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Major Review of the National Electricity Market

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Executive Summary

- In November 2024, the Federal Minister for Energy and Climate Change, Chris Bowen, announced an expert review of the National Electricity Market (NEM) settings, ostensibly to support ongoing investment in firmed renewable energy and storage after the existing Capacity Investment Scheme (CIS) winds down in 2027.
- The review is called the Nelson Review, after its chairman Tim Nelson. The review is likely to take at least a year. It seems likely that some form of capacity mechanism within the NEM will be considered.
- Post 2030 this may supplant current measures like the CIS as the driver of the future system. The least likely outcome from the review is business as usual.
- Whatever the final recommendations, implementation will take some time as the NEM requires mirror legislation in all participating jurisdictions



In late November 2024, the Federal Minister for Energy and Climate Change, Chris Bowen announced an expert review of the National Electricity Market (NEM) settings, ostensibly to support ongoing investment in firmed renewable energy and storage after the existing Capacity Investment Scheme (CIS) winds down in 2027.

The review is led by a full time Chair supported by three part time panel members and a Secretariat in the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW). The Chair is Associate Professor Tim Nelson, until recently a senior executive at Iberdrola Australia, formerly with AGL and the Australian Energy Markets Commission (AEMC). Mr Nelson is respected in the NEM, is a credible appointment and will be exclusively focused on the review.

The Terms of Reference (TOR) for the review recognise the long history of discussions about NEM design and settings. This includes the work of the now defunct Energy Security Board (ESB) on a NEM post 2025 design. There was speculation the review could be undertaken by the Productivity Commission (PC) but Minister Bowen seems to have retained carriage within his portfolio.

Consultation with States


As with any review of this nature, it is expected there will be extensive consultation with the state governments and the NEM bodies such as the Australian Energy Market Operator, the Australian Energy Regulator (AER) and the AEMC. The states are particularly important as each has policies to support the energy transition, the most comprehensive of which is the NSW Electricity Infrastructure Roadmap (“NSW Roadmap”).

Historically the states are also the level of government most responsible for electricity supply. The creation of the NEM in the 1990’s was led by the Commonwealth and meetings of Energy Ministers are chaired by the Federal Minister, but energy infrastructure delivery, as well as significant ownership, resides with the states. The firmed renewables system envisaged by the Integrated System Plan (ISP) is also land intensive, making state planning processes crucial.

The involvement of the NEM bodies means radical or wholesale changes to the market should not be expected. In any case, such an approach would be disruptive to a market that has now been operating for over 25 years. The complexity of changing a real time 24-7 market should not be underestimated.

Responding to the Changing Generation Mix

In any case, the settings of the NEM wholesale market worked well for the first 15-20 years. It is the changing generation mix, particularly the increasing penetration of variable renewable energy (VRE) that has called into question the market settings. To be more explicit, there are question marks whether a market like the NEM that only provides revenue for generated electricity or system services, can bring forward enough dispatchable/firm generation and storage to ensure system reliability.



The NEM's "energy only" design created a central clearing house that minimised generation costs based on matching offer and bid prices. It created a merit order of generation under which the next increment of demand was serviced by the lowest cost generator available in the market. The marginal cost of that generator then set the market price for that settlement period. Generators whose bids were not accepted received no revenue for that period. It was a design that rewarded low-cost reliable generation. It also provided economic signals for investment and a tradeable market for contracts.

As has been claimed many times by its supporters, VRE has the lowest marginal cost, but it generates in response to weather conditions and production incentives like Renewable Energy Certificates (REC's), rather than a price signal.

As VRE installation in the NEM increased, including behind the meter, it has meant higher cost dispatchable sources of electricity have been displaced and receive little if any revenue for significant periods of each day, and at times of the year. The economics of "baseload" technologies like coal that operate throughout the year become increasingly challenged, while peaking generation like gas and hydro have an increasingly uncertain revenue outlook.

The Current Capacity Investment Scheme (CIS)

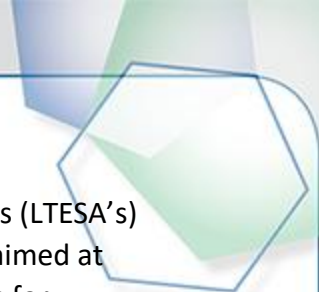
The result is that coal closes earlier (absent state support), but replacement firm capacity has a difficult business case. If a commercial case cannot be established, the market is likely to be short of the dispatchable generation required to maintain reliability during periods of low VRE output, and/or high market demand. Dispatchable storage such as batteries and pumped hydro can and will play an important role in filling this void but have duration limits.

At a national level, the CIS is the main pathway through which this revenue uncertainty is being mitigated, by providing downside risk protection. The CIS agreements, that are secured through auctions that run until 2027, operate on a "cap and collar" basis, where if revenue targets are not met, top up is provided by the Commonwealth Government. However, if revenue support is provided, there may be some obligation to repay that support later if revenue targets are exceeded.

The CIS excludes some key firming technologies like gas powered generation (GPG), unlike the NSW Roadmap. There is also a view it is not designed to support a high capital cost, long life asset like a pumped hydro plant.

Uncertainty of Revenues for New Storage Technologies

Where dispatchable technologies are concerned, the CIS is largely seen as supporting batteries. It is noteworthy that the South Australian government, which has the system most dependent on variable renewable energy (VRE), recently proposed the introduction of an additional state-based scheme called the Firm Energy Reliability Measure (FERM). This was largely seen as a response to the importance of GPG as a firming technology and its exclusion from the CIS.



Whether it's the CIS agreements, or the Long-Term Energy Service Agreements (LTESA's) provided under the NSW Roadmap or the FERM, all are temporary measures aimed at tackling the same problem, uncertain revenue under the current NEM settings for technologies that are critical to firming VRE and ensuring reliability.

Other markets with similar “energy only” designs to the NEM, are facing similar challenges. The market with a similar design to the NEM, with which I am most familiar, is the ERCOT market in Texas. ERCOT's grid is largely islanded from the rest of the US but has one of the largest loads in the country.

With significant population growth, old and new energy intensive industries like petrochemical plants, oil refineries and data centres, long hot summers and unpredictable winter extremes, ERCOT is a case study in the challenges of balancing high VRE and strong demand growth in an energy only design.

In Texas, the VRE grew from state-based policies that set up Competitive Renewable Energy Zones (CREZ's) in the west of the state, where over 20 GW of wind is now installed. Supplemented by significant recent growth in solar, Texas is finding it challenging to keep pace with the firming requirements of an increasingly volatile demand and supply mix.


Unlike the NEM, Texas has access to large amounts of locally produced gas and an expansive gas network, meaning GPG is the go-to technology for firming. The price of the fuel to support the GPG is significantly below what an Australian gas generator would pay.

Even then, there remains revenue uncertainty for ERCOT's GPG and other firming technologies because of the speed and size of VRE installation. Base demand is also partially met by two nuclear plants in the state.

While persisting with its energy only settings, the Texas legislature, famous for its small government “free market” philosophy, recently established a \$5 billion Texas Energy Fund (TEF) to provide low interest loan support for firming technologies like GPG. The fund, administered by the Public Utilities Commission of Texas (PUCT) was oversubscribed by eight times in its recent call for applications, with the Governor indicating it would be expanded.

The challenging economics of new firm/dispatchable generation, means any scheme like TEF or CIS or the FERM become the main pathway to meeting market needs, as competitor projects believe they will be disadvantaged. Hence given these schemes are selective, and can contribute to a delay in commitments, addressing revenue sufficiency for all potential projects through the market will be a better long-term approach. Ultimately, this is likely to see some changes to the energy-only settings of the NEM.

The NEM has already had to adjust in recent times to the changing technology mix with the establishment of a new participant category, Integrated Resource Providers (IRP's). This category includes a range of storage technologies such as batteries as well as hybrid generation/storage plants.



The NEM has also seen rule changes that procure new services to support the transition to higher VRE, including a Fast Frequency Response (FFR) category that is ideally suited to batteries. As more coal generation exits the system, further remunerated essential system service (ESS) markets will have to be established to fill requirements that hitherto were provided by coal. This includes such things as system strength and inertia.

The need for these new NEM markets had already been laid out in the earlier work of the ESB. It's possible they will be included in the NEM procurement framework the way Frequency Control Ancillary Services (FCAS) have been. That said, their quantity will not be sufficient to sustain utility scale generation and storage infrastructure, especially if there are multiple providers.

None of the new markets are likely to address the problem of revenue uncertainty and sufficiency for dispatchable gas plant and longer duration storage.

Revenue Hedging and the Need for Capacity Payments

The need for market participants to pre-contract or hedge against high price periods may sustain some dispatchable plant. Large retailer hedging policies and regulatory obligations like the Retailer Reliability Obligation (RRO) that flow from the NEM's reliability framework will have a role to play in developing dispatchable plant. Indeed, the review's Terms of Reference (TOR) require it to consider interactions with the NEM's reliability framework.

These measures are, however, unlikely to be enough to sustain the level of requirements for dispatchable plant to firm increasing VRE in the NEM. Inevitably this will lead the review to the question of whether a payment for capacity is required, irrespective of whether it generates.


The Western Australian Wholesale Energy Market (WEM) already has a mix of energy and capacity revenue available to participants. That market is also operated by AEMO, the operator of the NEM. The capacity needs of the system are determined centrally by AEMO based on a market reliability assessment undertaken two years out. This is known as the Reserve Capacity Mechanism (RCM).

AEMO procures reserve capacity in line with what it assesses is needed to maintain the reliability of the WEM, assigning capacity credits in line with technical characteristics of the plant. Capacity credit allocation is open to wind and solar but is higher for dispatchable plants like GPG.

Possible Outcomes of the Nelson Review

It seems inevitable that some form of capacity mechanism within the NEM will be considered by the Nelson review. If so, post 2030 capacity payments may supplant current measures like the CIS as the driver of future system needs for dispatchable plant. How any NEM capacity mechanism interacts with the CIS and other scheme agreements that extend beyond 2030 will be complex.

Either way, the least likely outcome from the review is business as usual. Whatever the final recommendations, implementation will take time as the NEM operates with mirror



legislation in all participating jurisdictions. Change to the institutions and arrangements of the NEM has always proven to be disconnected from the speed of change in technology and market requirements.

The consequence of this disconnect, and delays in building new projects underpinned by government schemes, has been a need to prop up existing coal plant to ensure sufficient capacity is available at times of high demand. Those plants have in turn adjusted their operations by ramping up and down in line with daily and seasonal changes in the output of VRE. We have already seen the attendant risks of such an approach, as those plants are prone to increasing forced outages.

Given the impacts of VRE on dispatchable plant in the NEM have been known for some time, and been on full display in South Australia, the Nelson review will be tackling a range of foreseeable issues. There is no questioning the merits of the review, just the timing. Better late than never.

About the Author

Cameron O'Reilly is an energy and public policy specialist who has held a number of roles in Australian energy markets over the past 15 years. He joined Marsden Jacob in 2021 after holding senior energy policy roles with the NSW Department of Planning, Industry & Environment (DPIE). In 2023, Cameron led the Marsden Jacob team that conducted the Electricity Supply & Reliability Check Up for the NSW Government. The Check Up made 54 recommendations, of which 47 were accepted (in part or full) by the Government.

From 2018-2020 Cameron was a Principal Energy Advisor and Executive Director in the NSW Department of Planning, Industry & Environment (DPIE), a period that covered the development and release of the NSW Transmission Infrastructure Strategy, the NSW Energy Strategy, and the NSW Energy Infrastructure Roadmap.

While in DPIE Cameron was involved in the negotiation of underwriting agreements to bring forward the delivery of priority transmission projects in NSW outlined in the Integrated System Plan (ISP) and represented NSW in the Federal-State Liddell Taskforce which considered the market impacts of the closure of large generators

From 2006-2015 Cameron was the Chief Executive of the Energy Retailers Association of Australia (ERAA), the peak industry body for retailers of electricity and gas in Australia's national energy markets. While at ERAA Cameron was involved in the deregulation of the retail energy markets in Victoria, New South Wales, South Australia and Queensland.

In 2008 Cameron was awarded the Fulbright Professional Scholarship in Australia-US Alliance studies for a comparative policy study of the impact of emissions reduction policies on the energy generation sectors of the US and Australia.