



Approach to electricity wholesale market performance monitoring

Discussion paper

August 2017

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Shortened forms

Shortened Form	Extended Form
ACCC	Australian Competition and Consumer Commission
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ASX	Australian Securities Exchange
COAG EC	Council of Australian Governments Energy Council
FCAS	frequency control ancillary services
IRSR	interregional settlement residue right
LRMC	long run marginal cost
MCE	Ministerial Council on Energy
MEU	Major Energy Users Inc.
NEL	National Electricity Law
NEM	National Electricity Market
NER	National Electricity Rules
the performance report	The biennial report required as part of our wholesale market monitoring and reporting functions.

1 About this consultation

Under new amendments to the National Electricity Law (NEL), the AER is required to monitor electricity wholesale market performance on a systematic basis and publish a report on its findings at least every two years (**the performance report**). This important monitoring and reporting role supports the efficient operation of the electricity wholesale market as it allows early detection of issues affecting market performance. We must publish the first report by December 2018.

To complete this report, we need to develop a practical, robust and systematic approach to assessing wholesale market performance. This Discussion Paper represents our first major engagement with stakeholders on these new functions. We are seeking input from stakeholders to develop our approach, including on:

- key concepts, such as the meaning of *effective competition* and *efficiency*
- the relevant products and markets we should consider
- how we should go about assessing the performance of the markets
- how we should gather, use and present information.

At this stage, we are not looking for views on whether competition is effective in the wholesale markets. Stakeholders' feedback at this time will assist us to define and prioritise future work. Ultimately, we are aiming to develop a public statement of approach, which we will use to guide our analysis and prepare our performance reports.

The amendments to the NEL require us to monitor the wholesale market and report on its performance. In particular, we are required to identify and analyse whether:

- there is 'effective competition' within the relevant wholesale market, as defined in the NEL
- there are features of the market that may be detrimental to effective competition within the market
- there are features of the market that may be impacting detrimentally on the efficient functioning of the market and the achievement of the national electricity objective.

We have a series of existing performance reporting obligations across our wholesale, retail and network areas that pre-date these new functions. We will draw on these as required to assist our analysis. We also publish our annual State of the Energy Market report which provides an overview of the electricity and gas supply chain.

Our existing monitoring activities for wholesale markets generally focus on short term outcomes, compliance issues and individual price events. The new monitoring and reporting functions will provide a broader, long-term perspective. Results of our analysis will assist to identify and highlight market inefficiencies or competition issues early.

1.1 Consultation process

Our proposed engagement with stakeholders to develop our statement of approach is set out in Table 1.1.

Table 1.1 Indicative timetable for development of statement of approach

Milestone	Date
Consultation paper published	31 August 2017
Public discussion forum	6 October 2017
Written submissions on the discussion paper close	13 October 2017
Draft statement of approach published	November 2017
Written submissions on the draft statement of approach close	December 2017
Final statement of approach published	February 2018

We anticipate there will be additional scope for engagement on detailed methods and other issues as we move to preparing the performance report in 2018.

1.2 How to get involved

We will post information and updates on this project on our website at www.aer.gov.au/wholesale-markets/market-guidelines-reviews.

1.2.1 Register your interest

We invite stakeholders to register their interest in receiving specific updates on this project via wholesaleperformance@aer.gov.au preferably by close of business **8 September 2017**. Participants who register before this date will be consulted on the content and format of our upcoming stakeholder forum in Melbourne on 6 October 2017. Further details of the forum will be published on our website and emailed to stakeholders who register their interest.

1.2.2 Invitation for submissions

Interested parties are invited to make written submissions in response to the specific issues or questions raised in this paper or any other aspects of the new monitoring and reporting obligations by the close of business, **13 October 2017**.

Submissions should be sent electronically to: wholesaleperformance@aer.gov.au.

Alternatively, submissions can be mailed to:

Mr Gavin Fox
Acting General Manager, Wholesale Markets
Australian Energy Regulator
GPO Box 3131
Canberra ACT 2601

We prefer that all submissions be publicly available to facilitate an informed and transparent consultative process. Submissions will be treated as public documents unless otherwise requested. Parties wishing to submit confidential information are requested to:

- clearly identify the information that is the subject of the confidentiality claim
- provide a non-confidential version of the submission in a form suitable for publication.

We will place all non-confidential submissions on our website at www.aer.gov.au. For further information regarding our use and disclosure of information provided to us, see the ACCC/AER *Information Policy*, June 2014 available on our website.

Enquiries about this paper, or about lodging submissions, should be directed to the Wholesale Markets branch of the AER on (03) 9290 1800.

1.3 Structure and purpose of this document

This document is structured as follows:

- Within each chapter, we have included a series of questions to guide discussion and stakeholder feedback. These questions are also set out below. Responses to these questions will inform the development of our statement of approach.
- Chapter 2 summarises our roles and provides some relevant background.
- Chapters 3 to 6 set out the kinds of issues that we will ultimately need to consider when assessing the competitiveness and efficiency of the wholesale electricity markets.
- Chapter 7 provides an overview of our information gathering powers.

1.3.1 Summary of questions

- Question 1: What material should we consider in establishing our approach?
- Question 2: What factors should we consider when prioritising tools or analysis?
- Question 3: What are the relevant products in the wholesale electricity markets? Are frequency control ancillary services (FCAS) and energy products part of the same or different markets?
- Question 4: Given the interactions between spot and derivatives markets, to what extent should we incorporate monitoring and reporting of outcomes in derivatives markets?
- Question 5: To what extent should we incorporate monitoring and reporting of interregional settlement residue rights (IRSRs)?
- Question 6: What are the factors we should consider when defining the geographic dimensions of the market?
- Question 7: What are the factors we should consider when determining the relevant period of time for our assessment?
- Question 8: What issues should we be aware of in applying the definition of effective competition in the National Electricity Law? Are there additional matters we should consider?
- Question 9: What factors can compromise efficiency in wholesale electricity markets?
- Question 10: What market concentration indicators should we consider?
- Question 11: What are the relevant sources of potential barriers to entry? What methods should we use to assess these barriers?
- Question 12: What are the issues we should consider regarding horizontal or vertical integration in the wholesale energy markets?
- Question 13: What aspects of a participant's conduct should we consider? Are there any methods or tools that might be insightful for assessing conduct?
- Question 14: How should we assess the overall performance of the wholesale markets?
- Question 15: How should we have regard to whether prices are determined on a long term basis by underlying costs rather than the existence of market power?
- Question 16: How can we identify inefficiencies in the wholesale markets?
- Question 17: How should we measure the extent of any inefficiencies we identify?

2 Background

2.1 Overview of the new functions

Our new functions and obligations are set out in the new Division 1A of Part 3 of the NEL and relate to both monitoring and reporting of the wholesale electricity markets.

2.1.1 Monitoring

In summary, our new wholesale market monitoring functions are to monitor and review, on a regular basis, the performance of wholesale electricity markets, including identifying and analysing whether:

- there is effective competition in the market
- there are features of the market that may be detrimental to effective competition within the market
- there are features of the market that may be impacting detrimentally on the efficient functioning of the market (and if so, assess the extent of the inefficiency).

2.1.2 Reporting

We must publish a report on the performance of wholesale markets at least every two years. The report must cover a period of at least five years¹, and contain discussion and analysis of:

- the results of the AER wholesale market monitoring functions
- features of the market that impact detrimentally on the efficient functioning of the market and the achievement of the national electricity objective, including (but not limited to):
 - the presence of significant barriers to entry
 - any other features of the industry structure that give rise to concerns that there may not be effective competition within the market
- inefficiencies in the market, their causes, and whether conditions in the market are such that the inefficiencies are likely to impact detrimentally in the long term on the efficient functioning of the market
- the monitoring methodology applied, and the results of indicators, tests, and calculations performed
- other matters of a long term nature relevant to effective competition within the market, including, for example, observations relating to planned increases in interconnector capacity and trends in demand for electricity and in the uptake of alternative sources of energy.

¹ The amendments include transitional provisions, which shorten the minimum period over which the first and second reports must cover (2 years for the first report and 4 for the second).

The first report is due in December 2018.

In addition, we may provide advice on the results of our wholesale market monitoring functions to the Council of Australian Governments Energy Council (COAG EC)². This may include advice as to whether there are features of the market (systemic or otherwise) that may:

- be detrimental to effective competition within the market
 - impact detrimentally on the efficient functioning of the market
- such that a legislative, regulatory or other response is required.

2.1.3 Possible outcomes of our findings

These new functions are concerned with monitoring and reporting. If we come to a view that a wholesale market is not effectively competitive or functioning efficiently, we may advise the COAG EC on possible responses such as:

- proposing changes to the National Electricity Rules that directly address the conduct or elements of market design that give rise to ineffective competition or inefficient outcomes
- engaging with the Australian Energy Market Operator (AEMO) regarding technical aspects of wholesale market operation or aspects of its planning responsibilities
- engaging with the Australian Energy Markets Commission (AEMC), government and industry stakeholders regarding the appropriateness of potential market reviews, rule changes or wider policies or settings.

Where ineffective competition or inefficient outcomes are attributable to other factors, we can provide comment or propose changes to broader legislative or regulatory provisions.

2.2 History to the roles

The new monitoring and reporting role arose following the AEMC considering a rule change proposal from the Major Energy Users Inc. (MEU). The MEU considered that during periods of high demand, some large generators had the ability and the incentive to exercise market power to increase the wholesale electricity spot price. The MEU proposal was to restrict offers submitted by a 'dominant' generator when regional demand exceeded pre-defined thresholds.³

The AEMC ultimately did not make the proposed rule change, as it did not consider there was sufficient evidence of the exercise of market power. However, the AEMC did recognise that there was potential for substantial market power to exist and be exercised in the future. It recommended that the COAG EC confer upon the AER a specific function to regularly report on whether the wholesale electricity market is operating efficiently.⁴

² Referred to as the Ministerial Council on Energy (MCE) in the NEL

³ Major Energy Users Inc. 2010, Proposed Rule Change to Enhance Generator Competition Outcomes During High Demand Periods in the NEM, 15 November 2010.

⁴ AEMC 2013, Potential Generator Market Power in the NEM, Final Rule Determination, 26 April 2013, Sydney.

In response to the AEMC's recommendations, the COAG EC pursued amendments to the NEL to introduce new wholesale market monitoring and reporting functions for the AER. Amendments to the NEL passed South Australian parliament in December 2016.

2.3 Related projects and reviews

In November 2016, the Commonwealth Treasurer and Minister for Environment and Energy requested that we monitor developments in Victoria and South Australia and report to COAG EC by March 2018. In particular, they requested that we advise on any factors affecting market efficiency following the closure of Hazelwood power station earlier this year. While we are not specifically consulting on the Hazelwood advice through this engagement process, the views expressed in this process are likely to inform aspects of our approach to the Hazelwood advice.

Separately, there is a range of other reviews or inquiries by other agencies, which may provide useful information or analysis on the performance of our new functions, notably:

- **ACCC retail electricity supply and prices inquiry**—the Treasurer directed the ACCC to hold an inquiry into the supply of retail electricity and the competitiveness of retail electricity prices. While the focus of the inquiry is on retail markets, the terms of reference note that the operation and competitiveness of the wholesale electricity market significantly affects retail market outcomes and needs to be considered.
- **AEMC retail competition and residential price trends reviews**—the AEMC undertakes annual reviews of retail energy competition in the NEM and retail electricity price trends. Both of these reviews examine the impact of wholesale issues, which we will consider in undertaking our new wholesale market monitoring and reporting roles.
- **The independent review into the future security of the National Electricity Market**—The Chief Scientist, Dr Alan Finkel AO, chaired a review of the NEM that published its findings in June 2017. A number of recommendations arose from this review. We will consider the impact of these recommendations to the extent they may affect the effectiveness or competition or the efficient functioning of the market.

Where appropriate, we will liaise closely with the relevant agencies so we can share insights on our various approaches.

3 How do we develop our approach?

We anticipate the statement of approach will be a high level document that will outline the questions we will seek to answer and key analysis we will undertake. It should be flexible enough to allow us to develop and modify our approach over time as we learn from our analysis and respond to feedback from stakeholders.

A flexible approach will also allow us to respond to changing market conditions over time. This is particularly necessary given the rapid transformation electricity markets have been experiencing in recent years due to, for example, the rise in penetration of distributed generation and controllable consumption devices. Changes such as these may have the potential to affect outcomes in the wholesale electricity markets.

3.1 What guides our approach?

There is a range of material that we will have regard to in developing our approach.

The new Part 3 Division 1A of the NEL outlines the scope of our functions and defines key terms, such as effective competition. In addition, we will have regard to the national electricity objective, which 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-

(a) price, quality, safety, reliability and security of supply of electricity; and

(b) the reliability, safety and security of the national electricity system.

In addition to the NEL, there may be a range of other materials and experiences (both locally and internationally) we could draw on, including, for example:

- competition law jurisprudence, including approaches commonly utilised by competition regulators (e.g. merger guidelines)
- the approaches of other international electricity market regulators and monitoring agencies in analysing the performance of wholesale electricity markets
- material published by the AEMC as part of its consideration of the MEU's 2010 rule change proposal.

While this material would not be binding on the AER, it could inform aspects of our approach.

Question 1: What material should we consider in establishing our approach?

3.2 How do we prioritise our analysis?

Analysing the effectiveness of competition and the efficiency of the market is a complex task. Our analysis will need to be informed by a range of qualitative and quantitative analysis. We

will examine the interactions between these various pieces of analysis rather than relying on any single result as a bright-line test.

We are likely to expand and enhance the measures and tools we use over time drawing on best practice. We will consider the following criteria to determine which measures, tools or information we will prioritise:

- *Probative value*—whether it will provide additional or new insights about market performance
- *Robustness*—whether it is a robust and reliable measure of performance
- *Accessibility*—the extent to which it can be well understood
- *Practicality*—the extent to which it can be prepared in a timely manner.

Question 2: What factors should we consider when prioritising tools or analysis?

4 What are the relevant markets?

Our market monitoring and reporting functions under s18C of the NEL refer to monitoring and reviewing *wholesale electricity markets*. The NEL defines a wholesale electricity market as “any market for electricity regulated under this Law or Rules”. While this definition limits the scope of the assessment task, it does not specifically define the particular products and markets that we should monitor.

Approaches to competition law analysis may provide useful guidance for framing the markets. In competition law, markets are commonly defined across various dimensions, including:

- *Functional*—the relevant level of the production process
- *Product*—the products in question
- *Geographic*—the areas across which buyers and sellers transact
- *Temporal*—the periods of time over which buyers and sellers make decisions about transactions, and entry and exit.

The functional level of the market (wholesale) is specified in the NEL. The AEMC's annual retail competition reviews and the ACCC's retail electricity supply and prices inquiry are exploring issues in retail markets (and the factors in other functional levels of the market that contribute to retail prices and margins).

There are interdependences between selecting the various market dimensions. A longer temporal dimension will often favour (but not always) adopting a wider product and geographic market definition. This is because greater time allows buyers and sellers more scope to engage in substitution and permits the entry and exit of new and existing participants.

4.1 What are the relevant products?

4.1.1 Spot market products

Products offered in the wholesale spot market are regulated under the National Electricity Law and Rules. The principal product traded is physical electricity. Subject to some limited exceptions, all electricity produced in the NEM must be transacted through the spot market.

There are also a range of ancillary services markets and a series of contracted services that ensure the secure operation of the power system. For example, AEMO operates frequency control ancillary services (FCAS) markets to manage frequency deviations in the supply and demand balance as well as more major events (such as the loss of a major industrial load).

The provision of FCAS and electricity generation could be considered close substitutes on the supply side. This is because AEMO may move the energy target for a generator which is providing FCAS, to minimise the total cost of energy. However not all generators can provide FCAS. The increasing proportion of non-synchronous generation capacity in recent years

may have significant impact on the performance and operation of FCAS markets. Given this, there may be merit in analysing wholesale energy and FCAS markets separately.

4.1.2 Derivative products

Outside the spot markets, most wholesale market participants sell (or buy) a range of derivatives products. Given spot prices can rise to as high as \$14 200 or fall as low as -\$1000, many market participants manage their exposure to price risk by entering into hedge (derivative) contracts.

Wholesale market participants trade these products in two distinct ways:

- *over the counter (OTC)*—this involves direct contracting between counterparties often assisted by a broker
- *exchange traded*—electricity futures products are traded on the Australian Securities Exchange (ASX).

Derivatives products are not regulated under the National Electricity Law or Rules. However, it may be important for us to have regard to the extent to which participants in the spot market trade in electricity derivative instruments. This is because there are close interactions between conduct or outcomes on the spot markets and trading of derivatives products. For example:

- derivatives products may be settled by reference to outcomes on the spot market
- the degree to which participants are hedged may affect how they offer capacity in the spot markets
- a lack of availability of derivatives products may act as a barrier to entry in the wholesale spot markets.

There are a range of derivatives products. The ASX products are standardised to promote trading, while OTC products can be sculpted to suit the requirements of the counterparties. Common forms of derivative contracts are:

- *Futures ('swaps' or 'contracts-for-difference')*—which allow a party to lock in a fixed price to buy or sell a given quantity of electricity over a specified time. Each contract relates to a nominated time or day in a particular region. These products include:
 - quarterly base contracts, which cover all intervals
 - quarterly peak contracts, which cover specified times of generally high demand
 - calendar or financial year strips covering four quarters.
- *Options*—which allow the holder to enter (without obligation) into a contract at an agreed price, volume and term in the future.
- *Cap/Floor contracts*—which place an upper or lower limit on the price that the holder will pay for electricity in the future (typically, \$300/MWh), and are traded as both futures and options.

4.1.3 Interregional settlement residue rights

Participants can hedge their exposure to inter-regional price differences by acquiring interregional settlement residue rights (IRSRs). When there is price separation across regions, electricity will tend to flow from lower priced regions to higher priced regions. The generators in the exporting region are paid at their local regional spot price, while customers in the importing region will pay the higher spot price in the importing region. This difference between these prices multiplied by the amount of electricity exported is called the settlement residue. The National Electricity Rules set out principles for the allocation of these rights and permits AEMO to auction the rights to these residues.

While IRSRs provide their holder with a stream of revenue when there is price separation between regions, they do not provide a completely reliable hedge against this risk. This is because network limitations within a region may cause prices to diverge even though an interconnector may not be constrained.

Question 3: What are the relevant products in the wholesale electricity markets? Are FCAS and energy products part of the same or different markets?

Question 4: Given the interactions between spot and derivatives markets, to what extent should we incorporate monitoring and reporting of outcomes in derivatives markets?

Question 5: To what extent should we incorporate monitoring and reporting of IRSRs?

4.2 What are the geographic considerations?

The NEM operates across five separate regions covering Queensland, New South Wales, the Australian Capital Territory, Victoria, Tasmania and South Australia. The regions roughly align with each of the state boundaries, with the ACT falling within the NSW region. The regions are linked by transmission interconnectors.

The interconnected nature of the market means that energy produced by generators may be consumed in any NEM region. However, the ability of electricity generators in one NEM region to supply consumers in another is limited by the capacity of the transmission network connecting the jurisdictions. These limitations must be taken into account when assessing the extent to which generators throughout the NEM are likely to constrain the spot pricing and output decisions of other generators.

Because of network limitations on power flows, derivative trading between participants in different regions is also limited. A participant that enters a contract settled against a price in one region to hedge its exposure to another regional price, is exposed to the risk that the prices may diverge. A contract settled at a different regional price provides a poor hedge for the participant's exposure to the local regional price. As noted above IRSRs also do not provide a completely reliable hedge against the risk of price separation between regions.

In its analysis of the MEU rule change proposal, the AEMC adopted a region based market definition, that is, it assessed the state of competition in each region of the NEM separately, except Tasmania.⁵

Question 6: What are the factors we should consider when defining the geographic dimensions of the market?

4.3 What period of time is relevant for the assessment?

AEMO issues instructions to generators in the NEM every five minutes based on generators' bids. The wholesale spot markets are settled every 30 minutes.⁶ One approach to defining the temporal dimension of the market could be to focus on behaviour during each 30-minute trading interval.

However, this may not reflect the basis on which generators and customers operate their businesses. Market participants make business and investment decisions based on their ability to earn a commercial return over the life of their investments. Participants do not enter or exit the market because of the price in a particular 30 minute trading interval. This suggests that the appropriate temporal dimension of the market should be substantially longer than a single trading interval.

The definition of effective competition given in the NEL also seems to suggest a much longer timeframe for assessing the effectiveness of competition than a 30 minute trading interval. We discuss this further in section 5 below. It may also be that different time periods may be suitable for different monitoring purposes. The performance report itself must cover a period of at least five years.⁷

Question 7: What are the factors we should consider when determining the relevant period of time for our assessment?

⁵ The AEMC engaged NERA, who applied a test to identify the smallest area of product, functional and geographic space in which a hypothetical monopolist could profitably impose a small but significant and non-transitory increase in price (SSNIP test). Tasmania was excluded from consideration as it was considered a special case. AEMC, *Draft Rule Determination—Potential Generator Market Power in the NEM*, 7 June 2012, pp. 17-18.

⁶ There is a proposal currently being considered by the AEMC to reduce the time interval for settlement in the wholesale electricity market from 30 minutes to five minutes.

⁷ The first and second reports must cover 2 years and 4 years respectively.

5 Defining effective competition and efficiency

Under the new Division 1A of Part 3 of the NEL, we must monitor the markets to identify and analyse whether:

- there is *effective competition* within the market and whether there are features of the market that may be detrimental to effective competition
- there are features of the market that may be detrimental to the *efficient functioning* of the market.

A threshold question is to understand what effective competition and the efficient functioning of the wholesale electricity markets looks like.

5.1 What is effective competition?

The level of competition in any market can be assessed against a range of competitive outcomes. At one end is a monopoly where one firm effectively controls all output in the market and there is no competition. At the other end is a perfectly competitive market where no firm holds market power at any time. Perfect competition rarely arises in practice.

We are required to identify and analyse whether there is *effective competition*. The definition of effective competition in section 18B of the NEL provides a non-exclusive list of factors we must have regard to:

- whether there are active competitors in the market and whether those competitors hold a reasonably sustainable position in the market (or whether there is merely the threat of competition in the market)
- whether prices are determined on a long term basis by underlying costs rather than the existence of market power, even though a particular competitor may hold a substantial degree of market power from time to time
- whether barriers to entry into the market are sufficiently low so that a substantial degree of market power may only be held by a particular competitor on a temporary basis
- whether there is independent rivalry in all dimensions of the price, product or service offered in the market, and
- any other matters we consider relevant.

The concepts of ‘effective competition’ have also been considered by the Australian Competition Tribunal, the Federal Court and the National Competition Policy ‘Hilmer’ Report (in the context of access to facilities).⁸

While not binding on us, economic theory and competition law commentary may provide useful insights when applying the concept of effective competition to the NEM.

⁸ For example see Chime Communications Pty Ltd (No3) (2009) ACompT 4; Sydney Airport Corporation Limited v Australian Competition Tribunal [2006] FCAFC 146; *The National Competition Policy: Report by the Independent Committee of Inquiry* (F. Hilmer, M. Rayner and G. Taperell), 1993, AGPS, Canberra

Economic theory provides that in perfectly competitive markets, firms are unable to influence the level of output and prices in the market—each firm is said to be a 'price taker'.⁹

Competition is often defined by an absence of market power,¹⁰ while market power has been described as "the ability of a buyer or seller to affect the price of a good".¹¹

The exercise of market power by generators in a wholesale electricity market has been described as taking two forms:¹²

- *financial withholding*—raising the price of *any output* above marginal costs (also known as economic withholding)
- *physical withholding*—reducing output offered to the market.

Policy-makers and courts typically focus on whether competition is 'effective' or 'workable'.¹³ This is in recognition that in many respects real world markets depart from the theoretical concepts that underpin perfect competition. A market is said to be effectively or workably competitive if none of the firms in that market have *sustained* market power.¹⁴ The High Court has defined market power as:¹⁵

*... the ability of a firm to raise prices above the supply cost without rivals taking away customers **in due time**, supply cost being the minimum cost an efficient firm would incur in producing the product....[emphasis added]*

The NEL also suggests that we should have regard to whether market power is sustained or enduring. In particular, the definition refers to whether:

- prices are determined on a *long term basis* by underlying costs rather than market power, even though a particular competitor may hold a substantial degree of market power from *time to time*
- barriers to entry are sufficiently low that a substantial degree of market power may be held by a competitor only on a *temporary basis*.

In competition law analysis, the existence of barriers to entry is typically regarded as a key determinant of whether firms have market power in a practical sense. In the absence of major barriers to entry, above-cost pricing may be transient and competitive forces can serve

⁹ Pindyck, R.S. and D.L. Rubinfeld (2001), *Microeconomics*, Fifth Edition (International Edition), Pearson Education Inc (New Jersey), p.328.

¹⁰ Brunt, M., "Market Definition" Issues in Australian and New Zealand Trade Practices Litigation', *Australian Business Law Review*, 1990, Vol. 18, No. 2, pp. 86-128, at p. 95.

¹¹ Mas-Colell, A., A. Whinston and J. Green (1995), *Microeconomic Theory*, New York, Oxford University Press, p.383.

¹² Stoft, S., *Power System Economics, Designing Markets for Electricity*, IEEE Press 2002, p.322. Stoft notes that in most cases, these are equivalent strategies. The only difference is that financial withholding strategies allow the generator greater control of prices (in that the generator can set the market price anywhere up to the level of the next highest bid or offer); but this can be no more profitable than a quantity withholding strategy (in which the generator can force the price up to the level of the next highest bid or offer).

¹³ John Clark is regarded as the founder of the concept of workable competition as initially set out in Clark, J.M., "Towards a Concept of Workable Competition", *American Economic Review*, Vol.30, No.2, Part 1, (June 1940), pp.241-256.

¹⁴ Kayser, C. and Turner, D. F., (1959), *Antitrust Policy* at p. 75.

¹⁵ Queensland Wire Industries Pty Ltd v Broken Hill Pty Co Ltd (1989) 167 CLR 177 (Queensland Wire) p.188.

to prevent such outcomes enduring over time.¹⁶ The economic rationale for comparing prices to underlying costs is that prices above or below underlying cost should eventually lead to a supply response – new investment or plant exit. The result is that firms make zero economic profits in the long-run competitive equilibrium.¹⁷ However, it is not always clear what is meant by ‘underlying costs’ in a power system with a variety of plant types and where the fixed and variable costs of different plant technologies will change over time. We discuss a possible interpretation and methods for quantifying this in section 6.

Question 8: What issues should we be aware of in applying the definition of effective competition in the NEL? Are there additional matters we should consider?

5.2 What is efficient functioning of the market?

In addition to assessing whether a wholesale electricity market is effectively competitive, we are required to monitor the markets and identify whether there are features that are detrimental to the *efficient functioning* of the market. Our reports must contain discussion and analysis of inefficiencies in the market, their causes and whether they are likely to be detrimental to the efficient functioning of the market in the long term.

The NEL does not contain a definition of efficiency; however, this is a well understood concept in economic literature. Economic efficiency is concerned with maximising overall welfare (or the sum of consumer and producer surplus) in a market given the available resources. Consumer surplus refers to the difference between the value consumers place on a good or service and the price they actually pay. Producer surplus refers to the difference between the price producers receive and their marginal costs of production.¹⁸

Economic efficiency is generally considered to comprise three dimensions:¹⁹

- *allocative efficiency*—resources are allocated to their highest valued uses
- *productive efficiency*—the value of resources used are minimised for a given level of outputs
- *dynamic efficiency*—resources are allocated efficiently over time.

A range of factors, including participant conduct, aspects of market design and other external features beyond market design, can compromise these dimensions. Box 5.1 sets out examples in each of these categories.

¹⁶ Queensland Wire, p.189.

¹⁷ Stoft, *op.cit.*, pp.58-59.

¹⁸ Pindyck, R.S. and D.L. Rubinfeld (2001), *Microeconomics*, Fifth Edition (International Edition), Pearson Education Inc (New Jersey), p.123, 269.

¹⁹ For example see *The National Competition Policy: Report by the Independent Committee of Inquiry* (F. Hilmer, M. Rayner and G. Taperell), 1993, AGPS, Canberra p.4

Question 9: What factors can compromise efficiency in wholesale electricity markets?

Box 5.1: Examples of potential compromises to efficiency

Participant conduct

The exercise of market power through financial or physical withholding by generators can compromise efficiency across all three dimensions, for example:

- Withholding may raise average wholesale electricity prices persistently above the opportunity costs of supply. This may result in a deadweight loss to society by deterring demand and causing a sub-optimally low level of electricity consumption and production. This reflects a loss of allocative efficiency.
- Withholding by low-marginal cost generators may result in higher-cost generators operating in their place. This increases the resource costs of dispatch and reflects a loss of productive efficiency.
- Withholding may lead to the premature entry of new generation plant due to expected wholesale prices being higher than they would otherwise be. Higher prices may also lead to lower levels of investment in electricity-consuming facilities. Both of these outcomes reflect a loss in dynamic efficiency.

Market design

Aspects of the NEM may compromise economic efficiency. For example, some system security services provided by synchronous generators are not currently valued in the market. As the generation mix shifts to more non-synchronous generation, these services are not provided as a matter of course, giving rise to increasing challenges in maintaining the power system security. This may result in insufficient system security services being provided, which represents a loss of productive efficiency. The AEMC has identified a need for the development of a fast-frequency market and other reforms to address these issues.

External features

Features of the NEM beyond market design may also give rise to inefficiency. For example, investment in the electricity sector, such as large scale generation, tends to be high cost and long term investment. Given this, stable government policy is required to underpin investment decisions. Uncertainty over policy direction may compromise dynamic efficiency, in particular, by undermining the integrity of market signals for plant and load investment and retirement decisions.

6 What framework do we use?

The Structure-Conduct-Performance (SCP) framework has been used for many years to analyse markets across a range of industries.²⁰ A number of electricity market regulators and monitoring agencies internationally have utilised the SCP framework in assessing markets.²¹

At its simplest level:

- *Structure* refers to the market structure, and includes the number and size of buyers and sellers, the nature of the products and the height of barriers to new entry.
- *Conduct* refers to firms' behaviour in the market, including production, buying and selling decisions.
- *Performance* refers to market outcomes, usually by reference to concepts of efficiency.

While this framework is a useful way to organise and present analysis, the structure, conduct and performance of the markets should not be assessed in isolation. This is because there are linkages between each of the three concepts. For example, participant conduct could influence market structure and vice versa.

The following sets out the key questions we seek to answer in applying this framework.

6.1 Does the market structure support competitive and efficient outcomes?

The extent of competition in a market is influenced by its structure. Features of market structure can be intrinsic to the market or result from participant behaviour. Key structural features may include:

- the number and size of sellers and buyers (market concentration)
- the existence or height of any barriers to market entry
- the extent of vertical and horizontal integration.

6.1.1 How concentrated is the market?

The definition of effective competition in the NEL directs us to have regard to whether there are active competitors in the market and whether they hold a reasonably sustainable position in the market. Looking at the market concentration is one way of doing this.

There are a number of measures of market concentration used in a competition law context, which may provide useful insights. Some energy market monitoring agencies internationally have considerable experience in applying these metrics.

²⁰ The structure-conduct-performance paradigm was developed by Joe Bain in the 1950s see Bain, J.S. *Industrial Organization*, New York, Wiley 1959

²¹ For example the New Zealand Electricity Authority and the Alberta Market Surveillance Authority

Market shares are a simple illustrator of the degree of concentration in a market. Markets with a high proportion of capacity controlled by a small number of generators are more likely to have ineffective competition. The ACCC uses market shares as a key input when determining merger matters.²²

There are a number of concentration metrics, which provide summary statistics by combining market share data for individual firms, including:

- *n-firm concentration ratio (CRn)* —examines the market share comprised by the 'n' largest sellers or buyers in the market. While this is a simple metric, it has various drawbacks, including that it does not account for changes in firm market shares wholly within or outside the 'n' largest firms.
- *Herfindahl-Hirschman Index (HHI)*²³ —calculated by adding the squared market shares held by each firm. The HHI highlights the impact of large firms on the market. It overcomes some of the limitations of concentration ratios by taking into account the market shares of all firms. However, the HHI does not account for variations in demand over time. This can be significant in energy only electricity markets such as the NEM, as high demand events are often needed for market power to be exercised.
- *Residual supply index (RSI)* —tries to overcome this limitation by measuring the extent to which one or more generators are 'pivotal' to the market. A generator is seen as pivotal if market demand exceeds the capacity of all other generators. In other words, the generator must be dispatched in order for demand to be met. A key shortcoming of RSI measures is that they focus on whether a generator is able to raise prices, rather than whether it is profitable for it to do so.

We currently publish market share, simple HHI measures and RSI data in our State of the Energy Market reports. Many international energy market monitoring agencies publish these metrics (or variants of them) when reporting on the performance of markets.²⁴

Question 10: What market concentration indicators should we consider?

6.1.2 Are there barriers to entry?

The definition of effective competition in the NEL specifically requires us to consider whether "barriers to entry are sufficiently low so that a substantial degree of market power may only be held by a particular competitor on a temporary basis". Barriers to entry are sometimes defined as costs that must be borne by new entrants which existing participants do not

²² ACCC, *Merger Guidelines*, November 2008, p. 36

²³ The HHI can range from a value of 0 (in a perfectly competitive market where each firm is infinitesimally small) to 10,000 (with a monopoly). For example, in a market containing three players with 20 per cent, 45 per cent and 35 per cent market shares each, the HHI would be ($20^2 + 45^2 + 35^2 =$) 3650.

²⁴ For example see State of the Market Reports for New Zealand (prepared by the Electricity Authority), the PJM Interconnection in the US (prepared by Monitoring Analytics) and Alberta (prepared by the Market Surveillance Authority).

incur.²⁵ Understanding barriers to entry can be important as the entry, or potential entry, of new participants can provide an important source of competitive constraint on incumbents.²⁶

In assessing barriers to entry, we must take care in distinguishing between barriers in an economic sense and factors that may make investment unattractive for both new entrants and incumbents.

Barriers to entry can arise from a number of sources:

- *Structural barriers* to entry arise where an existing participant has inherent advantages over new entrants. For example, this can be due to:
 - Sunk costs—Sunk costs are irreversible. They are only incurred by new entrants and increase the risks of entering a market
 - Substantial economies of scale—Economies of scale may limit the viability of new entry below a certain minimum efficient scale
 - Absolute cost barriers—These arise where the new entrant faces higher costs than an existing participant, for example because an existing participant has access to important technologies.
- *Strategic barriers* to entry arise due to the actions (or threatened actions) of existing participants. For example, an existing participant may engage in deliberate over investment in capacity to deter the entry of potential rivals.
- *Legal or regulatory barriers* to entry that restrict the ability of new participants to enter the market or existing participants to expand existing operations.

One method for assessing barriers to entry is to survey or interview market participants directly or through an intermediary. This could include both incumbents and potential new entrants. The AEMC adopts this approach in its Retail Competition Reviews.²⁷

Question 11: What are the relevant sources of potential barriers to entry? What methods should we use to assess these barriers?

6.1.3 Is horizontal or vertical integration significant?

Horizontal integration is the extent to which competitors enter into legal arrangements or agreements between themselves. It occurs for a number of reasons and can take various forms (for example, joint ventures and power purchase agreements). The effect of horizontal integration is there could be communication and collaboration between participants who in all other respects are competitors.

²⁵ See McAfee, R.P., H.M. Mailon, and M.A. Williams, "What is a Barrier to Entry?", *AEA Papers and Proceedings*, Vol.94, No.2., May 2004, pp.461-465 (McAfee et al) for a summary of the different definitions of barriers to entry in the economic literature.

²⁶ ACCC, *Merger Guidelines*, November 2008, p. 38

²⁷ AEMC, 2017 *Retail competition review*, p.50

Vertical integration occurs when a company expands its operations by moving to other parts of the supply chain. In electricity, this usually involves combining retail and wholesale market operations. Vertical integration allows generators and retailers to internally insure against price risk in the wholesale market. This reduces the need for these 'gentailers' to hedge their positions in futures markets.

Vertical integration can contribute to barriers to entry. For example, vertical integration may lead to reduced liquidity of futures markets, which may deter new entry, or hasten plant exit.

Question 12: What are the issues we should consider regarding horizontal or vertical integration in the wholesale energy markets?

6.2 Does conduct in the market support competitive and efficient outcomes?

Reviewing conduct is important to understand how participants respond to circumstances in the market. In particular, it may be important to understanding the extent to which participants engage in economic or physical withholding. As discussed in chapter 5, while occasional instances of withholding may not prevent the wholesale market from being "effectively competitive", sustained or enduring behaviour may be of greater cause for concern. Economic and physical withholding can also lead to inefficiencies. Currently we analyse participants' conduct as part of our review of high price events, but there may be merit in analysing participants' behaviour over a longer term.

A key difficulty with any assessment of withholding behaviour is to determine the extent to which it exists. It may not be as simple as comparing generators' bids to an estimate of their costs. This is because generators' costs are not linear. Thermal generators in particular tend to face 'lumpy' unit start-up costs, minimum generation levels and ramp rate constraints. This means that a generator's bid may need to reflect its judgement as to how long it may be dispatched, to what extent and at what price. Nevertheless, analysis of generator bidding behaviour may provide useful insight into whether generators are withholding capacity.

Understanding generators' contracting behaviour may also be relevant to the effectiveness of wholesale market competition and the efficiency of market outcomes. For example, a greater willingness of generators to contract should help minimise contract premiums, which are ultimately paid by consumers. In addition, the more generators are contracted, the lower their incentives are to engage in withholding behaviour. Accordingly, there would be merit in monitoring wholesale contract liquidity and prices.

There may also be merit in considering other aspects of participants' behaviour. Other jurisdictions internationally have applied concepts traditionally associated with financial market regulation, such as market manipulation, to energy markets. These regimes aim to improve the integrity of markets so that participants can be confident prices reflect a fair and competitive interplay between supply and demand. Manipulative conduct can lead to inefficiency as it can challenge the integrity of the market, lead to misinformed decision

making and harm confidence.

Question 13: What aspects of a participant's conduct should we consider? Are there any methods or tools that might be insightful for assessing conduct?

6.3 What is the overall performance of the market?

The NEL requires us to consider whether:

- there is effective competition in the market
- there are features of the market that may be detrimental to effective competition
- there are features of the market that may be detrimental to the efficiency of the market and, if so, assess the extent of that inefficiency.

In our view, the assessment of market performance should separately consider the effectiveness of competition and the efficiency of the market. Even if a market is effectively competitive, there may nevertheless be market outcomes which are inefficient. For example, participant conduct or market features may not lead to an assessment that the market is not effectively competitive; however, that same conduct or feature may compromise the efficient functioning of the market.

We anticipate that we will need to draw on a broad range of measures to make robust conclusions on the performance of the markets. There are a range of quantitative measures that various agencies have applied to assess aspects of the performance of the markets. These are discussed below. It is important to note however that there are limitations associated with these measures. We consider it unlikely that any one measure or tool could lead us to a firm conclusion that the market is effectively competitive or efficient. Our assessment will draw on a broad range of information, including any observations arising from our other monitoring activities.

Question 14: How should we assess the overall performance of the wholesale markets?

6.3.1 Measures of effective competition

The definition of effective competition in the NEL requires us (among other things) to consider whether prices are determined in the long run by underlying costs. This requires us to consider what is meant by 'prices' and 'underlying costs'.

In an efficient, competitive market, with free entry and exit, we would expect prices to move broadly in line with underlying costs. On the one hand, if prices are persistently higher than underlying costs, entrepreneurs will see an opportunity and enter the market, driving down the price. On the other hand, if prices are persistently lower than the underlying costs existing firms will eventually reach a point where it is no longer profitable to remain in the market and leave. Over time, this will cause the market price to rise.

These ideas apply to the wholesale electricity market. An efficient wholesale electricity market involves a mix of different supply and demand side options. In equilibrium, with free entry and exit, the prices should adjust so that each of these different generation types earns a normal competitive return on its investment.

Two approaches to assessing whether prices are determined in the long run by underlying costs include:

- *Levelised cost of energy (LCOE)* —known by other names, including levelised unit electricity cost (LUEC) – is a measurement of the average cost of building and operating a specific generator over its assumed life cycle. It follows that LCOE can be seen as the average minimum cost for a generator to sell its electricity in order to break even over its lifetime. If prices are sustained above LCOE, it would be expected that investment occurs, or that price signals cease. If neither of those scenarios eventuate, it may indicate that factors other than price are impeding the effectiveness of competitive outcomes in the market. The Market Surveillance Authority in Alberta adopted this approach in its 2012 State of the Market report²⁸. It calculated the LCOE for a specific generation type and compared it to a conditional average price in order to confirm that prices were not higher than necessary to ensure the market was sustainable.
- *Long run marginal cost (LRMC)* —LRMC is the cost of meeting an incremental change in demand, assuming all factors of production can be varied. In its assessment of the MEU's rule change, the AEMC compared estimates of LRMC to average historical wholesale market prices to assess whether prices are determined on a long-term basis by underlying costs²⁹. The AEMC's justification for using this measure was informed by its view that the occasional ability of a generator to increase prices for a short period of time is an inherent feature of a workably competitive wholesale market. Transient pricing power only presents a concern if it occurs frequently and significantly enough to cause average annual wholesale prices to be above the LRMC of generators.

The primary difference between LCOE and LRMC is that LCOE does not optimise generation developments against an incremental change in demand. Further, as the LCOE approach is project-specific, it is not based on forecast demand, rather it is based on the expected lifetime of the generator. Whereas LRMC estimates yield a single number for the entire generation mix, each technology yields its own LCOE. The benefit of this is that by calculating them separately, it is better able to account for varying costs and expectations between technology types. It is also much easier to derive LCOE results than most estimates of LRMC.

Conversely, the simplicity of LCOE means it may exclude some important costs (e.g. start-up costs) or effects (such as the impact of new entrants on price). LCOE also assumes that a generator has full choice over when, and to what extent, it operates.

There are also a number of limitations in comparing LRMC to prices to assess the performance of the markets. For example, there is no single LRMC in a power system with a variety of different plant types, where fixed and variable costs change over time. Additionally,

²⁸ Alberta MSA, *A Comparison of the Long-Run Marginal Cost and Price of Electricity in Alberta*, December 2012.

²⁹ AEMC 2013, *Potential Generator Market Power in the NEM, Final Rule Determination*, 26 April 2013.

calculating LRMC is a complex modelling exercise. There are a number of methods for calculating LRMC, but each requires a range of input assumptions to be made, many of which could be seen as subjective or arbitrary. Three common forms of LRMC are:

- ‘*Greenfields*’ or ‘*Standalone*’ LRMC—this interpretation of LRMC determines the least-cost combination of new entrant generation to meet demand increments.
- ‘*Average Incremental Cost*’ (AIC) LRMC—the AIC approach to LRMC calculates the cost of the least-cost combination of new generation to meet incremental demand, taking existing generation capacity as given.
- ‘*Perturbation*’ LRMC—the perturbation methodology finds the amount by which future capital and operating costs vary as a consequence of an increment or decrement of demand.

Each technique for estimating LRMC has advantages and disadvantages and would yield different results.

Given these limitations, we should not place too much emphasis on the results of either approach, should we use them. Any potential indicators would form part of a larger whole. The definition of effective competition in the NEL provides a range of other factors to consider in conducting our assessment, which we discuss in other sections of this chapter.

Question 15: How should we have regard to whether prices are determined on a long term basis by underlying costs rather than the existence of market power?

6.3.2 Identifying and measuring inefficiencies

Some regulators, such as the Alberta MSA, have attempted to measure the efficiency of its market. The MSA estimated productive inefficiencies arising from higher cost generators running in place of lower cost plant. It did this by comparing estimates of:

- the lowest resource costs required to meet demand (assuming that the generators' output was determined based on its estimated short run marginal cost), to
- the resource costs of the generators that actually ran over the year (calculated by multiplying generator's output by an estimate of their short run marginal cost).

The MSA calculated allocative efficiency by testing what the load would have been if the spot price had been equal to the SRMC of the marginal generator (assuming each generator was dispatched based on its costs).

While these approaches may provide some indication of the extent of inefficiency, at least in the short run, there are a number of drawbacks. Modelling exercises require a number of assumptions and may not reflect real world outcomes. Estimating the SRMC of generators may be difficult, particularly where fuel costs are volatile. Further, these estimates do not account for start-up costs.

There may be merit in undertaking a more qualitative approach to identifying inefficiencies and assessing their impact. The Alberta MSA has undertaken a more qualitative approach to assessing dynamic efficiency. It considered whether prices were being sustained at high or low levels and how this may have affected plant entry and exit.

Our approach could also be informed by our ongoing assessment of the causes and impacts of high prices or other significant market events. Our review of these events may highlight repeated conduct which compromises efficiency or other market design or operational issues which impact the efficiency of the market.

Question 16: How can we identify inefficiencies in the wholesale markets?

Question 17: How should we measure the extent of any inefficiencies we identify?

7 Information gathering and confidentiality

7.1 Publicly available information

Sub-section 18D(1)(a) of the NEL provides that we must use publicly available information to carry out our wholesale market monitoring functions in the first instance.

There is a range of public information we may rely on, including information and data published by AEMO, the AEMC and jurisdictional regulators, as well as data available through the Australian Securities Exchange. We may also collect primary data through direct engagement or surveys of market participants.

7.2 Confidential information

7.2.1 Gathering confidential information

If we identify an issue, then we may use our powers under section 28 of the NEL to acquire non-public information. We may obtain information:

- to assist to determine whether:
 - there is effective competition within the market
 - there are features of the market that are detrimental to effective competition, and
 - there are features of the market that may be impacting detrimentally on the efficient functioning of the market (and assess the extent of the inefficiency),
- if there is an inefficiency identified, to analyse if the inefficiency gives rise to competition in the market that is (or was) not effective competition.

7.2.2 Treatment of confidential information

Our general approach to the use and disclosure of information is set out in the *AER/ACCC Information Policy*, June 2014 which is available on our website. The amendments to the NEL include additional provisions on the treatment of information collected under our section 28 powers for the purpose of the new wholesale market monitoring functions. These additional provisions have not yet commenced and as such have not been reflected in an update to our information policy.

In short, section 18D(2)–(6) of the NEL provides that:

- any information obtained using the section 28 powers for the purpose of the market monitoring function is taken to have been given in confidence
- we must not use this confidential information for any purpose other than the performance of the wholesale market monitoring functions
- we must not disclose the confidential information unless the disclosure is for the purpose of the wholesale market monitoring or reporting functions and the information can be combined or arranged in a way that does not reveal confidential aspects of the information or the identity of whom the information relates

- the AER must return any documents obtained within 12 months or as soon as reasonably practical after 12 months.

In preparation for the commencement of these provisions, we propose to treat any information we gather using our section 28 powers for the purpose of the wholesale market monitoring functions as if it were subject to the restrictions (to the extent we are permitted to do so under law). We consider that adopting these practices, where appropriate, will ensure that we establish procedures which are compliant with the obligations under the NEL when they are ultimately enlivened.

Our approach to the use and disclosure of all other information we receive (including confidential information provided voluntarily) is set out in the *AER/ACCC Information Policy*.