

Response to Energy Security Board capacity mechanism design paper

Australian Projections researches issues of national importance, such as aged care, COVID19, education and energy. We are trying to help Australians and their politicians understand the National Electricity Market.

In 2017 the Finkel Review did not consider a competitive capacity market was appropriate. In September 2021 energy ministers agreed on 14 principles, which have been guiding ESB's work on a capacity mechanism.

We estimate that about \$400 billion of capital is needed between 23-24 and 50-51 under AEMO's Step Change scenario. ARENA responses and renewable energy takeovers suggest there is strong interest in investing in Australian renewables. With policy clarity, the necessary funds may be readily available.

The NEM has operated with very high reliability since December 1998. Growing price instability may reflect increasing proportions of cheap renewable power, extreme weather, failures of coal-fuelled generators, and high prices of coal and gas.

Renewable generators and storage can be built within a year. Bringing forward key capital expenditure as much as possible would help reduce the severe price fluctuations that are affecting providers and consumers. AEMO should be asked to design a scenario which brings forward generator, storage and network investments as quickly as possible.

Under the Step Change scenario, there may be about \$37 billion of fuel costs, and about \$100 billion of carbon emissions at European prices. A faster transition to renewables could save much of these costs and emissions. Wholesale prices in an NEM based wholly on renewables may be about \$70 per MWh, compared with the average of about \$130 in 21-22.

We suggest that state governments be responsible for the orderly closure of coal generators. State and Commonwealth governments should work together to plan a rapid transition to a fully renewable NEM, and to offer financial incentives to key new projects. Energy ministers should ask the ESB to cease work on the design of any general capacity mechanism.

1. Background

1.1 Finkel Review

The Energy Security Board was established by the nation's energy ministers in August 2017 to coordinate the implementation of the recommendations of the Review into the Future Security of the National Electricity Market (the Finkel Review).

The Review said

"A capacity market is a significant market reform, which would require a long-term and costly departure from the existing market framework. Such a reform should only be considered in circumstances of irresolvable failure of the energy-only market to bring forward sufficient

new capacity to ensure reliability ... the Panel does not believe a move to a competitive capacity market to be appropriate at this time.” (2017 p78)

The Finkel Review said (p31)

”Policy stability is required to give the electricity sector confidence to invest in the NEM.”

1.2 Government support for investments in dispatchable capacity

ESB (2022b p10) noted that

“...governments have provided some level of support for most investments in dispatchable capacity over the past decade. This has taken many forms, including grant funding (ARENA, state governments), legislated obligations (Queensland Gas Scheme, NSW GGAS), and government-initiated contracts (eg Snowy 2.0 and the Hunter Power Project and Victorian Big Battery)”

ESB also mentioned ARENA, the NSW Electricity Infrastructure Roadmap, the Victorian Renewable Energy Target and the ACT Large Feed-in-Tariff scheme as measures providing long-term, out-of-market funding for new entrant capacity (p71).

1.3 Energy ministers’ principles

These 14 principles, agreed in September 2021, included three references to capacity:

“3. provide a signal to value capacity that best supports the needs of the NEM...

10. encourage the timely replacement of existing capacity through driving commitments to new investment within reasonable periods of closure of existing capacity...

12. recognise relevant state and territory policies and investment schemes to account for bespoke arrangements to retain and replace existing capacity” (ESB 2022b p5)

1.4 Responses to ESB capacity mechanism project initiation paper

34 responses to ESB’s December 2021 paper are publicly available (ESB 2022a). Of these, 26 were from energy or equipment providers, three from public interest bodies, two from investment managers, two from major user groups and one from an energy research group. Some of the responders were reluctant to commit to a position on proposals unsupported by quantitative analysis. But in general the renewable energy providers and the public interest bodies opposed any form of capacity mechanism, while fossil-fuel providers supported various capacity mechanisms.

1.5 Uncertainty created by capacity mechanism proposals

QIC Limited, an investment manager with some Australian renewable assets, said in response to the capacity mechanism project initiation paper

“To meet the substantial investment needs of the NEM, significant private capital is available, but policy stability and certainty are key to reduce investment risk, reduce cost of capital and reduce consumer bills. QIC GI is concerned that a capacity mechanism will

generate significant uncertainty. This significant uncertainty will both disincentivise the investment in new capacity required to meet the energy requirements of the NEM as well as increase consumer electricity prices due to the higher cost of capital required.”

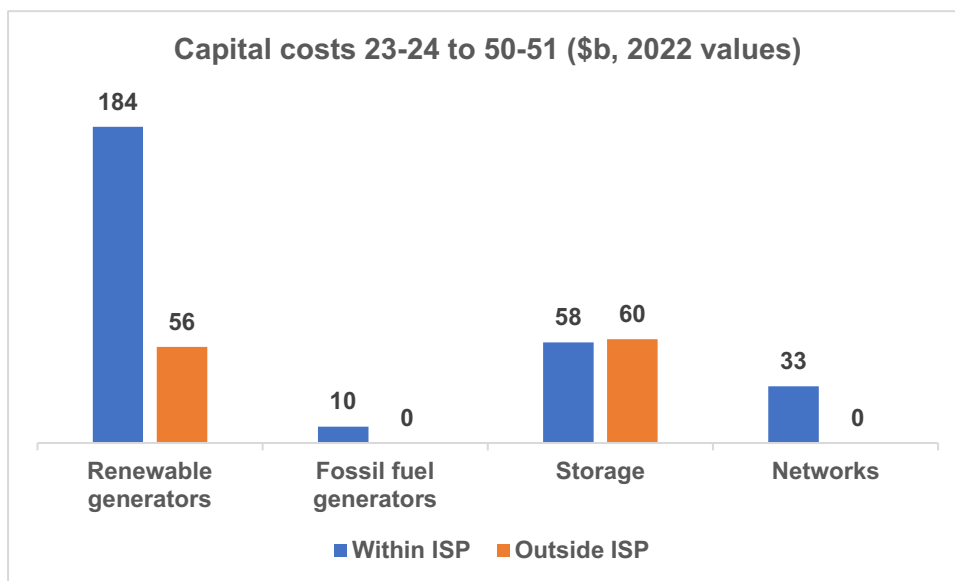
2. AEMO’s Step Change scenario

2.1 Purpose

The Step Change scenario is one of four scenarios used by AEMO to test different development proposals. It describes Step Change as “rapid consumer-led transition of the energy sector and co-ordinated economy-wide action”. Based on panel surveys in late 2021, Step Change is considered by energy industry stakeholders to be the most likely scenario to play out. As shown later in this submission, a much faster transition to a fully renewable NEM may be feasible.

2.2 Estimated capital costs under Step Change

Using AEMO (2022a) and CSIRO (2022) assumptions, we have estimated the capital needed from 23-24 to 50-51 as about \$400 billion in 2022 values. We have separately estimated assets falling within or outside AEMO’s Integrated System Plan (ISP). Assets within the ISP are those that supply electricity into the NEM, or the networks making supply possible. Increases in ISP storage and networks should encourage private investment.



2.3 AEMO view of availability of private funding

In its June 2022 “Capacity mechanism high-level design paper”, the ESB said

“Given the present market dynamics and lack of long-term investment signals, investment in new generation is predominantly possible only by a few large entities. It is questionable whether these relatively few entities will finance the vast levels of investment required over coming decades.” (p14)

2.4 Responses to ARENA grant funding

ARENA (2022) announced that 12 projects had been invited to submit applications for \$100m of grant funding for large-scale batteries. The 12 projects had an aggregate capacity of 3050 MW / 7000 MWh, and a total ARENA grant request of \$297 million. Based on the capital costs in CSIRO (2022 p70), these applications represented about \$3700 million of project costs. A government subsidy rate of 8% is thus enough to attract many applications. The short-listed projects were from a pool of 54 expressions of interest.

2.5 Renewable energy takeovers

In 2020 Iberdrola, the world's second-largest wind energy producer, bought Australian-listed renewable energy provider Infigen for \$893 million. In 2021 QIC bought Australian and New Zealand wind and solar owner Tilt Renewables for \$3 billion. CWP, one of the largest renewable energy producers in Australia, is seeking purchase offers (Carter 2022).

2.6 Likely availability of private funds for Step Change

The 54 applications for ARENA grants, together with the wide interest overseas and here in renewable investments, suggest that most of the capital costs for generators, storage and transmission can be privately funded. Australia's political stability, strong balance of trade and suitable climate make it a preferred destination for international investors in renewables.

The long-term inflation-linked nature of renewable energy investments makes them attractive to superannuation. For example, the website of one of Australia's largest superannuation funds says

"AustralianSuper currently invests in a range of renewable energy projects across markets. We plan to have investments of over \$1 billion in the sector by the end of 2022."

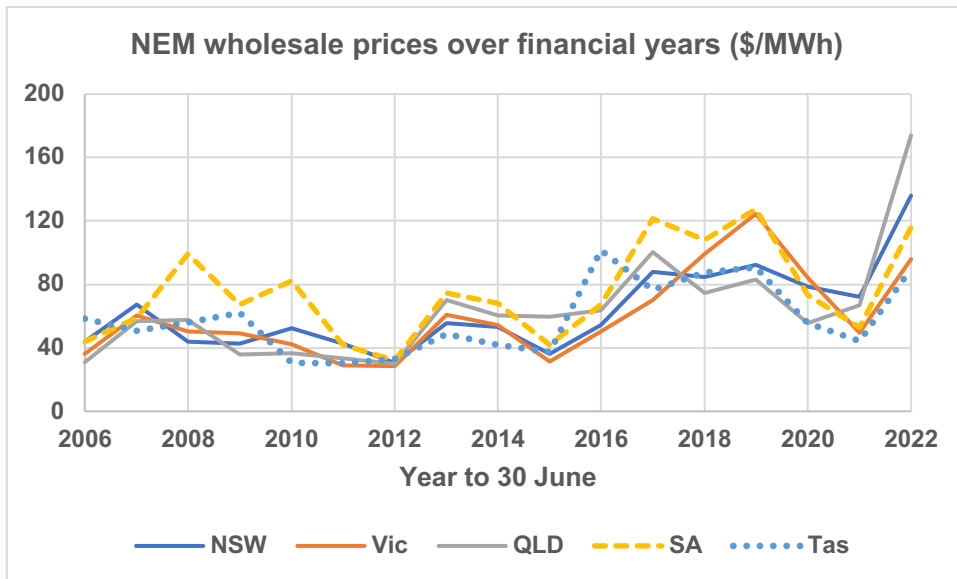
3. Emerging problems in the NEM

3.1 High reliability of the NEM in the past

The ESB noted that

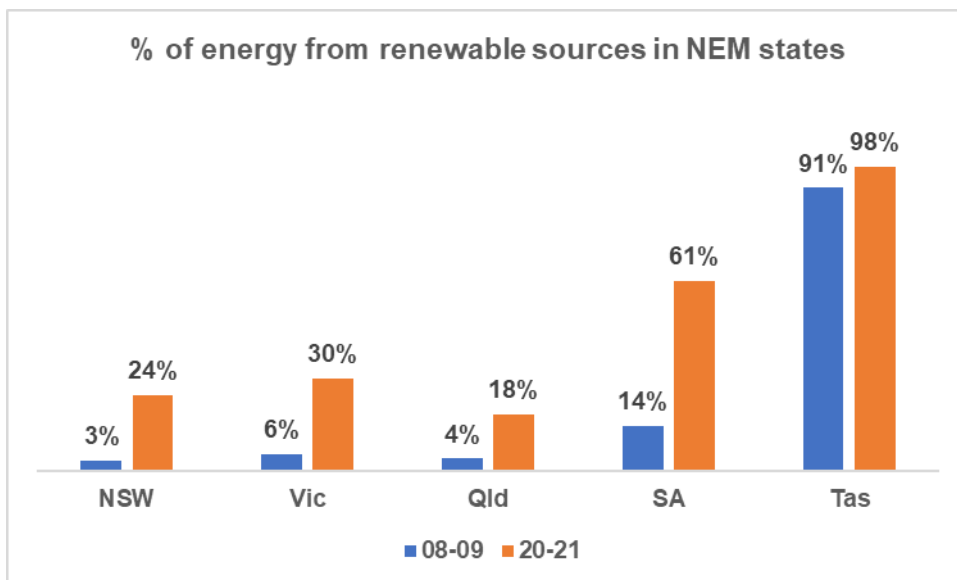
"There have only been five instances of any load-shedding since 2005 related to reliability - twice in Victoria and three times in South Australia. However, recently, emergency reserves have increasingly been required to maintain reliability, with the Reliability Emergency and Reserve Trader deployed 15 times in the past 5 years, and never before that." (2022b p16)

3.2 Unstable, rising NEM wholesale prices



WA and the Northern Territory are not in the NEM, and ACT figures are included in NSW. Average wholesale prices for each financial year for each state have been estimated from the quarterly values published by AER (2022). The NEM has had unstable wholesale prices since 2016, generally rising, with large differences between states. The highest prices in 21-22 have been in Queensland and NSW, the states with the lowest renewable energy shares. The large differences between states suggest that transmission networks are inadequate.

3.3 Growing shares of energy from renewable sources



Percentages of energy from renewable sources have been calculated from production data (DISER 2022). Across the five states, the share of renewables has increased from 8% in 08-09 to 30% in 20-21. The slow response times of fossil-fuel generators limit their ability to compete during rapid changes in supply or demand.

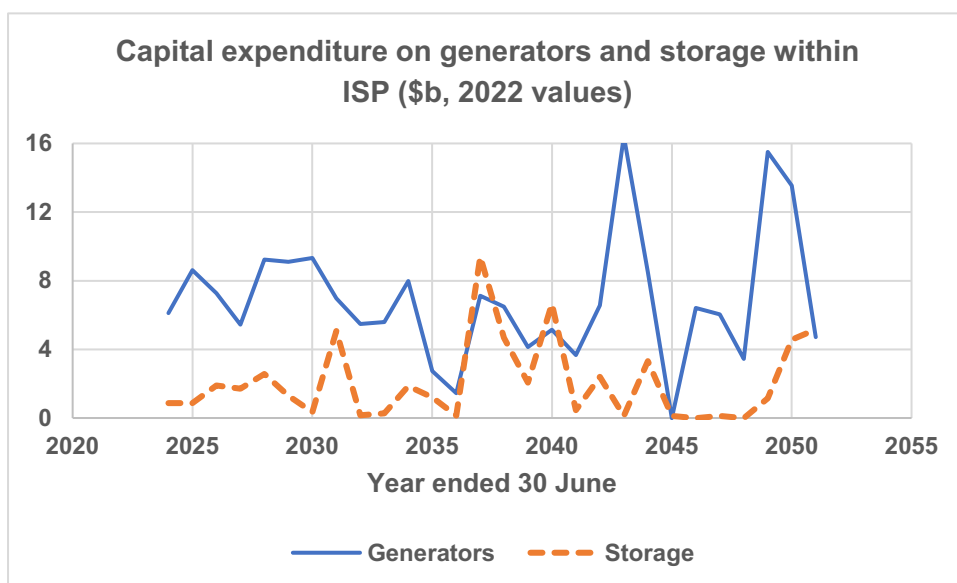
3.4 Recent interventions by the NEM

AEMO last year paid almost \$100 million in compensation to generators, after directing them to put more supply into the market or ensure the grid was stable (Mark Ludlow 2022). AEMO suspended the NEM for 9 days in June 2022, with compensation costs estimated by AEMO’s CEO as hundreds of millions of dollars (AEMO 2022b). In July AEMO asked market participants not to purchase gas from Victoria’s spot market for use outside Victoria, or for all electricity generation in Victoria (AEMO 2022c). The ACCC has forecast an east-coast gas deficit in 2023, with even higher gas prices (ACCC 2022).

Given the high prices of coal and gas used by some generators, more costly interventions are likely. Rule changes to the NEM may be needed.

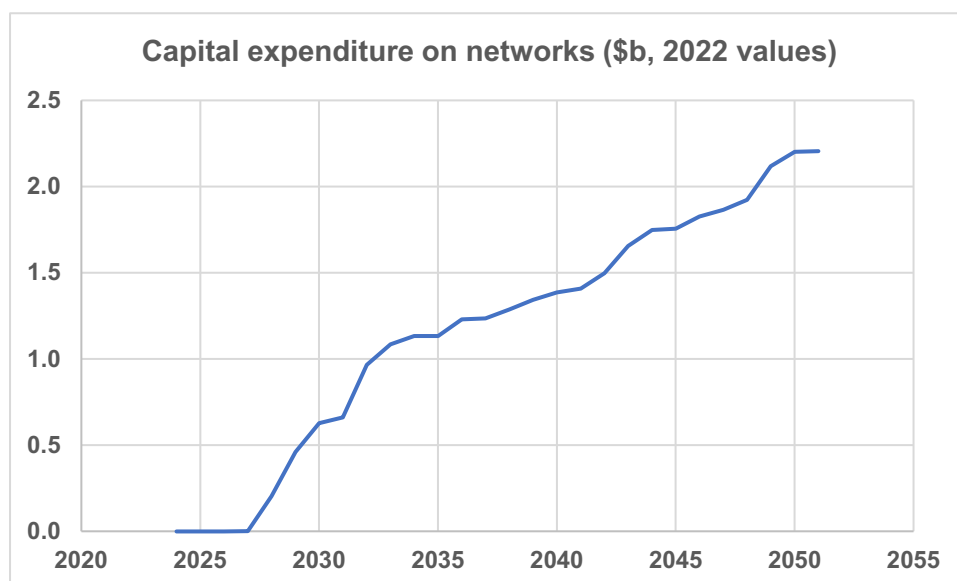
4. A faster transition to a fully renewable system

4.1 Capital for ISP generators and storage in Step Change scenario



These estimates suggest that ISP generator expenditure will peak in about 42-43, and ISP storage expenditure will peak in about 36-37.

4.2 Capital for networks in Step Change scenario



An April 2022 statement by the Australian Labor Party said

“Labor’s Rewiring the Nation will invest \$20 billion to rebuild and modernise the grid, in line with a blueprint already completed by the Australian Energy Market Operator and signed off by all governments.”

This funding promise does not seem to be reflected in the slowly rising network expenditure in the Step Change scenario.

4.3 Room to move more quickly than the Step Change scenario

CSIRO (2022, p74) estimated the construction time for a large-scale solar photovoltaic generator as 0.5 years, and for an on-shore wind generator as one year. Big batteries can also be built in less than a year. Given the fast build times, the planned capital expenditures seem too slow.

AEMO (2022a table 7) shows the earliest possible delivery date for 10 transmission projects, and their expected timing in the Step Change scenario. The average difference between the earliest possible delivery and the expected timing is over 4 years.

4.4 Bringing forward expenditure on ISP generators, storage and networks

Bringing forward ISP capital expenditure as much as possible would help reduce the severe price fluctuations that are affecting providers and consumers. Expenditure on ISP storage might be particularly effective, as more storage would allow existing generators to operate for longer periods. AEMO should be asked to design a scenario which brings forward generator, storage and network investments as quickly as possible.

4.5 Wholesale prices in a fully renewable NEM

CSIRO (2022, p59) has estimated the levelised cost of electricity (LCOE) in a system with wind and solar providing 90% of the electricity as between \$60 and \$80 per MWh. LCOE is a measure of the total revenue a generator must recover to meet all of its costs including a return on investments. Comparing CSIRO's estimate with the average wholesale price of about \$130 in 21-22, prices in a fully renewable NEM should be lower.

4.6 Reductions in fuel costs and carbon emissions

AEMO estimates its Step Change scenario will have about \$37 billion of fuel costs, and 900 Mtonnes of carbon emissions. These emissions would cost about \$100 billion at current European carbon permit prices. A faster transition to a fully renewable system would reduce fuel costs and emissions.

5. Suggestions

5.1 Distinguish between new and existing capacity

The ESB sees the need to distinguish between new and existing capacity

"...the ESB recognises that new and existing capacity have different requirements. Existing capacity faces sunk costs, while new investors require sufficient certainty that their capital costs, as well their operating costs, will be recovered." (2022b piii)

5.2 State governments should be responsible for the orderly closure of coal generators

Each coal generator was built by a state government, and most of them were sold to private firms with varying contractual liabilities. They occupy strategic locations within state electricity grids, and provide significant local employment. Rehabilitating their sites is likely to be costly and protracted. State governments should be responsible for their orderly closure, if necessary providing short-term funding or taking back ownership.

5.3 State and Commonwealth governments should work together to plan a rapid transition to a fully renewable NEM

State governments will want to make best use of the opportunities created by a system relying largely on distributed renewable energy sources. AEMO has the expertise to advise on the optimal locations of renewable generators and sources, and on the networks needed to link them to users. ARENA and CEFC should be able to advise on the potential availability of private funds. Co-ordinated planning should encourage potential investors.

5.4 State and Commonwealth governments should work together to offer financial incentives to key new projects

Where necessary, modest financial incentives should be offered to ensure key projects are built when needed.

5.5 Energy ministers should ask ESB to stop work on any general capacity mechanism

There is no clear need for a general capacity mechanism, applying to both new and existing sources. Continuing discussion of such a mechanism may be deterring potential investors, or increasing the risk margins required by investors.

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Abbreviations

ACCC	Australian Competition and Consumer Commission
AEMO	Australian Electricity Market Operator
AER	Australian Energy Regulator
ALP	Australian Labor Party
ARENA	Australian Renewable Energy Authority
CEFC	Clean Energy Finance Corporation
CSIRO	Commonwealth Scientific and Industrial Research Organization
DISER	Department of Industry, Science, Energy and Resources
ESB	Energy Security Board
GGAS	Greenhouse Gas Abatement Scheme (Australia)
ISP	Integrated System Plan
LCOE	Levelised cost of electricity
NEM	National Electricity Market

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