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WHOLESALE DEMAND RESPONSE ENERGY MARKET MECHANISM: RULE CHANGE REQUEST

31 AUGUST 2018

1. Summary

This request is for a rule change to enable better integration of demand side participation in the wholesale electricity market. The three proponents of the rule change agree with the AEMC's position that technological change is driving new products and services which allow consumers to participate in the market. As the AEMC has written, 'In the longer term, the Commission considers that the active role of the demand side in the wholesale market will be much more prominent, resulting in a genuine two-sided market.'[1]

This wholesale demand response (WDR) rule would build on the work of the AEMC's Reliability Frameworks Review (RFR) in 2017-18 and Power of Choice outcomes since 2013. It is being submitted now and in this form in order to support regulatory and policy processes. The AEMC's *Reliability Frameworks Review (RFR) Final Report* stated:

> The Commission understands, through their submission to the Review, that TEC and PIAC will submit a rule change request to the AEMC to implement such a mechanism by end of August 2018. If these stakeholders have not submitted a rule change request by this time then the Commission will draft the rule change request for the Energy Security Board to submit. This will be supported by testing the practicability and costs associated with this, with in-market demand response trials being undertaken by AEMO and ARENA. [2]

This market reform was Recommendation 6.7 of the 2017 *Independent Review into the Future Security of the National Electricity Market* ('Finkel Review') and Recommendation 21 of the 2018 ACCC *Retail Price Inquiry Final Report*.

Specifically, this rule change request is based on Recommendation 2 of the 2018 *RFR Final Report*. It was first mooted as Option 1A in the *RFR Directions Paper*,[3] where it was referred to as 'Transferring the value of the wholesale demand response from the existing FRMP [financially responsible market participant] to the aggregator.'[4] In the *RFR Final Report,* Recommendation 2 reads, in part:

> Demand response providers should be able to be recognised on equal footing with generators in the wholesale market and so being able to more readily offer wholesale demand response in a transparent manner to AEMO.[5]

A thriving market for WDR would contribute directly to the achievement of the National Electricity Objective (NEO) and the National Energy Retail Objective (NERO), because it would contribute to lower bills. The fleet of demand reduction capacity that WDR would recruit could also improve security and reliability via complementary emergency, network and ancillary services demand response.[6]

Over the long term, WDR can be one of the key enablers of the orderly retirement of coal-fired generation, because it provides rapid dispatch of 'negawatts' of avoided consumption to help manage the rise in distributed, variable, renewable generation. WDR can thus contribute to remediating the 'energy trilemma' identified by the Finkel Review, as it would 'simultaneously provide a high level of energy security and reliability, universal access to affordable energy services, and reduced emissions'.[7]

The WDR model proposed in this rule change follows closely on Option 1A in the RFR *Directions Paper*. This means that the broad design has been canvassed with stakeholders, which should speed up the rule making process compared to a rule change that proposes an entirely novel market reform. Our request has been deliberately kept at a high level in order for some issues, such as the baselining methodology/ies and the details of scheduling, to be either determined during the rule change consultation process or delegated to subsidiary AEMO procedures or AER guidelines. The rule as proposed has also been designed to interact with the successful AEMO/ARENA summer demand response trials currently underway.

2. Proponents

Total Environment Centre (TEC), 2/99 Devonshire St Surry Hills NSW 2010

Public Interest Advocacy Centre Ltd (PIAC), Level 5, 175 Liverpool Street Sydney NSW 2000

The Australia Institute (TAI), 1/1 1 Franklin St Manuka ACT 2603

TEC (www.tec.org.au) has been involved in National Electricity Market (NEM) advocacy for the last 15 years, arguing above all for greater utilisation of demand side participation—energy conservation and efficiency, demand response/management and decentralised generation—to meet Australia's electricity needs. By reforming the NEM we are working to contribute to climate change mitigation and improve other environmental outcomes of Australia's energy sector, while also constraining retail prices and improving the economic efficiency of the NEM—all in the long term interest of consumers, pursuant to the National Electricity Objective (NEO). TEC has initiated three other Rule change requests.

PIAC (www.piac.asn.au) is an independent, non-profit legal centre based in Sydney. Established in 1982, PIAC tackles barriers to justice and fairness experienced by people who are vulnerable or facing disadvantage. PIAC's Energy and Water Consumers' Advocacy Program (EWCAP) represents the interests of low-income and other residential consumers of electricity, gas and water in New South Wales. The program develops policy and in energy and water markets. PIAC has extensive expertise in technical, policy, regulatory and market design matters pertaining to demand response in the NEM.

TAI (www.tai.org.au) is an independent public policy think tank based in Canberra. It is funded by donations from philanthropic trusts and individuals and commissioned research. Since its launch in 1994, the Institute has carried out highly influential research on a broad range of economic, social and environmental issues. The Institute has worked on NEM regulation and reform issues closely following the Finkel Review. The Australia Institute was selected to carry forward the legacy of the Climate Institute and last year established a specialist Climate and Energy Program.

3. Brief description of the proposed rule

The proponents request that the AEMC amend the National Electricity Rules (NER) to introduce a WDR mechanism, including a new category of market participant: the demand response service provider (DRSP). Essentially this would allow single load or aggregated and scheduled demand response to offer its flexibility into the wholesale market: something that cannot occur under the current Rules.

Our proposal is based on the AEMC's preferred Option 1A in its *RFR Directions Paper*: 'Transferring the value of the wholesale demand response from the existing financially responsible market participant [FRMP—ie, retailer] to the aggregator.' As the AEMC notes, this model has the following features:

- Third parties such as WDR aggregators (now called DRSPs) could submit demand response offers to the wholesale market.
- DR offers would be scheduled, in a manner similar to bids submitted by generators.
- The DRSP would be exposed to the wholesale price for the difference between the baseline level of consumption and the actual level of consumption. The retailer would be settled on the wholesale market for the baseline level of consumption.
- The DRSP earns the spot market price for the reduction in demand and shares this with its participating customers.

- All retail energy customers would be free to participate in this mechanism (although it would not be compulsory for them to offer WDR products themselves.

How the WDR mechanism would work

During a DR event:*

- The retailer would bill the customer on the baseline consumption.
- Market settlement would be based on the baseline consumption
- The network operator charges are applied on actual consumption.
- Generators would be paid for energy dispatched.
- The DRSP:
  - would receive the spot price for energy reduction by their customers, as determined by comparing actual consumption to baseline consumption; and
  - would pay the customer for the value of their demand reduction based on agreed commercial arrangements.
- * *A dispatch event may be defined as when a DSRP submitted a dispatch offer based, for example, on its customers' ability to alter their net demand voluntarily, and AEMO has accepted this offer and issued a dispatch instruction.*

The proponents intend to work with the Commission and stakeholders to refine this broad proposal into a final rule.[8] We have avoided detailing some elements of the proposed mechanism on the basis that either the AEMC would develop these through the consultation process, or they could be the subject of subsidiary AEMO procedures or AER guidelines. We are also happy to work with a pilot process which would develop the subsidiary design details through AEMO and ARENA's 2017-2020 demand response trials.[9]

4. Recent history

As demand-side technologies have become more widespread and powerful, the profile of demand-side markets has risen. The AEMC has progressively developed its own approach to DR which has informed this rule change request.

In its 2012 *Power of Choice final report*, the AEMC recommended the introduction of a DR mechanism that facilitates demand side participation in the wholesale market, and the introduction of a new category of market participant for non-energy services.

The COAG Energy Council (COAG EC) consequently lodged the Demand Response Mechanism and Ancillary Services Unbundling rule change request with the AEMC in March 2015. The COAG model was restricted to large loads, was non-scheduled, and allowed retailers to prevent customers from participating in the mechanism.

In November 2016 the AEMC made a 'more preferable rule' which provided for a new type of market participant—a market ancillary service provider—to offer customers' loads into the frequency control ancillary services (FCAS) markets. However, the AEMC decided not to implement the 'demand response mechanism':

> The Commission considers the benefits associated with the proposed mechanism can be achieved without the need for a regulatory mechanism in the wholesale market, particularly as there are no barriers in the Rules to demand side participation in the market.[10]

The AEMC was also concerned about the 'considerable cost to all consumers'[11] of implementing the proposed rule, especially to upgrade retailers' billing systems, relative to the perceived benefits at that time.

However, since 2016

- Under the current arrangements, and despite assurances to the contrary by retailers, demand response remains greatly underutilised relative to its potential.
- Technological changes and changing market conditions—in particular, rising wholesale prices and system security issues—have created renewed impetus for the creation of a WDR market, meaning its future benefits in terms of avoided wholesale or generation costs, are arguably higher.
- The significant self-reported costs to retailers for implementing systems changes to accommodate demand response services provided to their customers by other parties remain unsubstantiated.

Numerous formal energy market reviews and reports in the past two years have argued for the value of a WDR mechanism, including:

- Finkel Review (Recommendation 6.7) (2017).
- AEMC Strategic Priorities (2015 and 2017).
- ENA/ CSIRO Network Transformation Roadmap (2017).
- AEMO's Advice to Commonwealth government on dispatchable capacity (2017).
- Energy Security Board, Health of the NEM report (2017).
- ACCC Retail Price Inquiry Final Report (Recommendation 21).[12]
- Energy Security Board, National Energy Guarantee: Draft detailed design consultation paper (2018).
- Energy Security Board, Technical working group paper on demand response (2018).
- AEMO, Summer operations report 2017-18 (2018).[13]

In 2017, the COAG Energy Council directed the AEMC 'to recommend a mechanism that facilitates demand response in the wholesale energy market and ensure any rule change is in place by the summer of 2018-19.'[14]

Related regulatory and public policy developments include the joint Australian Renewable Energy Agency (ARENA) and AEMO initiative[15] over three summers (2017-2020) to provide 200MW of DR to moderate extreme peaks in demand and cope with grid emergencies.

5. Nature and scope of the issue

While the NER are largely supply-side in design, there have been repeated calls (including by the AEMC) and consequent regulatory reforms to encourage more demand-side participation in the national electricity market (NEM), particularly to reduce peak demand (and thus place downward pressure on consumer bills) and improve consumer choice.

There are a number of ways that peak demand can be reduced, including by demand management —i.e., long term or structural programs including energy efficiency and tariff reform. Demand response, by contrast, refers to short-term market responses to reduce peak demand. As EnerNOC observes, there are several generic ways to achieve DR:

> [C]onsumers can help lower network demand through changes to their consumption:
>
> 1. Forgoing the consumption they otherwise had planned—e.g. dimming lights, or turning off water features at a swimming pool.

2. Delaying consumption—e.g. interrupting production at a factory by bringing forward a maintenance outage, or simply stopping production and catching up by extending a shift at a later date.
3. Bringing consumption forward—e.g. pre-cooling a cold store to the bottom end of its acceptable temperature range, so that it can withstand an extended period without cooling.[16]

In addition, energy users with backup supply, in the form of onsite generators or battery storage or hydrogen energy systems, can isolate all or part of their load from the network and continue consuming energy from onsite sources.

There are four main services that DR can provide:

- Network (transmission and/or distribution) demand response.
- Wholesale demand response.
- Ancillary services demand response.
- Emergency demand response.

This rule change is concerned specifically with wholesale DR. In the wholesale market, DR has the potential to 'constrain the pricing of generation businesses, limit the need for additional generation and lead to lower prices.'[17]

Given the extensive recent history of the AEMC's own consideration of this issue, it is not necessary to revisit its nature and scope in detail. Instead, we have summarised the issue into three brief topics:

- WDR in general.
- Potential roles for a WDR mechanism in the NEM.
- Issues created by the absence of a WDR mechanism.

WDR in general

At its simplest, WDR responds to high spot prices in the wholesale market by rewarding lower demand. This helps to:

- Directly reduce energy bills for participating customers.
- Indirectly reduce energy bills for all consumers, by displacing more expensive forms of capacity in the wholesale market and limiting the potential for generators to exploit market power (e.g., reducing the ability for generators to charge high prices during periods of tight demand-supply balance. This means that the presence of DR capacity could reduce wholesale prices even if it isn't dispatched.)
- Increase reliability at low cost, by increasing the volume of dispatchable capacity in the wholesale energy market. This would reduce the need for expenditure via the Reliability and Emergency Reserve Trader (RERT).
- Support the development of the National Energy Guarantee (NEG), or any other NEM-wide mechanism designed to support emissions reduction or reliability improvements, by providing a framework of DR contracts and allowing market customers to meet their obligations

Allowing third parties (ie, participants who are not licensed retailers or market customers) to sell demand response will further promote these benefits. These parties (demand response aggregators and providers) should be able to be recognised on equal footing with generators in the wholesale market, and so offer wholesale demand response directly and transparently into the spot market.

As an indication of the potential impact of the WDR in the wholesale energy market, we point to what happened after a rule change allowed independent DR aggregators to bid into the NEM's Frequency Control Ancillary Services (FCAS) markets from July 2017:

> [A]pproximately 180 MW of new DR resources have entered the ancillary services markets in the past six months alone…
>
> A recent report by the market operator AEMO found that the entry of the new grid-scale battery (known as the Hornsdale Power Reserve) and EnerNOC's DR resource into the markets were the major drivers behind a 57% reduction in FCAS costs between Q4 2017 and Q1 2018.[18]

The introduction of WDR is very likely to also lead to a material reduction in the spot market price during some peak demand events.

Potential roles for a WDR mechanism in the NEM

DR provides a number of benefits in the market. The AEMC recently summarised these as follows:

- A more active demand side effectively increases the amount of reserves in the market. As the demand side becomes more and more active, it would be expected that larger amounts of demand response would be observed at high prices (which tend to accompany times when there are low reserves). Larger quantities of demand response would reduce the likelihood of needing to exercise interventions such as issuing directions, employing other out-of-market reserves or involuntary load shedding to restore the supply-demand balance.
- For participants that face the real-time spot price for purchasing electricity, wholesale demand response can offer a number of valuable services.
- The NEM currently provides limited visibility on the amount of wholesale demand response.
- Firm and fast acting demand response requires time, education and equipment to develop. In contrast, there is wholesale demand response that can be utilised without investing as much time or resources but the extent of this demand response is likely to be both less firm and more variable.[19]

In addition, as EnerNOC observes, DR has a significant advantage over generation in terms of flexibility and price:

> We note also that demand response is a particularly flexible source of capacity within a market – it can decide to come forth—and also mothball or retire—in particularly short timeframes, compared to traditional supply side resources. An oversaturated demand response market would quickly self-correct… If the costs a generator incurs by remaining in the market (its costs) exceed its revenues (its benefits) the generator is uneconomic, and will choose to mothball or retire. The same is true for demand response – and because in general the capital invested in a demand response installation is far less than the capital investment in a generating plant of equivalent size – demand response's decision to mothball or retire is considerably less consequential than that of a generator.[20]

Issues created by the absence of a WDR mechanism

In the absence of a mechanism that allows third parties to offer DR directly into the wholesale market today, the roles and benefits of DR noted above are not being fully realised.

As the AEMC has noted, there is a theoretical 'efficient market incentive' for retailers to offer and engage in WDR. However, it has often been observed that current arrangements have led to a sub-optimal level of DR in the NEM compared with other energy markets. This may be due to a raft of factors including the issue that this rule change request seeks to address (by allowing third parties to participate in the wholesale market) but also practical commercial issues and cultural factors (i.e., a lack of knowledge about or bias against demand side behaviors and technologies). Above all, at present DR providers can only benefit by offering their services to a retailer to manage the load of the customers of that retailer. There are many barriers to developing these partnerships.

Reflecting on these barriers, the AEMC observed in the RFR *Final Report* that

> Under the current arrangements the supply of energy to a consumer is bundled with wholesale demand response. Retailers are incentivised to utilise demand response where it is efficient to do so; however, they may opt not to if they lack the experience or the organisational expertise to utilise wholesale demand response or do not expect to recover the costs of engaging with a consumer to provide wholesale demand response. In addition, retailer have other ways of managing wholesale electricity market price risks, such as financial contracts and vertical integration.
>
> In addition, there are challenges for third parties looking to provide wholesale demand response. Third parties can only do so currently by either being a retailer themselves, or having a commercial relationship with a retailer.[21]

The absence of a WDR mechanism has led to a sub-optimal level of demand response in the NEM, as explained in the text box below.

Box 1: Potential

The International Energy Agency benchmark is that demand response can mitigate about 15 per cent of peak demand. In the NEM that would equate in theory to about 6000MW of demand on hot summer afternoons.* Demand response makes up about 10 per cent of the capacity in the Pennsylvania-New Jersey-Maryland Interconnection market (PJM), the world's largest electricity market. Recent estimates from the regulator there found that including demand response in their capacity market has reduced costs for consumers by US $12 billion in just a single year.

As the *Finkel Review* pointed out, Australia is falling behind global trends in the adoption of demand response.

> There are currently low levels of demand response in the NEM. A 2016 survey for the AEMC suggested there is only around 235 MW of demand response under contract to retailers, mostly involving exposure to the wholesale market spot price.

The International Energy Agency's 2018 review of Australia's energy policies likewise found that

> Demand-side participation in the NEM is at low levels; demand response in the wholesale market does not exist and it is underdeveloped in the retail markets…AEMO evaluated the levels in 2017 and found that around 512 MW of demand response is available for reliability purposes (from industrial consumers, including LNG industry) and around 109 MW of load is responsive to wholesale market prices above AUD 1000 per MWh in the NEM…[1]
>
> All actions should be pursued to boost competition and... foster access of new retailers to the wholesale market, including through demand response and large-scale storage, and other new technologies.[1]

* *This is a NEM-wide figure; in practice peak demand is likely to occur on different days and times in different regions.*

6. Principles

This section lists the principles which we consider should underpin any WDR rule change.

1. A WDR mechanism should be introduced in the NEM if it would be likely to help effectively and efficiently *respond to the energy trilemma*—i.e.,

- Placing downward pressure on wholesale prices and consumer bills.
- Improve options for achieving reliability/system security.
- Contribute to the reduction of carbon emissions generated in the NEM.

2. The WDR mechanism should be designed to allow any consumers (small and large) in the NEM to extract the value of demand response to be sold and used in the wholesale market (and other markets—ancillary, network, and emergency) and not allow retailers to limit consumer participation in any way.
3. The WDR should facilitate greater competition in the wholesale market.
4. The WDR mechanism should assist the market operator to better *coordinate* demand response, in order to efficiently balance supply and demand reduce transaction costs and increase the pool of potential participants.
5. 'The framework for facilitating wholesale demand response should be *flexible and resilient* enough to remain fit for purpose irrespective of what the future may bring.'[22]
6. The WDR mechanism should *support the role of DR in the Reliability and Emergency Reserve Trader (RERT) mechanism and the NEG* or any other comparable NEM-wide mechanism.[23]

The proposed rule has been designed to fulfil each of these principles.

7. Outline of the rule

The proponents propose the following changes to the NER, which builds on the option outlined in the final RFR report:

Chapter 2 (Registered participants and registration) would be amended to:

1. Allow DRSPs to register as market participants to provide demand response services, and ancillary services to the wholesale market, without the need to purchase electricity from the market to meet the demand of the participating loads outside of DR events;
2. Allow for registration criteria for DRSPs and for load to be classified as DR load by a DRSP;
3. Provide for obligations to comply for this class of market participant; and
4. Provide for payment and calculation of market fees for DRSPs.

There is already an existing participant category – the market ancillary service provider (MASP)—that allows load to be classified as ancillary services load and used to provide FCAS through demand response. The AEMC should consider the implications for this participant category following the creation of the DRSP registration category.

Chapter 3 (Market Rules) would be amended to include a new section, titled Wholesale Demand Response, with the following main features:

1. DRSPs may submit demand response offers to the wholesale market.
2. The value of any wholesale demand response during a DR event will effectively accrue to the DRSP.
3. Demand response offers will be scheduled, in order to create consistency with how generators are treated in the wholesale market.
4. DRSPs will be financially accountable for the flexibility of the DR load during a dispatch. That is, DRSPs will be exposed to the wholesale price for the difference between the baseline level of consumption and the actual level of consumption. To the extent that the DRSP reduces actual consumption to a level less than the baseline, it would receive the wholesale price. The FRMP would be settled in the wholesale market for the baseline level of consumption. (This would allow the value of the wholesale demand response to be accrued to the DRSP without affecting or involving the retailer.)
5. Consumers would not require the agreement of their retailer or the FRMP at the connection point to participate in the mechanism. (This would best enable wholesale demand response to

be facilitated, since retailers would not be able to prevent third party wholesale demand response.)

6. The WDR mechanism will include a transparent and robust methodology for measuring and verifying quantities of delivered wholesale demand response. The baselining method(s) will be developed, monitored and amended when necessary by an appropriate body or bodies.
7. The WDR mechanism will *not* require the establishment of a new connection point or the installation of a new meter, unless the DRSP and the participating consumer choose to install a new meter.
8. Subject to any short term restriction of WDR to large customers, the WDR mechanism will not preclude participation from any type of behind the meter flexible DER (i.e., load curtailment, embedded generators, batteries, etc.) and should not preclude export to the local network.
9. The cost of implementing and administering WDR will be borne by DRSPs, with the AER to be responsible for determining the extent of these costs annually.
10. The WDR mechanism will allow for a single participant to register a single 'dispatchable unit' and submit co-optimised bids for both energy and FCAS.
11. The WDR mechanism will allow for a single dispatchable unit to represent the aggregated response of multiple customer sites across a NEM region.
12. The WDR mechanism will ensure that wholesale demand response is able to meet the definition of a 'Qualifying Contract' under the NEG, if the reliability requirement of the NEG is implemented.
13. The WDR mechanism is separate to the procurement of demand response under the RERT.
14. The cost recovery rules for ancillary services also would need to be amended to take into account the DRSP and DR energy.

Chapter 4 (Power system security) would be amended to place an obligation on the DRSP to ensure that a DR provider takes reasonable steps to reduce load when a DR notice has been provided.

Chapter 7 (Metering) would be amended to include DRSPs as a business to business (B2B) participant, and give them the right to obtain NMI standing data and metering data for their customers, consistent with access rights for other participants.

Chapter 8 (Administrative functions): The DRSP as a market participant should be bound by the dispute resolution provisions in Chapter 8. Confirmation of a DRSP's right to request a review of business to business (B2B) decisions should also be clarified, noting the current review of B2B governance procedures.

The proposed rule would require other new provisions to create the WDR mechanism. The provisions would:

1. Require AEMO to publish procedures required for the implementation and operation of the WDR mechanism.
2. Outline the governance arrangements for WDR procedures.
3. Outline the roles and responsibilities of the retailer, distributor, market customer, DRSP and meter data providers.
4. Outline eligibility thresholds to support participation by large customers and (potentially at a later stage) aggregated small customers.
5. Outline the content of the WDR procedures, including baselines and operations of the mechanism.

6. Create an obligation to comply with, and an obligation to notify breach of the DRM procedures.
7. Contain notice and reporting requirements.
8. Contain transitional arrangements for the introduction of the scheme.

The AEMC is asked to consider the best location in the rules for these provisions.

With regard to procedures governance, reporting requirements, prudentials and consequential changes, the AEMC should consider which parts of the 2015 COAG EC Demand Response Mechanism Rule Change Request[24] remain relevant or require amendment.

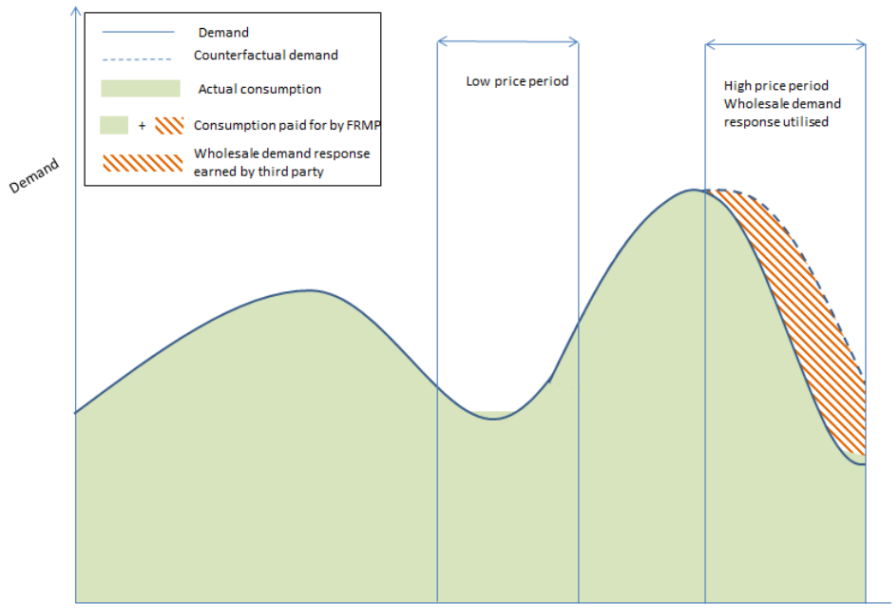
The AEMC is also asked to consider the changes to the NERR that may be required to implement this mechanism, for example in relation to customer protections and provisions regarding payment for energy, particularly when the mechanism is extended to small customers.

The AEMC should consider whether, in the interests of introducing the mechanism at the earliest practicable time, the mechanism should initially apply only to large customers, and be extended to small customers at a later stage.

8. How it would work and address the issues

Below is a brief overview of how the proposed WDR mechanism would work in practice. It is based on the AEMC's Option 1A in the *RFR Directions Paper*, 'Allowing third parties to sell demand response in the wholesale market'. It is followed by a simple illustration of the Energy and financial flows during a DR event, and some scenarios of how it might work in practice.

Figure 1: Transferring the value of demand response[25]

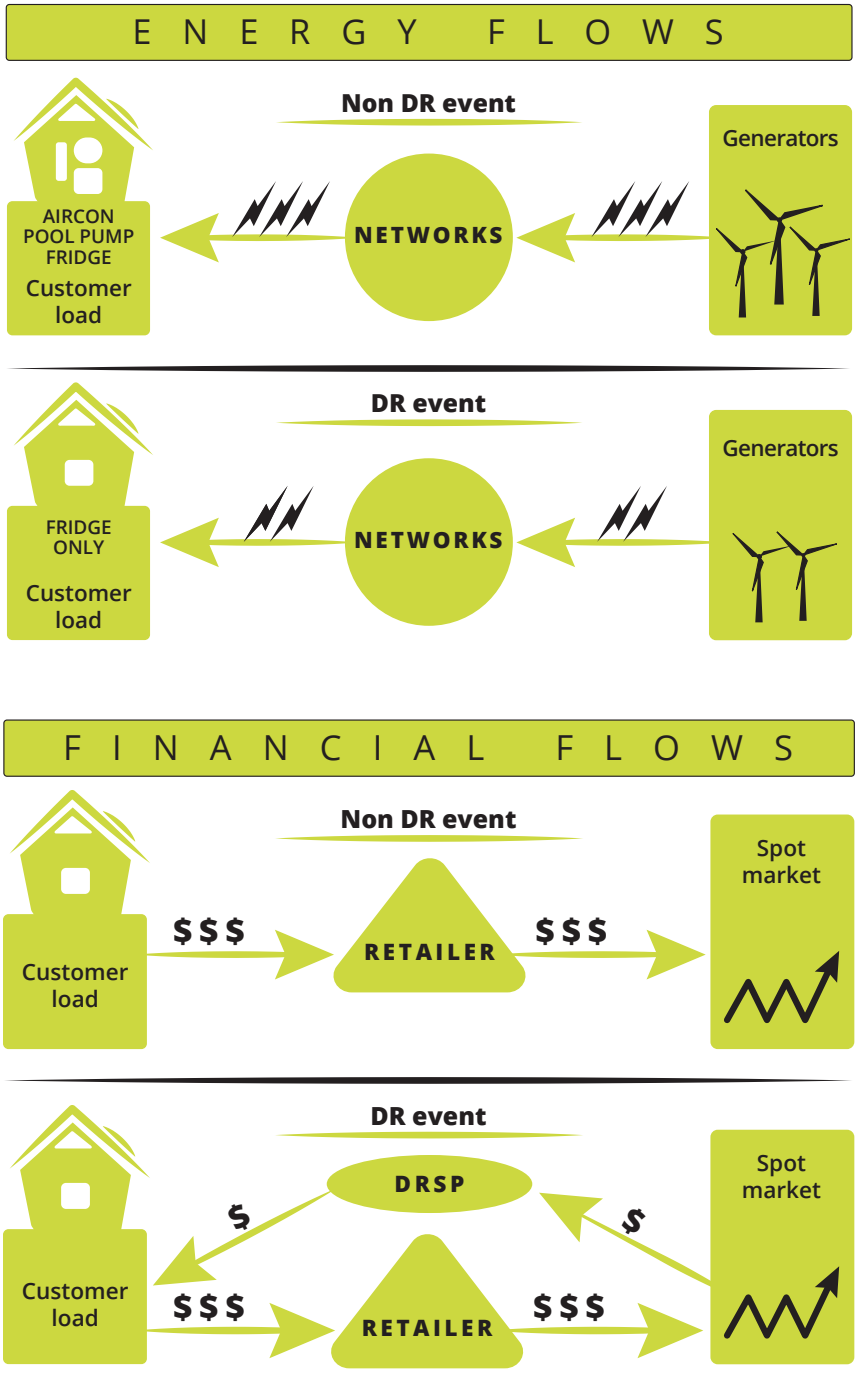


In this figure:

- The physical energy consumption is represented by the green area, and the baseline energy consumption by the dotted line.
- The striped area represents the amount of demand response, which the third party offers into the spot market and pays the customer accordingly.

- The retailer purchases the energy represented by the green and striped areas from the spot market and bills the customer accordingly.

Figure 2: Energy and financial flows



Box 2: WDR scenarios

Scenario 1: Commercial customer

A cold store business has contracted its refrigeration plant with an aggregated demand response service in order to generate additional revenue. The aggregator supplies the controller system and software which allows the plant to operate as a demand response facility that can bring forward energy consumption.

The frozen foods need to be kept at or below -18°C to remain safe for human consumption. High temperatures are forecast for the next day and AEMO predicts that the spot price, driven by demand, will be high in the afternoon due to air-conditioning. The DRSP takes control of the refrigeration thermostat, dropping the cold store temperature below -18°C before the high price events. The refrigeration can then be turned off during high price events, until the temperature in the cold store reaches -18°C, when it turns on again.

This reduction in peak daytime demand could coincide with prices being anywhere up to the regulated Market Price Cap of $14,500/MWh. Part of the wholesale market revenue is passed on to the owner of the cold store. The rest of the saving is kept by the demand response aggregator, who covers the cost of building and operating the demand response system..

Scenario 2: Small load aggregation

The Kerrigans are a large suburban family. They consume large amounts of electricity and consequently have a large retail bill. Fortunately, the Kerrigans' son Steve is an ideas man, who worked out that by turning off their electric hot water system and pool pumps, the Kerrigans can substantially reduce their load during peak times.

The Kerrigans are approached by a DRSP which is aggregating demand response across a number of homes and businesses. The Kerrigans sign up with the third party and agree that under certain conditions, they will reduce consumption. The DRSP will be able to remotely control the hot water system and pool pump, and will communicate with the Kerrigans in the lead up to a period with high wholesale prices. The Kerrigans are still billed by their original retailer. However, their wholesale demand response is valued through payments from the DRSP for voluntarily reducing demand.

The Kerrigans receive payments directly from the DRSP for their contribution to reducing peak demand on very hot summer afternoons and other times when the price of energy is high..

Scenario 3: Large industrial customer

Yasmin is recruited as the new plant manager for gizmOZ, an automotive parts manufacturer in Adelaide that exports to electric vehicle assembly plants in America, Korea and France. gizmOZ's competitiveness is suffering from increasing electricity costs, so Yasmin conducts a comprehensive energy audit to identify where the factory can conserve energy and where it can sell demand response services. The audit shows that it is economically efficient for Yasmin's factory to provide demand response in three broad classes of service: wholesale economic, ancillary and emergency, each at a specific price point and notification time depending on the particular equipment involved and its place in the production process.

One production line uses electric arc furnaces to melt steel and it can offer frequency and emergency demand response instantaneously for up to 30 minutes if the price offered is above $5,000/MWh. The smelter unit cannot be shut off or for longer times, but other production lines are more flexible, and Yasmin's audit determines that it is worth switching down or time-shifting operations to another part of the day with 5 minutes notice when the payment reaches $1,500/MWh. Between the smelter and these lines, gizmOZ can offer all three classes of demand response.

gizmOZ becomes a DRSP and installs new control systems so that it can communicate directly with AEMO's market and dispatch systems, bidding in its load-shedding and time-shifting potential up to a day ahead where the forecast spot price is over $1500/MWh.

Scenario 4: Innovative battery business

Sultan Battery provides integrated energy products and energy market services for small and large businesses, and is a DRSP. It provides DataKnown, which operates a series of data centres, with an uninterruptible power supply (UPS) and backup generators to all their sites to ensure they have reliable power. This equipment comes at considerable cost, but would normally sit idle until a blackout or power quality issue.

However, as part of their operation and maintenance agreement, Sultan operates the UPS and backup generators to take some of the data centre load offline when energy spot prices are high, offering the load reduction as WDR. There is no impact on the data centre operation. Sultan Battery takes care of the energy market arrangements, and the extra revenue for DataKnown from demand response more than covers the cost of maintenance and operation for the UPS and generators.

The proposed rule has been designed to address the main issues related to demand response identified during the 2015-16 COAG rule change process and by the AEMC in the 2018 RFR, as shown in the following table.

Table 1: Issues and responses

Issue	Response
Households and small commercial customers find it difficult to understand and participate in retail DR Retailers lack capability or incentive to offer demand response to households and small commercial customers. Flexible or short term energy contracts are not long enough for retailer to profit from investment in demand response aggregation for households and small commercial customers.	Unbundle energy supply and demand response. Allow consumers to choose to participate in WDR either via their retailer or a third party DRSP.
Cost and complexity of multiple meters	No new connection point or meter is required under the WDR model Customers will not bear cost of any new interval or smart meter
There will be multiple markets for demand response: RERT, ancillary, wholesale and retail	Allow wholesale demand response aggregators to sell the same loads across multiple markets, including network support services, seeking the highest value for the flexibility and simplifying the experience for participating consumers
Optimal design of rule for core operations: baselines, dispatch and bidding operations	Define framework in rule then delegate detailed design to guidelines and procedures Draw on the experience and lessons of AEMO/ARENA demand response 'in-market' trials
Costs of implementation: AEMO's settlement system and retailer systems	Retailers are not required to update automated systems to accommodate DRM, as they can opt to manually modify data at lower cost until such a time as the cost of doing so is higher than the incremental cost of system upgrades. It is noted that systems are being substantively upgraded for Five Minute Dispatch, which should substantially reduce the incremental costs attributable to WDR. In any case, the significant self-reported costs previously provided by retailers, for implementing systems changes to accommodate demand response services provided to their customers by other parties, remain unsubstantiated.
Uncertainties caused by non-schedule generators bidding into the spot market	Participation in WDR will only be allowed on a scheduled basis

9. Additional considerations

There are important elements of the WDR mechanism that are not included in this rule change request—in particular, the design of the *baselining methodology* or methodologies, and the form of *scheduling* of WDR dispatch.

Baselining refers to the counterfactual to be used to measure the extent of the DR—that is, based on past consumption in similar circumstances, how much energy the DR participant is likely to have consumed had they not reduced their load for a demand response event. As the AEMC notes of the WDR option that is the subject of this rule change request,

> The design of the baseline is likely to be a determinant in the effectiveness and efficiency of this option because setting the baseline significantly influences financial outcomes for the parties involved and hence the incentives on parties to undertake an efficient level of demand response…[26]

Scheduling refers to the nature of a generator's or a load's participation in the wholesale market.[27] Scheduled and semi-scheduled generators offer and bid into the market dispatch engine operated by AEMO. Non-scheduled and exempt generators do not bid into the spot market and are instead 'price takers'. Currently no loads are scheduled. In general, scheduling of WDR enables a greater degree of transparency and certainty around the operation of WDR. The option proposed in this request includes scheduling of WDR actions in order to create consistency with how generators are treated in the wholesale market.[28]

However, there will need to be some consideration of the exact form of scheduling that is most appropriate for offers of flexibility from aggregated demand-side resources, as their characteristics are quite different from those of conventional generators. Just as the *semi-scheduling* arrangement was introduced to reflect the capabilities of large scale wind and solar generators, so some comparable arrangement may be optimal for integration of large WDR resources. Similarly, just as *non-scheduled* small to medium generators are not required to be scheduled at all and can effectively dispatch energy at will, scheduling requirements for small volumes of DR may be limited to advanced notification of the start of a DR event rather than price-based central dispatch.

In our view, changes to the NER should focus primarily on high level principles, with directions in the rules for AEMO, and potentially the AER, to decide on the details of the mechanism's implementation via procedures and guidelines that can be readily adapted as the WDR mechanism matures in the market. As stated above, the baselining methodology/ies should also be refined through AEMO and ARENA's 2017-2020 in-market DR trials.

In the *RFR Final Report*, the AEMC identifies a number of other cost and legal issues which will require consideration and resolution during the rule change consultation process, namely:

- risks that may be imposed on parties not participating in demand response, depending on how the baseline was to be determined
- costs associated with system changes, including to AEMO's settlement systems
- costs associated with installing equipment or changing systems to schedule the demand response
- costs associated with applying this to aggregated small consumers…
- whether retail contracts for demand response might constitute financial products
- maintaining any consumer protections and associated changes to the NERL or NERR
- changes to retail Renewable Energy Certificate liability.[29]

Additional issues may also need further consideration in the course of the rule change process—for example:

- The application of the *National Measurement Act* 1960 (C'th) in relation to the purchase by retailers and customers of 'energy' that includes electricity and some demand response.

- How the contribution from individual and aggregated DER sources (such as batteries or virtual power plants) could be measured when those are operating in parallel with the network rather than isolating specific sites or loads—i.e., a baseline or other form of separate metering (including consideration of sub-revenue grade meter/child meter, subtractive metering or a virtual meter). A single customer site could include both DER and load reduction, so the AEMC may wish to consider this interaction.
- Matters relating to the aggregation of WDR, including the treatment of location-specific loss factors.

10. Contribution to the NEO and NERO

S.7 of the National Electricity Law (NEL) states:

> The objective of this Law 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.

The National Energy Retail Objective as stated in the National Energy Retail Law (NERL) 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.

WDR is particularly well suited to contributing to the NEO and the NERO. According to the AEMC,

> [A]llowing third parties to sell demand response into the wholesale market could have a number of benefits including:
>
> - Providing consumers with greater opportunities to participate in wholesale demand response by allowing additional parties to provide demand response and so promoting competition for these services. This would also have the effect of potentially decreasing prices in the wholesale market.
> - Improving the reliability of the power system. In many instances, wholesale demand response can more efficiently contribute to reliability than building new generation. This is particularly true when a tight supply-demand balance is only forecast to occur for a short period of time.
> - Providing greater transparency of demand side participation to other market participants, which will help market participants to make more efficient decisions in both operational and investment time frames on both the supply and demand side of the market.[30]

With respect to the overarching objective of promoting 'efficient investment in, and efficient operation and use of, electricity services', PIAC has explained the impact of DR on efficiency across the different parts of the NEM physical system and its markets:

> [A]ny part of the energy system that does not fully deploy demand response (DR) where it is cost effective to do so, cannot be considered to be operating at an acceptable level of efficiency. This applies equally to distribution, transmission, wholesale, and retail.[31]

The introduction of a WDR mechanism in the NEM wholesale market would contribute to promoting the long-term interests of consumers in several ways:

1. By contributing to system reliability.
2. By reducing costs to the market and, in turn, consumers.
3. By increasing consumer choice.
4. By supporting the NEG (if implemented).

Contribute to reliability and system reliability

DR contributes to system reliability by reducing the risk of blackouts occurring when demand exceeds supply—e.g., during summer heatwaves. PIAC argued in 2017 that

> The involuntary load curtailment that blacked out some South Australian households in summer 16/17, made necessary by generator failures on the day, could have been avoided if just 100MW (3% of the South Australian load) was voluntarily turned off. By comparison, more than 10% of Western Australia's wholesale market capacity comes from demand response, as it is allowed to participate in the wholesale market.[32]

In addition, the energy system as a whole will benefit from reliability that in many cases can be procured more efficiently through DR available to the market rather than by emergency DR or by building new generation.[33]

Reduce costs to consumers

WDR would reduce costs to consumers in two ways. Participating consumers benefit directly from a new revenue or income stream. All consumers benefit from lower average spot market prices. OakelyGreenwood's 2014 Cost Benefit Analysis of a possible DRM for the COAG Energy Council compared a low estimate of the benefits of a DRM with incumbent energy businesses' questionably high estimates of the costs of a DRM, and still found a net benefit for all consumers:

> The results of the modelling suggest that the DRM would exert downward pressure on wholesale electricity prices and have a flow-on impact to networks. It would certainly assist large energy users in reducing their energy costs and have flow-on benefits on network peak demand.
>
> It is also consistent with competition principles and would open the potential for new and innovative services.[34]

Increase consumer choice

The requirement that retailers must not restrict any customers from contracting with a demand response provider will ensure that all consumers can potentially access WDR, irrespective of whether or not their retailer chooses provide demand response. To date, DR is utilised primarily by commercial customers with loads that can be temporarily switched off. Under a WDR mechanism, however, residential and small business consumers, will be an emerging market for WDR.

Support the NEG, if implemented

WDR will also support the least-cost delivery of the NEG's emissions mechanism outcomes, enabling 'negawatts' to displace fossil fuel generation at the margin during demand peaks and, over the long term, by helping maintain reliability through a period of transition from centralized, synchronous and largely coal and gas-fired generation to variable, distributed, non-synchronous, renewable generation.

11. Potential impacts

The following is a high level summary of the likely impacts on consumers, market participants and other stakeholders.

DRSPs

Aggregators or DRSPs will benefit from a much expanded customer base by virtue of direct access to the wholesale market:

> The proposed rule change will offer DRAs the opportunity to offer DR and ancillary services directly to energy users, rather than working through other market participants. It will therefore support market development and the provision of energy services. DRAs will incur costs to enter the market, but this will be factored into the commercial arrangements offered to clients.[35]

Retailers

Retailers will have competition from DRSPs for the provision of DR services.

- While in 2013 Seed Advisory estimated retailer costs under a mandatory scheme to be approximately $112 million over ten years,[36] other stakeholders contended during the 2015-16 rule change process that this figure was grossly inflated.[37] The costs were self-reported by retailers and remain unsubstantiated. In any case, the costs were mainly to change back-end systems for which substantive changes will be required to implement the Five minute settlement rule change which will come into force in 2021. There should therefore be little or no material impact on their operations..
- Some *gentailers* may incur a net reduction in revenues, as WDR will provide a lower cost alternative to high-cost generation to meet peak demand.[38]
- In the past, retailers have also claimed that a WDR mechanism would impact their hedging costs. However, as the COAG EC argued in 2015,

  > …this is only likely to occur in the short term. Once the DRM is operational for a period of time, the ability of retailers to forecast demand response at any particular price point should improve, as energy users respond to price signals and DRAs develop portfolios of aggregated load which provide a more reliable response. DRAs also indicate they could offer their own financial hedging products to the market to manage the financial risks of spot price volatility.[39]

Generators

The WDR will increase competition in the wholesale market and facilitate the dispatch of the least-cost combination of generation and demand-side resources. DR delivered through the WDR will most likely compete with peaking generation plant.[40]

Customers

Large *C&I customers* will benefit from direct access to the market to sell wholesale DR—either via a third party DRSP or by themselves registering as a DRSP.

SMEs can also benefit from accessing the wholesale market through DRSPs.

Consumers without DER will benefit financially as lower wholesale market prices filter through to retail bills. The LTIC will also be served by lower carbon emissions, as 'negawatts' displace some fossil fuelled generation, and more flexibility in the market better support variability of wind and solar generators

Consumers with DER will benefit financially by having access, via aggregators, to the wholesale market—something that is only available at present via a few retailers and costly software and hardware. They will therefore also benefit by having access to more opportunities to monetise the DR potential of households in particular.

Networks

As the COAG EC argued in 2015, based on the mechanism proposed at that time:

> Cost impacts on network businesses to support the introduction of a DRM are likely to be minimal.
>
> The existence of the DRM may increase the availability and willingness of… customers to take part in network demand management programs, as energy users become more familiar with their ability to reduce load, and the potential impacts on their operations.
>
> The DRM has the potential to reduce peak demand, and future network investment….[41]

Market bodies

AEMO:

> AEMO will be required to set up new systems and procedures to operate and administer the DRM including the ability to determine baselines and implement systems for settlement. AEMO estimated costs to set up and operate the DRM at between $8-14million NPV.[42]

AEMO will have a large pool of new, transparent DR resources to more efficiently manage the energy system and markets.

AEMO and ARENA will also benefit by being able to test their baselining methodologies in real-world trials.

AER:

> As a wholesale market mechanism it is not envisaged that the Australian Energy Regulator would have a major role in the scheme. Its main role would be to assess and take action, where necessary, against market participants who breached DRM rules which had civil penalties attached.[43]

12. Summary of consultation

As a wholesale DR mechanism was first raised as part of the Power of Choice review, and was subsequently the subject of a rule change process in 2015-16, stakeholders have provided feedback on the concept, design and cost and benefits of various DR mechanisms on a number of occasions.

A wholesale DR mechanism has been generally supported by large and small consumer advocates, on the proviso that it will not lead to higher energy bills. Stakeholders are generally agreed that wholesale demand response supports the reliability of the power system.[44] In the past, retailers and generators have not been supportive, saying that it would distort pricing in an energy-only market, and exert upwards pressure on costs.[45]

However, since 2016 several factors have changed, including

- Significantly higher wholesale prices.
- A greater focus on resolving the energy trilemma, to all three arms of which DR is uniquely positioned to contribute.
- The significant self-reported costs to retailers that would 'exert upward pressure on costs', remain unsubstantiated.
- Successful (and ongoing) AEMO/ARENA summer DR trials[46] and these bodies' support for the introduction of a WDR mechanism.[47]
- The ESB's recognition of the potential role of WDR in contributing to the effectiveness of the NEG.

A WDR mechanism therefore makes even more sense in 2018 than it did in 2016. The AEMC carried out extensive stakeholder consultations as part of the RFR in 2017-18, including from a reference group and a technical working group.[48] After careful consideration of stakeholders' views, the AEMC concluded that 'the barriers to entry for providing demand response in the NEM should be lowered so *more* consumers have *more* opportunities to offer wholesale demand response.'[49]

The main outstanding issues appear to be:

- Understanding the true costs of implementing and administering the WDR mechanism.
- The legal issues identified earlier in this request.
- Determining the baselining methodology/ies, especially in the context of high DER penetrations.

- The scheduling arrangements.

In our view, the AEMC rule change consultation process will provide ample opportunities for all stakeholders views on these issues to be heard ahead of the AEMC resolving them in a manner that supports the long term interests of consumers.

13. Glossary

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ARENA	Australian Renewable Energy Agency
COAG	Council of Australian Governments
DER	Distributed energy resources
DNSP	Distribution network service providers
DR	Demand response
DRSP	Demand response service provider
ESB	Energy Security Board
FCAS	Frequency control ancillary services
FRMP	Financially responsible market participant
NEG	National Energy Guarantee
NEL	National Electricity Law
NEM	National Electricity Market
NEO	National Electricity Objective
NER	National Electricity Rules
NERL	National Energy Retail Law
NERO	National Energy Retail Objective
NERR	National Energy Retail Rules
RERT	Reliability and Emergency Reserve Trader
RFR	Reliability Frameworks Review
VPP	Virtual power plant
WDR	Wholesale demand response

14. Notes

[1] AEMC, *Reliability Frameworks Review Final Report*, 2018, 43.
2 AEMC, *Reliability Frameworks Review Final Report,* 2018, 45.
[3] AEMC, *Reliability Frameworks Review Final Report*, 2018, 43-55, Appendix A.
[4] AEMC *Reliability Frameworks Review, Directions Paper*, 2018, 130.
[5] AEMC, *Reliability Frameworks Review Final Report*, 2018, 45.
[6] AEMC, *Reliability Frameworks Review Final Report*, 2018, 44
[7] *Preliminary Report of the Independent Review into the Future Security of the National Electricity Market*, Commonwealth of Australia, 2016, 10.
[8] AEMC, *The rule change process: a guide for stakeholders*, 20 June 2017, 10 (footnote 19).
[9] AEMC, *Reliability Frameworks Review Final Report*, 2018, 44.
10 https://www.aemc.gov.au/rule-changes/demand-response-mechanism.
11 https://www.aemc.gov.au/sites/default/files/content/72d6295c-4ef8-4c7a-8d12-847a9723916b/ERC0186-Information-sheet-Final-Determination-FINAL.PDF.
[12] 'In relation to wholesale demand response, a mechanism should be developed for third parties to offer demand response directly into the wholesale market. Design of the mechanism should commence immediately, building on work undertaken in the AEMC's Reliability Frameworks Review. The mechanism should:
promote competition through allowing the widest range of businesses to directly offer demand response services
not allow retailers to limit the ability of their customers to engage a third party demand response provider (to the extent it is not inconsistent with the retail contract)
ensure load and generation response are valued appropriately based on the benefit they provide to the wholesale market
limit technical requirements placed on the customer that may inhibit take up or scope of these services (for example, requirements for multiple meters at the customer site).[12]
[13] AEMC, *Reliability Frameworks Review Final Report*, 2018, 117.
[14] Council of Australian Governments Energy Council, 12th COAG Energy Council Communique, 14 July 2017, 2.
15 https://www.aemo.com.au/Media-Centre/AEMO-and-ARENA-demand-response-trial-to-provide-200MW-of-emergency-reserves-for-extreme-peaks.
16 EnerNOC, quoted in The Australia Institute, *Saving mega bucks with negawatts*, 2017, 14.
17 ACCC, *Retail Price Inquiry Final Report*, 2018, 233.
[18] https://reneweconomy.com.au/demand-response-disrupting-australias-ancillary-services-markets-43382.
19 AEMC, 2018 *Reliability Frameworks Review interim report*, quoted in the consultation paper, 114.
20 EnerNOC, Submission to AEMC Reliability Frameworks Review–Interim Report, 2018, 5.
[21] AEMC, *Reliability Frameworks Review Final Report*, 2018, 53.
22 AEMC, *Reliability Frameworks Review Final Report,* 2018, 45.
23 See technical working group paper on demand response published alongside the National Energy Guarantee detailed design consultation paper, quoted in AEMC, *Reliability Frameworks Review Final Report,* 2018,138.
24 COAG EC, *Demand Response Mechanism Rule Change Request*, March 2015, 15-16.
[25] Figure from AEMC *Reliability Frameworks Review, Directions Paper*, 2018, 133.
[26] AEMC Reliability Frameworks Review, Directions Paper, 2018, 132.
[27] See AEMO, *Participant categories in the National Electricity Market.*
[28] AEMC *Reliability Frameworks Review, Directions Paper*, 2018, 131.
29 AEMC, *Reliability Frameworks Review Final Report*, 2018, 54.
30 AEMC, *Reliability Frameworks Review Final Report,* 2018, 53.
31 PIAC, Submission to AEMC Reliability Frameworks Review Issues Paper, 2017, 5.
32 PIAC, Submission to AEMC Reliability Frameworks Review Issues Paper, 2017, 5-6.
33 AEMC, *Reliability Frameworks Review Final Report,* 2018, 135.
34 OGW, *Cost Benefit Analysis of a possible DRM*, 2014, 16.
35 COAG EC, *Demand Response Mechanism Rule Change Request*, March 2015, 19.
36 COAG EC, *Demand Response Mechanism Rule Change Request*, March 2015, 18.
37 COAG EC, *Demand Response Mechanism Rule Change Request*, March 2015, 21.
38 See AEMC, *Reliability Frameworks Review Final Report*, 2018, 128-130.
39 COAG EC, *Demand Response Mechanism Rule Change Request*, March 2015, 18.
40 COAG EC, *Demand Response Mechanism Rule Change Request*, March 2015, 19.
41 COAG EC, *Demand Response Mechanism Rule Change Request*, March 2015, 19.
42 COAG EC, *Demand Response Mechanism Rule Change Request*, March 2015, 19-20.
43 COAG EC, *Demand Response Mechanism Rule Change Request*, March 2015, 20.
44 AEMC *Reliability Frameworks Review, Directions Paper*, 2018, 115.

45 COAG EC, *Demand Response Mechanism Rule Change Request*, March 2015, 20.
46 https://arena.gov.au/funding/programs/advancing-renewables-program/demand-response.
47 https://www.aemc.gov.au/sites/default/files/2018-05/ARENA-AEMO%20joint%20submission.pdf.
48 48 AEMC *Reliability Frameworks Review, Directions Paper*, 2018, 120.
49 49 See AEMC, *Reliability Frameworks Review Final Report*, 2018, 136.