing more detail on each of these initiatives (such as its timing and source or driver) is available on the AEMC web-site. See <http://www.aemc.gov.au/Markets-Reviews-Advice/2017-Energy-sector-strategic-priorities>

Goals	Initiatives	Programs and recommendations	12 months	24 months	36 months
Protections	NECF and Australian Consumer Law	Harmonise energy consumer protection arrangements across the national electricity market		mid 2019	
		Council has agreed to extend the NECF or otherwise protect consumers dealing with new energy service providers and new product/service offerings, including embedded networks	mid 2018		
		Strengthen protections for customers with life support equipment	end 2017		

INTEGRATION OF ENERGY AND EMISSIONS POLICIES

Goals	Initiatives	Programs and recommendations	12 months 31-Dec-18	24 months 31-Dec-19	36 months 31-Dec-20
Government implement a long term national emissions reduction target		By 2020, the Australian Government implement a national emissions reduction strategy for 2050			2020
Coordinated approach between the Commonwealth and jurisdictions		Commonwealth and jurisdictions agree to an emissions reduction trajectory for the national electricity market	"urgent need"		
Emissions reduction mechanisms to integrate with energy policy		Implement an emissions reduction scheme that is consistent with energy policy	"urgent need"		

Note: the phrase "urgent need" was used in the Finkel review, recommendation 3.2.

SYSTEM SECURITY

Goals	Components	Programs and recommendations	12 months	24 months	36 months
			31-Dec-18	31-Dec-19	31-Dec-20
Frequency control	Resist frequency changes	Final determination to deliver minimum level of inertia and initial Fast Frequency Response (FFR)	19-Sep-17		
		Minimum initial inertia level set	Apr-18		
		Final determination on generator performance standards rule request	mid 2018		
		Final determination on generator system model guidelines	12-Sep-17		
		Final determination on system strength	19-Sep-17		
		Draft rule considering mechanisms to deliver additional inertia	07-Nov-17		
		Review of the frequency operating standard (FOS)	mid 2018		
		Energy security obligations. The AEMC should require transmission network service providers to provide a sufficient level of inertia for each region or sub-region, including a portion that could be substituted by fast frequency response	mid 2018		
	Better frequency control	Frequency Control Frameworks Review: faster response services for FCAS; recent deterioration in frequency control performance.	30-Jun-18		
System strength	A stronger system	Draft rules on the management of power system fault levels	27-Jun-17		
		AEMC review and update the connections standards. A comprehensive review of connections standards should occur every 3 years.	mid 2018		
An adaptable and flexible system	Distributed energy resources	AEMC's final report on the Distribution Market Model	22-Aug-17		
		AEMC to review the regulatory framework for power system security related to distributed energy resources participation	mid 2018		
		AEMC to advise COAG EC on rule change options to incentivise and orchestrate distributed energy resource participation in services such as frequency and voltage control		mid 2019	
		COAG EC has agreed to develop a Distributed Energy Resources Register	mid 2018		
	System resilience to threats	AEMO ensure the black system restart plan identifies the roles of parties at each stage of the restart process, and includes regular testing of equipment and processes	mid 2018		
		Australian government to assess the national electricity market's resilience to human and environmental threats. The assessment should be updated every 3 years.		mid 2019	

	The ESB provide an annual report on the cyber preparedness of the national electricity market.	end 2018
	Develop a strategy to improve the integrity of energy infrastructure and the accuracy of supply and demand forecasting	end 2018
	Develop a national assessment of the future workforce requirements for the electricity sector	mid 2019

RELIABILITY

Goals	Components	Programs and recommendations	12 months	24 months	36 months
			31-Dec-18	31-Dec-19	31-Dec-20
Efficient market-based approach		The Reliability Standard and Settings review to consider the reliability standard and settings to apply from 1 July 2020	30-Apr-18		
		Reliability Frameworks Review to assess changes necessary to provide adequate dispatchable energy in the national electricity market	31-Dec-17 interim 30-Jun-18 final		
		The Reliability Frameworks Review will address various Finkel review actions a. the suitability of a 'day-ahead' market to assist in maintaining system reliability. b. the need for a Strategic Reserve as a safety net in exceptional circumstances c. a Generator Reliability Obligation.	31-Dec-17 interim 30-Jun-18 final		
		AEMO advice on the adequacy of current and forecast levels of dispatchable resources to meet the reliability standard over the next 10 years	01-Sep-17		
		AEMO advice on South Australia licensing arrangements	01-Aug-17		
	Information	AEMO to publish its short term demand forecast methodology, FY2018 summer forecast, preparedness for FY2018 summer	Sep-17		
		Rule change to replace the contingency-based definitions of lack of reserve conditions with a system triggered by a wider range of risks			
		AEMO's statement of opportunities, energy adequacy assessment program, and projected assessments of system adequacy	ongoing	ongoing	ongoing
		Generators to provide information on their fuel resource adequacy and fuel supply contracts	01-Dec-17		
	Appropriate intervention mechanisms		Reliability Frameworks Review will consider intervention mechanisms required, including the need for a Strategic Reserve.	Report to Council June 2018	
		AEMO last resort power to have gas fired generators available to maintain reliability in emergencies	01-Sept-17 initial response		

EFFECTIVE MARKETS

Goals	Initiatives	Programs and recommendations	12 months	24 months	36 months
			31-Dec-18	31-Dec-19	31-Dec-20
Market participation	Participation	Determine how distributed energy resources can be integrated into and participate in the national electricity market	22-Aug-17		
		Develop a mechanism that facilitates demand response in the wholesale market	mid 2018		
	Information on market participation	Develop a credible survey on electricity trading hedging products, or remove exemptions from derivative trade reporting requirements			
		Health of the NEM report to include information on the price and availability of long-term retail contracts for commercial and industrials	end 2017		
Transparent and efficient prices	Market overview	ACCC inquiry into retail electricity prices in the national electricity market, including issues associated with vertical integration and market power	draft Sept 2017		
			Final Jun 2018		
	Specific initiatives	Rule change process on whether to align the settlement time period (currently 30 minutes) with the 5 minute dispatch period	28-Nov-17		
		Creation of pricing mechanisms for the provision of inertia and fast frequency response			
	Implementation of cost-reflective network tariffs	01-Dec-17			
Market reforms to facilitate and adapt to change	Trial programs	AEMC to review and update the regulatory framework to facilitate proof-of-concept testing of innovative approaches and technologies	31-Dec-18		
		A funding source for trials by AEMO and the Australian Renewable Energy Agency should be assured for the long term			

NETWORKS

Goals	Components	Programs and recommendations	12 months	24 months	36 months	
			31-Dec-18	31-Dec-19	31-Dec-20	
Efficient regulation of monopoly infrastructure	Delineation of competitive and regulated services	Introduction of metering competition (except Victoria).	1-Dec-17			
		Distribution network service providers (DNSPs) implementing AER guidelines on ring-fencing	Jan-18			
		Rule change to allow contestability of connection services while keeping TNSPs responsible for network outcomes				
		Rule change processes on contestability of energy services (limiting NSPs' control of behind-the-meter assets)	21-Nov-17			
		Rule change process on whether distributors can use off-grid supply models to provide electricity, instead of maintaining/replacing existing network assets	19-Dec-17			
		Economic regulation	Test if capital investments in network assets are preferred over operational expenditure on demand-side measures.	mid 2018		
		If capex bias demonstrated, examine alternative models such as total expenditure approach		mid 2019		
		Finalise and implement the agreed reforms to Limited Merits Review	end 2017			
		Agreement to set binding rate of return guidelines with advice from independent panel	Jul-17			
		Review the Regulatory Investment Test for Transmission and for Distribution			mid 2020	
		Ensure DNSPs financial incentives allow distributed energy resources to contribute to the management of network constraints				
	Evolution of networks as efficient platforms for energy services		Cost reflective network tariffs are being implemented	01-Dec-17		
		Distribution	The AEMC's Distribution Market Model review and subsequent work, among other things, is considering how to efficiently integrate DER into the national electricity market	22-Aug-17		
Transmission		Review is underway on whether generation and transmission investments are efficiently coordinated	22 Aug 2017	Discussion paper		

GAS

Goals	Components	Programs and recommendations	12 months 31-Dec-18	24 months 31-Dec-19	36 months 31-Dec-20
Access to efficiently priced gas		2017 budget measures to improve domestic gas supplies include: study into the construction of gas pipelines from the Northern Territory and Western Australia; assessment to understand impacts on waterways and aquifers from unconventional gas projects; Gas acceleration program (GAP) for development of onshore gas fields.	GAP initiative is for 3 years		
		Australian Domestic Gas Security Mechanism to deliver natural gas to the domestic market, including limiting LNG exports if required	Decision on whether to invoke the mechanism is made each year		
		Case by case evidence based regime to assess individual gas projects, and fair compensation to landholders, to increase gas supply			
Access to efficiently priced pipeline infrastructure		Implementation of the Gas Market Reform Group's (GMRG) information and arbitration framework for non-scheme pipelines is underway	01-Feb-18		
		The economic regulation of covered pipelines is being reviewed	mid 2018		
		The Senior Committee of Officials (SCO) to report on regulatory options to strengthen pipeline regulation	end 2017		
Market information	Market assessment	ACCC inquiry into the supply of and demand for wholesale gas in Australia, including focus on pricing, volumes, domestic availability compared to export, the availability of goods or services that facilitate the supply of gas or gas transportation services	Reports every 6 months for next 3 years, commencing in October 2017		
	Gas Bulletin Board improvements	Gas Bulletin Board rule changes: information (among other things) on gas flows, forecasts, asset retirements and expansions – ie the ability of gas powered generators (GPG) to generate; increased reporting obligations for large gas users	30 Oct 2018 for GPG information		
		Additional AEMO improvements to the Gas Bulletin Board (e.g. publish voluntary pricing information)			
		AEMO to publish real time gas flows and market analysis to assist participants make operational decisions			
	Information	Relevant regulatory and scientific data on gas to be made available in an informative and easily accessible way			
Gas market reforms		Victorian government progressing rule change requests to improve the ability of participants to manage price and	mid - late 2017		

volume risks in the DWGM/Vic gas market	
AEMC to provide a biennial report to monitor the growth in liquidity in the wholesale gas and pipeline capacity trading markets	mid 2018
Measures to improve secondary trading of pipeline capacity are being implemented, including standardising gas transportation contracts, designing a capacity auction mechanism, and developing a capacity trading platform	late 2018 implementation

GOVERNANCE

Goals	Components	Programs and recommendations	12 months 31-Dec-18	24 months 31-Dec-19	36 months 31-Dec-20
Leadership and strategic direction	Strategic direction	Have a 3 year strategic plan in place, with annual refreshes and reporting against progress	mid 2018		
	Leadership	Establish the Energy Security Board to oversee the implementation of the blueprint, and system oversight of energy security and reliability	Jul-17		
		Energy Council to issue Terms of Reference and Statement of Expectations to ESB	Dec-17		
	Recommit to a national energy market	COAG EC recommit to a new Australian Energy Market Agreement, with; a national approach to emissions reduction; jurisdictions give notice prior to taking any unilateral action Assess the new licensing arrangements for generators in South Australia and whether they should be applied in other national electricity market regions	De-17 Council to consider draft AEMA		
Role clarity and coordination	Role clarity	Issue Statements of Expectations to the AEMC and AER, and a Statement of Role to AEMO	mid 2018		
	Coordination	Opportunities for improved coordination on reviews and reports by the market bodies. Staging of reforms and changes, to minimise impacts on industry and stakeholders			
Responsiveness to market changes	National electricity rules	Complete a comprehensive review of the national electricity rules			end 2020
	Functional improvements	Expedite the rule -making process, including through better prioritisation of work through the market bodies and COAG EC	end 2017		
		COAG EC issue a Statement of Policy Principles to the AEMC to provide clarification and policy guidance on applying the NEO in the rule making process	mid 2018		
		SCO and COAG EC to examine how to deal with recommendations in a more timely manner			
		COAG EC to ensure adequate funding for the AER and ESB			
		AEMO to update its Constitution by developing a new skills matrix for directors that will ensure appropriate representation of engineering or equivalent expertise	end 2017		

The ESB and AER to develop a data strategy for the national electricity market	end 2017 first phase end 2018 strategy	annual review	annual review
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