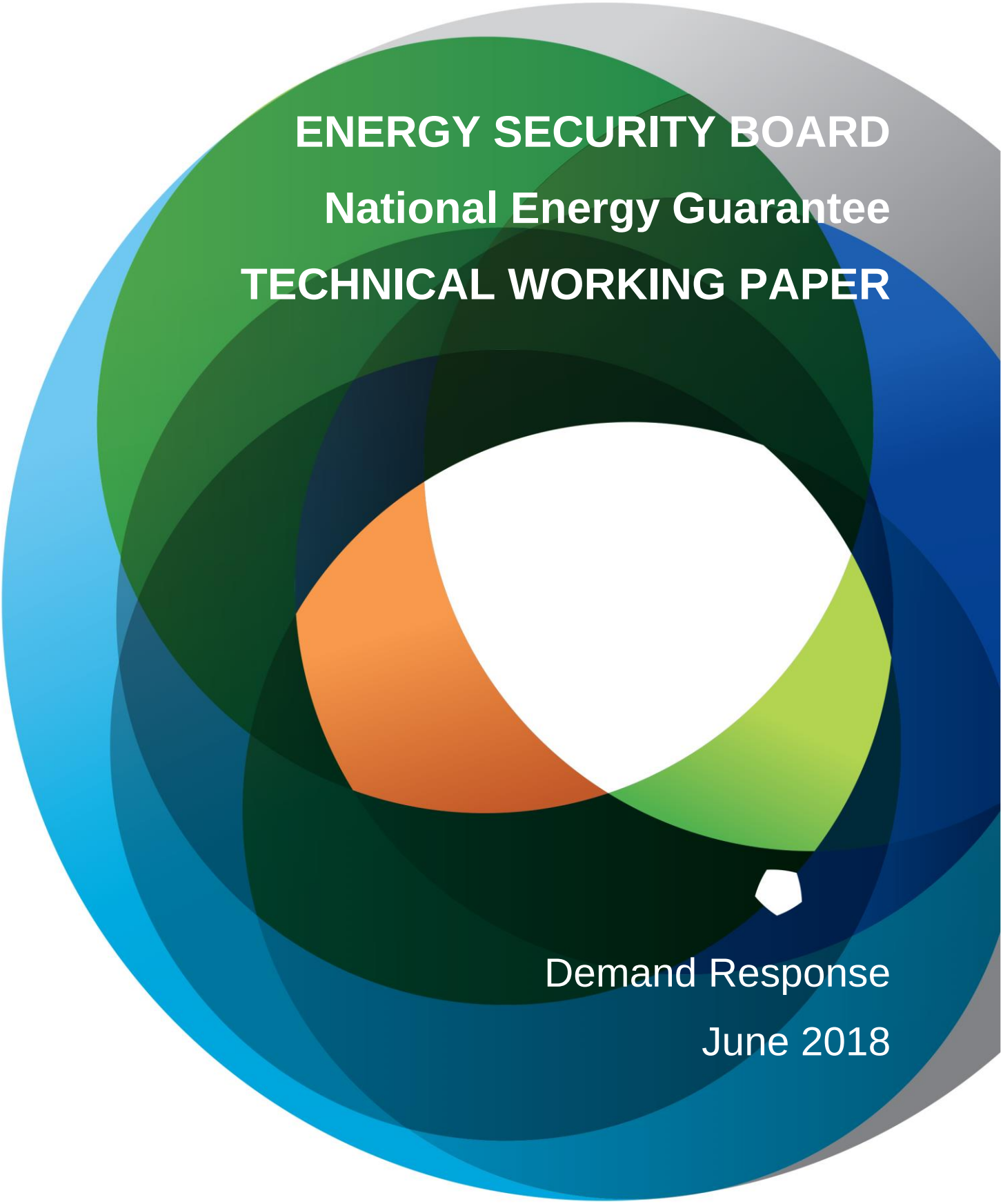
COAG
Energy Council

ENERGY SECURITY BOARD

National Energy Guarantee

TECHNICAL WORKING PAPER



Demand Response

June 2018

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Executive Summary

- The Guarantee has been designed to include Demand Response (DR) contracts as qualifying contracts for the purposes of the reliability requirement. Ensuring demand response is eligible will be central to ensuring the reliability requirement of the Guarantee is met at least cost.
    - Our analysis indicates that DR contracts for the reliability requirement do not need to be subject to specific or additional eligibility arrangements.
    - DR contracts will need to meet the same general qualification criteria as other eligible supply contracts and be registered with the AEMO Demand Side Participation Portal.[1]
- The Australian Energy Market Commission (AEMC) is currently considering how to best facilitate more demand response in the wholesale market in the Reliability Frameworks Review, including how to facilitate more wholesale Demand Response in the NEM including the suitability of specific mechanisms to do this. DR products designed to meet any future arrangements the AEMC puts in place are likely to be automatically eligible for the reliability requirement and the AEMC will be able to amend the rules to align with any future scheme. However, the treatment of DR under the Guarantee is designed to ensure that the eligibility of DR under the reliability requirement is not dependent on the implementation of new arrangements.
- To address any double and under-accounting risks identified in the Issues Paper, it is recommended the following simple design rules be reflected in the compliance and accounting arrangements:
    - at T-1, eligible DR contracts will count towards a liable entity's contract coverage for their share of system peak demand, and
    - if at T, the AER will 'gross up' the measured load by adding activated DR to the liable entity's actual demand and the system load to assess the entity's compliance.
- This paper sets out worked examples to explain how DR will be recognised and accounted for by liable entities and the AER.

1 https://aemo.com.au/-/media/Files/Stakeholder_Consultation/Consultations/Electricity_Consultations/2017/DSPIG/Demand-Side-Participation-Information-Guidelines-Consultation---Final-Report-and-Determination.pdf

1 Introduction

On 20 April 2018, the Energy Security Board (ESB) presented the COAG Energy Council with a high-level design proposal for the National Energy Guarantee (the Guarantee). The COAG Energy Council agreed that the ESB progress the detailed design of the Guarantee for determination by the Council at its August 2018 meeting.

As part of the development process, the ESB convened Technical Working Groups to advise on certain detailed design elements of the Guarantee. The Technical Working Groups were comprised of a broad range of stakeholders with relevant expertise from more than 30 organisations.

The purpose of this paper is to outline options and preferred approaches relating to the reliability requirement under the Guarantee, in particular:

- how DR will qualify and participate under the reliability requirement, and
- how DR will be accounted for by liable entities and market bodies in assessing compliance.

This paper provides additional detail and context to the Draft Detailed Design Consultation Paper. Interested parties are encouraged to lodge a submission to the consultation by **13 July 2018** for consideration by the ESB prior to the publication of the final design of the Guarantee.

2 Overview of High-Level Design

The ESB has stated its intention that DR will be able to qualify as dispatchable capacity for the purposes of the reliability requirement. Ensuring all potential sources of dispatchable capacity are eligible will be important to ensure the Guarantee is met at the lowest possible cost.

The AEMC is currently considering how demand response can be facilitated in the wholesale market through the Reliability Frameworks Review, including the suitability of specific mechanisms to do this. The ESB has stated that any products developed to meet the requirements of a future wholesale DR mechanism should also qualify under the reliability requirement. But, conversely, eligibility of DR under the reliability requirement should not be dependent on the implementation of a wholesale DR mechanism, as the AEMC's assessment of the need and feasibility of such a mechanism is yet to be finalised.

It is also likely that AEMO's Procurer of Last Resort function will utilise DR, as it can be a cost-effective source of temporary capacity. The ESB has stated that Procurer of Last Resort reserves would be held out of market to avoid distorting investment signals. To meet this criterion, DR reserves should not be able to count towards a retailer's contracting obligation under the reliability requirement if they are also contracted with AEMO under the Procurer of Last Resort.

3 Criteria for demand response to qualify reliability requirement

3.1 Demand response contracts not different to other qualifying contracts

DR contracts will qualify under the reliability requirement providing they meet the *general* criteria for all (DR, supply-side or other) Qualifying Contracts. Qualifying Contracts must have a direct link to the electricity market which a liable entity uses to reduce exposure to high spot prices.

In order for demand response to be used for compliance for the reliability requirement under the Guarantee, it must be registered with AEMO via the Demand Side Participation Portal, be allocated to a liable entity (and a supply region), and it must be 'in-market' (i.e. not contracted with AEMO under the Procurer of Last Resort).

The risks associated with the firmness of these DR contracts will rest with, and be managed by, the liable entities who rely on these contracts to meet their share of total system load and under the reliability requirement. We note that the AEMC is currently considering how to facilitate wholesale demand response, including a potential mechanism for doing so through the Reliability Frameworks Review. Any recommendations from this Review, if adopted, would provide a new route to market for DR resources and embed new regulatory requirements around the valuation and verification of DR.

The assessment about the integrity of DR contracts will reside with liable entities.

Liable entities that rely on DR contracts to cover their share of system peak demand will need to ensure they are registered with AEMO (at T-1) to ensure that AEMO has the visibility it needs to accurately forecast demand and supply. This will strengthen the incentives for parties to comply with existing reporting and registration obligations.

Preferred approach

- Demand-side or Demand Response contracts will qualify under the reliability requirement providing they meet the general requirements for Qualifying Contracts.
- To give AEMO the visibility it needs for its forecasting, DR contracts will need to be registered with AEMO via the Demand Side Participation Portal.

3.2 Accounting for DR under the reliability requirement

The reporting and compliance arrangements for the reliability requirement – particularly how load is assessed and DR that is activated during peak system events is treated – will need to reflect the unique characteristics of DR. Worked examples are explored below to show how under and double-counting risks can be addressed.

It is important that the accounting framework for the reliability requirement is sensitive to different uses of DR, both to avoid over and under-accounting, and to avoid the use of DR distorting the relative position of retailers and their share of peak system load. There are a number of methods for accounting for DR and when modelled some of these options produce perverse outcomes. The preferred approach has been developed to manage these perverse outcomes.

One specific difficulty that arises in relation to DR is with the measurement of the liable entities actual demand at time T due to uncertainty about the amount of DR that was activated at that time. A further difficulty relates to the scaling factor, which is a function of the actual system demand, which would potentially have been higher by an amount equal to the sum of all activated DR resources.

In theory, the more accurate approach would be to identify how much DR was activated by each liable entity, and then add the liable entity's DR to its measured demand, and the sum of all DR amounts to the actual system demand. This would be a very complex compliance task for the AER and liable entities. An approximation that is preferred would calculate each liable entity's scaled obligation based only on its measured load and its DR amount.

The preferred approach uses this approximate method, which is outlined in the examples below.

Preferred approach

- To avoid distorting the relative and absolute positions of liable entities under the reliability requirement, for the proportional liable load calculation of each individual liable entity, only its own activated DR contracts will be added back on the gross load of the region for that liable entity.
- To avoid double-counting, DR can be used and traded between parties provided it is not accounted more than once and it is registered with the AEMO Demand Side Participation Portal.

3.2.1 Example 1

In the example below, both scenarios have a counterfactual load of 375 MW and forecasted peak of 340 MW with a gap flagged. The only differences between A and A' is the amount of DR used by Retailer A. In Scenario A, at time T, Retailer A executes 40 MW of the Demand-side contracts it procured and reported at T-1 (~30 per cent of Total Load). In the second scenario A', at time T, Retailer A executes 20 MW of the Demand-side contracts it procured at T-1 (~15 per cent of Total Load).

This example demonstrates that a retailer's relative proportion of the load changes with the use of DR contracts, with other liable entities benefiting equally from the reduction in the load. However, the retailer's actions in this scenario impacts the compliance position of other liable entities, whose obligation may be dependent on the behaviour of other retailers/customers which is not a preferred outcome. This negative market outcome can be addressed by adding the activated DR contracts back into the gross load before calculating specific share of each liable entity under the reliability requirement as per the *Technical Working Paper on Compliance and Penalties for the Reliability Requirement*.[2]

Time T		**A**	**A'**	**B**	**B'**	**C**	**C'**		**40 MW DR**	**20 MW DR**
	Measured Load	90	110	100	100	140	140	Measure Total Load	330	350
	Activated Demand-side Qualifying Contracts	40	20	0	0	5	5	Counter-factual Total Load	375	375
What was measured	Measured relative Proportion of Load	27%	31%	30%	29%	42%	40%	Regional Forecast Peak	340	340
This is what it would have been without DR	Actual relative Proportion of Load	35%	35%	27%	27%	39%	39%			
Corrected grossed up DR	Proportional Load with DR	35%	35%	30%	29%	43%	41%			

2 Liable Entity Regional Load = (Measured Liable Entity Load + Liable Entity Activated DR Contracts) / (Liable Entity Activated DR Contracts + Total Regional Load) x P50 Forecast Regional Load

3.2.2 Example 2

At time T-1 the liable entity is required to submit its firmness adjusted and audited contracts to the AER (this includes DR contracts). When accounting for the use of these DR Contracts and to ensure that they are not "double counted" (i.e. used to reduce their share of system load, *and* to increase the demand-side resources they appear to be bringing to the market) the activated DR contracts for each liable entity will be used for the purpose of calculating its market share.

As the example below demonstrates, the percentage of each liable entity's relative load will be adjusted to include its own activated DR.

Retailer A at T-1 has a liable load of 2,000 MW out of a forecasted one-in-two year system peak of 5,000 MW. Retailer A has a Demand-side contracts being 100 MW and 200 MW at T-1 which have been reported for compliance. At T, the measured regional gross load and Retailer A's load was 5,500 MW and 1,900 MW, respectively. However, Retailer A only activated the 100 MW DR contract because the market price was below the strike price for the 200 MW contract. This results in the retailer gaining the benefit of reducing its load by executing the DR.[3]

Forecast Regional Peak	**5,000 MW**
Gross actual regional load	5,500 MW
Retailer A forecast load	2,000 MW
DR contracts	300 MW (100 and 200 MW)
Retailer A actual measured load	1,900 MW
Example	(1,900+100)/(5,500+100)x5,000
Retailer A liable load	1,786 MW (including the exercised DR Contracts)

Therefore, for Retailer A to meet its obligations, it must have had 1,786 MW of additional coverage in place for the load at T-1. The 100 MW DR Contract is seen in the load reduction.

3 Liable Entity Regional Load = (Measured Liable Entity Load + Liable Entity Activated DR Contracts) / (Liable Entity Activated DR Contracts + Total Regional Load) x P50 Forecast Regional Load

3.2.3 Example 3

At T-1, a smelter has the following load consisting of:

- 30 MW of easy to action Demand Response
- 50 MW of additional DR that is more difficult and costly to action, and
- 40 MW of essential load.

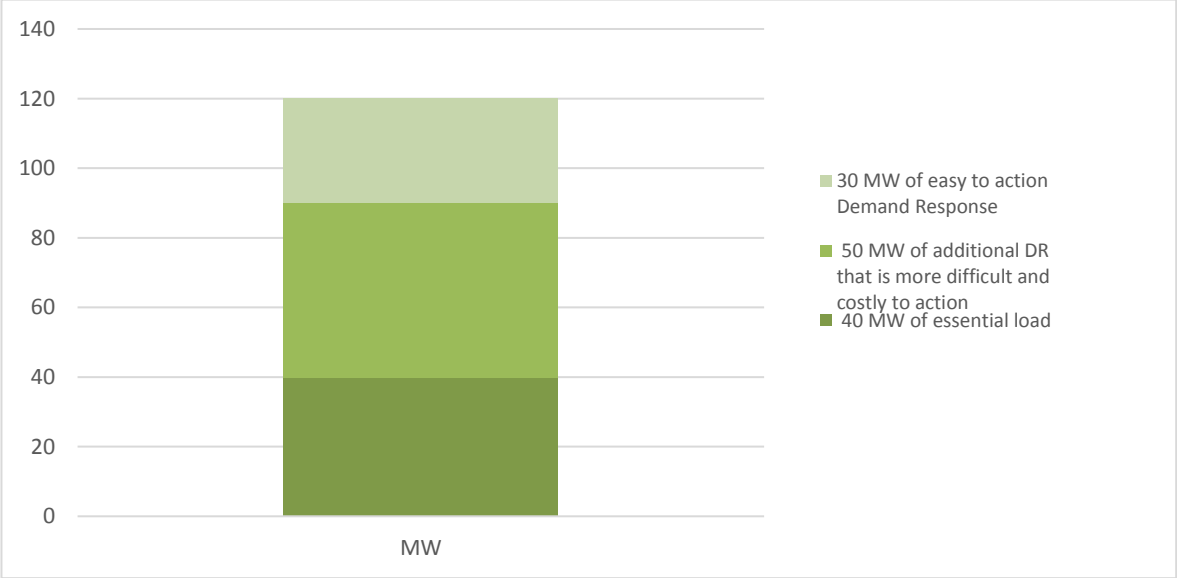
At T-1 the smelter has created its own eligible contract and registered it with the AEMO Demand Side Participation Portal for the easy to action DR for 30 MW and has other contracts in place for the remaining 90 MW of load (Total Load 120 = 30 + 50 +40).

In the same supply region as the smelter, a retailer contracts and registers with the Demand Side Participation Portal with the smelter to gain access to the additional DR.

At T, the smelter executes its Demand Response of 30 MW, the retailer also calls the DR load contract to be executed and the smelter drops this 50 MW load as contracted to do so.

Forecast P50	**5,000 MW**
Gross Regional Load	5,500 MW
Smelter Load	120 MW
DR Contracts	30 MW
Smelter Measured Load	40 MW (120-30-50 MW)
Example	(40+30)/(5,500+30)x5,000 = 63MW
Smelter Liable Load	63 MW (including the 30 MW DR Contract)

When calculating the liable load for the smelter, *only* the eligible contract for the easy to action DR (which it created) is used. This 30 MW of executed DR contract is grossed up for calculating the smelter's market share. The smelter also gains the additional benefit of entering into a contract with retailer and a reduced load as a result of the retailer executing the contract. The retailer in this example can use the contract for the DR sourced from the smelter to meet its obligations under the reliability requirement at T, *provided* it is not load for which it is liable. This example highlights that DR can be used and traded between parties provided it is not accounted more than once and it is registered with the AEMO Demand Side Participation Portal.



A Abbreviations and defined terms

AEMC or Commission	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
COAG	Council of Australian Governments
DR	Demand Response
ESB	Energy Security Board
Guarantee	National Energy Guarantee
MW	Megawatt
NEM	National Electricity Market

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