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Submission on: Discussion Document: Accelerating renewable energy and energy efficiency

New Zealand Aluminium Smelters Limited ('NZAS') is pleased to have the opportunity to provide a submission in response to the consultation document *'Discussion Document: Accelerating renewable energy and energy efficiency'* (the 'Discussion Document'). Nothing in this submission is confidential.

NZAS is the operating company for the aluminium smelter at Tiwai Point in Invercargill which is managed by Rio Tinto (79.36% ownership) in joint venture with Sumitomo Chemical Company, Limited, a Japanese company. The Tiwai Point smelter is a world-class facility which contributes around half a billion dollars to the Southland economy annually (6.5% of Southland's GDP[1]) and supports more than 2,600 direct and indirect jobs in the region. In 2019 NZAS made NZ$422 million in payments to New Zealand suppliers, including NZ$58 million to suppliers in Southland. NZAS is the only smelter in the world producing ultra-high purity aluminium using hydro-electricity generated from renewable sources, giving it one of the lowest carbon footprints of a smelter anywhere.

In this submission we will explain further how the smelter provides grid stability by providing constant baseload into the system, that it has the capacity to provide black start for the system operator should the grid trip, and how it is developing its existing capability to take load off during dry winters and continuing to work on commercialising this service. Already producing some of the lowest carbon aluminium in the world, technology is currently being commercialised which could potentially see NZAS produce the only zero carbon aluminium. The smelter is a key part of New Zealand's low carbon future and contributes to the growth of this country's already enviable level of renewable generation, however for this to be realised the smelter requires more internationally competitive power and transmission pricing.

Rio Tinto, NZAS' majority owner, is currently undertaking a strategic review of its interests in NZAS, which pays one of the highest delivered electricity prices, outside of China. It is this very high electricity and transmission cost which has resulted in aluminium production at the smelter ceasing to be internationally competitive for its owners. We are continuing to seek a solution to secure NZAS' future as a vital contributor to the New Zealand economy and believe that the smelter has a role to play in supporting the transition towards greater use of renewable energy, as well as contributing to the New Zealand economy more generally.

In this context, NZAS supports action by the New Zealand Government to ensure that NZ delivers on the international commitments made under the Paris Agreement, including through accelerating the transition from the use of fossil fuel to renewable energy and reducing emissions through increased energy efficiency. NZAS is the largest single user of electricity in New Zealand, consuming around 622 MW per annum across three large aluminium smelting "potlines" and one smaller quarter-sized potline that was restarted in 2018.

[1] Venture Southland: The economic and social impacts of NZAS on the Southland Economy summary, 2019

Manapouri power station, was purpose built to power the smelter. Today, Manapouri's generation meets around 90% of NZAS' power needs on average, with the remainder coming from the grid. There is strong co-dependency between Manapouri and the smelter as the grid has not been designed to enable one to operate without the other.

Without NZAS' load in Southland, Manapouri's ability to supply power into the grid would be restricted until transmission upgrades are in place to enable it to transfer the power to the North Island, where it could displace thermal and other generation capacity. Transpower has estimated the full cost of transmission upgrades necessary to deliver Manapouri's full load as far as Auckland would be around $600 million and would take 5 to 8 years. This investment would be on top of an already significant planned works to maintain the existing grid, including a significant project to ensure Auckland and surrounding areas maintain system stability in the face of a significant reduction in thermal generation to date, and in the future to achieve a fully renewable electricity system.

We understand that, without NZAS, Transpower would need approval to upgrade the grid, which would be granted if the Commerce Commission is satisfied that investment will deliver net benefits to customers that outweigh the benefits of other options such as North Island renewable generation. Manapouri generates some of the lowest cost hydro power in the world. This was confirmed by current CEO Neal Barclay in 2012, when he said; "We benchmarked the power station against 700 other hydro generators around the globe, and we found that Manapouri is in the top three power stations in the globe in terms of efficiency and profitability of output".[2] However, the Commerce Commission would have to take account of the cost of moving power from Manapouri to the upper North Island. It would have to consider the cost of the grid upgrades as well as the line losses and could in fact find that building renewable generation closer to this load provides a better outcome for consumers than the extensive grid upgrades required to move the power from distant generation.

The Commerce Commission would also have to consider the price customers could expect to pay for power rather than the cost of generation. The Electricity Authority monitors the electricity market's performance against a standard of "workable competition"[3]. In a workably competitive market, the cost of incumbent and new entrant generation sets a limit on the prices a generator can charge, rather than the operating costs of that generator. Therefore, the price charged for Manapouri power delivered over 1,500 kilometres to, say, Auckland may not be lower than the cost of locally generated renewable power.

New Zealand is very rich in renewable energy resources and has a large range of identified projects which could be developed to accelerate industry's transition away from fossil fuels to renewable electricity. A large stable load helps to underpin national electricity demand and support investment in new generation. In its "Electricity demand and generation scenarios" report of 2019, MBIE found that if the smelter closed at the end of its current electricity contract in 2030, the effect would be to materially reduce the need for new generation capacity to be built, even with the decommissioning of 400 MW of Huntly generation units[4]. New Zealand has renewable resources to develop enough renewable electricity generation to supply the smelter as well as transition customers using thermal energy to electricity and reduce thermal emissions. In New Zealand we have the opportunity to leverage that competitive advantage to grow our economy and jobs while simultaneously reducing emissions.

The large, stable, base-load electricity demand of NZAS is unmatched by any other load in New Zealand. Even as other businesses transition from other fuels to electricity, it will take many years before their load comes close to that of NZAS. Fonterra, for example, which uses coal to generate process heat in boilers, advised the

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[2] https://www.youtube.com/watch?v=bYdn05eA2VY

[3] Industry and market monitoring: Competition, Electricity Authority, 31 August 2011.

[4] "Electricity demand and generation scenarios: Scenario and results summary", MBIE, July 2019.

Electricity Authority at an oral submission on the Transmission Pricing Methodology Review on 2 December 2019, that with full conversion of coal-fired boilers to electricity they had the potential to consume between 225 MW and 375 MW at peak demand by 2050, and that it was very likely they would increase electricity use in the South Island by 24 MW to 40 MW by 2030.

Aluminium is a lightweight metal that is almost infinitely recyclable making it an ideal metal for the future in a decarbonising world. NZAS produces some of the highest purity aluminium in the world and is the only smelter to do so with hydroelectricity. On site, NZAS has taken every opportunity to reduce emissions where it is commercially sustainable, reducing emissions by 55% from ~4.5 tCO_2-e/t aluminium to ~2 tCO_2-e/t aluminium since 1990. These characteristics of NZAS position it as a favourable industrial load in a carbon constrained world. If aluminium were not produced at NZAS it is likely the capacity would be replaced by aluminium smelters in China using coal-fired electricity, leading to an increase in global carbon emissions. NZAS is a carbon emissions efficient business.

Powered by renewable hydro-electricity, NZAS has one of the lowest carbon footprints of a smelter in the world, emitting around 15 tonnes less of CO_2-e per tonne of aluminium produced than its coal-fired competitors. Despite using up to 12% of total generation, aluminium production contributed only 0.7% of national emissions in 2015[5]. NZAS is now one of a small number of smelters which has its metal certified by the Aluminium Stewardship Initiative and marketed by Rio Tinto under its 'RenewAl' Brand[6]. This certifies the aluminium is made from traceable raw materials and is produced with electricity from low carbon sources, using world class smelting processes.

There is the potential to significantly reduce on-site emissions at NZAS in the future. Rio Tinto, Alcoa, Apple and the Government of Quebec have announced a joint venture called "Elysis"[7] supported by the Government of Canada which looks to scale up and demonstrate the economic viability of an alternative process for making aluminium that does not release CO_2 as part of the underlying chemical reaction. The joint venture is targeting the middle of this decade to demonstrate this process at an industrial scale. The applicability and economic viability of retrofitting this, as yet undeveloped, process to NZAS (or to any other site) is at this stage unknown. It should also be noted that this process is potentially significant only where the emissions of a smelter's electricity supply are low, such as NZAS. As with any major capital investment at an aluminium smelter, the possibility of retrofitting the process will depend on the ability of NZAS to secure an internationally competitive electricity price for the long term.

Given electricity is such a significant input to aluminium smelting, the search of energy efficiency improvements to increase energy productivity is core to NZAS' business. In order to be internationally competitive, all smelters need to continuously improve their efficiency through investment in the latest smelting technology. Rio Tinto has a world class smelting technology group that works with all Rio Tinto's smelters to develop projects to continuously improve smelter energy efficiency. Although NZAS is nearly 50 years old, aluminium smelters can retain competitiveness for decades through continued investment in the latest smelting technology. Today NZAS remains a highly technically efficient smelter and, with the right settings to drive continued investment, can remain technically efficient for decades to come.

While aluminium smelters require a secure supply of baseload power, NZAS also has the ability to provide load flexibility when the grid is under pressure. NZAS can drop load almost instantaneously to help stabilise the South Island grid in the event of a sudden loss of generation. NZAS can also play a role in system "black start",

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[5] New Zealand Productivity Commission. (2018). Low-emissions economy: Draft report. Available from www.productivity.govt.nz/inquiry-content/low-emissions-draft-report p30 (Figure 2.6)

[6] For further information, refer to: http://www.riotinto.com/aluminium/renewal-low-co2-aluminium-20272.aspx

[7] https://elysistechnologies.com/en

which is the recovery of the system after a serious outage. The very large and stable load that NZAS provides, can be brought back first to stabilise the system as generators are brought back into service.

In addition, NZAS has an obligation to reduce consumption for an extended period at Meridian's request during a period of very low hydrology. NZAS also has the ability to reduce its load by smaller amounts as a dry period develops. NZAS has regularly responded to dry year risk. Given that that demand response from the smelter is likely to become more valuable to the grid as thermal generation exits and investment in intermittent generation grows, NZAS is currently doing work to improve its ability to provide a demand response.

In addition to its role in supporting New Zealand's policy to accelerate renewable generation and energy efficiency, having NZAS' load in the market also has other benefits for customers.

Transpower's current investment plans are focussed on improvements to North Island reliability, particularly to improve and maintain voltage stability in and around Auckland, to manage the exit of thermal generation which has historically provided that service. If NZAS were to close, this would not only increase the transmission investment required, but we understand it could also lead Transpower to reconsider its priorities and refocus on upgrading the lower South Island grid. In addition to having to pay for additional transmission investment, customers would also see increases in their transmission costs to cover the lost transmission revenue from NZAS and keep Transpower whole. By NZAS remaining in the market Transpower is better able to contain transmission prices as well as maintain its priority investing in reliability of supply in the North Island.

NZAS brings a wealth of other benefits to New Zealand, extending beyond the electricity industry and energy efficiency.

Operating a smelter requires highly skilled and trained staff. During the nearly 50 years NZAS has operated, the smelter has been a training ground for many university graduates who have taken those skills to other businesses throughout the country.

It has supported light metals research at Auckland University for many years. Initial research sponsored by Rio Tinto at the university has led to the development of the Enpot Technology which, although not found to be suited to NZAS' requirements, has been installed in one European smelter and is being marketed around the world.

NZAS has supported the growth of other businesses. One is Southland's Yunca Holdings Limited, which currently indicates that its aluminium smelter work over the past 20 years totals over 1,000,000 hours, with an estimated 200,000 hours spent on site, including work with several smelters outside New Zealand.

Sale of aluminium produced at NZAS accounts for 2% of New Zealand's entire foreign exchange, and aluminium is New Zealand's largest export to Japan, supporting the trading relationship between the two countries.

NZAS has experienced longstanding strong and stable support from its owners. Both Rio Tinto (through its acquisition of Comalco) and Sumitomo Chemical Company Limited have been owners of NZAS since it was developed and have patiently supported it financially through lean years as well as better times.

For NZAS, a workable energy and climate policy that maintains competitiveness for trade exposed industries during transition to a low-carbon economy is fundamental. NZAS has brought considerable benefits to New Zealand over nearly 50 years and can continue to support NZ's decarbonisation through accelerating renewables and energy efficiency, provided the settings are right and NZAS is able to secure competitively priced power to support a sustainable business for the long-term.

If you would like to discuss our comments further, please contact either Lesley Silverwood, Director Energy by email Lesley.Silverwood@riotinto.com,or Jennifer Nolan, Director External Relations on (04) 916 1496 or by email Jennifer.Nolan@riotinto.com.

Yours sincerely

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