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Competition in Energy Markets – Note by New Zealand

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1. Introduction

1. The New Zealand electricity industry has some unusual features, the most notable being that our isolation requires us to be self-sufficient. Our electricity markets are the result of structural change in the 1990s, including the corporatisation of the industry and (in 1996) the establishment of a spot market for the trading of wholesale electricity. As a result of the state previously investing heavily in hydro generation, New Zealand's electricity supply has been above 80% renewable for many decades.

2. The New Zealand Government has an aspiration to be net carbon zero by 2050, and to be 100% reliant on renewable energy in the electricity sector by 2030. This will require the incentivisation of heavy investment in renewable electricity generation in New Zealand, in addition to other things such as increased transmission capacity and a better means of managing intermittency of renewable generation.

3. However, current investment in renewable electricity generation does not appear to be at a rate required to meet the Government's decarbonisation goals. Further, since 2019, wholesale prices have been substantially above the cost of adding new generation capacity. These matters have prompted analysis of barriers to entry that may be impeding new generation development.

4. In this paper, we firstly outline the self-sufficient nature of New Zealand's energy markets, and provide a brief history of the governance of New Zealand's electricity industry including competition and regulatory roles within energy markets. We then describe the challenge of incentivising renewable electricity generation investment to meet decarbonisation goals, and briefly outline three interesting potential barriers that may be impeding such investment.

2. New Zealand's self-sufficient electricity markets

5. Being remote from other countries, New Zealand is forced to be largely self-sufficient in meeting its energy supply requirements, particularly with the generation of our electricity. 72% of our total energy needs in 2021 was sourced domestically. Currently all our energy needs for natural gas, renewables, and waste heat are met through domestic production, whereas for other energy sources, New Zealand engages in trade through exporting and importing.

6. New Zealand relies heavily on renewable energy sources to produce its electricity, such as hydroelectric, geothermal and wind generation. More than 80% of our total electricity needs are generated from renewable sources, reaching 86% from renewable sources in 2017, with the remainder largely coming from fossil fuels, including coal and natural gas.

7. New Zealand also has a significant renewable electricity potential with high capacity-factor wind, solar and geothermal resources that can be developed cost-effectively.

8. Hydroelectric generation has been a part of New Zealand's energy system for over 100 years and accounts for over 50% of our electricity needs. There is over 5,000 MW of installed hydro capacity in New Zealand, the majority of which is in the South Island. Many

large hydro schemes were built by the public sector prior to deregulation in the 1990s, along with a high voltage grid to deliver this electricity across the length of the country, and local distribution networks. While hydro contributes significant capacity to the New Zealand electricity market, relatively limited storage means that New Zealand is relatively exposed to variations in rainfall and snow-pack, which can result in “dry-years”, where generation from other sources is required to meet winter energy demands.

9. Most of our geothermal installed capacity is situated in the Taupo Volcanic Zone in the central North Island, and accounts for around 20% of New Zealand’s electricity generation. Wind generation continues to grow and makes up around 6% of our electricity generation.

10. Natural gas is produced domestically from six main gas fields and is used for electricity generation, process heat, production of methanol, and residential needs. About a third of our natural gas production is used to generate or co-generate electricity. Last year, the New Zealand Climate Change Commission recommended that the Government should determine how to eliminate natural gas use in residential, commercial and public buildings, in order to help meet the Government’s goal of making New Zealand net carbon zero by 2050.

11. New Zealand has coal resources and there were 15 mines operating in New Zealand at the end of 2021, although we also import a large proportion of coal, primarily for use in electricity generation at the 750MW Huntly Power Station. This is an important asset for our security of electricity supply requirements in dry years, if there is a natural gas shortage, and when there are winter energy and peak demand requirements.

12. The vast majority (94%) of New Zealand’s electricity is currently generated by four major electricity generating companies. There is a high degree of vertical integration between electricity generation and retail in New Zealand, as the four main generating companies are also the main retail companies.

13. In terms of security of supply, because of New Zealand’s isolation and reliance on hydro generation, the main risk to our security of supply is low hydro lake levels due to dry weather. Although there are regular concerns about lake levels, in 2008 levels were particularly low due to driest March - June period since 1947. This resulted in a public awareness campaign led by the industry encouraging all consumers to use power prudently and make savings. The EA has developed and now monitors a range of regulatory measures to help effectively manage the risk caused by dry years.

3. A history of the governance of New Zealand’s electricity industry

14. Until 1987, electricity generation and transmission, as well as policy and regulatory functions, were centralised and were the responsibility of the New Zealand Government. In the following years, New Zealand’s electricity industry was corporatised, deregulated and partly sold off. However, much of these are still somewhat under Government control as state owned enterprises.

15. In October 1996, a spot market was established for the trading of wholesale electricity. This market had several unique, notable features when it was established:

- It was the first electricity market in the world to use full nodal pricing;
- It was an un-capped, energy only market;
- Competition was initially between just two generation companies; and

- There was self-regulation of the market by participants.

16. In 1998, the Government announced a package of reforms to the generation, distribution and retail of electricity in New Zealand. The purpose was to encourage competition by separating the natural monopoly businesses from competitive parts of the industry. This resulted in New Zealand's largest state-owned enterprise electricity generator being split into three competing state-owned generators; and required local electricity supply authorities to separate ownership of their line and retail businesses, which led most local companies to sell their retail businesses. The retail businesses were bought by the generators for whom they provided a hedge against wholesale price risk.

17. Prior to 2004, New Zealand opted for 'light-handed regulation' in electricity and other industries. This approach relied on the threat of regulation under Part 4 of the Commerce Act to discipline monopolistic behaviour, supported by an information disclosure regime requiring the local distribution businesses to disclose information on their financial and non-financial performance. This is opposed to industry-specific regulation by a statutory body as was seen in many other countries at the time. Such an approach did not prove to be successful as the processes and criteria for identifying when price control should be imposed were unclear.

18. The Commerce Commission commenced an investigation into the electricity industry in August 2005, prompted by complaints that generators are enjoying monopoly rents as a result of them abusing market power, in breach of section 36 of Commerce Act. The Commission concluded that there appeared to be systemic problems in the wholesale electricity market, yet considered that monopoly rents could not be captured by section 36, as this was a legitimate maximisation of profits as opposed to breach of competition law. Although the Commission had the power to institute an inquiry with a view to recommending the imposition of price controls under Part 4 of the Commerce Act, it considered this was not the optimal response as structural solutions offered a superior path, not price caps or other targeted pricing regulatory measures through Part 4.

19. Another reason the generators' conduct could not be captured by section 36, and therefore section 36 could not be used as a form of price control, is due to the stringent test for the finding of 'taking advantage of market power' laid down in a 1995 telecommunications case by the Privy Council (New Zealand's highest court at the time). To succeed, the plaintiff must overcome the difficult hurdle of convincing the court that the defendant dominant firm's conduct was the kind that a non-dominant firm could not have rationally undertaken in the same circumstances. Further, the Privy Council held that the scope of section 36 is not to be extended to produce a quasi-regulatory system; and courts should not be expected to make regulatory decisions under a general provision of competition law. Section 36 could not therefore be used to regulate monopoly profits obtained by dominant firms. Section 36 has recently been amended to an effects-based test which comes into effect in April 2023.

20. In 2004, New Zealand moved away from 'light-handed regulation' and a form of yardstick regulation known as the "thresholds" regime was implemented under Part 4A of the Commerce Act. In 2008, Part 4A was replaced by Part 4 which put in place improved regulatory regimes for electricity lines businesses. This required the Commerce Commission to develop rules, requirements and procedures for regulation. The Commission was made responsible for regulating the transmission and distribution monopolies.

21. As a result of the generators and retailers failing to reach agreement on a new self-governance structure, the Government established an electricity regulator called the

Electricity Commission to take over governance of the industry, including arrangements for retailing, wholesaling, meter provision, transmission and system operation.

22. Further reforms in 2010 modified the governance arrangements in the electricity industry. These included a quasi-structural shift in control rights to several power stations between the three state owned generators, the stimulation of a financial market for forward (hedge) contracts, and allowed lines companies wider limits to retail electricity subject to certain conditions. It also provided a new governance model for the regulator by replacing the Electricity Commission with the Electricity Authority (EA). The EA is an independent Crown entity which regulates the New Zealand electricity market. Its objective is to promote competition in, reliable supply by, and the efficient operation of, the electricity industry in New Zealand for the long-term benefit of consumers. It does this by developing and setting the market rules, enforcing and administering them, and monitoring the market's performance.

23. Over time a tier of stand-alone independent retailers entered the market. These had collectively gained more than 10% of the electricity retail market by the end of 2020.

24. Wholesale electricity in New Zealand is bought and sold between electricity retailers and generators in a wholesale market at spot prices. These are set at certain points across the transmission grid every half hour. Spot prices depend on the prices and quantities of generation offered into the market, the level of demand, transmission losses and constraints, and system operation requirements. They can be very volatile on time scales from hours to seasons. However, vertically integrated firms have correspondingly reduced exposure to spot market prices and forward markets exist to allow market participants to manage their spot market risks. The operation of the wholesale spot market is regulated and monitored by the EA.

25. A significant feature of the New Zealand electricity market is the presence of the Tiwai Point aluminium smelter, which takes around 15% of New Zealand's annual demand. At periodic electricity contract renewals, the threat of its exit has created significant uncertainty for generation investors, as well as significant economic uncertainty for the local population who are reliant on it for jobs. It has successfully negotiated significantly lower prices than those observed in the wholesale market. Following a Discussion Paper which observed that such arrangements may lead to inefficient price discrimination which are not in the longer-term interests of consumers, the EA amended the industry code imposing greater regulatory oversight to deals of more than 150 megawatts. The Smelter's latest supply contract expires in 2024 creating a material price risk in the market in the short term depending on whether it continues, exits, or negotiates a further short-term supply agreement.

3.1. Performance of New Zealand's electricity industry

26. The EA considers that the New Zealand electricity market served consumers well during the decade prior to mid-2018. It delivered increased retail competition and stable prices, secure and reliable supply, and in 2017 reached around 86% renewable electricity sources based on capacity. Also, wholesale electricity prices were mostly determined under competitive conditions, and average prices tracked the cost of new supply.

27. However, since mid-2018, following a significant outage at the Pohokura gas field (New Zealand's principal gas field), electricity spot prices have risen and have generally remained well above the average levels that prevailed prior to the gas field outage. A review by the EA over the period 2019 to mid-2021 concluded that prices over the review period had, at least to some extent, reflected underlying supply and demand conditions – a sign of a competitive market. But it also found that the sustained upward shift in the average price

level was not fully explained by gas supply uncertainty or other factors that could be accounted for in the model, and that the pipeline of new supply was thin. Accordingly, the EA considered that that generator-retailers may have been exercising market power during the review period. Since the review period, spot prices have tended to be volatile.

4. Competition and regulatory roles in New Zealand's energy markets

28. Regulatory oversight of New Zealand's energy markets is primarily split between the three organisations below. This includes oversight of the institutions and legislation governing the production and supply of energy and related services, particularly electricity, natural gas, and liquid fuels.

1. The Ministry of Business, Innovation and Employment, which is responsible for industry strategy and policy, advising Ministers, and developing legislation. It also monitors the energy sector and publishes detailed data on the sources and uses of energy, energy balances and prices. It has a central role in monitoring and advising on energy markets to ensure that electricity, gas and liquid fuel are delivered in a safe, efficient, fair, reliable and environmentally sustainable manner.
2. The EA, which is the market regulator that, amongst other things, develops and sets market rules, enforces and administers them, and monitors the market's performance. It is also charged with promoting competition and the reliability and efficiency of the electricity industry for the long-term benefit of consumers.
3. The Commerce Commission, which is the economic regulator for transmission and distribution by setting revenue limits and reliability standards, and enforces general competition laws.

5. The challenge of incentivising renewable electricity generation investment to meet decarbonisation goals

29. The New Zealand Government has an aspiration of being 100% reliant on renewable generation of electricity by 2030, and New Zealand has also set into law a target for net zero greenhouse gas emissions by 2050. To achieve the aspiration of being 100% renewable by 2030, there is a need to accelerate development of new renewable electricity generation, and ensure the electricity industry and market can support even higher levels of renewables.

30. The current primary toll being used in the electricity sector to tilt generation investment in favour of renewable sources is the New Zealand Emissions Trading Scheme (ETS). This scheme involves the Government setting and reducing the number of 'emissions units' (representing one tonne of emissions) supplied into the scheme over time. This limits the quantity that emitters can emit, in line with New Zealand's emission reduction targets. Businesses who participate in the ETS can buy and sell units from each other. The price for units reflects supply and demand in the scheme. This allows businesses to make economically efficient choices about how to reduce emissions.

31. However, to achieve 100% reliance on renewable electricity generation, the replacement of fossil-fuelled generation with renewable electricity is also required. It is estimated that investment of 400-500 megawatts of new supply is needed every year until 2050. This is six times greater than the average annual investment over the past decade.

32. A recent survey found that committed investment is now ~2.5 times the average rate achieved in the last decade and there is a substantial ~8,000 GWh/year of actively pursued renewable generation that could be in service by 2025. Most of those projects are solar farms, for which there has been high interest in developing by overseas developers. So, although renewable generation investment has increased, it is still not at the level required to meet the Government's decarbonisation goals, and we are falling further behind the target every year.

33. Further, since 2019, wholesale prices have been substantially above the cost of adding new generation capacity. In a competitive market, entry by new suppliers or an expansion by existing generators occurs when prices exceed, or are expected to exceed, the cost of new electricity supply for a sustained period. This would then put downward pressure on prices until they reflect the cost of new supply.

34. The EA considers that these observations raise questions about whether reliance on conduct measures and competitive entry by new supply is sufficient for promoting wholesale market competition during the transition to 100% renewable generation, for the long-term benefit of consumers. This is not just in relation to replacing fossil plants with renewable sources, but also in relation to adding capacity to allow for the electrification of vehicles and decarbonising process heat. Most notably, the EA considers that these problems raise questions about whether there are impediments (including anticompetitive barriers) to entry by new renewable sources.

35. In a recent paper,¹ the EA assessed whether electricity market design, structure, and conduct requirements required change to promote competition. Despite the lack of required renewable investment, the EA considered that reliance on the current conduct-based measures remains broadly appropriate for the transition towards 100% renewable electricity (although it did note there are opportunities to strengthen these measures). It did not consider that fundamental structural options, such as virtual asset separation, are justified by the currently available evidence.

36. In the paper, the EA outlined some options it considered could incentivise the entry by new generation, including providing greater regulatory certainty to investors, making it easier to get planning consents, and making it easier for overseas investors to invest in generation projects in New Zealand.

37. We briefly outline below three interesting potential barriers that were identified by the EA as potentially impeding investment of renewable electricity sources.

5.1. Low predicted wholesale prices

38. The Market Development Advisory Group (MDAG), which is an independent body established by the EA to provide advice, has identified that low predicted wholesale prices may act as a potential barrier to new investment in renewable sources. However, the wholesale market would nonetheless be workable even with low wholesale prices.

39. Since its inception, the New Zealand wholesale electricity market has relied on supply from fossil fuelled generation to meet demand. The short run marginal cost (SRMC) of this plant is closely linked to fuel costs and is much higher than the SRMC of renewable sources, so owners of renewable generation sources normally earn significant Ricardian

¹ Electricity Authority, Promoting Competition in the Wholesale Electricity Market in the Transition Toward 100% Renewable Electricity (Issues Paper). Available at: <https://www.ea.govt.nz/assets/4-Monitoring/Issues-Paper-Promoting-competition-in-the-wholesale-electricity-market-in-the-transition-toward-100-renewable-electricity.pdf>

rents. In periods of high availability of intermittent renewable generation, which are bid into the market at low or zero prices to ensure dispatch, spot prices may collapse to very low levels, as has been seen in the South Australian market.

40. If New Zealand transitions to 100% renewable electricity, and keeps the current market design, there is a question as to whether spot prices can be high enough to encourage enough investment in renewable generation to meet demand in future.

41. The MDAG has begun a programme of work aimed initially at understanding the issue, as well as other issues relating to the operation of the wholesale electricity market under 100% renewable electricity.

5.2. Government Policy

42. Government policy, although if well designed can encourage new investment, may also act as a barrier to new investment in renewable sources. A recent example of such a policy that was identified by the EA is the New Zealand Battery Project.

43. The Government is investigating pumped hydro storage and other alternatives as a solution to the ‘dry year problem’ when hydro catchments are low and fossil fuels are burnt to generate electricity to cover the shortfall. This is known as the New Zealand Battery Project.

44. Pumped hydro technology involves transferring water between two reservoirs at different heights. Water flows from one reservoir to the other through tunnels, passing through a power station. When electricity demand is low or when surplus power is available, electricity is used to pump water from the lower reservoir to fill the upper reservoir. When water stored in the upper reservoir is released, it flows down the tunnels to drive turbines that generate hydro-electricity. Water in the upper reservoir effectively acts as a battery, as it can be released to generate electricity when it is needed during times of high demand or during dry years.

45. In its paper, the EA states that the New Zealand Battery Project has the potential to change the competitive landscape, and advised that renewable developers identified uncertainty around this project as an impediment to future renewable development.

46. The EA identified that, in the medium to long term, there is uncertainty around the ability of the market to deliver on generation or demand flexibility solutions at a scale that provides sufficient competition for stored hydro in providing flexible generation during extended periods of low wind and sun. Greater clarity around the scope and timing of the New Zealand Battery Project would help reduce a material source of uncertainty.

47. The EA proposes to invite the Government to bring forward the completion this project, as well as some other Government-initiated energy projects, as it considers reduced uncertainty would contribute to more renewable generation investment sooner.

48. In addition to bringing forward the New Zealand Battery Project, the EA also proposed to invite the Government to bring forward its plan to phase out natural gas, as it considers reduced uncertainty about this plan would contribute to more renewable generation investment. This is because natural gas will be needed as a source of back up renewably sourced electricity to provide security of supply, both during sustained dry periods and for year-round peak demand, and this need is likely to become increasingly variable. Such a reliance on natural gas will continue until the New Zealand Battery Project comes online or another source of back up energy becomes available.

5.3. Access to de-risking arrangements

49. Finally, lack of access to certain de-risking arrangements, such as offtake or firming arrangements, can act as a potential barrier to new investment in renewable sources.

50. Having an offtake or firming arrangement has historically been a pre-requisite for new entrant generators to proceed with a project in order to access project finance. Access to such arrangements has been identified as an emerging issue for independent generators investing in intermittent renewable generation like wind and solar. If a lack of access to effective financial risk management products becomes an issue, it could make it harder for such generators to put together a supply agreement with end-use purchasers, which could then impede independent investment.

51. This issue has been recognised by the EA, and it proposes to regularly collect information on offtake and firming agreements to understand and build the evidence base about the nature and scale of this issue, and identify potential responses it could undertake.

6. Conclusion

52. Like New Zealand, many countries who have set decarbonisation goals will be facing the challenge of incentivising new renewable electricity generation investment, whilst managing security and reliability of supply. While New Zealand has some unique attributes and excellent renewable resource endowments, the transition to higher levels of renewable generation will be no less challenging than in overseas markets.

53. In the transition to higher levels of renewable sources, there are likely to be more opportunities for some market participants to have pivotal positions in meeting demands. Regulators will need to be alert to such situations and ensure that conduct monitoring and interventions are effective in countering opportunities for exercise of market power. It will also be important to design markets that enable effective demand-side participation that allows low-cost flexibility resources to compete effectively in traditionally supply-side dominated markets.

54. Further, adherence to enduring principles of good regulatory and policy practice such as consistency, predictability, independent expert regulators and competition authorities, will be critical in the face of a potential clamour for intervention to ensure investor confidence in stable, predictable markets so that there can be timely investments made in new generation capacity.

55. Such measures will go some way to enabling countries to meet their decarbonisation aspirations.

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