



30 Voices on 2030:

The future of energy
in Aotearoa

October 2023



Foreword:

In the weeks leading up to New Zealand's 2023 general election, we interviewed 30 energy leaders and innovators for this report - 30 Voices on 2030: The future of energy in Aotearoa.

The Voices provide a fascinating picture of how our energy sector might look in 2030.

They told us that despite our rich renewable resource base and natural advantages, Aotearoa New Zealand faces significant challenges in our energy transition. Unrealistic renewable targets, regulatory uncertainties, high costs, the lack of an energy strategy and an "unjust" transition are just a few of the concerns raised – which the incoming government might wish to heed.

While acknowledging the challenges, most Voices remain positive for the success of the transition. They highlight New Zealand's unique strength - our community relationships and partnerships which can be used to develop our talent base and foster new industry collaborations.

Above all, they told us the energy transition is bringing new opportunities which New Zealand is well placed to seize. The development and adoption of new renewable power generation, energy storage, demand management and digital technologies, based on a solid strategy and facilitated through good relationships with consumers and communities, should enable New Zealand to achieve its energy goals.

In the following few pages we present a summary of what we heard through these conversations, and our conclusions. Later in our report, you can read directly what our Voices told us.

We want these conversations to stimulate further discussions and support the development and creation of the energy strategies and solutions which will help fuel prosperity for our country, not just to 2030, but beyond.

We hope you will join us.

Ngā mihi



Greg Bishop
KPMG Partner
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Key themes:



New Zealand will not meet a 100% renewable electricity generation target by 2030 and attempting to do so will just hold us back

We don't need a national "aspirational target", we need an energy strategy.

This was the key message we heard, and it came across time and time again in our interviews.

We heard comments like "hopefully we are not making perfection the enemy of good" and "a renewable target is only one part of the solution. A national energy strategy would remove some of that uncertainty and enable us to incentivise and de-risk such investment. It would allow New Zealand to explore and invest in a wider range of energy options and guarantee a more cost effective and equal transition for us all."

There was a wide degree of acceptance that our pathway to prosperity is not with a "turning off" philosophy, rather a joined-up approach which enables us to "invest to reduce".

Several of the Voices pointed to the Crown Fibre ultra-fast broadband rollout as a potential model which could be adapted to help build the electrification we need.

We concur.

In 2022, at 87%, the amount of energy generated by renewable was the highest ever, with hydro power accounting for the majority (60%) of the supply.

The Voices believe that New Zealand's greener electricity system should be treated as a competitive advantage. As the country nears the 100% target, we need to capitalise on the fact that most of its power generation is generated by renewables and allow some trade-offs to concentrate on more important issues such as energy affordability and security.

Key themes:



Collaboration:

We need to be more joined up; we need to work together

New Zealand lacks – but needs – systems thinking.

Many of our Voices expressed the view that parts of the industry work in silos and we need a more joined up approach – including the regulators.

We heard comments like “each party in the system shouldn’t be taking actions without thinking about the impact on others, and within the bounds of competition law, looking to work together to obtain greater efficiencies” and “lack of systems thinking prevents the transition developing in a way that’s both cost effective and efficient.”

On regulation, New Zealand doesn’t have “the right regulatory and policy settings in place. We need a focused and streamlined approach that brings together the regulatory and policy agencies to truly manage this, instead of the current, disjointed multi-agency system.”

We also believe New Zealand needs a much more joined up approach – the ultra-fast broadband rollout shows us what is possible.

Key themes:



Policy & regulations:

Regulatory certainty is key and our performance has been poor

Our changing regulatory environment is a significant barrier to progress, potentially delaying Net Zero by 2050.

While there was not universal agreement, some Voices see the government hindering rather than helping new energy investment in New Zealand. They warn that the attractiveness of our energy market is being undermined by a changing regulatory environment and policy uncertainties.

The effectiveness of the Emissions Trading Scheme (ETS) was questioned by few, but supported by many, while the application of the Overseas Investment Act was seen as too broad and dealing with too many asset classes.

Consenting was noted as a significant issue, again not helped by recent law reform.

Many said our regulatory framework for transmission and distribution needed to change. Comments included “if we continue our regulatory focus on ‘just in time’ infrastructure delivery, we will continue to deliver too late and will slow the transition rather than accelerate it.”

Our view is simple – businesses need certainty before they can make investment decisions. And the level of investment which is needed has never been made before.

Key themes:



Technology & innovation: Technology will help

Much is already being done, more is on the way, and the future is bright.

We were surprised at the level of innovation currently underway, often at least slightly under the radar.

Significant developments include the aggregation of decentralised power supplies into Virtual Power Plants (which can help with peaking challenges) and the creation of Multiple Trading Relationships (which allow consumers to trade power between themselves, bypassing traditional retailers).

Technologies including artificial intelligence, machine learning, the Internet of Things (IoT) and analytics could be used to optimise the grid, shift load and deliver more affordable, reliable, and sustainable energy.

New battery technology will extend the range of electric vehicles and could produce back up storage, useful for our more remote communities. There is potential for real time meter readings from smart meters to allow power companies to analyse energy consumption and network performance, facilitating planning and improve customer service.

More automation in New Zealand's energy system can reduce manual intervention and alleviate workforce gaps, contributing to lower operating costs and more affordable power.

We were encouraged by what we heard.

Key themes:



Market structure: Is the market broken?

Not surprisingly, there were a wide range of views.

The larger, vertically integrated retailers generally seemed reasonably happy with the current market settings, however others were not.

We heard from one Voice that the market was no more than “a clearing house.”

Another Voice told us that the capability now exists to “dynamically influence demand on the system”, however this “emerging dynamism is quashed in our vertically integrated market.”

They also told us that “inaction is highly profitable and there is a void of political leadership right when we need significant investment and behaviour change.”

They told us that regulatory settings in the UK generate behaviours among vertically integrated businesses which they are not observing here.

Key themes:



Talent & supply chain:

At the bottom end of a supply chain?

Views were mixed, but a theme emerged.

Most Voices were worried about supply chain issues with equipment. They warn that global suppliers have the choice of many markets, most of which are much larger than New Zealand's.

However, one is exploring options to increase access to solar panels produced using circular and sustainable processes, with a view to eventually manufacturing them in New Zealand for use locally and for export to Australia¹.

Views on possible labour supply difficulties were mixed. Some were concerned that a pending global shortage would make it difficult for us to import skills, and that this was compounded by our immigration settings.

Others were positive that we would "home grow" the talent that we needed and, moreover, that this young talent would find the solutions to the hard technical problems we would inevitably have to overcome.

They noted that companies are already starting more targeted skills programs in secondary schools, colleges, and apprenticeships, designed to share the industry's vision and attract the energy workforce of the future. That said, while diversity within Aotearoa New Zealand's energy industry is improving, much more remains to be done to promote women, Māori and other underrepresented groups into the sector.

References

1. [From the Netherlands to Taranaki: world's lightest solar panels to power New Zealand's future energy centre](#)

Key themes:



Consumers:

Without intervention, the energy transition will be unjust

The benefits and costs of the energy transition will not be shared evenly.

Most agree that consumers will ultimately have more choices in the new energy system, due to new technologies and demand side management tools. They will have access to data through smartphone apps and this will allow them to manage their energy usage and participate in load shifting.

There was real concern however that the benefits and costs of the transition will not be shared evenly, increasing inequality.

We heard that “the people who would benefit most from electric vehicles or solar panels, are often the least likely to be able to afford them” and “as more of the economy and transportation electrifies, the only people shifting to EVs and home batteries are the wealthy, subsidised by the government.”

In contrast, those who are least able to afford their energy will face higher costs of both fossil fuels and electricity.

This is a complex social issue. We see a need to address the inequalities which will change over time and this will need to be carefully thought through.

Key themes:



Te ao Māori:

Greater partnership with Māori is required

Māori are up for investing and participating meaningfully.

We heard that the relationship Māori have to the natural resources critical for the nation's energy generation, alongside their role as the original practitioners of sustainability and their appetite for intergenerational investments, underpins the case for their meaningful inclusion in Aotearoa's energy industry.

Furthermore, there is a significant opportunity to engage with the diverse perspectives that Māori have that could introduce fresh approaches to support the energy industry transition. They have incredibly deep experience and connection with environmental and social issues and also want to invest in the industry. This makes them well placed, in an ESG world, to help balance and/or align the commercial, social and environmental imperatives.

Beyond the opportunity to draw on perspectives that could lead to the innovation and transformation

we seek, it is both courteous and right for the industry to engage with mana whenua and recognise their ownership rights. This recognition can set the stage for joint working to pursue opportunity together to find solutions that might not be possible with each party working in isolation or limiting what is possible to mitigation agreements.

Māori want investment and employment for their people to ensure there is direct benefit back to communities. They are not against energy development but simply want to see that such development is considered, done well and adequately weighs up the economic, environmental and social considerations.

They told us it is time to explore a new framework for the energy sector that enables access to meaningful Māori investment and participation.

Conclusion:

Ngā mihi nui ki a koe mo tō tautoko

We need to work to make the energy transition work for all New Zealanders

Our 30 Voices predict that by 2030 Aotearoa New Zealand will be well on its way to transitioning from an economy based on fossil fuels to one based on more environmentally friendly electrification.

However, the transition to a more sustainable energy future must be equitable and there is much still to be done.

As we noted in the Foreword, unrealistic renewable targets, regulatory uncertainties, high costs, the lack of an energy strategy and an “unjust” transition are just a few of the concerns raised – and which the incoming government might wish to heed.

We would like to extend a thanks to all of our 30 voices for contributing their time and enthusiasm to bring this together, along with our KPMG energy sector team with a special mention to Tom Counsell, Karl Arndt and Nikki Stigley.



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“Focusing on that small remaining percentage of emissions in the generation sector may slow us down when it comes through a higher cost less stable system. We need to maintain and build confidence in the system.”

What is needed to enable New Zealand’s energy sector journey to 2030?

Transpower, as both a grid owner and a system operator, has a central role in New Zealand’s ecosystem. We’ve seen that in the quarter to the end of 2022 that 95% of generation came from renewables. Focusing on switching that last 5% to renewables at the expense of other areas may start to slow energy transition, making the system higher cost and less stable.

We need confidence in our energy system, confidence that we can deliver to winter peaks. We need new and upgraded infrastructure. New Zealand has not built significant new transmission for a generation, yet we are focused on the small sliver of emissions left in the generation sector. We need to think about whether we’ve got the settings right to build needed assets within our communities and how we engage with them. In the global race to decarbonise, we need to be clear where we stand.

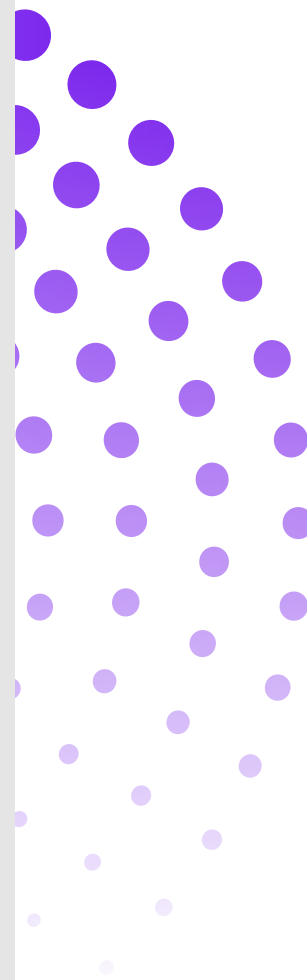
Success involves both bravery and making trade-offs. The decarbonisation targets for New Zealand are well accepted. However, our market, Government agencies and policies settings could work together more consistently.

Chantelle Bramley:
General Manager of Strategy and Customer, Transpower



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The market can do what it does best; allocate capital and risk appropriately. Meanwhile Government could take more of a lead to ensure energy and environment “trade-off” discussions are made; to provide direction on the continued use of some fossil fuels, environmental impacts, and greater electrification. The Commerce Commission and Electricity Authority mandates may also need to include an emissions reduction element that allows them to interpret existing instruments differently.

How do you see the energy investment environment evolving toward 2030?

New Zealand’s energy market has served New Zealand well; it has been a robust place to invest. As the energy transition progresses, many chicken and egg situations are emerging that hold back investment. We’re focused on matching supply and demand, so generation isn’t built until load shows up and the grid needs to have the capacity to support that. As we’ve seen with the development of renewable energy zones in other countries, new frameworks can be required to address the impasse that can occur where the first to connect bears consequential risks when others commit. Safety nets are needed, but perhaps the market should be more dynamic to accept that, under certain settings, controls may be exceeded or reduced back again. Flexibility will allow us to target issues differently.

Our regulatory settings may need to evolve to make investment more predictable, leveraging the natural competitive advantages of the existing, renewable, energy system, and recognising the shortcomings of New Zealand as two islands with a limited interconnected energy network. We should look to capitalise on the relatively small size of our sector, building a smarter system by collaborating effectively. By unlocking investment in the wider economy, we can bring about a faster electrification of New Zealand’s industry and transportation sectors to accelerate overall emission reductions.

What are the main hurdles for New Zealand’s energy sector going forward?

The labour force issue remains a massive challenge across the sector. We need to tackle the challenge of low sector awareness if we are going to attract economists, policy experts, environmental and data scientists, stakeholder engagement experts, as well as engineers. The softer skills are becoming more important, to interpret the trends and understand the insights from our energy data and engage with a wide range of stakeholders.

New Zealand’s transmission system was designed for two-way flows, but there is a substantial gap still in the interface from the transmission system down to the distribution level. We support distribution businesses improving the digital capability within that part of the supply chain to improve network interfaces and protocols, and better use technology to alleviate grid optimisation challenges.

The need for more joined up infrastructure planning is also growing. One benefit New Zealand has, is the relatively small scale of its energy and infrastructure sectors. There is only one transmission provider. We need to get better at dealing with the simpler infrastructure challenges; we have the land and the grid capacity currently to do so, because there are much bigger ones on the horizon.

One huge challenge for our utilities is retaining a social license to operate. One of the biggest barriers to New Zealand’s decarbonisation agenda is the physical impact on our communities as we need land to build assets. Going forward, we will have to be more considered in how we drive benefits for our communities and ask investors to directly support the development of more community infrastructure, including energy, roads, and green spaces. The big questions for New Zealand’s energy industry going forward, are not only if it can remain globally competitive, and electrify its wider economy, but also, it can retain the trust of its communities to carry on providing them with the utilities they need in an electrified world.

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“Unless we put communities at the centre of energy transition in New Zealand, we will exacerbate existing social inequalities.”

Looking back from 2030, what has been the biggest shift in New Zealand’s energy market?

Ara Ake is on a journey with businesses, innovators and communities to deploy innovative energy solutions across Aotearoa New Zealand. “Ara Ake” means new pathways, a journey forward. Today, in 2030, the conversation has moved beyond just investing in technologies to a conversation focusing on investing in the communities and places where those technologies are being deployed. New energy technologies and solutions can bring huge benefits to people’s homes and lifestyles, health, and wellbeing. Ara Ake wants to ensure everyone has equal access to the opportunities they offer.

To create an equal energy ecosystem involves a radical shift in thinking. We should be thinking of the challenge ahead of us as an energy transformation rather than an energy transition. This is because we must put people and their communities at the centre of what we do and use technology to help them prosper. If you empower communities, you will be able to deliver transformational change.

New Zealand is fortunate to already have a strong concept of community, including Māori and Pasifika communities - and the transformation required is indeed at this community level. These communities are much closer to challenges around energy inequality and are better placed to address them. Much of that inequality relates to access to new energy technologies, which have traditionally had cost barriers.

Cristiano Marantes:

CEO, Ara Ake



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For example, the people who would benefit most from electric vehicles or solar panels, are often the least likely to be able to afford them. This challenge is then compounded by the lack of infrastructure in many communities and the disproportionate understanding of these technologies, too.

Empowering communities to get involved in their own energy solutions, whether it's micro-grid or distributed energy schemes, will bring a faster energy transformation and enable it to be more sustainable, equitable and resilient by 2030.

In 2030, what will have been the most exciting energy technology advances over the past decade?

I would expect that, by 2030, some of the most transformational change will likely be in the growth of distributed energy resources. I could see this being facilitated by such developments as micro-grids, community energy projects, energy sharing and a significant increase in virtual power plants (VPPs).

We've already had some really exciting developments in this area. The first 30 MW of these VPPs, using consumers' solar and battery systems across New Zealand, was announced in 2023¹. By 2030 digital technologies will allow the aggregation of this distributed power, via the cloud, into larger and larger VPPs. The capacity of these is growing each year, meaning that by 2030 VPPs will potentially manage peaks in demand, in the same way thermal did a decade ago.

I would expect that the ability to share energy between people and communities will also be more widely adopted in Aotearoa by 2030. This is an important part of empowering consumers and communities to make better choices on how they generate and use energy. The first energy sharing initiative between 200 homes was announced in 2023, with a strong focus on reducing energy hardship².

Battery technology advancements will also likely be playing a bigger part of our energy ecosystem in 2030. The fact that batteries are lower cost, greater energy density, more recyclable, and part of a circular economy, is a big factor in underpinning their wider use around New Zealand by 2030. For example, electric vehicle batteries with a range of over 1600 km (1000 miles) were already an (early) reality in 2023 - a particularly exciting development for New Zealand, a country with lots of remote communities.

In 2030, how did New Zealand overcome the barriers to new energy growth?

I have a lot of optimism about Aotearoa's ability to take advantage of innovations in renewable energy for the benefit of consumers and communities. In 2030, I would like to think that New Zealand will be recognised as a global leader in overcoming the barriers to new energy growth. This would likely involve investing in communities, including capacity and infrastructure, to adopt and deploy energy technologies at scale.

Our strong, global innovation networks can also help us get over some growth challenges, particularly those related to renewable energy supply chains. The partnership Ara Ake set up with a European innovative solar manufacturer in 2023, is a good example³. This new solar technology uses materials that are mainly locally sourced, are fully recyclable and circular and can be made entirely from bio-based polymers. They have an ultra-low carbon footprint, do not contain toxic materials such as PFAS and are more than 50% lighter in weight than standard PV modules. New Zealand was one of the first countries in the world to adopt the use of these solar panels in 2023. By 2030 these will be widespread and manufactured in New Zealand not only to serve our internal market but to export to Australia and the Pacific Islands.



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Having a robust and also progressive regulatory environment is going to be crucial to our success – one that promotes and enables consumer-led innovations and attracts global innovators to come to Aotearoa to deploy some of the most advanced energy solutions in the world. In 2023, the regulator in New Zealand enabled a world leading energy sharing initiative focusing on giving consumers the choice to share excess solar energy with those experiencing energy hardship².

I think New Zealand will also have demonstrated that collaboration, combined with meaningful action - you could even call this “collabor-action” - is essential to achieving economic, social, cultural, and environmental impact.

Ara Ake is already bringing industry, innovators, policy makers, regulators, investors and communities together, so that through collaboration we can transform our country’s energy sector for the decades to come - “E hara taku toa i te toa takitahi, engari he toa takimano, takitini” (Success is not the work of one, but the work of many).

I would expect that the ability to share energy between people and communities will also be more widely adopted in Aotearoa by 2030.

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**“As New Zealanders we
must face up to the
particular challenges of
our energy transition.”**

\\ Malcolm Johns
CEO, Genesis Energy

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What actions have been taken by the New Zealand power sector over the past decade to 2030, to mitigate climate change?

The most critical action from a climate change perspective has been the electrification of more of New Zealand’s economy. In the 2030s, with electrification still growing, we need to make sure that people have confidence in the grid. Once our energy system pushes past 90% renewable power generation, there will be a trade-off between certainty and uncertainty. In 2030, we have more diverse renewable power generation and more New Zealanders owning electric vehicles. If the consumer is subject to rolling blackouts because of the intermittency of wind and solar, we will start to lose confidence in the energy system.

Genesis operates the nation’s largest gas fired power plant at Huntly, which can also use biomass and coal. Whether it still burns coal is more a question for New Zealand not for Genesis. The question we continue to ask the Government and the New Zealand energy consumer in 2030 is, as we make this renewable energy transition, and without fossils fuels and adequate storage, are you prepared to tolerate blackouts and if so, for how long? The answer will determine how the last 5-10% of New Zealand’s electricity generation is secured. And if there are, there will be a decline of confidence in our grid. We might have achieved 100% renewable electricity, but the long-term prize will be the electrification of over 50% of the economy.

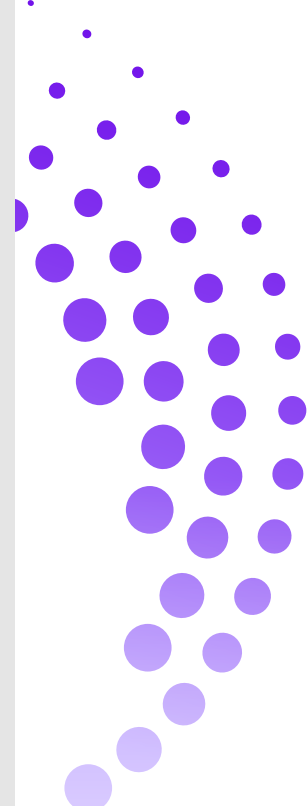
Net Zero by 2050 is law and managing through challenges like these is essential to removing uncertainty. As New Zealanders we must face up to the particular challenges of our energy transition. First, to electrify more of our society and economy will involve more imports, including electric cars, electric furnaces, and heat pumps. Also, as the energy transition is really a system transformation, it is creating considerable tensions between our political parties who favour different approaches to our 2050 journey. For our nation, this transition remains a complex undertaking.

Malcolm Johns:

CEO, Genesis Energy



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What is the solution to delivering that last 5-10% of power into a market transitioning to 100% renewables?

There's always a market solution. Ultimately the regulator designs the market, and they need to decide what the risk/reward tolerance might be in achieving that last 5-10%. If the answer is zero risk to the security of how the grid operates, then they need to design a market with enough standby capacity for peaking, firming and dry year coverage. If they don't, there will be a greater risk to the grid under different scenarios. Regardless, the market will respond. The complication is that we are not sure what role we want hydro, natural gas, and biomass to play, are they transition fuels or structural features of a future energy market, especially for dry years, when there is not enough hydro power for all our generation needs.

One solution could be to build more renewable capacity than is needed, but it's unlikely that New Zealand energy market can fund renewables overbuild without adequate rewards. We have trialled the use of biomass at Huntly; it showed that the plant could fully operate on biomass instead of coal; 1.5m tonnes of biomass would give you circa 3TWh of energy in a dry year. There might be greater need from New Zealand's industries for a biomass reserve to cover dry years than for base load or peaks.

An observation around moving electrons is there is no national standard for distribution. This means that some parts of the system might move faster than others in pursuit of future technology that may aid demand side efficiency but also remains limited in its ability to both collect energy and store it. Even if you can move the electrons around easily, New Zealand has limited storage options, meaning the mismatch of peaks in renewables generation and demand curves become harder to manage.

How does New Zealand develop its energy sector for the long term?

One thing I learned from the Christchurch earthquake back in 2011 was attracting capital is not the challenge; in that case there was plenty of capital, the challenge was making it land on something investable and buildable. In 2030, we have more than enough capital wanting to invest in new generation, our challenge is giving it a landing pad on an investable and buildable opportunity. There are lessons for New Zealand from the post-earthquake journey of Christchurch.

As Kiwi become more expert in partnering for progress, how to manage foreign direct investment might evolve into a critical skill for the future. It offers multiple benefits, including long-term stable partnerships, access to capital and results in social benefits, for example, more Māori and women, coming into the sector at every level.

We are already seeing Māori starting to participate more of the power sector in New Zealand - from a capital perspective, from an employment perspective and in leadership roles. The solutions the energy sector needs plays well to a Māori world view, with long wide horizons and multi-generational benefits - they have the right "time" mindset for the investments the sector needs. Also, most major generating assets in New Zealand are on areas of iwi interest.

As demand for solar and wind energy, and hydro power grows, we are seeing Māori interacting with, and taking more of an interest in our energy infrastructure.

Genesis has always supported diversity in New Zealand's energy sector. We have many of programs at secondary schools and apprenticeships designed to create the next generation of talent and leadership for New Zealand's energy sector, including more rangatahi. The energy industry of the future will comprise more diverse companies and workforces and newer assets and technologies, all designed to help multiple generations. Genesis hopes that we will be part of that long term development too.

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“Engagement with mana whenua to recognise ownership rights is critical for Aotearoa’s climate goals.”

How can the Tūaropaki Trust support Aotearoa to meet its decarbonisation and climate goals?

As we sit in 2030, it is clear that Aotearoa will not achieve its decarbonisation goals without more enabling regulation and incentives from our Government. If there continues to be uncertainty and lack of consistency in our climate change and energy regulations and policy, including a dysfunctioning ETS system, then as a country we will miss not only our Net Zero goals, but also the 100% renewables goal. It is still too easy to just meet minimum targets, with inadequate incentives or pressure to do more.

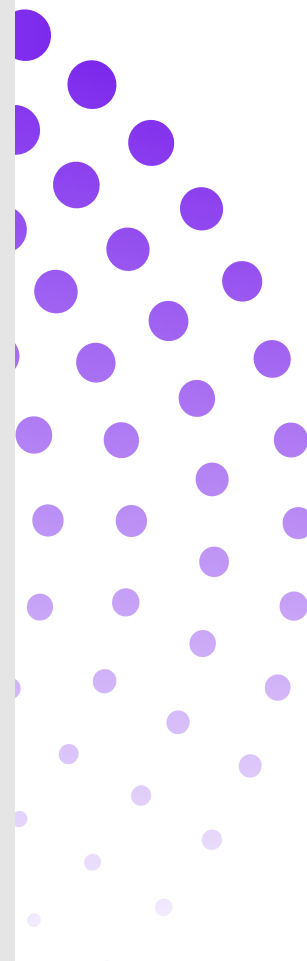
One impediment to transforming the energy sector, has been the failure to work with mana whenua on energy policy. Māori own the resources needed to help Aotearoa achieve Net Zero, but failure to meaningfully collaborate has meant a lot of time has been lost and opportunities missed. For example, our Trust has geothermal energy, freshwater resources, rural land and opportunities in green hydrogen, wind, solar and hydrogen energy production. We also offer engineering and drilling services for the energy industry. Basically, all of the things you need for a rapid energy transition.

The Government has not engaged enough with Māori to recognise our rights of ownership over freshwater and geothermal resources. Even when ownership rights are recognised, our rights to develop are not enabled. Aotearoa needs access to our resources, and that can only happen with our consent and our support. If the Government persists in trying to develop land

Gina Rangi:
Chair, Tūaropaki Trust



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and water taonga without the involvement of mana whenua, if we are not part of decision-making, then we are much more likely to object, for example by opposing resource consents. However, where we are part of decision-making, when our rights are recognised, we are much more willing to work with partners to find ways to develop. When development is sustainable, when it respects our communities and our taonga, of course we support development.

Our message to the Government is, you must engage with mana whenua by recognising our ownership rights. Mana whenua must be enabled to fully participate in energy sector development and to bring more innovative solutions that the incumbents haven't yet thought of, or that they are unwilling to pursue.

In 2030, what challenges are Māori facing in Aotearoa's energy sector?

Māori are experiencing two existential crises – the first relates to the current and future impacts of climate change and the other concerns our connection with our whakapapa, our identity, and our connection to our whenua (lands).

Many of the sector challenges for Māori derive from historic practices that sought to disconnect Māori from our whakapapa, from our communities and from our taonga. In the case of Tūaropaki, due to deforestation of our traditional lands, many of our people moved away from our traditional homes in the 1940s and 1950s. Our tupuna amalgamated our remaining landholdings into a single block at that time, and converted it to farming in order to provide employment for our families. But many, most, of our owners and their children have lived away from the whenua since then.

It is very difficult to influence education, social and cultural outcomes when our families live at a distance from our traditional community. It is a challenge to develop the right sector experience, the senior management and leadership experience that is needed to develop our resources.

It's difficult to deal with the climate crisis at the same time as our community is dealing with the crisis of maintaining our collective identity – our values, our language, our sense of community connection. We must address these issues head-on.

Diversity remains an issue in the energy industry in Aotearoa. It has improved, with greater numbers of young Māori engineers and scientists and more gender diversity, but not enough. There are young ones coming through, but there are simply not enough Māori in senior positions. That affects the culture of organisations, and it inevitably affects how welcomed and supported our young people feel in the industry.

When our Trust started offering scholarships to our owners and their uri (descendants), we had very few students applying, largely because they just didn't think they were good enough. In some areas, particularly engineering and science, there were no applicants at all, even though we knew they were studying those tohu. We would go through our records to find those students. That has changed and, in 2030, we have at least two or three of our young people every year studying engineering or science, and they are very capable. We try to support our students as best we can, for example, scholarships as well as participating in the TupuToa¹ scheme programme, which offers an employment pathway for Māori and Pacific tertiary students into corporations, the commercial sector and professional services.

What strategies do you have in order to facilitate more Māori participation in the energy sector?

While our participation in the sector has improved, we still do not see enough Māori in energy leadership positions in Aotearoa. There are mana whenua in the industry and we own and govern resources, but very few, if any, at the C-suite level in energy companies in Aotearoa.

The Trust has established a leadership programme to work with early career owners and uri, to provide both mentorship and practical opportunities to develop their leadership experience. At an individual level, mentoring is also important. When I was first appointed as a company director to the Tūaropaki Power Company power I approach an energy sector CEO that I worked to as for advice. He went out of his way to provide me with learning opportunities, for example, he supported my appointment to a geothermal resource consent peer review panel. I worked with incredible scientists and engineers and they were very supportive, helping me to understand and examine the impact of geothermal field operations on a different geothermal field. It helped me to better understand the science, and to contrast that with what was happening on the Trust's Mōkai field. I would advise both new and experienced Māori governors to seek out mentors, and network with different organisations.



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Where do you think the main opportunities are in the Aotearoa hydrogen market?

In 2018 the Trust partnered with Obayashi Corporation, a large Japanese company with extensive infrastructure and green energy investments in Japan. Together, we established Halcyon Power which is New Zealand's only green hydrogen producer. Our intention is to establish a green hydrogen supply chain which includes transportation, site storage and refuelling infrastructure.

Aotearoa cannot reduce its transport emissions without using hydrogen, particularly for long haul and heavy vehicles. However, this is an area where more enabling legislation and Government incentives are required to level the playing field with high carbon fuels such as diesel.

We are a long, thin country and it means that electric vehicles cannot be the whole solution for transportation between cities. There are also promising applications in other hard to electrify situations such as remote power generation, marine and aircraft.

It is new and exciting technology and we understand the long-term approach needed to establish the sector. Despite these challenges, the technology for the new hydrogen industry is already there with demand increasing.

Both blue and green hydrogen have great potential, including the potential of a future export market in Japan. Japan will not meet its own climate targets without hydrogen, and Aotearoa can help them to do so.

**Mana whenua
must be enabled
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“Our purpose is to enable our customers to participate in a better energy future for them and the planet.”

Placing yourself in the year 2030, what are the challenges for the New Zealand power sector?

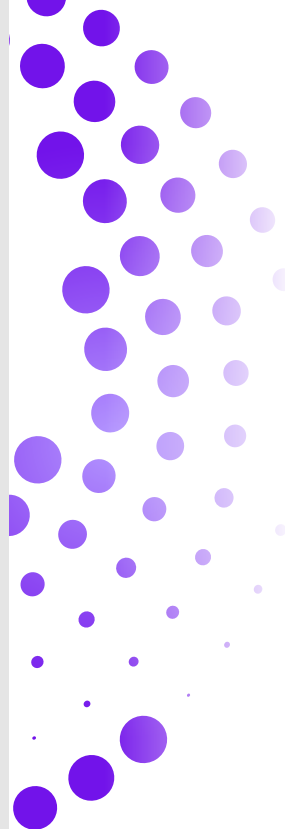
Unfortunately, we have not met the 100% target for renewables in power generation - despite New Zealand’s rich endowment of renewables in its electricity system. This is largely because our incumbent energy companies are heavily incentivised to ensure the marginal price setting unit is delivered by fossil fuels - they get paid that fossil fuel price regardless of the fuel that they use. As long as our marginal power prices are still set by coal and gas, incumbents remain incentivised to keep them in the generation mix. Regulators need to solve the renewable challenge by ensuring investment in peak management assets by non-incumbent players.

New Zealand has not changed how we meet peak power demand; it is still largely met by our hydro dams. The cost of firming a grid based on intermittent renewables has hindered investment from new players. Demand side innovations to reduce peaks has largely failed because the major players are incentivised to continue to see high peak prices. Also, New Zealand (currently) has no futures market for peak power, so smaller companies like Electric Kiwi cannot effectively firm the newly built renewable energy.

Luke Blincoe: CEO, The Energy Collective



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There is also less capital available for investment in our energy infrastructure. For example, early adopters of household solar panels are likely to be wealthier consumers, which leaves a smaller pool of capital available to invest in our power infrastructure, causing greater social equity issues with those that can least afford it, left paying an increasing share of our grid infrastructure costs. The prize New Zealand is working toward in 2030, is a cleaner electricity grid, lower overall emissions from accelerated electrification, cheaper electricity, and a richer country.

Is innovation is happening in the New Zealand power sector in 2030 and if so, where?

In New Zealand in 2030 we still have an imbalanced wholesale market with vertical integration and highly concentrated of wholesale market power, which is not only stifling competition but also participation in the transition. As long as the incumbents maintain the market power to set peak prices, they are disincentivised to innovate on the demand side. To see more innovation a truly competitive retail market is required, meaning the old market structures need to change.

Some innovation is happening with transportation with the growth of electric vehicles and electric vehicle charging. This has been a more elegant solution for New Zealand as we have been able to leverage our largely renewable energy system to support more electric vehicle use. Electrification of our fleet is a good strategy in terms of meeting our climate goals while also improving our current account. It is an opportunity to replace dirty imported fuels with clean, locally made ones.

How do you see competition developing in the power sector?

We have seen new players enter the market this decade, for example, the telecommunications company 2degrees. They entered the power market back in 2022, bundling broadband and power contracts together but are now creating a more competitive and innovative power market by exploiting the similarities between our electricity and telecommunications sectors.

Generally, however, the risk of entering the New Zealand power market, if you are not vertically integrated, or government backed is high. The concentration of market power in wholesale and subsequently retail markets is not a great

model for encouraging investment. Transmission, distribution, and generation are good things for governments to own as they are non-contestable nation building infrastructure, but it has resulted in a decline in retail competition. We are still not seeing, for example, any international players. The UK company, Octopus Energy has a big balance sheet, but they appear to have a lack of confidence in our energy market due to the lack of access to wholesale markets.

Regulation could address some of these markets and competitive challenges. The regulator could force market making on peaks and super peaks, which would provide a price discovery mechanism that currently doesn't exist.

Even if Electric Kiwi abandoned its prudent risk management approach and speculated every week of the year to try to secure the best deal regardless of volume position, we would not be able to compete with the retail prices of the vertically integrated players This is market power in play and being able to readily access decent hedging arrangements is hindering the development of retail competition, innovation, and lower prices in New Zealand's power sector.



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What are the important parts of the retail business for Electric Kiwi in 2030?

Artificial Intelligence (AI) was already playing a large role in our business earlier this decade and our primary technology focus in 2030 remains on AI and data management. The retail space will remain data driven and it's the players who can capture the market and client insights the fastest and most efficiently who are winning. Understanding the skill base needed to do this is also important. Previously, there was a perception that you need to be an electrical engineer to understand the power retail space, now you need a passion for information and the ability to deal with complex consumer and pricing data.

Electric Kiwi wants to use its technical know-how and insights so our customers can not only have the best consumer experience but also make the best choices. Our license to operate in this emerging market is based on the understanding that if you want your customers to love and trust you, you must employ your technology to offer them what they need. Innovative players with technology capability, like Electric Kiwi are successfully carving out a niche in enabling consumers who want to engage with their energy transition, to make choices, around carbon or costs. We don't want to oversimplify the renewable challenge, but rather make it easy for our customers to participate. We want to be able to say to our customers "if you want a better future and you want to be on a better planet, you have to act too. Let us help you to do that..."

If you want a better future and you want to be on a better planet, you have to act too.

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“The Electric Arc Furnace is fundamental to decarbonising New Zealand’s economy; our steel will have better green credentials than imported steel.”

What have been the challenges for New Zealand Steel so far during this energy transition?

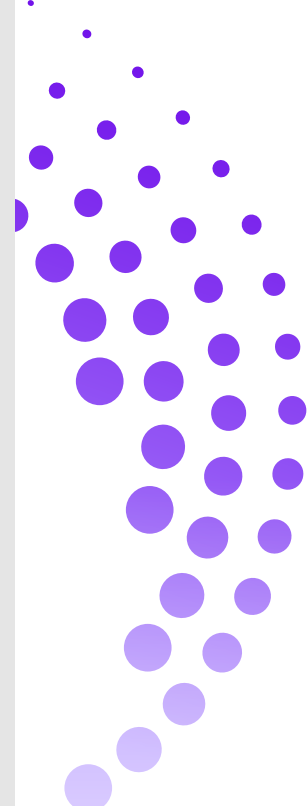
There are particular pressures being a large industrial emitter in New Zealand. NZ Steel accounted for around 2% of New Zealand’s total emissions in the early 2020s, largely through coal consumption. Certain decarbonisation pressures accelerated our switch to renewable electricity. Pressure is being felt from all parts of society including customers, architects, our communities, regulators, the Courts, NGOs and so on. New Zealand Steel decided to take a pro-active approach and lead the way by decarbonising early and at scale.

Trying to reach the 100% renewable power generation target is admirable – however, the law of diminishing returns is a factor that needs to be considered. Once the grid starts hitting over 90%, every dollar spent on those incremental percentages needs to be carefully weighed against other alternative carbon removal programmes. It’s now a game of trade-offs and it has become harder to determine which renewable investments (grid electrification vs other decarbonisation efforts) will get us there, the quickest – but that analysis is critical.

Nathan Jones:
General Counsel/Regulatory Affairs,
BlueScope



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Supporting energy projects which have real practical benefits to our economy and progress our decarbonisation journey in Aotearoa should be prioritised. Protecting our steel industry is an important part of that. New Zealand Steel's economic contribution is over \$600 million per year for New Zealand's economy.

It means when you buy \$100 worth of steel made in New Zealand, \$80 stays here, but when you buy imported steel, only around \$5 stays in New Zealand.

What measures have you taken to progress your sustainability journey in New Zealand?

The biggest decision taken was to halve the use of coal at our Glenbrook steel plant, recycle scrap steel and introduce an electric arc furnace (EAF). Our \$300 million EAF melts down scrap steel using renewable electricity. With an EAF, our coal consumption is reduced by around half, and the missing half is replaced by scrap steel, which goes into the EAF. Our investment is estimated to reduce New Zealand Steel's emissions by over 45% and sets the platform for our 2050 Net Zero goal. We will not stop at 45% however – we aim to reduce our emissions further even once the EAF is commissioned. We may be able to achieve this via feeding more scrap into the EAF and/or using green hydrogen to reduce the remaining iron sands in our process. It is this later opportunity that gets me excited due to the cutting-edge nature of hydrogen technology and the broader potential benefits to New Zealand.

EAFs are more common in North America and Europe, as both markets have a strong supply of scrap steel, from multiple suppliers, supported by cheap, reliable, firm electricity (much of which is nuclear). While we had the decarbonisation driver, many of the other market drivers to support this project were not there, and we have had to solve for that. New Zealand's small market and isolated location means we are not awash with scrap metal, while the long-term view of our power prices is relatively high.

First, we started to talk to a number of our utilities. We went out to the market with an informal tendering process for the renewable power required. Establishing a common vision of this broader decarbonisation picture took some time, and we were pleased to partner with Contact Energy, who understood our decarbonisation vision. The Power Purchase Agreement we negotiated with Contact provides us with 30MW average of renewable electricity in a flexible off-peak arrangement which let us scale down production in times of peak demand or supply shortages.

The EAF enables us to do this more easily, as it is modular, and operates in batches of half an hour. Once a batch is done, there is typically a short lag and the next one comes through, so we can turn it off and on like a light switch at those half hour intervals, for shorter or longer periods, depending on how New Zealand's power demand is peaking.

Support from the Government has also been important. Through the Government Investment in Decarbonising Industry Fund¹ (GIDI), it is contributing up to \$140 million in support of this EAF project. The GIDI fund is set up to support such investments in industries like ours as alternatives to buying offsets overseas. It also enables projects to happen faster than they otherwise would, delivering larger emissions reductions much earlier. GIDI is not, however, the total panacea to decarbonisation in Aotearoa - a holistic approach is required by Government. Depending on the specifics of the project, a blend of appropriate ETS market incentives, bespoke regulatory settings and direct funding is ideal – this broader approach is commonly seen in the EU.



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What are the next steps for New Zealand Steel in its decarbonisation journey?

We need to continue fostering more joined-up thinking amongst all of New Zealand's stakeholders to facilitate a smoother transition to a low-carbon future. Without working with our upstream supply chain partners and the Government, the EAF investment would not have been possible. Not one company is going to dominate the end-to-end supply chain for projects of this scale – collaboration is essential.

This new energy future is exciting – New Zealand is going through a once in a 50-year energy transition. The amount of new technology coming into the country as part of this transition is amazing. It's not only our EAF, but other technologies like, offshore wind, grid scale batteries, green hydrogen/ammonia and sustainable aviation fuel are all real opportunities in the short-to-medium term. The key will be able to ensure that our competitive advantages as a country are highlighted to investors and leveraged.

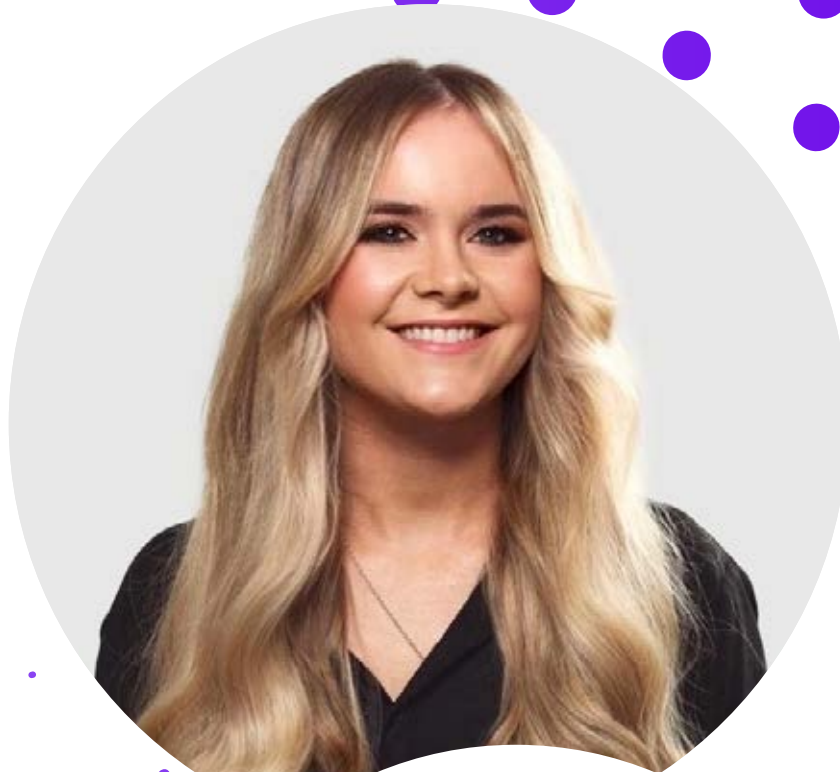
The opportunities are endless.

This new energy future is exciting – New Zealand is going through a once in a 50-year energy transition.

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Elliott Powell \ Esther Tomkinson:

Co-Chairs, Young Energy Professionals Network

“New Zealand must look to involve its younger generation in creating its energy future, making sure that all knowledge is passed down and that we build a more diverse and inclusive sector.”

When we set the 100% renewable targets for 2030 it seemed a long way off, but it is arriving quickly. There are only so many changes that can be achieved in that timeframe, particularly as seven years is almost the time required to prospect and consent in the renewable power sector. Targets are important to align the industry and ensure we make progress: we should always look ahead to where the industry should be, say, in 2035 and 2050, and work backwards.

There are multiple challenges in getting to 100% renewables, whatever year is targeted. There is a peak capacity problem that the market is trying to deal with, and there are few decent solutions to it. We are building batteries to take the edge off it but over time expect a greater contribution from demand response to ensure the grid is secure over multiple cold low wind days.

Over the last decade, there was an assumption that natural gas would fulfil some of that backup role. With that no longer seeming to be the case, New Zealand’s Government and industry need to get moving on other backup solutions. We will need to ensure that the prospect of Onslow being built in the late 2030s doesn’t shorten the economic life of new projects to the point they are not built. Despite all this, great progress has been made; the emissions intensity of the grid is less than half of what it used to be. Going forward we will need to ensure that the cost of achieving 100% renewables in all conditions is worth the trade offs across other sectors. We have to ensure that energy prices stay affordable so other industries and large industrial companies can still electrify.

There are some gaps in our regulatory regime preventing the build out of more renewable energy, offshore wind is a good example. For much of the last decade, New Zealand had no robust regulations in place for offshore wind developments. If you add the consenting issue to that, progress is slower than it could be. All of this is further complicated by the sheer scale of renewable generation required over the next decade.

It’s also clear that the Emissions Trading Scheme (ETS) will not get us there by itself, as the price of carbon is still too low and investor confidence in the ETS has declined in recent years. Recent complementary policies, like the GIDI fund and Clean Car Discount are helping make progress in areas that might otherwise be slower.

Another barrier to decarbonisation of the grid are the ongoing delays in getting new renewable generation



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connected. The Transpowers and Vectors of our world have huge queues of connection requests which has become a major constraint for a lot of projects.

The energy transition in New Zealand must be driven by the younger generation. They are already interacting more with the energy market. As they come into the workforce and start to buy houses, they want a heat pump rather than a gas boiler; they are much more aware. Younger people buying their first car today are far more likely to get a hybrid or an electric car. Their choices are not only driven by economy, as they would prefer not to buy petrol or diesel, but that it will reduce their carbon footprint, and progress the journey toward Net Zero.

New Zealand should support this generational shift toward renewable electricity with the right capital models. The decision to spend \$10,000 extra on a car to save \$200/month can be difficult to justify for most people. The right financial incentives can help to support spending on electric cars and heat pumps - recent moves by banks to offer low interest loans is great for progress here.

There are also generational issues to consider within the energy sector itself. If you visit some of New Zealand's utilities most of the workforce is very experienced. We need to bridge the gap between the younger generation entering the sector, and the older generation leaving it. Before they do, we must make sure we transfer their experience and knowledge to the younger generation. New Zealand's energy industry is more appealing if people entering can see themselves there, so in that regard increased gender and ethnic diversity will help make the sector more appealing to young people.

Over time we expect the makeup of the workforce to change, it can already be seen today. New hires are not only more diverse, but they have different skills. For example, not everyone working in the energy sector

needs to have a qualification. Without different people we will never have more diverse thought processes and without those, we won't transform the industry.

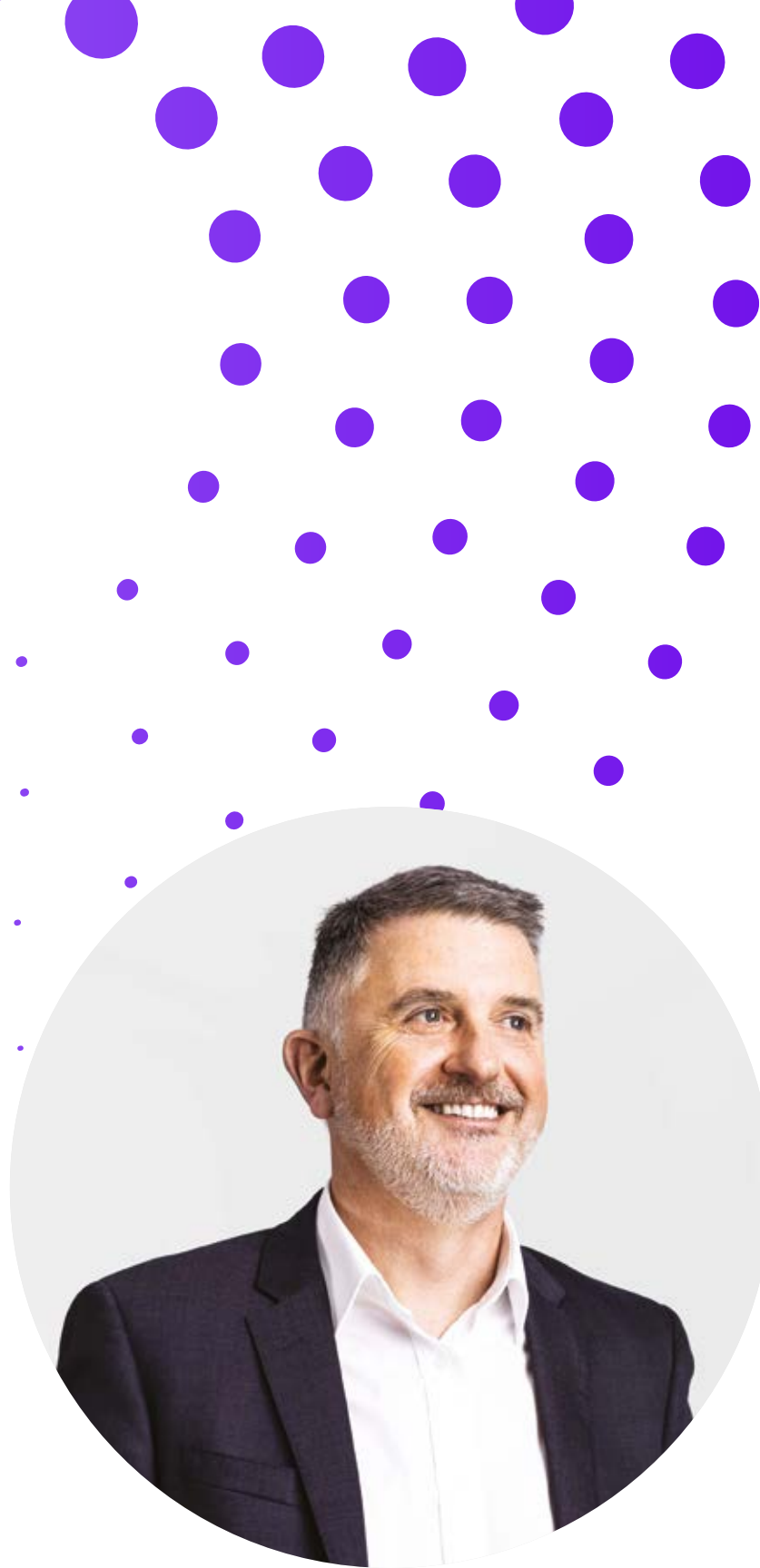
We are trying to practice what we preach within our own network. What we ultimately want are perspectives on New Zealand's energy sector that are fresh and new. Historically, the young electricity professional network was aimed at people under 35. We have now broadened this so that you are also welcome if you have been working in the sector for less than 15 years. You are bringing skills and experience from other industries. If it helps us find people with emotional intelligence, technology skills and leadership potential, then that is the foundation for a successful energy industry for the 2030s and beyond.

The energy transition in New Zealand must be driven by the younger generation.

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“New Zealand’s energy transformation is both revolution and evolution. Innovation and staying relevant to global renewable suppliers are key to its success.”

In 2030, New Zealand is fortunate to have close to 100% renewable electricity. Having a small amount of thermal generation is critical for managing security of supply in an affordable way over the medium term and for that the most logical solution is open cycle gas turbines which can ramp up quickly to meet peak demand.

The energy transition is complex; there won’t be a single action which will achieve it. To decarbonise, we need both an energy revolution and evolution, with innovation and the ability to learn from those innovations. Some will succeed, others won’t. For example, as more electric vehicles appear on our roads, we will have the opportunity to evaluate and learn how to best integrate them into the grid while still managing peaks. We need to go through the energy transition with not only a growth mindset, but also being more open to change.

Vince Hawksworth:

CEO, Mercury NZ

As we work toward Net Zero by 2050, New Zealand should capitalise more on its reputation for strong execution and operation of renewable energy projects. We need to remain relevant to global suppliers of renewable equipment. New Zealand is a small marketplace compared to the huge demand for renewable projects in Europe, Southeast Asia, or the USA, but we do have a lot of renewable experience to share. For example, some of our wind assets such as the Tararua Wind Farm are globally renowned for both their longevity and superior operational performance.

However, to attract an international wind turbine or transformer supplier, we cannot rely on our reputation alone. We need to recognise that the global supply market has changed. Many suppliers of renewable assets and equipment, particularly in the wind space, have encountered challenges. This has seen them become laser focused on their pricing. Our energy sector needs to put more effort into helping them understand how our market works and what it can offer ahead of their final investment decisions, so they can invest here with confidence.

We also need to be much smarter in how we invest in our energy industry, not only in financial terms but also in terms of developing our own people and communities and attracting international talent. The sector needs to be seen as a diverse and attractive place for people from all backgrounds to succeed and have great careers. Part of what motivates people is working somewhere with a strong purpose and the decarbonisation and electrification of our energy industry provides just that.



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New Zealand is a much more multicultural place in 2030. It is likely to be more so over the coming decades with Māori and Pasifika making up a bigger proportion of our communities than they do today. There has been increased focus on supporting equity and inclusion, including embracing te ao Māori.

In addition to creating more opportunities for our people in Aotearoa, we also need to facilitate the movement of talent to New Zealand. The current policy on immigration is a hindrance for the development of the energy sector. I emigrated here in 1993 with no job but was given permanent residence which told me the country valued my skills. Today, in 2030, you might be a fantastic Filipino geothermal engineer who would love to come and work in New Zealand, but you are not certain you can stay. The energy sector needs immigration rules that attract talent without them having to leave after a few years.

For Mercury, success in this fast-changing energy market is about taking advantage of all opportunities - the revolution and evolution. Revolution is already happening with projects like our Turitea Wind Farm, which was New Zealand's largest when commissioned in 2023, and added an additional 2% renewable generation to the country's national grid. Evolution might be slower but will be just as impactful. For example, the success of any large hydrogen plant would capitalise on many smaller scale hydrogen use cases and projects which have gone before.

We are now seeing first-hand in 2030 how electricity-driven technologies are changing our world. Our aim is to open up that world to our customers, aided by new technology and our adjacent broadband and mobile industries. Delivering innovative solutions which meet customers changing needs in a sustainable way is where a lot of the opportunity lies.

The sector needs to be seen as a diverse and attractive place for people from all backgrounds to succeed.



“By 2030 Aotearoa is re-industrialising with low - and no - carbon technologies.”

\\ Chris Blenkiron,
CEO, New Zealand Aluminium Smelter

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Chris Blenkiron:

CEO, New Zealand Aluminium Smelter (NZAS)

Fast-forward seven years and how far has New Zealand’s decarbonisation, and indeed the world’s, advanced by 2030? Has this decarbonisation meant the de-industrialisation of our economy too? And what could happen next?

By 2030 Aotearoa is re-industrialising with low- and no-carbon technologies.

Through the course of the 2020s, Government and business came closer together to strategically problem solve New Zealand’s global place in the energy transition. With a strategically advantageous backdrop of 85%+ renewable electricity, the country worked to develop significant growth in renewable generation, particularly in wind power, with some of the most attractive wind zones anywhere in the world.

New Zealand had to overcome its small scale and export reach limitations by partnering with global players who bought cheaper capital and international supply chains, a key to unlocking the global competitiveness of our natural resources. This proved critical as towards the start of the 2030s a global energy/electricity price is emerging as a key driver to economic growth, whereas formerly “a barrel of crude” was the key denominator of energy competition. Now, in the 2030s, a new global market of “a MW of renewable” is swiftly dictating who the global players are, and what markets are able to attract international capital to grow.

Through the 2020s New Zealand made some key strategic decisions on how to access these global markets to gain prosperity from the renewable resources at our disposal. Emerging technologies have continued to offer exciting de-carbonisation projects for hard-to-abate sectors around the world – specifically in heavy transport and steel production. The majority of the market, however, has steered toward direct electrification to maximize the efficiency of the all-important – and abundantly available in New Zealand - renewable electrons.





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In the previous decade key decisions were made to centrally prioritise and strategically support industries to grow in New Zealand that had strong yield and storage capabilities. These industries are using renewable energy, allowing them to remain globally competitive through the coming decades.

New Zealand entered the 2030s with one of the lowest carbon footprints anywhere in the world for steel and aluminium production. Long before 2030, NZAS' aluminium smelter at Tiwai was one of the cleanest smelters on the planet: the average smelter produces around twelve tonnes of carbon dioxide for every tonne of aluminium produced, while Tiwai generates only two.

These developments have now provided the launching pad for low and no-carbon industry to establish in New Zealand, with downstream processing, by-product and value-adding industries piggy-backing off the country's strategic advantage to produce the materials the world desperately needs in the ongoing energy transition – the scale of which was only being glimpsed back in the early 2020s.

We are getting noticed. New Zealand is hitting above its weight in attracting new industry and exporting high value, highly strategic materials the world needs for the energy transition. Historically, there has always been strong global demand for the aluminium made at Tiwai, and it is a critical material for global decarbonisation and future technologies. It's used by a variety of industries including aviation, solar, EVs, electronics, in aircraft wings and car and phone batteries, while the ultra-high purity metal is used in computer hard disks.

Industry itself has evolved through the 2020s, to re-position its thinking away from value definition of fifty years around asset utilisation targets and uptime. Instead, industry has recognized that its value for the next fifty years is in flexibility, load shedding and energy storage. – and in partnership with the energy system that industry itself is a central element of part of. And this new approach has seen company attitudes and community partnerships improve for the better too. Companies which prioritised these capabilities, through investment and development of its people, thrived, while laggards faced ongoing pressure to participate in the solution.

Industry in New Zealand has become a significant part of solving a growing security of supply challenge seen around the world in a push for a fully renewable energy system. Communities demanded more from business to deliver environmental, social and cultural outcomes of benefit to all participants.

Here at Tiwai we were already responding to these realities in the early 2020s. The voice of mana whenua at the decision-making table grew significantly, underpinning a deeper understanding of and appreciation for decisions that have impact on the whenua, water and air that sustains us all. Harnessing these natural resources and turning them into national economic prosperity, this time around to the benefit of all involved rather than a select few, is being done in a way that brings value to all.

The partnership agreement announced in 2022 between NZAS and Ngāi Tahu, mana whenua of the land on which the smelter is sited, has involved the company adjusting to a different values model and working with the variabilities of the changing grid.

Some of the environmental issues we had to put right on the Tiwai site would not have occurred in the first place if we had a partnership with Ngāi Tahu much earlier in our history. Past decisions would have been challenged in the right way and thought about more deeply, right from the start. And there is growing awareness that businesses need to provide meaningful work, with appropriate pay and conditions, to the communities in which they operate. Industry and partners are being challenged in the face of automation, and low employment industries are being challenged on their enduring contribution to communities.

The next ten years, to 2040 and beyond? The future is bright for New Zealand as an emerging niche and high-value industry player that exports more of what the world needs than ever before, utilising industry in a way that is both sustaining and growing its strategic renewable energy advantage.

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Sarah Gillies:

CEO, The Electricity Authority

“At the Electricity Authority we’re looking to how, in our role as a regulator, we can continue to grow to serve our part.”

As the industry regulator, our mandate at the Electricity Authority (the Authority) is to create a competitive, reliable, and efficient electricity industry for the long-term benefit of consumers. The Authority is not in the business of delivering electricity, but in the business of industry regulation, and how it can be applied and improved to best serve all New Zealand’s communities.

Our focus is on regulation that enables rather than hinders progress. Over the next decade or two, a significant challenge will be coordinating a system wide approach to decarbonising the electricity industry to help New Zealand achieve Net Zero carbon greenhouse gas emissions by 2050. We already have the benefits of having a high proportion of renewable energy compared with some other jurisdictions. We know there are significant economic and social benefits to electrification for consumers - large and small - and the Authority is keen to see those benefits realised. Regardless of whether we exactly meet the 100% renewable by 2030, the Authority is focused on efforts to achieve benefits for all consumers.

Transformation requires a collaborative approach and as the regulator, we have a solid understanding of our regulated parties and both the challenges and opportunities now and in the future. We recognise there is substantial expertise and experience across the industry and agencies that will help us identify, develop and implement solutions on behalf of all New Zealanders. We’re increasingly looking at ways we can work alongside others to learn from their experiences and draw on their expertise.

There are a lot of big sector issues to resolve, particularly around the themes of capacity and capability; creating more new renewable capacity and building industry capability to electrify our economy. The energy market settings need to be right to encourage investment, while the labour market needs to deliver the people to resource the challenge. New Zealand also needs better access to global supply chains. All parts of the system must work well together. For that, we need more system thinkers. Without system oversight we are at risk of participants individually solving their own segment of the pie, without thinking about how all the pieces of the pie (or system) fit together.

To deliver on Net Zero emissions targets, and encourage investment, we need to work closely with central Government as well as industry and consumer groups. We have a pipeline of important projects underway which address the electricity aspect of common issues facing many other sectors and for which government assistance is necessary. For example, the recently announced National Resilience Plan has set aside

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\$6 billion for strategic investments, on top of the Government infrastructure plan, which aims to invest \$71 billion up to 2028.

We need to ensure our electricity system is resilient in the face of extreme events whether they be natural hazards or cyber-attacks. One of our key priorities is our Future Security and Resilience work programme. This is a multi-year programme focused on making sure New Zealand's power system remains stable, secure and resilient as it evolves in coming decades. There's a lot to consider within a relatively small budget. We have to prioritise and focus on what will deliver better outcomes for all consumers now and in the future. We have to work with others, and we must be transparent across Government with what we're working on to maximise collective effort and avoid duplication.

As steward of the energy market regulatory system the Ministry of Innovation, Business and Employment (MBIE) is playing a key role in enabling joint conversations about important industry issues. The Council of Energy Regulators has been operating for over a decade and includes MBIE, the Commerce Commission, the Gas Industry Company, the Energy Efficiency and Conservation Authority and the Electricity Authority. Through this forum we can together identify areas of overlap or any gaps across the energy sector and look to develop a coordinated response.

Consumer protection and energy hardship are areas which require a system response. Energy hardship is a multifaceted issue for which many interventions may be necessary to affect change. That doesn't mean we don't do anything – it means that we need to work more closely with other Government agencies and organisations to respond.

Innovation and technological change will drive the transformation of the electricity sector. It is critical the rules keep up with changes underway to help unlock the benefits of innovation for all consumers. This requires us to work in diverse ways and to work faster, acknowledging that sometimes we'll be playing catch up.

The multi-party trading relationship work that evolved out of the trial with Kāinga Ora, Wellington Electricity and Ara Ake is a great example of how regulation needs to evolve to enable the potential positive impact of new technologies. The trial is a great test of market rules and required Code exemptions to progress under the existing rules. This trial has illustrated the benefits that flow from industry collaboration and how initiatives like this can better support vulnerable communities, giving users more choice and autonomy around how they want to consume and produce electricity. Collaborative action, with a little bit of creative thinking, will play an important part in reducing energy hardship as we transition to a Net Zero emissions future.

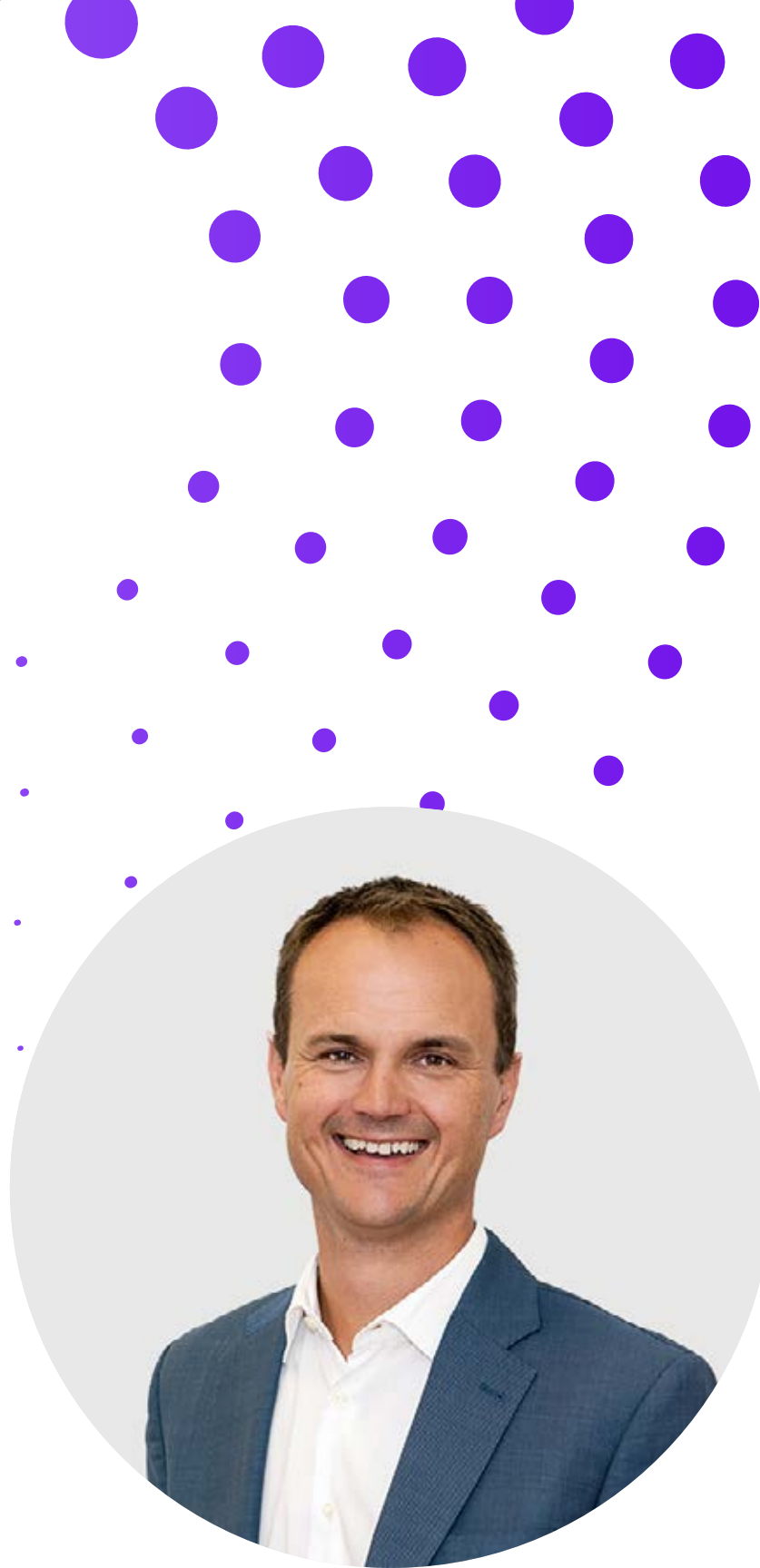
In addition to wider sector collaboration and systems thinking, the success of this energy transition also depends on data driven market analysis to inform regulatory decision making. With dedicated data and market analytics teams, we can better track compliance with existing regulations and model the impact of future ones. Over the next decade, data will be a central focus for the Electricity Authority's decision making.

New Zealand already has highly renewable baseload and we have the potential to be a global sandpit for innovation as the world looks to transition to a low carbon future. If we continue to leverage our strengths, we will achieve our energy ambitions.

The role of the Electricity Authority is to enable the processes, engage with the industry, and bring it together to progress change. That's a very exciting space to be in and I'm privileged to lead an organisation so critical to New Zealand's low carbon future.

If we continue to leverage our strengths, we will achieve our energy ambitions.

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Lindis Jones:

CEO, Z Energy

“Our energy transition needs involves big capital flows, but its costs are incurred in different ways across society, and that’s when inequalities show up.”

New Zealand is unlikely to reach 100% renewable energy by 2030, largely because achieving that last few percent will prove to be both expensive and complicated.

There continues to be challenges accessing the capital required for the transition.

Norway, for example, has made significant investment decarbonising their light vehicle fleet. These were both direct subsidies for buying an electric vehicle or indirect, by allowing EVs free passage through motorway tolls or free city parking. However, I suspect these subsidies have seen a wealth transfer from the Government to richer Norwegians, who can afford EVs and who live in houses in the wealthier suburbs where it is easier to charge them and who benefitted from such indirect subsidies. While the transition is an overall capital challenge, it’s also a question of equity and ensuring the costs do not fall on those that can least afford them.

There is also an issue of the amount of “unproductive” capital associated with the energy transition goal. Of the trillions of dollars required to be spent a significant proportion is likely to be unproductive capital meaning there is no real uplift in productivity. While there will continue to be innovation and job creation associated with green technologies many households and businesses are now being confronted with investment decisions that do not directly increase productivity.

Capital is also at risk of being assessed as unproductive because the decisions being made regarding our energy future are often considered against a relatively short time horizon and fail to account for externalities. If you factor in the current carbon price, which is too low to change behaviour, it is all working to make our country’s required capital investment unproductive.

One of the biggest challenges we are facing here in New Zealand, is the extent to which policy makers, consumers and investors have a shared view of different technologies. Hydrogen is a good example. It will likely play a key role in our energy system going forward, but where and how are still big unknowns. It is often assumed that hydrogen will be used as a fuel for heavy vehicles or as an input to Sustainable Aviation Fuel (SAF) with an associated benefits that hydrogen can be used as an energy store and made at times when excess energy is generated from renewable sources.

However, the economics of manufacturing green hydrogen do not seem straight forward and not universally agreed. Some studies¹, have shown that manufacturing green hydrogen could divert the supply of

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renewable electricity away from households and maintain upward pressure on consumer electricity prices. Even in 2030, we may not fully understand the impact of large-scale hydrogen technologies, production and use. This makes it very tough for companies confronted with near term decisions.

A key thing to remember is we're working to solve a 2050 Net Zero problem and while this is not the same weighting, we need to put in place policies and schemes that will endure for decades and for future generations.

The Emissions Trading Scheme, for example, is just over 10 years old and Z Energy, along with many others, are still trying to make it workable. We have a distinctive role as the biggest point of obligation in the whole scheme. We are particularly interested in a functioning market because if the market is not functioning properly, we can't buy the units, and if we can't buy the units, it involves a significant penalty. We are also grappling with incentives such as afforestation to combat the effect of burning of units of fossil fuels. In some cases, there are clear advantages. New Zealand has a significant amount of indigenous forest, which we can add to and protect, while increasing the underestimated value of their incredible biodiversity. However, equating the burning of one unit of a fossil fuel over the planting of an exotic forestry and the timelines involved, is just not the same; one is permanent, and one is not. Every option has its own complexities to consider.

Success for New Zealand and Z Energy involves making this short-term absolute target of 100% renewable energy less of a priority and finding solutions for the longer term. We need to properly evaluate all the options to reduce emissions which involves Government and industry working together on a national energy strategy.

New Zealand is fortunate to have significant supplies of clean energy and biomass resources, and we also care about other environmental factors such as biodiversity and the community impacts of our land use.

A renewable electricity target is only one part of the solution. A national strategy would remove some of that uncertainty and enable us to incentivise and de-risk such investment. It would allow New Zealand to explore and invest in a wider range of robust energy options and guarantee a more cost effective and equal transition for us all.

Even in 2030, we may not fully understand the impact of large-scale hydrogen technologies, production and use.

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What path should New Zealand be taking to reach goal of 100% renewable generation by 2030?

New Zealand’s emission reduction targets are ambitious, but it has to be done. It’s inevitable the electricity sector will get to around 95% renewable by 2030 through sheer economics – it is now cheaper to build new renewable generation than continuing to operate existing thermal plant.

Internally at Meridian, the Net Zero target is being used to motivate our team. To do our share of the heavy lifting, we estimate that we need around 10,000 GWh of new generation by 2050, almost double Meridian’s current capacity. That is the equivalent of about 20-25 Harapaki wind farms or \$8-10 billion of new investment. The run rate across the sector needs to lift massively, so to create real momentum, Meridian has taken on the challenge to develop one grid scale renewable energy project per year up to 2030 – we call it our 7 in 7 challenge.

Of course, moving closer to 100% renewables will require flexibility to manage the intermittency of wind and solar, as well as dry year risk. The good news is the market structure we have in New Zealand provides the right incentives on participants to innovate, invest and solve for these system challenges. We believe a diversified and market driven portfolio of solutions would seem the logical path. We are not anti large-scale options like Lake Onslow but we are anti the notion of centrally planned solutions being touted as silver bullet solutions. That is unlikely to produce an efficient outcome for electricity consumers.

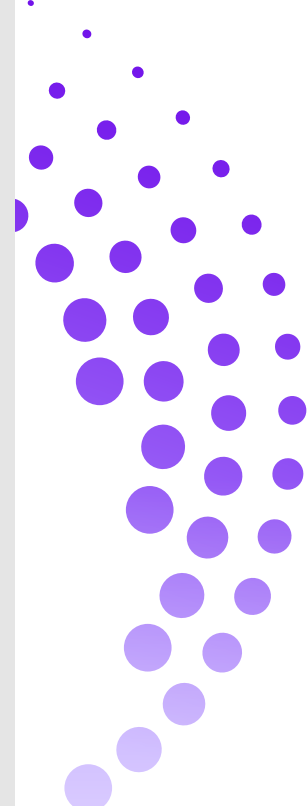
A market driven approach will see the introduction of more grid level solar and onshore wind generation, which over a season have much less variability than hydro. We are also seeing increased demand side participation as the economics work to incentivise major users of electricity to ramp down production when the system is constrained. Also, home battery and solar solutions are becoming increasingly more viable, without the need for subsidies.

Neal Barclay:

CEO, Meridian Energy



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The electricity system and market works well in New Zealand, and we should probably allow it to continue to provide the environment that will support innovation and investment. Or in other words, let's avoid the temptation to meddle with it too much.

What are the key solutions to improve system security in a renewable future?

We believe demand side participation will be key. And so, we're backing the Southern Green Hydrogen (SGH) project because it can potentially resolve around 40% of the dry year risk in our country. By flexing its demand on the electricity system, SGH can offer flexibility to smooth both short-term, within day, and seasonal peak constraints.

SGH will likely be export led at first as export dollars will help fund the initial \$2-3 billion investment in the plant. But the demand for hydrogen based products in the domestic market is also expected to grow significant in the 2030s and 2040s, so a large scale hydrogen production facility will make a significant contribution toward decarbonising those sections of our economy that are hardest to abate, such as heavy vehicle transport, fertilisers and coastal shipping etc.

There is also a need for Transpower and network companies to get ahead of the game. The Commerce Commission regulates capital allocation for a significant portion of the transmission and distribution systems on a just-in-time basis. In a low growth environment that has worked well and delivered efficient outcomes for electricity consumers. But as growth in demand for electricity ramps up the need for significant new investment in core network infrastructure - 'just in time' may be too late. Expert analysis suggests that much of the investment needed to transition to Net Zero within the electricity sector will occur in network infrastructure. Transpower and the network companies will need support for the growth necessary and in some cases, to ensure they are well resourced to deliver on the growth and system enhancements that are necessary. By the way, I am not arguing for consolidation as community-owned distribution networks do have an important role to play going forward as they represent the voice of the communities we serve and operate within.

It is also worth clarifying that all this new investment will not drive overall costs up for consumers. Growth in electricity infrastructure will be spread across new demand and will also enable lower cost energy solutions than the current fossil fuel based solutions we rely on today. Moving with purpose to an economy powered by renewable energy will improve New Zealand's productivity and global competitiveness.

How should we approach the equity issue as we transition to a low carbon economy in 2050?

Access to electricity is a basic human right. Meridian recognises that there are households facing energy hardship and we have taken a leadership approach to identify households in need and providing them direct and relevant support to help change their circumstances. We have launched an Energy Wellbeing Programme, backed by a \$5 million investment over the next two years, to enable us to reach up to 5,000 households in need of help. Our teams work closely with these customers but also bring in specialist agencies and providers to provide practical support like insulation, heating and curtains that reduce electricity costs and also make homes healthier as well as budgeting advice and financial support. We trialled this programme in 2021 and we found we can make a real difference for customers experiencing hardship. It won't be easy, but we are committed to getting on with it.

What are the barriers to maintaining this momentum in the energy sector?

Several things could disrupt the current momentum, but as I mentioned, the pure economics are driving New Zealand to a more renewable future. And the market structures ensure competition continues to deliver good outcomes for consumers. The electricity sector in New Zealand consistently benchmarks in the top ten of countries in the OECD on the trilemma of security, sustainability and cost. If the economics are robust and sustainable over the long run, then the right projects will be developed.

A recession could affect progress, but despite the pressures it brings to jobs and people's lives, it's more of a short-term impact for the sector because this transition is all about investing over the long term.



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Probably the most significant potential barrier that could affect progress is the Resource Management Act reform process. The resource management framework is obviously critical in terms of the time it takes to consent electricity infrastructure projects and therefore New Zealand's decarbonisation journey.

Replacing the RMA with the Natural and Built Environment and Spatial Planning Acts has been a very complex process and there is a lot more work to do to frame up key policy statements that will enable local Government and the courts to interpret the new legislation, such as The National Policy Statement for Renewable Energy. A change of this scale will take time to settle in and for all parties to build familiarity operating within the new rules. But we don't have time.

The sector is not looking for a free hit as good projects need to take account of (and where possible), mitigate their negative impacts on the environment and communities. But we do need a consenting environment where the national and global positive climate impacts of renewable energy can be balanced against the more localised (sometimes) detrimental impacts.

To move forward, we need to channel what New Zealand does best – collaborate, share ideas, and develop our capabilities to achieve the best outcome for our economy. All parties, Meridian included, can always do better. The opportunities in this energy transition are immense and realising them is bringing all New Zealand's organisations and communities closer together.

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John Carnegie:

CEO, Energy Resources Aotearoa

“Politics is getting in the way of this energy transition. If we keep flip flopping on its direction, we will never get to Net Zero.”

Looking back from 2030, what have been the major changes in New Zealand’s power market over the past decade?

Looking back at 2023, from 2030, which is not a long time ago, it was clear that a momentum was building in the New Zealand energy sector which hasn’t hit a crescendo yet. We have realised this energy transition is a marathon not a sprint and have made impressive inroads. The transport fleet has been increasingly electrified, and our process heating is progressively shifting away from coal. We are seeing more alternative fuels, greener gases like hydrogen and biogas in the energy mix too. There is also a whole cycle of technology swapping underway, and many new technologies are emerging, particularly around the demand response.

While we seem on track to meet our 2050 Net Zero target two areas have the potential to derail progress. The first is the sheer scale of the investment needed and the unaffordability of subsidising new energy into our

existing energy systems, and second, the continued under reliance on the Emissions Trading Scheme (ETS) as a mechanism to reduce total emissions. Politics can help to shape this energy transition, but it can also damage its progress.

For the energy market to develop properly, it needs a more systemic view of the economy and the energy sector, which force more consideration of where the trade-offs are. Clear price signals are also important as, without them, investors and risk takers stay away. The more Governments dip into markets, the more risk takers dip out, as they cannot view how their investments are performing in the longer term, as regulations and subsidies are always changing. The Government can keep using the ETS but needs to reduce the “cap”¹ as the ETS, an economic tool, is being manipulated/softened to avoid distributional impacts, rather than the welfare system. The carbon price will then increase, and we can use other mechanisms to protect the more vulnerable elements of society from energy poverty and businesses in terms of avoiding carbon leakage.

If we can get this transition right, it will not only define how our own economy and society develops but also enable us to maintain our international competitiveness. We need to understand that continuing to use natural gas, for example, will make our energy more affordable. As more of the economy and transportation electrifies, the only people shifting to EVs and home batteries are the wealthy, subsidised by the Government. If we are taking a more systemic approach, we have the perfect tool - the carbon price. It is the common thread which

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goes through every industrial process and every sector from power to transportation – it unifies the energy system like no other tool can.

Despite these challenges, it is surprising how far we have shifted both our economy and society. So far, it has mostly been a progressive change rather than a transformational one; transformation still sounds bold and relatively unachievable. Consumers have become more engaged with the energy sector and are making more informed choices about their energy consumption. It has happened largely because it has become normalised to be paying the price of carbon every time, they put the heat or the hob on. Similarly for transportation, the uptake of electric vehicles has been steadily increasing despite the upfront cost and associated infrastructure issues, as consumers are realising the fuel and emissions benefits. One technology which could be transformational is carbon capture and storage (CCS) but to progress it needs a more targeted regulatory regime to support its development, as it is relatively expensive although reducing rapidly.

Our ongoing energy policy issues are being complicated by New Zealand continuing to elect Governments which have very different philosophies as to how to meet the goals of the energy transition. Previously, there was greater political consensus around big issues like monetary policy, trade, or superannuation. Today, any consensus on these big issues seems lost and the political landscape is becoming more fractured. For energy policy, the consensus required is around the big picture policies relating to the energy transition and climate change, rather than the building block regulations.

We also continue to develop policies by looking in the rear-vision mirror, looking at data that’s two or three years old. Altogether, these policy issues are hindering investment, slowing progress and will ultimately make our energy less affordable.

The Government must also make sure it is not creating white elephant policies; putting investment dollars into areas which hinder our economic development and make our economy less internationally competitive. We need to make sure that we are picking the low hanging fruit first such as natural gas, which is an important transition fuel, with CCS. If our industries and households switch to electricity only and all the natural gas infrastructure is gone, if we want it back, it’ll be gone and meanwhile electricity demand will have probably doubled. If we can maintain the gas infrastructure, we can use it for future fuels, like biogas, green LPG, or hydrogen.

Setting the correct regulatory frameworks today, will allow the conditions for the right fuels to emerge tomorrow, in a way that doesn’t risk our economy or security of supply.


Hopefully we are not making perfection the enemy of the good. The ideal is that New Zealand continues to grow as an economy, establishing new industries and using new technologies to maintain our international competitiveness, and prevent Australia taking all of our markets. They are progressing well with key energy transition opportunities in hydrogen, ammonia, and offshore wind, taking advantage of their huge resource base.

They are already creating the market and the infrastructure, selling fuels like green hydrogen before we’ve even got started. Both Australia and New Zealand sit on the edge of an incredibly energy hungry part of the world, Asia; there are huge opportunities there. Australia is already repositioning fast to take advantage of them, New Zealand needs to as well.

Consumers are making more informed choices about their energy consumption.

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“The electricity sector is set to multiply in size and criticality, so competition needs to be robust.”

\\ Margaret Cooney
COO, Octopus Energy

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Margaret Cooney:

COO, Octopus Energy

Will New Zealand achieve 50% of total energy consumption from renewable sources by 2035 and 100% renewable electricity by 2030?

We're supportive of ambitious decarbonisation, but New Zealand probably won't meet the targets as quickly and affordably as needed.

We see the opportunity to use technology to deliver a more affordable and cleaner energy system alongside great customer service. Octopus is a unique company in the energy sector, we're not a product of privatisation, we started as an entrant retailer in the UK in 2016 and have grown to be one of the largest retailers in that market as well as being a technology provider and one of the largest renewable investors in Europe. It's a story that highlights how technology can be harnessed to deliver better outcomes, and the importance of regulatory frameworks that enable the most efficient and innovative operators to flourish.

The role of retailers is no longer about pumping out bills. We now have the capability to dynamically influence demand on the system. This is a leap from 25 years ago when the market was designed. However, this emerging dynamism is quashed in our vertically integrated market.

A 100% renewable system will take a massive increase in the generation build rate - increasing forward prices demonstrate this is not happening as needed. It also requires flexible demand to integrate intermittent renewables most cost effectively. Mobilising this demand requires investment and skill. It takes a combination of market incentives, retailer capability and incentives for customers.

As smart appliances become ubiquitous, the proportion of customer load that can be flexed increases. Consumer flexibility can play an increasing role in the system.





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The conundrum is that if this flexibility isn't utilised the electrification of demand will drive a more costly energy system: if EVs plug in and start charging at 5pm it will increase peak infrastructure required. Even in markets with lots of flexible generation, the system will be ~ 5% more expensive without consumer flexibility.

Today we're able to shift 5% of total demand out of the peak simply with a static TOU pricing signal. For households with electric hot water and an EV we can automate and optimise +50% of their total demand.

To realise meaningful system benefits requires the largest retailers to get their game on. New Zealand is falling behind. In other countries more progress has been made. In the UK, the Demand Flexibility Service involved the market paying consumers to turn down their consumption to avoid winter peaks - 500K customers can shift 100MW+ off the back of a text and incentive. Conversely consumers can consume for free if they turn up their consumption when there is an abundance of solar and wind in the system that would otherwise need curtailing.

But why will it take so long, and why is New Zealand falling short?

Everyone is comfortable with the status quo; inaction is highly profitable and there is a void of political leadership right when we need significant investment and behaviour change.

We've learnt from the energy crisis the catastrophe of inequities that can unfold from a supply crunch. It's the story of people in the UK with unaffordable quadrupled bills, businesses shutting, the economy tanking.

We need to be acutely aware that energy supply and economic prosperity are directly related and that shortages have brutal consequences on consumers, while being immensely profitable for producers. When the downside to consumers is high, you can't let the market be, you need to manage that risk to deliver equitable outcomes. This may make decision makers who cut their teeth in the post Muldoon era shudder but needs must!

We've seen a rush of attention and resources committed to shoring up the transition in other countries. Examples are the Inflation Reduction Act tax incentives for clean energy investments (from grid to household), and NSW's Consumer Trustee which is making decisions in the financial interests of NSW energy consumers. Countries are also implementing smarter market systems like the UK's Smart Systems and Flexibility Plan.

We don't have the luxury of time, there are pressing immediate decisions, and the Government needs to action a plan! We can do this. If we look at another recent transition, the broadband rollout, we implemented a plan that ensured a timely rollout and harnessed the capability of the private sector.

The electricity sector is set to multiply in size and criticality, so competition needs to be robust. It's not. There is a concentration issue with vertically integrated firms and market power problems that manifests from it. The futures market has been inaccessible over the past year in part because Clearers don't want to bear asymmetric risk. There is a margin squeeze enabled by a vertical cross-subsidy; independent retailers can't compete. This leads to asset heavy, long lead time solutions at the expense of a more innovative distributed market.

In the UK a vertically Integrated business needs to operate their businesses at arms-length. There are conditions in licences prohibiting cross-subsidies and price discrimination. As a result, entrants OVO and Octopus have become two of the largest suppliers. We have also licensed our tech to competitors which illustrates their drive for more efficiency.

From Octopus's perspective ineffective competition is why we've made a modest, experimentation focused entry. If the regulatory guardrails were in place, we'd have more confidence investing here.



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The generation side of the market will face the same challenges. Additionally, there are no government CFD or subsidies here. These are being used in other markets to de-risk and bring forward investment. The market for investing in renewables is a global one, this means New Zealand is a comparatively unattractive place to invest.

The potential for entry to markets is what keeps prices in check. Incumbents are incentivised to maximise their portfolio value and invest at a rate that works for them, which is legitimate, but not socially optimal. This is a clash of interests that we need to be wise to. We need generation built at a rate that is not happening, we also need retailers unlocking demand flexibility at a rate that is not happening.

We should be excited by the potential opportunity, an affordable, low carbon energy system could underpin our prosperity... If everyone takes action it could happen, this requires a step change in form.

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“New Zealand needs a co-ordinated approach, with a clear energy policy, to ensure a fair and equitable energy transition; relying on the current framework to achieve decarbonisation is just a strategy of hope.”

An incredible amount of work is being done by energy businesses, including Vector, to support and enable the energy transition. But New Zealand doesn't have an energy strategy or the right regulatory and policy settings in place to meet our ambitious renewables target. We need a focused and streamlined approach that brings together the regulatory and policy agencies to truly manage this, instead of the current, disjointed multi-agency system.

Simon Mackenzie:

CEO, Vector

One of the major challenges is the perpetuation of a mindset and approach that this transition can continue to be managed in silos, rather than recognising that a complex system approach is required. The origins of this mindset and approach date back to industry reforms undertaken 25 years ago.

In short, we face a very different challenge and objective to the rationale for these out-of-date reforms.

By looking overseas to places like the UK and Australia, we can see the benefit of forming specific agencies to enable a whole of energy system approach. This ensures, for example, what's happening on the demand side of the equation, regarding the connectivity of high intensity loads, such as electric vehicle (EV) charging, is being matched by the right supply side outcomes in terms of location, price, security of supply and dynamic management.

At the same time, the existing market design, structure, and performance of all parts of the system are being challenged. We have been advocating for a co-ordinated approach for some time, yet we still observe the continuation of the multi-agency approach, but with each agency thinking and operating in their own swim lanes. Our response is that they should absolutely be in the same pool and must be focused on synchronised swimming.



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Many countries, New Zealand included, are trying to achieve Net Zero by primarily employing a traditional “brute force” approach, that is, building more generation and large-scale transmission without giving enough thought to the need for also having “smart force”. This couples deep customer insights with new technology and smarter platforms to break the prevailing brute force paradigm. A smarter system will alleviate some of the renewable energy challenges, like intermittency and the uneven loads coming from EV charging. It will provide a clearer picture of our power consumption and allow more robust power scheduling and management. And, more importantly, it will ensure a more affordable system for our transition.

We need to pause and ask ourselves what are the fundamental problems we are trying to solve in this energy transition?

How do we build an affordable, smart, resilient system that considers the future needs of the consumer and the cost to them? Every part of the energy system needs to take responsibility for focusing on affordability, rather than leaving one side to be responsible for this. As such, the system has to welcome and enable new technology, customer solutions, and market solutions, while also recognising the integration and dynamic challenges of co-ordinating and managing security and resilience. The current policy and regulatory rules governing industry structural settings are no longer fit for purpose.

An important focus of ours, which we’d like to see embraced across the sector, is on the benefits of creating strategic alliances with technology companies. At the start of the 2020s, Vector set up collaborations with Amazon Web Services (AWS) and Google X. With AWS we have created a New Energy Platform (NEP) which has Internet of Things (IoT) and analytics capabilities.

We need to work with global leaders to bring the latest thinking in customer experience, technology, regulation and policy settings, and to be more outward-looking. New Zealand has to move away from a very insular beltway mentality, based on legacy thinking and feeling rather complacent around our renewable position that was largely built many decades ago.

The primary aim of the NEP was to rapidly collect and analyse data from millions of smart meters that securely gather information on energy consumption and network performance.

We can use these insights to better plan energy networks, drive smarter investment decisions, and increase network reliability. Data and insights are critical to understanding consumer needs and behaviours, network investment behaviours, and the impact of new technology - good and bad - on networks and the wider energy system. This enables us to invest in much smarter targeted ways than historically have been seen, hence significantly contributing to an affordable transition.

Another perennial topic, often suggested as a way to create a more joined-up energy system in New Zealand, is to consolidate more of our smaller electricity distribution companies. We haven’t seen a compelling case for this: people fail to appreciate that many electricity distribution businesses (EDBs) have a far greater connection and concern for their communities than others in the sector, and understand the issues, challenges and investment required for their customers and local conditions. We also look at the work many EDBs are doing and see there is already great collaboration between them.

A good example of this is the Northern Energy Group¹, set up back in 2019 by Vector, Counties Energy, Northpower, The Lines Company, Top Energy and Waipa Networks. This group have nearly 50% of New Zealand’s

electricity customers across their territories. They are ensuring their consumers benefit from the changes in technology and innovation happening across their networks. Vector shares in areas like cyber security, data analytics and new technology.

Shared experiences and working together have helped the Northern Energy Group to modernise and improve their performance and customer outcomes. Many EDBs have strong capability and proven track records in delivering energy and infrastructure solutions and innovation outside of just their electricity network services, as well as fibre, generation, solar and battery, and often lead in providing EV charging for their communities. Collaborations like this are a much better route to operational efficiency and customer focus than consolidation.

There is an undoubted need for billions of dollars of investment in the country’s energy infrastructure and the reality is New Zealand has to compete for resources and capital on a global stage all attempting to do the same thing at the same time. The magnitude of the transition we are facing is such that, without the right policy and regulatory settings and a clear strategy, New Zealand will struggle to get attention or interest from capital markets to fund the investment.



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Trillions of dollars are being spent across the globe in energy transitions and we run the risk of being forgotten and left behind unless we make it easy for investors to quickly understand New Zealand’s energy strategy, the risks, opportunities and regulatory settings for this and, in turn, attract and retain critical skills.

When the longer-term forecast is considered, there’s lots of debate about dry year and climate change: no-one can have missed the destructive events that affected the Northern Hemisphere this summer, and the need for a solution is becoming very urgent. There are many vocal critics against Onslow; I’m not saying it is the right or wrong solution, but it is not evident what the alternate solutions to dry year challenges are. These solutions need to be identified, quantified, risk and affordability assessed, then well debated and addressed quickly. Look how swiftly we are transitioning from major floods and cyclones to the hot, dry and windy El Nino conditions.

The energy sector has an increasingly important role to play in people’s lives and Vector is leading the way. Many of the challenges facing New Zealand arrive in Auckland first, whether it’s the proliferation of data centres, community growth, or a rapid rise in EVs. Given our majority customer-owned ownership structure, we will always be a voice and strong advocate for the Auckland consumer. We have long seen the energy transition as a hugely challenging but exciting opportunity, which has to start with customers and meet their ever-increasing needs, whilst ensuring an affordable transition.

To do this we have focused on developing a great team, building strong relationships with suppliers and, importantly, developing strategic partnerships with some of the leading technology businesses in the world. This gives us valuable insights into ways in which this complex energy transition can be navigated through, for example, the capabilities of using data, analytics, customer insight, and other growth options, which make working at Vector a unique proposition as we help to shape the future.

We have long seen the energy transition as a hugely challenging but exciting opportunity.

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“As New Zealand is an economy which relies on exports, the decarbonisation of our supply chains has to be a priority.”

Looking back from 2030, what has been the biggest change in New Zealand’s energy sector over the past decade?

By 2030, all businesses will have a better understanding of the broader energy landscape. Energy decisions are no longer driven by price priorities but rather by where energy comes from, how it is made and what part it plays in the whole energy supply chain. The tyranny of distance will always be an issue for New Zealand’s exports, we needed to differentiate by making our exports greener. Recognizing that we are an economy which relies on export earnings, decarbonising our supply chains became a priority.

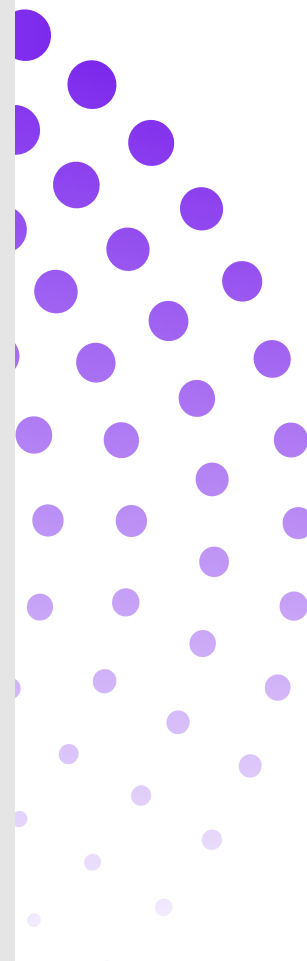
Earlier in this decade, what was hard to understand, was not only the extent of the energy transformation needed to meet future demand but also that carbon borders were going up. This has meant we needed to decarbonise our production processes and our supply chains and early action has given New Zealand a strategic advantage over countries with higher-emission exports. We now consider energy less in terms of physical molecules but as something more integral to New Zealand’s produce and exports. We will need to shift the operations of our farms, ports, ships, and trucks to renewable energy and zero emissions. A green supply chain enables New Zealand to export milk, kiwifruit, vegetables, cotton, and even high end produce like wine into European markets and, as a result, receives a premium price.

Andrew Clennett:

Co-Founder & CEO,
Hiringa Energy



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When Hiringa set up a partnership, in 2023, with Sundown Pastoral in Australia, we saw the benefits that a greener supply chain could have on prices. The Good Earth Green Hydrogen and Ammonia (GEGHA) project provided solar energy, hydrogen and green ammonia for heating, farm operations, transportation, and agricultural fertilisers for a cotton farm in Australia. GEGHA now produces climate positive and traceable cotton and can track its cotton using blockchain technology all the way through to the clothes racks of Europe. The farm has seen the prices for its cotton bales steadily increase over the decade, and, with more green energy improvements such as when we installed the solar farm, we are seeing even larger price premiums. By 2030 these lessons have been applied to our export supply chains in New Zealand with our agricultural exports such as our fruit and wine industries enjoying a sales premium and secure access to global markets.

How do you see New Zealand’s electricity sector working today, in 2030?

An electricity sector and more broadly an energy system based on more renewables, with energy generated outside of the main grid, including solar, wind geothermal and hydrogen, is automatically more decentralised. In 2030, New Zealand’s energy sector has a much more diverse set of companies, communities and customers who have taken energy ownership into their own hands. Amongst them are “leaders” who realized earlier in the decade, that they needed to act, and decarbonise to protect their value chain. The “laggards” are those players who waited for the market to tell them what to do. Leading companies like Hiringa and some independent companies developing onshore wind, large scale solar and offshore wind are also “disruptors,” who saw the technology opportunities the energy transition offered and seized them fast. The mix of players is also resulting in stronger competition in power market prices.

As a large player in the New Zealand hydrogen market, how has this market evolved in 2030?

Even today, as we head into the 2030’s, the benefits of whole areas of the sector transitioning to renewable electricity still haven’t been fully considered or the sheer scale of replacing fossil fuels properly comprehended. In transportation, for example, while electric cars and trucks can be used over smaller distances, finding a solution for larger trucks, shipping, aviation, and long-distance rail has been more of a challenge.

Green hydrogen has bridged that gap, as it can be used more similarly to fossil fuels. Trucks running on batteries are heavier and need recharging more often, and hydrogen’s refuelling speed and light weight make it a good solution for these heavy vehicles, shipping and aviation. New Zealand’s milk collection, for example, is now run with trucks primarily using hydrogen for longer distances, while the more local trucks use batteries. Hydrogen and ammonia might yet, be the solution, too, for our rail network. For cost reasons, it’s very unlikely that we will have a high-speed rail network running on electric here. Such trains are already running in North America and Europe and in Australia; Fortescue has been running ammonia trains in the Pilbara since the early 2020’s¹.

Hydrogen is also transforming the aviation sector into one which is much more sustainable. In 2023, Hiringa was a founding member of a new consortium to bring zero-emission aviation to New Zealand². The Hydrogen Consortium’s vision has been to support the country to pioneer the commercial deployment of green hydrogen-powered aircraft. Today we are creating new sustainable aviation fuels that reduce emissions by up to 80%. We have also been establishing the infrastructure and hydrogen to supply the aircraft using these fuels. It should only be a matter of time before the entire rail, maritime, aviation and heavy transport fleet in New Zealand, can be running on a combination of renewable electricity, green hydrogen, eMethanol and eAmmonia based fuels.

What are the next steps for the energy transition in New Zealand, post 2030?

There used to be a big disconnect between our vision for the electricity and energy sectors and the policy and regulations needed to achieve it.

Earlier this decade, one of New Zealand’s biggest achilles heels was that we seem to believe our molecules were a different shape and our electrons spun another way to the rest of the world. Our view that New Zealand was distinctly unique was stopping us from introducing more low-carbon technologies, and was a serious barrier to uptake throughout the economy, making it uncompetitive. As soon as we started speeding up some of the key regulatory changes needed, for example, adopting the ISO hydrogen standards³ for the production, storage, transportation, and measurement of hydrogen, we stepped in line with the rest of the world and momentum started building quickly.



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As we head further into the decade, we must try not to make the mistake of earlier Governments and policies, when climate change and environmental issues slipped down the political agenda as they were being lumped together in a way that deprioritised them against other issues of the day.

Our leaders need to understand that issues around climate change have to be separated from generic environmental ones. Climate change is a techno-economic environmental problem, it needs a specific set of solutions, which might impact other parts of the environment. What are those trade-offs? Hiringa can help them to figure that out.

MBIE's Interim Hydrogen Roadmap⁴ says that 70% of New Zealand's emission abatement required by 2050 can come from direct electrification. It's becoming increasingly understood that hydrogen and its derivatives such as green ammonia and e-methanol will play a critical role in achieving the final 30% emission reduction required. We need to start scaling up now if our economy is going to be ready to deploy these low emission fuels when they are needed, and the trucks, ships, planes and trains to use these fuels are entering the market today.

Hydrogen is transforming the aviation sector into one which is much more sustainable.

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Donna Flavell \ Manaaki Nepia:

CEO \ Chief Advisor, Waikato-Tainui

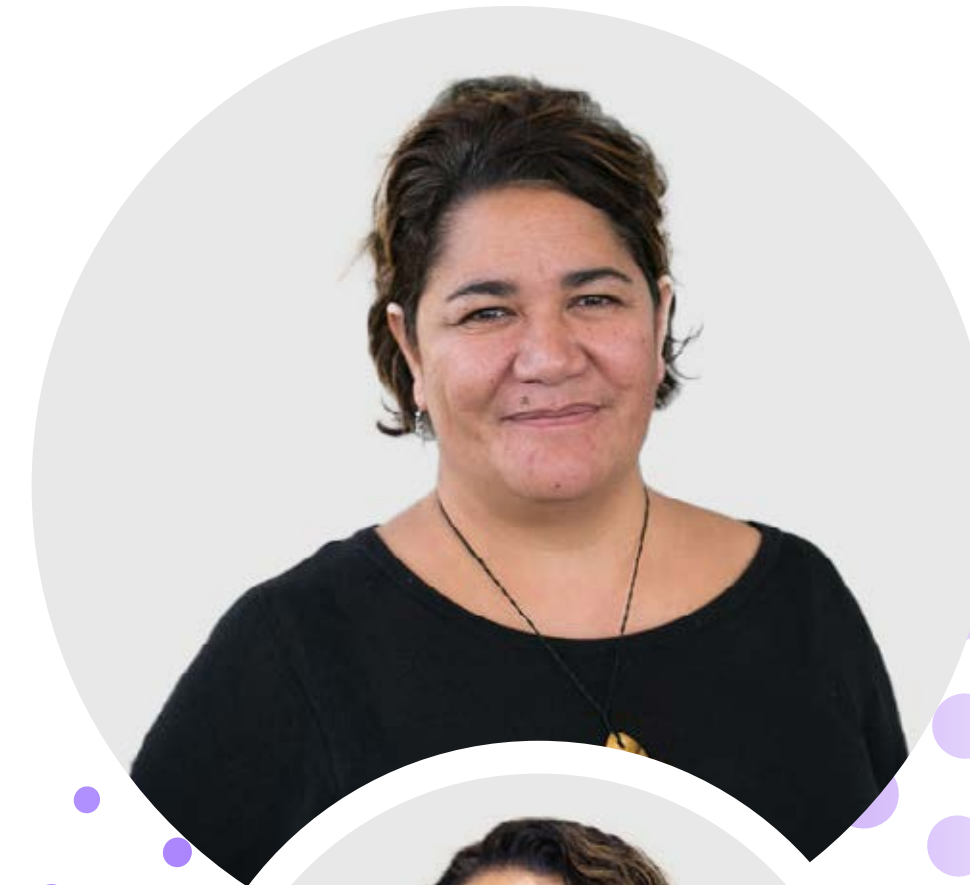
“Employment and investments that revert directly back to benefit our communities, that is what makes sense to us.”

In 2030, what are the priorities for Waikato-Tainui in regards the energy sector?

One of our biggest goals has been to make Waikato-Tainui self-sufficient and reduce our reliance on external sources of energy. We have been exploring a wide variety of alternative energy sources such as solar farms, wind energy, and hydrogen to meet this goal. We envisage that this may even go as far as helping us to disconnect from the main grid and use our natural environment to support our energy needs.

A key ambition is to reduce the cost of living for our people, as many continue to find life challenging. Our data tells us that many of our people are not well represented in jobs that enable them to make ends meet. Finding and funding initiatives which make a difference to their lives, and which mitigate the cost of living has been important. Alternative energy is one such initiative and aligns well with iwi projects that focus on improving the wellbeing of our people, such as being able to use solar energy in new Māori housing.

Our preference in the longer term is to also reduce the reliance Aotearoa has on our awa – our river – for its energy needs going forward. We need to change our mindset to focus on the health and wellbeing of the awa, for itself, for the Waikato-Tainui community but also for all of Aotearoa’s communities. The awa for us is our tupuna (ancestor) and we believe it cannot be owned.





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What I would love to see is that one day those energy companies are not required, and we can remove some of the dams from the awa to help address some of the impacts on the awa: eels can migrate again, the silt will be cleared out so our rapids can flow again, and so forth.

Waikato-Tainui's approach has been to safeguard the wellbeing of all awa by getting more involved in decisions around how it is managed. That has involved dealing with a host of unresolved settlement process issues around access to water. For example, if there is an application by a project or housing scheme for 100 cubic metres of water, but it only needs 50, why is 100 allowed? Waikato-Tainui believe our cultural mindset around the awa lets us manage water allocations more fairly and efficiently - optimising consent applications and reallocating excess water (beyond what the awa needs for itself) to allow new entrants creating a fairer system for all.

What is the primary involvement of Waikato-Tainui in Aotearoa's energy system in 2030?

The basis of our involvement is related to our ownership of the land where energy infrastructure and projects are located. Solar farms and offshore wind farms also create an opportunity for our whānau in terms of long-term employment, allowing investment back into the community where those assets might be located. Going forward, we would like to find a way for companies to work alongside whānau that both recognises our role in leading these projects, while also coaching us to lead them more effectively.

We have agreements with parts of the energy sector, which offer us secondments and internships designed to build capability and train our whānau. However, what we find is that when we place our people in these roles, we also have to provide the right type of support for them because it's very challenging for them to be in these environments where the ways of working, the culture and individualised behaviour can be quite different to their own collective based experiences. We try to place interns in groups, so they don't feel lonely, and can support each other, and also offer pastoral care.

We try to do as much as we can to make sure they succeed but the companies they are working with also need to adapt and change to realise the true value from working in true partnership.

Such schemes do not necessarily provide a route to management and leadership for iwi members. Often people get into roles and realise that it's not for them, or they don't fit and it's hard to get them to stay. If they do stay, they often go on to do some important work, usually on the conservation side of the industry rather than the commercial side. This is understandable as it leverages their connection with nature; it is how our people are wired. But we do need to work with companies and our people to find the balance.

One thing we have realised is that often iwi find partnering with offshore companies easier than working with domestic firms. Iwi find that the relationships work better because foreign companies have less baggage around iwi and cultural matters or settlement issues than Aotearoa companies. They have a genuine interest in understanding us and finding ways to work well together. These relationships often take advantage of the fact that we can get into commercial arrangements with foreign companies in a way that the Crown and other private sector companies cannot.



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What changes would Waikato-Tainui like to see, to help with iwi participation in the energy sector?

We would like to see greater Government investment and we want to be part of the conversation to influence where and how much is invested. There is a general sense amongst iwi that many of Aotearoa's key policies and regulations, particularly in the energy and water space, are designed in isolation, without our participation and valuable perspective.

We want to be both stakeholders and investors. Iwi are hard wired to protect the environment and we will always bring a strong environmental lens, but we have commercial goals too. In Aotearoa, Māori are uniquely positioned to lead our country in conscious investing. It's the only way we can make sure that we are bringing benefits to the community and to nature. That is our strength.

Our goal is to create a Māori infrastructure fund which allows all iwi the opportunity to invest in the energy transition based on more sustainable considerations. To achieve our energy sector investor ambitions, iwi need to come together and pool our resources. Waikato-Tainui is a big iwi, with over 80,000 people, but we're still small fry in the energy industry and on the world stage. Achieving our ambition of participating in bigger renewable energy projects like offshore wind, involves us working better together, as a collective.

Achieving our ambition of participating in bigger renewable energy projects like offshore wind, involves us working better together, as a collective.

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“Government intervention in our energy transition is an old solution. We need new approaches to let young, intelligent people have a go; only then will it progress.”

What progress has Contact Energy made on its journey to Net Zero?

Contact Energy has committed to achieving Net Zero emissions by 2035 in our generation activities, and we are on track to reach that goal sooner. More than 80% of Contact’s generation is from renewable sources, we have reduced our emissions by 59% since 2012. We are now accelerating our Net Zero journey with our \$1.2 billion investment in renewable generation projects now underway, as well as innovative approaches, expertise in industrial gases and most importantly having a mind-set of not being afraid to make mistakes.

Recently, we have found a way to capture emissions from most of our geothermal fields. We undertook innovative trials to prove this technology. Geothermal reservoirs store non-condensable gases (NCGs) dissolved in geothermal fluids. Features, such as fumaroles and hot pools can let the gases vent into the atmosphere. We have found a way of capturing the stream of NCGs by putting them back in under a lower pressure as the water is injected back underground. We thought we might capture a reasonable quantity of emissions; we have ended up capturing more than 80%.

Mike Fuge:
CEO, Contact Energy



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This approach to our emissions challenge has taught us that our energy transition targets need fewer old approaches and more new ones. In our own experience, we need to let the bright, young people have a go - in this case an expert industrial chemist - and they will find solutions to issues like these. It also involves taking the lid off the box and letting all the enablers out; more stable frameworks, a price for carbon and an ability to tolerate high levels of risk.

What has helped with the progress toward Net Zero?

It is always important to find the right balance between Government intervention and market-driven solutions.

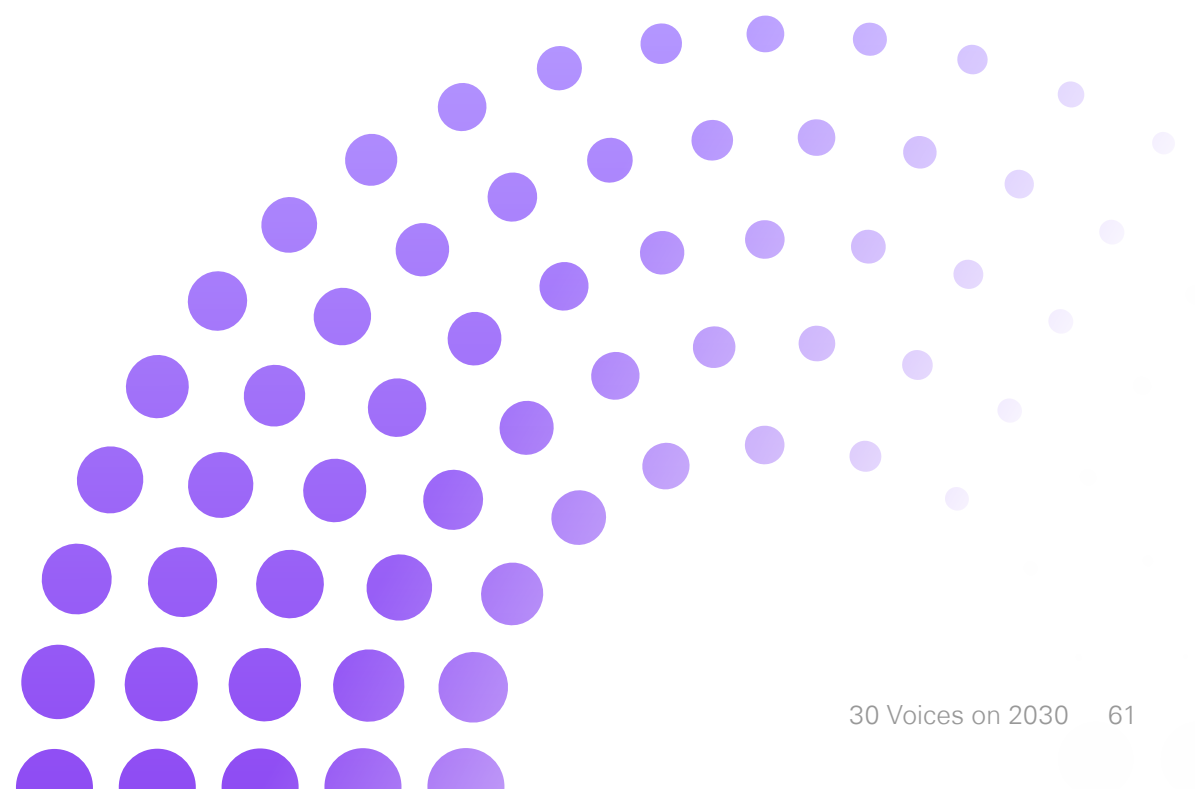
Once the market settings are established, they should not change, as having an unstable regulatory regime creates uncertainty. The renewable energy market in Chile shows what a stable regulatory regime can achieve. It's one of the most attractive renewable energy markets in the world and has not significantly changed its energy market settings in decades. It isn't perfect, but it works because it's stable which means investors have confidence in it. Some might argue as uncertainty affects foreign direct investment, it can be a friend as it keeps competitors out, but most companies want a level playing field of competition.

Having a high percentage of renewable electricity in the New Zealand energy system will bring economic rewards. If we can achieve 98% renewable electricity generation soon, the rest of our economy will be fast followers. We can convert our transportation and industries to electricity and use innovation to go harder and faster than the rest of the world. The pace of recent change, for example, in the hydrogen market has been incredible - as heavy trucks running for longer distances on hydrogen and dairy farms forming hubs that operate using hydrogen, shows.

Another interesting innovation has been the use of high temperature heat pumps in agriculture. Fonterra plans to reduce coal use in its farms by 2037 and introduced giant heat pumps to its processing sites for cleaner steam generation in the early 2030s. It then started using that renewable energy powered heat pump technology to produce steam at high enough temperatures and in greater volumes, to dry milk to powder for dairy ingredients¹, improving its energy efficiency and reducing its emissions.

A fundamentally renewable electricity generation system could also let us export our renewable energy, in the form of renewable energy certificates. There is a growing market in trading these renewable science-based credentials, particularly in countries like the USA. New Zealand can help develop a more international renewable energy certificate market, because our neighbours like Japan and South Korea have more limited renewable energy development opportunities.

Renewable electricity generation will enable us to relieve some of the pressure on our agricultural sector. While we already have the most carbon efficient agricultural sector in the world, its processes are under huge pressure to further decarbonise. We don't want our farms to close forcing us to import more carbon intensive products. That has been the consequence of our refinery closing; rising imports of more carbon intensive gasoline, diesel, and jet fuel.





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What are the next steps for New Zealand's energy sector?

I see the challenges with Transpower face, with the challenge of investing in a more distributed system based on renewable generation, with an increased and unpredictable load. To support its investment burden, we could follow the example of the 2015 Crown Fibre² ultra-fast broad band roll out, which used commercial models. This included co-investment and the transfer of seed money from the private sector to meet the Government's goals for faster broadband. New Zealand used to be around number 26 in the world in terms of broadband speed, now we are in the top three, and all for the relatively low cost of less than \$2 billion.

We should also need to help New Zealand's electricity distribution sector because in many ways they are going to be at the forefront of the transition. At the moment, many of our electricity distribution businesses (EDBs) are trust owned and have limited access to capital, limited incentives to build new infrastructure or provide new points to tie into. If we can help the sector access what I call the 4 Cs: Capital, Capability, Capacity and dare I say it, Competition, in short order they will be much better equipped to quickly connect homes businesses and industry to near 100% renewable electricity in the very near future.

If we can transfer seed money into Transpower in the same way as we did with Crown Fibre and lift the capability within the distribution sector, we will solve quickly a challenge that has already started to slow the transition overseas before it becomes a problem here.

Then the capital, the capacity and the capability will all follow.

New Zealand used to be around number 26 in the world in terms of broadband speed, now we are in the top three.

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“There is a requirement for distribution networks to become smarter; to do that needs some regulatory change, but the cost and efficiency advantages are huge.”

Looking back from 2030, what have been the major changes in New Zealand’s power market over the past decade?

The political shifts in New Zealand have influenced parts of the energy market over the past few years. A more pragmatic take on the Government’s “100% renewable power generation by 2030” policy has been a change in the right direction. We have also seen New Zealand’s electricity distribution businesses (EDBs) progressing the decarbonisation of our power networks. We heard the feedback and continue to collaborate more and more and have worked with our customers to enable the required new assets to facilitate decarbonisation.

Probably one of the biggest changes has been the increase in electricity prices; while our whole-of-energy bill at the household level doesn’t feel significantly worse, electricity simply costs more per unit than it used to. The transition has involved building new generation and infrastructure, and uneven intervention on funding has tipped the balance on to consumers to pay for it. The timing of that price increase was difficult to predict as we had to grapple with the option of investing early, with a risky “build and they will come” philosophy, or wait for real load options to spur demand and the market to set prices that drove investment. Ultimately, we have had to accept, not being 100% renewable has meant some trade-offs, and unfortunately we are still importing some thermal fuels to manage dry year risk.

Peter Armstrong: CEO, ElectroNet Group



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How can New Zealand keep the cost of the energy transition low?

Renewable levelised cost curves have been declining for decades; for these trends to continue we are going to have to really embrace innovation and automation. Over the next decade I think we could see some really interesting developments in a manufacturing-type approach to renewable technologies like solar. If you think about it – constructing a solar project should be relatively simple. It has a highly repeated, and predictable pattern of tasks which needs to be repeated hundreds, and even thousands of times. At the moment, this is highly labour intensive. In the future, I think we could see the convergence of technologies like AI and robotics to help really drive the cost efficiency of project builds. For now though, talent is going to be one of the bigger challenges when it comes to designing, building and operating the new technology needed for the energy transition.

New Zealand’s power distribution sector has a unique skills challenge. For many of us, we are locally owned and our owners build, maintain and operate our networks. We have line mechanics in our teams who have worked for us for 30+ years; they have grown up in the same town and think nothing of getting up at two in the morning to go and fix the lines because they are doing it for their communities. In a way this explains the culture you see in many of these business - that Kiwi can-do attitude. Attracting and retaining the next generation of talent is going to be key.

Another important challenge is standardisation. In the past we’ve seen each network use its own engineers to develop their own designs to their own standards. They’ve developed their own approach to procurement, equipment standards, network planning, you name it. This is getting a lot better now and we are seeing many great examples of both proactive and reactive (e.g. in storm situations) collaboration. There’s a big prize here – a resilient electricity system is going to eventually depend on a high level of interoperability of our distribution networks.

I think EDBs have an important role to play with electricity generation too - We need to acknowledge that New Zealand has good locations for solar, geothermal, wind and small to medium scale hydro and we should adopt a sensible approach to resource planning and allow regions to maximise the resources they have.

How do you see the future of power distribution in New Zealand?

The power distribution network of the future will become a highly intelligent interoperable system capable of handling distributed energy resources of all types. It will be capable of managing its own demand challenges, using new tools that allow us to manage the grid more flexibly. Our networks will be a lot smarter, largely due to the development of distributed energy resource management systems, or “DERMs”. These are allowing the management of the grid in real time and ensure it can maintain its reliability as large volumes of distributed energy resources come online. In addition to better demand management, a DERMs system can also be good for EDBs as they help to manage local voltages on distribution feeders.

There’s a key question live at the moment which is whether a shift to a flexibility market should be utility-led or market-led. Should we, as a utility which has to follow reliability standards, bear the costs of big changes like DERMs or should we let the market set the price for them as demand emerges. There has been a focus over the last decade, to make networks smarter which has increased the ability to manage demand more flexibly in these more renewable led, systems. In the long run though, as the value streams from flexibility services are proven, network and service developments will probably be more market driven.



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Supporting New Zealand's distribution networks to become smarter, particularly regarding the lower voltage parts of our networks, will probably require regulatory change. Electric vehicles are already on the horizon, and in some networks having a noticeable impact - and our network needs to be ready. It's not just whether the network can handle everyone coming in from work at similar times and plugging in their cars to charge, it's also about who pays for it. We'll need tariff structures that can manage and change demand behaviours, so the network can operate more efficiently and cost effectively. In doing so, we will also be protecting future investment.

Above all, what this energy transition needs is a pragmatic approach to decarbonisation, which not only harnesses the best of technology, but considers the trade-offs, so we create the most cost-effective energy system for all New Zealanders.

**New Zealand has
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“What competitive advantage will New Zealand have in 2050, if all countries are decarbonising, that is one of the big questions we are trying to answer.”

By 2030, will New Zealand have reached its 100% renewable generation goal?

By 2030, New Zealand will have managed to be mostly renewable, with possibly over 95% renewable generation. Even though it might not be 100%, this remains a significant achievement, well beyond most countries in the world. There is a lot to be gained, but we also need to be careful that we don't have a narrow focus, pushing for electrifying industry without managing and optimising the transmission and distribution infrastructure required to support the large increase in load.

In 2030, I expect we will have achieved a positive position despite facing fierce competition for technology, skills, and investment in the international marketplace. We are doing the hard work and influencing other countries to do the same.

As we look ahead to 2050, the question then arises, what might be New Zealand's unique selling position compared to the rest of the world once the global transition to green technology is more widespread. If the assumption is that by 2050, most countries will have significantly reduced emissions and embraced more sustainable energy and environmental systems, what competitive advantages does New Zealand retain, beyond being a highly renewable market and having some industry specific technological capability? The BusinessNZ Energy Council is grappling with these big questions as we move into the next decade.

Tina Schirr:
Executive Director,
BusinessNZ Energy Council





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What have been some of the challenges so far in New Zealand's energy transition?

Part of the challenge is that New Zealand seems to go through a transformation rather than a transition. Yet, New Zealand is still a small country with resource constraints. It is positive that most businesses across New Zealand are investing in sustainability, there are hardly any businesses not investing to make their own operations more efficient.

A big challenge is stable in steady investment. Making our energy system fit for purpose will need significant investment. Attracting investment into the New Zealand's energy sector is challenging. Bloomberg's Climate Scope study¹ ranks New Zealand 73rd down the list of its 107 most attractive countries for renewable energy project investment. There are many more attractive countries out there for new energy investment than New Zealand, with the project lead time being one of the main roadblocks to the sheer scale of renewable energy needed by 2030.

Besides investment, New Zealand must compete with many countries for skilled labour. A problem difficult to resolve as there are plenty of uncertainties. The lack of high skilled labour currently may be a temporary challenge, but poorly signalled and constantly changing immigration policy settings do not help New Zealand attract the international skills and talent we need.

Only a few years ago, the prevailing political narrative was that New Zealand relied on too many migrants. Now it is clear we do not have enough migrants with the skills needed to support a growing economy.

To attract talent, we must work hard to be an attractive country to work and live and retain the skills that we have. New Zealand needs to aspire to be a first-choice destination and ensure there is coherence across infrastructure policy settings to ensure we can accommodate a growing population. The skills needed to build infrastructure aren't necessarily permanently required in one place, so if we enable a mobilised skilled workforce who can seamlessly move to where construction is required, while addressing the energy challenges residing in multiple countries.

Another recent challenge New Zealand faces is the uncertain regulatory environment as we implement and embed the right policy settings needed for a successful transition. In our energy scenario work, Kea and Tui using the TIMES-NZ model, a collaboration of more than 60 partners across businesses, Government and academia, the power of gradually increasing carbon prices over time was illustrated in delivering New Zealand's intended emission reductions.

Unfortunately, in reality, the signal sent by NZU prices has been volatile due to ETS policy uncertainty caused by frequent amendments, flip-flops, reviews, and political rhetoric. This has undermined confidence that is needed to justify substantial investment in decarbonisation technology. Outlining the long-term course ahead for the ETS, including its settings and unit levels will provide clarity and lift regulatory uncertainty. This requires broad political support for durable settings over a long period of time. For the doubters, bipartisan agreement across the political spectrum on the ETS can be done. The passage of the Zero Carbon Act is a perfect example of what's possible.



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What does the BusinessNZ Energy Council see as a way forward to meet some of our country's energy challenges?

More focus is needed on areas that are important to the New Zealand economy where clean fuels could achieve a real difference in emission reductions. For example, more attention should be given to aviation and shipping, given their importance in New Zealand's supply chain and connectivity to the world. Just recently the New Zealand Hydrogen Aviation Consortium released its roadmap showing the potential removal of up to 900,000 tonnes of carbon emissions every year by 2050 using hydrogen-fuelled aircraft flying domestic routes. This means more affordable new renewable electricity generation is needed, in conjunction with further electricity transmission and distribution capacity, including policies and regulations needed to create and support a green fuel ecosystem and importantly cost-effective ways to produce and supply such fuels.

As we shift more to relying on renewable energy, we need to make sure our energy system remains resilient with robust backups, particularly since climate change is bringing more extreme weather events. Clean fuels such as biofuels, biogas, hydrogen, methanol, and others cannot only play an important role in shipping, aviation and industry but will help us to maintain energy supply during potential disruptions.

We have already identified challenges regarding attracting overseas investment and talent to New Zealand and there is also the potential of our cleaner electricity that could be a competitive advantage for investors to establish businesses.

Finally, education is essential for our future economic growth – both preparing the future of the workforce well with the skills and knowledge they need to thrive in work or business and ensuring that the workforce continue to upskill and reskill to meet changing business needs.

Education is essential for our future economic growth.

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“New Zealand’s energy system has zero chance of being 100% renewable all of the time, but it might have every chance of being 100% renewable some of the time.”

What role do you see New Zealand’s natural gas industry taking as we move towards the 2030 targets?

New Zealand needs to take a more pragmatic approach to the energy transition. It involves recognising there is zero chance of our system being 100% renewable all of the time but has every chance of being 100% renewable most of the time. New Zealand’s economy has benefited from a large amount of hydroelectric generation, but with something as important as Climate Change, we cannot be 100% reliant on a power system that vulnerable to natural hazards like earthquakes, volcanoes, and cyclones.

Fortunately, the country has options to provide affordable and reliable energy that is 100% renewable most of the time. As a fuel source, natural gas needs to be in the mix. We’re seeing an increasing proportion of solar and wind within our renewable supply mix, which creates intermittency challenges as the grid will find it hard to vary production in response to demand. Hydro energy is constrained by the availability of suitable rivers and lakes, affected by seasonal fluctuations and our unpredictably changing climate. Natural gas is the perfect partner for renewables not only because it emits less greenhouse gas for each unit of energy than alternative fossil fuels like coal, but because it possesses the unique ability to manage peak power demand and let the system vary the load.

Andrew Jefferies:

Managing Director, New Zealand
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Natural gas is a good alternative solution to meet peak power demand, but its ability to deliver benefit to the market has been complicated by the fact that gas production is in rapid decline. The consequences of a lack of investment and little new exploration in the oil and gas industry are becoming clear.

New Zealand's estimated gas reserves have dropped below ten years of remaining use for the first time¹. Just as we are depending on natural gas to provide backup to our renewable energy system, it is falling short. Our Kupe gas field continues to supply the liquefied petroleum natural gas (LPG) market both here in New Zealand and in the East Coast of Australia, but supplies are becoming tighter. New Zealand is increasingly reliant on imported LPG, and, as a result, we are observing increased LPG prices. We are likely to see the same for natural gas with imports of this forecast to increase electricity and gas prices massively.

What is the solution if New Zealand has no back up natural gas to support our renewable energy transition?

The energy sector is considering the complexities and limitations of various technologies, but it all comes down to the costs; nothing is technically not doable. Carbon capture and storage (CCS) is currently possible, but it costs. There are other options, like biofuels and biogas, but both come with CO₂ emissions, and there are other nasties in the CO₂, like sulphur dioxide and hydrogen sulphide found in biogas.

CCS provides a real opportunity for New Zealand's energy sector; some of the country's generation sites are already doing it. The process involves separating the CO₂ from power stations the key complexity being the nitrogen in the air which turns into nitrous oxide in the combustion process. You must have either a complex scrubbing system at the back end of the power plant or take the nitrogen out of the air before it goes through the power plant process. It all adds to the cost and reduces plant efficiency because you are using more power to achieve it.

CCS solutions have been facilitated by international standards out the EU and US that provide a robust methodology for understanding plant construction, the equipment and designs needed, and how much CO₂ can be sequestered and booked. The CCS system is also supported by a strong potential market for CO₂ in New Zealand, through our food and drinks, agriculture and chemicals industries.

What do you see as the main barrier to achieving Net Zero over the next decade?

There is a lot of ideological posturing around energy that prevents us taking a more holistic view. Often, it's not carbon that groups involved take issue with, but with industry of all types and its relationship to capitalism. That's their real problem and they see unreliable wind and solar machines - mined, processed and manufactured elsewhere - as the only solution.

By putting all our eggs in one basket, society will continue to muddle along until we hit a brick wall. Ultimately, there remains a lack of desire to put in place investment that maximises the mix of energy options, including fossil fuels. Regarding all fossil fuels as the same ignores the role of gas as a transition fuel. Gas produces half the CO₂ of coal with far better properties in terms of peaking power provision and heating. Gas is a three-letter word for transition. Fear by some of industry, stalls carbon capture and storage development, which isn't being considered within the mix in New Zealand, despite the low carbon impact, potential for lower energy prices, and increased reliability of energy supply.

We're already seeing some alternative technologies hit the back burner. New wind and solar schemes are being delayed, mostly due to consenting and cost issues. Green hydrogen development is being held back due to the associated products, such as green urea, despite New Zealand's heavy use as a fertiliser within the agricultural sector. The promising tidal resource in the Cook Strait has now been ruled out because of the whale migration. We're no longer having a rational discussion about what we're trading off against.



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As a nation, we have made progress in understanding the nuances of the energy transition, especially those associated with the goals of the energy trilemma - affordability, security, and sustainability. Sustainability is a worthy goal, but the appetite for sustainability may wane against the possible realities of an unstable and unaffordable energy system. Security and affordability fulfil our basic needs for energy, sustainability is more aspirational.

Over the decade to 2030, we are at risk of going through a period where the trilemma pyramid has been turned upside down, with everybody saying, "sustainability is a must." However, as the challenges of the transitions became clearer and energy prices rise, the need for energy affordability and security is now coming to the fore. The danger is that, ironically, the sustainability goal might be moving to the back burner, while we try and bridge the gap between affordability and security.

To solve some of these bigger sector issues around consents and market incentives, New Zealand needs rational not ideological discussion. You can't pick which scientific consensus you use based on ideology and ignore the rest. Otherwise, we will never have a sustainable, affordable, and secure energy system.

**By putting all our
eggs in one basket,
society will
continue to muddle
along until we hit a
brick wall.**

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Chris Jewell:

CFO, Lodestone Energy

“If we can speed up access to an unconstrained grid, Lodestone could build four solar farms a year. We’re going pretty quickly, unlock the transmission and the magic will happen.”

Reflecting back, in 2030, New Zealand has managed to get close to 100% renewable electricity, but still has a challenge to transition the balance of the energy sector. New Zealand should be proud that those with a strong financial and political balance sheet have chosen to deploy it well, enabling those innovative companies (with limited balance sheets) to stand up and solve the challenge. Many councils, banks, equity providers, customers, Government regulators, and Boards of Directors have taken brave decisions - at times rowing against the tide of seeking short term profit, protecting local interests at the expense of the bigger picture.

New Zealand now has the challenge of driving fossil fuels from the balance of the energy sector – transport, customer equipment, industrial heating remains an opportunity. The rapid roll out of EVs off the back of the 10,000 new chargers has created a sizeable demand response tool and an ability to flatten the demand profile as most cars are only driven for an hour a day.

Most are already equipped with the software to determine the ideal charging times for the grid and if they’re all plugged in somewhere, they are ready to stop their draw from the grid to help manage load.

From a solar generation perspective, the only barrier holding us back now is access to unconstrained grids. All the good grid opportunities have been soaked up. It’s a lot faster to build a solar farm or install a battery than it is to upgrade or build the new transmission needed to access the grid. The grid largely still operates on a just in time user pays upgrade system – prioritising economic efficiency over pace – that’s been too slow. Our regulators had the opportunity to take a 100-year view on the lowest cost New Zealand energy model when considering Return on Investment in the 2020s and encourage building grid ahead of the curve.

New Zealand has a lot of great options for new solar and wind farms. One of the best places to build a wind farm is on the south coast of Taranaki: It’s flat, windy, isolated, with a small population but has little transmission infrastructure. Most of the renewable generation companies cannot afford to fund such transmission projects themselves and that, along with a general lack of collaboration, has hampered progress.



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Back in 2022 a renewable energy zone was mooted for Northland, close to Auckland. Unlocking that renewable energy zone required three or four developers to get together and do a deal to agree who was going to pay for all the transmission upgrades. It was never agreed and so the upgrade never happened, and the sunny north remains with only a small number of solar farms. A brave decision to invest ahead of the curve would have been much faster.

To get to anywhere near Net Zero, we need more international capital coming into New Zealand. In 2020 it was assessed that New Zealand needed to deploy \$60 billion to hit Net Zero in 2050. The New Zealand Government, council entities, and mixed ownership model (MoM) companies, simply ran out of fire power to support this investment. Successive Governments choose not to use their political capital to sell down the MoMs, and our local councils didn't take the opportunity to amalgamate the various lines companies – which left these entities capital constrained. Capital is global and its great we embraced the opportunity international capital offered. International capital seeks regulatory certainty and fortunately successive Governments provided that.

New Zealand's Overseas Investment Act (OIA) fortunately did not get in the way of new renewable generation schemes. The OIA had been important to protect our sensitive lands and preventing monopoly assets being exploited, but, in the last decade, the OIA was modified to ensure it wasn't applied too broadly across too many asset classes. The combination of the OIA working well and greater regulatory stability was important in bringing in international capital.

Reflecting on hydrogen and offshore wind. New Zealand took the opportunity to connect our world class offshore wind resource and build global hydrogen export industry in Taranaki – supporting many other nations energy needs. We avoided the mistake of getting distracted trying to stand up hydrogen for applications where it made more sense to use electricity.

To get to anywhere near Net Zero, we need more international capital coming into New Zealand.

A photograph of an industrial facility, possibly a refinery or gas processing plant, featuring a complex network of pipes, walkways, and structural steel. The image is overlaid with a blue gradient that transitions from a darker shade on the left to a lighter shade on the right, where the text is located.

“The industry needs leadership and group resolve to create robust solutions.”

\ Andrew Knight
CEO, Gas Industry Co.

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Andrew Knight:

CEO, Gas Industry Co.

Looking back from 2030, why has New Zealand been unable to meet the 100% renewable power generation target?

The sector's inability to consent and develop enough renewable power projects in the timeframe is a problem. The second barrier is the scale and diversity of the renewable development needed, particularly for offshore wind, which in turn impacts the current market structures.

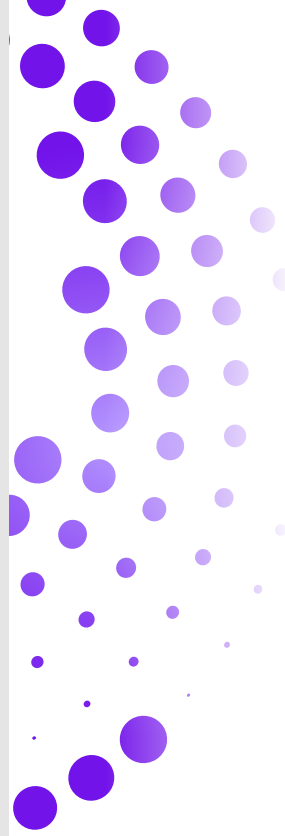
A key question that still needs to be answered as we transition to more diverse forms of renewable power generation, is what form of energy will provide backup. We have taken too long to get clear about backup solutions for renewable fuel intermittencies would work, which then raises the question of the transition and who pays for it.

Since the mid 2010s a perceived lack of policy stability and market predictability for power generators and industrial customers meant they could not plan and invest appropriately. Wholesale electricity prices remain persistently high and are currently well above long run marginal cost, even in the years of strong hydro storage and despite a relatively strong pipeline of new generation development.

Our electricity spot market continues to reward vertical integration. While it might be perceived to be a competitive market, it appears in practice to be regional markets dominated by the incumbents. This distorts signals to incentivise the development of the transformational new generation and back up projects we need today. A number of other approaches are available and in the past the Government has positioned itself in-between the infrastructure developers, and consumers by taking the price risk in the middle. This is similar to the approach taken to develop the Maui gas supply.



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What role does natural gas play in this energy transition in New Zealand?

This question has very different answers depending on which segment of the consumers you are addressing. Utilising the existing natural gas infrastructure and the bio-methane production to remove emissions from residential and small commercial consumers appears to be the most cost effective, least disruptive, and reliable way to address emissions in this consumer segment.

For the electricity back-up role, I believe market changes are required so that natural gas can play an effective role as a transition fuel towards renewable electricity targets. These changes involve some capacity mechanisms and more security of supply for natural gas. For capacity, these mechanisms need to encourage the development of more gas storage to support the flexibility of gas delivery during the transition. Options could range from payments to those who keep stored gas available to support security of supply or long-term contracts for development of new storage. The Government should be assessing whether more gas storage or gas demand response could provide a cost-effective interim energy storage solution for dry years until more renewable solutions are developed and operating.

There is not enough investment going into the upstream natural gas industry to maintain our industrial base during this transition and that is a big risk. Take a big industrial gas user like Methanex. Over the past decade, their consumption has been in decline, because they cannot secure enough gas supply. They need certainty that natural gas will still be developed long term because they need to allocate capital to secure their supply and invest in their plant.

What is the way forward for the energy industry in New Zealand?

The industry needs leadership and group resolve to create robust solutions. We learnt how effective collective action can be during the contract renegotiations which changed pricing and risk structures in the natural gas industry here in the early 2000s. It worked because a group of energy industry CEOs came together to solve the industry capacity and self-regulation problems. Without that, New Zealand would never have built critical new thermal generation during the early 2000s period.

We expect the Emissions Trading Scheme (ETS) to achieve our emissions targets and it can if it is applied.

Carbon capture and storage (CCS) is an underutilised opportunity in New Zealand. You can achieve the emissions reductions needed from gas by capturing the emissions from natural gas, upstream. From an emissions point of view and a cost point of view, New Zealand doesn't need to replace residential and small commercial gas consumption. The way forward is to make these investments, not just in CCS but across a range of options, including biomethane, peak electricity generation and across our transmission and distribution networks.

What New Zealand needs to decide is, are we trying to solve a fuels problem or a wider emissions burden for all of society? We will never meet our Net Zero target if we continue to put the burden on one sector and focus on reducing emissions by fuel, rather than reducing them as a system.

This lack of system thinking prevents the transition developing in a way that's both cost effective and efficient. Before anyone can invest with confidence, they need certainty in how the market is developing, otherwise, we are in danger of operating with a "turning off" philosophy, not an "investing to reduce" philosophy, meaning we continue to risk our security of energy supply.

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“To attract green energy investment, the Government and businesses in New Zealand need to be at the top of their game in terms of planning, infrastructure coordination, and attracting talent.”

What role is digital technology playing in New Zealand’s energy transition in 2030?

There is a critical role for technology to play in New Zealand’s plans to decarbonise its energy system. The energy transition is not just about switching to renewable sources of energy – it’s about using less energy – and adapting our usage to suit renewable energy and low-carbon technologies. To achieve this our energy system will need to be smarter, more connected, and more coordinated.

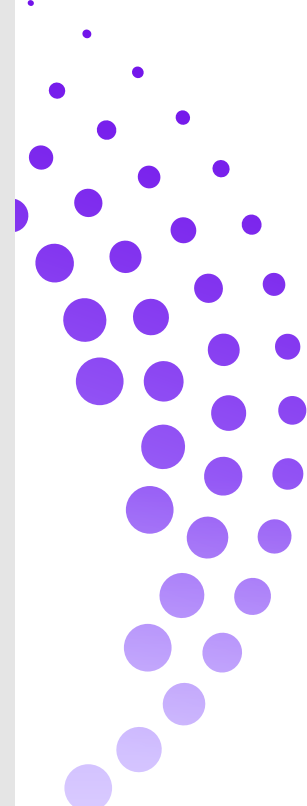
We conducted research last year into the role digital technology can play in New Zealand’s climate change challenge. We modelled significant opportunities, with annual emissions reductions of 2.4 million tonnes by 2030. Enough to make a significant contribution to our national emissions budgets.

These savings are delivered by smart grid technologies enabling distributed energy resources, battery storage, and micro-renewables. Digital technology will also drive energy efficiency in industrial processes, through automation and optimisation, and improve the efficiency of buildings through connected building management systems, smart home technologies, optimising lighting, heating and cooling.

Jolie Hodson:
CEO, Spark NZ



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Many of these opportunities are powered by technologies such as the internet of things (IoT) and artificial intelligence (AI). Through these technologies, energy companies and energy purchasers can more effectively match supply and demand. Smart chargers can ensure that EVs charge outside peak times, utilising renewable energy instead of fossil fuels. IoT networks can extend the reach of charging infrastructure across the country, encouraging uptake by removing the challenge of range anxiety.

IoT is often referred to as the ‘skin of the planet’ – as it allows people and businesses to sense things in the physical and natural environments, and generates data that enables informed decision making. Using AI, machines can make those decisions on an automated basis. It is about empowering better decision making and improving productivity.

Where is energy related technology investment focused in 2030?

Back in 2022, a report on the decarbonisation of New Zealand’s energy sector estimated that we would need to invest \$42 billion over the rest of the decade, across generation, transmission, and distribution to hit our decarbonisation targets. To get to Net Zero we need to increase our renewables mix, modernise our network distribution, and build more storage and electric vehicle infrastructure.

The investments we are making in digital technology will complement these energy investments by providing opportunities to optimise the grid, to encourage behaviour change and mode shift, and to enhance the efficient use of energy by businesses and individuals. At Spark we are making significant investments into digital infrastructure in the coming years – into the resilience of our mobile network, expanded data centre capacity, IoT, AI, and 5G standalone, which will open up new innovation opportunities for New Zealand businesses.

As well as new capital investment, New Zealand also needs to focus on the resilience of its existing electricity infrastructure. The fragility of our transmission grid was exposed during Cyclone Gabrielle, which hit back in the summer of 2023. During Gabrielle, around 40,000 homes were without electricity for days, after Transpower’s station at Redclyffe was submerged. This had a significant flow on impact to digital connectivity, which relies on power to operate. As a digital sector we have been reflecting on what more we can do within our own businesses to improve resilience, such as

extending the life of cell tower batteries, but this will only go some way to solving the challenge of how we reinforce infrastructure to operate effectively in an increasingly warmer country. We believe we need to be planning for climate adaptation and infrastructure development across sectors, so we can take a systems view and make the most of these investments for our communities.

How has the electric and green transportation sector progressed to 2030?

We’ve already seen change accelerating, and that’s expected to continue. That’s down to a combination of attractive and viable green transportation options becoming available, shifting consumer and business sentiment and purchasing, and support from Government policies and incentives to push things ahead.

This change is not just about shifting to electrification or other low-carbon options. It will also see us travelling differently, shifting commuting patterns, and optimising logistics networks for new technologies.

By 2030 we will have seen a significant proportion of our fleet shift to EV. We would expect the transition to be paced alongside the rollout of suitable charging infrastructure, which will adapt and grow alongside usage patterns.

Given the average life of a vehicle in the New Zealand fleet is around 20 years, we will still have a significant legacy fleet operating. This has potential implications for social equity, and may promote different ownership models and innovation around mobility as a service.

As for other decarbonisation technologies, success will always depend on how quickly infrastructure can support the different fuels coming into use. We are seeing more hydrogen use in commercial areas like trucking and more biofuel use in aviation.

Enabling sector decarbonisation will take a lot of investment across different industries. Everyone has to be on their best game - Government from a policy perspective, providing consistency and clarity; and business, from an investment perspective, providing direction as to if and where they will invest. It will also need considerable collaboration regarding the workforce and the capabilities needed for these new energy areas. And above all, it requires more robust planning as to how it will all be done.



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How are policy and regulation issues affecting Spark's business in 2030?

In our sector I see the issue being one of missed opportunity, more than issues with specific regulatory proposals. We don't have a compelling strategy to accelerate the growth of our digital economy as a nation. If I look to other markets they have strategies in place for things like artificial intelligence, cyber-security, and so on. We have huge opportunities in New Zealand to increase our exposure to weightless exports, and to grow our own technology disrupters. But we need a plan, we need to stimulate technology uptake across our economy, and we need to integrate technology into the decisions we are making across the economy – whether that is in transport infrastructure, health services, housing development, or climate change mitigation and adaptation. Technology cannot sit out to the side on its own – it is an enabler, and we will realise its benefits when it is part of the broader economic development decisions we are making.

A big challenge in achieving these opportunities is access to talent, and in many instances the skills we need will overlap with the energy sector. Better planning would highlight the skills needed in the energy transition, sending signals into secondary and tertiary education, and creating a pathway for talent into sectors like renewables and technology. This kind of coordinated approach would also enhance the work we are doing to diversify our sector, improving representation for women, Māori, and Pasifika.

We need to be planning for climate adaptation and infrastructure development across sectors.

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“If New Zealand wants to decarbonise faster than the global green fuels market, it will be expensive. It makes the energy transition as much an economic challenge as a technical one.”

What role do you see for methanol in New Zealand’s energy mix as we transition toward a Net Zero 2050?

Traditionally, methanol has been a building block of the chemical industry but increasingly its significant role in the transition to a low-carbon economy is being recognised. There is a growing demand for methanol as a key component in lower emission solutions like electric vehicles, wind turbines and solar panels. Methanol can also be used as a cleaner-burning fuel to support shipping to decarbonise.

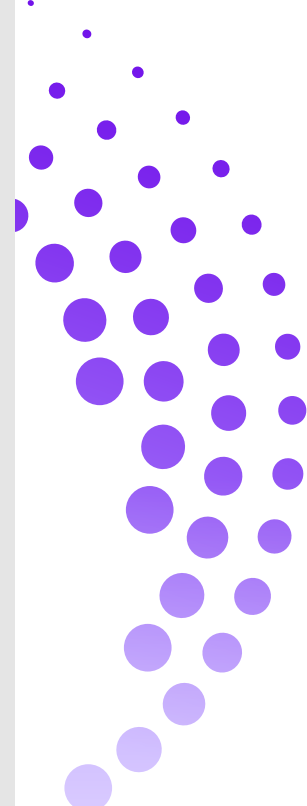
Globally, around 60% of methanol production comes from natural gas, 40% from coal, and a small, but growing, amount from renewable sources. Most of the carbon sourced from the gas is never emitted as it is locked up in the methanol, which is then used to create everyday products. Our Taranaki facility produces methanol using gas with around a fifth of the emissions of coal-based production.

If we do not produce methanol here in New Zealand from gas, then it would be made overseas from coal and contribute to higher global emissions.

Stuart McCall: Managing Director, Methanex



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Many of New Zealand’s export businesses face emissions from shipping their product to international markets and are seeking low emission solutions to transport goods over long distances. Methanol can support that goal as a “future-proof” pathway to decarbonisation alongside bio-methanol and e-methanol.

What are some of the challenges to using Methanol as a cleaner transition fuel?

Methanol is a “hard to abate” industry meaning that the transition is less straightforward. There is a lack of available technology to generate high process heat, at scale, and its cost remains prohibitive. It is acknowledged that this transition will take longer than for other industries that have economically and technically viable alternatives.

We are focused on providing methanol through and beyond the transition as an essential component of modern society; natural gas is a key feedstock in the petrochemical sector and not just a fossil fuel. The “hard to abate” nature means that gas will be required for decades to come while alternatives are developed. The scale of the transition is significant and making small changes in “hard to abate” industries can make a big difference to emissions.

As gas is methanol’s main feedstock, regulatory barriers to exploration and development challenge its supply through and beyond the transition. In this early part of the energy transition, using gas helps shift away from higher emitting sources. Gas is an excellent solution which will allow our economy to grow through the transition whilst reducing global emissions, but from a policy perspective, we are not embracing it.

Another major challenge has been the slow start to carbon capture, utilisation, and storage schemes (CCUS). Inconsistent global initiatives may drive investment away from well-intended countries like ours with less supportive incentives. For example, the United States is providing significant incentives to speed up investment in CCUS. While the cost of CCUS is challenging, the business case is particularly tough in New Zealand due to the regulatory barriers. As we transition to lower carbon solutions, we need to embrace all potential solutions.

Does the Emissions Trading Scheme (ETS) help or hinder New Zealand’s energy transition?

The ETS can play a key role as the primary tool for driving emissions reduction. However, for hard-to-abate industries it comes with risks that need to be responsibly managed with a global perspective.

Schemes like the ETS can lead to a situation where emissions are reduced in one region but increase globally as production shifts to countries with less stringent regulations. Most overseas methanol production has no carbon cost applied to it which means that New Zealand is less competitive than countries who use more emission intensive coal to produce methanol but do not face a carbon cost.

ETS costs can make regions uncompetitive and risk carbon leakage i.e. pushing production to higher-emission intensive processes and regions. A bespoke approach to preventing carbon leakage will deliver better global emission reductions.

What is the next step for the methanol market in the energy transition?

Globally, we are seeing huge interest in methanol for shipping. Since 2014, Methanex has pioneered methanol dual fuel engines and proven methanol as a safe, lower emission marine fuel. Today, over 60% of our fleet of tankers are capable of running on methanol.

In recent years, no one has developed cleaner shipping fuels like green methanol because there were not customers able to use, and willing to pay, for them. Maersk, a leading shipping company, has tried to resolve this challenge. It is stimulating the use of green fuels in the shipping industry with plans to investment billions in over twenty-five new methanol dual fuel vessels. It has created the methanol demand and the industry is responding with the supply. However, despite the growth in this market, there are still cost tensions between the higher cost of green fuels and the customer’s willingness to pay.



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Alongside advances in CCUS, we have also seen advances in lower emission methanol production. We invested in Carbon Recycling International, who developed the world's first renewable methanol plant in Iceland. It uses technology which converts renewable energy and recycled CO2 emissions from a geothermal power station to create renewable methanol. It shows that technical challenges are not a barrier but the demand and the ability to pay must match the supply.

An appropriate regulatory framework could support ongoing investment into gas exploration and development. From here we can continue to provide the low-cost supply of methanol that New Zealand customers currently demand, and support new customers seeking to transition. The lowest cost, short term course of action is to leverage existing assets and infrastructure to lower emissions. Over a longer time horizon, New Zealand has the potential to be competitive in renewable methanol production as both domestic and export markets grow. It will involve higher costs and higher prices, but if New Zealand electricity, biogas and biogenic CO2 supplies become globally competitive, our existing infrastructure and operating capability can provide the needed competitive advantage.

We need to embrace short-term solutions that reduce global emissions and accept that "perfect solutions" will develop more slowly. If we want to decarbonise faster than global markets would otherwise determine, this will come at a cost, and we have to balance that against other priorities.

An appropriate regulatory framework could support ongoing investment into gas exploration and development.

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“We have moved forward in 2030 by focusing more on progress and less on perfection.”

What are the particular challenges faced by New Zealand’s Electricity Distribution Companies (EDBs) in the energy transition?

There are huge challenges for every company involved in the country’s energy transition but the major challenges for New Zealand’s 29 EDBs relate to the regulatory environment, access to capital, access to resources to deliver the major increase in investment required, and maintaining political and customer confidence that price impacts are worth it.

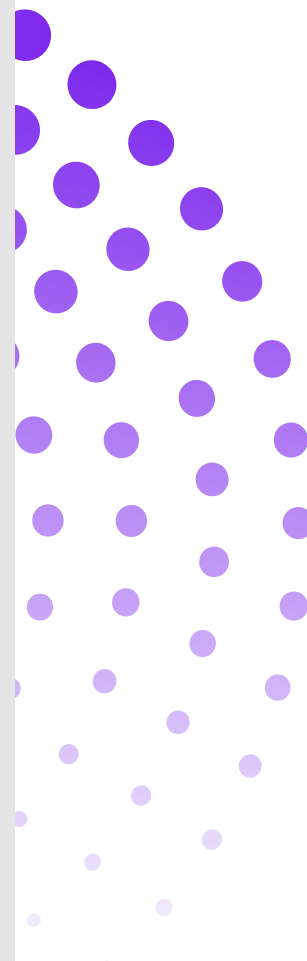
We and the other EDBs understand that through increased electrification, increasing electricity to 60-70% of overall energy use, New Zealand can deliver much of the gross emissions reductions required to meet the Net Zero target. But this needs huge levels of investment and the amount of capital required in the distribution sector is often underestimated. BCG’s “The Future is Electric” report¹, published back in 2022, estimated that New Zealand’s energy distribution sector needed \$22 billion of investment up to 2030 alone¹. This is a 25-30% increase in investment over that period, largely driven by increased demand and making networks smarter to keep costs down in the long term.

That investment enables a smarter, more distributed network, which is resilient and affordable in the face of increased storm activity and other climate-related changes. Studies show that the end point of electrification is more affordable for households (replacing ICE vehicles with EVs reduces household energy costs), though the transition may be bumpy as costs may increase ahead of uptake.

James Kilty:
CEO, Powerco



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I believe by 2030, we may not have seen anywhere near that amount of investment unless the new settings enable EDBs to invest. EDBs today are struggling with rising costs, consenting challenges, and resource constraints, and this is reducing the capacity to fund and deliver work at just the wrong time.

Regulatory settings must help meet the challenge. EDBs must be enabled to invest ahead of need to enable electrification – there is no point building lots of renewable power stations or distributed energy sources if the networks cannot deliver. Equally, customers need a resilient network with sufficient capacity to give them confidence to electrify. If we continue our regulatory focus on ‘just in time’ infrastructure delivery, we will continue to deliver too late and will slow the transition rather than accelerate it. Being ahead of the curve will be sustainable politically, financially and environmentally.

What might be some of the answers to the “access to capital” challenge for New Zealand’s EDBs?

Without access to capital, there will be a continued decline in the quality of New Zealand’s infrastructure generally, as noted by the Infrastructure Commission. Without capital EDBs will not create the decentralised, decarbonised, digitised system which is resilient enough to power the economy. Our green electricity system gives us the opportunity to ‘grow to zero’, growing our economy as we transition to Net Zero, but it will need investment. Investors that can attract debt, commit equity, and be enabled to do so by the right regulatory settings.

The electricity sector does not need government investment. We are 85% renewable electricity now and will be ~97% by 2030 without intervention. What we regulated monopolies do need are regulatory settings that support us to invest in and deliver the infrastructure to support our Net Zero 2050 targets. The right settings support ongoing private investment in the electricity system and free up public money to focus in other areas, for example supporting more vulnerable energy consumers or helping our industries to transition.

Consolidation of EDBs has been considered several times. The operational cost savings are minor, largely due to the nature of an EDB. Our workforces have to be out in the field, close to the communities and assets they support. There might be some head office savings, but it’s marginal in terms of the benefit to the end consumer.

So consolidation isn’t an operating costs strategy but rather a future-focused capital and resources one. Which means we then revert to the same issues around access to capital – the right regulatory settings, ability to attract debt, owners willing to invest equity, etc. Powerco used to be a collection of council owned entities. We are now owned by long term infrastructure investors and this has allowed us to fund investment. I do worry that talk of consolidation is a distraction from taking action to decarbonise now. If asset owners see a need to sell to fund the transition or other adaptation needs, they’ll do it. Until then, it’s best if everyone just gets on with it.

What should New Zealand’s energy sector be focusing on, for success in the 2030s?

We need more mature and connected thinking and more flexible approaches to enable the energy transition. It is too early to foreclose on options. Technology is developing quickly and if we try to chart a ‘perfect’ path that forecloses options now we risk bad outcomes. We cannot plan for perfection; if we try and design the perfect transition, it won’t happen.

For example, the 100% renewable electricity target is slowing our transition. It is constraining investment that can support a resilient and affordable electricity system through the transition. This means higher forward electricity prices and increased reliance on imported coal this decade, which is the opposite of what we need. Gas peaking power plant, green gases, carbon capture utilisation and storage, gas storage all have important roles to play in a resilient and affordable transition and can be leveraged this decade for success in the 2030s.

Studies show the potential for around 30% green gas in the residential sector by 2030. So let’s not foreclose on that either. With the biggest early wins in the transition being in transport and industry, biogas can help reduce emissions in the gas system for households without the significant costs of appliance changes. The gas networks can enable this.



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Growing a more productive economy and industries should be a major goal for our energy transition because it's a fantastic opportunity to leverage our low carbon electricity sector. Other economies are creating a path to Net Zero by exporting production to higher emitting economies. I think we are still relatively immature in our understanding of carbon leakage. There is a lot of debate, but it seems to me that as we already have a green electricity system, our objective should be to leverage it and grow industry here.

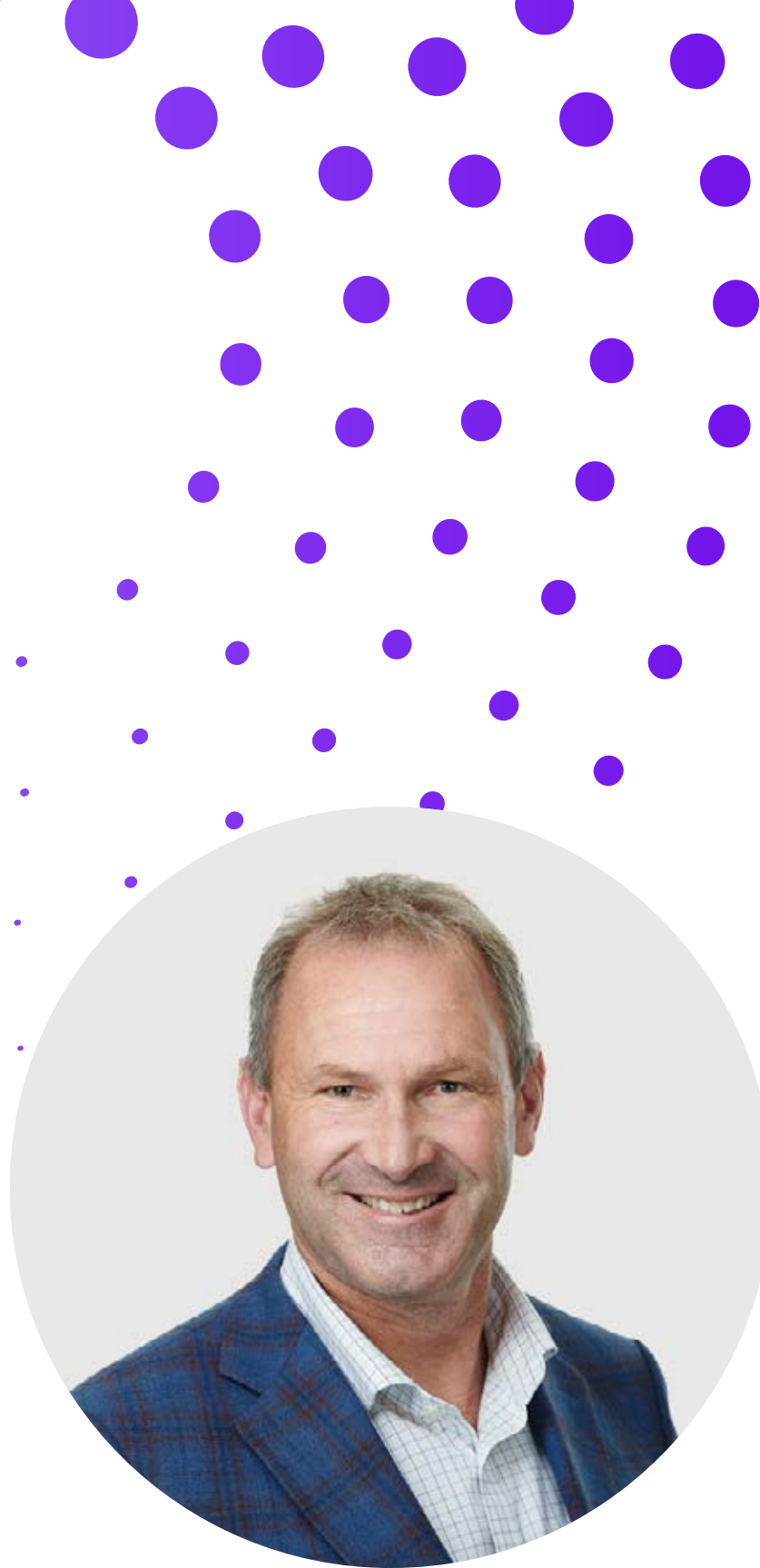
For success in the 2030s we need to change our mindset now. We don't need perfection, we need progress. We need 'good enough'. Low regret, directionally sound, and adapt in due course. Perfect can come later, for now good enough is perfect! If we keep options open, have enabling regulation, target growth, and let markets operate then in the 2030s, we will have an energy system which, while not perfect, is, at least, progressing New Zealand aggressively to a Net Zero 2050 target; growing New Zealand to zero.

**For success in the
2030s, we need to
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Andrew McLeod:

CEO, Northpower

“We need to keep our eye on capability and delivery. Net Zero will require a material infrastructure build, that will call for capital, people, and strong policy settings.”

Net Zero by 2050 feels like an achievable goal and achieving 95% renewable generation by 2030 feels like something we should be proud of as a nation when it is done; it will position us in a very select group of countries globally. The key to getting to this position is to play to our strengths and execute well.

To do this, we’ll need to ensure we don’t overreach and take good options off the table too early. Gas, for example, is likely to be an effective transitional tool while other system balancing solutions and sustainable fuel options prove up. Defining the strategy for the transition, rather than just defining the endpoint, is critical to ensuring the pace of the transition and the predictability of the outcome.

We also need to pick up our game on infrastructure build. We need to double the scale of our power systems over 30 years, with deep integration at a household and business level. It’s a big shift, touching every part of the electrical system, from generation, through transmission, and distribution, into households and businesses. A total regearing of the whole system.

The infrastructure build challenge is big, but the electricity sector has proven its ability to deliver high values of investment when it’s needed, and we’ve been through periods of rapid expansion before. This transition will span a few decades, with a whole lot more people involved than before, but provided we start to put some spades in the ground soon, and streamline key approval processes, it’s achievable.

I’ve been involved in construction for about 30 years, across the water, gas, and communications sectors. I’ve worked here and offshore during some big ‘gear shifts’ in those sectors. Invariably these transitions start a little slow, but once the infrastructure owners gain certainty, and construction companies fully mobilise, the delivery muscle just keeps rolling until the job is done.

In fact, looking at it now, the path forward seems to be a lot clearer than it was even a few years ago. Electric vehicles, in-home batteries, solar integration, and the stack of options to enable a renewable energy buildout are all pretty mainstream now, and our communities are more comfortable with them as they are turning up as ‘products’ that can be purchased and plugged in.



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The real ace we have in our hands in this transition is capability and financial capacity. We have very capable organisations right across the sector, with strong technical capability, and enviable financial strength. At a time when the Government books are looking increasingly stretched, and Infrastructure are calling out the infrastructure gap that has emerged, we need to lean on these companies to fund and build the infrastructure transition we need for energy.

Some of the longer-term technical shifts required at the back end of the transition look a little challenging, but it's positive to see the considerable advances being made globally in energy transition technologies, including grid-scale batteries, biofuels, and hydrogen. We'll need those things later in the transition, but we have a good starting point, so we can afford to be patient and let the global manufacturing giants unlock the manufacturing efficiencies needed to achieve the cost points we need for them to work in our context.

Fundamentally a strong transition is all about confidence and clarity. The Government should look to the sector to drive the right solutions, but to do that well we'll need the rules of the game to be clear. Specifically, we need an Energy Strategy that sets the stage for the energy system we want, a considered Transition Plan that enables us to progressively switch to renewable fuel sources, and a keen eye on the total cost of delivered energy for consumers over time.

I do at times ponder the regional differences that will invariably play out over this transition on the way through. The household business case for electrification depends quite heavily on electric vehicles and self-production. Our communities up here in the North do it tough, and it concerns me that many of our local families don't have the financial resources to access EVs and home solar installations; those families may bear the costs of electrification, without access to the benefits. That just does not seem equitable.

Perhaps a partial solution to this is to find ways to give our communities a deeper stake in energy, and back each other up at a local level. In Northland, we have an abundance of renewable generation resources, and our communities own the distribution infrastructure. It's not a big leap to a regional model where energy is generated, owned, and traded locally, with the ability to share and price in the local surplus. Centrally cleared markets don't have that level of flexibility.

Along these lines, I'm encouraged to see the rise of new independent generators, as solar provides less capital-intensive options for generation. The big gentailers continue to provide the solid backbone for our energy market, and I don't see that changing any time soon. Having large gentailers with the capability to take on very large projects is a real strength in our markets, but some additional offerings, and some depth to energy markets, must be a positive thing.

For us in Northpower, we're pretty focused on supporting the transition directly. We own the power and communications networks here in the North, and we have a large construction business of very material scale that's entirely focused on energy infrastructure. Our efforts are flowing into positioning our networks to support the transition, and into building our construction capability to support the infrastructure build.

From a people and skills perspective, we see this transition as a hugely positive opportunity. The scale of infrastructure build is a unique opportunity to build construction capability in our sector. The best way to build trade, technical, and engineering skills is via involvement in construction projects, and we'll be making the most of that opportunity. There are 1000s of 'career-making opportunities' on offer over this transition for New Zealanders.



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We should embrace opportunity and use it as a momentum to build real engineering strength back into the sector and back into New Zealand. I'm an engineer, and New Zealand engineers and trade staff are deeply respected around the world for their work ethic and flexibility, the problem has always been experience and exposure to larger projects. This opportunity is in front of us now.

Overall, while there is a bit of hesitation around, I think if the Government moves decisively to provide some clearer energy strategy settings, is purposeful regarding market settings needed to enable the required investment, and is realistic regarding the shape of the transition and the companies who have feet on the ground and get the job done, the capital will flow, and decarbonisation will happen.

I think sometimes we overthink these things. A nice example of how strategy, financing, and transition can flow well was the UFB Fibre Rollout led out by Crown Infrastructure Partners. 10 years ago we had the same debates about what was possible, and how markets could deliver a shift. Thanks to a bit of courage from the Government of the day, and cone confidence and conviction from the sector, the infrastructure is in the ground, uptake of the service is north of 70% nationally, and New Zealand is in a much better place because of it. We need to replicate that clarity and confidence.

In Northpower we're looking forward to being right at the centre of this transition. It's an exciting time to be in the industry.

**The scale of
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Dion Tuuta:

CEO, Te Kotahitanga o Te Atiawa Trust

“Aotearoa needs a new framework for the energy sector that enables Māori participation and access at appropriate levels; we have a lot to offer.”

There is no doubt about the need for a clear plan and vision for New Zealand’s energy future. The complication is how to achieve it. An important part of that plan is clarity around our energy targets. Personally, I have no idea how far we are off achieving 100% renewables. However, the discussion needs to be depoliticised and requires collaboration and cooperation between different parties, including politicians and Māori.

The interest in impacts on the taiao has meant that in 2023, environmental concerns have become almost entrenched into any new energy development. Striving for the 100% renewable mix and for perfection in how we protect the environment is not as straightforward as it first seems. It is not as simple as - oil and gas is always bad, renewable is always good. Any form of energy, green or not, has some impact, even renewables, such as visual or noise pollution leading to some projects being impacted by NIMBYism*, and others experiencing pressures around the social license to operate. Such extremism is complicating the search for the middle

ground, particularly where parties are objecting to energy project that will reduce the impact on the environment because they are deemed to not go far enough.

Within te ao Māori, there is added complexity to be navigated given our beliefs and narratives around whakapapa and whenua. We try to develop economically in a way that reflects these beliefs but potential partners and many of our own people do not understand these and don’t always have the appetite to learn about them. This can lead to enormous friction between us and mainstream society which can paralyse; it impacts on the pace at which we make plans or act. If we can’t integrate these beliefs, we end up with trade off decisions to be made between environmental, cultural, social, and economic factors.

These complexities, when combined with the barriers to participation for Māori in the wider energy industry, lead to Māori communities getting frustrated. If excluded from productive participation, our only way to participate is to object through the Resource Management Act. It makes more sense for the Government or the individual companies to engage in a conversation with us through the lens of Māori as partners – rather than as a last-minute consultative input into their project idea.

This can add considerable amount of time and cost to the developing project when active engagement with Māori can be a more productive approach. We must ask ourselves as tangata whenua if we are making the long-term situation for ourselves easier or harder? Are we being value additive to a process or value destructive to our intergenerational wellbeing?”

* NIMBY is an acronym for the phrase not in my back yard”, and is used to characterise opposition to proposed developments in a local area.

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The new offshore wind sector is a good example of the limitations to our participation in the energy industry. Many of us in Taranaki are enthusiastic about offshore wind’s potential; some of my colleagues know more about this industry than the Government, but these projects are almost impossible for us to get involved in. They are huge in scale, meaning they have a high investment threshold and high level of relative risk for us to invest in alone. Also, Māori are still in the post-settlement stage of our development meaning many of our leaders must think locally rather than nationally or globally. We need to evolve in a way that enables us to operate at the individual iwi level on some kaupapa while we work together on others at the regional and national level in order to enable our involvement in such projects.

We need to increase our involvement beyond being purely landlords to taking equity stakes in energy projects. Active ownership would mean we participate more in the commercial side of renewable energy like some of our other whanau in the geothermal space are already doing. It would also bring some experience and scale to our operations. Taking an equity stake gives you access to the boardroom and to an understanding of the mechanics of these projects, giving us confidence to expand into more developments.

Commercial partnerships are key to success in Aotearoa’s energy sector. Relationships and partnerships are important to Māori but, at an iwi level, these can be limited to regional and national political engagement driven by treaty-based rights and interests matters.

We are already developing our collective investment muscle with several investment vehicles. One example is the Te Pūia Tāpapa investment fund¹ which is a collective of 26 iwi and Māori entities, which has over \$100 million earmarked for investment in large scale businesses and assets. The energy transition offers opportunities to invest in partnerships with the commercial sector and

Māori see developing quality relationships as one of the biggest upsides of greater participation in renewable energy. Some partnerships could offer secondments for Māori to Europe or the USA, so they can train and gain experience in the renewable energy industry.

Māori consider the energy transition as both a social issue and a business opportunity. There’s no point in being collectively wealthy if our whānau continue to suffer the worst of deprivation. Success for Māori in energy over the next decade will require changes in engagement with Māori, including the Crown ensuring

Māori are proactively engaged as treaty partners, proactively opening the doors to participation in the energy sector for Māori, and for Māori themselves to increase our appetite for investment appetite and ensure we have the correct representation at the table. Our national energy strategy not only needs to make sense economically but also address Māori poverty issues, and particularly, energy poverty issues. Only then, will we find a more collaborative way forward.

We must ask ourselves as tangata whenua if we are making the long-term situation for ourselves easier or harder?

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“Embracing flexibility is so important to ensure we make the best use of existing capacity.”

\\ Andy Burgess
General Manager - Infrastructure Regulation,
Commerce Commission

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“We need to make sure there is flexibility. Both flexibility in terms of how we manage loads, as well as how we regulate, so that we get the greatest use out of existing network capacity and adapt to change.”

How do you view the target of 100% renewable energy by 2030?

The Commerce Commission’s role in the New Zealand energy ecosystem is to influence the network monopolies to ensure they are transparent about their performance and ensure they have the right financial incentives and performance standards. The 2030 target feels aspirational, a way to make progress. The Net Zero 2050 commitment feels like the key path the sector should prioritise as there is still a lot more to be done to reach that target.

If we are serious about reaching 100% renewable generation, we are going to need to connect more generation through new network infrastructure. We need to be mindful of the approach taken to new connections to ensure we make good use of existing capacity ahead of building new assets that may serve only a few peaks. There is a big question about where generation connects. The cost of the connection is one factor, but managing the consent process and locational signals may be the bigger issue to tackle.

Importantly, the sector requires a strategy to work towards across the transition period. With an energy strategy, the sector will have greater clarity on where priorities lie and the timings to work toward, to chart a path forward.

Andy Burgess: General Manager - Infrastructure Regulation, Commerce Commission





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As the energy market evolves toward Net Zero, what are some of the enabling factors will facilitate progress?

New Zealand's network utilities already have information about the quality of the network, where pockets of capacity already exist, but not enough on the low voltage network, which is most likely to be affected by new technology such as electric vehicles. Where there is existing capacity, we should be using it and the regulated networks should have a good idea of where the system is working and where the constraints lie. We have proposed improving publicly available information in congestion to help those connecting or providing flexibility services plan. There also needs to be action to improve the availability of real time information on what's happening on the networks – something that needs to happen in the short term.

Greater use of flexibility technology will enable the sector to make better use of network existing capacity. Importantly, the sector recognises the need to enable more flexible solutions, but progress seems to be constrained. We also need to answer questions around who can do what, including who should send a signal and control devices. I'd personally favour a market driven approach, wherever that is feasible.

Regulation will also be an important enabler. Through the introduction of new legislation for the fibre and water service industries, we've seen how quickly regulation for monopoly industries can evolve and adjust for the limitations within the existing framework. Greater flexibility in regulation, for example around how to manage funding across multiple regulatory control periods, the length of regulatory periods, and individual price paths for some distribution businesses may be areas for consideration. Our job is to continue to update the regulatory regime under Part 4 of the Commerce Act to ensure it will help enable a more electric future at a reasonable cost to consumers. There is also potentially more the sector could be doing within the existing framework.

What are some of the main issues the sector needs to remain mindful of over the transition period?

The need to plan in a more sophisticated way for different scenarios is really important. There will inevitably need to be more capacity freed up in many locations, through making better use of existing capacity, enhancing infrastructure or using non-network solutions. At the Commission, we are very conscious of the need to make the right calls and also the effect of those

calls on people's bills. There are questions which are not directly for us about equity both across consumer types and regions, but we will need to consider how investment decisions can impact across generations. Future consumers might not thank the sector for deferring decisions on work that could be completed now, but similarly current consumers may not support investment where the need doesn't seem to be as pressing. This is why embracing flexibility is so important to ensure we make the best use of existing capacity.

As a sector, we need to make sure that there are no undue barriers to bringing down prices for end consumers. We need to ensure there is effective dialogue across different industry partners. Each party within the system shouldn't be taking actions without thinking about the impact on others, and within the bounds of competition law, looking to work together to obtain greater efficiencies. Working together to create common standards may help to manage supply costs, whether it be through more homogenous products or shared training and network standards.

New Zealand is a great place for experimentation, but we need to be smart around where we invest to ensure consumers don't pay more than they need to for current and future assets.

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Jimmy Kerr \ Brett Shoemaker:

Launch Lead \ Chief Sustainability Officer, Microsoft Australia New Zealand

What have been the priorities so far for Microsoft, regarding sustainability and Net Zero?

Microsoft has globally committed to being carbon negative, water positive, and have zero waste by 2030 while also protecting more land than it uses.

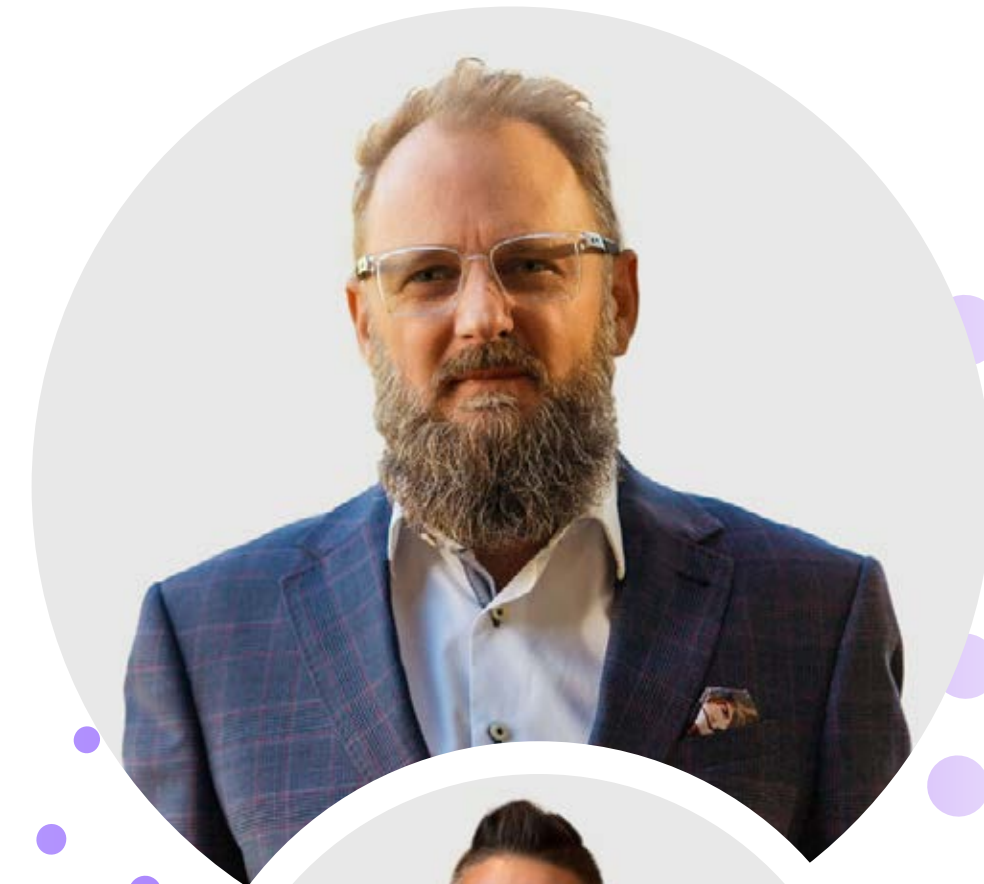
This means we have been focused on three main areas: decarbonising our own operations, working with our clients and partners to support their sustainability journey, and investing in initiatives that benefit society.

The first and most important goal has been to decarbonise ourselves, by reducing emissions in our own operations. In New Zealand this led us to partner with Ecotricity as the supplier for all the electricity to run our new New Zealand Datacenter Region. It was critical to us that it was powered by 100% carbon zero certified electricity¹.

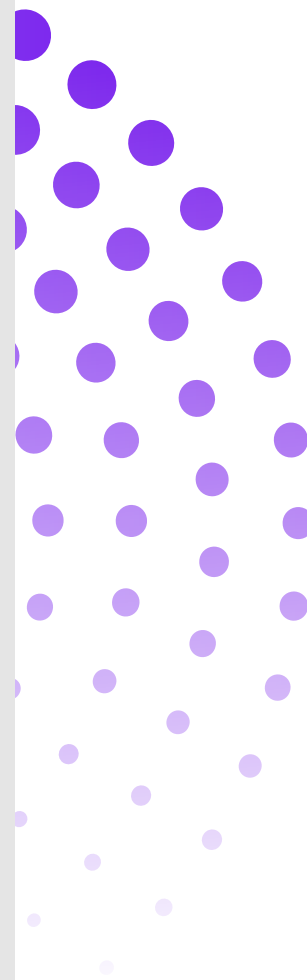
We leverage our global experience, knowledge, and tools to support our customers by partnering with them to build solutions to accelerate their sustainability journey. Our initiatives to help wider society are primarily technology and innovation led.

One of our biggest societal initiatives is the Global Renewables Watch project², which uses AI and satellite imagery to map and measure all the utility-scale solar and wind installations on Earth. It evaluates the progress of the energy transition and tracks trends over time while providing unique spatial data on land use. It involves synthesising large amounts of data to support protecting the environment while increasing global renewable energy capacity. We are nowhere near mapping everything, but the project is making huge progress.

Another major initiative is related to carbon removal which is a focus for our harder to abate emissions. Using equity and debt capital, our Climate Innovation Fund³ invests in technologies that support new climate related innovation. This initiative recognises the huge amount of financial and human capital needed to scale the technologies and innovations for Net Zero.



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What does Microsoft see as the main challenges to the energy transition here in New Zealand?

Microsoft, in our role as a major electricity consumer with ambitious climate and energy commitments, sees a responsibility and opportunity to drive changes in the energy sector. There are however some challenges in the New Zealand market that require more attention.

First, we need to accelerate the 100% use of renewables in electricity generation and enable technology to achieve that. It involves diversifying the energy mix to include more wind, solar and geothermal energy, as well as investing in research and development. Last year Microsoft and Contact Energy signed New Zealand first renewable attribute purchase agreement⁴. This long-term investment from Microsoft in renewable energy attributes brings the global standard to New Zealand and allows Contact to bring renewable generation online faster.

We need to accelerate the use of technology in the transition otherwise it may not meet our future sustainability goals. There are relatively simple technology processes still not being utilised. For example, employing Artificial Intelligence (AI) to let a consumer know when the grid is operating on 100% renewable energy. Allowing customers to participate more easily in electricity demand management by letting them see, in real-time, how they can reduce their home energy use. We also need to use more AI in the automation of routine processes in utilities, so we close consumer transactions more quickly, reducing the number of manual interventions required and the labour and energy involved.

Microsoft wants a fair and equal energy transition. Our presence in New Zealand is driven by a desire for a social license to operate. To protect that, we need to ensure we address local needs, have more involvement in communities most at risk of not benefiting from the transition. Access to affordable renewable energy should be an option for everyone.

What are the key success factors for Microsoft on its sustainability journey?

Technology is engrained in everything we do. It will not by itself entirely solve the climate crisis. It can, however, play an enabling role in the innovations needed to alleviate it. Many innovations associated with the energy transition are not necessarily new but involve applying existing technologies to new environmental challenges. Customers moving their data into a hyperscale cloud is a good example. Generally, it has enabled a 93% increase in energy efficiency and a 98% increase in carbon efficiency. Leveraging technology to measure and save energy, move data into the cloud, and increase automation supports sustainability. Today, Microsoft is using similar terminology in our sustainability conversations, to that of our digital transformation conversations a decade ago.

Our progress so far also relates to the fact that our commitment to sustainability extends across our entire company, not just sustainability departments. Every segment of Microsoft's business, from data centres to software development to finance, play a role in integrating sustainability into our operations. It means every part of the business optimises its processes to align with our overall sustainability goals.

Two other areas are also crucial for success in the energy transition. Collaboration is important and we team with our clients and other partners, to ensure we are all working toward the same goal. Our project with the Marine Science Institute in Western Australia⁵ is a good example there, as it involves creating a shared analytics framework for infrastructure development, modelling its impact on nature and the climate.



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We also need to diversify and upskill our workforce. The engineering and IT sectors generally, have a lack of diversity compared to others. The transition is creating new roles, such as carbon removal procurement, which didn't exist a decade ago. We are also expanding and upskilling other roles. Today our materials scientists must consider the sustainability of hardware design as we try to improve the carbon footprint of our operations.

We have worked with a number of incredible organisations such as TupuToa to try and foster more diversity into our workforce, to get a broad range of people from many parts of our society into the technology business. I believe this really allows us access to the best of both worlds. In the sense that we can access global capability services, and also lean into and use all of our local talent. For Microsoft, what we are doing here in New Zealand is more than just technology and sustainability, it is empowering people and supporting their livelihoods too.

Microsoft is globally committed to being carbon negative, water positive, and having zero waste by 2030 while also protecting more land than it uses.

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KPMG reflections:

Tom Counsell:

Director,
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“Having spent significant time in my career at Genesis Energy, I remain deeply fascinated by this sector. Through my recent conversations, two things continue to resonate with me:

- We are more likely to see an evolution and not pin our hopes on a revolution, and;**
- We are currently in a period of transformation rather than just transition.**

These two ideas are not mutually exclusive. At the start of pulling together 30 Voices on 2030, I wondered how the industry would tackle labour challenges and attract the necessary talent for transformation. Fortunately, I now believe this won't be a major hurdle since the sector has so much to offer, particularly with so many opportunities to make a significant impact not only for New Zealand's present but for future generations as well.

While there may not be a single solution to the challenges we face, the industry is already adapting and making progress, and I'm eager to track each small milestone and victory that will ultimately lead to the transformation Aotearoa New Zealand needs.”

KPMG reflections:

Karl Arndt: Director, Management Consulting KPMG New Zealand

“I’m really excited about the nexus of the four themes from this report that were identified as enablers for the future: people and talent, technology impacts, customers, and working with mana whenua.

When considered in aggregate, it’s clear that the energy transition will not just be a transition of assets and infrastructure, but also a transition of businesses and how they operate.

Looking to the next decade and beyond, successful companies will be ruthlessly focused on customers; digital-by-design and heavily leveraging emerging tech. They’ll have an incredible diversity of people, skillsets and ways of thinking; and authentically built on te ao Māori principles and value sets.

The transition will be challenging but the good news is that there are learnings we can draw from other industries (financial services, for example) and other geographies as we look to navigate our path through this change. The destination will be worth the effort, and I am excited to be a part of the journey.”



KPMG reflections:

Nikki Stigley: Senior Manager, Deal Advisory KPMG New Zealand



“Reflecting on my family history alongside my own 15 years within the sector, it’s heartening to see the momentum toward greater decarbonisation. Back in 2007, I was in the team at Genesis Energy developing tariffs to trial alongside the first smart meters. A century earlier, in 1915 my great grandfather Lloyd Mandeno, one of New Zealand’s electricity pioneers, showcased the electric home, including New Zealand’s first electric hot water system.

In 2023, our system still benefits from that early ripple control technology. As we look ahead to 2030, it’s exciting to consider how advances in communication will continue to enable us to connect even more devices and provide even greater system (and user) flexibility.

Speaking with industry to create this report, we’ve repeatedly heard how, under the right settings, the adoption of flexibility solutions can be accelerated to improve demand side participation. For nine years I managed Transpower’s pricing function with a strong incentive to defer demand during periods of peak network congestion. I’ve experienced how we as an industry can change market settings, so will be watching the flexibility space with particular interest as we move toward a decarbonised future.”

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