Renewable Energy Zones
National Consultation 2022

Elemental Group

energy estate

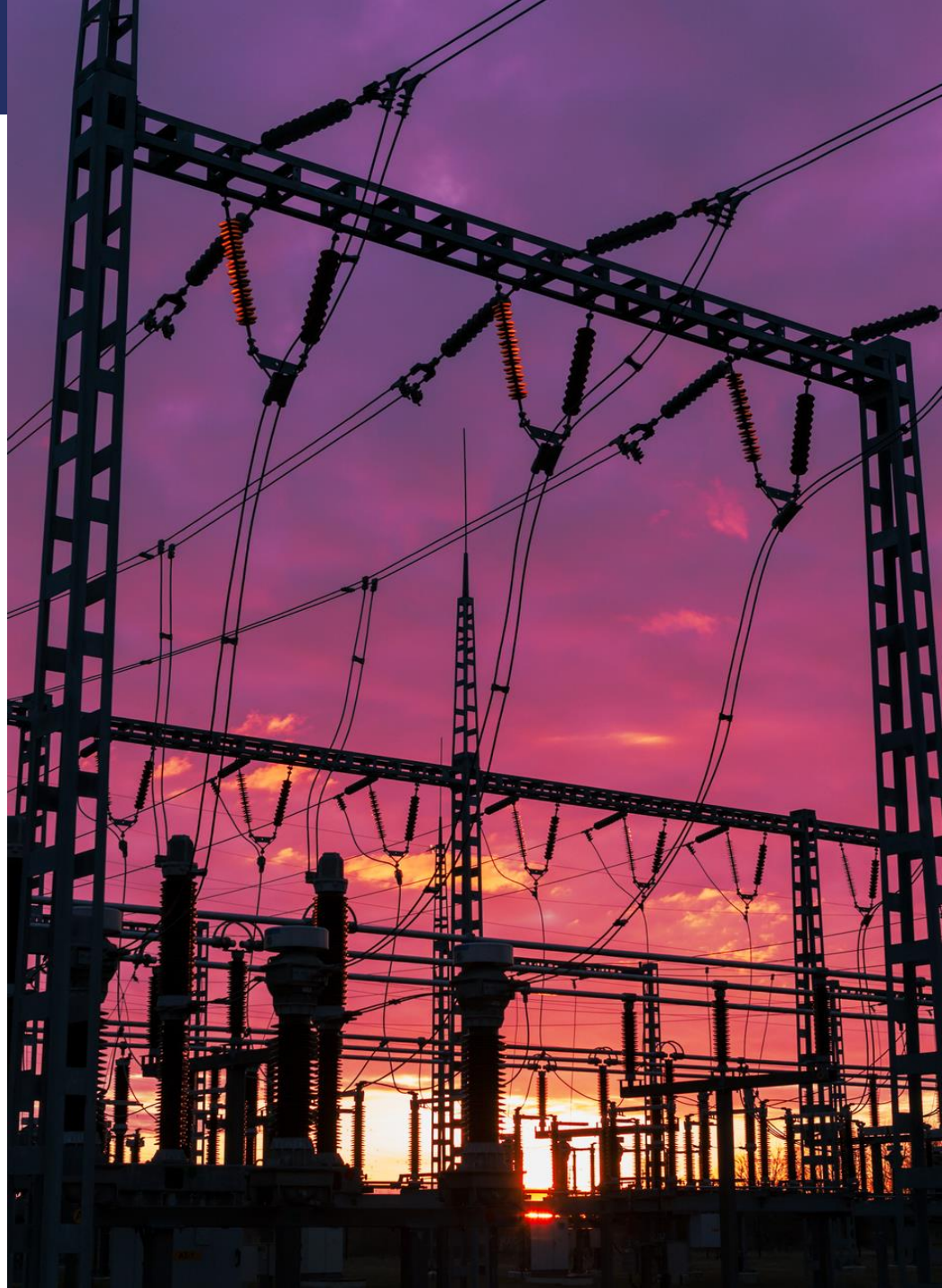
Introduction

We are delighted to submit a response to the Renew Energy Zones National Consultation.

Energy Estate and Elemental Group are active participants in the New Zealand energy market. We are developing onshore and offshore wind projects, solar, storage and green hydrogen/e-fuels projects in a joint venture called Kakariki. Each of us also provides a wide range of advisory services to the market including repurposing of existing energy infrastructure, strategic, commercial and technical advice, development services and supporting the development of clean industrial clusters.

We strongly support the development of REZs in New Zealand which we view as a critical enabler for rapid decarbonisation and a vehicle to change the vision from the status quo- which is locking in high prices and energy insecurity to a future of 600% renewables as well as a thriving domestic industry and export markets.

In our submission we have provided responses for the questions posed in the REZNC and included background material and further analysis which you may find helpful including a summary of our development principles) .



Elemental Group

Development Principles

Traditional owners first

Commitment to the UN SDGs

Targeting biodiversity outcomes

Using and amplifying 'local'

energy estate

accelerating the transformation of the energy sector

We strive to help our partners and clients achieve net zero outcomes and passionately advocate for local supply chains and capacity building. Our development principles embed the Sustainable Development Goals in all aspects of our business.

Our goal is to deliver a portfolio of onshore wind, offshore wind, solar, green hydrogen/e-fuels and transmission projects focused on renewable energy zones and industrial precincts.

By taking our current pipeline of projects through development, construction, and into operations, we will seed the next generation of decarbonising infrastructure.

SDG artwork by Jordana Angus of the Wiradjuri people

Development

Wind

Solar

Energy storage

PHES

Hydrogen

Acceleration

Green chemicals

Industrial precincts

EVs and transport

Sustainable mining

Advisory Services:

Commercial Development
Master Planning
Transition planning

About Elemental

Overview

Elemental Group is an employee-owned energy consultancy headquartered in New Plymouth with offices in Perth and Port Moresby. We provide a full range of professional geoscience, science, engineering, environmental, project management, and financial modelling services for the energy sector.

Elemental Group was established in 2012 focusing predominantly on oil and gas opportunities. In 2014 the company recognised a need to focus on renewable energy and the environment, bringing in additional experts to develop those capabilities. Since then the company has completed 4 MW of NZ, Australian, Pacific and Caribbean studies or projects in wind, batteries and solar.

The company has 12 staff and uses up to 80 consultants as project needs dictate. The switch to include renewables has been very beneficial for the company, especially as petroleum work has taken a hit with the NZ government's decision to ban oil and gas exploration from 2018. The company is now focused on building renewables to 80% of their income while developing clean technology assets in conjunction with Energy Estate.

Relevant Experience

Elemental and its personnel have been involved in:

- 30 solar projects in the Pacific Islands and Caribbean ranging from 100s kW to MW scale
- Nauru 1.1 MW solar power plant construction (would be NZ's largest installation)
- World bank African 50 MW solar plant IPP agreement
- UAE 100 MW Solar IPP agreement including EPC, O&M, Finance and PPA
- 1 GW IPP programme in South East Asia
- 100 MW Solar PV plant IPP in UAE
- Samoa 550 kW cyclone resistant wind turbine integrated into small grid
- Wind resource prediction analyses for multiple wind farms of 100 MWs
- Planning inputs for consenting purposes
- Layout optimisation for wind farms
- Energy consenting for offshore energy projects

Q1. Do you agree that the first mover disadvantage and high connection costs can be challenges for connecting new renewable generation and/or large electricity loads to the electricity network?

Yes we agree.

This is an issue in New Zealand and other markets globally. High connection costs for new generation is a major concern for achieving net zero and deep decarbonisation, particularly as existing thermal generators benefit from connections which were often funded in a different regulatory environment and their connection costs were smeared across the energy system rather than being directly incurred by the generator and adding to the LCOE of the new generation asset.

The first mover disadvantage is a challenge for new generation and new loads in a New Zealand context. This is a disincentive in the context of areas where there are potential renewable energy zones (such as Northland). This also applies in the case of new large loads where there are other potential energy users such as new or growing industrial clusters such as Marsden Point or Kowhai Park (new cluster located next to Christchurch International Airport).

We believe that the speed and scale of the energy transition means that the existing rules for the sector which were designed for a different time need to be transformed. We are strong proponents of the need for collaboration between new renewable generators in order to efficiently design and deliver the new and augmented transmission infrastructure that is required to connect new generation to the transmission grid.

One point to note is that efficient utilisation of new transmission infrastructure is not always compatible with new VRE with capacity factors of 50% at best. This is a factor to be taken into account in design of renewable energy zones such as focussing on zones with a diversity of renewable resources and incentivising storage at appropriate points in the system to enhance utilisation of the new infrastructure. We strongly support the REZNC focussing on new loads as well as connecting new generation as we believe this can reduce overall costs to energy users in a transitioning system with higher levels of electrification.

Q2. Do you think the concept of a Renewable Energy Zone could be beneficial in a New Zealand context?

Energy Estate and Elemental Group believe renewable energy zones can play a significant part in the New Zealand energy system.

We have been actively promoting the REZ concept over the last year including submissions to InfraCom. A copy of our submission to InfraCom is attached as an appendix to this submission. This includes details of potential challenges and how they can be mitigated (see slide 30).

Key points to note include:

- **Social licence** – we have highlighted in our submission the issues that are faced gaining and maintaining social licence for REZs. One of the key issues for us is spreading the benefits as wide as possible across the host and affected communities and landowners rather than just the "lucky ones" who end up with wind turbines and solar farms on their land. The scale and structure of the payments made to hosts of transmission lines is an area we believe needs greater consideration than has traditionally been the case.

- **Enhanced collaboration** – REZs offer the opportunity to get market participants to collaborate – around issues such as engagement with stakeholders and avoiding community engagement fatigue, supply chains and infrastructure such as road and bridge upgrade, working together to achieve high value biodiversity outcomes, training and REZ transmission infrastructure design.

- **Avoiding the sugar hit** – this has been a material issue in other jurisdictions, with an abundance of construction jobs dwarfing the enduring jobs for the region where RE projects are built. A well structured REZ can help address this issue by programming the build-out over a longer period.

- **Regional capacity building** – This is a key attribute of a REZ which has been identified in jurisdictions such as NSW. It will be important to invest in training in the relevant regions such as Northland with a particular focus on skills shortages in high voltage and wind technicians. Early engagement with local businesses to encourage them to participate in the supply chain is another benefit for the regions. We have found that local suppliers and businesses often don't realise that there are opportunities such as civil works, fencing,

Q3. What region(s) do you think would be suited to Renewable Energy Zones? (1/2)

We have undertaken extensively analysis of the opportunities for REZs in New Zealand, taking into account key factors such as:

- renewable energy resource
- existing T&D network
- existing and potential new load
- replacement of thermal generation
- fuel switching opportunities including gas, oil, aviation and shipping fuel, LPG
- potential for partnerships with iwi
- buildability of transmission and new renewable energy zones
- competing land use including farming, horticulture and forestry and
- ability to build and maintain social licence for new transmission and new renewable generation and storage assets

We support the development of the first REZ in Northland. We have included details of our analysis in the appendix.

The other regions we would suggest to prioritise are:

- **Taranaki** – strong onshore wind resource, world class offshore wind resource, existing infrastructure and load (including large energy users in the dairy industry looking to electrify), significant PtP opportunities
- **Southland** – world class onshore wind and offshore wind resource, smelter and dairy industry demand, PtX potential
- **South Hawkes Bay/North Wairarapa –** world class onshore wind resource, reasonable solar resource and proximity to robust infrastructure, low population density compared with other regions

Q3 What region(s) do you think would be suited to Renewable Energy Zones? (2/2)

Waikato – strong onshore resource, reasonable prospect of solar (though constrained by competing land use issues), strong offshore wind resource, robust infrastructure, retiring thermal generation, close to main loads in NZ and growing local load. Please see this recent article highlighting the potential in the Waikato region. https://www.stuff.co.nz/environment/300535957/the-goldilocks-region-for-renewable-energy .

The map on p21 of REZNC only includes part of the Waikato region. We believe this underplays the very significant opportunity in this region where there is a globally unique combination of existing hydropower, existing and potential geothermal, high quality onshore and offshore wind resource and potential solar power development. This is coupled with proximity to the backbone infrastructure and demand centres and existing BF nodes such as Huntly with retiring fossil fuel generation. The progressive actions of WRC as demonstrated by their geothermal development strategy further underline the attractiveness of a Waikato REZ.

Canterbury region - The map on page 21 does not identify any clusters around Canterbury. We believe that this region is well placed for development of new large scale renewable energy projects including solar and wind. The proposed **Kowhai Park cluster at Christchurch airport** is a good example of the real potential in this region. Proximity to robust transmission infrastructure, green fuel demand from aviation and shipping, large scale dairy operations and abundance of hydro generation in the region and to the south are other attractive features. We believe that clean industrial clusters are often best located where they build on existing strengths and the Canterbury region benefits from having a large existing workforce which is not the case every other suggested regions in NZ.

Other regions - More broadly we believe green revitalisation of the forestry industry can create new clusters across NZ. The recent announcement of the expansion of the Whakatane paper mill is a sign of the positive future for this industry - especially as it comes so quickly after the proposed closure of the mill. https://www.nzherald.co.nz/rotorua-daily-post/news/whakatane-mill-gets-expansion-green-light-after-nearly-closing-last-year-securing-hundreds-of-jobs-for-region/QJE6HMU7ESI6TSZHRMQTKMTY4Y/.

Forestry regions often benefit from robust grid infrastructure as well as having the required skills, social licence for industrial scale developments and willingness to embrace the opportunities in green manufacturing and supply chains.

Q4. What benefits do you think should be considered in the decision-making process for Renewable Energy Zones in New Zealand?

The benefits we suggest be considered include:	
1	System design rather than responding to individual connection enquiries
2	Reduced costs to consumers through efficiencies of design and use of new and augmented transmission infrastructure
3	Ability to embed development principles into the connection process – this is the approach being taken in NSW where the NSW Government has indicated through the Roadmap process that generators wishing to connect to a REZ will need to meet certain criteria such as how they have engaged with hosts and affected communities over and above the requirements under the planning regime
4	Enduring employment opportunities for a region
5	Encouraging developers to look at shared infrastructure such as storage rather than each developer pursuing their own approach regardless of the impacts on and benefits for the wider system
6	Co-ordination of community engagement and trying to avoid consultation fatigue
7	Pooling of community benefits and ability to focus on high impact benefits from the REZ rather than one offs such as "roundabouts"'
8	Attracting low cost capital into the sector to drive down the WACC for new generation and the transition
9	Attracting new loads – we have started to see this in other regions globally. Although NZ has high levels of renewable electricity a well designed REZ can attract new energy intensive loads which want access to secure renewable energy not just electricity such as food processing and sustainable building materials

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Q5. Do you agree with the proposed guiding principles? Are there any that you would change or add? (1/2)

We have commented below on the proposed principles and on the following page suggested some additional principles can be incorporated into the REZ design and delivery strategy for New Zealand

We agree with **GP01** and note that REZs should not just focus on unlocking new RE resources but building on existing RE generation and the complementarity of the renewable resources. REZs which are focused on just wind or solar have been the ones which we believe are the less attractive in the long run

We do not agree with **GP02**. This is harking back to the 'market knows best' principles which underpinned the first wave of liberalization and corporation of power markets globally. The concept of REZs must involve a strong element of system planning rather than being entirely driven by generators seeking extra capacity or users looking for low-cost solutions for their demand but which impact our energy users in the system. The examples you have give from other markets were not always driven by the market but often have been top down from the system operator and/or the Government to ensure that capacity was replaced in a timely manner and long term deamnd and net zero/decarbonization targets can be met.

We strongly agree with **GP03** from the perspective of ensuring that REZs benefit the local energy users. It is important the potential benefits for a region are considered – for example industrial development in the Northland region which benefits Top Power should be considered rather than the lines company seeking to put all the costs on to the REZ while in the long-term benefits will flow to the consumers through better utilisation of the existing assets and growth in the region.

4.1 Guiding principles for developing Renewable Energy Zones

01

REZs are built to harness and unlock renewable energy resource, storage and efficient network infrastructure to support the long-term decarbonisation and energy needs of Aotearoa, as well as the region hosting the REZ.

02

REZs are customer driven and are only built where there is clear demand from generation or load developers. This will help to ensure that a REZ is developed in line with the market, decreases the risk of investing significantly in infrastructure that may be underutilised or local consumers having to cover the incremental cost of network investment.

03

Local consumers will be no worse off as a result of developing a REZ. Our intent is to define a funding model that ensures new generation connections or demand developers cover the cost of the network investments required so that the additional costs associated with a pilot REZ in the Northland region do not fall on local consumers. The funding model needs to align with transmission and distribution pricing regulation.

04

REZs are developed through partnerships and collaboration with local iwi and stakeholders to ensure that regions hosting a REZ receive a net benefit from the development.

05

REZs deliver net benefits to Aotearoa's electricity system where existing connection processes cannot. For example, by increasing competition in the wholesale market to potentially lower regional electricity prices, increasing diversity or supporting reliability or security of supply.

06

REZ location and REZ participant selection are done via a transparent methodology to ensure potential regions and REZ participants are given the opportunity to build their case, including demonstration of any wider social, economic or environmental costs and benefits to the region.

07

REZs are enabled with minimal changes to the existing electricity regulatory framework. Large changes to the regulatory framework can take a significant amount of time to undertake and can have wide reaching implications to existing connected customers.

GP04 is one of the key guiding principles for our joint venture. If NZ fails to move to new ownership models for transmission this is a lost opportunity taking into account the precedents already established in the geothermal sector and the global examples such as Fort McMurray to Edmonton in Alberta.

We agree with **GP05** and note that one of the benefits of developing REZs is increasing global interest in the NZ energy sector which brings in new sources of capital and can increase delivery capacity (a major limiting factor for NZ which is currently seen as having high construction and delivery costs)

We strongly agree with **GP06**. The original ISP in Australia is a good example of REZ selection which involved too much desktop analysis and insufficient stakeholder engagement. There is no point locating a REZ based on abundant RE resources if the host communities are adamantly opposed to the designation. You will never satisfy all stakeholders – whether you are developing a new road or a REZ – but understanding the dynamics from the outset is key in our view.

We agree with the sentiments of **GP07** but note that tinkering with market design when power prices are consistently high, and NZ is facing new pressures from decarbonisation and energy security may require more holistic changes in the energy system in the near future.

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Q5. Do you agree with the proposed guiding principles? Are there any that you would change or add? (2/2)

We have set out below some additional proposed guiding principles:

- **Load:** We believe a renewable energy zone works best when there is existing and/or anticipated future load within or proximate to the REZ. In the case of Northland REZ, there is a reasonable level of load from Whangarei and existing industry in the region and the potential of new load at a revitalised Marsden Point and NorthPort, but the main load is likely to be the Greater Auckland load centre. One of the reasons we believe that local load is important is the social licence that is gained when the new wind, solar, geothermal and other generation assets and new and/or augmented transmission infrastructure help sustain and/or create enduring jobs in the region where the REZ is located. The opposite is true when all the REZ is doing is harvesting renewable energy and imposing material changes to thenatural environment of a region to service the energy needs of a far off load somewhere else in the country. Local load can also help overcome the concerns around a "sugar hit" – which is where there are a lot of construction jobs when a REZ is developed but all the opportunities drift away once the renewable energy projects and transmission is up and running.

- **Overall system efficiency:** While it is appealing to design REZs to capture the best resources, we advocate having a sharp focus on the overall system efficiency. REZs bring back a strong element of central system planning to the transmission system (and the wider energy system with the rapid move to decarbonise the NZ economy more generally).

- **What is the goal** – we strongly believe that the guiding principles should include delivering clean, affordable energy solutions for all New Zealand energy consumers, addressing energy poverty and creating new export industries for New Zealand.

- **Shared benefits** – this principle is embedded in the NSW Electricity Infrastructure Roadmap and Energy Estate and Elemental Group are passionate advocates of the need for REZs to deliver enduring local benefits – for example by mandating local employment, local content requirements, local training and iwi/local ownership of renewbale energy assets and new transmission infrastructure. We advocate working closely with the relevant unions and the wider union movement to embed best practice working conditions and practices into the REZ design.

- **Consistency with regional plans:** The regional plans promulgated by the regional councils in New Zealand are a key part of the planning framework and are based upon engagement with the local communities. We believe that there needs to be close interaction with the regional plans during the REZ design phase.

Q6. Do you agree with the proposed criteria for selecting suitable regions for REZ development? Are there any that you would change or add? (1/2)

We have commented below on the proposed criteria and on the following page suggested some additional criteria to be considered when selecting suitable regions

We believe this criteria is only part of the picture when analysing potential regions. Many of the REZs being developed around the world are focussing on unlocking the RE potential rather than just creating access for developers who spotted a region. The NSW REZs are good examples as the 3 REZs had limited developer interest due to lack connectivity UNTIL The REZ was announced

In general, REZs are usually located in areas of relatively low population density with correspondingly weak distribution grids in the absence of significant local industry (with dairy and forestry being the swing factor in NZ). We believe that REZs need to be transmission connected and then consideration needs to be given as to how you can utilize existing local network corridors to upgrade and augment the local capacity.

We strongly agree with the criteria. This is why designing REZs to benefit the system and not just the connecting generators is a critical selection and design criteria. The REZ design process needs to encourage storage and dispatchable generation alongside VRE.

4.3 Selecting regions for REZ development

- **Generation developer demand:** Are there already significant numbers of renewable generation developers seeking to build in the area?
- **Economically efficient network investment:** Is the estimated cost of network investment per unit of generation capacity ($/MW) lower in a REZ compared to connecting generation to the grid via current connection processes?
- **Network capacity in the region:** Are areas on the local network nearing capacity?

Other proposed criteria that could be considered:

- **Access to good renewable resource:** Does the region have high levels of wind, solar and/or other renewable resources in areas where lower cost land is available?
- **Potential added benefits to the grid:** Would additional generation and storage improve network resilience, diversity or enable interconnection investment deferrals?
- **Additional economic and social benefits:** Is there a socioeconomic case for investment in the region? For example, by enabling a just transition following departure of large industry.

We generally agree with this criteria, but this is a blunt tool which does not take into account wider benefits including facilitating new load and the additional social and economic benefits highlighted below. You may also wish to develop a REZ to reduce overall system costs by pairing, say, wind with existing hydro even if the connection costs are higher than another region which is a wind only region closer to load with cheaper connections. We believe this will be a key consideration for NZ when climate risk with hydro is taken into account.

You have raised two issues – Quality of resource and availability of low-cost land. Addressing the second issue - NZ has relatively high land costs and there are many competing land uses in most parts of the country. If you limit REZs to places with comparatively lower cost land you will not have many REZs! We do agree that selection of REZs must take into account competing uses for land.

This is a key criteria with Taranaki, Northland and Southland being obvious examples in NZ. REZs offer New Zealand the opportunity to diversify the economy away from the major population centres, and Auckland in particular, and build on the decentralised nature of the agricultural and forestry industries.

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Q6. Do you agree with the proposed criteria for selecting suitable regions for REZ development? Are there any that you would change or add? (2/2)

We have set out some additional proposed criteria for selecting suitable regions for REZ development below.

- **Social licence** – this is the key criteria for us particularly in a New Zealand context. In several countries we have seen REZs proposed in order to access high quality wind and/or solar resources without fully understanding the social values of the existing landscape and traditional owner's views. In our view this requires a level of in person and on the ground consultation with local iwi and hapu, local communities and a deep understanding of competing land uses in the REZ.

- **Access to suitable infrastructure** such as ports and roads and potential for affordable upgrades including benefits of shared infrastructure and logistics between REZ infrastructure, connecting generators and energy users/clusters.

- **Housing availability** – this has not been taken into account sufficiently in our view in REZ design anywhere to date. Many countries including NZ are suffering from acute shortage of housing, whether in large cities or the regions. The workforce needed to build-out a REZ will draw upon local resources but will inevitably result in an influx of additional workers into a region. We have seen repeated situations where this has pushed up housing costs and put more pressure on vulnerable groups. We would encourage this to be taken into account with the REZ design and implementation. If you get it right you can leave regions in a better position than before the REZ by being a net contributor to the housing stock – this could be achieved by requiring developers and their supply chains to build new housing as we have seen with some PPPs.

- **System benefits** – such as locating a REZ close to load centres and reducing dry season and interconnector risk and the need for new infrastructure at a transmission and distribution company level.

- **Access to workforce** – this is less likely to be an issue in New Zealand compared with places like Australia and Canada (where availability and cost is a factor – and this is covered in the ranking of the REZs in the Australian ISP through the comparative cost analysis).

- **Complementarity** – such as potential for large scale wind to be located close to existing large-scale hydro which could result in more storage capacity being available at certain times of the year and help to flatten peak electricity pricing.

- **Scaleability** – if the REZ is too small it is unlikely to drive down the connection costs and may not attract sufficient developer, investor or user interest.

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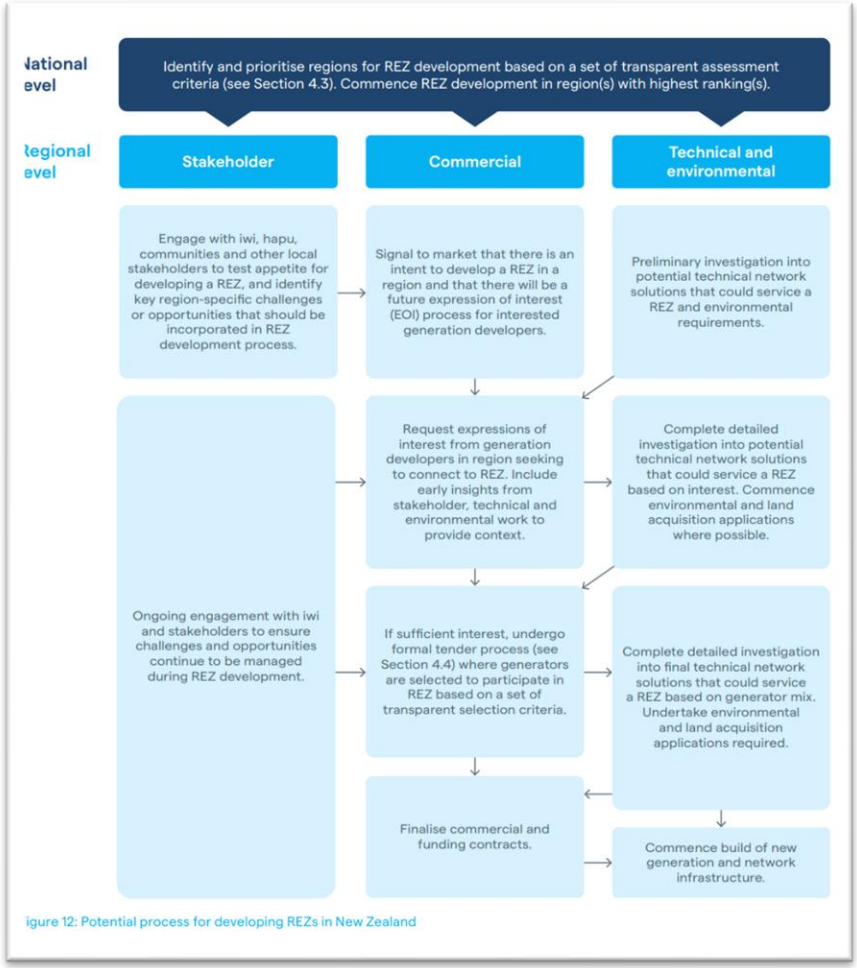
Q7. Do you agree with using a tender process for committing projects in a REZ? Are there alternative processes that could be considered?

We do not agree that the tender process described is entirely reflective of the approach being taken in Australia. There are several different approaches being taken at Federal and State level to deliver REZs including the use of the traditional RIT-T process for interconnection (especially when you deliver "many to many" outcomes and/or there are system side benefits from connecting a REZ). In some cases there are private led developments which may have direct or indirect Government support such as G-REZ in Victoria which builds off the designation of Gippsland as a Victorian REZ. The tender process is being pursued in NSW with the NSW designated REZs which do not overlap with the REZs in the ISP but it is critical to note each REZ TNSP role is being tendered separately, not just the opportunity for generators to connect.

We have included figure 12 from REZNC below and included our comments on the proposed process.

The regional reference group concept in NSW with a cross-section of local stakeholders including indigenous groups, councils, local MPs and business leaders is a useful approach to stakeholder engagement for the REZs.

A critical issue is who will take responsibility for land acquisition, planning and interface arrangements with Transpower and local networks? In NSW the current position is that this will fall on EnergyCo rather than the new TNSP or the generators



igure 12: Potential process for developing REZs in New Zealand

We would support a high level of industry participation in the design phase. The whole point of a REZ is to promote collaboration between the transmission, lines companies and generators rather than the "at twenty paces" approach that has been encouraged by the existing regulatory settings.

The REZ framework should also seek to promote collaboration in the design phase so generators look to develop projects which benefit the system and the REZ rather than just their own interests. This is the approach that Energy Estate has taken with WalchaLink and development of the New England REZ in NSW.

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Q8. Who should be involved with coordinating and undertaking the various steps within a REZ development process? (1/2)

Our suggested list of stakeholders to be included in a NZ context include:

Design phase

- Transpower
- Lines Companies
- Iwi/Hapu
- Regional councils
- Central Government – MBIE, NZTE, Ara Ake, other relevant ministries such as Treasury, environment, oceans/fisheries, transport

  *[**Note:** In our view REZs are most successful when Central Government seeks to co-ordinate the different government stakeholders. This does not need to involve a fast track or centralised planning process for REZ infrastructure or connecting generators/loads but expecting proponents to shuffle between different departments without a level of co-ordination can have negative outcomes. The concierge/case management services being put in place by NSW is a good example of the support that can be given for REZs.]*
- Electricity Authority
- Commerce Commission – particularly for clarity around the regulatory position for Transpower and the Lines Companies
- Connecting Generators
- Retailers/energy market participants
- Delivery partners/ports/transport

  *[**Note:** We recommend involving delivery partners in the design phase particularly in a NZ context where there are logistic challenges (such as access to ports and suitable bridges and roads) and high delivery and construction costs. We have seen several REZs designed initially by transmission companies, governments and their consultants without understanding fundamental buildability issues and constraints. The result has been major redesign issues during the development process and even shelving or relocating the proposed REZ. There is no substitute for on the ground due diligence during the design phase.]*

Q8. Who should be involved with coordinating and undertaking the various steps within a REZ development process? (2/2)

Design phase (continued)

- Experienced (local) environmental, ecological and social consultants

  *[**Note:** This builds on the previous point. A successful REZ is dependent upon delivering the REZ infrastructure and the connecting projects. During the design phase you need to understand the issues which will be faced in the development phase so you can seek to design the REZ taking into account on the ground physical, environmental and social constraints and opportunities. The need to redesign the Central West Orana REZ to move from a linear route to new design which seeks to minimise biodiversity impact and maximise the use of public land is a good example of why focussing on these I issues early on can save time and money.]*

Implementation phase

- Transpower
- Lines Companies
- Iwi/Hapu
- Regional councils
- Central Government – MBIE, NZTE, other relevant ministries such as Treasury, environment, oceans/fisheries
- Connecting Generators
- Retailers/energy market participants
- Delivery partners/ports/transport
- Funders

  *[**Note:** Development of REZs is more akin to a well managed PPP process than development of competitive generation or regulated transmission assets. Many elements of a REZ will be funded by project finance or corporate balances sheets and engagement with potential lenders from an early stage in the implementation phase is very helpful as it ensures you get their inputs and they are up to speed when asked to finance projects inside a REZ. In the case of the NSW Electricity I infrastructure Roadmap key funders have been involved from the design phase (such as NAB and CEFC).]*

Q9. Do you agree with the proposed project criteria? Are there any that you would change or add? (1/2)

We have commented below on the proposed criteria and suggested additional criteria. We note that the REZDC mentioned by way of example a period of one year for a EOI process to assess initial interest. We believe that this is much longer than is necessary and running a elongated REZ development process creates a real risk of developer and stakeholder fatigue especially if one of the goals of REZs in NZ is to attract new capital and new market participants to help dive down cost of capital and increase competition.

We support the comment on page 31 of the REZNC that a cost benefit analysis can be useful during the REZ design phase. However, we stress the cost benefit analysis needs to have a wider remit that a regulatory investment test. We have first hand experience of the negative impact of taking a traditional "straight jacket" RIT approach to a REZ situation (Broken Hill in Australia).

Land rights should include easement corridors between the project and the REZ infrastructure

From a generator's perspective we believe the consenting risk assessment is a key criteria as otherwise the other connecting generators end up bearing the consenting risk of other projects which had been anticipated to connect

Proposed project selection criteria

Criteria could include:

- Land secured (not started, in negotiation, secured)
- Stage in financing (none, in process, secured)
- Stage in design (concept, developed, detailed)
- Stakeholder engagement (not started, plan in place, in progress)
- Consenting (not started, in progress, secured)
- Network connection concept assessment (not started, in progress, complete)

Financing should take into account proponents who can finance on balance sheet so may not engage with lenders at an early stage

Our view is that network studies and connection design should be very well advanced at the selection stage as this reduces the risk of re-design and allow the REZ infrastructure to be efficiently designed and delivered

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Q9. Do you agree with the proposed project criteria? Are there any that you would change or add? (2/2)

Our suggested additional project criteria for you to consider are set out below:

- Local content strategy
- Iwi partnership strategy
- Community ownership
- Procurement and equipment supply
- Offtake arrangements – this is seen as a key feature in many of the REZ development processes especially if the connecting generator is not part of an integrated gentailer. In a NZ context where new generation is rapidly needed to address security of supply, thermal retirements and reduce prices you may not want weight this criteria as highly as we have seen in other markets.
- Financial commitment including willingness to put up credit support/guarantees
- Approach to collaboration with other generators, users and REZ infrastructure owners (i.e. Transpower/Lines Companies) – in some cases this has been judged on the level of participation and support that a generator has shown throughout the process
- Need for OIO approval and status

Q10. Do you agree with the challenges we have identified?

We have commented on the challenges identified below.

5.1 Access and Firm Capacity Rights

We do not have as strong views as some other proponents on the access and firm capacity rights issue. We believe a balance can be struck between the existing open access rules and the rules to be put in place for REZ. Rather than just end up with large incumbents winning all the rights to connect in a REZ we think it is important for REZs to encourage new entrants who make take a different approach to the development cycle and introduce more competition to the energy market in NZ. It is correct that REZ proponents don't want to run the full risk of other developers piggybacking on the initial commitments and expenditure required to underwrite the REZ development. One suggestion is a mechanism where new entrants have to pay a proportionate share of REZ costs in order to connect rather than limiting access rights to an initial club. Another principle which ahs been applied is limiting the amount of capacity in a REZ which can be given to any one developer/gentailer in order to enhance competition.

5.2 Funding and cost recovery

We do not agree that statement on page 13 of the REZNC that "typically...developers are committed up front so that network investment is designed to the right size, and all costs are shared and recovered from the connecting generators'. In our view this is exactly the type of traditional thinking which has led regulators and other stakeholders globally to review how to better design and deliver shared infrastructure. There are many practical issues with the approach - such as how can you co-ordinate the development pathways of different projects. If you take this approach right size will almost always be under-sized and won't take into account expansion let alone system strength and future proofing (such as designing the grid infrastructure to accommodate storage when fossil fuel retirements will happen sooner or later). We strongly recommend that New Zealand looks at supporting REZ development through anticipatory expenditure which is then recovered from subsequent connecting generator or users. This can be funded by TransPower (through new or existing debt facilities), agencies such as NZGIF (which would be performing a similar role to CEFC in Australia or GIB did in the UK) or the first mover.

5.3 Environmental approvals

This is a particular issue in NZ due to the operation of the RMA. We believe these issues can be addressed in the proposed RMA reform but co-ordination of different developments with different developers, impacts and stakeholders across a REZ will remain a practical issue to be overcome.

Q11. What are some of the ways to overcome these challenges and who should be involved?

We have included in our response to Q10 some of the ways to overcome the first two challenges identified – access and firm capacity rights and funding and cost recovery.

Environmental approvals

In this submission we have included a number of suggestions which seek to address this challenge and we have highlighted some of our suggestions below:

- Iwi/hapu involve in initial design including go - no go decisions.
- Regional Reference Group concept from NSW with broad cross-section participation including local suppliers, energy users and unions.
- Mandatory co-ordination amongst developers in respect of community engagement. The feedback we have recently had from communities and councils in the Gippsland region of Victoria is that people wanting to be involved with consultations and community engagement are having to attend events 2-3 times every week. This is leading to engagement fatigue and in our view is not fair on local communities.
- Better use of digital platforms/VR so stakeholders can understand the impact of proposed projects including cumulative impact
- Acknowledging cumulative impact issue upfront and ensuring this is built into REZ design
- REZ design to include a focus on high value and enduring environmental benefits for the region – such as new biodiversity corridors, restoring habitat and creating wildlife/fauna sanctuaries
- Emphasising the benefits upfront rather than as a response to community and stakeholder concerns – this is why we believe local employment/supplier mandates are so important to mitigate the approval challenges. A great example in practice was the Victoria desalination project which ensured that benefits were shared across the community – even to the level of not using just one local catering supplier for the construction workers but using as many different local suppliers on a rolling basis.

Q12. Do you see any other potential challenges that need to be considered? (1/2)

- **Timetable** – we believe it is important to have a sensible timetable which gives stakeholders the opportunity to engage and proponents the time to properly prepare their submissions. In a NZ context where the consenting pathway for new renewable energy projects can be elongated you will also need to factor in whether projects will be ready to connect.

  If you take the approach that all projects need to be ready to connect at the same time (as was inferred In the REZNC) we believe that REZ development in New Zealand will be slow and potential participants may even lose interest.

- **Regulatory interference or indifference/Lack of clear political support** – the recent intervention by the Commissioner of the Environment is a good case doesn't encourage developers and investors that New Zealand is strongly supporting a rapid build-out of new renewbale capacity despite the positive actions taken by Transpower through NZGP and TMH.

  It is not clear to us that the Electricity Authority or the Commerce Commission are wholly on board with the REZ concept or understand the potential benefits to New Zealand of new large scale clean industrial clusters and fostering new demand. This is not uncommon in our experience as the principles which underpin a REZ are different than the fully liberalised market which has been espoused for the last 30 years.

- **Failure to deliver local outcomes and lack of monitoring to assess whether or not commitments/intentions have been met** While we and other developers have high hopes for delivering local outcomes the key to success is the delivery of these outcomes.

  The model adopted by the Australian Capital Territory was excellent – with strong obligations on developers to deliver llocal outcomes, frequent audits and mechanisms to deal with failures to deliver the contracted outcomes (such as cash contributions a fund administered by the ACT which was used to deliver local outcomes).

  We recommend embedding within the NZ REZ concept the appropriate mechanisms to monitor the delivery of local outcomes and ensuring that there is regular auditing of the commitments made by developers/REZ transmission owners and operators.

Q12. Do you see any other potential challenges that need to be considered? (2/2)

- **Mobilisation of sufficient resources within Transpower and other key stakeholders** – In our experience transmission companies and regulatory bodies have under-estimated, often substantially, the resourcing required to deliver REZs (and the energy transition generally). The sheer volume of connection enquiries and EOI responses has, at times, overwhelmed the relevant teams.

  The rapid growth of the teams managing the NSW Electricity Infrastructure Roadmap is an example of what can be required to deliver REZs across one State in Australia. The team has grown from literally 2 people when there was a Renewable Energy Advocate but no formal REZ concept of legislation to hundreds of people across multiple teams dealing with the different workstreams. We are not suggesting or advocating that NZ should take the same approach as NSW (which includes significant market intervention by the Government in transmission and procurement of generation and storage) but exercises of the magnitude of REZ design and implementation should not be viewed as an extension of the day job for a transmission company or the lines companies either.

- **Design of REZ infrastructure** – we have included a slide on the issue of **undergrounding of transmission lines**. We believe bringing a new concept to stakeholders like a REZ deserves to have sufficient attention on the design of the transmission infrastructure and assessment of the options such as undergrounding and new tower designs. This has recently become a critical issue in Australia and we recommend you carefully study the ongoing debate in Victoria with the Western Victorian Transmission Project (the first ISP Project) and the protests from the councils and communities.

  The redesign of the Central West Orana REZ in NSW is another example of the issues being faced with design and insufficient engagement with stakeholders early in the design process. In our view, the new design which moves away from linear infrastructure to focus on building new infrastructure in areas with a lower social value due to the existing mining operations and reusing corridors is a good result for the stakeholders but came only after communities raised their material concerns.

  This also applies to the **design of towers and other infrastructure**. Radical steps like wooden and guide structures and adopting the most innovative designs should be considered carefully in the design phase. We know that the many communities and individuals have very negative perceptions of transmission towers and the corridors required for transmission. Not everything can be designed like the waste to energy plant in Copenhagen with the integrated ski slope but doing nothing to address legitimate concerns is unlikely to speed up the development of REZs.

Undergrounding – one approach to social licence issues with REZs

Proliferation of overhead power lines is a major factor in the development of REZs and the energy transition generally. The table below is drawn from the recent public documents released by Ausnet Services in Victoria, Australia in response to sustained pressure from local stakeholders for it to re-consider undergrounding of the WVTP – the first ISP project in Australia. We acknowledge that undergrounding adds costs, but encourage all stakeholders to rethink their traditional approach in view of the scale of the challenge and the opportunity.

Factors to think about include:

- Safety – this may not be a key factor in NZ but PG&E moves in California are being mirrored in other jurisdictions
- Quantification of benefits underplayed, especially resilience
- Overhead lines causing continuing delays to project timeline and the enduring bitter taste/community issues
- Design for the future? Culverts with built-in expansion options is an option which is now being considered in some situations.
- More efficient use of land – especially when looking at higher voltages

	Overhead	Underground
Aboriginal cultural heritage	Aboriginal cultural heritage sites can be avoided in design. Potential for visual impact on intangible cultural heritage associated with a place.	Aboriginal cultural heritage sites cannot easily be avoided in design. Lower potential for visual impact on intangible heritage with less overhead infrastructure.
Aviation	Overhead infrastructure presents a potential risk to aviation that in most cases can be managed.	Underground infrastructure presents no risk to aviation.
Biodiversity (vegetation management)	Biodiversity values can be fully or partially retained on an overhead transmission line easement. Vegetation up to 3m in height can be retained within the easement. Taller vegetation permitted where the minimum clearance and fuel load densities are maintained. Native grasslands and associated habitat can be avoided in design. Trees outside the easement are maintained so that they are below the fall zone of the transmission line. Overhead transmission lines can be a hazard to some bird species. The partially cleared overhead transmission line easement can affect some native species by creating a barrier to movement between adjacent native vegetation.	Biodiversity values are not retained on an underground cable easement, except where trenchless construction methods have been used. All vegetation is cleared in the underground construction area along the length of the route, except where trenchless construction methods are used. Less opportunity for trenches to avoid native grasslands and associated habitat. Only grasses or shallow rooted vegetation is permitted to grow on the underground easement. Underground cables pose no risk to bird species. The cleared underground cable easement may affect some native species by creating a barrier to movement between adjacent native vegetation.
Bushfire and other natural disasters	There is no record of a bushfire being started by an overhead transmission line in Victoria. Safe operation near overhead transmission lines is required for firefighting aircraft and ground-based firefighting crews. Overhead transmission lines are exposed to extreme weather events which may exceed the design wind loads potentially resulting in damage.	Underground cables are not exposed to fire. There is no record of a bushfire being started by an underground transmission line in Victoria. Underground cables do not constrain aerial firefighting activities. Ground-based firefighting crews need to be aware of underground cables when bulldozing fire breaks. Storm damage to cables can occur due to soil erosion from flood events, tunnel erosion and landslips due to heavy rainfall.

	Overhead	Underground
Electric and magnetic fields (EMF)	Overhead transmission lines generate electric and magnetic fields. Transmission line ground clearance is designed to ensure electric and magnetic field strengths are below Australian and international EMF guidelines. Magnetic field strengths from overhead transmission lines are lower than from underground cables at an equivalent height above ground.	Underground cables generate electric and magnetic fields. Electric fields are screened by the metallic sheath built into the cable. Underground cable burial depth is designed to ensure magnetic field strengths are below Australian and international EMF guidelines. Magnetic field strengths from underground cables are higher than from overhead transmission lines at an equivalent height above ground.
Historic heritage	Heritage sites and artefacts can be avoided in design by spanning over areas and micro-siting towers. Transmission lines can detract from the context of heritage places and sites.	Less opportunity for trenches to avoid heritage sites and artefacts compared to overhead transmission lines. Above ground infrastructure can detract from the context of heritage places and sites.
Land use – including Agriculture	Height restrictions on machinery and vehicles to provide safe clearance from the line. Overhead transmission lines can be designed to provide greater ground clearance in some situations. Heavy machinery and equipment permitted. Grazing permitted. Cropping permitted. Gun irrigators not permitted. Centre-pivot and lateral irrigators are permitted with AusNet Services' permission and where incorporated in design. Sheds and dwellings not permitted within easement.	No restriction on operation of taller equipment and vehicles. Restrictions on heavy machinery and equipment. Grazing permitted. Cropping not permitted* Gun, centre-pivot and lateral irrigators are permitted. Sheds and dwellings not permitted within easement. *Underground cables can be buried deeper to allow cropping, although deeper burial increases cost due to reduced thermal efficiency.
Landscape and visual	Potential for high visual impact in sensitive areas.	Reduced visual impact except where above ground facilities and easements through vegetation are required. Potential for high visual impact in sensitive areas where the following is required: • transition stations (partial undergrounding). • conversion stations for HVDC/HVAC connections. • reactive compensation stations for HVAC.
Noise	Noise from transmission line conductors (wires) can be discharged under certain atmospheric conditions. Transformers in terminal stations emit noise.	No noise from underground transmission lines except at associated above ground infrastructure. Transformers in converter stations and reactive compensation stations emit noise.

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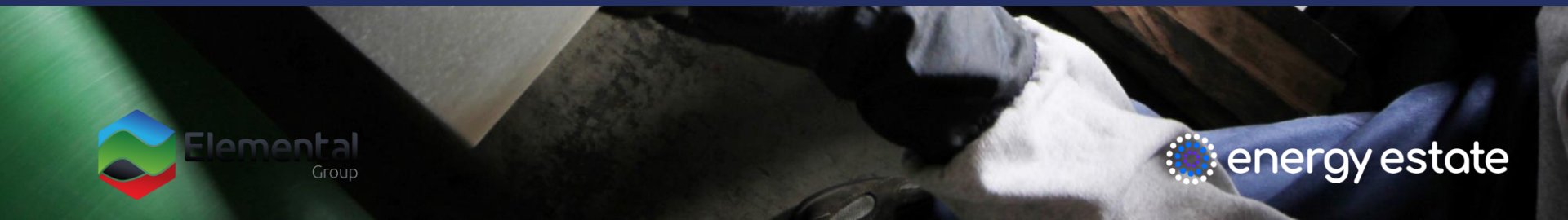
Renewable Energy Zones:
An economic development opportunity for New Zealand



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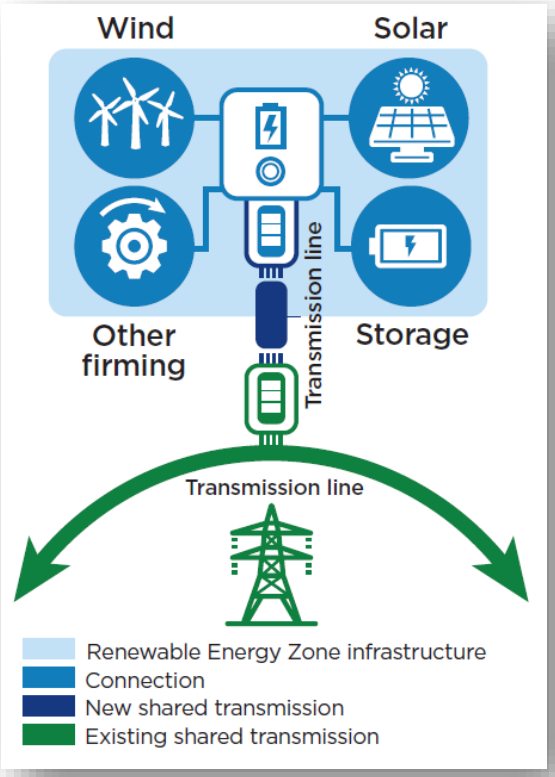
What is a Renewable Energy Zone?

A Renewable Energy Zone (REZ) is an area designated for the coordinated development of renewable energy generation, storage and transmission.

The coordinated development of electricity infrastructure can:

- reduce the need to build transmission into new areas
- reduce project connection costs and risks
- optimise the mix of generation, storage and transmission investment across multiple connecting parties
- co-locate and optimise the otherwise 'lumpy' investments in network and system support infrastructure
- support broader economic development including new industrial precincts and reduced energy costs for energy users
- co-locate and optimise weather observation stations to improve real-time forecasting
- promote regional expertise and employment at scale, and
- create investable, low risk opportunities for the private sector to invest.

Renewable Energy Zones are currently being developed throughout Australia, championed by the Australian Energy Market Operator (AEMO) in its Integrated System Plan and adapted by state governments to drive the integration of renewables, regional development and their net zero goals.



NSW Government schematic of REZ

Energy Estate has been closely involved with the development of REZ in Australia. Simon Currie was a member of the industry working group for AEMO's initial ISP and we have contributed to the 2020 ISP and upcoming 2022 ISP. Energy Estate has over 20 projects it is developing within REZs, including intra-REZ transmission projects.

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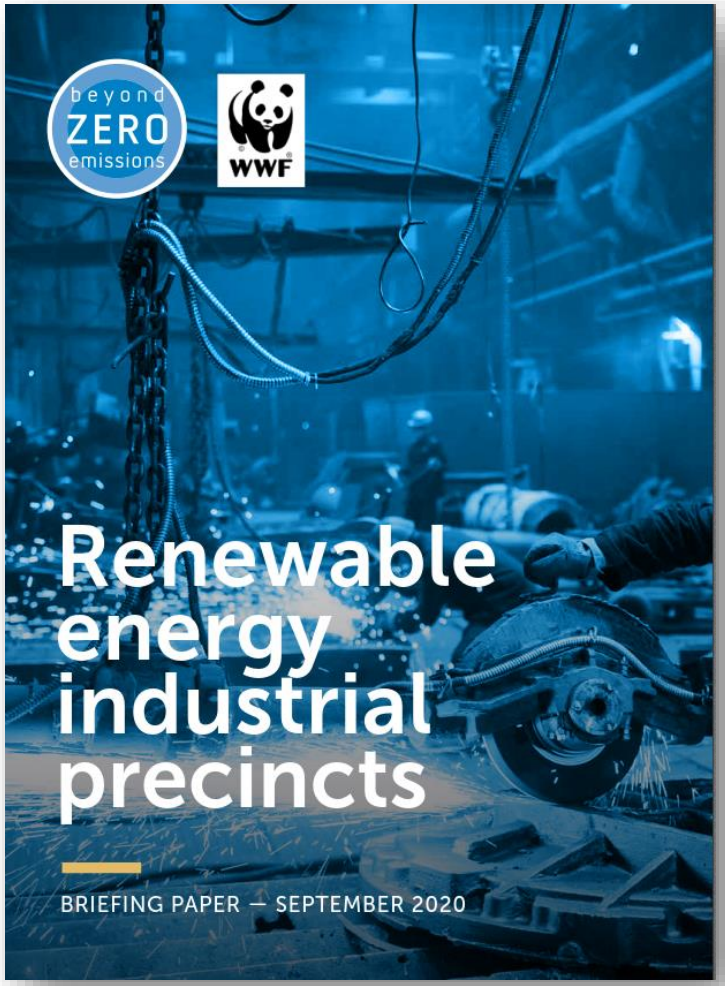
Renewable Energy Industrial Precincts (REIPs)

REZ developments can also facilitate new regional load and industry. Renewable Energy Industrial Precincts (REIPs) are established within or near to a REZ to benefit from cheaper, green power, and can revitalise industry in regions and provide a transition from fossil fuel dependent activities.

Energy Estate has been working with Beyond Zero Emissions and the WWF on the development of Renewable Energy Industrial Precincts in Australia. We have identified multiple highly suitable locations in New Zealand.

Key benefits of renewable energy industrial precincts include:

- Attracting businesses and investors, support local industries, secure existing jobs and create new ones.
- Provide access to cheaper infrastructure and energy (electricity and heat) shared across multiple large energy users, which will lower power bills and related costs for all.
- Provide access to a skilled workforce that is trained in the development and operation of efficient, zero emission industrial processes.
- Provide an opportunity to commercialise new technologies and solutions onshore, by attracting start-ups to co-locate with established industry players.
- Increase the likelihood that energy intensive manufacturers will remain in New Zealand.
- Become hubs for the development of innovative zero emissions and circular economy technologies and solutions that New Zealand can sell to the world.



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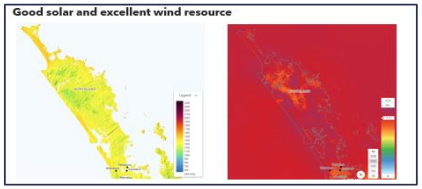
Our submission to InfraCom

Northland REZ

Context	• Ideal location for a REZ, best solar resource in New Zealand coupled with proximity to Auckland load centre. • Development of new industry can provide an economic lift to the region.
Generation	• Solar: 1000MW+ • Onshore wind: 960MW (7 projects, MBIE Wind Generation Stack Update, 2020) • Offshore wind: 1000MW (BlueFloat preliminary estimation, 2021)
Load	• New green chemicals production at Marsden Point • Ideally located to send power south to the major Auckland load centres
Tx	• Upgrades needed on the Maungatapere to Kaikohe line. • Options could include storage, electrolysers and grid augmentation,



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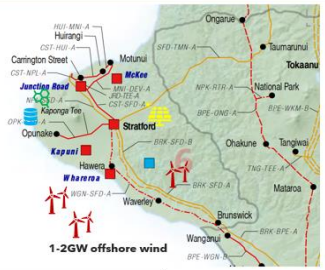
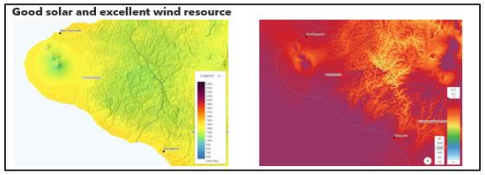
Taranaki REZ

Context	• Strong location for a REZ – excellent wind resource, existing thermal generation, good connections to load, skilled workforce. • Opportunity to support transition of region through development of green chemicals and offshore wind industry.
Generation potential	• Solar: TBA • Onshore wind: 500MW (3 projects, MBIE Wind Generation Stack Update, 2020) • Offshore wind: 2000MW (MBIE Wind Generation Stack Update, 2020)
Load	• Up to 150MW of load in Taranaki region largely from industry. Anticipated increase in load through new green chemical industry. • Potential to export north or south to Wellington.
Tx	• Upgrades needed on Stratford to Huntly if exports exceed 600MW unless local load increases. • Options could include storage, electrolysers and grid augmentation.





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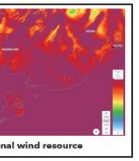
Southland REZ

Context	• Support the continued operation of the Tiwai aluminium smelter with low cost renewable electricity. • Encourage the development of new green chemical production (green ammonia and e-gasoline) exported via the Tiwai deep water port. • Production of process heat for regional dairies through electrification of equipment, green ammonia into fuel cells or other novel methods.
Generation	• Up to 1GW onshore wind identified. • 1GW of co-located wind and solar around repurposed Macraes mine. • Long term 1GW+ offshore wind development opportunities.
Load	• Tiwai Green Industrial Precinct, complementing the smelter with green chemical production and green data centers.
Tx	• Strong existing lines servicing Manapouri into Tiwai Point. Generation expected to be consumed locally, limited interconnection to other regions required.



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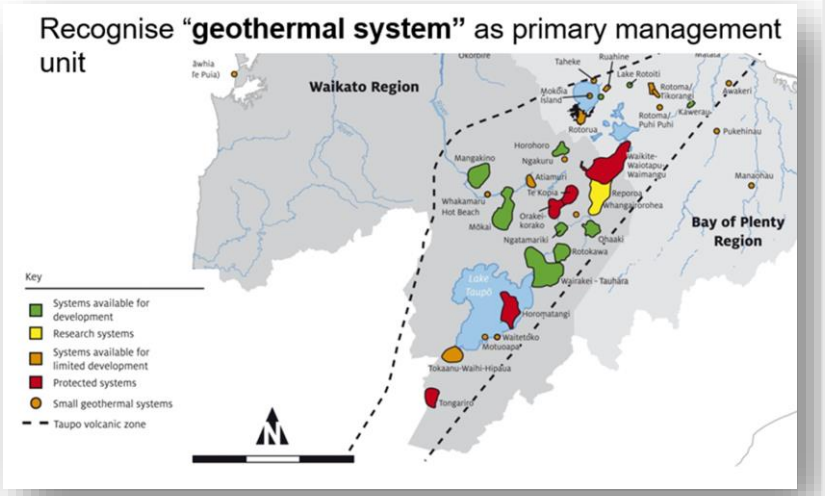
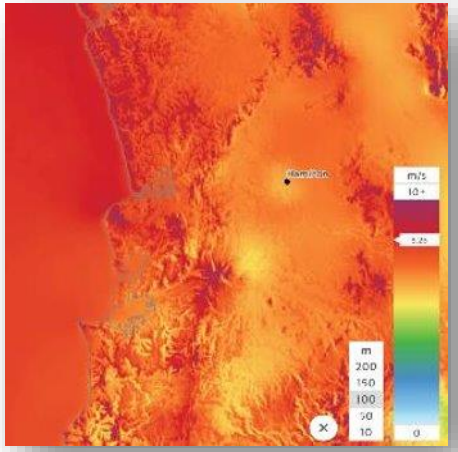
Waikato – prime candidate as a REZ

- Build on recognised success of geothermal system management
- Waikato region is strategic:
  - Excellent wind resource
    - Potential for onshore and offshore wind
  - Good solar resource but acknowledge competing land use
  - Retiring thermal generation
  - Opportunity to complement existing hydro and geothermal generation
  - Existing transmission assets and corridors
- Likelihood of strong load growth
  - Need to decarbonise process heat
  - Green steel
  - New industrial precincts such as Ruakura
  - SuperCity
- WRC supportive and proactive
- Tainui as a partner
  - Strong track record as a partner and delievring successful outcomes





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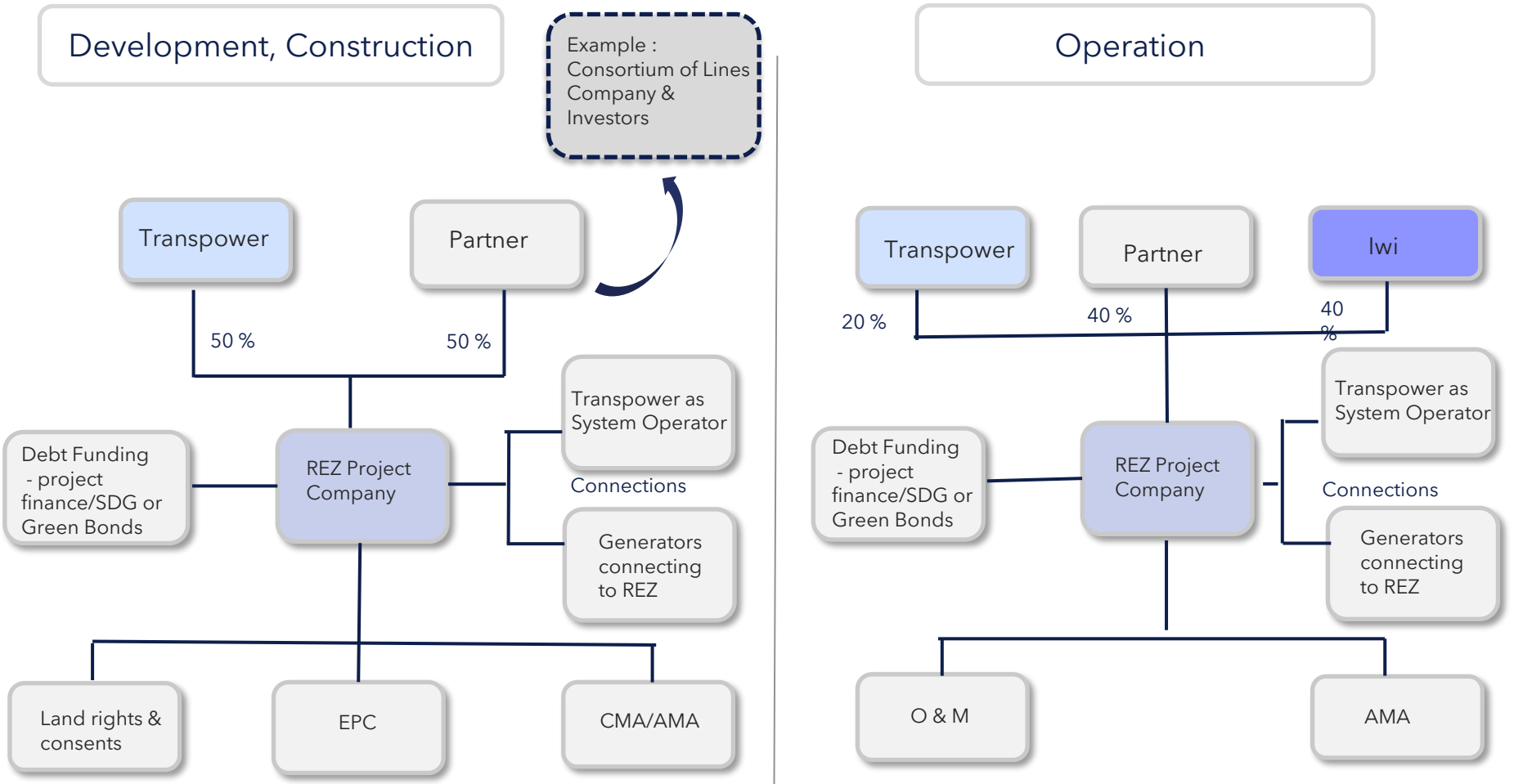
Potential challenges and mitigation

There will be many challenges faced by proponents and government in the establishment of Renewable Energy Zones. In Australia, governments and regulatory bodies are widely consulting with the industry and the public to ensure the development of renewable energy zones best meets the requirements and expectations of all stakeholders, in particular achieving a high level of social license.
Some of these challenges and potential mitigants are set out below:

Issue	Example	Mitigation
Social licence/values - Inadequate benefits for local community	*"The big city gets the power, and we get the ugly wind turbines and solar farms"* *https://reneweconomy.com.au/social-licence-emerges-as-critical-issue-for-renewable-energy-zones-nsw-says/*	Extensive focus on providing information on how the projects can positively impact the community. Honest and thorough community engagement. For example, Energy Estate's Walcha Energy Project has an Australian leading 5% community stake for all projects, ensuring 5% of the profits from each of the projects is invested back into the community. Information regarding
Transmission corridors and project land – REZs can create conflicts with other land uses	Opposition to high quality and productive land being 'overtaken' by electricity infrastructure. Farmers fear for land that produces some of 'best potato crops in the world' *https://www.abc.net.au/news/2021-04-05/potato-growers-fight-transmission-lines/100027596*	Ensure that as much as possible, development is on low production land, even where that may not be the most economic route or choice for the project. Educate farmers and land holders of the potential for co-existence of agriculture and farming with wind solar projects.
Cumulative development risk	REZs concentrate generation and transmission projects to a defined area – creating a high risk that 'cumulative impact' of projects will slow or prevent development approval.	Respond to and take into account local objections. Mandate visual impact minimisation into design principals of projects.
Over subscription	In Australia REZ expressions of interest have received responses in excess of 9x proposed capacity. High competition for developers. *https://renewablesnow.com/news/nsws-pilot-renewable-energy-zone-gets-27-gw-of-proposals-703633/*	Regulation and policy oversight to ensure that the best and most suitable projects are chosen for development. It has been recognised that some form of centralised planning will be required rather than allowing 'open access'.
Demands on infrastructure and disruption to locals	Road closures and congestion due to transportation of workers and equipment, influx of temporary workers into towns stretching local capacity for goods and services.	Invest in local infrastructure upgrades that can have a long lasting positive effect on the area. For example, building houses for temporary workers to then transition to low income housing.
System strength and thermal capacity issues	Projects in the West Murray Zone in north western Victoria and south western NSW faced considerable curtailment due to influx of inverter based generation which required significant technical upgrade to overcome. *https://www.energymagazine.com.au/aemo-outlines-west-murray-zone-challenges/*	Undertake in depth network and market modelling to explore the relative potential of network and technology solutions to address the challenges of system strength and thermal capacity.

NZ REZ – new ownership model?



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Our Development Principles (1/2)

We have developed an 'impact' framework based around a number of industry and government benchmarking criteria. By implementing these criteria in each project we develop and support, we are able to accelerate the impact and realise the full potential of projects and partnerships.

	Impact Criteria	Description	Aligned Frameworks	Relevant Accountability Mechanisms
1	Indigenous landholders first	We recognise that Iwi are the original landholders / custodians.	EQUATOR PRINCIPLES	
2	Community-centred outcomes	Kakariki seeks to ensure communities benefit from all of our projects. In some cases this is reflected through Community Funds or through benefit sharing mechanisms that align with regional economic development strategies.	11 SUSTAINABLE CITIES AND COMMUNITIES; EQUATOR PRINCIPLES	• United Nations Indicators of Sustainable Development (Goal 11)
3	Biodiversity and vegetation restoration	We require a commitment to biodiversity restoration / improvement above local regulatory baseline requirements in the areas where projects are located. Where possible, projects should also support colocation of agricultural activities.	15 LIFE ON LAND; EQUATOR PRINCIPLES	• United Nations Indicators of Sustainable Development (Goal 15) • CDP Reporting Framework • InfluenceMap Methodology
4	Skills, training and education	All of our projects seek to support the training and upskilling of the local workforce. This may be through scholarships, partnerships with training institutions or action plans to support the Just Transition of communities.	4 QUALITY EDUCATION	• United Nations Indicators of Sustainable Development (Goal 4)
5	Local employment	We commit to maximise local employment during the construction and operation phases of our projects. The percentages of local employment reflect (at minimum) industry and government standards.	8 DECENT WORK AND ECONOMIC GROWTH	• United Nations Indicators of Sustainable Development (Goal 8)
6	Local procurement	We seek to mirror or improve upon local content requirements mandated by leading government jurisdictions and industry bodies. We also seek to collaborate where possible to ensure the development of local supply chains.	8 DECENT WORK AND ECONOMIC GROWTH	• United Nations Indicators of Sustainable Development (Goal 8)

Our Development Principles (2/2)

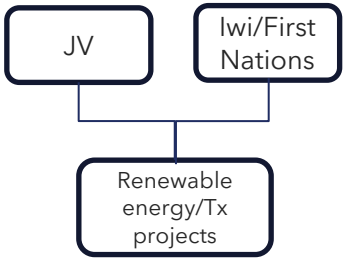
	Impact Criteria	Description	Aligned Frameworks	Relevant Accountability Mechanisms
7	Legacy of projects	All projects are undersaken with long-term sustainablility and social development impacts in mind.		• CDP Reporting Framework • InfluenceMap Methodology
8	Diversity and Representation	We prioritise inclusion and diversity across our projects and partnerships, recognising the importance and value of diverse backgrounds, viewpoints and experiences.		• United Nations Indicators of Sustainable Development (Goal 10)
9	Partnerships	Core to our business and our projects is the concept of partnership as a means to achieve the best possible outcomes for all stakeholders and local communities. These partnerships compliment our own strengths, and span grassroot community organisations, Iwi groups, governments, industry bodies and other companies.		• United Nations Indicators of Sustainable Development (Goal 17)
10	Stewardship and Leadership	EEEG recognises our responsibility to ensure we exercise our leadership and influence in a way that promotes positive change and long-term sustainability. We align all of our actions and projects against the UN SDGs and leverage projects to achieve broader social and economic development outcomes.		• United Nations Indicators of Sustainable Development (Goal 9) • InfluenceMap Methodology
11	Driving circular economic practices	Sustainability is at the core of our business and a key part of this is promoting circular economic practices where possible across the energy value chain. We actively support initiatives that seek to reuse, recycle or repurpose materials and equipment use in the construction and operation of projects.		• United Nations Indicators of Sustainable Development (Goal 12) • CDP Reporting Framework • InfluenceMap Methodology
12	Net zero by 2050	We align all of our actions and projects against the target of Net Zero emissions by 2050, in line with the Paris Agreement less than 2°C Target.		• United Nations Indicators of Sustainable Development (Goal 7) • CDP Reporting Framework • InfluenceMap Methodology

Our solution to gaining social licence – *R2D2*

We are committed to developing renewable energy projects which provide enduring benefits to local communities. Our tools for building and maintaining social license include the principles set out below.

COVID-19 has illustrated the need for holistic thinking in every investment we make in NZ and globally. In particular, the pandemic has shown how important reliable and secure data access is for rural communities and small towns. Renewable energy projects are not built in Auckland, Wellington or Christchurch but in rural parts of New Zealand. In many cases data access is poor compared with the larger centers. Building large scale renewable projects and associated transmission involves laying substantial amounts of new high quality and capacity fiber optic broadband cable. Our development principles include giving access to this capacity to landowners impacted by our developments and local communities.

Rangatira



Restoration

sculpture by the sea

Design

Data

SFN SMART FARM NET. connecting farms for future prosperity

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Examples of Energy Estate's integrated projects

HYDROGEN CITY,TEXAS

Project details	• 60GW solar PV and wind – in stages • 200MLD desalination • 22,000tpd hydrogen • 125,000tpd Ammonia Plants
Location	Texas, USA
Timeline	Q4 2021 – Land Secured Q4 2021 – Concept Design Completed Q3 2022 – Feasibility Study Completed Q3 2023 – FEED Study Completed Q4 2023 – Financial Close Q1 2024 – Construction Commences Q1 2026 – All Components Operational

CENTRAL QUEENSLAND POWER

Project details	3GW wind, 1GW+ solar, up to 2TWh BESS and long duration storage options
Location	Central Queensland REZ, AUS
Timeline	• Q3/4 2023 – Scheduled construction commencement for Stage 1 projects • Q1 2025 – Stage 1 projects operational

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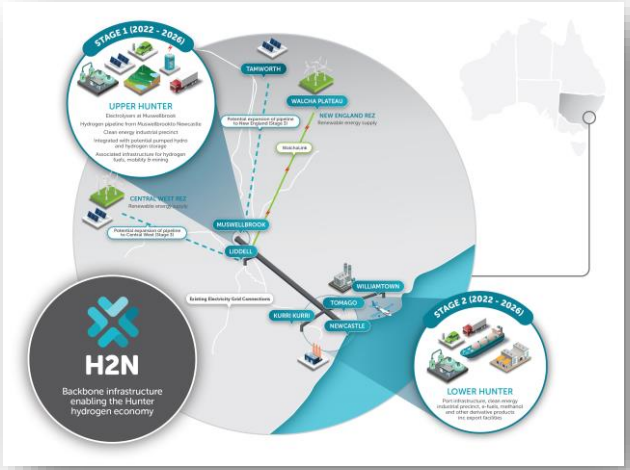
Examples of our integrated projects

HyNQ – NORTH QUEENSLAND CLEAN ENERGY HUB

Project details	• Hydrogen production and green ammonia export facility – scalable to 1000tpd • 1.6GW of on-site solar PV and off-site wind via a private TL • Integrated desalination (40MLD)
Location	Abbot Point, QLD, Australia
Timeline	Q4 2022 – Feasibility Study Completed Q4 2023 – FEED Study Completed Q2 2024 – Financial close Q3 2024 – Commence construction 2026 – All components operational

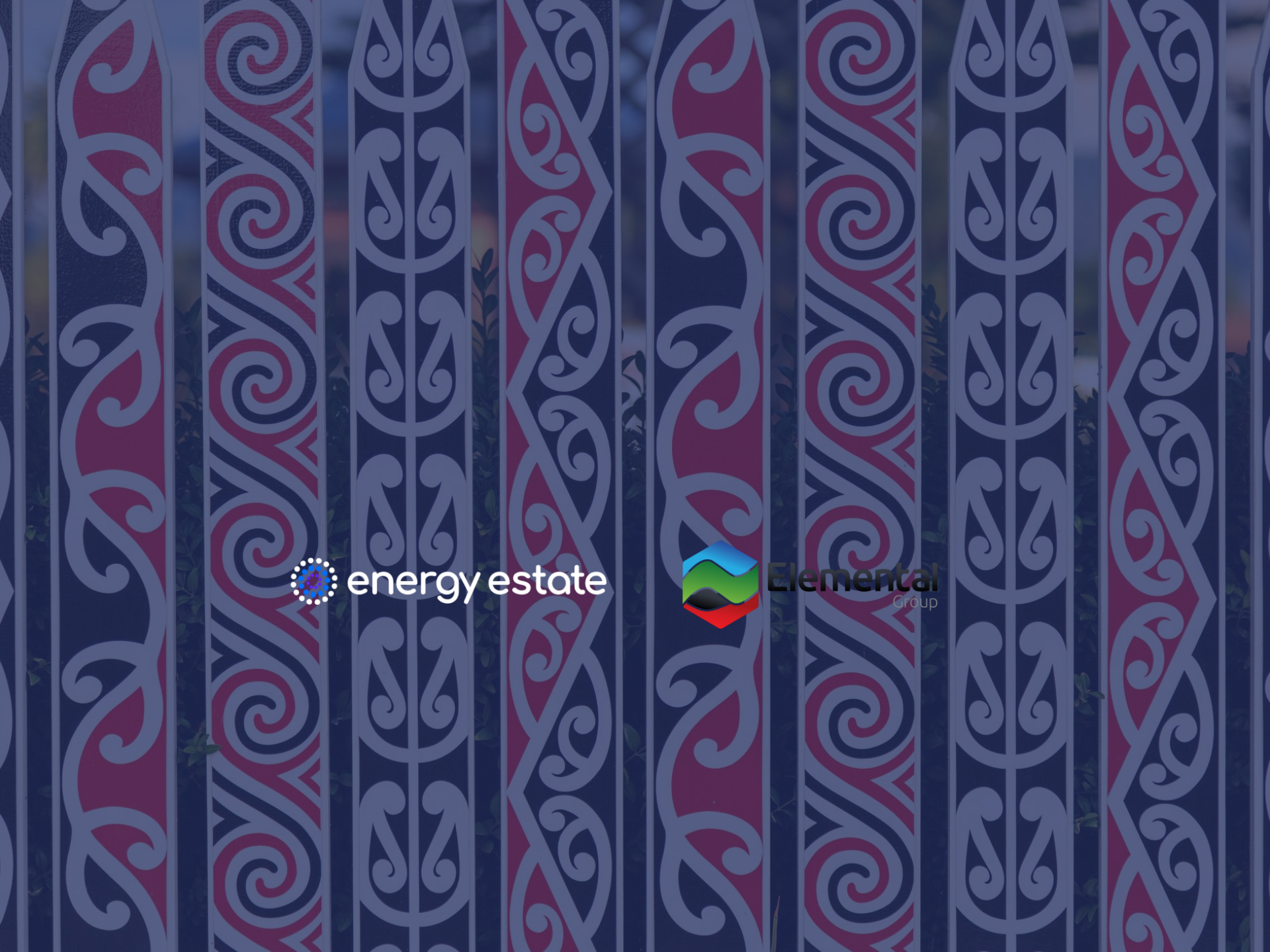
HUNTER HYDROGEN HUB



Project details	• #1: Solar, storage, hydrogen pipeline • #2: H2 derivative product (ammonia, methanol, methane, SAF etc) development • #3: Clean industrial precincts
Location	Hunter Valley, NSW, Australia
Timeline	Stage 1 (2021 – 2024): Western Hub development with hydrogen storage Stage 2 (2022 – 2026): Expansion of hydrogen pipeline to Lower Hunter and further offtake opportunities and derivative product development

Elemental Group

energy estate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