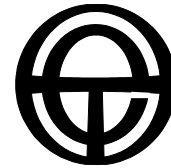


**TOTAL ENVIRONMENT CENTRE INC.**  
LEVEL 4, 78 LIVERPOOL STREET, SYDNEY, NSW 2000  
PO BOX A176, SYDNEY SOUTH 1235  
Ph: 02 9261 3437 Fax 02 9261 3990  
www.tec.org.au



**SUBMISSION  
to**

**AEMC  
Review of Energy Market Frameworks  
in light of Climate Change Policies**

**2<sup>nd</sup> Interim Report**

**Reference EMO 0001: 2<sup>nd</sup> Interim Report**

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For further information contact:

Tee Lim or Jane Castle  
Ph: 02 9261 3437  
Email: tee.lim@tec.org.au

# AEMC Review of Energy Market Frameworks in light of Climate Change Policies 2<sup>nd</sup> Interim Report

## 1. Introduction

### 1.1. The Review

Total Environment Centre (TEC) welcomes another opportunity for input to the AEMC's *Review of energy market frameworks in light of climate change policies*. However, it is extremely disappointing to note that the Review's aims and implementation have remained fixated upon the effects of the Carbon Pollution Reduction Scheme (CPRS) and the Renewable Energy Target (RET) on the National Electricity Market (NEM), rather than how the NEM can help facilitate the goals of the climate change policies.

As McLennan Magasanik Associates (MMA) has pointed out, energy ministers have not fully exploited their role to provide national leadership so that broader convergence issues and environmental impacts are effectively integrated into energy sector decision making.<sup>1</sup> The AEMC has also failed to fulfil its potential by retaining a narrow, short-sighted approach. The Terms of Reference (ToR) and the AEMC's interpretation of them are designed to maintain a status quo that shuts out renewable energy, discourages energy efficiency, promotes poor investments and traps Australia in a dependence on polluting fossil fuel generated electricity.

TEC is pleased to present a new report by MMA, *Role of the NEM in responding to climate change policies*<sup>2</sup> (Attachment A), as a key component of this submission. The report shows that:

- efficient and clean development is being frustrated by the energy market frameworks;<sup>3</sup>
- even with the implementation of emissions trading, other market failures present barriers to the entry of renewable and low emission generators;<sup>4</sup>
- there are stark conflicts between the objectives of the NEM and climate change policies;<sup>5</sup>
- the lack of an environmental objective for the NEM has constrained opportunities for demand reduction and energy efficiency;<sup>6</sup>
- energy ministers have not fully exploited their role to provide national leadership so that broader convergence issues and environmental impacts are effectively integrated into energy sector decision making.<sup>7</sup>

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<sup>1</sup> MMA. 2009. *Role of the NEM in responding to climate change policies*. Source: [http://www.tec.org.au/index.php?option=com\\_docman&task=doc\\_download&qid=345&Itemid=360](http://www.tec.org.au/index.php?option=com_docman&task=doc_download&qid=345&Itemid=360), and attached.

<sup>2</sup> Commissioned by Total Environment Centre with support from the National Electricity Consumers Advocacy Panel

<sup>3</sup> Ibid. p. 13.

<sup>4</sup> Ibid. p. 46.

<sup>5</sup> Ibid. p. 3.

<sup>6</sup> Ibid. p. 23.

## 1.2 Conflicting goals

The report has found that the goals of the energy market conflict with climate change policies at the highest level through its lack of an environmental objective and subsequent rules. These conflicts are highlighted in the table below:<sup>8</sup>

### Comparison of goals of the NEM, CPRS and RET

Scheme: ► Objectives ▼	NEM	Carbon Pollution Reduction Scheme	Renewable Energy Target
Global response to emission reduction	No	Yes: indirectly through setting an example in emission reduction policy	Yes: indirectly through setting an example in renewable energy policy
Local response to emission reduction	No	Yes: the issue of permits guarantees local emission reduction	Yes: the target itself guarantees local emission reduction
Ecological sustainability	No	Yes: implied by emission reduction	Yes: implied by reduction in carbon emission from thermal power displaced
Economic efficiency	Yes	Yes: cost effective emission reduction	Yes: traded certificates provide for coordination of investment to minimise costs
Efficient prices	Yes	Yes: implied by cost-effective emission reduction	Yes: traded certificates provide for transparent pricing and cost discovery
Addressing disadvantage	No	Yes: for those adversely affected by the Scheme	No
Quality of supply	Yes	Yes: implied by processes for emission measurement	Yes: implied by standards for certificate recognition and supported by the penalty regime
Reliability of supply	Yes	Not applicable	Not applicable
Security of supply	Yes	Not applicable	Not applicable
Safety in production and delivery	Yes	Not applicable	Not applicable

## 1.3 Failure to interrogate the NEL objective

While the MCE's ToR failed to explicitly direct the Review to consider the NEM Objective (Schedule 7 of the National Electricity Law (NEL)), the MMA report indicates that the ToR "did mention the objectives of the NEL and the [National Gas Law], which are the overarching legislation so, by implication, the objective of the NEM could be considered by the review".<sup>9</sup> The AEMC has therefore been remiss in ignoring any examination of the NEM Objective. Consumer, community and environment groups have repeatedly called for the incorporation of environmental and social objectives into the NEL<sup>10</sup>, and at this

<sup>7</sup> Ibid. p. 20.

<sup>8</sup> Ibid. p. 3.

<sup>9</sup> Ibid. p. 54.

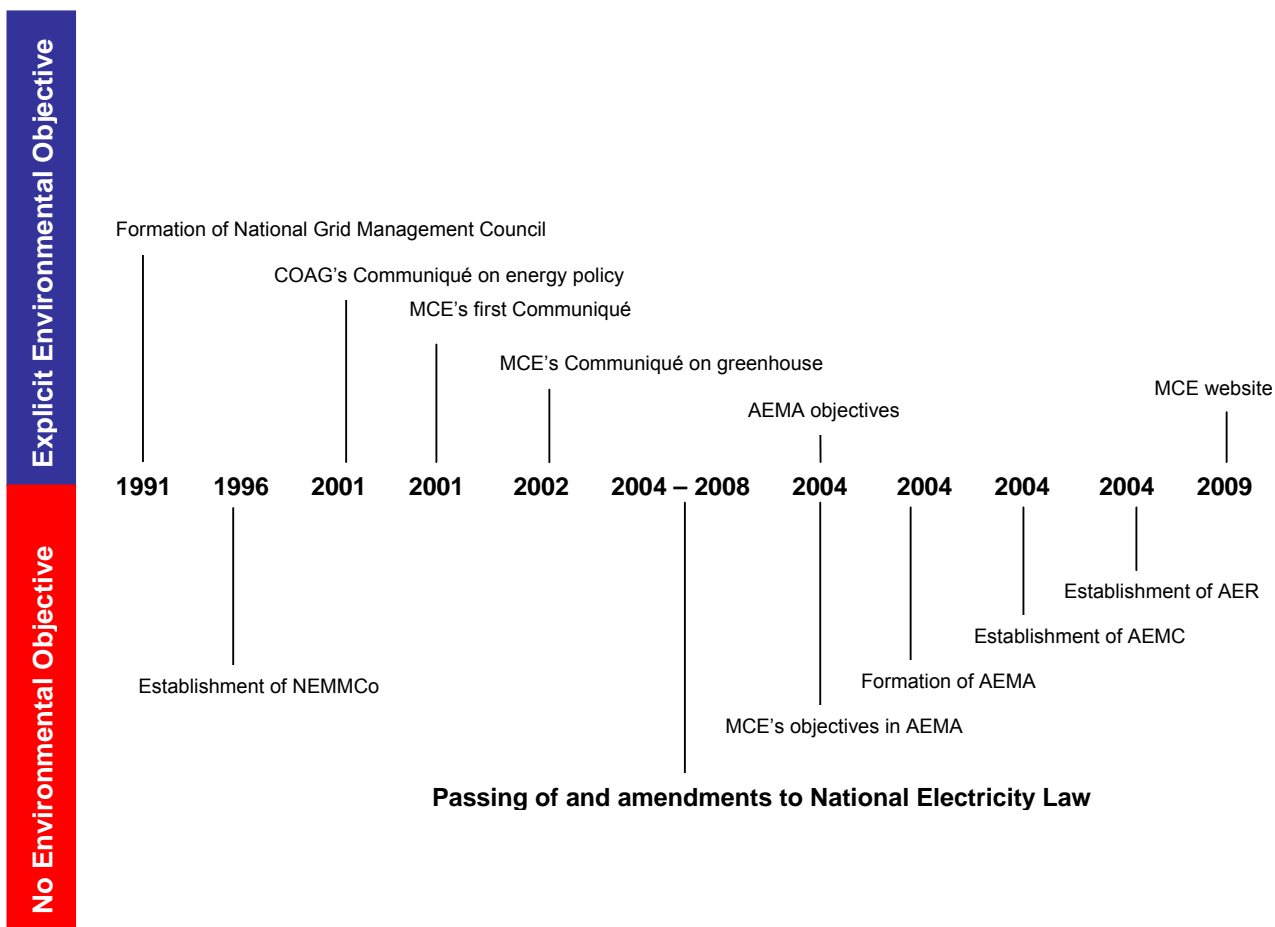
<sup>10</sup> For example, TEC. 2006. *How should environmental and social policies be catered for as the regulatory framework for electricity becomes increasingly national*. Source: [http://www.tec.org.au/index.php?option=com\\_docman&task=doc\\_download&gid=214](http://www.tec.org.au/index.php?option=com_docman&task=doc_download&gid=214); TEC. 2007. *National Electricity Law amendments package*. Source: [http://www.tec.org.au/images/17\\_nel\\_amendments\\_tec\\_0207.pdf](http://www.tec.org.au/images/17_nel_amendments_tec_0207.pdf); TEC. 2007. *Power for the people declaration*. Source: [http://www.tec.org.au/index.php?option=com\\_docman&task=doc\\_download&gid=206](http://www.tec.org.au/index.php?option=com_docman&task=doc_download&gid=206); TEC. 2008. *Submission to AEMC Review of energy market frameworks in light of climate change policies, scoping paper*. Source: <http://www.aemc.gov.au/Media/docs/Total%20Environment%20Centre-e42b1da5-05bf-4cd3-8418-ee7dc5074cdd-0.PDF>

crucial juncture of the Review, it is appropriate that the AEMC recommend to the MCE that an evaluation of the NEM Objective be undertaken in this context.

The MMA report shows how environmental objectives have been articulated for the NEM since 1991, but have not been included in the critical piece of legislation, the National Electricity Law. As the timeline below illustrates, this was not the aim of COAG when it established the energy market.<sup>11</sup>

Despite the lack of an environmental objective for the NEM, the MCE’s role purportedly remains “To provide national leadership so that consideration of broader convergence issues and environmental impacts are effectively integrated into energy sector decision-making”<sup>12</sup> (emphasis added). Likewise, the lead banner on the MCE’s website claims the body is “responsible for delivering the economic and environmental benefits for Australia resulting from the implementation of the Council of Australian Governments national energy policy framework” (emphasis added).<sup>13</sup> The MCE is quite clearly *not* fulfilling these roles, making these claims misleading.

### Changing emphasis on environmental objectives



<sup>11</sup> MMA. op. cit. p. 8-13.

<sup>12</sup> <http://www.ret.gov.au/documents/mce/about/default.html>

<sup>13</sup> MMA. Ibid.

To reiterate from our submission to the Scoping Paper of this Review<sup>14</sup>, regarding our recommended environmental objective:

The Market Environmental Objective is to contribute to achieving ecologically sustainable development and is to have regard to the effect on the environment of the generation, transmission, distribution, supply and use of electricity and related activities including achieving a reduction in emissions of greenhouse gases.

There will be inevitable price impacts on consumers as a result of the schemes and vulnerable consumers are most at risk of bearing adverse impacts. Therefore, in tandem with the environmental objective, the MCE should investigate a complementary social objective:

The Market Social Objective is to promote the long term interests of consumers with respect to the supply of electricity as an essential service including addressing the particular vulnerabilities that particular classes of consumers may have such as customers who are: disabled or chronically sick; of pensionable age; of low income; and/or residing in rural areas.

TEC strongly urges the insertion of environmental and social objectives in the National Electricity Law to balance out the existing, narrow economic objective of the NEM.

The MCE, through its ToR, and the AEMC, through its narrow interpretation and implementation of the ToR, are squandering a unique opportunity to consider how the NEM can enhance and effect climate change policies. This Review, as it currently stands, will most certainly not boost “the ability of the energy markets to meet the climate change challenge, through efficient and timely investment...”<sup>15</sup>

#### **1.4 Scope of the rest of this submission**

We have structured Section 2 of this submission to specifically address the issues that we identify are of greatest significance within the review of the NEM in light of climate change policies, discussed roughly in the order in which they appear in the 2<sup>nd</sup> Interim Report:

- Connecting remote generation
- Efficient utilisation and provision of the network
- Generation capacity in the short term
- Investment in capacity to meet reliability standards
- System operation with intermittent generation
- Distribution networks

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<sup>14</sup> TEC. 2008. op. cit.

<sup>15</sup> Ministerial Council on Energy. 2008. *Terms of Reference – AEMC review of energy market framework in light of climate change policies*, p. 2. Source: [http://www.ret.gov.au/documents/mce/documents/terms\\_of\\_reference\\_aemc20080825163904.pdf](http://www.ret.gov.au/documents/mce/documents/terms_of_reference_aemc20080825163904.pdf)

## 2. Specific issues within the Review

### 2.1 Connecting remote generation

#### *2.1.1 Preferred option and assessment of alternative models considered*

TEC is supportive of the AEMC's intentions to address existing barriers to efficient connection of remote generation to distribution and transmission networks, including the free rider and economies of scale issues that bear upon these forms of generation.

However, Option 4 remains our preference, and we question the Review's dismissal of its suitability.

We believe that the connection assets should be funded by the generality of *taxpayers*, not energy consumers, as this would be inappropriately non-transparent. As it is Commonwealth policy that is driving the additional costs, and it is all citizens who are the ultimate beneficiaries of the long-term social and environmental outcomes, it is appropriate that this infrastructure is funded in a transparent manner across the tax base. This is likely to be the more equitable solution also. We reiterate from our previous submission<sup>16</sup> that:

This whole issue of transmission infrastructure should be taken up by the Commonwealth Government. ... There is a clear net benefit from supporting large renewable generators in terms of ameliorating dangerous climate change via the potential for vastly reduced greenhouse gas emissions.

There appears to be some contradiction in the way the preferred model is discussed in Section 2.3 of the Report<sup>17</sup>, and then presented in Section 2.5 as Option 2. Section 2.3 describes a model that involves planning by AEMO, as well as network businesses, yet Section 2.5 presents a preferred model (Option 2) whereby network businesses would be primarily responsible for planning.

It is critical that there is an independent, central planner responsible for planning connection assets. The current lack of independent planning has resulted in the inefficient, peak driven augmentation of networks and this pattern must be rectified. Section 8.4 of the MMA report<sup>18</sup> supports TEC's earlier recommendation that the National Transmission Planner will likely be the most appropriate body to fulfil this role. In Section 2.3, the Report discusses the suitability of the AEMO to undertake planning for connecting remote generation, even raising the "national transmission planning function, given to the AEMO by the MCE."<sup>19</sup> Yet in Section 2.5, the Report dismisses the AEMO's suitability, citing AEMO's "caution about placing undue reliance on the contribution of the national transmission plan".<sup>20</sup> If it is the case that the AEMO is "unlikely to have sufficient

<sup>16</sup> TEC. 2009. *Submission to AEMC Review of energy market frameworks in light of climate change policies, 1<sup>st</sup> interim report*, p. 8. Source: <http://www.aemc.gov.au/Media/docs/Total%20Environment%20Centre%20-%20Received%2024%20February%202009-a5510697-2503-45cc-95b5-d73c8b90719b-0.PDF>

<sup>17</sup> AEMC. 2009. *Review of energy market frameworks in light of climate change policies, 2<sup>nd</sup> interim report*, p. 16. Source: <http://www.aemc.gov.au/Media/docs/Second%20Interim%20Report-5b4f2d74-8c01-4546-8805-c992d196e35f-0.PDF>

<sup>18</sup> MMA. op. cit. p. 87.

<sup>19</sup> AEMC. op. cit. p. 17.

<sup>20</sup> AEMC. Ibid. p. 22.

resources or access to the required information to effectively undertake a detailed planning role”,<sup>21</sup> then it is imperative that the AEMC recommend to the MCE that this be rectified, rather than simply leaving the planning function to network businesses that, as proponents for network capital expenditure and operations, have vested interests.

### *2.1.2 Small-scale distributed generation*

TEC wishes to highlight once again that the Review continues to focus on large-scale renewable generators only. Small-scale embedded generation, such as solar photovoltaic (PV) micro-generation, face a different set of barriers within the NEM which have not been addressed in the Review.

The MMA report reveals that in most states in Australia:

...PV is disadvantaged through market failure which does not take into account the value and benefits to the electricity network which arise from the adoption of renewable energy technologies embedded within the electricity network and the environmental benefits achieved through reduced carbon emissions and other pollutants.<sup>22</sup>

The market barriers that impede distributed generation, in particular solar PV, “have led to inefficient investment decisions, such as over-investment in networks and underinvestment in distributed energy solutions.”<sup>23</sup> Micro PV makes high-value contributions to the energy market during peak prices, and has network benefits for transmission and distribution, both of which are currently unpriced and unaccounted for (expanded upon in Section 6.3.2 of the MMA report). MMA suggest that “PV micro-generation may be competitive if the full cost of externalities is taken into account in the design of tariffs for electricity exported back into the grid.”<sup>24</sup>

## **2.2 Efficient utilisation and provision of the network**

TEC does not agree that the Review has accurately identified which elements of the existing framework are considered inadequate. Discussion of the potential for demand management and distributed generation to assist efficient utilisation and provision of the network remains conspicuously absent.

Forecast congestion within the network can be efficiently ameliorated through demand management solutions, and the AEMC should investigate the persistent barriers to such responses. As we have stated elsewhere, the current *AEMC Review of demand side participation in the National Electricity Market* has fallen well short of its potential to provide a means of harnessing the vast, untapped potential of demand management in the NEM.

While it is possible that congestion may increase while the NEM continues to ignore demand management, as it integrates more renewable and other energy sources,

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<sup>21</sup> Ibid. p. 22.

<sup>22</sup> MMA, op. cit. p. 40.

<sup>23</sup> Ibid. p. 42.

<sup>24</sup> Ibid. p. 40.

distributed generation has the potential to offset this congestion by inherently lower usage. Regarding the network barriers to distributed generation, the MMA report suggests that:

...the regulatory framework does provide some barriers to the ability of new entrants to fully capture the benefits they bring to the distribution system. While the regulatory rules require that networks pass on the benefits of avoided transmission use of system (TUOS) to larger embedded generators, no such requirement applies to compensating smaller distributed generators for the avoided TUOS. Therefore, there is an uneven regulatory treatment between large and small embedded generators.<sup>25</sup>

Regulatory failure; inappropriate incentives; existing TUOS arrangements; and the market bias against demand side participation currently result in network augmentation being “preferred over potentially more efficient non-network solutions, including embedded generation and distributed generation and demand side alternatives.”<sup>26</sup>

TEC believes that regulatory requirements (such as the G-TUOS charge and a congestion pricing mechanism) should apply to all generators with an emissions intensity factor included to ensure that renewable energy generators are not penalised and climate change policies external to the NEM are not dampened. This approach should also apply to DUOS charges.

In addition, we urge the examination of any grandfathering arrangements that could be distorting the market and increasing barriers to new entrants. As MMA argues:

To ensure that new generators compete on the same level as existing generators, the electricity rules could be examined to ensure that new generators are not subject to requirements that older generators are not required to comply with. The NEM has been in operation for a sufficiently long period of time for any grandfathered arrangements to be re-examined and removed, should they prove to provide an advantage to the older and more polluting generators at the expense of newer, lower emission generators.<sup>27</sup>

Finally, it is worthwhile to note the impact of existing TUOS charges on distributed generation, as a failing of the existing framework, as observed in the MMA report:

While distribution network service providers are required to compensate [distributed generation] for the avoided TUOS charges, due to the lower requirement for importing energy from the transmission system, these TUOS charges are not actually avoided. Transmission businesses are revenue controlled. Avoiding some TUOS charges by one distribution business simply raises the level of TUOS charges for all transmission customers. Any reduction in TUOS revenue in one year is made up by higher charges in the following year due to the “unders and overs” correction mechanism in the revenue control arrangements applicable to transmission businesses. Due to the locational nature of transmission pricing,

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<sup>25</sup> Ibid. p. 37.

<sup>26</sup> Ibid. p. 47.

<sup>27</sup> Ibid. p. 86.



the avoided TUOS charges from one customer are also likely to result in higher TUOS charges for other customers of the same distributor. Thus, the same distributor that pays the avoided TUOS charges for one customer, is likely to pay higher TUOS charges in subsequent years for its other loads. As a result, the distributor incurs the TUOS charges twice:

- by the payment of avoided TUOS charges to the embedded generator and
- by the increased TUOS charges due to the transmission revenue control adjustments to the regional TUOS price.

As a result of this arrangement, distributors do not want to make avoided TUOS payments to [distributed generation proponents]. The current arrangements for making avoided TUOS payments appear to introduce a regulatory distortion to the market.<sup>28</sup>

## **2.3 Generation capacity in the short term**

### *2.3.1 Reserve contracting*

TEC strongly agrees that the options available for the AEMO to procure reserve should be expanded. Whatever the mechanisms recommended for achieving this are, they must include formal arrangements for fast response and explicit incorporation of demand management (DM) solutions, in particular, demand side response (DSR).

Under the current arrangements, reserve capacity provided by DSR is not adequately recognised for the reliability support it provides:

As a result, current NEM reliability standards support the installation of surplus generating capacity with virtually no economic demand side response leading to excessive development of peaking plant. This is inefficient as the costs incurred in installing surplus capacity are likely to be substantially in excess of any demand withdrawal to meet the infrequent extreme peak demands or coincident outages of large power generation units at times of high demand.<sup>29</sup>

In the Western Australia Wholesale Electricity Market, a payment is made for the provision of reserve capacity. Similarly, Attachment B provides details of the reserve trader programs of Texas and California. Mechanisms therefore clearly exist for reserve capacity to be provided by DSR provided there is reasonable compensation for the service.

As the Consumer Utilities Advocacy Centre (CUAC) outlined in their previous submission to this Review:

One of the benefits of an active and effective demand side in the NEM is that, it can quickly and efficiently provide significant capacity to the NEM through either

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<sup>28</sup> Ibid. p. 43.

<sup>29</sup> Ibid. p. 45.

taking discretionary load off the network or providing generation to the network and/or users in the network. We note that work on developing an active demand side in the NEM has been ongoing for a long period of time with limited noticeable difference to the role of demand side to date.<sup>30</sup>

TEC has consistently held that the AEMC has ignored the opportunity to establish a standing reserve based on DSR. Recognition of DSR as a viable and frequently optimal reserve must be prioritised. There are various ways that DSR as reserve can be treated, including within the requirements for the Reserve Trader mechanism; or through scheduled load arrangements (discussed below); or as standing reserve. We sent a detailed letter to the AEMC on 21.10.08 on this subject (Attachment B), and we reiterate from that letter once again:

The current version of a reserve trader within the NEM is rarely used and overly cumbersome, providing limited potential for rapid response (or reduction of greenhouse gas emissions). Replacing the same mechanism with a permanent program that awards contracts for demand side reserve capacity could be made to work within the NEM model. It would provide a range of functions: to provide reserve; enhance security and reliability; and deliver significant co-benefits of reduced carbon pollution and carbon costs.

### *2.3.2 More accurate reporting of demand side capability*

TEC supports the strengthening of current demand side participation (DSP) reporting obligations to AEMO in the Rules. We agree that there is a need for more rigorous and specific requirements for all market participants, in particular networks but also including all those with demand side capabilities, such as retailers and demand management providers, to report on demand side capability.

Given the degree to which the market is regulated, it seems peculiar that the AEMO is not able to obtain the information it requires for such operational purposes. We support the approach proposed by the AEMC to Sub-group A that a Rule change be recommended to the MCE to strengthen the current DSP reporting obligations to AEMO in the Rules. The Rule change should follow the standard Rule making process (as opposed to a fast track Rule change), providing for broad consultation.

TEC believes that there should be much wider reporting on demand side capability for networks. The annual, full public disclosure of information by Transmission Network Service Providers on emerging network constraints is essential to the development of non-network responses to these constraints. Disclosure of information is fundamental to transparency and certainty of decision making, and it relies not on quantity, but quality. The current requirements are insufficiently rigorous to allow proper uptake of demand management by existing businesses and lack of quality information can inhibit new entrants to the market.

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<sup>30</sup> CUAC. 2009. *Submission to AEMC Review of energy market frameworks in light of climate change policies, 1<sup>st</sup> interim report*, p. 7. Source: <http://www.aemc.gov.au/Media/docs/Consumer%20Utilities%20Advocacy%20Centre%20-dd65ff89-f8e6-41f7-b04a-c7d2789c1c5b-0.pdf>

TEC also wishes to draw attention to its submission to the *AEMC Review of national framework for electricity distribution network planning and expansion, stakeholder workshop and paper*<sup>31</sup>, which recommends specific reporting requirements for demand side participation by Distribution Network Service Providers.

### *2.3.3 Facilitating distributed generation (DG)*

TEC commends the AEMC for recognising the importance of facilitating distributed generation within the NEM. However, we believe that discussion of distributed generation in the Review is extremely limited and narrow in scope. Section 6.3.6 touches only upon existing DG, and its potential benefits in terms of improved reliability and reserve shortfall mitigation. The AEMC must specifically address the barriers to both new and existing distributed generation, and acknowledge the full range of benefits that such generation offers (discussed below).

We take particular issue with the AEMC's notion that "...the current arrangements do not seem to impose a substantial barrier to strategic use of small distribution connected generators for exporting power to the NEM."<sup>32</sup> The MMA report contradicts this at length, stating that the Rules in fact "do not allow small scale distributed generation and demand side response to directly participate in the wholesale market", except through an aggregator<sup>33</sup>. Further, the MMA report highlights that:

Low emission distributed micro-generation technology had been disadvantaged as the prices paid for its output did not take into account the value and benefits to the electricity network which arose from being embedded within the electricity grid... an asymmetry issue exists in that only the network service providers truly know the value of the network benefits and would have an incentive to under-report these benefits.<sup>34</sup>

The report expands upon the barriers to embedded generation, including:<sup>35</sup>

- Difficulties in obtaining network operation information during negotiations on network connection agreements and costs. The embedded generation proponent does not have full information on their use of the network system, so may incur higher costs for connection to the transmission network.
- Lack of requirements for embedded generation to be explicitly assessed where augmentation of networks is being considered. The regulations do require network service operators to analyse alternatives to network upgrades as part of the approval process, but often the information is sought too late to allow the full development of alternative proposals. This late supply of information inhibits competition in demand side planning and development.

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<sup>31</sup> TEC. 2009. *Submission to AEMC Review of national framework for electricity distribution network planning and expansion, stakeholder workshop and paper*. Source:

<http://www.aemc.gov.au/Media/docs/Total%20Environment%20Centre-22a87fe-8e26-4d56-88c7-8c31a8bf68b3-0.pdf>

<sup>32</sup> AEMC. op. cit. p. 68.

<sup>33</sup> MMA. op cit. p. 37.

<sup>34</sup> Ibid. p. 32.

<sup>35</sup> Ibid. p. 33.

- Network pricing structures that includes high stand-by charges, with minimum chargeable demand that is only used when the embedded generator is not operating. This requirement penalises customers who self-generate, as they incur both the costs of generation and network demand charges that other generators do not incur. The lack of competition reduces the diversity of demand side participation which exacerbates the stand-by cost issue.
- Low buy-back rates for electricity that is exported to the network that do not reflect a proper recognition of the network benefits that the generator brings to the network including the reduction in losses, deferred network augmentation and potentially improved supply reliability.
- The existence of the retail arm of the network business creates a potential conflict of interest in supporting embedded generation projects proposed by third parties.

The MMA report also observes that the very structure of the NEM poses a barrier to distributed generation, in that it was established around existing generators.<sup>36</sup> New entrants (such as distributed generation) are subject to requirements that older existing generators have not had to meet, resulting in a higher cost structure which places them at a disadvantage.

The Review's recommendations for facilitating distributed generation are vastly insufficient, and must be expanded upon in detail. Distributed generation has a critical role to play, not least in achieving the RET; reducing network congestion; improving reliability; and reducing carbon emissions; yet the NEM framework and the slow removal of barriers remains a major obstacle to its success. The AEMC cannot rely upon the MCE Standing Committee of Officials' National Energy Customer Framework (NECF) to ensure greater utilisation of distributed generation – the MCE review of distributed generation has been running for years with minimal real progress, and the timetable for settlement of the NECF has been continually delayed.

#### *2.3.4 Load shedding management*

Contracted load shedding is another DM response that must be better developed within the NEM, and TEC supports the recommendation to the MCE that some formalised load shedding management (LSM) be introduced. Direct load shedding arrangements with large end users have the potential to significantly ease network constraints during critical peak periods. There needs to be permanent contracts with major users and DM providers that are in place well ahead of the seasons of peak use, but which can be rapidly deployed. The AEMO has the power to intervene and can make arrangements in advance of perceived and unplanned for constraints – as an independent body, it is appropriate for the AEMO to be able to institute these kinds of provisions.

Previously, NEMMCO contracted with the demand side for load shedding to occur during times of supply stress. “However, these contracts are short term, usually during the summer months when demand is high and only for up to nine months. These contracts do not give demand side participants sufficient certainty to invest in changes to their

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<sup>36</sup> Ibid.

production processes. As a result, participation is limited.”<sup>37</sup> A formalised LSM scheme must therefore provide the incentives and encouragement for much greater participation.

We agree with the AEMC’s assessment that the guaranteed revenue stream from load shedding management is unlikely to be more attractive than market-based opportunities, and therefore there is not a significant risk of interruptible load being withdrawn from the market.

## 2.4 Investment in capacity to meet reliability standards

TEC strongly disagrees with the AEMC’s notion that “the existing framework provides effective signals to promote efficient levels of investment in both transmission capacity, generation capacity and demand response.”<sup>38</sup>

As discussed in the MMA report and elsewhere in this submission:

- “...market failures have led to *inefficient* investment decisions, such as over-investment in networks and underinvestment in distributed energy solutions.”<sup>39</sup> (Section 2.1.2 above)
- “While in principle, small and medium scale embedded generation projects should receive compensation to encourage their development and economically defer investment in the network, the perverse incentive offered by the regulatory environment discourages demand side response and rewards investment in network infrastructure.”<sup>40</sup> (Section 2.2 above)
- “...reserve capacity provided by demand response is not recognised for the reliability support it provides. As a result, current NEM reliability standards support the installation of surplus generating capacity with virtually no economic demand side response leading to excessive development of peaking plant. This is inefficient as the costs incurred in installing surplus capacity are likely to be substantially in excess of any demand withdrawal to meet the infrequent extreme peak demands or coincident outages of large power generation units at times of high demand.”<sup>41</sup> (Section 2.3.1 above)

The existing framework *does not* provide effective signals to promote efficient levels of investment in demand response, as evidenced by the negligible levels of DSP at present. The current flaws in the framework regarding DSP are presently under review in the *AEMC Review of demand side participation in the National Electricity Market*,<sup>42</sup> but, as mentioned above, this Review is failing to adequately respond to the problem. MMA also released a report last year discussing these and other barriers to DSP, identifying that:

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<sup>37</sup> Ibid. p. 38.

<sup>38</sup> AEMC. op. cit. p. 71.

<sup>39</sup> MMA. op. cit. p. 42.

<sup>40</sup> Ibid. p. 44.

<sup>41</sup> Ibid. p. 45.

<sup>42</sup> <http://www.aemc.gov.au/Market-Reviews/Open/Review-of-Demand-Side-Participation-in-the-National-Electricity-Market.html>

The structural transformation that will be required ... will necessarily feature demand side response (DSR), as well as distributed and embedded generators, which together will become increasingly important in smoothing the impact of infrastructure investment activities on the wholesale market. ... DSR in particular could become a critical transition strategy to overcome critical investment lags if they occur.<sup>43</sup>

The AEMC has failed to undertake explicit consideration of DM issues in light of climate change policies in this Review. We urge once again that the AEMC acknowledge the need to rapidly reduce consumption of electricity; and increase the use of load shifting DSR opportunities, within the NEM.

## 2.5 System operation with intermittent generation

TEC agrees that the existing market frameworks are sufficiently robust to maintain secure system operation in the context of large increases in renewable generation.

We note that this iteration of the Review continues to place emphasis on the intermittency of wind-powered generation. In response, we cite from the MMA report:

...the federal government is implementing a wind forecasting regime and wind forecasting techniques are improving, along with the technology to control dispatch by wind farms, so this is unlikely to be a material problem in the future. The key issue here is whether wind generation is treated more harshly than other forms of generation. All forms of generation have some element of unpredictability, so the question is whether the rules apply in an equal way across all forms of generation.<sup>44</sup>

The Australian Wind Energy Forecasting System (AWEFS) under development will likely eliminate much of the uncertainty regarding wind generation. There is implication that the rest of the system is 100% reliable, which it is not. It is set up to average .002% of unserved energy over the system, and the expectation is not that each component is reliable in and of itself.<sup>45</sup>

The establishment of a diverse mix of renewable energy sources and gas, in the transition period, is required, including solar thermal; geothermal; and wave energy; some of which are perfectly capable of providing peaking plant.

## 2.6 Distribution networks

TEC agrees that the distribution network is sufficiently robust to support consequent changes effected by the CRPS and expanded RET.

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<sup>43</sup> MMA. 2008. *An initial survey of market issues arising from the Carbon Pollution Reduction Scheme and Renewable Energy Target*, p. 67.

<sup>44</sup> MMA. op. cit. p. 39.

<sup>45</sup> TEC. 2008. op. cit.

We believe there is merit in innovation funding for distribution businesses, specifically, for the investigation of DM options. We recommend the funding be extended to transmission businesses also. Network businesses currently investigate DM options on a very limited basis, with CRA International<sup>46</sup> noting that:

Efforts by regulators to encourage [Network Service Provider] consideration of DSP as an alternative to network augmentation have, thus far, yielded limited success only ... In CRA's experience, DSP is more likely to occur when a NSP actively facilitates DSP compared to passively advertising an opportunity.

The Australian Energy Regulator (AER) has already introduced limited innovation allowances for some distribution networks, as part of its DM incentive schemes (DMIS). These DMIS must be rapidly enhanced (as current funding levels are disappointingly low), and a similar development is needed for transmission businesses.

TEC recommends that any innovation allowance scheme be accompanied by an investigation of the current DM activities networks are engaged in. A database of what DM options networks investigate; what is successful and what is not; and the actual DM options they pursue would assist effective allocation of funding.

The AER will be collecting similar information for its innovation funding schemes. Rigorous reporting, however, has only been set out for DM actions under the schemes. It should be required for **all** DM investigations by both transmission and distribution networks.

TEC would caution that an innovation allowance is not sufficient in itself to ensure efficient (increased) levels of DM, and other mechanisms need to be established also.

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<sup>46</sup> CRA International. 2008. *The wholesale market and financial contracting: AEMC review of demand-side participation in the NEM*. Source:  
<http://www.aemc.gov.au/Media/docs/Report%20on%20The%20Wholesale%20Market%20and%20Financial%20Contracting%20by%20CRA%20International-37c1c6da-f033-4b70-ab70-597177a23337-0.pdf>

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Report to  
**Total Environment Centre**

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**Role of the NEM in responding to climate change policies**

10 June 2009



Ref: J1731

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## **Project Team**

Jim Stockton

Ross Gawler

Lionel Chin

Rachel Connor

Kate Brook

Nicola Falcon

Jo Moss

Geoff Carroll

### **Melbourne Office**

242 Ferrars Street  
South Melbourne Vic 3205  
Tel: +61 3 9699 3977  
Fax: +61 3 9690 9881

### **Brisbane Office**

GPO Box 2421  
Brisbane Qld 4001  
Tel: +61 7 3100 8064  
Fax: +61 7 3100 8067

### **Canberra Office**

GPO Box 443  
Canberra City ACT 2601

Email: [mma@mmassociates.com.au](mailto:mma@mmassociates.com.au)

Website: [www.mmassociates.com.au](http://www.mmassociates.com.au)

ACN: 004 765 235  
ABN: 33 579 847 254

**TABLE OF CONTENTS**

	<b>GLOSSARY AND ABBREVIATIONS</b>	<b>1</b>
<b>1</b>	<b>EXECUTIVE SUMMARY</b>	<b>3</b>
<b>2</b>	<b>INTRODUCTION</b>	<b>6</b>
	2.1 Background	6
	2.2 Methodology	6
<b>3</b>	<b>CHANGING EMPHASIS ON ENVIRONMENTAL OBJECTIVES</b>	<b>8</b>
<b>4</b>	<b>COMPARISON OF CLIMATE CHANGE AND NEM GOALS</b>	<b>14</b>
	4.1 Comparison of climate change and NEM objectives	14
	4.2 Comparison of goals of the NEM, CPRS and RET	17
	4.3 MCE's Terms of Reference and the scope of the AEMC review	19
<b>5</b>	<b>POTENTIAL ROLE OF DEMAND SIDE PARTICIPATION</b>	<b>23</b>
<b>6</b>	<b>BARRIERS POSED BY THE NEM TO CLIMATE CHANGE POLICIES</b>	<b>30</b>
	6.1 Electricity markets	30
	6.2 Regulatory framework	36
	6.3 Impact of market failure on low emission energy technology new entrants	38
	6.4 Low carbon electricity grid	47
<b>7</b>	<b>THE RESULTS OF STAKEHOLDER CONSULTATION</b>	<b>52</b>
	7.1 Institutions and policies	52
	7.2 Low carbon generation issues	76
	7.3 Costs of adjustment and to consumers	80
	7.4 Other issues	81
<b>8</b>	<b>SUMMARY OF PARTICIPANTS' RECOMMENDATIONS</b>	<b>85</b>
	8.1 The NEM objective	85
	8.2 Requirements for new generators	86
	8.3 Embedded generation	86
	8.4 Remote area generation	87
	8.5 Incorporating carbon costs into infrastructure decisions	88
	8.6 How the NEM could better facilitate demand side participation among distributors	88
	8.7 How the NEM could better facilitate demand side participation among retailers	89
	8.8 Small-scale renewable generation and cogeneration	89
	8.9 National institute for energy efficiency and demand management	91

8.10	Advanced metering infrastructure	91
8.11	Summary of options to align the NEM with climate policies	91
<b>9</b>	<b>REFERENCES</b>	<b>95</b>
<b>10</b>	<b>ACKNOWLEDGEMENTS</b>	<b>100</b>
	<b>APPENDIX 1, BACKGROUND TO THE AEMC'S REVIEW</b>	<b>101</b>
	<b>APPENDIX 2, A BRIEF DESCRIPTION OF THE NEM AND RELATED ORGANISATIONS</b>	<b>106</b>
	<b>APPENDIX 3, DISCUSSION GUIDE</b>	<b>110</b>
	<b>APPENDIX 4, NATIONAL GRID MANAGEMENT PROTOCOL OBJECTIVES</b>	<b>114</b>
	<b>APPENDIX 5, ENVIRONMENTAL AND SOCIAL PROVISIONS IN NON-FEDERAL LEGISLATION</b>	<b>115</b>
	Australian Capital Territory	115
	New South Wales	116
	Queensland	116
	Victoria	117

## LIST OF TABLES

Table 1	- Comparison of goals of the NEM, CPRS and RET	3
Table 2	- Summary of major barriers and solutions preferred by participants	4
Table 3	- Environmental objectives	11
Table 4	- Comparison of goals of the NEM, CPRS and RET	18
Table 5	- What is the potential for energy efficiency in Australia and where is it located	24
Table 6	- Market failures impacting on the success of climate change policies	47
Table 7	- Comparison of NEM, WEM and the New Zealand Electricity Market	57
Table 8	- Matrix of demand side participation and markets	71
Table 9	- Summary of major options preferred by participants	93

## LIST OF FIGURES

Figure 1	- Approach	7
Figure 2	- Spot price cycles in Victoria	31

Figure 3 – Example of leverage from demand side participation _____	36
Figure 4 – Hurdles to be passed with smart meters _____	76
Figure 5 – City of Sydney’s Green Transformer project _____	83
Figure 6 – Linkages between generators and end customers _____	107
Figure 7 – Interconnected network of the NEM _____	108

## **LIST OF EXHIBITS**

Exhibit 1 – The National Electricity Market objective _____	14
Exhibit 2 – The CPRS objective _____	16
Exhibit 3 – The expanded RET objective _____	17

## **VERSION**

<b>Version</b>	<b>Date</b>	<b>Comment</b>	<b>Approved</b>
Draft V41	12 April 2009	Work in progress	Jim Stockton
Draft V46	14 April 2009	Interim report	Jim Stockton
Draft V56	22 April 2009	Incorporating forum results	Jim Stockton
Final V63	20 May 2009	Incorporating comments from TEC	Jim Stockton
Final V65	10 June 2009	Incorporating comments from TEC	Jim Stockton

## GLOSSARY AND ABBREVIATIONS

Abbreviation	Definition
AEMA	Australian Energy Markets Agreement
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AMI	Advanced metering infrastructure
CMR	Congestion Management Review
CO <sub>2</sub> e	Carbon dioxide equivalent
COAG	Council of Australian Governments
Cogeneration	Production of heat and electricity. Also used in this report to describe trigeneration, production of heat, cooling and electricity
CPRS	Carbon Pollution Reduction Scheme
CRR	Comprehensive Reliability Review
DCC	Department of Climate Change
DEWHA	Department of Water, Heritage and the Arts
D-factor	A factor introduced by IPART to reduce regulatory barriers to demand management in NSW
DMIA	Demand management innovation allowance
DNSP	Distribution network service provider
DRET	Department of Resources, Energy and Tourism
DUOS	Distribution use of system
ESIPC	Electricity Supply Industry Planning Council of South Australia
Expanded RET	Expanded Renewable Energy Target
FACS	Frequency, Control, Ancillary Services
FRC	Full retail contestability
GDP	Gross domestic product
IMO	Independent Market Operator
IPART	Independent Pricing and Regulatory Tribunal
MCE	Ministerial Council on Energy
MWh	Megawatt hour
NABERS	Australian building greenhouse rating scheme
NEET	NSW Energy Efficiency Trading scheme
NEL	National Electricity Law
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company

<b>Abbreviation</b>	<b>Definition</b>
NER	National Electricity Rules
NFEE2	National Framework for Energy Efficiency 2
NGL	National Gas Law
NGMC	National Grid Management Council
NPV	Net present value
NSP	Network service provider
NTNDP	National Transmission Development Plan
NTP	National Transmission Planner (for electricity)
PTS	Principal Gas Transmission system of Victoria
PV	Photovoltaic
RAB	Regulated asset base
REC	Renewable Energy Certificate
REMCo	Retail market administrator for full retail contestability of gas in South Australia and Western Australia
RERM	Reliability and Emergency Reserve Mechanism
RERT	Reliability and Emergency Reserve Trader
RET	Renewable Energy Target
RoLR	Retailer of Last Resort
SCADA	Supervisory control and data acquisition
SCO	Standing Committee of Officials
SWIS	South West Interconnected System of Western Australia
TEC	Total Environment Centre
TNSP	Transmission network service provider
ToR	Terms of Reference
ToU	Time of use
TUOS	Transmission use of system
VENCorp	VENCorp's primary functions include operating the Principal Gas Transmission (PTS) system of Victoria, developing and managing Victoria's wholesale gas market, facilitating gas full retail contestability (FRC) in Victoria and Queensland, electricity and gas planning and development and managing electricity and gas emergencies
VoLL	Value of lost load
VRET	Victorian Renewable Energy Target
WEM	Wholesale Electricity Market in the SWIS

## 1 EXECUTIVE SUMMARY

The Total Environment Centre (TEC) commissioned McLennan Magasanik Associates (MMA) to conduct research on the National Electricity Market's (NEM's) response to, and interaction with, climate change policies. This report examines potential impediments that the NEM has created for climate change policies, both in its high level objective and specific NEM rules. It was initiated in response to the Australian Energy Market Commission's (AEMC's) Review of energy market frameworks in light of climate change policies.<sup>1</sup>

Table 1 compares the high level goals of the NEM, CPRS and the RET.

**Table 1 – Comparison of goals of the NEM, CPRS and RET**

<b>Scheme: ►</b>	<b>NEM</b>	<b>CPRS</b>	<b>RET</b>
<b>Objectives ▼</b>			
Global response to emission reduction	No	Yes: indirectly through setting an example in emission reduction policy	Yes: indirectly through setting an example in renewable energy policy
Local response to emission reduction	No	Yes: the issue of permits guarantees local emission reduction	Yes: the target itself guarantees local emission reduction
Ecological sustainability	No	Yes: implied by emission reduction	Yes: implied by reduction in carbon emission from thermal power displaced
Economic efficiency	Yes	Yes: cost effective emission reduction	Yes: traded certificates provide for coordination of investment to minimise costs
Efficient prices	Yes	Yes: implied by cost-effective emission reduction	Yes: traded certificates provide for transparent pricing and cost discovery
Addressing disadvantage	No	Yes: for those adversely affected by the Scheme	No
Quality of supply	Yes	Yes: implied by processes for emission measurement	Yes: implied by standards for certificate recognition and supported by the penalty regime
Reliability of supply	Yes	Not applicable	Not applicable
Security of supply	Yes	Not applicable	Not applicable
Safety in production and delivery	Yes	Not applicable	Not applicable

The assignment collected data via in-depth interviews and a forum with stakeholders who represented a variety of demand management and energy efficiency providers, community-based organisations, wind farm and cogeneration proponents, electricity

<sup>1</sup> See *Appendix 1, Background to the AEMC's review* on page 101 for more information on the review.

distributors and electricity generators. These data were supplemented with information from the submissions made to Australian Energy Market Commission (AEMC) for its review, and submissions made for related reasons to other reviews.

Table 2 summarises the ideas proposed by the participants in this study that appear to have the greatest potential to help align the NEM with Australia's climate change policies.

**Table 2 – Summary of major barriers and solutions preferred by participants**

<b>Issue</b>	<b>Effect of issue</b>	<b>Policy option to correct the issue</b>
NEM objective	<p>Ignores negative externalities of fossil-fuelled generation</p> <p>Fails to fulfil national leadership role</p>	Incorporate emission factor into the generator dispatch algorithm
New generators	Inconsistent technical requirements for ancillary service and control equipment	Review rules to standardise procedures for small scale technologies
Embedded generation	<p>Information asymmetry</p> <p>Lack of recognition of environmental, network and distribution benefits</p>	Published information on opportunities to stimulate activity and increase competitive response to the opportunities
Remote area generation	<p>First mover pays for transmission</p> <p>Sub-optimal transmission capacity built as a result</p>	Funding arrangements to overcome first mover penalty and the free rider benefit for later movers
Incorporating carbon costs into infrastructure decisions	<p>Pre-emptive construction of infrastructure</p> <p>Information asymmetry</p>	<p>Policy to exploit demand side options before additional expenditure on transmission or distribution is approved</p> <p>Published information on the value of capacity at nodal locations</p> <p>Standardised format or template for working out and presenting a value function showing timing so proponents can analyse the value of embedded generation</p>
NEM does not facilitate demand side participation by distributors	Less demand side capacity used than in pre-NEM years	<p>Longer term option for NEMMCO's Reliability Safety Net contracts</p> <p>Modify the regulatory test to ensure demand response options must be used before spending is approved for new distribution infrastructure</p>
NEM does not facilitate demand side participation by retailers	Retailers' revenue is based on volume of sales	<p>Allow retailers to become energy service providers and enhance incentives to reduce sales</p> <p>Break link between generators and retailers</p>



<b>Issue</b>	<b>Effect of issue</b>	<b>Policy option to correct the issue</b>
Small scale renewable generation and cogeneration	Lack of facility means that higher cost options are used to meet the CPRS target	Higher feed-in tariffs Revised stand-by charges
Imbalance in level of effort being applied to different options	Bulk of public funds being captured by coal interests	Create a national institute for energy efficiency and demand management
Advanced metering infrastructure (AMI) is being introduced	What is AMI going to control?	Need decisions about how AMI can be of benefit, and who it can benefit

We are indebted to the organisations which participated in the interviews and forum. They are listed in the section titled *Acknowledgements* on page 100.

## 2 INTRODUCTION

The Total Environment Centre (TEC) commissioned McLennan Magasanik Associates (MMA) to conduct research on the NEM's response to, and interaction with, climate change policies. This report describes the results of the research.

### 2.1 Background

This report was initiated in response to the AEMC's review of energy market frameworks in light of climate change policies.<sup>2</sup>

The purpose of this research was to highlight any impediments that the NEM has created to climate change policies, both in its high level objectives, in specific NEM rules and in the ways the participants have chosen to operate. It also examines activities related to, but outside the NEM and issues relevant to the NEM and climate change policies in some other way. The research was designed to collect data which could be used to propose ways in which these impediments could be reduced, with the aim of increasing the NEM's ability to interact positively with climate change policies.<sup>3</sup>

This assignment for TEC had two broad objectives in relation to the AEMC review, which can be summarised thus:

- to identify the points where the NEM may be dampening or obstructing the efficient implementation of a range of climate change policies
- to build networking, capability and consensus among consumer and environmental groups and the clean energy industry on how the NEM can facilitate climate change policies.

### 2.2 Methodology

The core question in this assignment was, "Are there aspects of the objectives, rules or operation of the NEM that are impediments to the implementation of climate change policies?"

Climate change policies may be found at the federal, state and local government levels. Examples include the CPRS at the federal level, state and territory policies such as the Energy Efficiency Trading scheme (NEET) in New South Wales, gross feed-in tariffs in the ACT and trigeneration and energy efficiency programs by local government.

The assignment collected data via in-depth interviews and a forum with stakeholders who represented a variety of demand management and energy efficiency providers, community-based organisations, wind farm and cogeneration proponents, electricity

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<sup>2</sup> A more detailed background to the AEMC Review can be found in *Appendix 1, Background to the AEMC's review* on page 101.

<sup>3</sup> A short description of the NEM is included in *Appendix 2, A brief description of the NEM and related organisations* on page 106.

distributors and electricity generators who have experience of the NEM. The organisations which participated in the interviews and forum are listed in the section titled *Acknowledgements* on page 100. The discussion guide for the interviews is included as *Appendix 3, Discussion guide* on page 110.

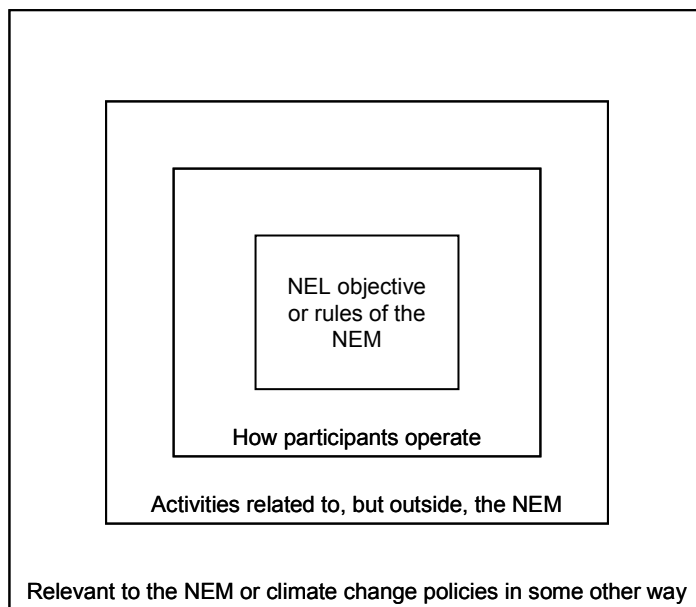
After the interviews were completed, we used the issues raised by the participants' experience to analyse the operation of the NEM and to identify impediments to the implementation of climate change policies within its objective and operating rules and the related behaviour of the participants in the market.

Once an issue was identified by participants, the sequence of key questions was:

1. Is this issue a result of the National Electricity Law (NEL), the objective or rules of the NEM, that is, of the formal structure?
2. If not, is this issue a result of the operation of the NEM, that is, how the participants have chosen to operate?
3. If neither 1 nor 2 above, is it a result of activities that are related to, but outside of, the NEM?
4. If none of the above, is this issue relevant to the NEM and climate change policies in some other way? If it is relevant, is it better dealt with in some other arena, such as the political process?

This approach is illustrated in Figure 1.

**Figure 1 - Approach**



Using the issues identified by participants as a starting point, we then drew on MMA's work in the energy market to elaborate on key issues where the NEM and the activities of the players in the market may be impeding the achievement of Australia's climate change policies.

### 3 CHANGING EMPHASIS ON ENVIRONMENTAL OBJECTIVES

This chapter traces the declining emphasis given to environmental objectives from the formation of the National Grid Management Council in 1991 to the NEM today.

Initially, the environment was one of the core objectives of the National Grid Management Council, which was one of the organisations that evolved into the NEM of today. A key moment in the establishment of the NEM was the formation of the National Grid Management Council (NGMC) in 1991 to progress the NEM's development. In 1992, the NGMC issued its first National Grid Protocol and it is notable that the first of the listed objectives was:

*“to encourage the most efficient, economical and **environmentally sound** development of the electricity industry consistent with key National and State policies and objectives”* (our emphasis)<sup>4</sup>

As the issue of climate change began to gain attention in the 1990s, energy market reform was seen as a key driver to reduce greenhouse gas emissions. As the Australian Greenhouse Office stated in 1999, energy market reform:

*“has the capacity to achieve lower greenhouse intensity and as such is a **key element of Australia's greenhouse response**. Accelerated energy market reform, as outlined in the PM's statement of November 1997, can provide an impetus for the uptake of cogeneration, renewable energy and other less greenhouse-intense supply options.”* (our emphasis)<sup>5</sup>

The importance of the environmental objective in Australia's national energy policy was reaffirmed in 2001 when COAG released an appendix to a communiqué titled *COAG energy policy details: 8 June 2001, Attachment 1, Towards a national energy policy*.

*“Meeting our future energy needs will require careful policy design so that fuel choice and use are optimised from economic, operational, reliability and security of supply, and **environmental perspectives**.”*

*“All Australian Governments recognise that effective operation of an open and competitive national energy market contributes to improved economic and **environmental performance**, and to delivering benefits to households, small business and industry, including in regional areas.”* (our emphasis)<sup>6</sup>

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<sup>4</sup> National Grid Management Council. 1992. *National grid protocol, first issue*. Source: [http://www.efa.com.au/Library/NationalGridProtocol\\_1992.pdf](http://www.efa.com.au/Library/NationalGridProtocol_1992.pdf). Last accessed: 8 May 2009. Objectives page.

<sup>5</sup> Australian Greenhouse Office. 1999. *Submission to Senate Environment, Communications, Information Technology and the Arts Reference Committee inquiry into Australia's response to global warming*. Source: <http://www.apf.gov.au/house/committee/jsct/kyoto/sub112d.pdf>. Last accessed: 8 May 2009. Page 13.

<sup>6</sup> COAG. 2001. *COAG energy policy details: 8 June 2001, Attachment 1, Towards a national energy policy*. Source: [http://www.coag.gov.au/coag\\_meeting\\_outcomes/2001-06-08/docs/energy.rtf](http://www.coag.gov.au/coag_meeting_outcomes/2001-06-08/docs/energy.rtf). Last accessed: 8 May 2009.

COAG agreed to three national energy policy objectives:

- “Encouraging efficient provision of reliable, competitively-priced energy services to Australians, underpinning wealth and job creation and improved quality of life, taking into account the needs of regional, rural and remote areas;
- Encouraging responsible development of Australia's energy resources, technology and expertise, their efficient use by industries and households and their exploitation in export markets; and
- Mitigating local and global **environmental impacts**, notably **greenhouse impacts**, of energy production, transformation, supply and use.” (our emphasis)<sup>7</sup>

Six months later, the MCE released its first Communiqué which stated that:

*“The Council's key objective is to produce policies which will maximise the provision of reliable energy services and drive an open and competitive energy market while delivering benefits **within a sustainable development framework** and meeting expectations of social responsibility and responsiveness to consumers.”* (our emphasis)<sup>8</sup>

Under the heading of *MCE's role in greenhouse issues*, the MCE's communiqué a year later in November 2002 reaffirmed its role in greenhouse policy and measures:

*“Tackling greenhouse emissions from the energy sector is an important element of Australia's greenhouse response strategy, as emissions from the sector make up nearly 70% of total emissions. The MCE is responsible for energy policy and its implementation, and provides an important forum for the discussion of the issues and their implications for energy production and consumption. In recognition of the importance of greenhouse issues in setting future national energy policy and programs undertaken by the Council, a **standing agenda item for future Council meetings was established on the MCE's role in respect to development of national greenhouse policies and measures.**”* (our emphasis)<sup>9</sup>

The formalisation of the Australian Energy Market Agreement (AEMA) in 2004 stated the environmental objective in the recitals in the first two paragraphs:

*“A. In June 2001, the Council of Australian Governments (COAG) recognised that effective operation of an open and competitive national energy market will contribute to improved economic and **environmental performance** and deliver benefits to households, small business and industry, including in regional areas, and:*

*(a) established the Ministerial Council on Energy (MCE) to provide national oversight and coordination of energy policy development and to provide national leadership so that*

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<sup>7</sup> Ibid.

<sup>8</sup> Ministerial Council on Energy. 2001. *Ministerial Council on Energy, Melbourne 7 December 2001, communiqué*. Source: [http://www.ret.gov.au/Documents/mce/\\_documents/MCECommunique1\\_7dec0120040729130539.pdf](http://www.ret.gov.au/Documents/mce/_documents/MCECommunique1_7dec0120040729130539.pdf). Last accessed: 8 May 2009. Page 1.

<sup>9</sup> Ministerial Council on Energy. 2002. *Ministerial Council on Energy communiqué, Brisbane 29 November 2002*. Source: [http://www.ret.gov.au/Documents/mce/\\_documents/MCECommunique3\\_29Nov0220041115170338.pdf](http://www.ret.gov.au/Documents/mce/_documents/MCECommunique3_29Nov0220041115170338.pdf). Last accessed: 8 May 2009.

*consideration of broader convergence issues and **environmental impacts** are effectively integrated into energy sector decision-making” (our emphasis)<sup>10</sup>*

The AEMA also looked to the future with an objective to:

*“(b) the establishment of a framework for further reform to:*

*(vi) address **greenhouse emissions from the energy sector**, in light of the concerns about climate change and the need for a stable long-term framework for investment in energy supplies.” (our emphasis)<sup>11</sup>*

In addition, the AEMA did not inhibit the jurisdictions from pursuing their own environmental and greenhouse policies.

*“(a) Nothing in this Agreement affects the right of any of the Parties to develop, implement and/or maintain (whether through legislation, regulation, administrative initiatives or otherwise) policies relating to **environmental (including greenhouse)** and planning issues within their own jurisdictions.” (our emphasis)<sup>12</sup>*

However, when the AEMA set out the role of the MCE and its responsibilities, the environmental objective was not mentioned specifically, although it could be implied in the responsibility for *“(e) longer-term, systemic and structural energy issues that affect the public interest”*.<sup>13</sup>

The AEMA named three energy market institutions. They were:

- AEMC, responsible for rule making and energy market development
- AER, responsible for economic regulation and compliance with the Codes
- NEMMCO, responsible for day to day operation of the power system and the wholesale spot price market.

Although the environmental responsibility was clear in the recitals of the agreement, none of the institutions were charged with this responsibility, even though the environmental objective remains important to the MCE, and is one of only two objectives listed for the MCE on its website as follows:

*“To provide national leadership so that consideration of broader convergence issues and **environmental impacts** are effectively integrated into energy sector decision-making” (our emphasis)<sup>14</sup>*

Table 3 summarises the times at which an environmental objective was confirmed. In parallel with these initiatives, state and territory Acts incorporated environmental and

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<sup>10</sup> Council of Australian Governments. 2004. *Australian Energy Market Agreement*. Source: [http://www.ret.gov.au/Documents/mce/\\_documents/IGA\\_FINAL\\_\(30JUNE2004\)2004071310032320041112162849.pdf](http://www.ret.gov.au/Documents/mce/_documents/IGA_FINAL_(30JUNE2004)2004071310032320041112162849.pdf). Last accessed: 8 May 2009. Page 1.

<sup>11</sup> Ibid. Page 6-7.

<sup>12</sup> Ibid. Page 2-3.

<sup>13</sup> Ibid. Page 8.

<sup>14</sup> Source: <http://www.ret.gov.au/Documents/mce/about/default.html>. Last accessed: 8 May 2009.

social objectives. Excerpts of these Acts are included in *Appendix 5, Environmental and social provisions in non-federal legislation* on page 115.

**Table 3 – Environmental objectives**

Year	Event	Environmental objective
1991	Formation of National Grid Management Council	Y
1996	Establishment of NEMMCO	N
2001	COAG released communiqué on a national energy policy	Y
2001	MCE's first communiqué	Y
2002	MCE communiqué of its role in greenhouse issues	Y
2004-08	Passing and amendments to National Electricity Law	N
2004	MCE's objectives within AEMA	N
2004	Formation of AEMA	N
2004	Establishment of AEMC	N
2004	Establishment of AER	N
2009	MCE's website	Y

When the Minister introduced the Australian Energy Market Bill 2004 for its second reading, the speech did not mention an environmental objective.<sup>15</sup>

At the second reading of the National Electricity (South Australia) (New National Electricity Law) Amendment Bill, the exclusion of environmental issues was explained as the result of their being covered by other proposed reforms.

*"The new National Electricity Law does not explicitly address environmental issues such as greenhouse. A future program of reform identified in the "Reform of Energy Markets" paper and the Australian Energy Market Agreement objectives will address issues such as user participation, barriers to distributed and renewable generation and further integration of the national electricity and gas markets over time. Addressing these issues is likely to reduce greenhouse emissions in an economically efficient manner."*<sup>16</sup>

As mentioned above, the environmental and greenhouse objectives were not allocated to NEMMCO, so in 2005 NEMMCO legitimately noted that:

*"Under the Rules, NEMMCO's charter focuses specifically on efficiency, security and reliability of power supply, and excludes favouring one fuel source over any other."*

<sup>15</sup> Source: [http://parlinfo.aph.gov.au/parlInfo/genpdf/chamber/hansardr/2004-06-17/0011/hansard\\_frag.pdf;fileType%3Dapplication%2Fpdf](http://parlinfo.aph.gov.au/parlInfo/genpdf/chamber/hansardr/2004-06-17/0011/hansard_frag.pdf;fileType%3Dapplication%2Fpdf). Last accessed: 8 May 2009.

<sup>16</sup> Source: [http://www.ret.gov.au/Documents/mce/\\_documents/NEL2ndreadingspeechhansard9feb0520050211091852.pdf](http://www.ret.gov.au/Documents/mce/_documents/NEL2ndreadingspeechhansard9feb0520050211091852.pdf). Last accessed: 14 May 2009.

*Consequently, NEMMCO has neither the power nor the authority to make decisions based on considerations of sustainability and balance in resource management”<sup>17</sup>*

However, NEMMCO’s claim that the environmental responsibility is a state government based task seems disingenuous, because it avoids mentioning that an environmental and greenhouse responsibility does lie with the MCE under the AEMA:

*“The various state regulators ensure that environmental impact assessments are conducted as part of any power industry planning initiatives. The regulators also monitor operations at industry sites within their jurisdictions, and the industry itself operates and audits waste reduction and recycling programs.”<sup>18</sup>*

In contrast to the environmental objectives discussed in the preceding paragraphs, NEMMCO now explicitly excludes the consideration of environmental matters and treats emissions as an externality. In NEMMCO’s own words:

*“Environmental benefits, unless explicitly priced, are externalities.”<sup>19</sup>*

Climate change policy is currently being driven by the federal and state climate change and environment ministers. This is perhaps most clearly illustrated at the federal level by the fact that both the CPRS and the RET are under the Department of Climate Change, rather than under the Department of Resources, Energy and Tourism. By default, the electricity industry, which is one of the largest areas of environmental impact, has been removed from the environmental portfolio.

The Labor Party had clear policy ambitions in this area, as shown in Labor’s *National platform and constitution 2007* document which stated, in part:<sup>20</sup>

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30. Labor recognises the enormous potential for improved energy efficiency is a largely untapped resource for improved business productivity and savings for households and reducing **greenhouse gas emissions**. Labor will adopt an ambitious, national energy efficiency program and work in partnership with energy suppliers, regulators and State and local governments to ensure that every business and household in Australia has improved access to energy savings technologies and advice.
  31. Labor will work with State, Territory and local governments to ensure that **five star energy efficiency** provisions are mandatory for new homes.
  32. Labor supports the promotion of demand management and energy efficiency throughout the national electricity and gas systems, with programs targeting both domestic and industrial energy use. Labor will ensure the national electricity market delivers **environmental outcomes** by promoting renewable energy and cleaner fuels and removing barriers to sound demand management and cogeneration investments.
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<sup>17</sup> NEMMCO. 2008. *An introduction to Australia’s National Electricity Market*. Source: <http://www.nemmco.com.au/about/about.html>. Last accessed: 20 March 2009. Page 27.

<sup>18</sup> Ibid.

<sup>19</sup> NEMMCO. 2008. *NEMMCO submission of stage 2: issues paper – review of demand-side participation in the national electricity market*. Source: <http://www.aemc.gov.au/pdfs/reviews/Review%20of%20Demand-Side%20Participation%20in%20the%20National%20Electricity%20Market/submissions2/016NEMMCO.pdf>. Last accessed: 1 April 2009. Page 2.

<sup>20</sup> Australian Labor Party. 2007. *National platform and constitution 2007*, Chapter 9, Combating climate change and building a sustainable environment. Source: [http://www.alp.org.au/download/now/2007\\_platform\\_chapter9.pdf](http://www.alp.org.au/download/now/2007_platform_chapter9.pdf). Last accessed: 20 April 2009.



33. Labor is committed to taking a leadership role in the **efficient use of energy** and will ensure all government departments and agencies adopt best practice energy efficiency.
  34. Labor supports the introduction of measures to promote consumer uptake of **energy efficient technologies and renewable energy**.
  35. Labor is committed to expanding national, mandatory **energy efficiency design and performance standards**, including those for domestic appliances, industrial equipment, residential and non-residential buildings and motor vehicles.
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The drift from considering environmental issues continued with the discussion paper prepared for the public forum held in Melbourne on 1 May 2009.<sup>21</sup> The document does not mention environmental or greenhouse goals.

Thus we observe a complete reliance on CPRS, RET and Government energy policies to influence environmental impacts of the energy sector with the assumption that efficient energy trading and management and network development processes will be supportive of the over-arching environmental objectives. This report demonstrates that efficient and clean development is being frustrated by the current Energy Market Frameworks.

For example just recently, in April 2009, NEMMCO announced that it intended to cease publishing greenhouse intensity data, as it was concerned that it may not be accurate, and that NEMMCO had no authority to require the data to be provided, updated or verified. However, if NEMMCO does not publish this data, who will? It is hard to imagine an organisation that is better placed than NEMMCO to analyse the data on greenhouse emissions from the electricity sector and disseminate the results. As a key principle of the NEM is that it should not favour one energy source or technology over another, the termination of this publication leaves relatively immature and emergent clean energy options vulnerable to the inherent advantages enjoyed by fossil fuel driven, supply side incumbents.

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<sup>21</sup> AEMC. 2009. *Review of energy market frameworks in light of climate change policies, discussion paper, public forum*. Source: <http://www.aemc.gov.au/pdfs/reviews/Review%20of%20Energy%20Market%20Frameworks%20in%20light%20of%20Climate%20Change%20Policies/Public%20Forum%20Discussion%20Paper%20Melbourne.pdf>. Last accessed: 11 May 2009.

## 4 COMPARISON OF CLIMATE CHANGE AND NEM GOALS

This section analyses relevant policy issues under the headings of:

- Comparison of climate change and NEM objectives
- Comparison of goals of the NEM, CPRS and RET
- MCE's Terms of Reference and the scope of the AEMC review.

### 4.1 Comparison of climate change and NEM objectives

The goals of the NEM – and the CPRS and the RET – as instruments of the federal government's climate change policies, are different. The NEM objective focuses on economic and customer service matters, whereas the objectives of climate change policies are to reduce greenhouse gas emissions in Australia and thereby to influence local and global action on climate change. The following sections analyse these goals under the headings of:

- The NEM objective
- Scope of the NEM objective
- The CPRS objective
- The expanded RET objective.

#### 4.1.1 The NEM objective

The NEM objective is shown in Exhibit 1. The objective describes the desired economic outcomes from the viewpoint of market customers over a long period of time.

#### Exhibit 1 – The National Electricity Market objective

The National Electricity Market Objective is set out in Schedule 7 of the National Electricity market law:

*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 dimensions of the objective in relation to the supply of electricity to customers are:

- **Price** – which measures the economic burden placed on customers in paying for the services they receive. Efficient investment and operation implies that the price of the service relative to the value of the service is minimised. Not all electricity services have the same cost or value and hence it is not sufficient just to minimise price, if that also reduces the quality or value of the service.

- **Quality** – which measures the consistency of the service, including its technical parameters as indicated by frequency of supply and stability of the voltage around the nominal rated value. Quality could also relate to the associated services, including the communication between customers and service providers and the usefulness of the information provided.
- **Safety** – which relates to the fact that electricity is inherently dangerous in its production, transmission and utilisation phases. Safety would cover physical safety for people and the living environment. Safety may also be interpreted to relate to the manageability of business and financial risks that customers face in the purchase of electricity. This latter concept of safety also overlaps with the concept of security.
- **Reliability** – which relates to the continuity of electricity supply and the frequency and duration of supply disruptions. Ideally, the supply of electricity should be continuous and uninterrupted at all times, but this is technically and financially impossible, because the production and transmission of electricity includes processes that are not perfect in execution. Equipment and processes sometimes fail and time is required for recovery, which results in customer outages. The appropriate level of reliability is that which can be achieved economically, having regard to the sum of the cost customers experience from supply disruption and the costs of providing network redundancy and reserve generation capacity.
- **Security** – which relates to the concept that disruptions in one place do not propagate to other customers and do not escalate into huge costs and adverse impacts. Security is achieved in the way that the risks of operation are managed to avoid cascade failures.

Reliability, safety and security are also applied to the electricity system itself. The logic here is that supply to customers cannot reflect these qualities unless the integrity of the generation, transmission and distribution of electricity is maintained.

#### **4.1.2 Scope of the NEM objective**

It may be noted that the components of the objective are fundamentally about the supply of electricity itself, irrespective of other consequential impacts associated with the electricity market, such as emissions of pollutants, or any legal rights to levels of service. The focus of this objective in relation to customer services is often measured at the aggregate market level, rather than distinguishing relative advantages or disadvantages to particular market participants.

Despite the theoretical potential of the long-term interests of consumers to include the environment and environmental costs, the second reading speech for the NEL emphasises

the economic aspects and that environmental and greenhouse issues will be dealt with separately.<sup>22</sup>

However, the NEL confers a level of discretion on the AEMC. In making rules for the NEM, the AEMC has a clear mandate, *"the AEMC may give such weight to any aspect of the national electricity objective as it considers appropriate in all the circumstances, having regard to any relevant MCE statement of policy principles."*<sup>23</sup> This provides some theoretical flexibility to weight different aspects according to the customer impacts being considered. For example, higher prices for a higher value service may be accepted, even though higher prices in isolation would not be consistent with the objective.

#### 4.1.3 The CPRS objective

Exhibit 2 shows the stated objective of the CPRS.

##### Exhibit 2 - The CPRS objective

The objective of the scheme is to meet Australia's emissions reduction targets in the most flexible and cost-effective way; to support an effective global response to climate change; and to provide for transitional assistance for the most affected households and firms.

The elements of the objective are:

- to achieve emission reduction targets
- to achieve those targets in a flexible and cost-effective way
- to support a global response to climate change
- to provide transitional assistance for those most affected.

The White Paper confirmed the above objective, which was originally proposed in the Government's Green Paper. These objectives clearly relate to the challenges of reducing carbon emissions in an economy which has prospered on the back of them. However, these same emissions are now a source of risk to the economy and the living environment, which will need to be addressed by economic measures that may cause hardship for some households and businesses.

#### 4.1.4 The expanded RET objective

The objective of the amended Mandatory Renewable Energy Target (MRET) is being altered to focus on the electricity sector and will be a major driver of the de-carbonisation of the electricity sector. The discussion notes accompanying the amendment state:

*"This item amends object (b) of the Act from "to reduce emissions of greenhouse gases" to "to reduce emissions of greenhouse gases in the electricity sector". By encouraging the*

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<sup>22</sup> Source: [http://www.ret.gov.au/Documents/mce/\\_documents/NEL2ndreadingspeechhansard9feb0520050211091852.pdf](http://www.ret.gov.au/Documents/mce/_documents/NEL2ndreadingspeechhansard9feb0520050211091852.pdf). Last accessed: 14 May 2009.

<sup>23</sup> Section 88(2) of the NEL.

*deployment of renewable energy, the RET scheme will contribute to reducing greenhouse gas emissions in the electricity sector. However, the Carbon Pollution Reduction Scheme will introduce an overall cap and an annual limit on greenhouse gas emissions.”<sup>24</sup>*

The resulting objective, if the legislation is passed, is shown in Exhibit 3.

### **Exhibit 3 – The expanded RET objective**

The objects of this Act are:

- (a) to encourage the additional generation of electricity from renewable sources; and
- (b) to reduce emissions of greenhouse gases in the electricity sector; and
- (c) to ensure that renewable energy sources are ecologically sustainable.

This is done through the issuing of certificates for the generation of electricity using eligible renewable energy sources and requiring certain purchasers (called liable entities) to surrender a specified number of certificates for the electricity that they acquire during a year.

Where a liable entity does not have enough certificates to surrender, the liable entity will have to pay a renewable energy shortfall charge.

The change in focus of the RET objective reflects the role of the CPRS in controlling carbon emissions overall.

## **4.2 Comparison of goals of the NEM, CPRS and RET**

An analysis of the goals of the schemes reviewed in the preceding sections is presented in Table 4. It is based on a meta analysis of the objectives of the three schemes, with the schemes shown across the top and the components shown in the left hand column. The objectives of these schemes are complementary in the objectives of economic efficiency, efficient prices and quality of supply. The objectives of the NEM do not align with the CPRS and the RET in the areas of a global response to emission, a local response to emission reduction and ecological sustainability. The NEM goals of reliability of supply, security of supply and safety in production and delivery are not applicable to the CPRS or the RET.

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<sup>24</sup> Source: <http://www.climatechange.gov.au/renewabletarget/consultation/pubs/commentary.rtf>. Last accessed: 14 May 2009.

**Table 4 – Comparison of goals of the NEM, CPRS and RET**

<b>Scheme: ►</b>	<b>NEM</b>	<b>CPRS</b>	<b>RET</b>
<b>Objectives ▼</b>			
Global response to emission reduction	No	Yes: indirectly through setting an example in emission reduction policy	Yes: indirectly through setting an example in renewable energy policy
Local response to emission reduction	No	Yes: the issue of permits guarantees local emission reduction	Yes: the target itself guarantees local emission reduction
Ecological sustainability	No	Yes: implied by emission reduction	Yes: implied by reduction in carbon emission from thermal power displaced
Economic efficiency	Yes	Yes: cost effective emission reduction	Yes: traded certificates provide for coordination of investment to minimise costs
Efficient prices	Yes	Yes: implied by cost-effective emission reduction	Yes: traded certificates provide for transparent pricing and cost discovery
Addressing disadvantage	No	Yes: for those adversely affected by the Scheme	No
Quality of supply	Yes	Yes: implied by processes for emission measurement	Yes: implied by standards for certificate recognition and supported by the penalty regime
Reliability of supply	Yes	Not applicable	Not applicable
Security of supply	Yes	Not applicable	Not applicable
Safety in production and delivery	Yes	Not applicable	Not applicable

Only the CPRS has specific objectives for social equity in terms of providing direct assistance to those most adversely affected by any increase in carbon pricing. Disadvantage in the electricity market and the renewable energy market may occur for low income households unable to pay for a basic level of service. Such disadvantage is usually covered through social services, pensions and charitable activities, rather than being a part of the NEM and RET objectives.

Concerning ecological sustainability, developments in the power sector are influenced by planning rules that determine what infrastructure may be constructed and where it may be constructed. In this respect, the various state planning bodies may carry out environmental impact assessments as part of any power industry planning initiatives.<sup>25</sup> While the jurisdictional approval of new power generators may be influenced by considerations of greenhouse gas emissions, this seems unlikely.

<sup>25</sup> NEMMCO. 2008. *An introduction to Australia's National Electricity Market*. Source: <http://www.nemmco.com.au/about/about.html>. Last accessed: 20 March 2009. Page 27.

This is not to say that other infrastructure, such as network augmentations, would be similarly influenced, despite the potential of network service providers to undertake demand management or energy efficiency as an alternative.

It could be argued that the impact of the rules and procedures operating in these markets may sometimes have inadvertent consequences that undermine the primary objectives. The way procedures are arranged can cause behavioural responses that limit the incentives for market participants to fully embrace the objectives in their day-to-day business. It is a constant challenge for regulators and governments to ensure that the rules and procedures continue to evolve to support policy objectives as fully as possible. In one sense, the NEM was designed in an historical policy framework, and the CPRS and the RET in a later policy framework. The salient feature of the NEM is that it is an evolving market and thus could be viewed as capable of adapting to Australia's climate change policies.

### **4.3 MCE's Terms of Reference and the scope of the AEMC review**

This section reviews the MCE's Terms of Reference and presents MMA's assessment of the scope of the AEMC's review to date.

#### **4.3.1 MCE's Terms of Reference**

At the MCE meeting of 13 June 2008, the MCE agreed to direct the AEMC to conduct a review of the energy market frameworks in the light of climate change policies. The Terms of Reference (ToR) provided by the MCE are shown in *Appendix 1, Background to the AEMC's review* on page 101. The ToR may be summarised as:

- conduct a review of the current energy market frameworks
- having regard for the objectives of the National Electricity Law (NEL) and the National Gas Law (NGL)
- actions must be proportionate (we assume this means that the costs of actions should be commensurate with their benefits relative to doing nothing)
- actions must recognise the value of stability and predictability in regulatory processes
- detailed advice is required on the implementation of proposed amendments
- the review is Australia-wide in both gas and electricity
- current and past reviews and rule changes need to be considered (presumably with a view to maintaining stability and predictability as mentioned above)
- fundamental revision of market designs is not anticipated
- CPRS and RET designs are not to be reviewed.

An Advisory Committee has been established to provide views and advice to the AEMC during the review. A program of consultation and scoping papers and interim reports is specified.

These Terms of Reference are appropriate to the NEL objective because they:

- are consistent with the markets' objectives as legislated in the NEL and NGL
- cover the whole electricity and gas sectors, which will increasingly interact due to the impacts of the CPRS in favouring gas-fired over coal-fired generation as an interim lower emission resource
- do not complicate matters by trying to amend the CPRS and RET when these are already subject to further review and possible alteration as the legislation is finalised by the Commonwealth House of Representatives and Senate
- include implementation issues so that change can be initiated immediately following the review.

In the broader context of the MCE's mandate, the Terms of Reference do not fully exploit the MCE's role to provide national leadership so that broader convergence issues and environmental impacts are effectively integrated into the energy sector's decision-making.

#### 4.3.2 The AEMC's approach

The AEMC published its Scoping paper in October 2008<sup>26</sup> and its 1<sup>st</sup> interim report in December 2008.<sup>27</sup> The Scoping paper confirmed AEMC's acceptance of the Terms of Reference and it worked within those terms. With respect to other reviews and rule change proposals, the Scoping paper mentions several that may have had an impact on this review. Specifically, AEMC considered that those of particular relevance were:

- demand side participation
- the Total Environment Centre's demand management rule change proposal.

Both were relevant because they would have an impact on the potential costs and benefits of demand side solutions in the market. According to the AEMC, other relevant reviews were:

- the National Transmission Planning Arrangements Review
- the Congestion Management Review
- the Reliability Panel's Comprehensive Reliability Review.

The AEMC has looked at the effects of the CPRS on the NEM, rather than how the NEM can facilitate the goals of the CPRS. While this approach may be consistent with the MCE's Terms of Reference, it is perhaps not as broad as it could have been.

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<sup>26</sup> AEMC. 2008. *Review of energy market frameworks in light of climate change policies, Scoping paper*. Source: <http://www.aemc.gov.au/pdfs/reviews/Review%20of%20Energy%20Market%20Frameworks%20in%20light%20of%20Climate%20Change%20Policies/Scoping%20Paper.pdf>. Last accessed: 23 March 2009.

<sup>27</sup> AEMC. 2008. *Review of energy market frameworks in light of climate change policies, 1st Interim report*. Source: <http://www.aemc.gov.au/pdfs/reviews/Review%20of%20Energy%20Market%20Frameworks%20in%20light%20of%20Climate%20Change%20Policies/First%20Interim%20Report.pdf>. Last accessed: 23 March 2009.



### 4.3.3 Issues considered by AEMC

The issues to be considered by AEMC in the Scoping paper and 1<sup>st</sup> interim report have been identified in the Scoping paper and confirmed through consultation and some consultants' report (including one by MMA). The issues are listed in *Appendix 1, Background to the AEMC's review* on page 101.

AEMC's focus is mainly related to the impacts of the transition from coal-fired generation to gas-fired and renewable generation with potential impacts on:

- supply reliability
- supply security
- intermittent generation
- new network connections in remote areas
- financing for new capacity
- the impact of wholesale price changes on retailers.

MMA agrees that these are the major areas of concern where the existing energy market frameworks may not be optimised for the new market environment. They are not specifically defined in the MCE's Terms of Reference, but they are consistent with the concerns that have been identified by the major industry participants.

### 4.3.4 Interim report

The AEMC 1<sup>st</sup> interim report has made an initial assessment of the issues raised in the Scoping paper. Areas of concerns focused on the resilience of the market frameworks in relation to:

- retail price regulations may not be sufficiently flexible to manage price variation arising from changes wrought through the CPRS
- transmission connection to new areas for acquisition of large scale renewable energy is unlikely to be effective if arranged on a bilateral basis between networks and prospective generators. The current arrangements are not optimal where transmission projects are much larger than the incremental generation projects they serve<sup>28</sup>
- network congestion may impose limits where there is a major shift in generation patterns and location. There is some concern as to whether the regulatory process and the market incentives are strong enough to avoid inefficient constraints through appropriate network development. This is particularly an issue in Western Australia, where the development of renewable energy resources north of Perth is heavily

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<sup>28</sup> Economists refer to economies of scale as a potential source of market failure. This means that investments that may be efficient in the long term, because bigger is much cheaper per unit of service, may not be financially viable in the initial period and therefore not proceed. This is because there is no speculator who is willing and able to finance the early losses in order to reap the later profits. Governments may take the speculator role and set up regulatory arrangements that ensure financial viability for long-life infrastructure with these scale economies, such as ports, highways, and transmission assets.

constrained by network capacity. A new 330 kV transmission line to Geraldton is planned to open up the network for new generation north of Perth.

These matters are now subject to quantitative analysis to determine whether or not the current arrangements are likely to produce adverse outcomes that could be avoided by changing the energy market frameworks. At this stage, it appears that the AEMC is pursuing these matters in accordance with the MCE's Terms of Reference.

## 5 POTENTIAL ROLE OF DEMAND SIDE PARTICIPATION

It is widely acknowledged that the NEM has not created the level of demand side participation that occurred before it was established. As the NSW Independent Pricing and Regulatory Tribunal pointed out,

*“It is the Tribunal’s strong view that there is significant untapped potential for efficient demand management. To a large extent, one of the major obstacles continues to be a culture which favours traditional ‘build’ engineering solutions and which pays little more than lip service to alternative options.”*<sup>29</sup>

Similarly, COAG has stated that its *“analysis indicated significant energy efficiency improvement potential available to be exploited across all sectors of the economy.”*<sup>30</sup>

Likewise, one of the key findings of the Parer report found that:

*“there is a relatively low demand side involvement in the NEM because:*

- the NEM systems are supply side focussed*
- the demand side cannot gain the full value of what it brings to the market*
- residential consumers do not face price signals.”*<sup>31</sup>

Due to the lack of an environmental objective for the NEM, regulators are limited to the consideration of the benefits of demand side participation in a framework that externalises environmental benefits, including carbon costs. When combined with the barriers created by a supply side focused market, the case for demand side participation becomes difficult to make. Previously the cost of carbon has not been reflected in energy costs and this has muted the longer term benefits of demand side management in the economic analysis.

A report by McKinsey and Company has provided an estimate of the quantum of savings that are available from energy efficiency, even without considering carbon cost.<sup>32</sup> It estimated that by 2020, the actions required to achieve reductions of almost 80 megatonnes of CO<sub>2</sub> are net dollar savings, that is, they save in dollars more than they cost to implement. This means that about 25% of the total reduction potential could be achieved at no cost to the economy. Most of these saving opportunities were energy

<sup>29</sup> IPART. 2002. *Inquiry into the role of demand management and other options in the provision of energy services*. Source: <http://www.ipart.nsw.gov.au/files/Inquiry%20into%20the%20Role%20of%20Demand%20Management%20and%20Other%20Options%20in%20the%20Provision%20of%20Energy%20Services%20Interim%20Report%20-%20April%202002%20-%20website%20document%20ISBN%201877049182.pdf>. Last accessed: 12 May 2009. Foreward.

<sup>30</sup> COAG Ministerial Council on Energy, Energy Efficiency and Greenhouse Working Group. *Towards a national framework for energy efficiency – issues and challenges*. Source: [http://nuclearinfo.net/twiki/pub/Nuclearpower/WebHomeEnergyEfficiency/nfee\\_discussionpaper.pdf](http://nuclearinfo.net/twiki/pub/Nuclearpower/WebHomeEnergyEfficiency/nfee_discussionpaper.pdf). Last accessed: 12 May 2009. Section 3.

<sup>31</sup> WR. Parer. 2002. *Towards a truly national and efficient energy market*. Source: [http://www.ret.gov.au/Documents/mce/\\_documents/FinalReport20December200220050602124631.pdf](http://www.ret.gov.au/Documents/mce/_documents/FinalReport20December200220050602124631.pdf). Last accessed: 11 April 2009. Page 174.

<sup>32</sup> McKinsey and Company. 2008. *An Australian cost curve for greenhouse gas reduction*. Source: <http://www.theaustralian.news.com.au/files/greenhouse.pdf>. Last accessed: 20 April 2009. Page 6.

efficiency measures related to improvements in buildings and appliances. The McKinsey and Company report noted that “many can be categorised as market failures from misaligned incentives, for example, those between builders and tenants.”<sup>33</sup>

The full extent of available untapped energy efficiency opportunities has not been robustly quantified for Australia and indeed, this would be extremely difficult to do.<sup>34</sup> However, a number of preliminary analyses and case studies have been undertaken to determine the availability of cost-effective energy efficiency improvements. While the assumptions underlying these analyses are open to debate and criticism, for example, criteria used to determine cost-effectiveness, discount rates, energy price path assumptions, level of business-as-usual improvements in energy efficiency, costs associated with energy efficiency improvements, extrapolation of best practice study results to the whole sector, and representativeness of simulated producers and consumers, the studies consistently show the existence of considerable untapped cost-effective energy efficiency opportunities. A summary of these studies is set out in Table 5.

**Table 5 – What is the potential for energy efficiency in Australia and where is it located**

Sector	Energy efficiency potential (%) SEAV-NFEE phase 1 - low scenario <sup>a</sup>	Energy efficiency potential (%) SEAV-NFEE phase 1 - high scenario <sup>b</sup>	Energy efficiency potential (%) SEAV-NFEE phase 2 <sup>c</sup>	Energy efficiency potential (%) SEAV-NFEE general equilibrium study <sup>d</sup>	Energy efficiency potential (%) Clean Energy Future Group <sup>e</sup>
Manufacturing and mining	23	46	6.2	6.9	11
	20	50		3.4	16
Commercial	27	70	10.4	10.4	39
Residential	34	73	13	13	21
Agriculture, forestry and fishing	23	50	na	5	21
Construction	20	40	na	6.3	27

a. Source: Sustainable Energy Authority of Victoria (SEAV), Armstrong G and Saturn Corporate Resources 2003. Estimates based on current commercially available technologies with an average pay-back period of four years based on stable real energy prices over the period 2001-2012.

b. Source: Sustainable Energy Authority of Victoria (SEAV), Armstrong G and Saturn Corporate Resources. 2003. *Preliminary Assessment of Demand-Side Energy Efficiency Improvement Potential and Costs*. Melbourne Estimates include consideration of emerging technologies potentially available within the study timeframe with an average pay-back period of eight years based on stable real energy prices over the period 2001-2012.

c. Source: *Energy White Paper* 2004; EMET Consultants 2004a, 2004b, Energetics 2004, George Wilkenfield and Associates 2004b. Estimates show changes relative to business as usual projection for 2014/2015 (for residential sector), 2010 (for commercial sector), 2011 for manufacturing sector for measures with a pay-back period of no more than four years for residential water heating and

<sup>33</sup> Ibid.

<sup>34</sup> Productivity Commission. 2005. *The private cost effectiveness of improving energy efficiency*. Report number 36. Source: [http://www.pc.gov.au/data/assets/pdf\\_file/0018/44622/energy.pdf](http://www.pc.gov.au/data/assets/pdf_file/0018/44622/energy.pdf). Last accessed: 13 May 2009. Page 67.

- commercial and manufacturing sector energy efficiency improvements and no more than 6.5 years for other residential energy efficiency measures, based on stable real energy prices over the modelling period. Assumptions underlying the uptake of energy efficiency measures under business as usual projections varied among the sectors.
- d. Source: Allen Consulting Group. 2004. Estimates assume that only half of the energy efficiency measures with a payback up to and including 4 years were introduced in the modelling period 2005 to 2016.
- e. Source: Sadler, Diesendorf and Dennis. 2004. Estimates of energy efficiency improvements to 2050 were based on assumption that there would be a future constraint on greenhouse gas emissions leading to an increase in energy prices of between 25 and 50%. An increase in energy prices increases the quantity of cost-effective energy efficiency opportunities.

This substantial potential for cost-negative reductions of greenhouse emissions has come to the attention of the jurisdictions and they have put in place energy efficiency programs and regulations. However, these arrangements are external to the NEM.

In the short term, there is limited opportunity in the NEM to respond quickly to capacity shortfalls by building new generation capacity. This is because of the significant lead times required for development and commissioning of new capacity. For example, AEMC cited an expected lead time for an open cycle gas turbine plant of 22 months.<sup>35</sup>

The annual Statement of Opportunities identified low levels of reserve capacity in the short term in South Australia and Victoria, difficulties if any existing generation capacity were withdrawn and a material reserve shortfall if any existing plant was retired early.<sup>36</sup> However, the AEMC argued that intervention by NEMMCO through directions or via the Reliability and Emergency Reserve Trader (RERT) mechanism was undesirable, because of the risk that these actions would distort the market, and it viewed the existing RERT and directions powers as sufficient to provide a safety net. However, AEMC noted that the RERT mechanism was not designed for either large amounts of capacity or frequent use, and that it was limited by rules to only being used for up to nine months in advance.<sup>37</sup> A further limitation was the way in which NEMMCO collected data on the potential volume of demand side capacity via surveys, which AEMC felt could be gamed by understating capacity, in the hope of earning high profits once a RERT process is triggered. This seems to imply that AEMC does not have confidence in the way NEMMCO collects the demand side data.

Energy Response offered the following observations on the present process:

*“Energy Response understands that while the Medium Term Projected Assessment of System Adequacy may be forecasting a shortfall in a region up to twelve months ahead, the demand forecasts are reviewed by the jurisdictions in June, so while it sounds as though nine months is ample time to get ready, in actual fact there is much less time available. If demand is not reviewed till June, then approval for a RERT program cannot be sought till early July.*

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<sup>35</sup> AEMC. 2008. *Review of energy market frameworks in light of climate change policies, 1<sup>st</sup> interim report*. Source: <http://www.aemc.gov.au/pdfs/reviews/Review%20of%20Energy%20Market%20Frameworks%20in%20light%20of%20Climate%20Change%20Policies/First%20Interim%20Report.pdf>. Last accessed: 23 March 2009. Page 17.

<sup>36</sup> Ibid. Pages 19-20.

<sup>37</sup> Ibid. Page 21.

*Then to be ready for summer, the agreements with RERT Providers must be in place by November at the latest. This gives NEMMCO only five months, not nine months, in which to gain all the approvals necessary, decide on the level required, make the necessary arrangements, prepare the documentation, advertise and wait for responses, shortlist potential providers, negotiate with them and sign their contracts. Energy Response asks why can't arrangements be made ready one, two or three years ahead to avoid the rush? Surely, if RERT is meant to be an insurance policy (ie not a market mechanism) it should be in place long before the house burns down!"*

Gas-fired generation can only perform a transition role as coal is phased out and low carbon options are phased in, and will only be able to provide a transition to low carbon generation. MMA's analysis of the economic benefits of reform identified an inefficiency in the NEM which has led to excessive investment in peaking plant in Victoria and South Australia.<sup>38</sup> This has occurred for three reasons. There is a shortage of demand side response to meet infrequent extreme peak demand or coincident outages of large electricity generation units at times of high demand. There are no long-term contracts available to finance base load plant and no government support through state-owned utilities. MMA's business-as-usual scenario had mostly gas-fired plant in the expansion sequence because of gaming in the bidding of coal-fired plant, the emission abatement targets and the initial surplus of base load plants. In addition, the reliability standard supports surplus generating capacity because of the virtual absence of economic demand side response.

In a submission to NEMMCO on the exercise of RERT, Energy Response asked if a longer period of time could be allowed than the current nine month rule when NEMMCO arranged contracts for reserve capacity. This would allow Energy Response more time to arrange contracts with end-users.<sup>39</sup> NEMMCO's reply was that it would treat such an arrangement as non-conforming if the end-user contracts were not in place before it contracted with Energy Response. NEMMCO responded that it "is not prepared to limit the latest time at which it can enter into a reserve contract" seems to miss the point that Energy Response was asking about the earliest time at which NEMMCO could enter into a contract. There was clearly an unresolved issue between these parties that was not addressed.

Energy Response also asked about the possibility of longer term arrangements, that is, longer than the present nine month maximum term. NEMMCO's response, that this falls outside Rule 3.20.3 (b) because the reserve shortfalls have been seasonal, seems to be a very limited view. NEMMCO then referred to the nine month limit in Rule 3.20.3 (d) in an argument that appears circular. Energy response has since elaborated on its argument.

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<sup>38</sup> McLennan Magasanik Associates. 2007. *Evaluation of economic benefits of reform*. Report to Electricity Reform Implementation Group.

<sup>39</sup> NEMMCO. 2009. *Procedure for the exercise of reliability and emergency reserve trader (RERT) draft determination and report*. Source: <http://www.nemmco.com.au/powersystemops/248-0003.pdf>. Last accessed: 7 May 2009. Pages 10-11.

*“Energy Response makes the point; if NEMMCO only has five months in which to contract with RERT Providers (ie July to November) then Energy Response, as a very likely provider, would have virtually no time before summer to contract with end users. It appears that Energy Response made a valid suggestion as there is little hope that an aggregator can conform to this process provided by the AEMC.”<sup>40</sup>*

After considering the various attempts to quantify the energy savings offered by demand side participation, in 2009 the Total Environment Centre proposed a rule change “requiring network service providers (NSPs) to consider demand management solutions before planning network augmentations” and “including specifications in the regulatory test for demand management options to be considered prior to network options”.<sup>41</sup> This proposed rule change is similar to the Californian loading order. While the AEMC argued that these changes were not likely to contribute to the achievement of the National Electricity Objective, it reaffirmed the existing principle that “that both network and non-network alternatives are considered on their relative merits.”<sup>42</sup> However, whilst NSPs know where transmission assets are most needed if they are the only type of solution available, the demand-side providers are not in an equivalent position to identify in a timely manner where DSM options are best placed due to the asymmetry of information.

Demand side participation does not feature prominently in the 1st interim report of the AEMC’s Review, except in relation to peak capacity management in WA and the other rule change processes being managed by AEMC. However, there remains a concern that the National Transmission Planning Process, as currently defined, will not provide sufficient information for the spatial planning of demand side participation. Rule 5.6A.2 does not specify any forms of information that would assist long-term planning of demand side response and embedded generation in relation to network congestion and alternative investment. This matter has been raised previously during the NTP process, but did not have any traction. The outputs seem to be more focused on coordinating network developments other than demand side developments, and the AEMC review continues this weighting. It is hoped that this deficiency may be addressed under the review of demand side participation.

The current approach to regulated revenue for networks encourages increasing energy sales in the short-term and expanding the regulated asset base in the long-term, both of which are largely dependent on demand. This counters any incentive to reduce demand.

However, the AEMC appears to be satisfied that the current arrangements are satisfactory,

*“Our analysis demonstrates that a network business that is regulated under a price cap has **private** incentives for buying DSP that are consistent with socially efficient levels of DSP. A number of stakeholders have advocated that a price cap penalizes the use of DSP by network*

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<sup>40</sup> Personal communication, Michael Zammit.

<sup>41</sup> AEMC. 2009. *Rule determination, National Electricity Amendment (Demand Management) rule 2009*. Source: <http://www.aemc.gov.au/pdfs/reviews/Demand%20Management/aemcdocs/010Final%20Rule%20Determination.pdf>. Last accessed: 13 May 2009. Page 9.

<sup>42</sup> Ibid.

*businesses because DSP reduces network demand, which in turn reduces network revenue. This view is erroneous.”<sup>43</sup>*

In the body of the report, the AEMC explains its reasoning,

*“Consumption of peak demand network services will be socially efficient when the benefit to society from that consumption is greater than or equal to the social cost.*

*The social cost of peak demand usage is the (capital financing) cost of the required peak capacity (also equal to the private cost for the network business) and the social benefit is the value consumers get from using network services at peak times. Conversely, the social cost of encouraging DSP is the loss of benefit to consumers from peak usage of network services and the social benefit is the resulting avoided network peak demand cost.*

*Thus, for a network business to achieve a socially efficient level of DSP, the DSP inducement payment they offer, plus the network charge avoided by the user, (which is also equal to the total effective DSP inducement from the customers perspective) must be marginally greater than the value placed on consumption of the service to the user (otherwise it would be socially beneficial to consume).*

*It follows that a profit maximising price-capped network business has commercial incentives to offer DSP inducement payments up to the difference between the network charge and the peak demand capacity costs avoided by DSP. Importantly this is also the DSP inducement payment required to achieve the socially efficient level of DSP.*

*Accordingly, there is no economic basis for providing additional incentives for network businesses to achieve efficient levels of DSP under a price cap from regulation or to compensate them for the revenue foregone when they do adopt DSP incentives. Indeed to do so is likely to encourage them to pursue DSP beyond the point where is it socially efficient.”<sup>44</sup>*

This argument assumes that networks and DSPs are fully informed about the economic opportunities for coordinating network development and DSP. Experience of respondents indicates that we are far from this ideal starting position due to lead time and information constraints.

Comparison with pre-NEM arrangements and other jurisdictions, however, indicates that demand side participation remains low in the NEM. For example, NSW distribution networks spend less than one fifth of what an average US utility spends, and some utilities in the US spend much more than this average level.<sup>45</sup> If the benefits of reduced

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<sup>43</sup> AEMC. 2009. *Demand-side participation in the National Electricity Market draft report*. Source: <http://www.aemc.gov.au/pdfs/reviews/Review%20of%20Demand-Side%20Participation%20in%20the%20National%20Electricity%20Market/aemcdocs/008Stage%202%20-%20Draft%20Report.pdf>. Last accessed: 6 May 2009. Page ix.

<sup>44</sup> Ibid. Pages 18-19.

<sup>45</sup> Institute for Sustainable Futures. 2008. *Win, win, win: regulating electricity distribution networks for reliability, consumers and the environment, review of the NSW D-factor and alternative mechanisms to encourage demand management*. Source: <http://www.isf.uts.edu.au/publications/dunstanetal2008winwinwin.pdf>. Last accessed: 20 March 2009. Page 6.



greenhouse emissions were included in NEM bids, it is likely that this would change what is considered to be a socially efficient level of DSP.

## **6 BARRIERS POSED BY THE NEM TO CLIMATE CHANGE POLICIES**

This chapter describes the results of work by MMA that identify barriers posed to Australia's climate change policies by the NEM.

### **6.1 Electricity markets**

Electricity markets exhibit characteristics that increase the likelihood of market failure. Electricity is considered to be an essential good, with significant social and environmental externalities. The supply is generally concentrated in a small number of large providers, using capital intensive and long-lived assets. These conditions limit the ability of competition to ensure that economically optimum results are achieved.

#### **6.1.1 Market power of existing generators**

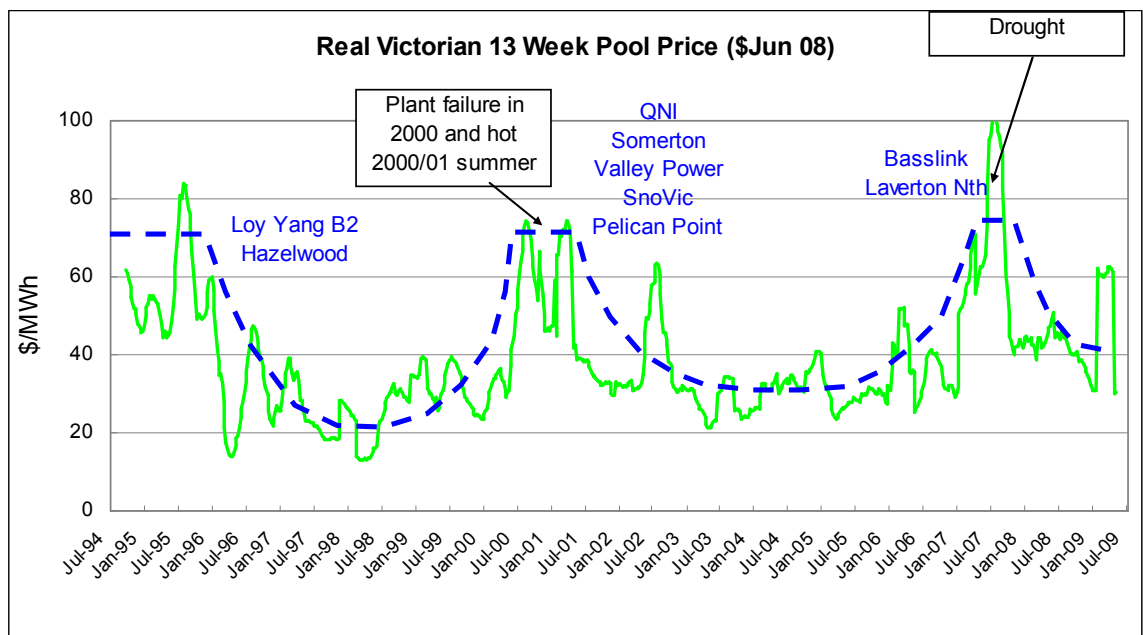
Volatile pool prices in an energy only market do not necessarily indicate market failure. Pool prices are set by the unit with the highest bid required to meet demand.<sup>46</sup> Generators are allowed to rebid as they assess the level of demand and available supply, taking into account plant failure. While generators may only be able to exercise their market power for short periods when supply conditions allow, this ability can cause extreme pool price volatility. This volatility is factored into contract prices in terms of higher risk premiums, and contributes to the difficulties that large users have in obtaining long-term energy contracts.

Some pool price volatility is required, as it provides signals for new investment. Without a separate mechanism to signal the need for capacity, the NEM requires this volatility to ensure that there is investment in sufficient capacity to meet demand. As the supply/demand balance tightens, generators can increasingly exercise market power in more bidding intervals, and thus raise the average price level and provide the signal required by new entrants. This price volatility flows through to increased contract prices which may be created to provide initial revenue security for new projects during the initial debt laden operating period.

Any exercise of market power by generators has not prevented new entry and may in fact have encouraged new entry, thereby bringing prices down. An example of new capacity and price reduction occurred in Victoria after the very high prices during the Loy Yang B plant failure in winter 2000 and the hot 2000/01 summer as shown in Figure 2.

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<sup>46</sup> In practice, system marginal price is set by a complex set of equations (the NEMDE Linear Program) based on constraints in the network and the losses within and between regions. The resulting price is usually not the bid price of highest dispatched generator, but rather the result of equations involving a number of generators, the loss factors and interconnector constraints.

**Figure 2 – Spot price cycles in Victoria**

While it may be argued that generators may exercise market power to keep prices low to pre-empt entry, this is likely to be self-defeating and low prices in the earlier days of the NEM reflected excess capacity and high levels of vesting contracts, rather than market power.

The market power of generators is thus likely to be a concern only if it is sustained, that is, where a generator or a coalition of generators is able to continuously and sustainably raise prices above costs. In the absence of other barriers to new entry, the exercise of market power may not be sustainable.

### 6.1.2 Uncertainty in the market

Of greater concern for new generation entrants is the lack of a long-term contract market.<sup>47</sup> With the exception of generation as part of a vertically integrated business such as AGL or Origin Energy, new entrants are generally unable to obtain contracts for their energy of sufficient length to underwrite their long lived investments. Contracts in the electricity market are mainly for one or two years. Contracts for five or ten years are rare. This is largely the result of uncertainty over future developments in the market and acts to stall high capital cost new entrants, particularly renewables.

### 6.1.3 Neutrality of technology

The NEM was established around existing generators and their capabilities. New entrants, however, were subject to certain technical requirements, including those regarding control

<sup>47</sup> W. Parer. 2002. *Towards a truly national and efficient energy market*. Source: [http://www.ret.gov.au/Documents/mce/\\_documents/FinalReport20December200220050602124631.pdf](http://www.ret.gov.au/Documents/mce/_documents/FinalReport20December200220050602124631.pdf). Last accessed: 11 April 2009.

equipment and the ability to meet ancillary services, which the older existing generators did not have to meet. These additional requirements mean that the cost structure of new entrants is likely to be higher than that of existing generators, placing new entrants at a disadvantage.

The NEM is designed to be technology neutral. This means that renewable technology and embedded generation must be able to compete with more established fossil fuel fired generation technology in accessing the market without assistance. This places low emission technologies at a disadvantage, given their higher cost structure. While renewable generation technology often has very low marginal costs, for example, solar and wind generation technologies, the capital costs are significantly greater than conventional generation technologies. However, this fact should not be considered a market failure by itself, but a factor that adds a material barrier to the development of renewables. The major barrier to large scale uptake of renewables has been the absence of a sufficient carbon price signal. The RET was intended to provide encouragement to develop lower cost renewable energy resources to prepare for the time when greenhouse gases are fully priced having regard to their environmental impacts.

#### **6.1.4 Embedded generation**

Low emission distributed micro-generation technology had been disadvantaged as the prices paid for its output did not take into account the value and benefits to the electricity network which arose from being embedded within the electricity grid. Embedded generators can also make a case to have some of the benefits of deferred network upgrades passed on to them. Nothing in the rules prevents embedded generators from being able to negotiate with network service providers to share some of the benefits from embedded generation, but an asymmetry issue exists in that only the network service providers truly know the value of the network benefits and would have an incentive to under-report these benefits.<sup>48</sup> This also stifles competition in demand side provision due to the high cost of information and lack of access of network data to consultants.

Another benefit that embedded generators bring to the electricity market, that should be available to proponents, is the reduction in network losses. As electricity is transported through the wires in the transmission and distribution system, energy is lost in the form of heat. This loss is quadratically related to the load demand. By building a generator near a load, the amount of energy required to be imported from the network is reduced. This reduces the losses incurred by the network for all other customers. While larger embedded generators are usually able to include this benefit in their negotiations for connection to the system, this benefit is not included in feed-in tariffs that simply reflect general use tariffs, or if the feed-in tariffs are paid on net exports only. If the marginal losses are reduced by the embedded generator, these benefits are passed on to all local customers in lower prices and the revenue to the generator is reduced. This occurs

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<sup>48</sup> In fact, such arrangements can benefit network service providers, as the payments could be deemed to be outside the regulated revenue arrangements governing their revenue streams from regulated network services.

because there is no mechanism to hedge against marginal loss factors or to contract the benefits back to the embedded generator.

On 1 January 2008, changes to the National Electricity Rules (NER) were made. They were aimed at creating additional incentives for embedded generation and demand management by providing increased regulatory certainty, so that efficient investments in these alternatives to network investment can be included within the regulatory framework. While there may be some indications that distributors are trialling direct load control and considering small-scale generation, the outcome of the changes to the NER are still uncertain and it remains to be seen if the market barriers to embedded generators will be overcome by the changes. There is no evidence that the procedures for the National Transmission Planner include relevant support for demand-side planning.

### **6.1.5 Monopoly networks**

Transmission and distribution network service providers are usually natural monopolies and, in the absence of regulation, will usually be able to limit services and raise prices. Customers seeking access to these network systems are also usually at a disadvantage due to the asymmetry of information. The problem of free riders may also be present when network investment is considered. With many small customers, each benefiting a little from a large transmission investment, there is the temptation to free ride. While everyone would be better off sharing in the investment, the temptation to free ride and avoid paying for the expense may overcome the ability to form a consortium to negotiate a contract with the network service provider.

Network operators control access to information regarding their networks and have the ability and, under the regulatory regimes, often the incentive to impede access by embedded generators given that the presence of such generators may reduce the need for network augmentation. Network owners are also normally the planning organisation (not in Victoria or South Australia). Incentives in the economic regulatory framework that apply to networks encourage network businesses to grow their assets in order to increase revenue. Alternative solutions to maintain or improve network reliability do not have the same incentives. As a result, a conflict of interest arises when network service providers are expected to assist embedded generators in their connection to the network. Such integration work tends to be time consuming and costly because it is project specific. The recent NER changes are unlikely to overcome this failure.

Potential embedded generators, including those proposing low emission generation technologies like cogeneration and renewable technologies like wind farms and small scale solar generators, often complain that the potential for embedded generation is impeded by a number of barriers including:

- Difficulties in obtaining network operation information during negotiations on network connection agreements and costs. The embedded generation proponent does

not have full information on their use of the network system, so may incur higher costs for connection to the transmission network.

- Lack of requirements for embedded generation to be explicitly assessed where augmentation of networks is being considered. The regulations do require network service operators to analyse alternatives to network upgrades as part of the approval process, but often the information is sought too late to allow the full development of alternative proposals. This late supply of information inhibits competition in demand side planning and development.
- Network pricing structures that includes high stand-by charges, with minimum chargeable demand that is only used when the embedded generator is not operating. This requirement penalises customers who self-generate, as they incur both the costs of generation and network demand charges that other generators do not incur. The lack of competition reduces the diversity of demand side participation which exacerbates the stand-by cost issue.
- Low buy-back rates for electricity that is exported to the network that do not reflect a proper recognition of the network benefits that the generator brings to the network including the reduction in losses, deferred network augmentation and potentially improved supply reliability.
- The existence of the retail arm of the network business creates a potential conflict of interest in supporting embedded generation projects proposed by third parties. This issue has diminished over time as retail and network businesses have been increasingly separated.

#### **6.1.6 Free riders**

Incentives also exist for potential proponents of larger scale renewable energy generators to delay the development of their investment in the hope of free riding, at least partially, on network extensions. NEM networks charge for connection on the basis of shallow connection costs.<sup>49</sup> This involves the connection proponents paying for all connection assets up to the point of connection to existing assets. As potential renewable energy developments may be some distance from the existing network, the assets required for connection may amount to a substantial investment. Should the network be expanded due to general load requirements, or if another party has paid for the extension due to a requirement for connection, the next party to connect to the network is able to free ride on this extension and only needs to pay for their own connection. Even if this connection requires an upgrade deeper down the network than the immediate connection, the

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<sup>49</sup> Shallow connection costs include the costs of connection assets up to the point of connection with the existing network infrastructure. Deep connection costs include the cost of augmenting the existing network infrastructure beyond the point of connection.

principle of paying only shallow connection costs would allow the proposed connection to avoid payments for deeper costs.

### **6.1.7 Economies of scale**

Networks are usually characterised by economies of scale. This presents another problem for the development of wind farms, solar and geothermal generators which rely on remote resources. During the initial phases of development, the installed capacity is likely to be small relative to the total potential resource. Unless the developer owns the full resource, the transmission network will only be built with sufficient capacity to meet the needs of the immediate development, rather than the total potential capacity of the resource. The initial developer will have no incentive to fund the installation of network capacity greater than its needs. However, this is likely to be sub-optimal from society's perspective, as the savings from economies of scale will be lost.

Currently, arrangements in the industry do not provide any mechanism for additional network capacity to be funded on the basis of a longer-term societal perspective. Additional network capacity can only be funded by the broader customer load if it can be shown that the project meets the regulatory test, that is, it is the best alternative. However, building network capacity beyond the needs of the first proposal will most likely have a negative net present value, that is, from the regulatory test perspective, it is better not to install the additional network capacity since there is no generation capacity proposed that will immediately use the network capacity. As a result, the first proponent will only build what they need. When the second proponent is ready, the network will have to be augmented, and so on. Proceeding in this piecemeal fashion means that, over time, the network costs more than it would if it was built to the final capacity in the first instance. This problem has been acknowledged in the AEMC's current climate change review.

### **6.1.8 Leverage from distributed resources**

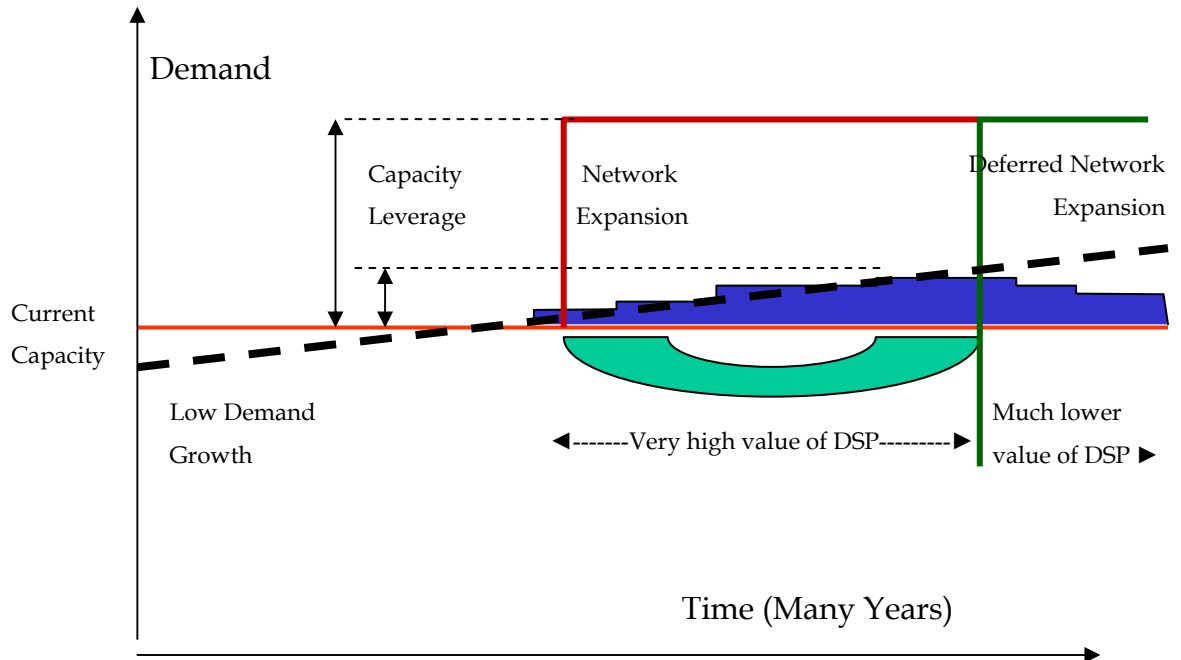
There is the question of leverage from small scale distributed resources in the presence of low demand growth and economies of scale in network development as illustrated in Figure 3. The figure shows that a relatively small scale demand side program can defer a much more expensive network development where there are substantial economies of scale. This could go on for many years before the demand side options are fully exploited and the network expansion becomes economic. An outstanding example of this at large scale is the deferment for over 34 years of Bairnsdale Terminal Station and associated 220 kV line from Morwell from 1984 until at least 2018 based on current planning.<sup>50</sup> This embedded generation has successfully deferred a high cost, high risk network investment and enabled the 66 kV network between Morwell and Bairnsdale to have an extended economic life. Note that the high value of demand side programs is location and time

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<sup>50</sup> Bairnsdale Terminal Station does not appear as a project in the 2008 Annual Planning Review

specific. Regionally averaged feed-in tariffs for small scale resources does not provide sufficient incentive to put these resources where they are needed.

**Figure 3 – Example of leverage from demand side participation**



## 6.2 Regulatory framework

### 6.2.1 Incentives to grow regulated network assets

The incentives provided in the regulatory framework encourage network owners to grow their assets. The prices that networks are allowed to charge are directly related to the value of the asset base, that is, the higher the asset value, the higher the average prices. New entrants offering solutions that replace network assets are thus often faced with unsympathetic network operators. This includes solutions that lower peak demand or provide distributed generation. Often, these solutions may be more efficient and environmentally friendly, but encounter significant barriers, as illustrated by the following quote,

*"SP AusNet noted that failing to roll capex spent under the demand management innovation allowance (DMIA) into the regulatory asset base (RAB) would deter investigation of non-network solutions, and stated that under such an approach demand management capex would not be treated on an equal footing to network augmentation or replacement capex. SP AusNet submitted that allowing DNSPs to roll demand management capex into the RAB and retain the capex savings from network replacement/augmentation deferral would be necessary to encourage DNSPs to undertake demand management. SP AusNet considered that this is particularly the case given that the regulatory framework*



*operates to reward DNSPs more from spending capex than opex. That is, the **balance of incentives already works to deter demand management.***<sup>51</sup>

How the recent changes to the NER will act to counter these incentives is unclear, as they have not yet been tested.

### 6.2.2 Avoided TUOS

While not strictly a market failure, the regulatory framework does provide some barriers to the ability of new entrants to fully capture the benefits they bring to the distribution system. While the regulatory rules require that networks pass on the benefits of avoided transmission use of system (TUOS) to larger embedded generators, no such requirement applies to compensating smaller distributed generators for the avoided TUOS. Therefore, there is an uneven regulatory treatment between large and small embedded generators.

### 6.2.3 Demand side participation

While originally designed to be a two-sided market, the NEM has developed mainly as a supply side market, with little or no participation from the demand side.<sup>52</sup> There are no direct pricing signals designed to draw a stronger demand side response and the low energy prices that exist do not provide a strong incentive for demand reduction. The NEM rules do not allow demand side response to directly participate in the wholesale market, although an aggregator can draw together the dispersed demand response resources.<sup>53</sup> However, even where such resources are available, the dispatch of a demand side response leads to a reduction in pool prices as demand is withdrawn.<sup>54</sup> This mutes the price signal seen by the demand side participant.

In addition, the absence of a capacity market in the NEM does nothing to encourage the demand side to develop an ability to provide reserve capacity during peak periods.

Under current regulatory arrangements, distribution network businesses derive revenue from energy throughput. The fixed component of a network tariff is typically based on the peak demand by the customer. Thus, demand side response, by reducing demand, reduces the potential revenue received by distribution businesses. As a result, distribution businesses have an incentive to discourage demand side participation. This in itself is not a market failure, except where the network service provider is able to use their superior information and/or price averaging under regulated tariffs to stymie demand side responses.

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<sup>51</sup> Australian Energy Regulator. 2009. *Final decision, demand management incentive scheme, Jemena, CitiPower, Powercor, SP AusNet and United Energy 2011-15*. Source: <http://www.aer.gov.au/content/item.phtml?itemId=728014&nodeId=a038bffa24f3c1190aa658345eac5c71&fn=Final%20decision%20for%20Victorian%20Demand%20Management%20Incentive%20Scheme.pdf>. Last accessed: 18 May 2009.

<sup>52</sup> Some large energy intensive industrial customers, such as the aluminium and zinc smelters, do interrupt their loads for a limited time during extremely high price periods.

<sup>53</sup> The NEM rules do allow for dispatchable loads as long as they meet strict criteria.

<sup>54</sup> This is seen as a market failure in that the entity withdrawing demand does not reap the benefit that other customers receive from the lower prices induced.

The reliability safety net provisions of the NER require NEMMCO to ensure that the reliability of supply meets the specified reliability standards. When these standards are in danger of being breached, NEMMCO goes to the market to secure additional supplies.

These supplies have in part been met by demand side participation, with NEMMCO contracting with the demand side for load shedding to occur during times of supply stress. However, these contracts are short term, usually during the summer months when demand is high and only for up to nine months. These contracts do not give demand side participants sufficient certainty to invest in changes to their production processes. As a result, participation is limited.

Some recent changes to the NER were aimed at counteracting the incentives for networks to undervalue or minimise expenditure on demand side response. These changes required network service providers to consider efficient demand side resources in meeting the expected demand for services. To provide an incentive for network service providers, various states have schemes, including allowing the recovery of foregone revenue from the implementation of demand side participation and direct funding of demand management schemes. The AER has also developed incentives for Queensland and South Australia and a demand management innovation allowance scheme for NSW and the ACT.<sup>55 56</sup> These actions appear to contradict the idea that incentives are not necessary.

### **6.3 Impact of market failure on low emission energy technology new entrants**

This section discusses the market failures described in the preceding section under the headings of:

- Wind energy
- Solar energy
- Cogeneration
- Demand side participation
- Addressing market failures in the NEM.

#### **6.3.1 Wind energy**

With the introduction of the MRET scheme, wind generation rapidly increased. This has created some difficulties for the operation of the power system. The output from wind farms is dependent on local wind characteristics, which are uncontrollable. Output cannot be accurately predicted and this may require system operators to put on more thermal plant in advance to provide ancillary services to manage this unpredictability. Wind

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<sup>55</sup> Source: <http://www.aer.gov.au/content/index.phtml/itemId/718843>. Last accessed: 10 June 2009.

<sup>56</sup> Source: [http://www.aer.gov.au/content/item.phtml?itemId=717776&nodeId=bfb769cf58e25d965e09ecfa54e057a&fn=Appendix%20D:%20Demand%20Management%20Innovation%20Allowance%20\(29%20February%202008\).pdf](http://www.aer.gov.au/content/item.phtml?itemId=717776&nodeId=bfb769cf58e25d965e09ecfa54e057a&fn=Appendix%20D:%20Demand%20Management%20Innovation%20Allowance%20(29%20February%202008).pdf). Last accessed: 10 June 2009.

generation cannot be controlled and nor can it be dispatched by NEMMCO in the manner that coal, gas or hydro generation can be dispatched. While wind output may be intermittent, it can be limited if it risks overloading the local electrical network. As a result, NEMMCO has developed the semi-dispatch process. The AEMC has published a determination approving the proposed process.<sup>57</sup> This semi-dispatch process partially alleviates the management of intermittent wind power by allowing NEMMCO to reduce wind power output below the current potential level so that network constraints are managed and additional generation raise capability is provided from the wind farm instead of by committing thermal generation at higher cost.

Further, the federal government is implementing a wind forecasting regime and wind forecasting techniques are improving, along with the technology to control dispatch by wind farms, so this is unlikely to be a material problem in the future. The key issue here is whether wind generation is treated more harshly than other forms of generation. All forms of generation have some element of unpredictability, so the question is whether the rules apply in an equal way across all forms of generation. Also, note that the rebidding rules do allow generators to shift quantity bands across the price band range offered until a short time before the dispatch interval. This should give all generators some flexibility to respond to the unpredictability of their generation.

Wind farms are frequently located in relatively remote sites, where the electricity distribution or transmission network either did not exist or was not designed to handle the quantity of energy and power output of the wind farms. As a result, the networks had to be extended or strengthened. The current regulatory regime requires those seeking connection to pay for the cost up to the point of connection. For remotely located wind farms, the additional cost of connection often proves to be insurmountable. The regulatory arrangements do not provide a mechanism for the sharing of such costs in anticipation of other remote generators, or the spreading of these connection costs to the general load. Remote generators are faced with either paying for the connection themselves, or attempting to form a consortium of other potential generators in the area to pay for the connections.

This arrangement leads to the potential free rider issue discussed on page 34. The first party that connects to the network is faced with all the cost of extending the existing network, while the second and subsequent parties are able to connect to the expanded network at a substantially reduced cost.

An additional market failure that applies to remote generators is the existence of significant economies of scales in network services, as discussed on page 35.

These types of network externality create a conundrum for policy makers. On the one hand, the existence of economies of scale with network extensions leads to the idea of

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<sup>57</sup> Source: <http://www.aemc.gov.au/electricity.php?r=20070430.162452>. Last accessed: 14 May 2009.

providing assistance for optimal network sizing. On the other hand, such assistance could create bias against other wind generation, or other renewable generation options that are located within the existing network structure.

These market failures only apply to the case of expanding network capacity within a region of the NEM. Where network capacity across two regions needs to be expanded to allow wind generation to access the broader market, there are rules that allow for a proper assessment of the expansion.<sup>58</sup> Under the rules, the expansion can proceed if it can be demonstrated that it provides net benefits to the market. The only issue here is the definition of net benefits may be restricted and may not include environmental benefits to society such as reduced emissions of greenhouse gases. This weakness will be mitigated through the expanded RET and CPRS which will better reflect the long-term environmental benefit of low emission generation.

### 6.3.2 Solar energy

While large scale solar energy, including solar thermal and concentrated PV generation, also faces the connection cost issue faced by wind generation, small embedded PV systems face a different set of issues. There are potentially two externalities associated with small scale PV generation:<sup>59</sup>

- unpriced high value of contributions to the energy market during peak prices
- unpriced network benefits for local transmission and distribution.

While large scale PV is still uncompetitive with alternative technologies, PV micro-generation may be competitive if the full cost of externalities is taken into account in the design of tariffs for electricity exported back into the grid. However, in most states in Australia, PV is disadvantaged through market failure which does not take into account the value and benefits to the electricity network which arise from the adoption of renewable energy technologies embedded within the electricity network and the environmental benefits through achieved reduced carbon emissions and other pollutants. This is partially caused by the focus on region wide feed-in tariffs rather than focusing greater effort where there is leverage arising from economies of scale as discussed in section 6.1.8 on page 35.

Peak solar output of PV systems corresponds closely with times of peak demand, typically during summer afternoons with high air conditioner use. On the other hand, during off peak hours, usually at night, PV output is zero. At peak times, the pool price frequently rises well above average pool prices, often reaching hundreds, or thousands, of dollars per MWh. Extra generation of electricity by small scale distributed PV systems at these times

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<sup>58</sup> An example could be the expansion of the interconnect capacity between South Australia and Victoria to allow for greater development of wind generation in South Australia. Currently, the development of wind generation in South Australia could be limited by the small size of the South Australian market and the limited capacity to transport excess wind generation across to the rest of the NEM.

<sup>59</sup> Or any other form of distributed small scale generation.

of peak demand reduces system demand, and thus lowers the peak wholesale price of electricity. Distributed PV thus contributes most when wholesale prices are highest. However, owners of PV panels are unable to capture this benefit if the PV system simply reduces the energy consumed within the house on which the PV system is installed. Buy-back tariffs metered on a net basis (ie only on the amount exported to the grid), do little to encourage new investments in small PV systems. Even if the electricity generated is exported into the grid, if the buy-back tariff is simply the equivalent of the general use tariff, the benefits of generating during times of peak system demand is not reflected, as average retail prices on which general use tariffs are based are not an accurate reflection of the value of PV to the market during these peak periods. More innovative tariffs are not offered for several reasons, including lack of adoption of interval metering (not necessarily a market failure) and the imposition of retail price caps for some customer classes.

However, it should be noted that the market rules do not prevent a household (or any other customer) from installing interval meters and arranging an innovative tariff arrangement with their retailer. This could include installing a separate meter for all generation output. This would mean that gross metering would take place. However, there would be an additional cost incurred for the additional meter and account. Whether this is a viable arrangement is dependent on the generation quantities and the set-up cost.

PV also has benefits for the network which the tariffs fail to reflect. The retail prices charged for electricity, which includes network charges for distribution and transmission faced by small customers, are an averaged price. They do not incorporate any location and time-of-use price signals to indicate to the customer the real network cost of their load based on their specific location. During times of peak system demand, the marginal cost to the network is much higher than the averaged network charges faced by customers, as the cost of network augmentation to manage system load is driven by the extent of peak demand. Buy-back tariffs that are the equivalent of general use tariffs thus do not accurately reflect the value that distributed PV systems bring to the network. PV generation which provides embedded energy during high demand periods is significantly under-compensated for its network benefits.

Aside from network benefits, micro PV also leads to reduced network losses. As losses incurred in the transmission and distribution of electricity are quadratically related to the power demand, reducing the demand for imported power would lead to reduced losses that are greater than the average losses. Setting buy-back tariffs at the equivalent of general use tariffs does not reflect this benefit, as general use tariffs use an average of the losses incurred. In cases where higher feed-in tariffs are available, this benefit may be taken into account during periods where energy is exported to the grid. This benefit is most pronounced during peak periods when system losses are greatest. However, given that most feed-in tariffs only apply to net exports, the benefit of lower losses is not captured during periods when the capacity of the PV is meeting only the resident load, as is most likely during the summer peak periods.

These market failures have led to inefficient investment decisions, such as over-investment in networks and underinvestment in distributed energy solutions.

### 6.3.3 Cogeneration

While conventional generators have an efficiency of less than 40%, by capturing and re-using the heat generated, cogeneration plants can achieve efficiencies in excess of 80%. As a result, less fuel needs to be consumed to produce the same amount of useful energy and lower carbon emissions are produced for a given economic benefit. Because of the need for continuous generation of industrial heat, cogeneration also usually supplies base load power compared to other types of renewable or low emission generation technologies, which cannot be depended upon to provide base load service.

In Australia, cogeneration is usually fired by natural gas, which has lower emissions than other base load plant fired by coal. While the market failures faced by cogeneration are not as significant as other sources of low emission technologies, there are some issues that, if addressed, could lead to greater investments in cogeneration technology.

The major difficulty faced by proponents of cogeneration projects is usually in the area of information asymmetry when negotiating connection agreements with the network. Often cogenerators are embedded in distribution networks within industrial estates, where the heat can be used for industrial processes. As a result, a connection agreement needs to be negotiated with the distribution network service provider to export excess electricity that is not required for internal consumption and to provide for back-up supply in the event the cogenerator is unable to generate because of either maintenance or an unplanned outage. As discussed in the section titled *Monopoly networks* on page 33, negotiations with a monopoly network are difficult given the information asymmetry, as well as the incentive structure of the regulatory regime that applies to distribution network service providers.

The NTP, NEMMCO, TNSPs and DNSPs do not currently collect and publish data on opportunities in demand management and energy efficiency, for example, in an annual statement of demand management and energy efficiency opportunities.<sup>60</sup>

While NEMMCO's annual Statement of Opportunities sets out data which can be used for the identification of demand side opportunities such as cogeneration, it has a number of defects from the perspectives of the participants. In particular, the data are at an aggregate level, which makes it difficult to identify specific locations where demand side participation could be commercially viable, and there is information asymmetry, with incumbent distributors and retailers possessing far greater levels of information than third parties.

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<sup>60</sup> However, the AEMC is considering requiring transmission networks to provide more details on constraints for this purpose, in the context of its draft Rule determination in response to Total Environment Centre's Rule change proposal.

Often proponents of cogeneration projects have difficulty getting full recognition for the benefits that would flow to all customers in avoiding or delaying network infrastructure costs. Usually only the network service provider is able to quantify the benefits that would flow as a result of having a cogenerator embedded in its distribution network. However, the incentive available to the network makes it want to expand its system. As a result of this conflict, the network service provider is usually reluctant to provide much encouragement to the cogeneration proposal by allowing the full benefits of any network savings to be captured by the cogenerator.

Recent changes to the NER allow the AER to reject network augmentation expenditure proposed by network service providers if it can be shown that expenditure on distributed generation would be more efficient. While this may give some encouragement to cogeneration proponents, it does not ensure that the issue of information asymmetry is addressed and it assumes that the regulator is able to obtain the necessary information to make a decision that there are distributed generation alternatives to the proposed network augmentation. The effectiveness of this provision is still untested and how it will work in practice is unknown.

While distribution network service providers are required to compensate cogenerators and other embedded generators for the avoided TUOS charges, due to the lower requirement for importing energy from the transmission system, these TUOS charges are not actually avoided. Transmission businesses are revenue controlled. Avoiding some TUOS charges by one distribution business simply raises the level of TUOS charges for all transmission customers. Any reduction in TUOS revenue in one year is made up by higher charges in the following year due to the “unders and overs” correction mechanism in the revenue control arrangements applicable to transmission businesses. Due to the locational nature of transmission pricing, the avoided TUOS charges from one customer are also likely to result in higher TUOS charges for other customers of the same distributor. Thus, the same distributor that pays the avoided TUOS charges for one customer, is likely to pay higher TUOS charges in subsequent years for its other loads. As a result, the distributor incurs the TUOS charges twice:

- by the payment of avoided TUOS charges to the embedded generator and
- by the increased TUOS charges due to the transmission revenue control adjustments to the regional TUOS price.

As a result of this arrangement, distributors do not want to make avoided TUOS payments to embedded generators. The current arrangements for making avoided TUOS payments appear to introduce a regulatory distortion to the market.

Only in the longer term would TUOS charges reduce in total from what they would otherwise be, that is, when the next transmission investment is deferred due to the embedded generation. This highlights the need for better planning to coordinate network development with embedded supply and demand side resources so that these benefits are realised in a timely and efficient manner.

Overall, the potential contribution from cogeneration to reducing emissions could be large. Overcoming market failures associated with the adoption of cogeneration is likely to have a major impact on efforts to reduce emissions of greenhouse gases.

#### **6.3.4 Demand side participation**

Embedded and other small scale distributed generation are also part of demand side load reduction. Small scale distributed generation technologies include the use of natural gas-fired micro-turbines or reciprocating engines to generate electricity, especially during hours of peak demand or network stress. Distributed generation systems are usually between 1 kW and 10 MW. Many of the issues discussed in the section titled *Solar energy* on page 40 on buy-back tariffs for PV are also applicable to other small scale distributed generation and are not repeated in this section.

##### *Network impacts of demand side participation*

Demand side response provides a number of benefits in meeting the supply needs of the electrical power system. These arise from the deferment of local transmission and distribution reinforcement related to meeting extreme peak demands. This benefit would grow over time, as new network developments are progressively deferred and replaced by suitable distributed generation and other demand side resources.

Proponents face difficulties in negotiating appropriate terms and conditions that recognise the benefits of their projects in avoiding or deferring future network investments. While in principle, small and medium scale embedded generation projects should receive compensation to encourage their development and economically defer investment in the network, the perverse incentive offered by the regulatory environment discourages demand side response and rewards investment in network infrastructure. Recent changes to the NER to provide some certainty to distributors that efficient investment on demand management can be included in the regulatory determination of revenue may go some way in assisting proponents capture some of these benefits. The benefits of demand side response have increased in recent years, due to the rapid growth in take up of technology, including the increasing use of air conditioning, the widespread use of computers and other new appliances that place pressure on the electricity supplies and accentuate the peaks of electricity demand.

Another benefit that distributed generation brings to the network, is the reduction of losses. However, while losses are incurred in the networks, the cost of losses is not borne by network operators. The cost of losses is the responsibility of electricity retailers who pass them on to customers. Owners of distributed generators thus have difficulty in getting recognition for the reduction in losses that their assets bring to the system.

The rules require that avoided TUOS payments be made by the networks only to larger embedded generators. There is no requirement to similarly compensate the smaller



distributed generators. This creates an uneven regulatory treatment between two parts of a similar source of generating capacity, based on size.

### ***Wholesale market impacts on demand side participation***

In the NEM, the supply side sets prices. NEM rules do not allow small scale distributed generation and demand side response to directly participate in the wholesale market. While an aggregator can draw together the dispersed demand response resources, the dispatch of a demand side response leads to a reduction in pool prices as demand is withdrawn. This is likely to undervalue the resource and discourage increased participation until the supply/demand balance is restored. Should the dispatch of demand withdrawal be treated the same way as the dispatch of supply, during periods of high pool prices, the demand side may be in a position to set the system marginal price and thus bid in their resource at a price commensurate with the valuation of their worth. The current arrangements potentially lead to the situation where, after the dispatch of the demand response, pool prices fall below the level at which the resource was dispatched. This arrangement leads to the muting of the pool price signals that would elicit increased participation from this resource.

The NEM also does not have a capacity market where resources are paid for the level of reserve capacity provided. This means that the reserve capacity provided by demand response is not recognised for the reliability support it provides. As a result, current NEM reliability standards support the installation of surplus generating capacity with virtually no economic demand side response leading to excessive development of peaking plant. This is inefficient as the costs incurred in installing surplus capacity are likely to be substantially in excess of any demand withdrawal to meet the infrequent extreme peak demands or coincident outages of large power generation units at times of high demand.

In the Western Australia Wholesale Electricity Market, a payment is made for the provision of reserve capacity. A mechanism thus exists for the reserve capacity provided by demand response to be compensated for the service it provides.

### **6.3.5 Addressing market failures in the NEM**

The Stern Review estimated that *“the power sector will need to be at least 60% decarbonised by 2050 to keep on track for greenhouse gas stabilisation trajectories at or below 550 ppm CO<sub>2</sub>e.”*<sup>61</sup> While emissions trading will be the major policy instrument in response to climate change, rectifying other market failures that impede the entry of renewable and low emissions generation into the NEM would enable this target to be met at a lower cost.

A number of the market failures identified in MMA’s analyses are expected to be addressed by the setting up of the emissions trading scheme currently under development. When emissions trading commences, it is expected that the market failures

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<sup>61</sup> Stern, N H. 2007. *The economics of climate change, the Stern review*. Cambridge University Press. Page 352.

due to the cost of environmental externalities will be addressed, as these costs will then be internalised. Renewable energy generators that emit no carbon emissions, as well as low emission generators, will be able to capture the benefits of their low emission generation output through higher pool prices.

Some of the barriers relating to networks may also be addressed with the setting up of the National Transmission Planner within the AEMO.

Even with the implementation of emissions trading, however, other market failures are likely to persist in the NEM and continue to present barriers to the entry of renewable and low emission generators.

A summary of the potential market failures that are likely to have an effect on the achievement of climate change policies is contained in Table 6. The items with the greatest potential to contribute to Australia's climate change policies appear to be recognition of network externalities for embedded or distributed generators, network free rider issues and scale economies. One way to facilitate them would be to publish annual statements on the value proposition for network augmentation, including non-network solutions.

**Table 6 – Market failures impacting on the success of climate change policies**

Market failure	Effect of market failure	Policy option to correct for market failure
Generator market power	Low prices to pre-empt entry	No action
Uncertainties in the market	Difficulty in obtaining appropriate financial contracts	No action
Neutrality of technology	Inconsistent technical requirements for ancillary service and control equipment	Review of rules to standardise procedures for small scale resources
Externalities	Benefits of embedded generation not fully recognised in terms of network benefits and loss reduction	Recognise externalities of embedded and distributed generation
Monopoly networks	High cost stand-by arrangements and connection agreements Non transparent network planning arrangements Asymmetric information	Independent network planning body to produce annual statements that provide transparent value propositions for network augmentation, including non-network solutions
Free rider	Suboptimal network investments Access difficulties for embedded and remote generation	Nodal pricing Feed-in tariffs Financial transmission rights
Economies of scale in networks	Investment in suboptimal network capacity	Funding during initial surplus capacity period
Regulatory failures Inappropriate incentives TUOS arrangements Demand side participation	Network augmentation preferred over potentially more efficient non-network solutions, including embedded and distributed generation and demand side alternatives	Independent network planning body to produce annual statements that provide transparent value propositions for network augmentation, including non-network solutions

#### 6.4 Low carbon electricity grid

Another topic identified by MMA's work and the participants in this study is the rationale and priorities for public spending on the Australia grid to facilitate low carbon generators. This is currently an important question for the following reasons:

- Changing the electricity supply system to provide economic access to new low emission energy sources involves reassessing priorities, planning methods and regulation to align financial and technical resources to facilitate the transformation.
- The federal government is seeking to stimulate the Australian economy to reduce the risk of a recession. Early investments in infrastructure development can provide immediate employment opportunities and would use underemployed resources to provide useful assets for the energy sector transformation.

- The transmission and distribution networks will need to respond to the changes in location of power generation sources that are expected over the next ten years.
- The acquisition of distributed renewable energy will impose much more variable energy flows in the distribution and transmission systems and may require control of customer loads to optimise the acquisition and use of this energy and the interactions with less flexible thermal resources.
- New large-scale sources of renewable energy in outback Australia and the Eyre Peninsula may require augmentation of the transmission system to deliver this energy to the load centres and to displace thermal generation from the regional coal fields in the Latrobe and Hunter Valleys. There are significant economies of scale in such developments that are not adequately contemplated under the current regulatory approval processes.
- New metering, control and communication technologies provide opportunities to better manage supply and demand in a more dynamic energy flow environment. These new technologies will be deployed to make the energy markets more competitive, particularly on the demand side, and more efficient overall.

Readers should note that MMA is conducting feasibility studies for remote area generators. As such, it has a current interest in the development of the transmission grid.

#### **6.4.1 Establishing a smart grid**

The concept of a smart grid refers to the application of the control and communication technologies to automate interactions between customers, energy suppliers and network controllers, so that the use of energy resources is optimised and the reliability and security of the overall grid is improved.

Smart grid concepts include the use of advanced control technologies to manage the transmission system as an integrated system, as well as customer level metering, control and communication technologies to enhance the participation of the demand side of the market. Currently, the demand side response is limited, due to the costs and difficulties in aggregating sufficient demand to make a difference at the wholesale market level. Also, the customers who provide this service do not always receive revenue commensurate with the long-term system benefits.

Trading interval meters and associated control and communications systems enable:

- customers to monitor their energy use and identify scope for cost savings and improvement in energy efficiency, assuming that the meters are accompanied by an appropriate communications interface technology
- customers to monitor spot energy prices and change the timing of energy use accordingly (often referred to as load shifting and given as the primary justification for such technology, but it is not expected to be the major source of benefit because residential customers have more important issues on their minds)

- retailers to monitor customer energy use on a real-time basis so they can minimise their trading risks related to volume uncertainty
- retailers offering new and tailored energy service products to customers based on a better understanding of their pattern of consumption and end-uses
- retailers to control customer loads over short periods to provide reserve capacity through demand side response and to provide ancillary services to modulate system frequency by controlling storage based loads such as refrigeration and water heating. These services could be provided by aggregators in the form of ancillary services for load raise and lower within operating margins set for each type of appliance
- network owners to manage peak loads on critically constrained sections of the network, prior to when augmentation can be economically justified, by switching off loads for short periods at peak load times. In some parts of the network, this can be useful in managing regional peak demands, such as the electric hot water load peaks in regional areas.

The main challenge in adopting these technologies is the economies of scale in aggregating customer load and the commitment to a critical mass of investment in a region. There is also the difficulty that there is insufficient planning information available to identify when and where the initial effort would maximise benefits. Enough customers need to provide access to controllable load before an aggregated quantity could have any material effect on the power system as a whole.

The problem with smart grid technologies is that they require coordination right across the value chain, from power stations to appliance design. The disaggregated competitive nature of the energy market, plus the regulation of network services, means that many organisations need to cooperate to realise the potential of these technologies. In some cases there are short-term losses, which are clear, and long-term gains, which are uncertain. Combined with economies of scale and free rider risks, making progress in this area of market development is likely to be difficult.

#### **6.4.2 Public sector funding for the low emission electricity grid infrastructure**

Most of the requirements to enhance the performance of the transmission and distribution networks and the energy market to meet the challenge of CPRS and additional renewable energy can be funded by private investors responding to market signals. However, where there are economies of scale and substantial lead times, market pricing signals based on current operations can be misleading and inadequate as a basis for long-term planning and investment. Therefore, MMA considers that the best opportunities for public funding to support the transition to a low emission energy economy arise where the following conditions are met:

- There are substantial economies of scale, such that no single or small group of investors could be expected to coordinate their investments in a way that would produce an optimal outcome for the long-term.

- There are market-wide communications systems and protocols that need to be developed to support the aggregation and integration of demand side response. It is improbable that any one investor could provide such an infrastructure, except on a centrally planned and regulated basis. In that case, the per customer costs would be initially spread across all customers, much as common service charges are shared in the NEM.

We expect that public funding would be beneficial where investment projects have strong long-term value or optionality and yet the initial benefits to market participants are not commensurate with the initial funding costs and where the project is so risky and long-term that ongoing equity funding without dividends would not be forthcoming.

For example, we expect that the concept for public funding for major infrastructure development of new radial transmission to open up a new energy zone could work along the following principles:

1. The project must have a strong underlying value proposition so that it has a low probability of stranding and investment failure. It would open up low cost resources that could in the long run carry the cost of the infrastructure and yield net benefits to customers, as compared to alternative resources which already have adequate grid access.
2. The project would be funded on an annual basis, with a debt/equity funding mix by a suitably qualified private investor who would receive a regulated revenue.
3. The project revenue would be made up of the following regulated components:
  - A revenue stream from the initial generators to the extent that it provides access to the market on a profitable basis. This may well be the result of negotiation with the foundation generators.
  - A revenue stream from prospective generators who thereby obtain time limited firm access rights based on the optionality of the project to them. The access rights may be initially auctioned and then traded. Conditions would be needed to prevent anti-competitive behaviour by parties holding access rights.
  - A revenue stream from regional and inter-regional network customers who would expect to receive lower priced energy as a result of the project. This would be estimated on an annual market benefits basis. This would be a regionally varied postage stamp type charge.
  - A balancing publicly funded revenue stream that would achieve a regulated return on the asset that was assessed to provide long-term market benefits.
4. We would expect that the first revenue component in item (3) would represent more than shallow connection charges and would need to be sufficient to make the public funding level acceptable. This is essentially a negotiation with a public representative and is primarily a political and commercial decision. The revenue stream would cease

when the asset would be expected to be fully utilised. It might be reinstated in part if deep connection costs are levied on all generators.

5. The second revenue source would be determined commercially. The project may have maximum public support revenue for the auction to justify its commitment. A price clearing mechanism could be used to reduce the free rider risk. The rights revenue would be replaced with a regulated charge when generators take up their rights. This may involve a reduction of charges to the foundation generators receiving similar service to equalise competition.
6. The third revenue stream would be based on market benefits analysis and eventually would fund the asset, less any deep connection revenue, when it is used sufficiently to justify its cost.
7. The public funding would decline as the asset utilisation increased, in accordance with the increase of the second and third revenue streams.

## 7 THE RESULTS OF STAKEHOLDER CONSULTATION

The results of the analysis of the issues raised by the participants in this study are set out under the headings of:

- Institutions and policies
- Low carbon generation issues
- Costs of adjustment and to consumers
- Other issues.

Quotes from the interviews with participants, which elaborate on the issue or its context, are shown in italics.

### 7.1 Institutions and policies

The topics grouped under institutions are:

- Ministerial Council on Energy
- Federal government policy
- The AEMC review
- The AEMC
- State and territory policies
- NEMMCO
- NEM objective
- NEM operation
- Barriers to demand management and energy efficiency
- Factors dampening price signals to small consumers, particularly carbon price signals.

#### 7.1.1 Ministerial Council on Energy

This section discusses the issues raised by participants relating to the MCE, whose members represent the governments of Australia, under the headings of:

- Alignment of MCE's energy policy with climate change policies
- Competition favours incumbents and business-as-usual
- The terms of reference
- Environmental burdens and constraints
- Give primacy to the demand side.



### *Alignment of MCE's energy policy with climate change policies*

Participants spoke about the lack of coordination between climate change policies and the policies that defined the operation of the NEM. They saw a role for the MCE to better coordinate policies, as the peak policy making body for the NEM. They saw this in terms of the MCE acknowledging climate change as the dominant imperative.

*"MCE has to have a visionary body that looks at the holistic view of the change that we are looking for."*

*"The MCE is reactive, political, and acts in the interests of their own state. It is hard to imagine that they have the long-term vision required to engineer an electricity market and grid for the future. For example, the MCE has had Demand Side Response on the agenda since about 2003 or 2004 and there is still no major progress in that area five or six years later."*

*"Three different [federal] departments [DRET, DEWHA, DCC] have little to do with each other."*

The participants' comments show that they do not believe that the MCE is fulfilling its mandate as fully as possible, which is:

- to provide national oversight and coordination of policy developments to address the opportunities and challenges facing Australia's energy sector into the future
- to provide national leadership so that consideration of broader convergence issues and **environmental** impacts are effectively integrated into energy sector decision-making. (our emphasis).<sup>62</sup>

### *Competition favours incumbents and business-as-usual*

The NEM was set up to be technology neutral, that is, not to favour any technology over another. Several participants pointed out that in operation the NEM favours the incumbents and imposes barriers to new entrants using existing technologies, and has the potential to impose additional barriers to new entrants using new technologies. As a result, it favours the business-as-usual case.

Demand can be bid into the market in theory, but in practice, this rarely happens as it has to be scheduled loads, the rules do not allow demand response to be aggregated, and demand side response must have a NEMMCO SCADA system.

A comparable obstacle to aggregation is also created under Schedule 3.1 of the National Electricity Rules. Where aggregated demand side loads are bids, each generating unit, market network service or load must provide information separately and in aggregate form.

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<sup>62</sup> Source: <http://www.ret.gov.au/Documents/mce/about/default.html>. Last accessed: 9 April 2009.

### *The terms of reference*

Three core issues in relation to the terms of reference for the AEMC's review of Australia's energy market in the light of climate change policies emerged: that the MCE did not direct the review to consider the NEM objective; that the ToR were constructed to assess if the NEM would act as a barrier to the pass through of CPRS costs; and that the ToR were designed to protect business-as-usual.

The ToR could have specified a review of the objective of the NEM. However, the ToR did mention the objectives of the NEL and the NGL, which are the overarching legislation so, by implication, the objective of the NEM could be considered by the review. To date, the AEMC has not considered this approach.

The second point about whether the NEM would act as a barrier to the pass through of the costs incurred under the CPRS was raised by a number of participants. The third point about the ToR was that it was designed to protect business as usual. The terms did emphasise that:

- the review should recognise the value of stability and predictability in regulatory processes
- current and proposed rule changes should be considered
- fundamental revision of market designs was not anticipated
- CPRS and RET designs were outside the review, because they were already the subject of separate review and could be altered in the legislative process.

Taken together, these instructions appear to favour business-as-usual.

*"They are narrowly constructed to anticipate what AEMC wanted. They are mostly about how the NEM would act as a barrier to the pass through of CPRS costs."*

*"They have a narrow interpretation of the MCE's brief, and looked at how the CPRS could have negative effects on the NEM. The ToR are protecting business as usual."*

### *Environmental burdens and constraints*

Participants spoke about their desire for the MCE to drive a policy that was focussed on reducing the environmental burden of the energy sector, encouraging lower carbon generation technologies and communicating with the community about policy matters.

If implemented, these aims would lead to major changes in the role and the operation of the MCE, from energy policy to environmental policy. This is consistent with participants' comments about making climate change policy the overarching policy, with energy policy tailored to meet the climate change objectives. There are several international precedents for merging energy policy and climate change, the most recent being in the UK, where the Department of Energy and Climate Change has been created to reflect *"the fact that climate*

*change and energy policies are inextricably linked” and that “Decisions in one field cannot be made without considering the impacts in the other.”<sup>63</sup>*

*“... to play a more proactive role in communicating energy policy constraints and possibilities to the Australian community, rather than hiding behind the complexity of the energy market.”*

*“The MCE has the capacity to show leadership, for example, by developing a national action plan or a national institute for energy efficiency and demand management. The MCE should own this, like the Global Carbon Capture and Storage Institute.”*

### ***Give primacy to the demand side***

A number of the participants in this study believed that giving primacy to demand side initiatives would help to meet carbon reduction objectives.

*“The discussion paper stressed the risks of intermittent generation, but did not look at demand management and demand side participation as a means to manage the risk.”*

California’s loading order for electricity resources is worth noting in this context. Under the loading order, the preferred sources are energy efficiency, demand response, renewables and distributed generation.<sup>64</sup> The intent of the loading order is to develop and operate California’s electricity system in the best, long-term interest of consumers, ratepayers and taxpayers.

*“The Californian experience has halved the historic rate of electricity consumption growth. Demand management and energy efficiency align the customers’ interests with those of the electricity industry. In Australia, there is a misalignment. We would prefer a Californian model, where the primary resource is demand management and energy efficiency, with new infrastructure as the secondary option, the fall-back position. California has maintained the same kWh/person since the 1970s, done entirely through demand management, not through a carbon program.”*

*“Energy efficiency and demand response are faster and cheaper to bring on than new transmission or generation.”*

The participants also drew attention to the National Action Plan for Energy Efficiency in the USA. The National Action Plan for Energy Efficiency is a private-public initiative begun in 2005 to create a sustainable, aggressive national commitment to energy efficiency through the collaborative efforts of gas and electric utilities, utility regulators, and other partner organisations. National Action Plan Leadership Group members are identifying

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<sup>63</sup> Source: <http://www.decc.gov.uk/en/content/cms/about/about.aspx>. Last accessed: 5 May 2009.

<sup>64</sup> California Energy Commission. 2005. *Implementing California’s loading order for electricity resources*. Source: <http://www.energy.ca.gov/2005publications/CEC-400-2005-043/CEC-400-2005-043.PDF>. Last accessed: 21 April 2009. Page i.

key barriers limiting greater investment in energy efficiency, and developing and documenting sound business practices for removing these barriers.<sup>65</sup>

### **7.1.2 Federal government policy**

This section reviews the issues about federal government policies that were raised by participants under the heading of:

Call for the implementation of Labor policies

- Lack of alignment of policies and portfolios
- Responsibility in the NEM
- Inequality of voice for the demand side
- Minimum standards for generators
- Disaggregation and competition conflict with climate change objectives.

#### *Call for the implementation of Labor policies*

As noted in the section titled *Changing emphasis on environmental objectives* on page 8, there is significant divergence between Labor policies on the national electricity market and its actual operation. One participant expressed disappointment with the lack of progress that the federal government had made implementing its policies to cut greenhouse gas emissions.

#### *Lack of alignment of policies and portfolios*

The lack of alignment between climate change, energy efficiency and NEM policies has been noted. Participants commented on this lack of alignment, particularly in relation to the Department of Resources, Energy and Tourism (DRET) portfolio, which provides support for the MCE. In contrast, the Department of Climate Change (DCC) and the Department of Water, Heritage and the Arts (DEWHA) have the climate change and energy efficiency mandates.

These issues are part of the political process of Australia's federal system of government. The lack of alignment between climate change, energy efficiency and NEM policies would be transformed into a first order issue if an environmental or carbon objective were to be incorporated into the NEM objective. This could also provide an incentive for greater alignment between the climate change and energy portfolios.

#### *Responsibility in the NEM*

Participants stressed that no one person or department was responsible for the NEM. The responsible organisations include the MCE, the SCO, each jurisdiction's minister and their

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<sup>65</sup> US Environment Protection Agency. Source: <http://www.epa.gov/cleanenergy/energy-programs/napee/index.html>. Last accessed: 21 April 2009.

departments, AEMC as peak policy maker, AER, AEMO as successor to NEMMCO and the regulators in each of the jurisdictions.

The MCE is the peak policy making body regarding energy issues. AEMC sets the rules, while the AER regulates and enforces the rules. NEMMCO/AEMO operates the market. Several participants referred to the model used in California, in which the roles are centralised and coordinated in the role of the Chairman of the Public Utilities Commission.

*“In California, which is far larger than the NEM, it is just one person (the Chairman of the PUC), so why do we have such a confounding arrangement? You can get rule changes through the AEMC, but it takes time, and competitors can look over your shoulder and block you if they feel threatened even if what you propose is in the best interest of the market. The leadership of the NEM is like a “bowl of jelly”, it has no substance, and no one is responsible. There are a couple of key people, but you never see them, they are almost faceless and their names rarely, if ever, become public.”*

One participant provided the information which formed the basis of Table 7, which illustrates the high number of players in the NEM compared to the markets of Western Australia and New Zealand.

**Table 7 – Comparison of NEM, WEM and the New Zealand Electricity Market**

Market	Market operator	System operator	Regulator	Influences	Estimated number of players
National Electricity Market	NEMMCO	NEMMCO	AER and five state regulators	MCE, DRET, SCO, DCC DEWHA, AEMC, NEMMCO (AEMO), AER, VENCORP, ESIPC, NTP, five state regulators, eight state and territory ministers, several federal and state ministers	30+
West Australian Electricity Market	Independent Market Operator	Western Power Corporation	Economic Regulation Authority of Western Australia	One state minister, related state ministries, federal ministers	4+
New Zealand Electricity Market	M-Co	Transpower	Electricity Commission and Commerce Commission	Minister for Energy and related ministries	5+

### *Inequality of voice for the demand side*

The participants expressed a view that the big lobbyists were the coal industry and coal-fired generators; that coal-fired generation says, “You can rely on us” and this crowds out other options; and that renewable energy and cogeneration require a voice equal to that of coal-fired generation.

The coal industry and the generators, along with other participants, have presented their positions during the evolution of policy on climate change and the NEM. To help ensure that there is a diversity of views available, consumer groups have also been funded, for example via the National Electricity Consumers Advocacy Panel. During 2007/2006, the Panel paid \$1,301,707 in grants.<sup>66</sup>

However, from the perspective of the participants in this study, the interests of the carbon-based industries seem to have been able to dominate the policy debate.

*“I pay for my retailer to pay Queens Council to argue for me to be charged more.”*

*“It’s a range of voices that are being ignored, including thinking economists, not just the environmental movement.”*

During this assignment, the composition of the High Level Consultative Committee for the forthcoming White Paper titled *National energy policy – framework 2030* was drawn to our attention. While representatives for interests in fossil fuels and uranium were present, the absence of representatives from the customer side, or any form of demand side participation, was notable, supporting the participants’ view that demand side participation is not recognised. The members of the committee were drawn from:

- Department of Primary Industry (Victoria)
- Shell Companies of Australia
- Department of Resources, Energy and Tourism
- CSIRO
- Rio Tinto Australia
- AGL Energy Limited
- Xstrata Coal Investments Australia Pty Ltd
- BHP Billiton Olympic Dam Corporation
- Santos Ltd
- Woodside Petroleum Ltd
- Department of the Prime Minister and Cabinet
- Origin Energy Ltd

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<sup>66</sup> National Electricity Consumers Advocacy Panel. *Annual report 2006-2007*. Source: <http://www.advocacypanel.com.au/documents/AnnualReport2006-2007websiteversion.pdf>. Last accessed: 5 May 2009. Page 7.

- Energy Supply Association of Australia
- Australian Petroleum Production and Exploration Association Ltd
- Australian Energy Market Operator (Transitional) Ltd.

*“The NEM is not supposed to favour some options over others, but it does, and there is an inevitability in this happening. In addition, there are people who are using the regulatory framework and technical constraints to slow the transition to low carbon generation. The reliability framework has perverse disincentives to bringing on renewable and low carbon generation. There are some climate change policies that buttress the NEM. The provisions of CPRS permits that are going to coal-fired power stations is an example.”*

*“There is a need for a customer advocate, to make sure the interests of customers are looked after.”*

### ***Minimum standards for generators***

Some participants argued that the federal government should impose minimum standards on generators in terms of the maximum allowable level of CO<sub>2</sub> per MWh. There are several related issues. Australia is currently relying on a number of legacy coal-fired generators, which were built before the current climate change policy evolved. In a sense, they are trapped in a changing policy environment. If limits are to be set, this will need to be decided through the federal political process. It is unlikely that there will be any new coal-fired generators under the current policies, because investors are reluctant to fund them. However, this point is also relevant to gas-fired generators and the issue of combined cycle versus open cycle generators.

### ***Disaggregation and competition conflict with climate change objectives***

A number of participants in this study argued that the historical policy of the 1990s of the disaggregation of the electricity industry and the introduction of competition had created a legacy that conflicts with current climate change policies. They argued for a need to change to a coordinated, whole of system approach to capture the economic and energy savings of demand management and energy efficiency. At present, there does not seem to be an entity that can organise demand management or energy efficiency and reap the savings. However, any change in the policy of disaggregation and competition would need to be resolved through Australia’s federal political system.

*“Some of the framework for disaggregation and competition conflicts with climate change. In NSW, you have an ideal combination of government ownership, potential for co-operation, integrated response, and control of planning [to coordinate the electricity industry with climate change policies].”*

*“The NEM has benefited Australia by bringing competition to generation, but the ideology of competition in retail and distribution arguably does not have sufficient benefits to outweigh the substantial costs involved.”*

### 7.1.3 The AEMC review

This section discusses comments about the AEMC's review of energy market frameworks under the headings of:

- AEMC's interpretation of the terms of reference excludes the NEM objective and focuses on price
- Demand management not considered as a tool to reduce carbon
- Review used to accelerate privatisation and deregulation.

#### *AEMC's interpretation of the terms of reference excludes the NEM objective and focuses on price*

Participants argued that the AEMC has interpreted the terms of reference to exclude a consideration of the objective of the NEM. The MCE did not specifically direct the AEMC to consider the objective of the NEM, and that the review's terms of reference were constructed to assess if the NEM would act as a barrier to the pass through of CPRS costs. As noted in the discussion about the MCE, these issues could be seen as favouring the business-as-usual scenario.

*"The terms of reference of the AEMC review were already limited before starting and could not deliver the far reaching changes required to implement a regime consistent with such a fundamental change in the energy market as the effective decarbonisation of the economy over 40 years. There was also no reference in the terms of reference to look at international best practices for improving energy efficiency and reducing the carbon intensity of energy services delivery. These terms of reference were totally unsuitable to drive the change necessitated by the government's carbon mitigation targets."*

#### *Demand management not considered as a tool to reduce carbon*

Participants noted that the AEMC's 1<sup>st</sup> interim report mentions demand management as a part of the electricity industry, but does not consider it as a tool to reduce carbon.

Demand management is considered in regulatory reviews as an option to meet supply needs or network constraints, but it is widely recognised that the large potential for demand management remains untapped. Participants pointed out that during the consideration of demand management in regulatory reviews, this is done from an electricity supply and demand perspective and does not consider the greenhouse benefits that it could provide.

Considering demand management as a tool to reduce carbon, as well as an alternative to network augmentation, may substantially increase the likelihood of its use by the utilities. It implies, however, that climate change policies should be integrated into the objective of the NEM, as discussed at a number of points in this analysis.

*"Unless the market regulators are given a specific objective to utilise the energy system to ensure the most economical and carbon efficient supply of energy services (not central electricity supply), I do not see how we can achieve major carbon mitigation outcomes. We*



*currently have a system where if you want to boil a kettle to get water at 60C, we dig up lumps of coal with attendant methane emissions, transport it to a power station where 65% of the energy content is lost to the environment as low grade heat, lose 10% in transmission and distribution, and then apply the remaining energy to an element to heat the water. Hard to believe it is not a joke."*

### ***Review used to accelerate privatisation and deregulation***

This point relates to the legacy policy issues arising from the privatisation and deregulation policies of the 1990s, which many participants felt had created a status quo that was resistant to, or even hostile to, considering the climate change implications of energy policy because emissions were viewed as an externality. There was an underlying concern among participants that there may still be proponents of these policies who saw the review as a vehicle to continue to try to implement them. This ran counter to the desire of many participants to see a coordinated response to climate change from the energy markets.

*"Amongst other things, the review appears to us as a way of accelerating the process of privatisation and price deregulation, and there appears to be a higher agenda, which is part of the fundamental thinking."*

*"We were looking for an independent review, but it has been driven by the sell everything and let the market decide policy. It has not provided the independent advice that we expected."*

#### **7.1.4 The AEMC**

The comments in this section relate to the AEMC. They are presented under the headings of:

- Need for an independent body to oversee the energy market
- Insufficient weight given to demand side options
- Regulators do not want to anticipate government policy or the market.

#### ***Need for an independent body to oversee the energy market***

Participants in the forum discussed the idea of an independent body for the energy market, with a role similar to that of the Reserve Bank within the economy. One of the key attributes of a more independent AEMC would be autonomy from the political system, with a mandate that could look to future requirements in its decision making. This proactive responsibility, used frequently by the Reserve Bank in the setting of interest rates, could be of benefit. Participants in the forum saw a particular benefit if the AEMC were able to consider the environment, allowing it to respond to the changing science on climate change.

*"An independent body, able to act in expectation of events, able to make pre-emptive changes ahead of the game."*

### *Insufficient weight given to demand side options*

Participants expressed the view that the AEMC does not give sufficient weight to the demand side's views and that regulation through the AEMC and the AER does not ensure that cost-effective demand management is carried out before investment in additional infrastructure is approved.

In this context, it is interesting to note that the AEMC's Reference Group for its review of demand side participation in the NEM had only one industry representative from the demand side, Energy Response. The members of that group comprised:<sup>67</sup>

- Energy Australia
- BlueScope Steel
- CS Energy
- ElectraNet
- NEMMCO
- Australian Energy Regulator
- Energy Response
- Total Environment Centre
- Consumer Utilities Advocacy Centre
- AGL
- Centre for Energy and Environmental Markets, University of New South Wales.

Several participants of the study pointed out that transmission and distribution service providers were able to pre-empt demand side options by gaining approvals for excessive capital expenditure. The proposed spending of \$18 billion for the distribution network in the Sydney basin was cited by a number of participants.

### *Regulators do not want to anticipate government policy or the market*

Participants noted that while it may be prudent that regulators do not anticipate the policy decisions of governments, or the outcomes of markets, it delays responses to changing conditions by a number of years. This automatically means that the regulators are dealing with the consequences after the event, for example, as is now happening as regulators try to deal with the results of the experiment in the deregulation of financial markets. This prudence inadvertently acts as a barrier to timely responses.

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<sup>67</sup> AEMC. 2009. *Demand-side participation in the National Electricity Market draft report*. Source: <http://www.aemc.gov.au/pdfs/reviews/Review%20of%20Demand-Side%20Participation%20in%20the%20National%20Electricity%20Market/aemcdocs/008Stage%202%20-%20Draft%20Report.pdf>. Last accessed: 6 May 2009. Page 85.

### 7.1.5 State and territory policies

This section describes issues raised by participants about state and territory policies under the headings of:

- Lack of consistency between jurisdictions and over time
- Lack of consumption reduction objective for NEM undermines state-based initiatives.

#### *Lack of consistency between jurisdictions and over time*

Historically, each state had its own regulator, which answered to the state or territory government. There is now only one regulator for the wholesale market and the networks, the AER, which covers all of Australia. The jurisdictions still maintain responsibility for retail price regulation.

As the NEL and NER apply to all states in the NEM, the legal umbrella for the regulatory authority and framework is consistent across the NEM. Only Western Australia and the Northern Territory are outside the NEM. Given this situation, greater consistency across jurisdictions is to be expected in the future.

Lack of consistency over time is inevitable for political issues which are resolved via each jurisdiction's political process. This process can be expected to continue in the future because this is where policy decisions are normally resolved. As a result, differences between the policies of the states and territories can be expected to continue.

*“Feed-in tariffs are an example of climate change policies that are inconsistent across Australia. There are differences in rates, caps, gross versus net ... there is no consistency. The rules are consistent, they are national, but the states have interpreted them in different ways. As a result, both the industry and the investor have no long-term policy or financial certainty.”*

#### *Lack of consumption reduction objective for NEM undermines state-based initiatives*

Historically, there have been a number of state-based initiatives to reduce energy consumption or to change energy consumption patterns, often as a part of jurisdictional network regulation. One example is in the licence condition for NSW distribution networks under the *Electricity Supply Act 1995* that states:<sup>68</sup>

*“(5) Without limitation, the Minister must impose the following conditions on each distribution network service provider's licence:*

*(a) a condition requiring the holder of the licence, before expanding its distribution system or the capacity of its distribution system, to carry out investigations (being investigations to ascertain whether it would be cost-effective to avoid or postpone the expansion by implementing demand management strategies) in circumstances in which it would be*

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<sup>68</sup> Schedule 2, 6 (5) (a). Source: [http://www.austlii.edu.au/au/legis/nsw/consol\\_act/esa1995242/sch2.html](http://www.austlii.edu.au/au/legis/nsw/consol_act/esa1995242/sch2.html). Last accessed: 6 May 2009.

*reasonable to expect that it would be cost-effective to avoid or postpone the expansion by implementing such strategies,*

*(b) a condition requiring the holder of the licence to prepare and publish annual reports in relation to the investigations carried out by it as referred to in paragraph (a). ."*

This has meant that before expanding a distribution system or its capacity, distributors are required to assess alternatives which could avoid or postpone the expenditure.

As the NEM objective does not include such an explicit requirement to assess demand management options, this omission means that it does not align with state-based initiatives.

### 7.1.6 NEMMCO

The issues raised about NEMMCO are presented under the headings of:

- NEMMCO does not see a role in energy efficiency
- NEMMCO's role as reserve trader.

#### *NEMMCO does not see a role in energy efficiency*

Participants pointed out that NEMMCO does not see itself as having a role in promoting energy efficiency. Rather, it is likely that NEMMCO sees energy efficiency as a potential source of demand reduction, but its mandate does not allow it to encourage any one option over another. However, the next point may offer a mechanism that does allow it to take a role in demand management.

#### *NEMMCO's role as reserve trader*

As Reserve Trader, NEMMCO enters into reserve contracts with non-scheduled loads and generators in response to a reserve shortage.<sup>69</sup> NEM reserve contracts are activated when all market bids and offers have been exhausted and Frequency, Control, Ancillary Services (FACS) requirements cannot be met. Any expansion of the role of Reserve Trader is likely to act as an encouragement for NEMMCO to make use of demand management contracts using non-scheduled loads.

Rule changes were being implemented in June 2008 to replace the Reserve Trader with a Reliability and Emergency Reserve Mechanism (RERM).<sup>70</sup> NEMMCO is conducting a consultation on the Procedure for the Exercise of Reliability and Emergency Reserve Trader and SO\_OP\_3715 Procedure for the Dispatch and Activation of Reserve. The notice for the first stage of the consultation on the rules was issued on 18 February 2009.<sup>71</sup>

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<sup>69</sup> NEMMCO. 2003. *Non-scheduled reserve contract consultation – final report version no 1.0*. Source: <http://www.nemmco.com.au/powersystemops/198-0004.pdf>. Last accessed: 1 April 2009.

<sup>70</sup> NEMMCO. 2008. *NEMMCO submission of stage 2: issues paper – review of demand-side participation in the national electricity market*. Source: <http://www.aemc.gov.au/pdfs/reviews/Review%20of%20Demand-Side%20Participation%20in%20the%20National%20Electricity%20Market/submissions2/016NEMMCO.pdf>. Last accessed: 1 April 2009. Page 13.

<sup>71</sup> Source: <http://nemmco.com/powersystemops/248-0001.html>. Last accessed: 7 April 2009.

### 7.1.7 NEM objective

The topics raised about the NEM objective are discussed under the headings of:

- The NEM does not acknowledge the AEMA's or the MCE's environmental objective
- The NEM lacks a long-term perspective.

#### *The NEM does not acknowledge the AEMA's or the MCE's environmental objective*

The MCE has a clearly articulated environmental objective that originates from the 2006 Australian Energy Market Agreement (AEMA). It states that:

*"The Ministerial Council on Energy is the national policy and governance body for the Australian Energy Market, responsible for delivering the economic and **environmental benefits** for Australia from implementation of the Council of Australian Governments' national energy policy framework."* (our emphasis)

The NEM is an experiment in economic efficiency and promoting investment is an objective of the NEM. However, this is not the only objective. It also seeks to promote efficient operation with regard to quality, reliability, security and safety. It ignores the social and environmental effects of generation and treats emissions as an externality. In NEMMCO's own words,

*"Environmental benefits, unless explicitly priced, are externalities."*<sup>72</sup>

As a result, no environmental benefits are costed into the price of energy. As noted at a number of places in this analysis, this relates back to the absence of social and environmental objectives in the NEL or the NEM.

In the words of one of the participants:

*"The major tension is about how the NEM objective is interpreted by the rule makers and regulators. The objective of the NEM can be compatible with climate change policies. Some people would factor in reducing climate change risk as part of the long-term objectives of operating the NEM. The tension comes about because of the ideological history that underpins the thinking of rule makers, rather than something in the NEM objective. For example, when they look at efficiency, it is a financial view, a least-cost view to deliver a product. This is a neo-classical, free market view, in which carbon is an externality which, unless it is priced through the market, you don't factor it in."*

*"The NEM does not minimise the amount of fuel burnt."*

Several participants argued that the NEM was dampening climate change signals by not considering the environmental results of generation. NEMMCO would agree with this position because *"environmental benefits, unless explicitly priced, are externalities."*<sup>73</sup> As noted

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<sup>72</sup> NEMMCO. 2008. *NEMMCO submission of stage 2: issues paper – review of demand-side participation in the national electricity market*. Source: <http://www.aemc.gov.au/pdfs/reviews/Review%20of%20Demand-Side%20Participation%20in%20the%20National%20Electricity%20Market/submissions2/016NEMMCO.pdf>. Last accessed: 1 April 2009. Page 2.

<sup>73</sup> Ibid. Page 2.

above, there are questions regarding the effect this has on the implementation of climate change policies and the costs of reducing greenhouse emissions.

There was a concern that the NEM needed a leader – one body – which was knowledgeable and visionary. Participants argued that the NEM was unable to provide leadership, but simultaneously required it. These comments suggest a role for the MCE, which participants felt should be, or should be seen as, the peak policy making body.

*“Leadership is the single greatest issue affecting the NEM, or rather the lack of it.”*

### ***The NEM lacks a long-term perspective***

It has been noted that the NEM is about bidding for short blocks, which makes it a short-term clearing house for supply and demand, whereas planning for the environment is longer term. This point was seen by a number of participants as one of the shortcomings of the NEM, which was designed as a clearing market for a commodity. However, without a long-term perspective, a number of participants argued that it could not optimise for long-term outcomes. In particular, some participants argued that taking short-term, low-cost measures could increase the overall social and financial costs of dealing with climate change.

*“The NEM is driven by the short-term. The environment must be long-term, so it can be put off indefinitely in the economic / budget / political cycle.”*

*“The NEM is about bidding for 30 minute blocks. That tends to make it a short-term clearing house for supply and demand. Decent planning for the environment is longer term. Its nature crowds out environmental concerns.”*

*“One problem in the NEM is that generators are able to use their market power to increase prices and rebid into the market. Demand management is possible for larger firms and demand aggregators, but they have to bid in at short notice. At present, the design of the NEM discourages demand management, partly because the gas generators can operate at short notice.”*

*“On a 5-minute cycle, there is not sufficient time for a demand aggregator to respond.”*

### **7.1.8 NEM operation**

Issues raised by participants that were related to the operation of the NEM are presented under the headings of:

- Will the NEM be able to coordinate participants for major projects
- Favours new generation and transmission over efficiency and demand response
- Retailers revenue based on units sold
- Distributors’ revenue regulation encourages new infrastructure, blocking demand management and energy efficiency
- Regulatory test excludes environmental benefits

- There is no mechanism to consider a proposal for simultaneous multiple transmission connections.

### ***Will the NEM be able to coordinate participants for major projects***

Coordination of major projects was a role that was historically filled by government. NEMMCO/AEMO and the NTP are the coordinating bodies of the NEM. However, since deregulation, the private market has played a greater role, particularly in terms of investment decisions and investment timing. There were questions about the ability of the market to coordinate major projects, particularly in the context of climate change. A number of the participants in this study expressed concern about the wisdom of allowing a market to provide critical infrastructure, particularly in response to today's carbon price signal which may not be appropriate for assets with a life of 40 years.

*"The stakeholders in the NEM require a price signal for emissions, which incorporates the full social value, as opposed to just the cost of reducing emissions. This would give a more accurate pricing signal. This could be applied to investment decisions. The current approach is problematic if you are making decisions about an asset with a life of 40 years, and we have no idea what the emissions price will be in the future."*

### ***Favours new generation and transmission over efficiency and demand response***

NEMMCO sees its role as *"removing any specific barriers: i.e. 'levelling the playing field' rather than favouring demand side participation over other forms of participation."*<sup>74</sup>

However, some participants argued that removing specific barriers was not equivalent to levelling the playing field, because incumbents held a range of specific advantages.

*"The policies for the NEM inhibit the aggregation of the demand side and favour the supply side actions. There is a need for greater balance."*

Participants argued that established technologies, like the established generators discussed above, hold a range of advantages because they have benefited from the support of governments which provided the legal and financial frameworks under which they were constructed, the transmission and distribution infrastructure was built to service them, and the legacy of legislation and rules facilitate their operation. In contrast, a new technology has to fit within the existing legal and financial frameworks, prove that it is technically and commercially viable, and meet connection costs.

### ***Retailers revenue based on units sold***

Most retailers are aligned with, or in common ownership with, generation businesses. Participants argued that this relationship created an incentive for the owner to continue selling electricity during periods of high prices, in order to create generation revenue. As retailers' revenue is based on units of electricity sold, there is also little incentive to help consumers to reduce their consumption.

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<sup>74</sup> Ibid. Page 3.

Generators and retailers argue, however, that common ownership is a risk management tool. So widespread is this practice, that a new word has been coined to describe the symbiotic relationship between a generator and a retailer, a “gentailer”. Only time will tell if this word moves into the common jargon of the industry, but its appearance shows the frequency of the need to describe such an entity.

While it may be true that common ownership is a risk management tool, it also creates a perverse incentive for the combined entity to sell as much energy as possible during times of high prices, which are often the times of peak demand. This in turn puts pressure on the network providers to dedicate more assets to meet the requirements of peak demand. In light of climate change policies, this market framework could be seen to be working against efforts in other areas to achieve a more efficient level of electricity generation, transmission and distribution.

*“Generators and retailers want to sell as much as possible, in theory limited only by their marginal cost.”*

Participants argued that, instead, retailers should be reconfigured as energy service providers, rather than kWh sellers. Retailers can already profit from providing a range of services beyond selling units of electricity. This includes offering hot water, cogeneration, efficiency, demand management and appliances. As noted above, however, the current market framework creates strong incentives for retailers to sell more electricity. Participants argued that alternative incentives may need to be developed to encourage them to sell less electricity, in order for the potential for retailers to become energy service providers to be realised.

### ***Distributors’ revenue regulation encourages new infrastructure, blocking demand management and energy efficiency***

A number of the participants in this study argued that regulated revenue for networks and distributors was enhanced by increasing energy sales in the short-term and expanding the regulated asset base in the long-term, both of which are largely dependent on demand. This counters any incentive to reduce demand.

However, the AEMC has come to a different conclusion, arguing that:

*“We have also found that the financial incentives to support efficient DSP are stronger under a price cap than under a revenue cap. However, we do not consider the weaker incentives – which would appear to create incentives on networks to use too much DSP – are material barriers given other mitigating features of the regulatory framework, and having regard to the wider reasons for adopting a revenue cap as an appropriate form of control.*

*The objective for the design of incentives for purchasing DSP is for the network business to find it privately profitable to purchase DSP in situations where that purchase is also socially desirable. The purchase of DSP will be socially desirable (efficient) whenever a customer would otherwise consume electricity but places a value upon that consumption that was less than the cost of production. We find that a price cap delivers such incentives.*



*This finding implies that additional regulatory measures to amend the operation of price caps in respect of the use of DSP (such as the 'D-factor' adopted by IPART in its 2004 review of distribution business in NSW) are not required to promote the efficient contracting for DSP, but rather should be viewed as a subsidy to DSP.*<sup>75</sup>

This difference in views between the participants and the AEMC warrants further investigation, particularly the idea that socially desirable demand side participation only occurs when the value a customer receives by foregoing consumption exceeds the cost of production. If the AEMC's analysis was couched in purely economic terms, then perceived environmental benefits have been discounted.

The tone of the AEMC report suggests, in the matter of network regulation, that current levels of network demand side participation are acceptable. However, comparison with other jurisdictions indicates that they may be low. For example, it has been noted that NSW distribution networks spend less than one fifth of what the average US utility spends, and leading utilities in the US spend much more than this average level.<sup>76</sup>

If the benefits of reduced greenhouse emissions were included in NEM considerations, it is likely that what constitutes a socially efficient level of demand side participation would change.

### ***Regulatory test excludes environmental benefits***

The regulatory test does not consider environmental benefits, which limits its ability to provide value for money for emission abatement. The regulatory test has been described as "an analysis tool used by transmission and distribution businesses in the National Electricity Market (NEM) to assess the efficiency of network investment. The public consultation process for new large network assets provides information to the market on the development of the network and allows stakeholders to comment on proposed investments."<sup>77</sup> However, participants argued that as the regulatory test does not incorporate environmental benefits in its analysis, stakeholders' comments may carry no weight.

### ***There is no mechanism to consider a proposal for simultaneous multiple transmission connections***

This point relates to the limitations of bilateral connection negotiations between new remote generators and the transmission network. The current framework only allows for this form of arrangement, which potentially precludes a more efficient and more cost-

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<sup>75</sup> AEMC. 2009. *Demand-side participation in the National Electricity Market draft report*. Source: <http://www.aemc.gov.au/pdfs/reviews/Review%20of%20Demand-Side%20Participation%20in%20the%20National%20Electricity%20Market/aemcdocs/008Stage%20%20-%20Draft%20Report.pdf>. Last accessed: 15 May 2009. Page 17.

<sup>76</sup> Institute for Sustainable Futures. 2008. *Win, win, win: regulating electricity distribution networks for reliability, consumers and the environment, review of the NSW D-factor and alternative mechanisms to encourage demand management*. Source: <http://www.isf.uts.edu.au/publications/dunstanetal2008winwinwin.pdf>. Last accessed: 20 March 2009. Page 6.

<sup>77</sup> Australian Energy Regulator. 2007. *Final decision regulatory test version 3 and application guidelines*. Source: <http://www.aer.gov.au/content/item.phtml?itemId=715871&nodeId=feb158f9d190e6fa5fcbe360aea506da&fn=Final%20decision%20reg%20test%20v3.pdf>. Last accessed: 6 April 2009. Page 4.

effective framework for connecting a collection of remote generators in a hub and spoke model in one geographic area. The issue is of particular interest to some proponents of wind generation and geothermal tenements, particularly in South Australia.

This is an issue that the AEMC is addressing in its Review. The 1<sup>st</sup> interim report identifies the problem, confirms that it is a material issue and provides four options for addressing the shortcomings in the existing connection framework.<sup>78</sup>

#### **7.1.9 Barriers to demand management and energy efficiency**

Barriers to demand management and energy efficiency raised by the participants are discussed under the headings of:

- Demand side participation mechanisms underdeveloped
- Metering and SCADA requirements
- Capacity market.

#### ***Demand side participation mechanisms underdeveloped***

NEMMCO offered a matrix of types of demand side participation and potential market beneficiaries in its submission to the review of demand side participation in the NEM, shown in a modified form in Table 8. It provides a useful summary of the different types of demand side participation and the participants who can benefit from them. In addition to NEMMCO's matrix, in the environmental row, we have shown reduced emissions in the columns for load shifting and small generation.

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<sup>78</sup> AEMC. 2008. *Review of energy market frameworks in light of climate change policies, 1<sup>st</sup> interim report*. Source: <http://www.aemc.gov.au/pdfs/reviews/Review%20of%20Energy%20Market%20Frameworks%20in%20light%20of%20Climate%20Change%20Policies/First%20Interim%20Report.pdf>. Last accessed: 23 March 2009. Pages 34 – 41.

**Table 8 – Matrix of demand side participation and markets**

	Load shifting	Load curtailment	Small generation	Appliance efficiency
<b>Consumer</b>	More competitive tariffs	More competitive tariffs	New income source	Reduced energy consumption
<b>Retailer</b>	Lower hedging costs	Lower hedging costs	Lower hedging costs	
<b>DNSP</b>	Smoother load profile	Network support, deferred augmentations	Network support, deferred augmentations, avoided TUOS	
<b>TNSP</b>	Smoother load profile	Network support, deferred augmentations	Network support, deferred augmentations	
<b>NEMMCO</b>		Ancillary services and reserve trader	Ancillary services and reserve trader	
<b>Environmental</b>	Reduced emissions	Marginally reduced emissions	Reduced emissions	Reduced emissions

NEMMCO's view is that "demand interruption is considered to be appropriate **only** to the point at which the explicitly priced electricity supply savings exceed the value of electricity to that customer"<sup>79</sup> (our emphasis). By taking this position, NEMMCO may have created a mechanism that precludes demand interruption as a method of matching supply and demand in many cases.

NEMMCO sees its role as "removing any specific barriers: i.e. 'levelling the playing field' rather than favouring demand side participation over other forms of participation."<sup>80</sup> However, the participants in this study argued that a range of explicit and implicit barriers have evolved.

There have been difficulties in obtaining sufficient demand response because of the scale and metering requirements that have been imposed, as illustrated in the following points. However, demand aggregators and individual major customers have been used to provide some capacity during times of system stress.

In summary, many participants felt that all forms of demand side participation could and should be exploited more, that the current price signals did not influence consumption, nor were larger price signals likely to influence behaviour. In addition, they argued that regulators had ignored the potential of energy efficiency and that aggregation had been inhibited.

<sup>79</sup> Op. cit. Page 2.

<sup>80</sup> Ibid. Page 3.

### *Metering and SCADA requirements*

Currently, NEMMCO does not allow demand response trading without NEMMCO compliant metering and the NEM's only mechanism for demand management is for a scheduled load that is connected to NEMMCO's SCADA system. This creates a significant barrier for demand side participation, as it effectively locks out aggregated demand side response. The issue was raised by a distributor which has been working for several years on a demand response strategy.

Under 2.3.4(d) of the National Electricity Rules, a market customer may request that NEMMCO classify any of its market loads as a scheduled load. This creates an obligation to comply with 2.3.4(e) and chapter 3 regarding the provision of real-time data, bids and compliance with dispatch instructions equivalent to that of a scheduled generator.<sup>81</sup> As NEMMCO notes in its submission to the stage 2 issues paper, for small loads, this burden seems unrealistic.

*"In WA, in the WEM, you can be a demand side aggregator. In the NEM, the only mechanism is as a scheduled load, connected to NEMMCO's SCADA, but you can't do aggregated demand side response."*

*"NEMMCO's SCADA system does not see anything below 50 MW."*

### *Capacity market*

One of the participants argued that the reserve capacity mechanism in the Wholesale Electricity Market (WEM) is designed to ensure adequate generation capacity is available in the South West Interconnected System (SWIS) of Western Australia.<sup>82</sup> The reserve capacity mechanism is based on a trade of capacity credits between suppliers and users. For example, each retailer is obliged to secure enough capacity credits to meet its own reserve capacity requirement.

The capacity market provides a source of revenue for generators and demand side capacity, even if they are rarely used. This helps generators and demand side capacity to be financially viable, ensuring that they are available to provide energy on those occasions when they are needed. This has the effect of dampening price rises caused by a lack of capacity, which in the NEM can rise to a value known as the Value of Lost Load (VoLL), which is currently \$10,000/MWh compared to a Maximum Short-Term Energy Market (STEM) price in the WEM of \$286/MWh if gas-fuelled generation is available, or \$423/MWh if no further gas-fuelled generation is available and liquid fuelled generation is required.<sup>83</sup>

In the SWIS, the Maximum Reserve Capacity Price is \$122,500 per MW of capacity per year for generators and demand side participants, whether or not their energy is used in

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<sup>81</sup> Ibid. Page 11.

<sup>82</sup> Independent Market Operator. 2006. *The south west interconnected system wholesale market: an overview*. Source: <http://www.imowa.com.au/Attachments/ShortBrochure.pdf>. Last accessed: 1 April 2009. Pages 10-11.

<sup>83</sup> Source: [http://www.imowa.com.au/10\\_5\\_1\\_e\\_price\\_limits.htm](http://www.imowa.com.au/10_5_1_e_price_limits.htm). Last accessed: 15 April 2009.

the market. This is equivalent to \$13.98 per MW per hour for the year. The price will rise to \$142,200 from 1 October 2009 and to \$164,100 from 1 October 2011.

The Independent Market Operator of Western Australia described way the capacity market operates as follows:

*“Unlike many other markets, such as the National Electricity Market, the new wholesale market in Western Australia puts a specific value on capacity being made available to the market. Generators and demand management providers who commit to have their facilities ready to operate when called upon will receive payment (from either the Independent Market Operator (IMO) or under bilateral contract).*

*This process has been designed to ensure that customers can offer load reductions on the same basis as generators offering capacity. The IMO places the same value on capacity provided by demand management as is placed on that provided by generating plant. The process also gives demand management providers the flexibility to offer more than one block of capacity.”<sup>84</sup>*

#### **7.1.10 Factors dampening price signals to small consumers, particularly carbon price signals**

A range of factors that participants felt were dampening price signals are discussed under the headings of:

- NEM is short-term and price-driven
- VoLL limits price signals
- Disincentives for low volume customers
- The D-factor model may be required in the NEM
- Smart meters are unlikely to change customers’ behaviour.

#### ***NEM is short-term and price-driven***

The theoretical form of the NEM is benign, but in practice it is price-driven and short-term, with supply meeting demand rather than trying to reduce demand. The NEM uses price as a signalling mechanism for the use of energy. Unless there is some form of market failure, in theory this is economically efficient. However, if the price is too low because of an externality that is not costed correctly, for example for carbon emissions, then the price signal will not encourage lower energy use. At present, this price issue would be addressed by the proposed CPRS.

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<sup>84</sup> Independent Market Operator. 2006. *Opportunities for renewable energy and demand side management to participate in the Wholesale Energy Market*. Source: <http://www.imowa.com.au/Attachments/RenewableEnergyAndDSMAugust2006.pdf>. Last accessed: 15 April 2009. Page 19.

*“The NEM doesn’t give any information to consumers about carbon costs. As a result, there is no advantage for the low carbon generators. The benefit is given to coal-fired power stations.”*

### ***VoLL limits price signals***

In the NEM, VoLL is currently \$10,000/MWh, and is due to increase on 1 July 2010 to \$12,500/MWh. Participants said that a VoLL ceiling was probably desirable to avoid gaming. However, they also pointed out that caps could function as a hedging mechanism in the absence of VoLL and that New Zealand does not have a price cap.<sup>85</sup>

*“Blunting by VoLL prices removes signals to the consumer.”*

*“When VoLL was applied during the heat wave in South Australia and Victoria, demand went up by hundreds of megawatts and generation went down. That is, people who had been limiting their consumption reacted to the lower prices by increasing their load, and non-scheduled generators went off because \$300 was not enough to warrant continued generation.”*

*“The NEM is dampening price signals. There are two positions, the state government forecasts price rises, about twice what was previously indicated, but the price on the NEM may be too low to encourage new generators to be built.”*

### ***Disincentives for low volume customers***

Several participants spoke about the way that customers, particularly low-volume customers, were penalised when they minimised their energy use. Because their network charges were fixed, they effectively paid more, on average, per unit of electricity consumed. While this is not a NEM issue as such, it is a climate change issue that is exacerbated by the present electricity pricing system.

### ***The D-factor model may be required in the NEM***

The D-factor was designed to reduce regulatory barriers to demand management in NSW. It is used in the weighted average price cap control formula and allows distributors to recover:

- approved non-tariff-based demand management implementation costs
- approved tariff-based demand management implementation costs
- approved revenue foregone as a result of non-tariff based demand management activities.

The D-factor was introduced by the Independent Pricing and Regulatory Tribunal (IPART) for distribution determinations in NSW for the period from 2004 to 2009. It will

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<sup>85</sup> There is a default price cap in New Zealand of \$100,000 per MWh. It is not in the rules, but is due to a limitation in the current computing system which cannot handle six-figure bids.

be applied to Country Energy, Energy Australia and Integral Energy by the AER for the period 2009 to 2014 for price determinations in NSW.

One of the participants in this study was the Institute for Sustainable Futures of the University of Technology Sydney. In a paper on the D-factor and other mechanisms to encourage demand management, the Institute made a number of observations about the operation of the D-factor in New South Wales.<sup>86</sup> The report concluded that the D-factor had stimulated consideration and implementation of demand management by distributors, but without other reforms and complementary measures, it was unlikely to deliver an efficient level of demand management activity. Distributors reported savings of \$3.80 for every \$1.00 spent on demand management. However, the total reported expenditure on demand management by distributors was only equivalent to 0.13% of their revenue. These modest results compare unfavourably with the results achieved in California, which are discussed in the section titled *Give primacy to the demand side* on page 55.

*“NSW has the D-factor, which is used when distributors are arguing about their revenue. They use it to say we need this additional capital to be able to increase demand response. Does the NEM need a similar mechanism?”*

### ***Smart meters are unlikely to change customers' behaviour***

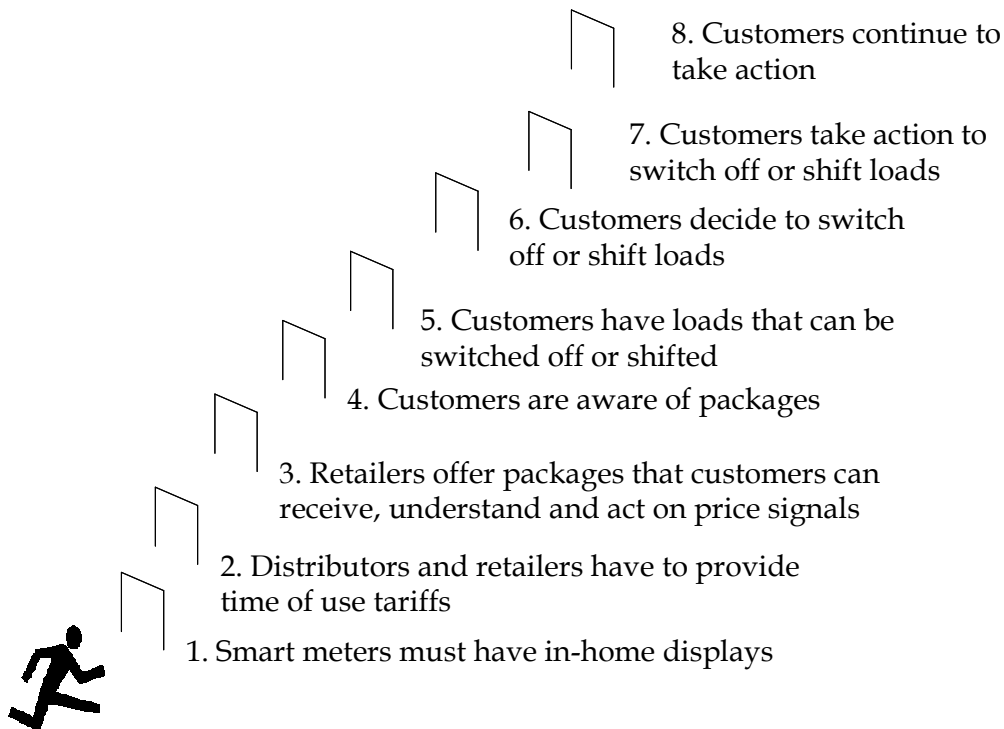
At present, information on real prices and real time price signals are not available to end customers. A number of participants questioned the likelihood that smart meters would affect customers' behaviour. MMA's research has shown that for smart meters to work in the way that proponents describe, a number of factors have to be in place, including the following:

- smart meters must have in-home displays
- distributors and retailers have to provide ToU tariffs
- retailers have to offer packages that enable customers to receive, understand and act on price signals
- customers have to be aware of the packages that retailers offer
- customers have to have loads that can be switched off or shifted
- customers have to decide to switch off or shift loads
- customers have to take action to switch off or shift loads.

Figure 4 illustrates the sequence of hurdles that must be passed before smart meters can be expected to have any effect on greenhouse emissions.

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<sup>86</sup> Institute for Sustainable Futures. 2008. *Win, win, win: regulating electricity distribution networks for reliability, consumers and the environment, review of the NSW D-factor and alternative mechanisms to encourage demand management*. Source: <http://www.isf.uts.edu.au/publications/dunstanetal2008winwinwin.pdf>. Last accessed: 20 March 2009. Pages 5-6.

**Figure 4 - Hurdles to be passed with smart meters**

*“Because of low prices, plentiful supply and reliability, people will be complacent about smart metering. Smart metering won’t give a turn-off signal on its own. It will need to be packaged by retailers. However, the price impact will be small and retailers will be reluctant to package suitable products. We don’t expect any benefit from smart meters.”*

*“The meters and metering infrastructure will belong to the networks and the home area network will be managed by the retailers, so unless these parties are mandated to implement demand management programs, we don’t expect any substantive reductions.”*

## 7.2 Low carbon generation issues

Issues related to low carbon generation are discussed under the headings of:

- Factors affecting the connection of medium and large renewable generators
- Factors affecting the connection of small renewable generators.

### 7.2.1 Factors affecting the connection of medium and large renewable generators

Factors affecting the connection of medium and large renewable generators are discussed under the headings of:

- Wind farms are penalised by connection costs
- Fossil fuel generators are subsidised
- Barriers to registration of generators
- Regulatory test does not consider environmental benefits.



### **Wind farms are penalised by connection costs**

One participant raised the use of connection costs to block non-remote medium and large renewable generators. They also spoke about a lack of compensation for reducing loss factors.

*“Proponents for wind farms are knocked by connection costs and distribution loss factors (which are further discounted), when a wind farm could be offsetting an 8% or 9% loss factor in the transmission system. This is an RET regulation issue. In general, apart from connection costs, performance standards, etc., the NEM requirements must be met, these can be difficult for new technologies.”*

*“It is currently impossible to build small wind farms in SA because of the cost of meeting the regulatory impediments. SA is unable to understand that local supply relieves the system and does not affect system security.”*

*“Technical issues ... current transmission system works against some technologies, particularly wind, geothermal and solar thermal. The best place for those is a long way from existing transmission networks.”*

Other comments on this topic included:

*“NEMMCO is not willing to see the potential of wind energy. As a result, there has been a drawn out technical battle. Because we do not have appropriate rules, that makes wind unusable.”*

*“The inability of thermal plant to shut down means that they run overnight, offering negative bid prices, thus displacing wind generators.”*

*“We need new storage technologies to absorb energy supply peaks.”*

Another participant summarised the dilemma of adding capacity to transmission and distribution systems, and how this promoted load growth in order to make use of the capacity as a vicious cycle.

*“This is a capital productivity issue. Two effects, firstly you don’t have the funds for energy efficiency, and secondly, once you have built capacity, the desire is to use it. As it comes in large increments, you have to reach capacity as quickly as possible. This creates a less flexible system than demand management.”*

### **Fossil fuel generators are subsidised**

Several participants argued that, from a theoretical point of view, the generators which are paying a premium to provide low-carbon electricity are being disadvantaged in the NEM. The high-carbon generators, which are using the atmosphere as a dump for their carbon, are not obliged to pay for this environmental service. As a result, the high-carbon generators are being subsidised by the community.

*“Going from the present situation to low emission technologies is the challenge, but the incumbent coal generators, who bear no cost for emissions, are subsidised. We are going to*

*need major infrastructure spending for geothermal, solar thermal, etc. The major coal and gas-fired thermal generators were designed and built by state governments. We now need the same effort in a market environment, which lacks leadership, cohesion, and a long-term perspective. We need sufficient vision to create a new infrastructure. Will this be cheaper than carbon capture and storage? I think it will be."*

*"If the NEM is dispatching on \$/kWh and carbon/MWh, with some weighting between carbon dispatch and energy price, it's in their long-term interests to be generating as cleanly as possible. CPRS/tax/MRET – are all set at a political level, separate to the NEM. But given some specific price on carbon, the NEM would pass through the cost signals. It is up to companies to invest in their own short and long-term interests. NEM players – generators in particular and retailers to some extent – all want business certainty. The sooner we have MRET or a pricing mechanism for carbon, the better ... for existing players and new entrants."*

### **Barriers to registration of generators**

Several of the participants have tried, or are currently trying, to register cogeneration units. All described protracted negotiations with distributors, as the following example demonstrates.

*"Cogeneration is a major strategy to achieve a 6-star Green Star building. For example, we have a 550 kVA cogen with absorption cooling in one of our recent Green Star ratings buildings.*

*It is also an important strategy in upgrading existing buildings to 5 stars NABERS performance. Honeywell in an Energy Performance Contract for 530 Collins Street is planning to install a 600 or 800 kVA cogen, using natural gas as fuel, to provide electricity used in the building with heat for building heating. We have had difficulty in finding the right expertise to advise on these applications, which reflects the market's experience, or lack of it. We are negotiating with the DNSP to see if the generator can be allowed to synchronise with the grid.*

*We have been negotiating for some months with little certainty, we have had to engage a consultant to provide fault current analysis at considerable expense and with little certainty around the outcome as there is very much an information asymmetry.*

*For a building, cogeneration is a significant greenhouse reduction, but we've found there is no facilitation, no mechanism, and no guidelines.*

*I understand that the DNSPs operate as regulated monopolies, so the regulator has a role to play to facilitate things that are government policy. By synchronising with the grid, we are confident that the building can achieve 5.0 stars, and can deal with a greater variety of the building requirements. As an island, we can only achieve 4.5 stars with consequently less greenhouse savings."*

*"Embedded generation is in the rules, but [some distributors] do not allow it. We need an Australian Standard for embedded generators. Once the generator has met the Australian*

*Standard, this will mean that the generator is ready to connect, and distributors cannot vary the rules to prevent it."*

On the topic of network access and connection arrangements for small generators, NEMMCO noted that S5.2.1(b) removes the application of minimum technical standards from a generator that is exempted, or eligible for exemption, from registration. However, the generator is then subject to being "connected or intended for use in a manner the Network Service Provider (NSP) considers is unlikely to cause a material degradation in the quality of supply to other Network Users."<sup>87</sup> This means that instead of being subject to S5.2.1, the NSP may focus on its own individual codes and connection approaches, rather than on consistency with the NER. While the intent was probably to simplify connection, it may have resulted in inconsistencies. A generator and a potential cogenerator who participated in this study would fall under the S5.2.1(b) exemption, and both cited examples of distributors using arbitrary demands to thwart connection.

*"The monopoly power of the networks means you need a mechanism that does not rely on negotiation. You may need a factor for probabilities that can be assigned for network support. This cuts through the negotiation process, so it is not pure in an economic sense, but recognises the inherent benefits."*

While technical requirements must be met, there is a belief among some proponents of renewables and embedded generation that distribution networks exploit their monopoly power to insist on excessive requirements, thereby making the connection of the renewable generator or embedded generator uneconomic. Their suggested recourse is to use engineering consultants to advise if the requirements are too high and, if so, to approach jurisdictional regulators. This seems like a high-cost, high-risk way to negotiate with a network provider that the generator would expect to be dealing with for many years to come.

### ***Regulatory test does not consider environmental benefits***

Participants raised the issue that existing transmission infrastructure reflects a history of coal-fired generation, rather than the needs of renewable energy generators, and that the regulatory test for transmission proposals does not consider environmental benefits. In tandem, these two points provided another example of a combination of factors that acts as a subsidy for fossil fuel generators. For example, optimal sites for geothermal and wind may be some distance from existing networks, or the available networks may not have sufficient capacity to cope with the additional generation. The legacy of the transmission system, paid for and built by state governments over decades, was designed and built for the fossil fuel generators. In fact, it was optimised for them. New low-carbon generators, particularly wind and geothermal, are faced with the regulatory test which does not recognise any of the environmental benefits that they may offer.

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<sup>87</sup> NEMMCO. 2008. *NEMMCO submission of stage 2: issues paper – review of demand-side participation in the national electricity market*. Source: <http://www.aemc.gov.au/pdfs/reviews/Review%20of%20Demand-Side%20Participation%20in%20the%20National%20Electricity%20Market/submissions2/016NEMMCO.pdf>. Last accessed: 1 April 2009. Page 6.

*“The transmission infrastructure is in the wrong places to foster the development of renewable energy.”*

### **7.2.2 Factors affecting the connection of small renewable generators**

The primary issue raised by participants was that the focus for renewables is on the large scale. While the NEM was intended to be technology neutral, the scale of its operations mean that it will focus on the larger generators, and that they will enjoy the classic economic benefits of scale.

*“We need a mechanism for little people to benefit. They need a fair way for them to get a project up. This may not be an economic decision; they may do it because they think of it as an investment in the future.”*

Comments about the lack of reward for lower emissions cogeneration and the lack of incentives to recognise the benefits of embedded generation were made by a number of participants.

*“Fuel cells will reach 65% efficiency and have potential for cogeneration at the residential level. We need a mechanism for the time value of avoided TUOS and DUOS costs.”*

## **7.3 Costs of adjustment and to consumers**

Issues related to the costs of adjustment and the costs to consumers are discussed under the headings of:

- CPRS has subsidised coal-fired generators
- Five to one bonus for small-scale PV has perverse effects
- Least-cost approach may lead to higher long-term costs to consumers.

### **7.3.1 CPRS has subsidised coal-fired generators**

A recurrent issue among participants was the perverse effect of the federal government policy which has given CPRS permits to the industries that are generating the carbon pollution that the CPRS was designed to address. This was seen as simultaneously devaluing the permits, and providing a gift to the largest creators of carbon.

*“The subsidies and the free permits that have been promised to the thermal generators for the CPRS will be a bonus over and above an elevated price in the NEM. The generators with these permits will get a higher income from increased NEM prices and free permits to keep them emitting while operating.”*

*“If small people install PV, it makes it easier for the fossil fuel generators to meet the target. The CPRS will frustrate the small generators, as offsets will allow coal generators to continue.”*

### 7.3.2 Five to one bonus for small-scale PV has perverse effects

The policy of allocating five RECs for each REC generated by small-scale PV generators was not supported by any of the participants in this study. They argued that it was a confusing externality which distorted the market for RECs by creating more than were warranted. This would act to lower the price of RECs, making them cheaper for fossil fuel generators to buy.

### 7.3.3 Least-cost approach may lead to higher long-term costs to consumers

One participant argued that seeking incremental least-cost changes may be less beneficial to consumers and may not create the best long-term solution.

*“Probably the biggest risk is that we will make incremental improvements to the supply structure, which locks in the structure. Making incremental changes may make it exponentially more difficult to accommodate future requirements. For example, the first 40% of reductions may seem cost-effective, but block what is required to achieve further reductions.*

*An alternative could be to make the cost of carbon initially quite high, reflecting the value to society of reducing emissions, which will give a different investment signal, leading to different outcomes. Using a least-cost approach may not provide the best long-term solution.”*

## 7.4 Other issues

Other issues relevant to this study are discussed under the headings of:

- Planning horizons are not long enough to accommodate extreme events
- Carbon capture and storage is unproven
- Green Transformers.

### 7.4.1 Planning horizons are not long enough to accommodate extreme events

One participant explored the effects of more carbon leading to more frequent extreme weather events. If the NEM is designed to deal with a 1 in 10 year event based on the historical data, then the planning would underestimate the frequency and severity of extreme events.

*“If climate change is a consequence of carbon, which will lead to greater climate extremes, we may already be seeing the signs of these changes this summer; NSW has been cooler, and Queensland has been exceptionally wet, Victoria has experienced a 1 in 20 year heat event, South Australia has experienced a 1 in 100 year heat event. But all the planning in the NEM is based on a 1 in 10 year event, so the 1 in 20 year and 1 in 100 year events fall out of the scope of that planning envelope. Since the NEM is supply side oriented, it only has supply side options to use, which cannot react in time to these extreme events (they need long lead times). But if there are more extremes, we need to either build more infrastructure quickly (supply side options), or reduce demand quickly. Building infrastructure for a 1 in 20 year or*

*1 in 100 year event would be financial/economic suicide. Reducing demand is really the only viable option."*

There was also concern that the CPRS may not be sufficient to meet requirements.

*"This government is not looking outside the CPRS, which is a complementary policy, at best. The proposed CPRS has low targets, massive subsidies to industry and fails to reduce targets in the light of state/territory and community consumption reduction activities. This will harm Australia, and negate the demand management and energy efficiency work that is happening already."*

*"The NEM has a very simple function; in its pure form, it is theoretically benign, however it is price-driven, short-term, with supply meeting demand instead of trying to reduce demand. How could the NEM be structured differently? The ideal would be all renewables, next best would be a tax on carbon to allow greater demand management. Environmentally focussed signals, rather than price signals. Trading in such a way that for 30 minute blocks, you were setting a pool price based on both bids on prices as well as bids to do with emissions ... bid price and carbon output. Twin objectives to call in generating. The NEM would be more complex, but not much harder to manage."*

#### **7.4.2 Carbon capture and storage is unproven**

A number of participants argued that demand side participation was preferable to the gamble on the so-far untested idea of carbon capture and storage. From a theoretical perspective, capital will seek out areas of investment which provide the greatest reward for the lowest risk. However, the participants pointed out that the proponents of carbon capture and storage do seem to be expecting public money to support their endeavour, rather than private capital.<sup>88</sup> Because of this, they felt that demand management, energy efficiency and renewables were being disadvantaged.

The participants' comments are supported by a report by McKinsey and Company titled *An Australian cost curve for greenhouse gas reduction*, which estimated the cost of CCS retrofits to coal using activities as over \$50 per tonne of CO<sub>2</sub>e in 2020, making it the third most costly abatement that it modelled. By 2030, the report estimated that the cost of CCS would be between \$40 and \$50 per tonne of CO<sub>2</sub>e, making it the sixth most costly abatement technology at that time.<sup>89</sup>

*"All I see is research and development being captured by carbon sequestration ... the illusion of clean coal."*

*"We are spending billions of dollars on carbon capture and storage, but that is not going to solve the problem. Business-as-usual will mean storage headaches for future generations."*

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<sup>88</sup> For example, one of the reasons cited for Santos' decision to suspend its Moomba carbon storage project was "weak government support." Source: <http://www.theaustralian.news.com.au/business/story/0,28124,25136614-5005200,00.html>. Last accessed: 3 April 2009.

<sup>89</sup> McKinsey and Company. 2008. *An Australian cost curve for greenhouse gas reduction*. Source: <http://www.theaustralian.news.com.au/files/greenhouse.pdf>. Last accessed: 20 April 2009. Pages 14-15.

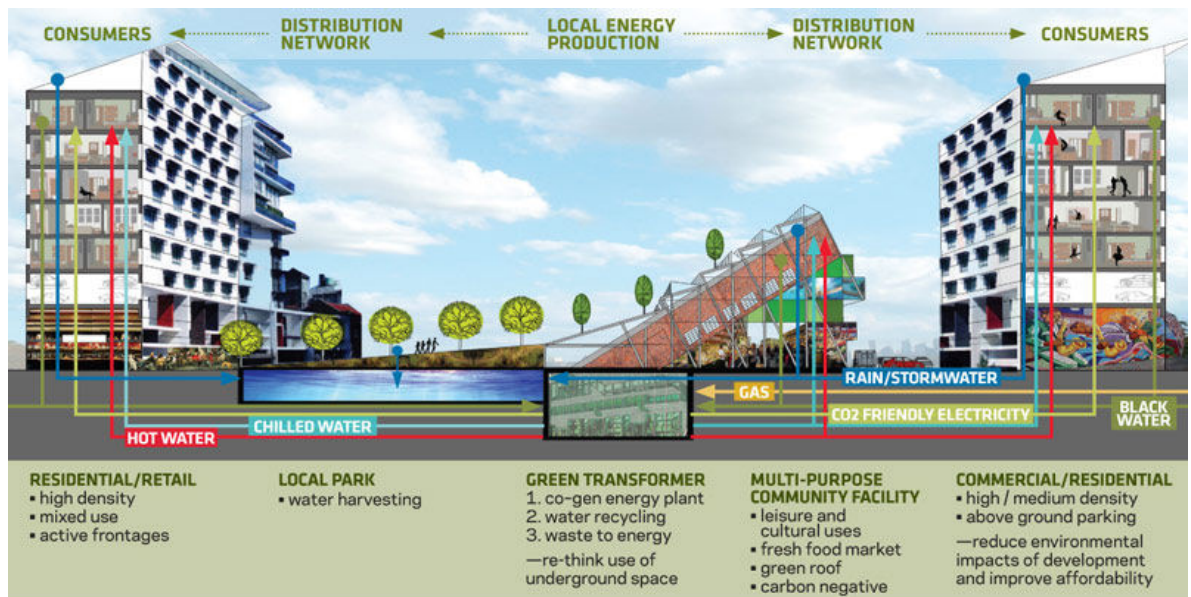
“Carbon capture and storage is a limited option.”

### 7.4.3 Green Transformers

The Green Transformers concept was mentioned by a number of the Sydney-based participants as an example of the type of options that they would like to see investigated.

The Green Transformer project is part of the City of Sydney’s Sustainable Sydney 2030 Vision. In media releases in March 2008, Clover Moore, Sydney’s Lord Mayor, described the plan to install Green Transformers in Sydney. Somewhat of a misnomer, the plan involves the installation of local generators, rather than transformers, with the idea that the local generators would reduce Sydney’s dependency on coal-fired generation and reduce the need for further building of transmission lines and transformers by generating an estimated 330 MW of electricity within the City. Initially running on natural gas, in the long-term, the Green Transformers could burn methane gas harvested from household waste. They would encompass cogeneration and tri-generation, as the heat and water from the generation process would be captured and used to provide hot water, heating and cooling.<sup>90</sup> The City of Sydney’s Green Transformer vision is illustrated in Figure 5.

Figure 5 - City of Sydney’s Green Transformer project<sup>91</sup>



In media releases about the Green Transformers, Clover Moore said that “such systems have been successfully operated overseas,”<sup>92</sup> and the City’s consultation paper refers to two overseas case studies: distributed cogeneration in South Korea; and generation from waste in the United States. In the South Korean case, approximately 800,000 homes are supplied with power and heat by the Korea District Heating Corporation. In the United States case,

<sup>90</sup> Sydney Media. 2008. *Green transformers could generate electricity in the City*, 26 March. Source: <http://www.sydneymedia.com.au/html/3559-green-transformers-could-generate-electricity-in-the-city.asp>. Last accessed: 20 March 2009.

<sup>91</sup> City of Sydney. 2008. *Green Transformers*. Source: <http://www.cityofsydney.nsw.gov.au/2030/thedirections/projects/EnviroPerfProj.asp>. Last accessed: 20 March 2009.

<sup>92</sup> Sydney Media. 2009. *Stop the haggling and say yes to Green Transformers*. Source: <http://www.sydneymedia.com.au/html/3835-stop-the-haggling-and-say-yes-to-green-transformers.asp?orig=Home>. Last accessed: 20 March 2009.

the Los Angeles Department of Water and Power has proposed some waste-to-energy facilities, which, for example, convert buried biosolids into energy. It is hoped the facilities will be in service, generating power to the city, by 2010.<sup>93</sup>

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<sup>93</sup> SGS Ergonomics and Planning. 2008. *Sustainable Sydney 2030, City of Sydney strategic plan*. Source: [http://www.cityofsydney.nsw.gov.au/2030/documents/strategy/02\\_ENVIRONMENTAL\\_PERFORMER.pdf](http://www.cityofsydney.nsw.gov.au/2030/documents/strategy/02_ENVIRONMENTAL_PERFORMER.pdf). Last accessed 20 March 2009, pp.112-113.



## **8 SUMMARY OF PARTICIPANTS' RECOMMENDATIONS**

This section synthesises the results of MMA's analysis and the information provided by participants. The combined data were used to prepare recommendations, which are summarised under the headings of:

- The NEM objective
- Requirements for new generators
- Embedded generation
- Remote area generation
- Incorporating carbon costs into infrastructure decisions
- How the NEM could better facilitate demand side participation among distributors
- How the NEM could better facilitate demand side participation among retailers
- Small-scale renewable generation and cogeneration
- National institute for energy efficiency and demand management
- Advanced metering infrastructure
- Summary of options to align the NEM with climate policies.

### **8.1 The NEM objective**

This section examines the usefulness and feasibility of a social objective or an environmental objective in the NEM.

The participants consulted during this study worked for a wide range of social objectives, ranging from a profit motive, to representing low income and disadvantaged households. As a result, any consensus on a social objective for the NEM, even among this small number of participants, is likely to be very general.

This diversity of objectives demonstrates the difficulties inherent in trying to define a social objective, let alone incorporate it into the algorithms that are used to dispatch generators within the NEM. Based on the findings of this assignment, we suggest that social objectives are more appropriate for the political process than for the NEM.

In contrast to the social objective, almost all of the participants spoke in favour of incorporating an environmental objective in the NEM. They saw this as a way to further the NEM's contribution to reducing carbon emissions, and to bring it into alignment with Australia's climate change policies. The participants argued that, because the carbon-based generators had received such favourable treatment under the CPRS, there was a need for a more direct mechanism to incorporate the cost of the externalities on fossil fuel-based generators into the price of the electricity they offered to the market.

One way to achieve this would be to select the generators to dispatch on the basis of bids that combined price and carbon. The selection algorithms would load the price of electricity by an appropriate factor for that generator's carbon output.

## **8.2 Requirements for new generators**

While the NEM was designed to be technology neutral, existing generators have the advantage of not being required to meet all the requirements that new entrants have to meet. This places new entrants at a cost disadvantage relative to the existing generators. To ensure that new generators compete on the same level as existing generators, the electricity rules could be examined to ensure that new generators are not subject to requirements that older generators are not required to comply with. The NEM has been in operation for a sufficiently long period of time for any grandfathered arrangements to be re-examined and removed, should they prove to provide an advantage to the older and more polluting generators at the expense of newer, lower emission generators.

A capacity market was also recommended, which would benefit larger scale demand side initiatives.

## **8.3 Embedded generation**

Information asymmetry disadvantages new generators seeking connections that are near load centres. Network operators control access to information regarding their networks and have the ability and incentive to impede. The move to set up a national transmission planner with access to information for all transmission planning decisions may assist these generators as they try to negotiate access to the transmission network. However, this is unlikely to ensure that generators seeking access to the distribution network have the ability to overcome the information asymmetry. To resolve this problem, a number of participants argued that it may be necessary to require all distribution businesses in the NEM to actively seek opportunities for embedded generation. All required augmentations of the distribution network should then be specified, with embedded generation considered as an alternative to network augmentation. Where embedded generation is shown to be a more efficient alternative to network augmentation, network support payments reflecting the benefits should be made to the embedded generator. Recent changes in the NER, which encourage distributors to actively consider alternatives to network augmentation, may help to address this issue.

It may be preferable to require network operators to explicitly consider the benefits that embedded generation brings to the network in terms of network support and deferral of augmentation. Connection agreements could then be structured so that these benefits are passed on to the embedded generator.

The introduction of nodal pricing may address this failure. The establishment of nodal pricing will reveal the nodes that will benefit from the connection of a generator. Generators that connect to such nodes will be able to obtain higher prices for their energy, compared to generators connected to unconstrained nodes. Distributed and embedded

generators will benefit from the transparency of nodal pricing and networks will not be able to exploit their control over network information. However, nodal pricing will increase the administrative and compliance costs associated with running a wholesale electricity market. Nodal pricing may also increase the level of abuse of market power by allowing regional suppliers to deliberately constrain local networks to get higher nodal prices.

#### **8.4 Remote area generation**

The main issue in addressing free riders and economies of scale is to establish a funding mechanism so that the first mover does not pay for all the network assets required to bring its generation to the market, while later movers pay a significantly lower cost. This is a recurrent issue with clusters of solar, wind or geothermal generators in remote areas. It may be possible to establish rules so that the later movers make a contribution to compensate the first mover. This model has been used for domestic electricity connections in rural areas of Victoria.

To ensure that network economies of scale are achieved, the funding arrangements will need to be sufficiently large to compensate for the financial losses that will be incurred during the initial phases of operation, until the full capacity of the network is in use. The establishment of a sufficiently independent NTP may be able to address this issue. Where it can be shown that proposed network expansion is sub-optimal, that is, where it is smaller than desired to achieve economies of scale, the NTP should be able to operate a fund during the initial phase so that networks do not suffer financial losses. Sufficient capacity can then be built to exploit some economies of scale. However, this idea requires the NTP to carry some of the risk that the additional generation capacity is never built. This risk can be minimised by incorporating sensitivity analysis in the benefits cost test that would underpin any support (much as is required for approval of regulated upgrades of interregional transmission capacity).

As an independent transmission planner, the NTP will be responsible for developing the National Transmission Development Plan (NTNDP). It is expected that the NTNDP will take a long-term perspective to the development of the power system, including the capacity of the transmission network. The NTNDP will be required to have an economic focus by including more forward looking scenarios which are economically efficient, rather than simply being technically feasible, as is currently considered. To be able to add value to the transmission planning process, the NTNDP will need to provide information to the market to guide long-term network investment decisions and provide signals for efficient generation investment. To do this, it will need to be able to quantify the benefits that alternative solutions, including embedded generation, will bring to different parts of the transmission system. This can be achieved by the NTNDP specifying a mathematical function that defines the net market value, or the optimal timing for the construction of a new transmission asset, including embedded generation and demand side participation. The mathematical function can be defined in terms of load, generation, or any of a number of different factors, and would be constructed from technical and economic analysis to

show when the construction of a new asset, or upgrade, could be expected to be economically efficient, or otherwise meet the objectives of the regulatory test. Its parameters would represent the sensitivity of value or optimal timing to variations in the forecast supply/demand conditions. The provision of this function will assist in making the market for transmission services more transparent and facilitate the assessment of non-transmission options by parties other than TNSPs.

## **8.5 Incorporating carbon costs into infrastructure decisions**

Major infrastructure decisions cover generators, transmission and distribution.

While no more coal-fired generators are likely to be built in Australia, gas-fired generators are likely to fill a transitional role until lower carbon forms of producing electricity are available. This means that carbon costs are already being considered by the proponents of new generators.

Expenditure on transmission and distribution infrastructure was seen by participants as a means to pre-empt the use of demand side participation. Therefore, a number of participants felt that an obligation to exploit demand side options should be imposed on transmission and distribution operators.

The issue of information asymmetry was also raised by participants regarding the value of demand side participation. There is a concern that the National Transmission Planning Process, as currently defined, will not provide the level of data required for the spatial planning of demand side participation. Rule 5.6A.2 does not specify the types of information that would be required.

## **8.6 How the NEM could better facilitate demand side participation among distributors**

Greater demand side participation has both energy and network benefits. While originally designed to be a two-sided market, the NEM has developed largely as a supply side market with little or no participation from the demand side. The regulatory arrangements currently in place do not encourage the development of greater demand response. A major failing of the current arrangement for demand side response is the short-term nature of NEMMCO's Reliability Safety Net contracts, which do not allow potential participants sufficient time to recover the cost of changing their production processes to provide demand side capacity. Longer term contracts, perhaps three to five years, may be necessary to provide sufficient certainty to make a serious commitment to providing a sustained demand side response.

The core problem identified by participants for distributors is that their revenue is based on asset values, which in turn is based on providing sufficient capacity to meet peak demand, which only occurs for a few hours each year. Any plan to increase energy efficiency among their customers, or for demand side participation by their customers, runs against their financial interests. The lack of demand side participation compared to pre-NEM arrangements was a recurrent theme raised by the participants, so it appears

that most of the distributors have been able to defend their interests effectively. Proponents of cogeneration reported similar defences by distributors.

The core problems were:

- information asymmetry, with only the distributor knowing the value of the reduction in demand on the network
- arbitrary use of reliability requirements, in order to increase the cost of network connection
- stalling on negotiations for connections.

Information asymmetry has been discussed at a number of points in this report in relation to the connection of large-scale renewables, embedded generation, small scale renewables, and large and small scale demand side participation.

Participants suggested that these problems could be overcome by mandating that demand side response options must be exhausted before spending on additional transmission or distribution assets will be approved. MMA suggests that publication of information regarding the value of capacity by node may provide a way for proponents of embedded and distributed generation to identify the locations where their projects would have the greatest value, and provide them with the leverage they will need to negotiate with the transmission and distribution providers.

### **8.7 How the NEM could better facilitate demand side participation among retailers**

The core problem for retailers is that their revenue is based on the number of units of electricity sold. Therefore, it is not in their interests to take any action that would reduce their income by encouraging energy efficiency or demand management. Participants also identified a conflict of interest among retailers that were aligned with a generator. The generator will want to sell electricity when prices are high, which are likely to be times of peak demand. Therefore, it does not wish to encourage either efficiency, or demand side participation.

Suggested ways to overcome these impediments included encouraging retailers to transform themselves into energy service providers, able to profit from providing services rather than just selling units of electricity. Another way would be to enhance the status of energy service providers so they could compete effectively with retailers.

### **8.8 Small-scale renewable generation and cogeneration**

While the CPRS will be the major policy instrument in response to climate change, rectifying other market failures that impede the entry of low emissions generation into the NEM would enable this target to be met at a lower cost.

Some of the barriers relating to networks may be addressed with the setting up of the NTP within the AEMO.

Even with the implementation of the CPRS, aspects of the NEM which present barriers to entry for low emission generators are likely to persist. Various options can be considered to overcome these market failures. These can be categorised as:

- Feed-in tariffs
- Stand-by charges.

These options are described in the following sections.

### **8.8.1 Feed-in tariffs**

As discussed in the section titled *Factors affecting the connection of medium and large renewable generators* on page 76, small scale renewable and low emission distributed generation technologies have been disadvantaged because the prices paid for their generation did not take into account the value and benefits to the electricity network which arose from their being embedded within the electricity grid. Participants felt that consideration should thus be given to require feed-in tariffs in all Australian states and territories to be set at a premium above general use tariffs to reflect the network benefits.

Even in states which pay a premium for feed-in tariffs, the quantity exported to the grid is based in most cases on net exports, rather than gross generation. This means that only excess energy exported to the grid is able to earn a return. For small systems installed by families that are home during the daytime, it is likely that no net exports are possible. However, benefits to the grid still exist as, in the absence of this source of electricity, extra demand will be placed on the grid. Feed-in tariffs with a premium above general use tariffs based on gross generation will enhance the incentive to install micro-generation facilities. The difficulty is that while it is the electricity retailers that offer feed-in tariffs, the benefits are captured by networks. As a result, it will probably require distribution networks to contribute funds, which they can recoup through the distribution pricing process. This will encourage the take-up of small-scale distributed generation technology.

This option implies that the feed-in tariff should be set at a level equal to the value of the additional benefits brought on. There is a question over whether the current rates for PV generation contained in state-based feed-in tariff schemes are equivalent to the value to society of the distributed PV generation. In principle, the feed-in tariff should be set at a rate equivalent to the value from avoiding purchasing energy in peak pricing periods and avoided network costs.

Even if incentive feed-in tariffs were to be applied, their impact, in terms of reducing total emissions, may not be large.<sup>94</sup> However, it does have a social benefit, because it allows householders to actively invest in renewable generation.

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<sup>94</sup> There are currently around 8.5 million dwellings in Australia. Assuming that half will be able to install PV systems (being separate dwelling with north facing roof space of adequate area to accommodate a PV system), that implies around 6,000 MW potential capacity of roof top PV. At a 17% capacity factor, this implies around 9,000 GWh of energy from this source or around 3% of current total energy consumption.

### 8.8.2 Stand-by charges

Stand-by charges are a major cost for cogeneration proponents and often prove to be a major discouragement to self-generators. While it is acknowledged that some level of stand-by charges is required to compensate the network for the capacity allocated to the cogeneration customer, the current level of charges, based on the maximum level of demand, is unlikely to accurately reflect the use of the network by the customer. Based on a N-1 redundancy level, the self-generating customers are only likely to use the full capacity that the stand-by charges embody if there is a double contingency (that is, when its own generators are not operating and there is a failure by one network component). This is in excess of other customers' level of quality of supply, as they use the network capacity based on a single contingency (that is, when one component of the network fails). MMA's analysis of stand-by charges supports the participants' view that the rules should be examined to reduce the burden that stand-by charges impose on self-generating customers.<sup>95</sup> Using a probabilistic method for determining stand-by charges, as occurs in Victoria, may be one option.

### 8.9 National institute for energy efficiency and demand management

Participants argued that the MCE could help to balance the level of effort being applied to meeting Australia's greenhouse gas objectives by establishing an institute for energy efficiency. They drew comparisons with the recently announced Global Carbon Capture and Storage Institute which has funding of about \$100 million per year, and suggested that the probability of an institute for energy efficiency and demand management successfully contributing to a reduction of greenhouse gases, by avoiding producing them in the first instance, was comparable or better than carbon capture and storage.

### 8.10 Advanced metering infrastructure

Smart meters and advanced metering infrastructure is being mandated in some states, but participants argued that the costs and benefits were not clear, and that the costs were likely to be paid by customers, while the benefits, if any, were likely to be received by the network operators. There is a need to clarify what loads are going to be controlled by smart meters, and who will benefit from their introduction.

### 8.11 Summary of options to align the NEM with climate policies

Table 9 summarises the ideas proposed by the participants in this study that appear to have the greatest potential to help align the NEM with Australia's climate change policies.

On the ultimate aim of reducing the volume of emissions from Australia's generation, transport and use of electricity, the ideas with the greatest potential appear to be:

- the incorporation of a price plus carbon algorithm in the dispatch procedures for generation in the NEM, rather than just price

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<sup>95</sup> McLennan Magasanik Associates. 2008. *NEM market failures and governance barriers for new technologies*. Report to the Garnaut Climate Change Review. Page 35.

- the greater use of distributed generation to overcome transmission and distribution losses
- overcoming the regulatory test and scale issues associated with connecting new, low carbon generators to the grid
- publishing information of the value of capacity by nodal locations.



**Table 9 – Summary of major options preferred by participants**

<b>Issue</b>	<b>Effect of issue</b>	<b>Policy option to correct the issue</b>
NEM objective	<p>Ignores negative externalities of fossil-fuelled generation</p> <p>Fails to fulfil national leadership role</p>	Incorporate emission factor into the generator dispatch algorithm
New generators	Inconsistent technical requirements for ancillary service and control equipment	Review rules to standardise procedures for small scale technologies
Embedded generation	<p>Information asymmetry</p> <p>Lack of recognition of environmental, network and distribution benefits</p>	Published information on opportunities to stimulate activity and increase competitive response to the opportunities
Remote area generation	<p>First mover pays for transmission</p> <p>Sub-optimal transmission capacity built as a result</p>	Funding arrangements to overcome first mover penalty and the free rider benefit for later movers
Incorporating carbon costs into infrastructure decisions	<p>Pre-emptive construction of infrastructure</p> <p>Information asymmetry</p>	<p>Policy to exploit demand side options before additional expenditure on transmission or distribution is approved</p> <p>Published information on the value of capacity at nodal locations</p> <p>Standardised format or template for working out and presenting a value function showing timing so proponents can analyse the value of embedded generation</p>
NEM does not facilitate demand side participation by distributors	Less demand side capacity used than in pre-NEM years	<p>Longer term option for NEMMCO's Reliability Safety Net contracts</p> <p>Modify the regulatory test to ensure demand response options must be used before spending is approved for new distribution infrastructure</p>
NEM does not facilitate demand side participation by retailers	Retailers' revenue is based on volume of sales	<p>Allow retailers to become energy service providers and enhance incentives to reduce sales</p> <p>Break link between generators and retailers</p>
Small scale renewable generation and cogeneration	Lack of facility means that higher cost options are used to meet the CPRS target	<p>Higher feed-in tariffs</p> <p>Revised stand-by charges</p>
Imbalance in level of effort being applied to different options	Bulk of public funds being captured by coal interests	Create a national institute for energy efficiency and demand management

<b>Issue</b>	<b>Effect of issue</b>	<b>Policy option to correct the issue</b>
Advanced metering infrastructure (AMI) is being introduced	What is AMI going to control?	Need decisions about how AMI can be of benefit, and who it can benefit

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## 10 ACKNOWLEDGEMENTS

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- Wayne Lissner of ETSA Utilities
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- Damian Sullivan of the Brotherhood of St Laurence
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- John Youssef of Granite Power and the Australian Geothermal Energy Association
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- Peter Sutherland of Softlaw Community Projects
- Tosh Szatow of Consumer Utilities Advocacy Centre
- Tony Westmore of Australian Council of Social Service
- Michael Zammit of Energy Response.



## APPENDIX 1, BACKGROUND TO THE AEMC'S REVIEW

At the Ministerial Council on Energy (MCE) meeting of 13 June 2008, MCE agreed to direct the Australian Energy Market Commission (AEMC) to conduct a review of the energy market framework to determine whether it requires amendment to accommodate the introduction of the CPRS and RET.<sup>96</sup>

The terms of reference from the MCE to the AEMC were:<sup>97</sup>

Pursuant to section 41 of the NEL and section 79 of the NGL, the MCE directs the AEMC to conduct a review of the current energy market frameworks and to identify any amendments which may be necessary, having regard to the NEL Objective and the NGL Objective, as a consequence of or in conjunction with the implementation of CPRS and RET. In identifying options for addressing issues raised by these implementations, the AEMC shall have regard to the need for actions to be proportionate, as well as to the value of stability and predictability in the energy markets regulatory regime.

The review shall provide detailed advice on implementation of any amendments the AEMC considers are required to the energy market frameworks.

The review is to consider both electricity and gas markets in all states and territories.

In conducting the review, the AEMC should consider, where relevant, current and past reviews and rule-changes. The review should also recognise current and foreshadowed reforms to the gas and electricity markets including the establishment of the Australian Energy Market Operator, revised gas access framework implemented by MCE, the establishment of the Bulletin Board and work on the Short-Term Trading Market.

MCE does not anticipate that this review will result in fundamental revision of market designs or impede the effectiveness of the access regimes under the *Trade Practices Act 1974*, but recognises the prudence and potential value of reviewing the ability of the energy markets to meet the climate change challenge, through efficient and timely investment and appropriate integration of renewable and other technologies.

The AEMC is not to review the design of the CPRS or RET, as these are matters being developed through other government policy processes.

Following the schedule set out in the terms of reference, AEMC prepared a scoping paper called *Review of energy market frameworks in light of climate change policies, Scoping paper* (referred to in this report as the Scoping paper), which summarised new policies and the energy markets and identified the main issues that were relevant to its task. These issues were chosen because the review was to identify where continuing with existing market frameworks might result in behaviour which was not consistent with the market

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<sup>96</sup> Ministerial Council on Energy. No date. *Terms of reference – AEMC review of energy market framework in light of climate change policies*. Source: [http://www.ret.gov.au/Documents/mce/\\_documents/Terms\\_of\\_Reference\\_AEMC20080825163904.pdf](http://www.ret.gov.au/Documents/mce/_documents/Terms_of_Reference_AEMC20080825163904.pdf). Last accessed: 9 April 2009.

<sup>97</sup> Ibid.

objectives of secure, reliable and efficient supplies of electricity and gas, as a result of the introduction of the CPRS and expanded RET.<sup>98</sup> For the NEM, these issues were:

- Issue 1: Convergence of gas and electricity markets
- Issue 2: Generation capacity in the short term
- Issue 3: Investing to meet reliability standards with increased use of renewables
- Issue 4: Operating the system with increased intermittent generation
- Issue 5: Connecting new generators to energy networks
- Issue 6: Augmenting networks and managing congestion
- Issue 7: Retailing
- Issue 8: Financing new energy investment.

On 23 December 2008, the AEMC published the *Review of energy market frameworks in light of climate change policies, 1st interim report* (referred to in this report as the 1<sup>st</sup> interim report).<sup>99</sup>

This was the first of a series of reports that assess whether energy market frameworks are resilient to the changes in behaviour that will result from the implementation of a Carbon Pollution Reduction Scheme (CPRS) and an expanded national Renewable Energy Target (expanded RET). MMA was also engaged by the AEMC to provide quantitative and qualitative advice to the AEMC in its preparation of its 1<sup>st</sup> interim report.

The 1<sup>st</sup> interim report presents the AEMC's analysis of the points in the frameworks on which it intends to focus when developing and assessing options for change.

The AEMC invited submissions on its 1<sup>st</sup> interim report; these were due by 20 February 2009.

The 2<sup>nd</sup> interim report will be published in June 2009 and will present the Commission's analysis of options for change.

The review will conclude with advice to the MCE in September 2009.

The 1<sup>st</sup> interim report used the existing market frameworks as its starting point, incorporating a number of changes that are anticipated, such as the establishment of the Australian Energy Market Operator (AEMO), which includes a role as National Transmission Planner (NTP) for electricity. Other assumptions included the recommendations of the Congestion Management Review (CMR) and the Comprehensive

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<sup>98</sup> AEMC. 2008. *Review of energy market frameworks in light of climate change policies, Scoping paper*. Source: <http://www.aemc.gov.au/pdfs/reviews/Review%20of%20Energy%20Market%20Frameworks%20in%20light%20of%20Climate%20Change%20Policies/Scoping%20Paper.pdf>. Last accessed: 5 March 2009. Page 16.

<sup>99</sup> AEMC. 2008. *Review of energy market frameworks in light of climate change policies, 1st interim report*. Source: <http://www.aemc.gov.au/pdfs/reviews/Review%20of%20Energy%20Market%20Frameworks%20in%20light%20of%20Climate%20Change%20Policies/First%20Interim%20Report.pdf>. Last accessed: 23 March 2009.

Reliability Review (CRR), including the proposed increase in the market cap price to \$12,500 per MWh.<sup>100</sup>

The 1<sup>st</sup> interim report stated the desired outcomes for the energy markets, as follows:<sup>101</sup>

*“There are a number of different facets to how we want energy markets to operate, which the frameworks should promote:*

- **Reliability:** *to deliver investment in different forms of new generation capacity at the right time and location, and at efficient cost. This requires efficient trade-offs between building new generation capacity, and avoiding the need for new capacity by reducing peak demand.*
- **System operation:** *to allow networks to be operated safely and securely keeping voltage and frequency within the desired tolerances. Where system operators intervene in markets, those interventions should be transparent, effective and not to distort the market.*
- **Networks:** *to support the market by providing incentives that promote investments to connect new network users and to handle changing patterns of network use that are planned effectively and delivered at efficient cost. The frameworks should also appropriately allocate the costs and risks associated with network investment.*
- **Retailing:** *to promote effective competition between retailers, and to protect consumers in respect of the prices they pay through regulation where effective competition is not present. Where necessary, regulation should be flexible and not stifle competition.”*

The review’s preliminary conclusions with respect to the NEM were as follows:<sup>102</sup>

*“For the CPRS, we have reached the following preliminary conclusions:*

- **Wholesale markets and investment:**

*The arrangements governing how wholesale electricity and gas are traded appear capable, without fundamental change, of promoting efficient, reliable and secure energy supplies in the context of the CPRS. ... the NEM ... provide(s) detailed signals as to the required size, location and form of new generation capacity. The CPRS does not obviously detract from this.*

*A key element in the NEM is the role of financial contracts, and in particular contracts which insure against high price events (“caps”), in signalling the need for new capacity. As long as regulation does not stifle the ability of this process to work, e.g. by setting the maximum market price too low, then the frameworks appear robust. ...*

- **Short-term management of reliability:**

*There is a tight generation capacity margin in some NEM regions in the period to 2010-15, and there are risks of some capacity being retired. In part this probably reflects the timing of*

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<sup>100</sup> Ibid. Pages iii-iv.

<sup>101</sup> Ibid. Page iv.

<sup>102</sup> Ibid. Pages v-vi.

*investment being affected by policy uncertainty about the CPRS. In this regard, there is a potential for more expansive intervention by the system operator in the short term.*

*The NEM framework has a number of settings and mechanisms to assist the management of reliability in the short, medium and long term. These have recently been reviewed by the AEMC Reliability Panel, and a number of modifications have been made or are being progressed (for example, the level of Value of Lost Load (VoLL)).*

*However, we consider that the existing framework may need to be modified further to manage more effectively the unlikely but credible contingency of an actual or anticipated large reserve shortfall in a region. It might be appropriate for additional mechanisms to be temporary. ...*

• **Retailing:**

*There are, however, significant risks associated with the elements of the regime for energy retail regulation. These risks are pre-existing, but are likely to materialize and increase as a result of implementing the CPRS. The CPRS introduces a new, and potentially uncertain, cost into the supply chain for wholesale electricity. In addition, higher wholesale costs also mean higher prudential costs for retailers.*

*We do not consider that the current retail price regulation arrangements are sufficiently flexible to be able to cope with these potentially large and rapid changes in retailer costs. We also consider that the regulatory contingency plans for handling the financial failure of a retailer (the "Retailer of Last Resort" (RoLR) arrangements) are not adequate.*

*While there are a number of processes underway to investigate potential changes to address these issues, we consider that there is a risk if these reforms are not progressed and implemented in line with the introduction of the CPRS and expanded RET.*

**Resilience of existing frameworks to the expanded RET**

• **Transmission investment for new connections:**

*The expanded RET will stimulate investment in renewables. This is likely to be in the form of wind generation capacity in the medium term. The new forms of generation are likely to be clustered in certain geographic areas that are remote from consumers and the existing transmission network. We consider that the existing model of bilateral negotiation for new connections will not cope efficiently with multiple connection applications to the same area nor will it be likely to manage efficiently the large expected volume of new connection applications. It is likely that this may result in unnecessary costs and delays.*

• **Managing network congestion:**

*Under some scenarios, the expanded RET stimulates increased network congestion within and between regions. This is particularly due to the new and different generation mix (i.e. renewables and their location decisions). Whilst there is some evidence, we are of the view that further work is required to establish the potential materiality of future network congestion resulting from the expanded RET. We consider, however, it is prudent to*

*continue examining whether the current signals for “self-management” of network congestion are clear enough and strong enough in such an environment. This is a particularly pressing issue in Western Australia, including in relation to the consequential actions required by or on behalf of the system operator.”*

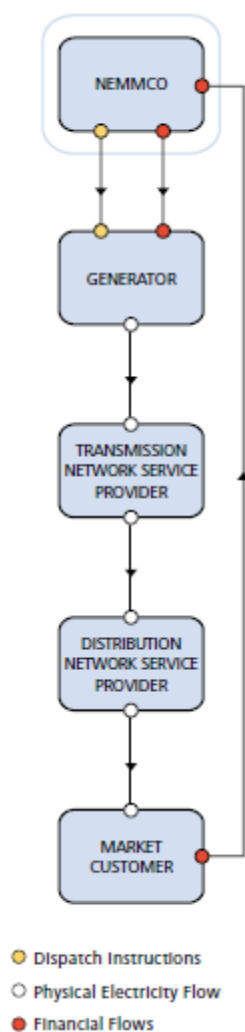
## **APPENDIX 2, A BRIEF DESCRIPTION OF THE NEM AND RELATED ORGANISATIONS**

The NEM is a market which supplies wholesale electricity to retailers and end-users between Port Douglas in far north Queensland to Port Lincoln in South Australia and to Tasmania.

The electricity is provided by generators, and distributed via procedures managed by NEMMCO according to the National Electricity Law and Rules. The NEM matches supply to demand and manages the financial transactions. As the balance between supply and demand changes, the price of electricity changes. Figure 6 shows the linkages between the generators and the end customers. NEMMCO is responsible for maintaining the security of the electricity supply, its reliability, and ensuring that there are sufficient reserves, for example, to meet periods of extreme demand. If demand exceeds supply in a region, NEMMCO can instruct network service providers to shed load by disconnecting some customers. NEMMCO's electricity market operations and planning functions, along with the functions of VENCORP, REMCO, the Gas Market Company, the Gas Market Operator, and Electricity Supply Industry Planning Council of South Australia (ESIPC), will all be taken over by the AEMO on 1 July 2009.<sup>103</sup>

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<sup>103</sup> NEMMCO. 2008. *About AEMO*. Source: <http://www.nemmco.com.au/corpinfo/aemo.html>, Last accessed 13 February 2009.

Figure 6 – Linkages between generators and end customers<sup>104</sup>

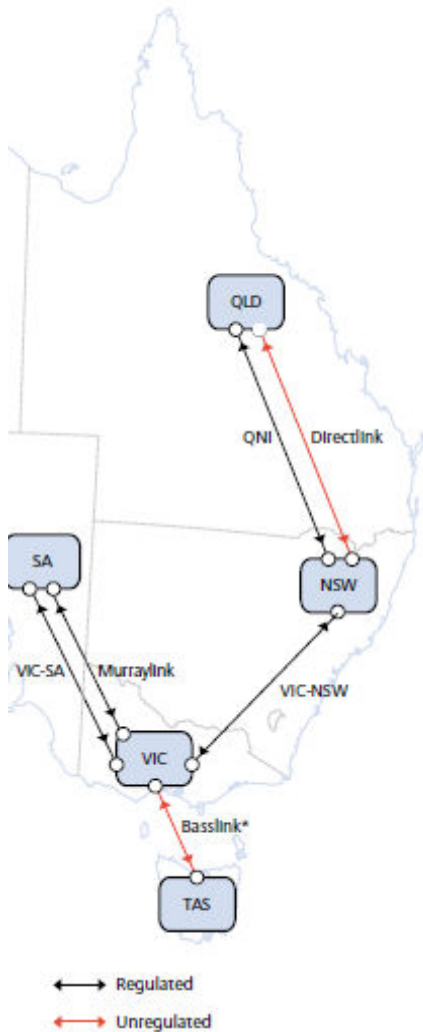
One option to balance supply and demand is voluntary demand reduction, where customers choose to reduce their consumption in response to conditions, such as high prices.

Another option is load shifting, where a customer moves their consumption from a time of high prices to a time of low prices.

<sup>104</sup> NEMMCO. 2008. *An introduction to Australia's National Electricity Market*. Source: <http://www.nemmco.com.au/about/000-0286.pdf>. Last accessed: 9 April 2009. Page 7.

The interconnected network over which the NEM operates is shown in Figure 7. Note that Directlink is now regulated and should be shown in black.

**Figure 7 - Interconnected network of the NEM<sup>105</sup>**



The main participants in the NEM are called:

- market generators, who may be scheduled or non-scheduled
- market network service providers
- market customers, who are retailers or very large end customers.

Other types of participants are:

- transmission network service providers (TNSP) (high voltage)
- distribution network service providers (DNSP) (between the transmission network and customers)
- specialist participants

<sup>105</sup> Ibid. Page 17.



- traders.

Most of the generators are coal, gas or hydro powered, and some are wind powered.

NEMMCO's charter focuses on efficiency, security and reliability of supply and does not allow it to favour one fuel source over another. NEMMCO does not have a mandate to make decisions based on sustainability or balance in resource management.

According to NEMMCO, the various state regulators ensure that environmental impact assessments are conducted as part of any power industry planning initiatives.<sup>106</sup> However, this statement has been questioned in the context of greenhouse emissions.

AEMC is responsible for rule making and market development for the NEM. The rule making role only involves correcting minor errors or changes that are not substantial. For market development, AEMC conducts reviews as directed by the MCE, or on its own initiative.

The Australian Energy Regulator (AER) is responsible for monitoring and enforcement of compliance with the rules, and economic regulation of electricity transmission.

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<sup>106</sup> Op. cit. Page 29.

## APPENDIX 3, DISCUSSION GUIDE

### Discussion guide for TEC's study on the NEM and climate change

Filename: J1731 TEC discussion guide for interviews with stakeholders v8

Last modified: 10 March 2009

Organisation	
Physical address and any special directions for finding the site	
Time and date of interview	
Name of interviewee	
Interviewee's role in the organisation	
Telephone	
Mobile telephone	
Email	
Scheduled by	
Interviewer	

#### Notes for codes:

#### Notes for interviewers

Participants are likely to ask about TEC's activities while they provide their answers.

The aim of this assignment is to identify specific points at which the National Electricity Market (NEM) may be dampening or obstructing the efficient implementation of climate change policies.

For any other questions, please ask them to contact:

Jane Castle

Senior Campaigner

Total Environment Centre

Level 4, 78 Liverpool St, Sydney

PO Box A176, Sydney South, 1235

Ph: 02 9261 3437

M: 0432 287 554

[jane.castle@tec.org.au](mailto:jane.castle@tec.org.au)

## Introduction

I1. My name is \_\_\_\_\_, and I work for a company called MMA. We are currently working for the Total Environment Centre, which is based in Sydney. The Total Environment Centre is a not-for-profit environment group that has been advocating on issues around the National Electricity Market for over four years. TEC has asked us to prepare a report on specific points at which the NEM may be dampening or obstructing the implementation of climate change policies. You may have received an email about this from MMA, Jane Castle or Glyn Mather of TEC some time in the last few weeks or so.

In studies of this kind, some participants are happy to have their organisation's answers identified in the report, and others prefer for their data to be de-identified and merged into the general analysis. Do you have a preference for one approach or the other? You can let me know your answer at the end of the interview if you prefer. We can also provide the option of you reviewing your quotes before they are used in the final report to ensure you are happy with them. Whatever you choose in relation to the report, your answers will otherwise remain confidential within MMA and TEC. *[if anyone asks for a confidentiality agreement to be signed we do this routinely and are comfortable with it.]*

Ok to be identified	
Ok to be identified but want to check final quotes	
Data not to be identified	

I2. Now, can I start by confirming the **details** about your organisation?

*[Check organisation name and the person's title or role in the organisation]*

## Climate change policies

Q1. From your organisation's perspective, do you see any high-level contradictions between the way in which the NEM is **organised** and the climate change policies of the **federal** government? *[Prompt if necessary with CPRS and MRET. Then prompt about other climate change policies – there are many. Also prompt about Green Power]*

Q2. What about contradictions between the way in which the NEM is **organised** and the climate change policies of your **state / territory** government? *[Prompt if necessary with Feed-in Tariffs, smart meters, Energy Efficiency Targets (Vic, SA, NSW) etc. Then prompt about other climate change policies – there are many.]*

Q3. What about the way in which the NEM is structured, regulated and **operated**, rather than the way in which it is organised. Does your organisation see any contradictions between these and climate change policies?

Q4. If there are contradictions, how do these impact on the **long-term interests** of consumers and the broader community?

**Terms of reference**

T1. Does your organisation have a view about the **terms of reference** provided by the Ministerial Council on Energy to the Australian Energy Market Commission for the Commission's review of energy markets and climate change policies? *[Probe]*

T2. Do you have any comments on the way in which AEMC has **interpreted** those terms of reference?

T3. Are there areas within the Ministerial Council on Energy's **mandate** that it could use to facilitate better interaction between the NEM and the government's climate change policies? *[Probe for specific topics and how they could be applied –[for example, you could mention the NEL Objective and its interpretation]*

T4. What kind of a **role** do you think the **MCE** should play in relation to the governments' climate change policies?

**Generation issues**

G1. In the next section, I'd like to ask you about issues related to the generation of electricity, then move on to distribution and then demand management and energy efficiency.

G2. Does the operation of the NEM create barriers to the connection of medium and **large-scale** renewable generators? *[Probe for reasons for answers and specific examples]*

G3. Does the operation of the NEM create barriers to the connection of **small-scale** renewable generators, such as households installing solar cells? *[Probe for reasons for answers and specific examples]*

G4. Thinking now about **cogeneration**, which produces both heat and electricity, or **tri-generation**, which produces heat, electricity and cooling ... Does the way the NEM is regulated create barriers to these forms of generation? *[Probe for reasons for answers and specific examples]*

**Distribution network service provider issues**

D1. Does the NEM encourage consumption by its customers?

D2. If yes. In what way does the NEM encourage consumption among its consumers? *[Probe for reasons for answer and specific examples]*

**Demand management and energy efficiency issues**

DMEE1. Are there any specific **barriers** to the greater use of demand management or energy efficiency options in the structure of the NEM? *[Probe for specific examples]*

DMEE2. Does the way in which the NEM operates **dampen the price signals** that would otherwise encourage greater demand management response or energy efficiency among customers?

DMEE3. What kind of impacts does this have on consumers?

### Overall

O1. Considering all of the issues that we have touched on today, do you think that the design and operation of the NEM is affecting the **costs** involved in the implementation of Australia's **climate change policies**? *[Probe reasons]*

O2. Has your organisation looked at what these **costs might be**?

O3. **If yes**, ask about the total **magnitude** of the costs, which customer segments will bear the costs, the quantum per sector, or the quantum per person or organisation in the sector

O4. Do you have any **suggestions** about how the interaction between the NEM and the climate change policies could be improved? For example, do you have ideas on how the structure, regulation and **operation of the NEM** could be modified to provide incentives to reduce greenhouse emissions?

O5. Could the structure, regulation and **operation** of the NEM be modified to facilitate the way carbon costs are used to guide decisions about what **infrastructure** will be built? *[Probe for specific examples].*

O6. Could the NEM regulations be modified for facilitate investment in **cogeneration and tri-generation**? *[If yes, probe for specific examples]*

### Close

C1. Are there any **other topics** that you would like to raise in the context of the NEM and climate change policies?

C2. And finally, has your organisation prepared any **papers or submissions** on these topics that we could refer to? *[If available, ask for copies. Confirm status, for example, work in progress, publicly released document, internal document, etc, and whether it can be cited]*

C2. Review whether their organisation is to be named or not in the report, either generally or specifically

Thank and close

## **APPENDIX 4, NATIONAL GRID MANAGEMENT PROTOCOL OBJECTIVES**

### **Objectives of the National Grid Protocol**

The Draft National Grid Protocol has been developed as the means by which the National Grid Management Council (NGMC) will satisfy the following objectives:

- To encourage the most efficient, economical and **environmentally sound** development of the electricity industry consistent with key National and State policies and objectives;
- To develop a generation market which is initially between Grid Owners/Grid Operators and Generators. New private capacity will increase competition in the market. The development of arrangements between customers and generators will be in place by July 1993;
- To provide a framework for long-term least cost solutions to meet future power supply demands including appropriate use of the demand management;
- To ensure that benefits and costs of interconnection extensions are properly identified and accounted for;
- To maintain and develop the technical, economic and **environmental performances** and/or utilisation of the power system;
- To enable private generation and publicly owned generation to compete on equal terms;
- To recognise commitments and reasonable expectations implicit in existing contractual arrangements, such as the Interconnection Operating Agreement, and ensure that parties to those arrangements are treated fairly. (our emphasis)

## APPENDIX 5, ENVIRONMENTAL AND SOCIAL PROVISIONS IN NON-FEDERAL LEGISLATION

This appendix contains excerpts from state and territory legislation that deal with environmental and social objectives.

### Australian Capital Territory

Independent Competition and Regulatory Commission Act 1997

In force at December 2008

#### 7 Objectives

The commission has the following objectives in relation to regulated industries, access regimes, competitive neutrality complaints and government-regulated activity:

(b) to facilitate an appropriate balance between efficiency and environmental and social considerations;

#### 20 Directions about prices

(2) In making a decision under subsection (1), the commission must have regard to—

- (f) the principles of ecologically sustainable development mentioned in subsection (5);
- (g) the social impacts of the decision; and
- (h) considerations of demand management and least cost planning;

(5) For subsection (2) (f), *ecologically sustainable development* (sic) requires the effective integration of economic and environmental considerations in decision-making processes through the implementation of the following principles:

(a) the precautionary principle—that if there is a threat of serious or irreversible environmental damage, a lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;

(b) the inter-generational equity principle—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;

(c) conservation of biological diversity and ecological integrity;

(d) improved valuation and pricing of environmental resources.

## **New South Wales**

Independent Pricing And Regulatory Tribunal Act 1992

In force at 1 January 2009

14A Setting of methodology for fixing prices

(2) In making such a determination, the Tribunal may have regard to such matters as it considers appropriate, including, for example, the following:

(g) the need to maintain ecologically sustainable development ... by appropriate pricing policies that take account of all feasible options available to protect the environment,

(i) considerations of demand management (including levels of demand) and least cost planning.

15 Matters to be considered by Tribunal under this Act

(j) considerations of demand management (including levels of demand) and least cost planning,

(k) the social impact of the determinations and recommendations.

## **Queensland**

Queensland Competition Authority Act 1997

In force at 23 February 2009

26 Matters to be considered by authority for investigation

(1) In conducting an investigation under this division, the authority must have regard to the following matters-

(h) considerations of demand management;

(i) social welfare and equity considerations including community service obligations, the availability of goods and services to consumers and the social impact of pricing practices;

(k) legislation and government policies relating to ecologically sustainable development;

(m) economic and regional development issues, including employment and investment growth;



## Victoria

Essential Services Commission Act 2001

In force at 1 January 2009

8A. Matters which the Commission must have regard to

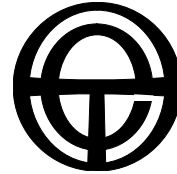
(1) In seeking to achieve the objective specified in section 8, the Commission must have regard to the following matters to the extent that they are relevant in any particular case-

- (d) the relevant health, safety, environmental and social legislation applying to the industry;
- (e) the benefits and costs of regulation (including externalities and the gains from competition and efficiency) for-
  - (i) consumers and users of products or services (including low income and vulnerable consumers).

## ATTACHMENT B

### **TOTAL ENVIRONMENT CENTRE INC.**

LEVEL 4, 78 LIVERPOOL STREET, SYDNEY, NSW 2000  
PO BOX A176, SYDNEY SOUTH 1235  
Ph: 02 9261 3437 Fax: 02 9261 3990  
www.tec.org.au



20 October 2008

John Tamblyn  
Australian Energy Market Commission  
submissions@aemc.gov.au

Dear Mr Tamblyn,

Re: Reliability and Emergency Reserve Trader

Total Environment Centre (TEC) is concerned about the current design of the Reliability and Emergency Reserve Trader (RERT) and the associated guidelines. There has been a massive oversight and hence a missed opportunity to establish a standing reserve based on demand side response (DSR). This concept was raised by NERA during the AEMC's Demand Side Participation Review and was considered directly in relation to the RERT, but was inappropriately rejected. It may not be possible to revisit the idea at this stage of the RERT Review, but should be considered within the AEMC's other reviews of Demand Side Participation and the Climate Change Review.

The NERA report<sup>1</sup> did argue against a DSR standing reserve, but recommended a staged approach, which would include annual invitations to provide reserve capacity. They suggested that where necessary these providers could be invited to quote for provision of reserve; then capacity would be contracted on the basis of the quotes. Even this mild recommendation seems to have been rejected by the AEMC.

TEC supported NERA's recommendations in our submission on that report, but we are still not convinced that the concept of a DSR standing reserve has no value. We suggest that both approaches should be followed, that is, the staged approach be adopted as an interim but that the AEMC, together with NEMMCO, continue to investigate the potential for a DSR standing reserve. The investigation should focus on the potential of demand side reserve to contribute to reliability and efficiency while following the principle of optimising demand side participation. This needs to be done in tandem with any investigation of the potential for DM bidding within the wholesale market.

#### **Other models**

Other markets have set up reserve trader programs of various kinds, fashioned around the provision of load curtailment by participants registered for the purpose in some permanent fashion within the market. The examples of Texas and California – although there are a number to choose from – are briefly described here.

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<sup>1</sup> NERA (2008) *Review of the role of demand side participation in the National Electricity Market, Draft Report for the AEMC*

### *Texas*

The Electric Reliability Council of Texas (ERCOT), which is also an energy only market similar to the NEM, has realised the value of the demand side and implemented programs to encourage DSR from various sources.<sup>2</sup> The NEM could include any combination of these ERCOT mechanisms within a permanent program as an adjunct to the Reserve Trader.

Of particular interest here is the Load acting as a Resource (LaaR) program, which is used within the ancillary services (AS) markets. It involves signing up customers with interruptible loads to provide operating reserves. Any provider of operating reserves under this program is eligible for a capacity payment, regardless of whether the curtailment occurs. Up to 1,300 MW can be called on through this program.

Another feature of the Texas programs, which is called on after the LaaRs have been exhausted, is the Emergency Interruptible Load Service (EILS). Its main features are:

- Contracts are made with network businesses in this case, who put in bids for contracts; the minimum is for one MW that can be via aggregation
- The contracts may be made for one or more quarterly contract periods, and more than this can be renegotiated
- There is a cost cap on the EILS program
- Each quarterly contract period is capped at 1,000MW
- The contracted "resource" must be able to reduce its load within 10 minutes
- Each resource is only to be called on twice in a contract period
- Each contractor is paid a capacity payment.

### *California*

The "Base Interruptible Program" (BIP) involves participants nominating a base level of electricity necessary to maintain operations that is below their historic average maximum demand. They then receive a monthly payment based on the size of the curtailable portion of their load, in return for committing to reduce to the base level when called upon. Curtailment requests cannot exceed one per day (of up to four hours), ten per month, or a fixed number of hours per year.

The "Demand Bidding Program" provides incentive payments of a fixed rate beyond market price for day-ahead curtailment commitments. When notified of such an event, participants can bid the amount of load they can reduce, and the hours for which they are willing to reduce this load. Bids must cover at least two consecutive hours.

Another feature is the "Demand Reserves Partnership Program". Participants in the program agree to reduce their electricity load (by curtailment or by operating on-site generation) when notified. This program, like BIP, also has time limits. Participants receive a monthly reservation payment as well as a performance payment for each load curtailment event. Individual customers usually participate via a designated "Demand Reserves Provider."

### **Load curtailment in the NEM**

The current version of a reserve trader within the NEM is rarely used and overly cumbersome, providing limited potential for rapid response (or reduction of greenhouse

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<sup>2</sup> Texas ERCOT PUC Substantive Rule #25.507 (EILS)

gas emissions). Replacing the same mechanism with a permanent program that awards contracts for demand side reserve capacity could be made to work within the NEM model. It would provide a range of functions: to provide reserve; enhance security and reliability; and deliver significant co-benefits of reduced carbon pollution and carbon costs.

The particular problem for demand side response is that the participant offering the load curtailment does not know in advance what the actual price paid will be at the end of the trading interval, and therefore participants cannot be confident of the value they will get for their curtailment. If there is a monetary incentive, in the form of payment to be in reserve plus a bonus when the reserve is activated, there is greater certainty for potential participants. This certainty is likely to unlock some of the demand side potential that is widely recognised to be untapped at present.

There is currently a very small amount of load curtailment in operation in the NEM, some of which is negotiated via retailer or networks. Prices paid for the curtailed load are based on a retailer's avoided cost, usually when the spot price exceeds the trigger price in a hedge contract, or on the value of network deferral. These are chronically under-utilised and there are virtually no other incentives to seek DSR as an alternative.

For end users, the main disincentive for load curtailment is that they do not get proper remuneration. Presently the end user merely avoids consumption at the market price when they curtail their load.

For the networks, deferral of new investments is disincentivised as it reduces the asset bases from which they can earn revenue. The only active incentives are those being developed under the AER's demand management incentive schemes. The schemes under way do offer some minor incentives – consideration of foregone revenue, “learning by doing” funds and so on – but TEC has argued that these need to go much further to have any real impact.

We therefore strongly urge the AEMC to investigate the potential for load curtailment programs within the NEM in the form of permanent programs to provide standing reserve. There are models in existence which provide the basis for a design for the NEM, possibly using a staged approach to be established in the interim. Development of load curtailment programs is a way in which the NEM could provide the sorely needed boost to DSR as well as a significant contribution to reducing carbon costs and greenhouse emissions.

Yours faithfully,



Jeff Angel  
Executive Director