

12 December 2011

Ms Jillian Broadbent AO  
Chairperson  
Clean Energy Finance Corporation Expert Review Panel

*By email: [cefc@treasury.gov.au](mailto:cefc@treasury.gov.au)*

Level 22  
530 Collins Street  
Melbourne VIC 3000

**Postal Address:**  
GPO Box 2008  
Melbourne VIC 3001

T 1300 858724  
F 03 9609 8080

Dear Ms Broadbent

### **Clean Energy Finance Corporation (CEFC) Expert Review Panel**

Thank you for the opportunity to submit to the request for submissions to the CEFC Expert Review Panel.

The Australian Energy Market Operator (AEMO) operates the National Electricity Market (NEM), the Victorian Declared Wholesale Gas Market (DWGM) in Victoria and the Short Term Trading Markets (STTM) for gas at hubs in Adelaide, Sydney and Brisbane. AEMO is also responsible for the procurement and planning of the shared network and connections of electricity transmission in Victoria and has a range of national planning functions for electricity and gas transmission.

AEMO does not participate nor invest in any market itself, but its role in supporting Australian Energy markets in a technology-neutral manner provides it a wide perspective that we hope is useful to your review.

In the attached submission we have described relevant features of the competitive energy markets. We feel it is important to understand their design to avoid the CEFC investment mandate unintentionally distorting efficient market outcomes. We also outline a range of publications and work we have or are undertaking which may be useful to the CEFC.

If you would like to further discuss any matters raised in this submission, please contact Ben Skinner 03 9609 8769.

Yours sincerely

David Swift

**Executive General Manager, Corporate Development**

cc:

Attachments: AEMO submission

# AEMO Submission to Clean Energy Finance Corporation (CEFC) Expert Review Panel

## 1. Role of AEMO

AEMO is an independent, member based organisation (60 per cent government, 40 per cent industry) working in the long-term interests of Australian consumers by ensuring that energy markets operate to balance issues of price, quality, safety, reliability and security of energy supply.

AEMO also delivers an array of gas and electricity market operational and planning functions. It operates in eastern and south-eastern Australia, but not in Western Australia or the Northern Territory.

AEMO does not invest or participate in the markets, but its responsibilities include:

- Day to day management of wholesale and retail energy market operations and emergency management protocols.
- Ongoing market development required to incorporate new rules, infrastructure and participants.
- Long term market planning through demand forecasting data and scenario analysis.

### Markets<sup>1</sup>

AEMO operates the retail and wholesale energy markets of eastern and south eastern Australia, including:

- National Electricity Market (NEM)
- Victorian Declared Wholesale Gas Market (DWGM)
- Short Term Trading Market (STTM) – wholesale gas in NSW, SA and Qld

Each of these markets operates under its own set of rules and involves different sets of participants.

### Operations

AEMO oversees the vital system operations and security of the NEM and the Victorian gas transmission network. Market operation includes a range of functions from systems operation, maintenance of system security, metering and settlements through to market performance reporting, incident analysis and emergency management. Those operations cover:

- Power system operator (Queensland, NSW, ACT, Victoria, SA and Tasmania)
- National gas bulletin board (Publishes current information on supply, demand and capacity across the interconnected gas transmission pipelines: Covers Qld, NSW and the ACT, SA, Victoria and Tasmania)
- Victorian designated transmission system (gas) operator
- Emergency management (electricity and gas)

---

<sup>1</sup> Introductions to these markets can be found at <http://www.aemo.com.au/corporate/publications.html>

It is important to note that AEMO's role as the operator of the Victorian gas transmission arrangements is unique and does not apply in other jurisdictions.

### Planning

In its role as the National Transmission Planner, AEMO delivers strategic gas and electricity planning advice and forecasting to guide long term investment in Australia's energy network infrastructure and resource management. This includes independent modelling of possible future scenarios and advice on how our markets might develop under those scenarios. AEMO provides advice on how generation and transmission might develop to meet forecast energy requirements.

AEMO also provides detailed energy forecasts for the scenarios, taking into account improvements in energy efficiency, the development of new technologies and better ability to control peak loads. This information is delivered annually through a suite of interrelated documents<sup>2</sup>:

National Transmission Network Development Plan (NTNDP)	<ul style="list-style-type: none"> <li>- A strategic plan and comprehensive information source for the NEM transmission network</li> <li>- Explores a range of scenarios to determine potential future electricity transmission impacts</li> </ul>
Electricity Statement of Opportunities (ESOO)	<ul style="list-style-type: none"> <li>- Provides information about demand forecasts, generation capacities, and NEM supply adequacy for the following 10 years.</li> <li>- Supported by the annual Power System Adequacy report which considers security matters in the following 2 years and the Generator Information Page providing ongoing information on existing, committed and future projects.</li> </ul>
Gas Statement of Opportunities (GSOO)	<ul style="list-style-type: none"> <li>- Examines the interconnected Australian gas transmission network, consolidating demand and reserve forecasts and opportunities</li> <li>- Explores a range of scenarios to determine potential future impacts on gas reserves, processing and storage, transmission pipelines and customer demand</li> </ul>
South Australian Supply and Demand Outlook (SASDO)	<ul style="list-style-type: none"> <li>- Presents information on the current and future state of the SA electricity market, including demand forecasts, supply capability and fuel supply as well as analyses of historical trends and the behaviour of wind generation.</li> </ul>
Victorian Annual Planning Report (VAPR)	<ul style="list-style-type: none"> <li>- Provides forecasts for energy demand and supply in Victoria and identifies future development needs for both the electricity shared transmission network and the Victorian Declared Transmission System</li> </ul>

These documents perform an important market disclosure process for intending commercial investors. In turn, they rely upon quality input information, much of which is derived from those investors. There are challenges in obtaining high quality information, especially

<sup>2</sup> These can all be found at: [www.aemo.com.au](http://www.aemo.com.au)

regarding new supply. AEMO suggests there would be value in CEFC supported generation projects being divulged and transparently published to ensure the market is informed.

As part of its Clean Energy Future policy, the government announced that:

“The Government will ask AEMO to expand its planning scenarios to prepare for greater use of renewable energy. This will include further consideration of energy market and transmission planning implications of moving towards 100 per cent renewable energy.”

This study, when completed, may be of interest to the CEFC in its work.

### AEMO’s role in the Victorian Electricity Transmission Network

In NSW, Queensland and Tasmania, the local Transmission Network Service Provider (TNSP) plans (with reference to AEMO’s NTNDP), constructs and operates (in conjunction with AEMO operations) the transmission systems and arranges connections to it. These TNSPs are government owned, for-profit monopolies, regulated by the Australian Energy Regulator (AER).

In South Australia the arrangement is similar, but the TNSP is privately owned and AEMO provides a level of independent oversight and review.

In Victoria, AEMO is the electricity transmission network planner and procurer and arranges network connections. Most existing network assets are physically owned by the regulated for-profit SPAusNet under a Use of System Agreement with AEMO. Where AEMO determines a Victorian augmentation to be justified and contestable, AEMO is able to put the project construction and on-going management out to competitive tender.

As part of this role, AEMO arranges transmission network connection projects in Victoria, which gives it detailed experience in the challenges of connecting new generation technologies to the grid.

## **2. High-level design of the NEM**

At its core, the NEM is a gross, energy-only, technology-neutral electricity market. There are five pricing regions and 6 interconnectors. One half hourly regional price is paid by all customers and paid to all suppliers, set by the marginal bid or offer.

As electricity is difficult to store and demand is highly weather-dependent and inelastic, the price can be extremely volatile. During high demand prices will often “spike” to the price cap of \$12,500 per MWh from their typical levels of \$20-\$50 per MWh. Occasional extreme prices reflect the high value placed on continuous supply by customers, and provides a return for investment in generation that reliably presents to market at time of peak.

Generators and retailers manage price volatility with hedging contracts<sup>3</sup> or vertical integration. Whilst actual revenues net of contracts are therefore less volatile, the underlying physical incentives around investment and maintaining reliability during peak time remain.

All technologies receive the same half-hourly price. AEMO may not consider environmental externalities, however incentives outside the NEM are available, including:

- the Large-Scale Renewable Energy Target (RET), which sets a minimum quota of large-scale renewable electricity, by way of certificates produced by renewable generators and surrendered to the Commonwealth by retailers.

---

<sup>3</sup> AEMO has no direct role in contracting markets.

- the Clean Energy Futures legislation, which will require fossil-fuelled generators to surrender emissions certificates sold by the Commonwealth.
- the Queensland Gas Electricity Certificate scheme, which sets a quota of Queensland gas-fired generation.

Contracting and vertical integration can also be used to manage financial risk arising from these schemes.

### Intermittent Generation

One of the most likely renewable generation sources at current costs is wind generation. There has been ongoing investment by a range of participants in wind generation and in identifying and developing potential future wind generation projects. A key challenge of wind and a number of emerging renewable generation sources like wave, tidal and solar generation technologies is its intermittency of production unless some form of energy storage is employed.

AEMO is presently studying the impacts of the expected continued growth of intermittent generation on the security of the NEM<sup>4</sup>. Whilst it creates technical challenges, AEMO feels the NEM design is well placed to deal with them. This includes some existing beneficial features, such as:

- Five-minute security constrained dispatch and pricing.
- The Australian Wind Energy Forecasting System (AWEFS) which is forecasting variations in output and thereby assisting non-intermittent plant to predict dispatch. It is intended to expand this system to also forecast large solar plants.
- The semi-scheduled generator provisions in the National Electricity Rules (NER) that requires wind generators to respond to AEMO dispatch signals to reduce output when network security is threatened.

South Australia demonstrates the success of the NEM in integrating wind generation given that it has one of the world's highest wind penetrations. Wind generation there contributes just over 20% of total supply on average and up to 80% on occasion. While wind generation in South Australia is being well managed operationally by the market, the market prices obtained reflect the high concentration of wind generation which is not correlated to demand. Other things being equal, investment in wind generation in regions with lower existing penetration is expected to become relatively more attractive in the future.

AEMO suggests that the market design is generally driving efficient outcomes and the CEFC mandate should take care to minimise any distortions. This is important in the case of wind generation which has enjoyed considerable new investment over recent years which we expect to see continue.

### **3. Electricity networks connection and who pays**

The electricity transmission and distribution networks in the NEM are “open access”, meaning that the owner, and AEMO, must offer access to any generator or customer who meets the technical requirements laid out in the Rules. As natural monopolies, the revenue they may recover is regulated by the AER.

---

<sup>4</sup> See recently published reports on integrating intermittent generation at [http://www.aemo.com.au/planning/wind\\_integration\\_investigation.html](http://www.aemo.com.au/planning/wind_integration_investigation.html)

The majority of network is described as “shared”, implying that a single user of those assets cannot be identified. For those assets, costs are recovered from customers. Augmentation of these shared assets must be justifiable by a cost/benefit analysis or reliability assessment<sup>5</sup>. Once a regulated network investment is justified, the investment is low risk, and there appears to be no shortage of capital available for such investment.

Assets only used by one party, e.g. a line extending from a substation to a single windfarm are described as “connection” assets. They are arranged for and funded by the connecting party. Where a new generator is located a distance from the existing shared network, then it will face a significant connection cost. At a high level, this is a desirable allocation of costs, as it causes the additional network cost to be internalised within the overall project cost, and, other things being equal, encourages the construction of the most efficient generation projects.

An issue for some new renewable generation is its distance from the existing grid. In these cases some of the cost of connecting the generator on a standalone basis will be efficient and drive proponents to find the lowest cost projects. However some of the cost may represent an inefficient cost because that project cannot by itself realise the benefits of scale that may arise if the connection has the potential to be shared with other new generators. The Australian Energy Market Commission (AEMC) recently completed an extensive consideration of these matters in a National Electricity Rule Change proposal<sup>6</sup>. AEMO has also developed a methodology which aims to assist the development of shared connection points to the Victorian network<sup>7</sup>. Generator investors in both models are still required to make a significant initial financial commitment, but the initiatives provide the potential to recover costs where assets become subsequently shared.

AEMO suggests that the CEFC should consider connection costs and risks to be part of a generation project’s overall costs and risks when prioritising investments.

#### **4. Transparency of mandate**

The energy markets, including the environmental markets such as the RET, rely on attracting private investment. As the CEFC’s objective is to support commercial technologies that would otherwise not have been built, and as a result will unavoidably affect other investors.

The CEFC should attempt to minimise the risk of uncertainty for other investors which would manifest itself through a barrier to entry and greater costs of capital. One way of doing this would be to provide a very clear, transparent and stable investment mandate so that other investors are unlikely to be surprised by CEFC decisions.

#### **5. Demand-side and Energy Efficiency**

AEMO is concerned that active participation of the demand-side remains low in energy markets and suspects there is a significant quantity of unexploited response capability accessible at moderate costs. As costs are dominated by the cost of reliably serving the peak demand, there are potentially large savings available if the demand-side becomes more active.

---

<sup>5</sup> “Regulatory Investment Test for Transmission” [www.aer.gov.au/content/index.phtml/itemId/730920](http://www.aer.gov.au/content/index.phtml/itemId/730920)

<sup>6</sup> <http://www.aemc.gov.au/Electricity/Rule-changes/Completed/Scale-Efficient-Network-Extensions.html>

<sup>7</sup> [http://www.aemo.com.au/planning/connection\\_initiatives.html](http://www.aemo.com.au/planning/connection_initiatives.html)



Economic signals do exist within the NEM to encourage active customer behaviour, both at the wholesale level through the volatility of price, and at the network level through cost-reflective tariffs and network support agreements. It is however administratively challenging for individual customers to implement arrangements to exploit these options. Demand-side aggregators do exist in the NEM, but at this time are not of significant scale. Access to start-up finance may be a relevant concern.

The NEM would also benefit through a more rapid take up in small-customer technologies, such as smart metering, in-home displays and remote controlled appliances. As relatively new technologies, suppliers may benefit from greater capital access.