SUBMISSION TO THE HOUSE OF REPRESENTATIVES STANDING COMMITTEE ON THE ENVIRONMENT AND ENERGY INQUIRY INTO MODERNISING AUSTRALIA'S ELECTRICITY GRID

APRIL 2017

1.1 EXECUTIVE SUMMARY

Australia's electricity system is seeing significant new investment. Renewable energy is entering the market at increasing scale, replacing ageing generation infrastructure and contributing to meeting Australia's emissions reduction commitments. The cost of producing electricity from renewable resources has declined significantly over recent years and remains on a rapid downward trajectory. Despite strong growth in renewable energy generation, electricity market design continues to reflect a system dominated by high-emissions thermal generation. Market rules need to be updated for an electricity grid with a growing share of renewable energy and distributed generation to promote a reliable and affordable electricity service. At the same time, investment is required in technologies and infrastructure such as grid-scale storage and transmission to better integrate and optimise high levels of renewables.

The CEFC was established to facilitate increased flows of finance into the clean energy sector. The CEFC supports the development of a resilient, balanced and secure electricity system through its investment activities, which include large-scale renewable energy, energy storage and other initiatives.

Taking into account the Inquiry's focus on the adequacy of the current electricity transmission and distribution networks to support Australia's future needs and drawing on our experience as a specialist clean energy investor, this submission draws on the CEFC's submission to the Independent Review into the Future Security of the National Electricity Market (February 2017) and highlights the following themes:

1. High levels of renewable penetration are technically feasible and are consistent with maintaining energy security
2. Strengthened transmission is necessary to facilitate a secure high-renewables electricity system
3. Investing in renewables and storage in advance of coal capacity withdrawal will minimise costs to consumers and maintain energy security
4. Smart technology solutions are important for boosting system resilience and lowering costs
5. Energy storage will play an important role in an electricity system with high renewables penetration
6. Policies to drive the long-term transition must be bankable.

2.1 HIGH LEVELS OF RENEWABLE PENETRATION ARE TECHNICALLY FEASIBLE AND CONSISTENT WITH MAINTAINING ENERGY SECURITY

A number of studies (AECOM 2012, AEMO 2013, Elliston 2013, Lenzen 2016, Teske 2016, Blakers 2017) have considered the technical challenges of a high penetration of renewable energy in the Australian electricity system. The studies have found that while an increasing share of renewables will mean changes to the way the grid is managed, there are no technical barriers to achieving energy security with a very high share of renewables.

Variable renewable energy output can be managed by promoting geographic diversity of energy sources. Geographic diversity assists because over larger areas, weather conditions are less correlated. In principle, over a sufficiently large area and with adequate transmission links, an electricity system could operate entirely with renewable energy resources. In practice, even a system with high levels of geographically diverse renewables will require energy storage and demand management for energy security and reliability.

Managing a growing share of renewables in the generation fleet will also depend on a strengthened transmission system and is likely to also involve a range of dispatchable renewable energy and storage technologies such as pumped hydro, biomass, grid-scale batteries and concentrated solar power. Depending on the cost path of these technologies, there is likely to be an ongoing role for some gas-fired generation to support variable renewable energy during the transition to a low-emissions electricity system.

Integrating a higher share of renewable energy will also be facilitated by improvements to wind and solar forecasting, improving markets for frequency control and ancillary services, promoting demand management and making other changes to market rules such as aligning market dispatch and settlement intervals (the five-minute settlement rule change request).

2.2 STRENGTHENED TRANSMISSION IS NECESSARY TO FACILITATE A SECURE HIGH-RENEWABLES ELECTRICITY SYSTEM

The National Electricity Market comprises five interconnected regional markets. Investment in transmission upgrades between and within regions will promote improved access to high-quality renewable energy resources and enhance grid stability. A recent paper for the CEFC (Jacobs CEFC 2016) looked at a range of published studies and found that under a range of emissions reduction targets, significant upgrades of interregional transmission capacity would be required to allow exploitation of the available renewable resources to replace the retiring coal generation fleet.

Investment in strengthening transmission interconnections between regions will help balance supply and demand, reduce price volatility, promote access to least-cost renewable energy resources and boost system redundancy in a grid with high renewables penetration. Augmenting interconnectors to South Australia and Tasmania would lead to a wide range of market and system security benefits. For example, augmenting South Australia's interconnectors would add resilience and potentially avoid system stress during periods of high demand, and a second interconnector across Bass Strait could unlock additional value in Tasmania's hydro system by allowing it to provide energy storage services for the mainland states.

Regulation of transmission investment should facilitate higher renewables penetration. Without changes, however, the Regulatory Investment Test for Transmission (RIT-T) is unlikely to deliver sufficient timely investment in transmission infrastructure to cope with the needs of Australia's future electricity system (CEFC 2016). As currently implemented, the RIT-T favours smaller upgrades to transmission capacity; it does not adequately consider the option value of proposed new investment; it uses inappropriately high discount rates; and it does not consider all relevant externalities. In addition, its single-asset focus means it cannot take into account the joint benefits of coordinated augmentations, despite studies such as AEMO's 2016 National Transmission Network Development Plan finding greater total net benefits when transmission investments are coordinated to create a more interconnected NEM. The COAG Energy Council has announced a review of the Australian Energy Regulator's RIT-T guidelines to better reflect the system benefits of upgrade options, including benefits relating to system security and renewable energy and climate policies.

2.3 INVESTING IN RENEWABLES AND STORAGE IN ADVANCE OF COAL CAPACITY WITHDRAWAL WILL MINIMISE COSTS TO CONSUMERS AND MAINTAIN ENERGY SECURITY

Over time, decarbonising the electricity system will involve decreasing the share of fossil-fuel generation and increasing the share of renewable energy. If ageing coal-fired generation capacity is withdrawn before new renewable energy capacity is available to meet the shortfall, prices are likely to be higher and more volatile. To facilitate a smooth transition to a high-renewables system and avoid price spikes, policymakers should consider supporting early investment in renewables to prepare in advance for coal capacity withdrawals.

Meeting Australia's emissions reduction targets will require significant new investment in electricity infrastructure. Economic modelling exercises over recent years (most recently Jacobs CCA 2016) have consistently found that there are policy tools available to minimise the cost impact on consumers.

2.4 SMART TECHNOLOGY SOLUTIONS ARE IMPORTANT FOR BOOSTING SYSTEM RESILIENCE AND LOWERING COSTS

New technologies that use smart controls to optimise the use of energy resources in electricity grids are important for boosting the resilience of the electricity system and keeping downward pressure on costs. The CEFC has committed $5 million to GreenSync, an innovative Melbourne-based company that uses smart controls and coordination to help integrate more renewable resources and battery storage systems into the grid, bringing benefits to businesses and consumers. GreenSync's clients include many of Australia's largest energy companies, supermarket chains, manufacturers, airports, resorts and universities.

Incentives for demand management – changing the time profile of demand or reducing peak demand through voluntary load reduction – are important for adapting to a higher level of renewables penetration. As well as providing flexibility to smooth demand in response to variations in renewable energy output, active demand can reduce the need for peaking generation and network assets that are oversized to cope with infrequent episodes of peak demand, and potentially avert crises during periods of system-wide high demand. But in Australia the incentives to provide demand management services are currently insufficient.

Network regulatory frameworks will need to adapt to emerging competition to ensure that new technologies that reduce costs for consumers can flourish.

2.5 ENERGY STORAGE WILL PLAY AN IMPORTANT ROLE IN AN ELECTRICITY SYSTEM WITH HIGH RENEWABLES PENETRATION

Grid-scale storage – such as pumped hydro, grid-scale batteries, solar thermal with storage, and behind-the-meter battery storage systems coordinated through smart-grid technology – will play an important role in ensuring that electricity supply is available when required.

Using grid-scale energy storage to respond to short-term fluctuations in demand is not new. Globally, the largest installed grid-scale storage technology is pumped hydro, which has been deployed in Japan and the United States primarily to balance relatively inflexible output from nuclear.

Bloomberg New Energy Finance reports that 90% of the 700 MW of utility-scale storage projects commissioned around the world in 2016 used lithium-ion batteries. The United Kingdom grid operator recently awarded 500 MW of energy storage contracts as part of its 2016 capacity auction, and California has mandated 1.3 GW of energy storage by 2020, with more than 400 MW already under contract. Governments in Victoria and South Australia have called for expressions of interest to install grid-scale battery storage.

Proposed rule changes such as aligning market dispatch and settlement intervals (known as five-minute settlement) would make fast-response technologies such as battery storage more economic, as well as increasing commercial incentives for demand management.

In January and April, the Australian Government wrote to the CEFC and ARENA asking us to collaborate in advancing storage technologies, including large scale batteries, pumped hydro and solar thermal.

2.6 POLICIES TO DRIVE THE LONG-TERM TRANSITION MUST BE BANKABLE

While costs for renewable energy technologies are continuing to decline, there is still no market for investment in utility-scale low-carbon generation capacity without investment support mechanisms. Long-term investment support mechanisms backed by governments are still necessary to drive low carbon energy generation to meet carbon targets.

A range of policies can drive decarbonisation of the electricity sector, for example as were considered recently by the Climate Change Authority (Jacobs CCA 2016). Policies vary in terms of their impact on wholesale and retail electricity prices, generator profits, resource costs and the rate of construction of new generation capacity.

Given the scale of capital investment required, and the long-term nature of the transformation of the electricity system, whatever policy approach is chosen the most important aspect from an investor viewpoint is a stable 'bankable' policy framework is necessary to promote investor confidence and capital availability and reduce risk, financing costs and the overall costs of the transition

Other aspects of the transformation of Australia's electricity system, such as technology costs, policy to drive investment and the role of particular technologies in the generation mix, are covered in the CEFC's submission to the Independent Review into the Future Security of the National Electricity Market (CEFC 2017).

ABOUT THE CEFC

The Clean Energy Finance Corporation invests, applying commercial rigour, to increase the flow of finance into the clean energy sector. Our mission is to accelerate Australia's transformation towards a more competitive economy in a carbon constrained world, by acting as a catalyst to increase investment in emissions reduction. We do this through an investment strategy focused on cleaner power solutions, including large and small-scale solar, wind and bioenergy; and a better built environment, with investments to drive more energy efficient property, vehicles, infrastructure and industry. The CEFC also invests with co-financiers to develop new sources of capital for the clean energy sector, including climate bonds, equity funds, aggregation facilities and other financial solutions. The CEFC operates under the *Clean Energy Finance Corporation Act 2012*.