Sustainable Business Council | WBC Global Network

CLIMATE LEADERS COALITION

ON A MISSION TO REDUCE EMISSIONS IN NEW ZEALAND

Driving Sustainable Growth: Opportunities for New Zealand's Economy

The case for a sustainable innovation-driven economy

2026

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Foreword

On behalf of the Sustainable Business Council (SBC) and the Climate Leaders Coalition (CLC), we are pleased to present *Driving Sustainable Growth: Opportunities for New Zealand's Economy.*

This report demonstrates that if we pursue an economy driven by innovation and productivity and underpinned by affordable and plentiful renewable energy, we can unlock a pathway to becoming a more prosperous country, with positive benefits to the environment and climate.

The economic opportunity before us is not about small improvements on the margins – it is about a legacy we can lay down for future generations while simultaneously contributing to tackling one of the greatest challenges we face – climate change.

The report estimates the economic prize is an increase of $22 billion per year in GDP by 2035, rising to more than $33 billion by 2050, compared to an economy that only relies on the current carbon price path.

At the same time, the report shows that pursuing this sustainable growth pathway would reduce national emissions by 6% per year by 2035 and 22% per year by 2050, compared to an economy that only relies on the current carbon price path.

The central recommendation of this work identifies the task now is not further diagnosis, but action.

We need to commit to a long-term time horizon coupled with medium-term action, maintaining a shared and enduring focus across all the portfolios necessary for economic growth for long enough to achieve economy-wide change.

We recognise this report is being released amid significant multiple crises. These include the oil and energy crisis caused by conflict in the Middle East; a cost-of-living crisis; and the effects of ongoing extreme weather events caused by climate change. Some will say this is not the time to discuss focusing on New Zealand's long term growth challenge. We would argue it is precisely because of this context that long-term prosperity and resilience matter. A more affluent and sustainable New Zealand equates to greater resilience (including energy resilience) better able to weather these international storms.

We also recognise that, as a country, energy transition has upfront costs, as our homes and businesses are currently set up to use a portion of non-renewable energy. Changing this to unlock cheaper overall energy bills requires early investment in new assets. The report describes how this can occur.

For many businesses, sustainability has increasingly moved from the periphery to the centre of business strategy. It is no longer only a risk management tool, but a source of competitive advantage, profit and resilience. The insights in this report reflect that reality. They also demonstrate sustainable economic growth does not need to come at the expense of our environment, but in fact the two are mutually reinforcing.

The combined impact of evidence, modelling, case studies and strong business contribution shows how we can unlock a dynamic, high-growth economy, which is high value, low emission generating, and increasingly sustainable. This is not a distant aspiration – it is a future state that is both achievable and necessary.

Realising this opportunity is critical if New Zealand is to lift its prosperity and strengthen its economic resilience. It is essential to improving living standards for all New Zealanders and ensuring the country remains competitive in a rapidly transitioning global economy.

This report reflects the views of over 150 of New Zealand's leading businesses, who together contribute over 45 percent of New Zealand's private sector GDP.

Sapere and Beca contributed specialist technical advice and modelling expertise, which formed the analytical foundations of the report. CGE modelling was provided by Qaive.

In addition to the contribution made by SBC members and CLC signatories, we would like to thank our sponsors, the British High Commission, DB, and Business New Zealand for supporting this work.

As the report concludes, if business and government can work together to put in place the essential enduring policies and actions required, the economic opportunity we describe is eminently achievable.

We look forward to continuing to work with business and government to bring about this shift towards a prosperous and sustainable future for all New Zealanders, present and future.

Chris Aughton
Chair
Sustainable Business Council

Malcolm Johns
Convenor
Climate Leaders Coalition

Mike Burrell
Chief Executive
Sustainable Business Council

Executive summary

1. New Zealand faces a persistent economic challenge. For more than 50 years, labour productivity has trailed the OECD average by around 20 percent, limiting income growth, constraining public revenue, and leaving the country increasingly exposed to global shocks. At the same time, New Zealand has been grappling with the significant challenge of reducing our emissions in line with global and domestic commitments. These dual challenges have sometimes been treated as competing priorities – this report demonstrates they are not.

2. The **central finding** of this report is that New Zealand has a clear, achievable opportunity to improve sustainable economic growth and resilience, while also reducing emissions – and the economic prize is significant.

3. We estimate that the first phase of a transition to an innovation-driven, low-emissions economy **could deliver an increase of $22 billion in GDP by 2035, rising to more than $33 billion per year by 2050,** compared to an economy that only relies on the current carbon price path. This scale of uplift would be sufficient to move New Zealand from where it has fallen at the lower tier of OECD growth performance, back to the middle of the pack.

4. These gains are driven by a reinforcing engine working together: **stable and enduring policies, abundant renewable energy, accelerated innovation and productivity, and a credible carbon price.** Acting together, these elements reduce costs, lift efficiency, and strengthen long-run competitiveness. Importantly, these elements operate as a system, not a series of independent policy levers.

5. At the same time, this work shows that pursuing this sustainable growth pathway would **reduce national emissions by 6% per year by 2035 and 22% per year by 2050** relative to compared to an economy that only relies on the current carbon price path.

6. The report uses economic modelling, international evidence and case studies to quantify the size of the sustainable growth opportunity if New Zealand focuses its efforts and accelerates the adoption of electrification and digital technologies, reinforced by a predictable carbon price.

7. **Electrification** reduces the lifetime cost of assets by lowering operating costs from greater efficiency and renewable integration, while digital technologies enable optimisation, automation, and new business models. Targeted R&D investment coupled with electrification and digital technologies accelerates the diffusion of new solutions from early formation to rapid market uptake. A credible carbon price further reinforces these shifts by rewarding organisations that can innovate quickly and efficiently, turning productivity gains into sustained competitive advantage.

8. A critical insight from this work is that **the binding constraint is not a lack of ideas, technology, or ambition** within business and governments, **but rather policy certainty and coherency over the medium term.** Investors and businesses have long emphasised that large-scale, productivity-enhancing investments require confidence that core policy settings, across energy, innovation, infrastructure and climate, will be stable long enough for returns to be realised.

9. The discipline is well established in other parts of New Zealand's policy architecture, including monetary policy, superannuation, trade, and increasingly infrastructure. **Extending the same approach to the full suite of policies underpinning sustainable economic growth is the exact recipe that is required to unlock the opportunity identified in this report.**

10. Our modelling illustrates the economic stakes are high ($22b to $33b). Not only would the prize quantified in this report enhance the fiscal capacity New Zealand currently lacks to invest in critical areas of society, but it would also give us the ability to invest in the work that will still be required to achieve our emissions budget pathways.

11. International experience shows this pathway is achievable. A growing number of advanced economies are lifting productivity and incomes, while stabilising or reducing emissions through clean energy and innovation. Countries that have invested early and consistently in these foundations – including Denmark, the Netherlands and Singapore – have demonstrated that sustainable growth and competitiveness can reinforce one another.

12. The recommendations from this report build on strategies and evidence already established by the current and former governments. They set out clear actions for both business and government, individually and in partnership, to establish the foundations required in the first horizon of this transition.

13. The GDP gains identified in this report are best understood as first-horizon outcomes, not the upper bound of what may ultimately be possible.

14. We recommend business and government work together to put in place the essential enduring policies and actions required. If we do so, the economic opportunity we describe is eminently achievable.

+$22b

GDP per year by 2035

Transition to innovation-driven, low-emissions economy could lift GDP by $22b by 2035

+$33b

GDP per year by 2050

GDP uplift could grow to more than $33b by 2050

–6%

emissions per year by 2035

Pursuing a sustainable growth pathway can reduce national emissions by an average of 6% per year relative to an economy that only relies on the current carbon price path.

–22%

emissions per year by 2050

By 2050, emissions reductions reach an additional 22% per year relative to an economy that only relies on the current carbon price path.

Key recommendations

The key recommendations from this report are set out below. More detailed versions of these recommendations are contained in Chapter 7 (Recommendations).

Action for business

This report has revealed there is a need for business to step up and show leadership when it comes to developing a shared economic vision for New Zealand. We will do this and work with government and other parties to agree to this shared vision, to enable us to commit to long-term economic policies. This new action is:

1. **Lead and advocate for a shared economic vision for New Zealand:** Businesses to develop and get behind a shared economic vision for New Zealand, advocate for it, and align their capital, capability and leadership around a sustainable business growth model. This would signal long-term demand for clean energy, digital systems and low emissions input, giving innovators confidence to scale.

Business will continue to take a leadership role when it comes to sustainable economic growth and climate action. The following three points are actions our companies are already taking, and we will look to accelerate this work:

2. **Collaborate and partner to tackle shared bottlenecks:** Businesses to deepen collaboration through partnerships, joint ventures and buyer groups that aggregate demand, share infrastructure and standardise specifications to speed deployment and build capability. To do this, we recommend that businesses form cross-sector collaborations to tackle shared bottlenecks.

3. **Strengthen resilience to economic and environmental shocks:** Accelerate the shift to renewable energy sources, particularly for transport and industry heat, signaling long-term economy-wide demand, while reducing exposure to global fuel volatility. Make use of technological advancement, like digital twins and real time monitoring, to improve operational efficiency and resilience. Invest in strengthening the physical resilience of critical business assets against extreme weather events. Build geographically diversified, circular and low-waste supply chains to mitigate import dependencies.

4. **Build workforce readiness for a digitised, electrified economy:** Upskill and reskill staff in digital tools, data literacy, automation and process optimisation. Secure talent pipelines aligned with future technologies.

As we have noted in the report, to achieve this step-change in productivity and sustainable growth business needs to work alongside government. The following recommendations are high-level policy recommendations we believe are necessary to unlock the economic prize we have described.

Joint action for business and government

The following recommendations describe the key areas where government and business need to work together to unlock the economic prize we have described in this report:

5. Develop a joint business-government medium-term action plan for **New Zealand's energy system** to create a clear long-term market signal for our future energy mix. A key tenet of the plan should be abundant, affordable renewable energy as a key foundation of New Zealand's economy, enabling economy-wide electrification. The plan would provide clarity to businesses regarding anticipated future energy demand, how it will be sourced and provide greater clarity around energy costs (including identifying gaps that require private or public sector actions).

6. Establish a **public-private "energy efficient process heat" partnership** to reduce industrial dependence on imported fuel, unlock electrification and other low carbon sources of energy to serve industrial process heat by converting an ambitious but realistic percentage of existing fossil-based process heat to low carbon, digitally enabled alternatives.

7. Develop a **joint government-business national transport fleet resilience plan** to decarbonise our transport system as insurance against future fuel shocks. The plan should consider our transport network as an integrated whole, leveraging the strengths and efficiencies of different modes, such as road, rail, shipping and aviation. This should include **coordinated electrification roadmaps** for heavy freight, light vehicles and public transport, while recognising the potential of alternative fuels.

8. Keep New Zealand globally connected and competitive through **maintaining pace with international expectations for sustainable fuel use in aviation and shipping.**

9. Establish a **long-term innovation plan** focused on scale up and commercialisation of New Zealand and international research, moving solutions from formation stage towards acceleration and rapid growth.

10. **Improve the effectiveness of the New Zealand Emissions Trading Scheme (NZ ETS)** to ensure it plays its part, by setting a strong and predictable market-based carbon price that creates the incentives necessary for decarbonisation, while delivering productivity gains.

This set of 10 recommendations make up the roadmap for how New Zealand can lift its productivity and sustainable growth and achieve the economic opportunities this report has identified.

Please refer to **Chapter 7** for a more detailed description of these recommendations.

Contents

01

New Zealand's opportunity: a more innovative, productive and cleaner economy

Key Points

- New Zealand has an opportunity to use its natural advantages of renewable energy, world class research, strong market access, and a vibrant tech sector to deliver a productivity step change.
- Innovation, productivity, renewable energy and carbon pricing reinforce each other, forming a strong engine for sustainable economic growth.
- This shows that climate action is a driver – not a trade-off – for economic opportunity. It enables competitiveness, investment attraction and greater resilience.
- To achieve this, electrification, digital adoption and targeted R&D is needed to drive lower costs, higher efficiency, reduced emissions and greater access to premium low carbon markets.
- The GDP gains identified in this report are best understood as first-horizon outcomes, not the upper bound of what may ultimately be possible

It is well recognised that New Zealand's productivity has been lagging for the past 50 years (see following chapter). This report suggests a different path is possible for New Zealand - one that delivers higher productivity and sustainable growth.

Our findings show that innovation, productivity, renewable energy, and carbon pricing together form a reinforcing engine for growth. New Zealand's decarbonisation challenges - including renewable electricity expansion, transport electrification, and agricultural emissions - are also areas where innovation can drive productivity gains.

Focusing effort here accelerates progress toward greater sustainable growth, while strengthening competitiveness in sectors where New Zealand already has global credibility. Our macro-economic modelling has quantified the 'size of the prize' if we leverage our natural advantages, representing a triple win for improving productivity, growing our economy and delivering a more sustainable future.

The recipe for success

New Zealand has several advantages that could be leveraged to realise a productivity step change:

- **Abundant renewable energy** provides a platform technology that lowers costs, enables new industrial processes, and supports innovation across the economy.
- **World class research capability,** especially in agritech, biotech, and renewables, offers a strong base for commercialisation.[1]
- **Deep global market access,** with Free Trade Agreements (FTAs) covering around 70% of trade[2], positions New Zealand as a trusted supplier of premium food, fibre, and low emissions agritech solutions.
- **A vibrant tech sector,** contributing $23.8 billion to GDP, employing over 119,000 people, and generating $11.4 billion in exports, demonstrates the country's capacity to scale high value industries.[3]

Building on these strengths, this report sets out a pathway to a significant uplift in GDP: electrified systems reduce costs through higher energy efficiency and renewable integration, while digital technologies enable data-driven optimisation, automation, and new business models.[4] Together they:

- Lift labour and capital productivity.
- Reduce emissions through integrated, electrified transport, industrial heat, and cleaner processes.
- Enable differentiated, low-carbon products that meet rising global expectations on sustainability performance – a trend which remains clear notwithstanding short term market turbulence.

Our findings shows that carbon pricing, innovation, and productivity form a reinforcing engine for economic growth. A credible carbon price creates strong demand for lower-emissions production and consumption, rewarding firms that can innovate quickly. That demand pulls through clean and digital technologies that cut emissions at falling costs, while also enabling firms to do more with less energy and material.

When paired with targeted R&D investment, these technologies - such as agritech, electrified systems, and digital optimisation tools - direct innovation toward both productivity gains and emissions reductions.

Electrification, digital adoption and R&D investment are the most powerful of these shifts: they reduce input and energy costs, lift efficiency, reduce emissions and open new high-value markets. Together, these forces align environmental performance with long-run economic growth, turning climate action into a driver - not a trade-off - for higher productivity.

This is not incremental improvement - it is a structural shift toward a digitally enabled, sustainable economy. Accelerating the shift offers early mover advantages:

- Premium pricing for low emission, circular products.
- Investment attraction in sectors where innovation reinforces comparative advantage.
- Faster uptake of electrification and digital technologies.
- Greater resilience through domestic renewable energy and nature-based solutions.

Across the country, many businesses and organisations are already leveraging this uniqueness to achieve sustained productivity improvements.

Through case studies we have sought to both highlight the diversity of approaches being adopted and demonstrate the capacity for innovation in New Zealand across a broad range of sectors, providing valuable context for understanding the strategies and actions that drive ongoing commercial success.

The choice in front of us

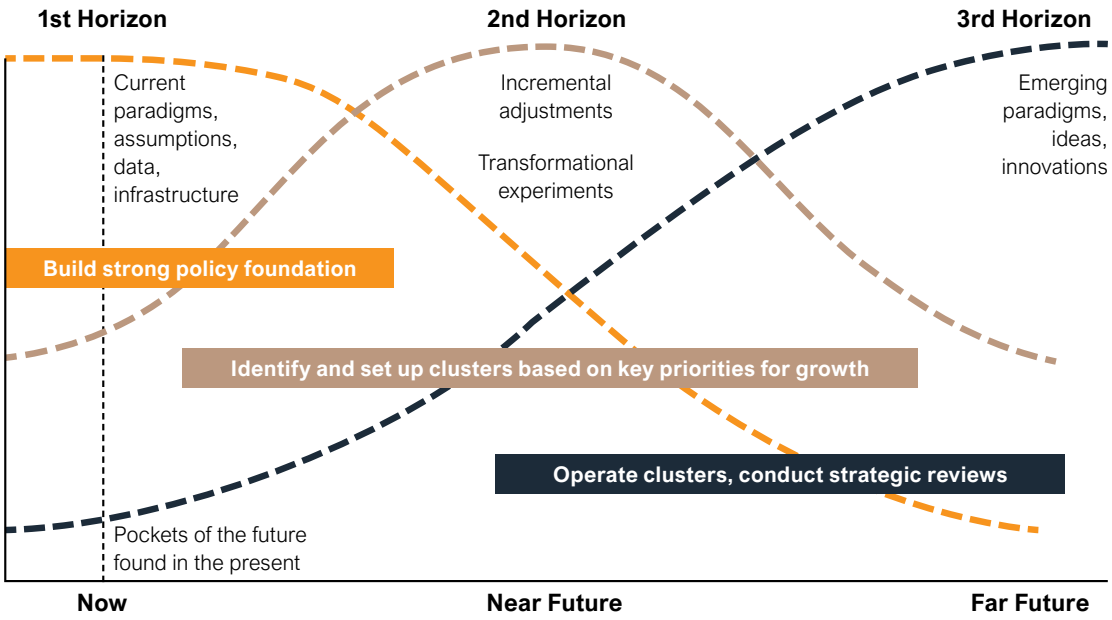
New Zealand has a choice to make – it can continue with business as usual and risk falling behind in a rapidly evolving global market, or it can embrace sustainable innovation and productivity, leveraging its unique strengths to drive long-term economic growth, while reducing emissions and building resilience for the future.

Realising this potential requires a shared national vision and a shift in how firms operate across multiple sectors. After decades of flat productivity and given New Zealand's reliance on primary exports and small firms, finding new engines of economic growth is no longer optional, it is essential. Both government and business have roles to play in enabling sustainable business.

ACTION TO REALISE THE ECONOMIC OPPORTUNITY SPANS SEVERAL TIME HORIZONS

The pathway towards a new economic paradigm requires balancing short-term stability with long-term vision. This pathway is made up of three horizons,[5] connecting the present with the desired outcomes. Building a strong policy foundation is an urgent outcome that should be the focus of Horizon 1, with the development of timebound taskforces focused on specific sectoral outcomes (which in this report we call 'clusters' or 'ecosystems'), spanning from the end of Horizon 1 into Horizon 3. Our recommendations in this report will focus on what needs to happen between now and 2030, to set the foundations for greater productivity growth in the long term.

Figure 1– The three horizons.



Source: Adapted from https://training.itcilo.org/delta/Foresight/3-Horizons.pdf

02

New Zealand's Challenge: low productivity

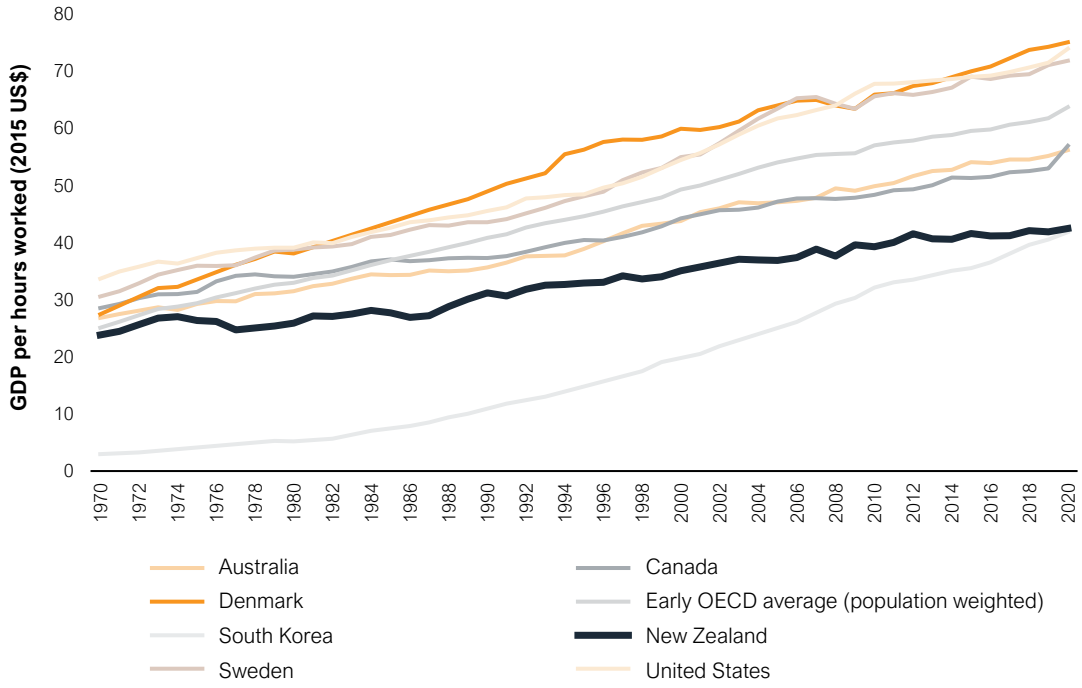
Key Points

- New Zealand's productivity has lagged for decades. We have not turned strong research capability into scalable, high productivity industries.
- International evidence points to innovation, especially via digitalisation, clean energy technologies, and advanced manufacturing, as the key lever for lifting long-term productivity and competing internationally.
- Global markets now demand credible sustainability performance, making low emissions production essential for maintaining market access, investment, and competitive advantage.

New Zealand's productivity has been lagging, and this is a risk

New Zealand's productivity has been lagging. For more than 50 years, New Zealand's labour productivity has been approximately 20% lower (on average) than in other OECD countries.

Figure 2: Economic output per hours worked in OECD countries. Source: *New Zealand Productivity Commission calculations based on OECD Productivity Database, release of December 2022.*



New Zealand's labour inputs have been the primary source of economic growth[6]. This has allowed New Zealand to grow GDP, but there is no material shift in the GDP per hours worked to match similar countries. One of the reasons New Zealand's export market profile has changed little over time is we have not focused on either labour productivity or leveraging technology and reducing input costs.

There is an opportunity to boost New Zealand's productivity and growth by improving performance in research and development

International evidence shows that although skills, capital, institutions, and global connections all matter, innovation is critical to long run productivity, particularly for small, advanced economies.[7] Countries that consistently create, adopt, and diffuse new technologies, production processes and organisational methods are the ones that achieve sustained prosperity.

A useful example is the United Kingdom, which deliberately aligned its economic growth strategy, industrial strategy, and innovation policy so they reinforce one another. As part of this alignment, the UK established the Catapult Network. The UK Catapult Network is a set of nine, sector focused technology and innovation centres created by Innovate UK to accelerate the commercialisation of R&D. Catapult acts as an operational bridge between government strategy and industry, helping to close the specific gap between strong research capability and weaker commercialisation performance. This is the same innovation challenge faced in New Zealand.

In short, the creation, diffusion and adoption of innovation underpins every other driver of economic performance. It is the fundamental reason why some nations become more productive and prosperous than others.

Yet New Zealand's growth has long depended on working longer rather than working smarter, with output gains driven mainly by labour effort instead of higher GDP per hour worked. This pattern reflects a persistent productivity gap that remains entrenched due to weak research and development (R&D) performance[8] and an innovation system that has struggled to generate and scale new ideas.

For example, according to the OECD's report "Boosting Productivity in New Zealand by Unleashing Digitalisation,"[9] coordination between digitalisation and clean energy adoption can significantly improve productivity across primary industries, manufacturing, and services. By enhancing the Digital Strategy for Aotearoa, government can target policies to close skill gaps, expand digital infrastructure, and stimulate uptake in high-impact sectors such as agritech, advanced manufacturing, and electrification. These sectors build naturally on New Zealand's strengths in innovation clusters, data-driven efficiency, and resource management - enabling cross-industry innovation via shared data systems, AI, and IoT platforms.

This points to a clear opportunity: shifting to an innovation driven model could unlock a step change in productivity and long-term economic performance.

New Zealand's persistent challenge is **moving from ideas to implementation.** Over the past few decades, the country's science and innovation system has generated strong conceptual and research outputs, but commercialisation and scaling remain weak. As McKinsey noted, New Zealand risks falling into a pattern of "ideas but not building businesses." Strengthening the infrastructures and institutions that support innovation is central to changing this trajectory.

Recent research by MBIE[10] highlights gaps in public investment since the 1980s in critical ecosystems: pilot facilities, biorefineries, market information systems, skilled talent pipelines, and patient capital. These elements are foundational for scaling innovation and securing competitiveness. The National Infrastructure Plan further underscores the need to **invest in enabling infrastructure and institutional capacity[11]** if transformational technologies are to diffuse effectively through the economy.

Recent moves, including the Science System Advisory Group's reform blueprint and the creation of the New Zealand Institute for Advanced Technology[12], signal recognition that New Zealand must shift toward a more outcome-focused, commercialisation-ready science and innovation ecosystem.

92%

of global economy

Nations are showing they can grow GDP while reducing emissions – with 92% of the global economy now successfully decoupling these indicators

70%

of NZ export value

Mandatory ESG and climate reporting regimes already cover 70% of NZ's total export value

Growth also requires competing in a world that increasingly expects sustainability performance

New Zealand's growth environment is being reshaped by rapidly rising global climate expectations.[13]Across major export markets, firms are now expected to demonstrate transparency, emissions reduction, and responsible resource use, and this shift is accelerating despite broader geopolitical turbulence. Mandatory ESG and climate reporting regimes already cover more than 70% of New Zealand's export value[14], with the Asia–Pacific region emerging as a major driver of this momentum. At the same time, national climate policy and international commitments - most notably the Paris Agreement - are tightening the domestic framework within which New Zealand firms operate. As a signatory, New Zealand has committed to a 2050 net-zero target and relies on the Emissions Trading Scheme to shape investment decisions, fuel switching, and land use across the economy. Together, these global and domestic forces make sustainable performance a baseline expectation for firms competing internationally and signal that New Zealand must adapt at pace to remain competitive in a world transitioning to low emissions growth.

For an export-dependent driven nation like New Zealand, complacency is a risky strategy. As a nation we rely on market access, premium positioning, and international trust.

This means that environmental credibility is increasingly a prerequisite for market access, not a 'nice to have.' New Zealand firms are responding, integrating sustainability into strategy, because it is now essential to maintaining a social licence to operate, attracting investment, and staying competitive in markets where scrutiny is rising.

Considering the evidence, New Zealand stands on the edge of a significant opportunity

This report asks whether a different path is possible for New Zealand - one that delivers higher productivity and sustainable growth.

International evidence shows that countries can grow GDP while cutting emissions, with 92% of the global economy now decoupling (absolute or relative) and 46% achieving absolute decoupling post-Paris (2015–2023).[15] Success factors have included clean energy shifts (fossil fuel phase-out towards renewables), carbon pricing, clean-tech and digital-based innovation. The next chapter sets out a pathway to realise this vision for New Zealand.

03

The productivity unlock: competitive advantage through lower business costs, resilience and product differentiation

Key Points

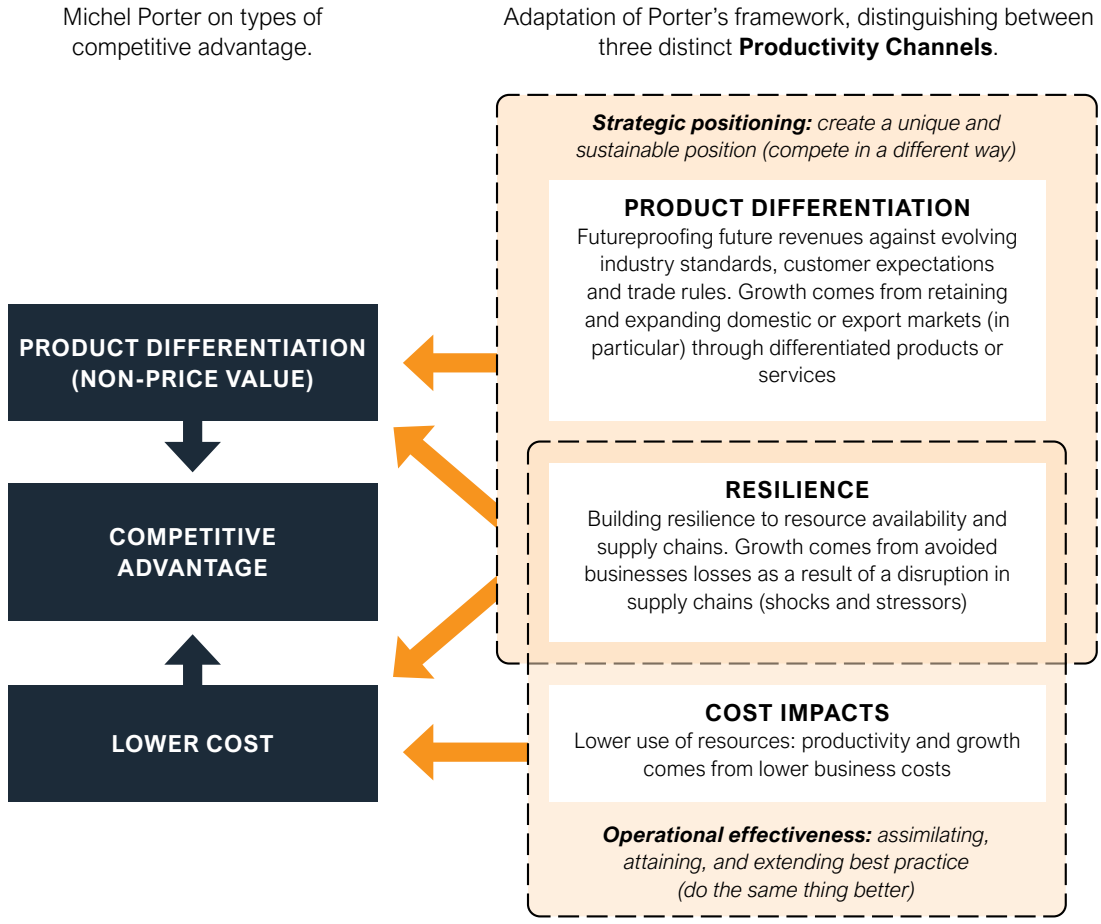
- This report identifies three productivity channels – lower business costs, product differentiation, and resilience – which reinforce each other, creating a flywheel of sustained competitive advantage.
- Efficiency gains from electrification, digital technologies and renewable resources reduce input costs, free up capital, and enable reinvestment in innovation and resilience.
- Lower impact, differentiated products strengthen market access and customer preference, as environmental performance becomes an access requirement in global markets.
- Resilience measures, such as supply chain diversification, renewable energy and adaptive infrastructure, protect firms from shocks while also supporting cost reduction and lower embedded emissions.
- Together these forces generate a self reinforcing loop, enabling New Zealand firms to scale faster, innovate more effectively and compete in a cleaner, more productive economy.

In this section, we set out how we can leverage New Zealand's unique advantages to deliver economic growth at a country and firm level. This model is validated by case studies of how New Zealand businesses are currently positioning themselves for competitive advantage, access to markets, and resilience to shocks (see Chapter 5).

Drawing from Michael Porter's model of competitive advantage (see Figure 3 below), we identify three main productivity channels: Lower Business Costs, Resilience, and Product Differentiation. Cost Impacts and Product Differentiation correspond directly to Porter's framework, while Resilience influences both product differentiation and cost reduction. Resilience plays a dual role for businesses: initiatives such as diversifying supply chains or investing in adaptive infrastructure not only protect against disruptions, but also enhance the ability to offer unique products and reduce operating expenses.

When applied together, these channels reinforce each other. Efficiency frees capital, resilience safeguards business continuity, and differentiation helps secure demand. Collectively, these effects help create a 'flywheel' of enduring advantage, positioning New Zealand to advance toward a cleaner, more productive, and sustainable economy.

Figure 3 – Porter's adapted model of Strategic Competitive Advantage. Source: Porter (2001)

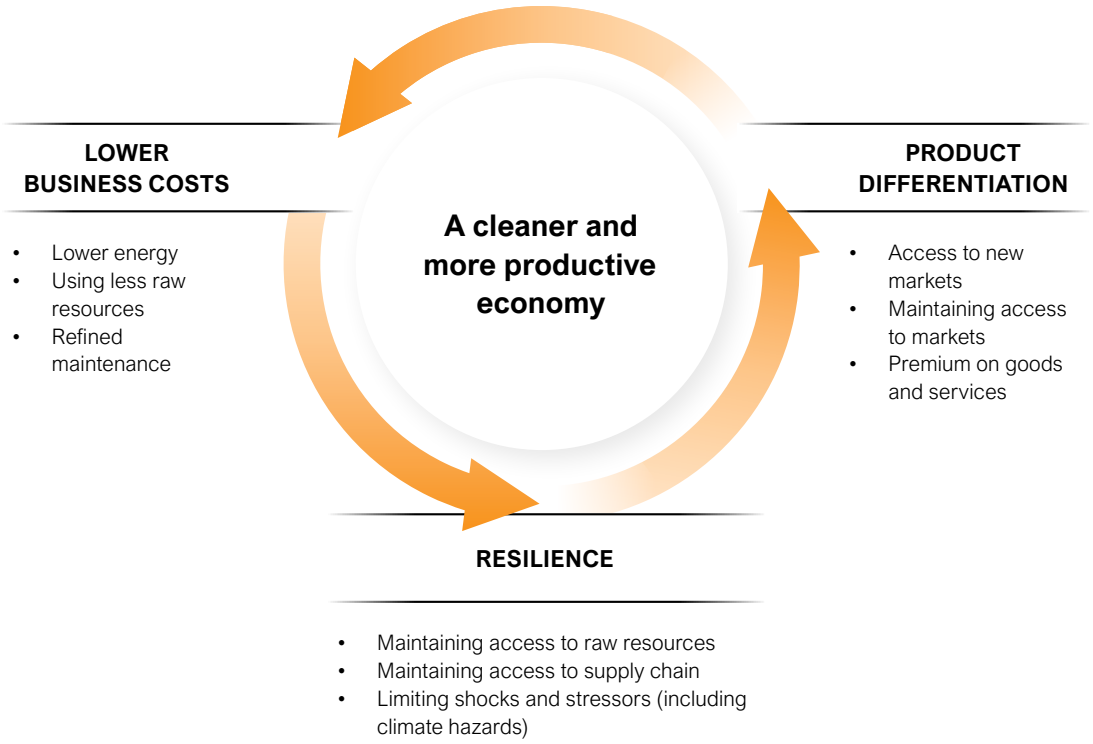


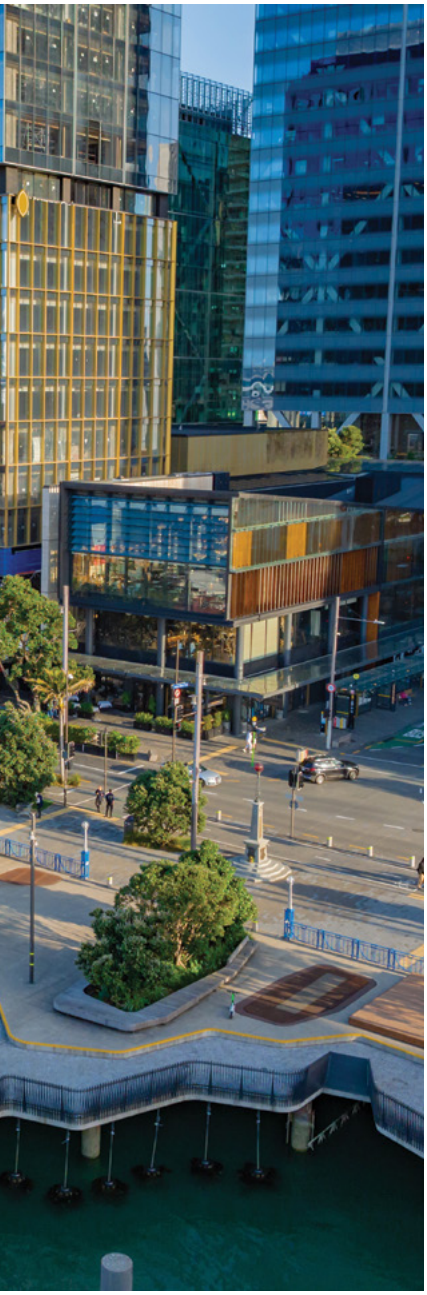
Pursuing these three channels creates a virtuous circle of competitive advantage

When businesses achieve higher efficiency, they unlock the potential to innovate and adapt, channelling resources into developing unique, lower-impact products and building resilience. Differentiated products with reduced environmental impact enhance market access and foster stronger customer loyalty, resulting in higher revenues and positioning firms to further invest in ongoing efficiency improvements. Simultaneously, resilience initiatives help safeguard these advancements by mitigating risks from supply chain disruptions, volatile fuel costs, and climate-related challenges.

As each element strengthens, we observe a flywheel effect emerge. Lower input costs accelerate competitive advantage, stronger market positions support ongoing innovation, and resilience safeguards long term performance. This reinforcing feedback loop is what enables sustainable businesses to scale more quickly, reach tipping points sooner, and contribute to a cleaner, more productive New Zealand economy.

Figure 4 – Lower business costs, product differentiation and resilience work together in a reinforcing feedback loop.





A closer look at three drivers of productivity

The following section builds on this model, exploring how businesses are already leveraging each of these drivers.

I. LOWER BUSINESS COSTS: THE FOUNDATION FOR GROWTH

Efficiency improvements reduce the labour, capital, energy, water and material inputs required to deliver the same level of output. This is achieved through waste reduction, process optimisation and circular economy practices. However, lower business costs are shaped not only by efficiency, but also by the scarcity of the input resource itself, which is reflected in the cost of extraction and therefore in the value of the resource. Scarcer, non-renewable inputs tend to become more costly and volatile over time, while renewable resources generally have lower and more predictable realisation costs once infrastructure is in place.

Lower input requirements and a shift toward less scarce resources translate directly into lower and more stable costs, while also freeing up capital and organisational capability that can be reinvested elsewhere in the business. These combined efficiency and resource substitution gains contribute to a self-reinforcing loop, by enabling investment in both differentiation and resilience.

Electrification and digital-based technologies can lower business costs. Compared to fossil fuelled systems, electrified systems have superior energy efficiency and fewer moving parts. Digital tech supercharges data-driven decisions: agritech harnesses precision tools, IoT, monitoring, and cloud computing for higher yields, while manufacturing and construction deploys smart machinery, digital twins, AI, robotics, and IoT for disruption-proof, self-regulating supply chains with end-to-end visibility and proactive risk control.

II. PRODUCT DIFFERENTIATION: THE LINK TO CUSTOMERS AND MARKETS

Markets are increasingly shaped by customer and regulatory expectations around environmental, social and governance performance. Evidence of lower negative externalities across a product's lifecycle is becoming the price of entry rather than resulting in a niche premium. Firms that convert efficiency gains into lower impact products are better positioned to meet these expectations, strengthening customer preference and protecting access to high value markets. Competitors that fail to respond face rising costs, shrinking demand and eventual loss of market relevance. This dynamic creates a continuous incentive to pursue further efficiency improvements that will sustain differentiation.

Electrification and digital technologies create powerful product differentiation by driving down the embedded carbon in goods and services, enabling firms to offer cleaner, lower-emissions products that stand out in global markets.

III. RESILIENCE: THE STABILISING FORCE

Resilience reinforces the loop by protecting business value against external shocks. This operates through two primary paths. The first is physical risk, where climate-amplified hazards threaten assets, operations and revenue. Investments such as battery energy storage systems, distributed generation or nature-based solutions like wetlands reduce exposure to these risks, while often delivering efficiency benefits.

The second path is supply-chain resilience, particularly in relation to geopolitical instability and dependence on imported fossil fuels. For transport reliant economies such as New Zealand, shifting toward domestic renewable energy reduces exposure to volatile global markets, lowers input risk and strengthens energy security. These measures feed back into efficiency through reduced waste and fuel price volatility, while also supporting product differentiation by lowering embedded emissions.

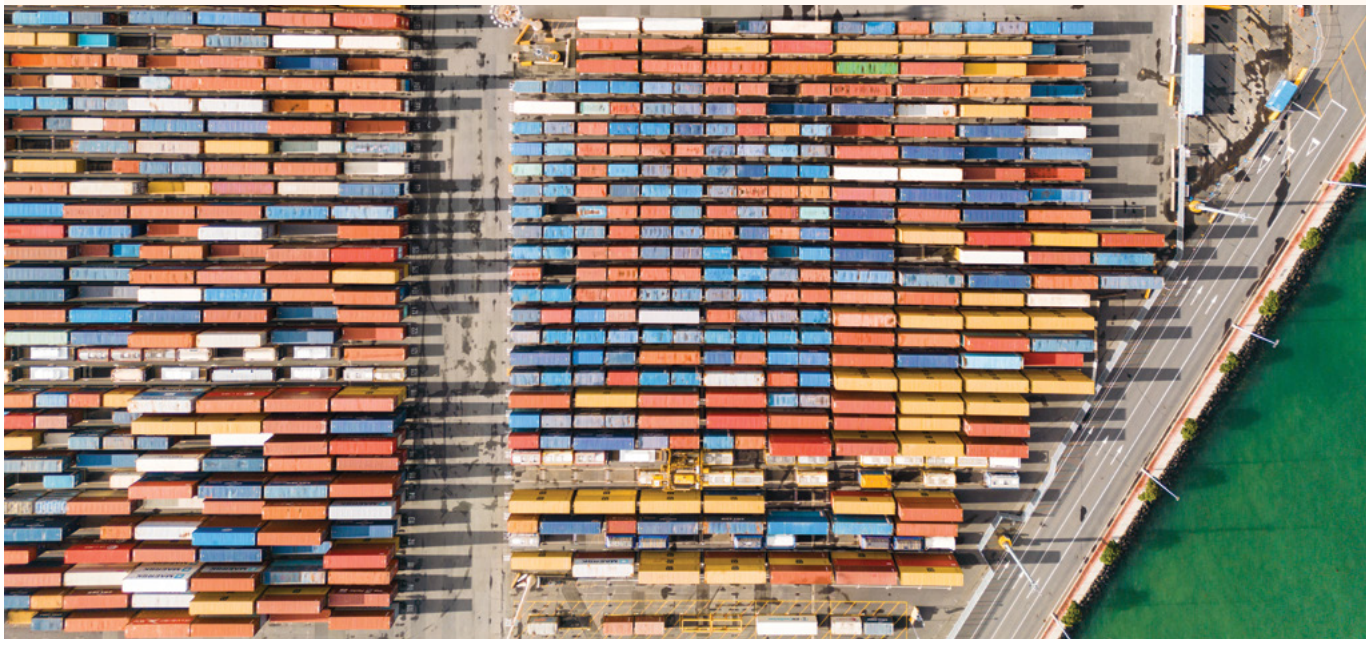
In summary, when businesses achieve higher efficiency, they unlock the potential to innovate and adapt, channelling resources into developing unique, lower-impact products and building resilience. Differentiated products with reduced environmental impact enhance market access and foster stronger customer loyalty, resulting in higher revenues and positioning firms to further invest in ongoing efficiency improvements. Simultaneously, resilience initiatives help safeguard these advancements by mitigating risks from supply chain disruptions, volatile fuel costs, and climate-related challenges.

04

The potential economic benefits from sustainable businesses are significant

Key Points

- Accelerating sustainable technologies delivers both higher productivity and lower emissions, showing climate action is an economic opportunity rather than a cost.
- An integrated 'Tech Renewable Leap', combining electrification, digital adoption and agritech innovation could deliver substantial economic gains, with a projected $22 billion per year GDP uplift by 2035 and $33 billion per year by 2050, compared to a Carbon Price Only pathway.
- Productivity improvements, especially from agritech, advanced manufacturing and construction, drive the majority of GDP growth, supported by avoided export and tourism losses.
- Emissions also fall further, with an additional 6% annual reductions by 2035 and 22% by 2050, largely due to agritech breakthroughs, electrification, and cleaner industrial and transport systems.



In this section, we model the potential economic gains from accelerated uptake of electrification and digital technologies that simultaneously cut emissions and lift productivity.

The quantitative evidence to date[16] has largely examined electrification and sector specific applications of digital technologies separately, assessing their individual impacts on productivity and emissions. In this report, we bring these strands together.

We combine the economywide effects of electrification with the sector level gains from digital adoption, and layer in the potential for agritech breakthroughs - particularly methane reducing innovations - to understand their combined impact on national productivity and emissions. This integrated approach allows us to model how these three drivers, acting together, could shift New Zealand's economic trajectory.

The modelling shows that a more sustainable economy (with a technology and renewable energy focus) leads to a significant increase in New Zealand's productivity and sustainable economic growth, as well as reducing emissions.

A transition to an innovation-driven, low-emissions sustainable economy could deliver an estimated increase of **$22 billion per year in GDP by 2035,** rising to more than **$33 billion by 2050,** compared to an economy that only relies on the current carbon price path, defined for the purposes of this work as a **Carbon Price Only**[17] scenario.

Simultaneously, this work shows that in doing so we would **reduce national emissions by an additional 6% per year by 2035 and 22% per year by 2050,** relative to a Carbon Price Only scenario.

+$22b

GDP per year by 2035

Transition to innovation-driven, low-emissions economy could lift GDP by $22b by 2035

+$33b

GDP per year by 2050

GDP uplift could grow to more than $33b by 2050

–6%

emissions per year by 2035

Pursuing a sustainable growth pathway can reduce national emissions by an average of 6% per year relative to an economy that only relies on the current carbon price path.

–22%

emissions per year by 2050

By 2050, emissions reductions reach an additional 22% per year relative to an economy that only relies on the current carbon price path.

The model

We have used a General Equilibrium model (Computable General Equilibrium - CGE) to understand the macro-economic opportunities that an economy driven by sustainable businesses present.

CGE models are widely used tools for analysing the local, national and global economic effects of policy changes, such as trade liberalisation, environmental policies, and structural reforms.

The Qaive General Equilibrium Model (QGEM) is a multi-region, multi-sector model that captures interactions between economies, markets, and industries, focusing on the flow of goods, services, and factors of production across regions and sectors.

The model provides detailed results on sectoral output, trade flows, factor prices, and welfare impacts across regions, making it useful for both global and regional policy analysis.

The key features of the model are:

- It has a **multi-regional and multi-sectoral structure,** where the global economy is divided into multiple regions (typically countries or groups of countries) and sectors (for example, agriculture, manufacturing, services, etc.). Each region produces and consumes a variety of goods and services, which are exchanged both domestically and internationally. Trade flows between regions are captured, allowing for analysis of the effects of trade policies, such as tariffs and quotas.
- It **incorporates input-output linkages between sectors,** meaning that each sector not only produces commodities, but also consumes inputs from other sectors. For example, manufacturing may require agricultural products, energy, and services as inputs. These linkages allow the model to capture the indirect effects of changes in one sector on others through supply chain relationships
- **Primary factors like labour, capital, land, and natural resources** feature flexible mobility and supply assumptions, with wages and rents clearing markets period-by-period. Region-specific endowments evolve over time, capital via depreciation and investment rates, labour via demographics in baselines and supply elasticities in policy scenarios.
- It **includes representation of households and governments** through the implementation of a regional consumer agent and a regional government agent. The model calculates changes in welfare (e.g. equivalent variation) based on changes in consumption, income, and prices, allowing for the assessment of the distributional effects of policies across households and regions as required.

The QGEM model - like all standard CGE frameworks - relies on national accounting conventions to construct GDP from both expenditure and income measures, with any differences in GDP and other economic indicators reflecting the input assumptions used in the analysis. It simulates shocks, such as changes in agricultural output or agritech investment, which increase demand for capital in the New Zealand economy. To meet these needs, the economy must invest and raise financing, with these adjustment paths and their economic impacts fully captured within the modelling framework. However, some elements of the analysis assume technological innovation, including locally driven research and development, which are not explicitly costed in the scenarios and could therefore entail additional, unmodelled costs. These costs are expected to be modest relative to the significant economic benefits generated by the scenarios.

We simulate a 'Tech-Renewable Leap' for New Zealand

To explore this, we applied a CGE model to **simulate such a 'what if' world.** This is not a forecast of what will happen, but a representation of what could occur. We note that some of the shifts we assume are already underway in parts of the economy, such as agritech.

The simulation is not designed to evaluate individual policy measures or projects. Instead, it helps illustrate the scale of economic opportunity if uptake of digital technologies, electrification and R&D investment is kick started where it is absent, sustained where it has begun, and then accelerated as early adoption takes hold.

In our **Tech-Renewable Leap** scenario, New Zealand surges ahead by accelerating electrification and digital technologies and R&D investment in agritech, aligning emissions trajectories with New Zealand Treasury shadow carbon prices, while unleashing productivity across key sectors. The carbon price is a significant driver for emissions reductions across the economy, except agriculture (we assume no pricing of biogenic methane emissions).

Agriculture transforms through uptake of digital and precision-technologies,[18] which together with targeted R&D investment in methane reducing technologies collectively deliver agritech breakthroughs. Productivity surges 18% in pastoral and horticulture output by 2035 (from just 1% today), driven by precision tools and management. Low-methane breeding and vaccines cut ruminant methane 10% from dairy and 1% from beef/sheep by 2035 (vs. 2025), scaling to 36% and 5% by 2050. This shields pastoral trade from tightening global rules and green consumer shifts, avoiding a 7.5% export loss by 2030.

Industry follows – by 2035, the full manufacturing sector enjoys 22.5% productivity gains from advanced digital tech (starting at 35% coverage in 2025); construction sees labour productivity jump 22.5% by 2040 via digital tools from 2030 onward. Carbon pricing incentivises demand reduction and fuel switches from gas/coal to heat pumps, reducing industrial emissions.[19]

Transport electrifies in response to carbon price signals.[20]In aviation and tourism, e-SAF prices fall 15% below jet fuel by 2050, boosting its share out of total aviation fuel use. This, in turn, averts a 1% loss in annual tourism revenue from environmentally conscious tourists by 2050 (starting from 2035).

This leap delivers a cleaner, wealthier economy where tech and renewables turn climate imperatives into growth.

To determine the economic benefits that a Tech-Renewable Leap could deliver, we compare it with a Carbon Price Only world, where long-term carbon pricing reflects the long-run supply costs of New Zealand Units (NZUs) from forestry (in the absence of substantial changes to the NZ ETS),[21] and the above shocks of tourism revenue loss and agricultural export loss materialise.

The modelling uses exploratory 'what-ifs' to generate insights. Neither the Tech-Renewable Leap nor the Carbon Price Only scenario represents a likely future on its own. Insights emerge specifically from comparing these contrasting worlds.

More detailed information on assumptions is provided in Appendix 3.

Modelling shows that action to improve productivity can deliver significant GDP uplift while reducing emissions

Compared to Carbon Price Only we find that a Tech-Renewable Leap can deliver a GDP uplift of $22.6 billion per year by 2035, and $33.6 billion per year by 2050.

Figure 5 - GDP in the Tech-Renewable Leap and Carbon Price Only worlds

Most of the GDP uplift is due to productivity improvements delivered by agritech, followed by productivity improvements in manufacturing and construction (advanced industry): 56% and 43% of total uplift by 2035, respectively. By 2050, **the GDP uplift induced by productivity improvements[22] is almost equally shared between agriculture[23] and advanced industry (51% and 47% of total uplift by 2050, respectively).**

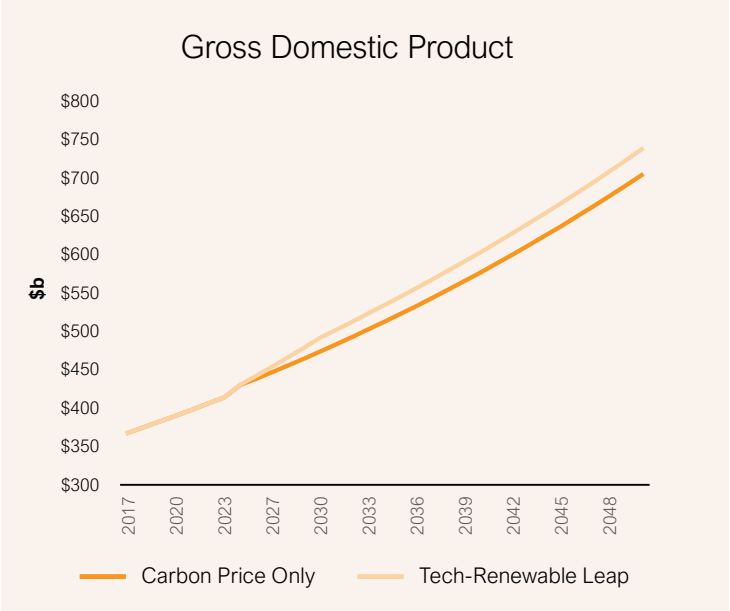


Figure 6 – GDP contribution from agritech, advanced industry and cleaner aviation

Note: tourism effect refers to avoided loss of tourism revenue as a result of e-SAF use; agritech effect refers to increased output due to digital-based tech in agriculture; advanced industry effect refers to productivity improvements due to digital-based tech in manufacturing and construction.

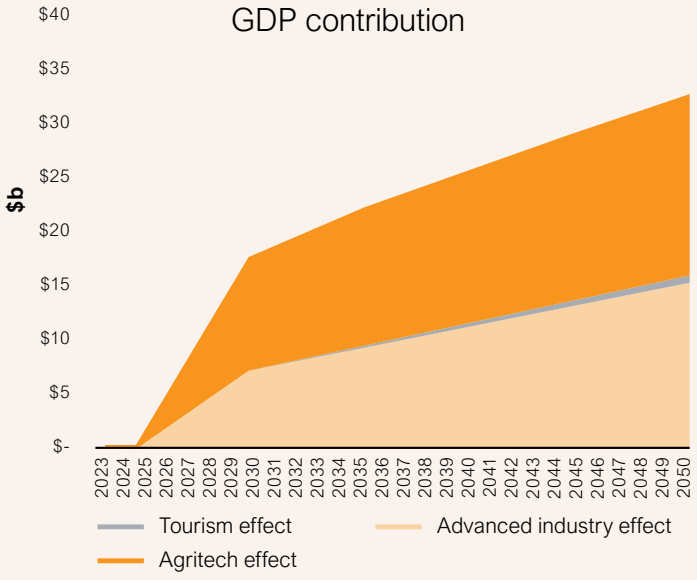


Figure 7 – Net GDP contribution from agritech in Tech-Renewable Leap (net of GDP impacts due a higher carbon price compared to Carbon Price Only)

The GDP impact of the higher carbon price in the Tech-Renewable Leap is more than offset by the combined effect of improved productivity from agritech (which increases primary sector output and processed foods manufacturing output), and the avoided loss of agricultural exports. The chart to the right shows **net GDP contribution from agritech,[24] rises from $11b in 2030 to $17b in 2050.**

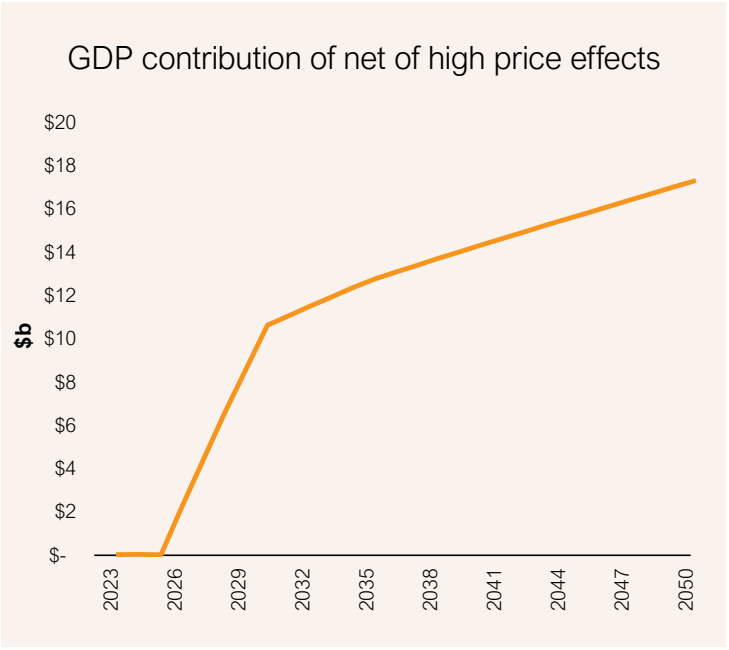
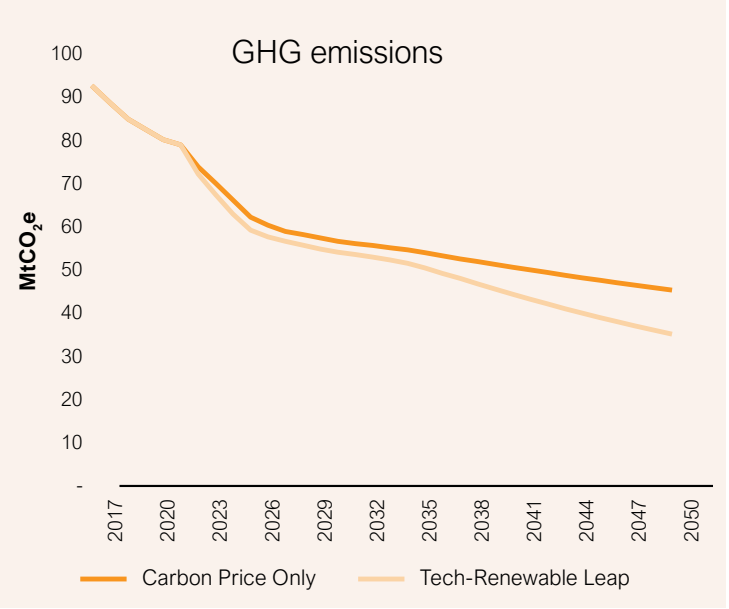


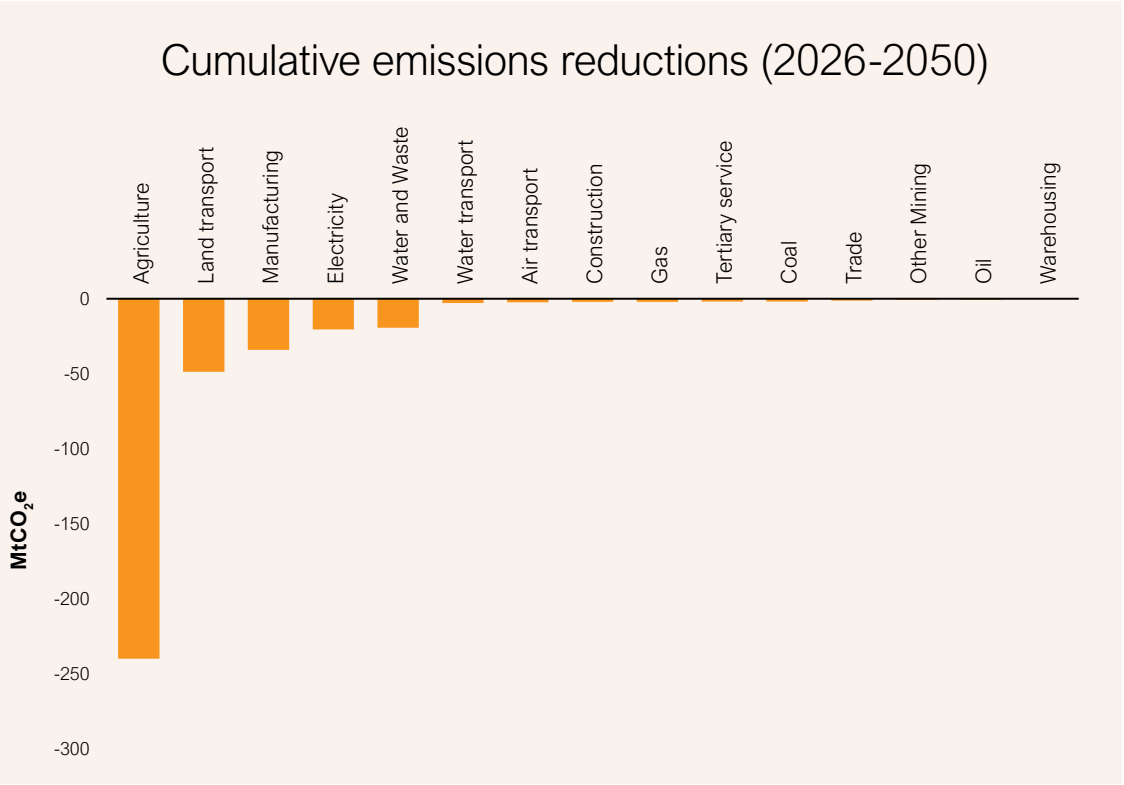
Figure 8 – GHG emissions in the Tech-Renewable Leap and Carbon Price Only worlds

Compared to the Carbon Price Only world, a Tech-Renewable Leap **can reduce emissions by 6% per year by 2035, and by 22% per year by 2050,** relative to a Carbon Price Only scenario. Overall, this amounts to 140 $MtCO_2e$ fewer emissions on a cumulative basis over the 2026-2050 period, or **11% of total emissions in Carbon Price Only over the period.**



In the Tech-Renewable Leap world, most of the emissions reductions occur in agriculture, followed by land transport, manufacturing and electricity. The emissions reductions in agriculture are significantly driven by technological advancements in low-emissions breeding and methane vaccines.

Figure 9 – Emissions reductions vs 2025 in Tech-Renewable Leap



Now that we have set out the findings of the macroeconomic model, we consider whether we are already seeing examples of business developments that are consistent with the Tech-Renewable Leap scenario and consider what insights those case studies provide us with to support the realisation of the macroeconomic opportunity. The case studies are organised as they relate to the three drivers of productivity as set out in Chapter 3.

05

Sustainable business transformation in New Zealand

Key Points

- New Zealand firms are increasingly embedding sustainability in business strategy as a driver of productivity, resilience, and competitiveness, validating the three productivity channels identified in chapter 3.
- Many clean technologies are clustered in the “acceleration” phase - proven but not yet scaling commercially - highlighting a need to push solutions past tipping points into rapid adoption to increase our innovation potential.
- Common barriers to scale include high upfront costs, complex policy or regulatory settings, capability gaps, and policy uncertainty (including around the NZ ETS and R&D settings).
- Key enablers include favourable whole-of-life economics, access to affordable renewables, collaboration and knowledge-sharing, and stable long-term policy signals that reduce investment risk.

Engagement with New Zealand Businesses

This section identifies case studies from New Zealand businesses which are consistent with the sort of developments anticipated under the Tech Renewable Leap scenario. They demonstrate that leading New Zealand businesses are already contributing to a degree of sustainable growth as set out in Chapter 3. To understand how businesses are transforming, we engaged directly with more than 30 New Zealand firms. Our engagement was broad, seeking a mix of sectors and business types, revenue scales, and included both SBC and CLC members as well as non-members.

Informed by international literature and successful overseas examples, our engagement focused on examining the links between sustainability and climate action, productivity, and economic growth. Engagement with SBC and CLC members was vital, given their significant contribution to New Zealand's GDP, and their collective ability to positively influence national outcomes – both economic and sustainable.

Validating the three productivity channels

We have taken the opportunity to speak directly with New Zealand businesses to understand and learn what action is being taken and how it fits into the hypothesis of the sustainable growth framework considered within this report.

Evidence from our interviews and case studies show that companies are adopting clean technologies and investing in resilience activities to secure and sustain competitive advantage. This reflects a broader shift toward the adoption of more sustainable business models, in which climate action, resilience, and productivity are treated as mutually reinforcing levers, not trade-offs. These elements together lower costs, safeguard continuity, and help differentiate businesses in tighter markets. These hallmarks of sustainable business are visible across sectors and businesses, from large infrastructure providers to community initiatives.

The following section illustrates how the productivity channels are playing out in practice, via case studies. Further detail on the case studies described is contained in Appendix 1.

I. SUSTAINABILITY LOWERING BUSINESS COSTS IN PRACTICE

A significant proportion of the case studies are of initiatives that are targeting whole-of-life energy cost reductions by shifting away from fossil fuel intensive systems toward more efficient, electrified and renewable solutions. This is a central driver of investment decisions across very different contexts, from ports and breweries to papakāinga, with clean technologies often providing the most economically advantageous pathway.

At **Port Nelson,** electrifying crane operations through the Dual Drive Crane and Wharf Electrification Project has delivered immediate and ongoing fuel cost savings, with cranes previously accounting for around 28 percent of the Port's total fuel use. Similarly, **DB Breweries'** partnership with **Pioneer Energy** to replace coal with biomass-derived reticulated steam at its Washdyke brewery has eliminated coal handling and boiler ownership, secured a stable renewable energy supply, and materially lowered operating and maintenance costs. These efficiency gains have been accompanied by a 78% reduction in site emissions, including approximately 98% reduction in steam generation emissions, while reducing exposure to fossil fuel price volatility.

Cost reduction dynamics are also evident beyond physical energy systems. **The MacDiarmid Institute,** specialising in materials science and clean technology, demonstrated how investing in research and skills reduced the long-term cost and risk of innovation. By embedding researchers in businesses through internships and seed funding, the Institute shortened development timelines and improved labour productivity, lowering the effective cost of clean-tech innovation and strengthening New Zealand's innovation capacity.

At a community scale, **Ngāti Whātua Ōrākei's** Hiko initiative demonstrates how similar principles apply to households. Hiko - a shared electric vehicle programme - enables shared access to electric vehicles without upfront costs. The initiative has reduced weekly transport expenses for whānau while providing a reliable, low emissions alternative for everyday travel. The vehicles are used daily for mahi, kura, sports and community activities, demonstrating that low emissions transport can be both dependable and cost saving.

II. SUSTAINABILITY AS A MEANS OF PRODUCT DIFFERENTIATION

A further set of case studies show how businesses are strengthening competitiveness through product differentiation, particularly by aligning products and services with increasingly stringent market, customer, and regulatory expectations.

For **Meridian Energy,** investment in large scale renewable generation and grid scale battery storage enables the company to offer customers electricity backed by renewable energy certificates. This differentiates Meridian's offering in instances where emissions intensity and transparency are becoming conditions of participation, rather than optional attributes.

Product differentiation is also evident in the resource recovery and waste to fuel initiatives led by **Enviro NZ Services Ltd.** Through its landfill gas capture programme and the production of Process Engineered Fuel (PEF), Enviro NZ has transformed waste streams into lower emissions energy products that replace coal in industrial processes. These initiatives help Enviro NZ and its customers achieve measurable emissions cuts, support efforts to meet rising expectations for waste diversion, and promote lower carbon intensity. In doing so, environmental performance becomes a source of commercial advantage, maintaining access to markets (and opening new ones), which in turn help others to increase their resilience and remain competitive in a low carbon economy.

Similar dynamics are emerging in the maritime and aviation sectors. **EV Maritime's** development of electric commuter ferries enables operators to offer low emissions maritime transport that improves air quality and positions services to meet tightening environmental standards in ports and urban transport networks. Importantly, the innovation is also creating new export opportunities for New Zealand: alongside deployment in Auckland, electric vessels are under development for international clients, demonstrating how this technology is opening new markets for New Zealand's clean maritime design, engineering, and technology capabilities.

In aviation, access to lower emissions fuels is becoming increasingly important for preserving New Zealand's competitiveness as both a tourism destination and an export reliant economy. Demonstrating credible progress toward lower carbon air travel strengthens brand value, supports compliance with emerging international market expectations, and mitigates the risk of reduced access to high value freight and passenger markets as regulators, customers, and carriers place greater scrutiny on aviation related emissions. **Air New Zealand** is proactively working with others in the aviation sector to advance and establish pathways to sustainable aviation fuel in New Zealand[25].

III. RESILIENCE AS AN ECONOMIC ADVANTAGE

Case studies also show how investment decisions are being driven by the need to strengthen resilience to shocks, including climate related risks, infrastructure failures, and supply chain disruptions.

The nationwide rollout of Ultra-Fast Broadband by **Chorus** and Local Fibre Companies illustrates how foundational infrastructure can simultaneously lift productivity and safeguard economic activity during periods of disruption. Fibre's passive design, with fewer powered roadside components, reduces failure points and service interruptions, helping protect supply chains, digital services, and access to essential systems such as banking, health, education, and government services. In doing so, Ultra Fast Broadband has strengthened New Zealand's ability to adapt and function under uncertain and rapidly changing conditions.

Toyota New Zealand demonstrates its commitment to supply chain resilience by supporting circular economy principles and robust product stewardship schemes across its operations. The company's sustainable approach to vehicle lifecycle management includes systematic recycling and repurposing of vehicle components, as well as closed-loop systems for hybrid batteries, tyres, and plastics.

A similar resilience logic underpins the **Ngāti Whātua Ōrākei** Ko Te Pūkākī: 2040 taiao regeneration blueprint, which positions environmental regeneration as core infrastructure that supports papakāinga rather than an optional outcome. By restoring ecosystems and strengthening natural and cultural systems, the programme reduces long term exposure to climate-related hazards such as flooding and water quality degradation, while lowering future infrastructure, remediation, and recovery costs. Healthy ecosystems provide natural protection and buffering that reduces reliance on costly engineered solutions, improves resource availability, and supports place-based prosperity over time. By embedding clear measurement, timelines, and quality assurance, investment in Ko Te Pūkākī: 2040 reduces delivery risk and enables informed, scalable investment decisions, strengthening the capacity of communities and the local economy to withstand and adapt to future shocks.

New Zealand businesses are adopting clean technology – more could be done to enable widespread, rapid growth

The above case studies show that New Zealand businesses are already acting. Evidence suggests that of the businesses interviewed, many of the interventions being used to boost productivity are poised at a tipping point on the innovation S-curve. This indicates that the circumstances needed to create rapid growth and widespread adoption amongst New Zealand businesses are not always present. We note that in instances (often with support from government) clean technologies have been enabled to temporarily move along the S-curve and achieve rapid growth.

Figure 10 - Qualitative analysis of New Zealand case study technologies on an innovation S-curve

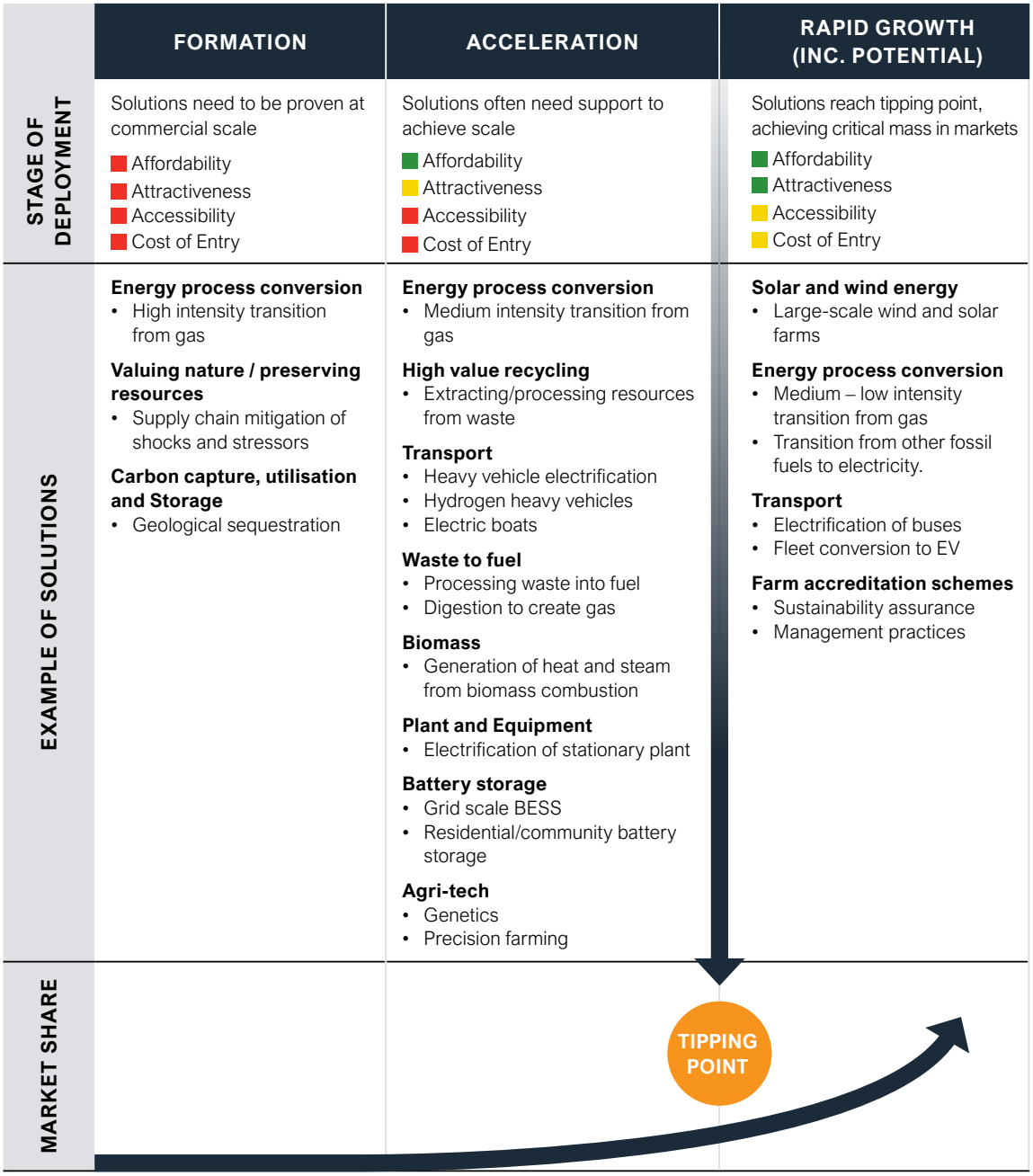


Figure 10, which is an adaptation of a Systemiq model,[26] illustrates our interpretation of where clean technologies used by New Zealand businesses currently sit along the innovation S-curve[27].

For this diagram, we categorised each intervention or technology into one of three stages of deployment:

- **Formation:** Characterised by innovative systems or technologies with markets that are not yet clearly established. These interventions are typically not widespread, they are novel, higher in cost, and require additional investment and support.
- **Acceleration:** At this stage, the technology is proven and the operating model is becoming mainstream. Market characteristics - such as offering, size, users, and competition - are well understood. Costs begin to decline, but further investment may still be required to unlock full value.
- **Rapid Growth:** Technologies in this phase exhibit widespread accessibility, reduced costs, and the potential to deliver transformative economic, social, cultural, and environmental impacts across their sector.

Our approach to assessing where a technology sits along the innovation S-Curve is structured around four criteria:

- **Cost of Entry:** The ability of stakeholders to afford the initial capital investment required for the infrastructure or operational changes necessary to implement the proposed solution. Where relevant this includes the cost and accessibility of finance.
- **Whole-of-Life Affordability (Economic Competitiveness):** Whether the total cost of ownership or operation over the life of the solution is lower than that of alternative options.
- **Attractiveness:** The performance of the solution (i.e. sustainability benefits, superior efficiency, quality, or other desirable attributes), and the extent to which the solution aligns with prevailing cultural and social norms.
- **Accessibility:** The ease with which businesses can access and implement the technology, and whether they possess the necessary information and capability to do so.

Placing the technology on the S-Curve provides a framework to compare interventions, understand their maturity, and identify the key factors influencing their adoption and impact. This approach enables us to map the progression of clean tech innovation in a New Zealand context, highlighting where solutions are poised for accelerated uptake and where in the innovation chain further support may be most effective.

This analysis can be used as a proxy to provide insights on the barriers and enablers needed to achieve a Tech-Renewable Leap, as modelled in the previous chapter.

Insights on how we can support a Tech-Renewable Leap

As a snapshot of the current state, we make several observations on the use and deployment of clean technology along the S-curve:

- Innovation in New Zealand is dynamic and multifaceted. Technologies do not always progress neatly from formation to rapid growth; instead, some oscillate, surging past the tipping point into rapid growth only to recede before establishing sustained adoption. **These shifts are often influenced by government interventions,** highlighting that market penetration can be fragile and dependent on ongoing support.
- Notable is the clustering of technologies in the acceleration phase. This raises questions about the factors inhibiting further progression. **Common barriers we uncovered include high entry costs, complex policy and regulatory settings, and uncertainty** in areas such as the R&D policy environment, and the future of carbon markets. **These inhibitors have potential to stall advancements,** even when a technology is proven and the operating model is mainstream, demonstrating that **successful innovation requires more than technical maturity.**
- These barriers indicate that advancing technologies beyond the acceleration phase is not solely a matter of technical capability. Even when solutions are proven and widely understood, external factors and uncertainty can limit momentum. This underscores the importance of holistic support, encompassing not just innovation and engineering, but also **accessible financing, clear policy signals, and stable market frameworks,** to drive technologies past the tipping point and into rapid growth.
- In most instances, **favourable whole of life affordability and the competitive leverage from the three productivity channels was a key factor** motivating businesses to invest in clean technologies or innovations. Many initiatives had also been made viable with investment support indicating that the cost of entry can still be a barrier to many businesses.
- Our learning from interviews and collection of the case studies for this work provides further insights to the path of technology along the S-curve. When it came to sharing innovation and implementation success stories, organisations have been generally open and willing to publicise their achievements at a high level. However, most organisations were unwilling to provide detailed data or information, citing legitimate concerns around confidentiality, intellectual property, and competition regulations. This suggests that, in some cases, accessibility and attractiveness, rather than just technical or economic factors, can act as equal or even greater barriers to accelerating technology beyond the tipping point. This reinforces the importance of **fostering an environment where sharing and collaboration are encouraged, and where trust and safeguards support openness, without compromising organisational interests.**

Together, these insights illustrate a complex innovation landscape shaped by intersecting forces of policy, market, and sustainability. The S-Curve framework underscores not only the current position of various interventions, but also the vital factors that accelerate or impede their journey toward transformative impact.

Although sustainable innovation is evident across New Zealand's business landscape, there is no consistent formula for leveraging its full potential. The journey from technological formation to widespread adoption is shaped by diverse and often unpredictable forces. While certain technologies surge forward, others retreat or stall, underscoring the absence of a uniform path for progress.

Despite these challenges, New Zealand businesses show a clear willingness to invest in sustainable practices, particularly through clean energy transitions. Their motivation derives from both economic opportunity and the imperative to address climate change, reflecting a dynamic commitment to a sustainable future. For progress to accelerate, holistic and coordinated support is required, encompassing accessible financing, clear policy direction, and collaborative frameworks.

The current barriers and key enablers to unlocking potential for stainable growth

At an individual business level, we found that in many instances innovation and sustainability initiatives are woven into businesses growth strategies, not merely as compliance or risk management tools, but as core drivers of productivity and competitive advantage. In other words, clean tech often provides the most economically advantageous solution.

We also found that not every business has the capacity or conditions to make this transformation. Limitations such as access to capital, cost of capital, attractiveness and accessibility of technology (amongst others) constrain some enterprises.

There is evidence that government led initiatives have helped the transformation in several areas. However, while progress is being made, there remains an ongoing need for policy support, industry collaboration, and investment in skills if we are to scale business transformation across the economy.

Bringing our findings from the case studies together, we have identified several barriers and enablers for business and government looking to transform to innovative, sustainable business models.

BARRIERS

- **High upfront costs:** The initial investment required for clean technologies remains a significant obstacle in some situations, limiting the pace of adoption for many businesses.
- **Lack of credible emissions reduction pathways:** Without clear strategies to reduce manufacturing and industrial emissions - especially those linked to energy - New Zealand companies risk losing competitiveness to imports with lower environmental footprints.
- **National benefits overlooked:** Because of New Zealand's small market size, some business decisions have broader national benefits that are not captured in individual company business cases, resulting in missed opportunities for collective progress.
- **Perception gaps:** A considerable number of businesses underestimate the urgency and complexity of transitioning to sustainable practices, which can lead to complacency and delayed action.
- **Policy uncertainty stifles investment and growth:** Uncertainty around tax policy and R&D incentives discourages investment and innovation. This lack of policy clarity not only deters current investment but also makes it difficult for businesses to plan future capital allocation, particularly into clean technologies and sustainable practices.

ENABLERS

- **Climate imperative drives action:** Despite challenges, many New Zealand businesses are proactively adopting sustainable innovations. This commitment stems from a need to maintain their competitiveness and a willingness to address climate change.
- **Favourable total cost of ownership:** Clean technologies often prove cost-effective over their lifecycle, making them appealing even when upfront costs are significant. Businesses recognise the long-term savings and competitive advantages inherent in these investments.
- **Collaboration maximises impact:** While cross-sector collaboration can be difficult, it yields substantial benefits. Successful partnerships facilitate resource pooling, risk sharing, and knowledge transfer, accelerating technology adoption and fostering a culture of openness and trust.
- **Access to renewable energy:** Reliable and affordable renewable energy sources are a major enabler for business success. Companies that generate their own electricity or switch from fossil fuels achieve cost savings, attract offshore investors, and enhance resilience.
- **Leveraging multiple productivity channels:** Businesses thrive when they diversify productivity strategies, such as transitioning from fossil fuels or adopting biomass energy. These moves not only save costs but also create product differentiation and market advantages.
- **Export market awareness:** New Zealand exporters are increasingly attuned to shifting consumer preferences and evolving trade requirements around environmental performance, positioning themselves to meet global demand for sustainably produced goods and services.
- **Stable policy environment:** We heard through this work that investors in long term assets are wary of the potential for policy settings to change significantly in New Zealand's short political cycle. This takes the form of investment risk.

With these barriers and enablers identified we can now move onto the key shifts required to achieve the opportunity identified in this report.

06

A pathway toward a more productive, sustainable economy

Key Points

- To realise the opportunity for a productive, sustainable economy presented in this report, we need a system shift to an electrified, digitised economy where clean power and digital infrastructure reinforce each other.
- Success depends on stable, coherent long-term policy settings and investment signals. New Zealand needs to pull in the same direction and stay laser-focused on high-value opportunities.
- The near-term focus should be to execute existing strategies, including the National Infrastructure Plan, the Renewable Energy and AI strategies, and the Digital Strategy for Aotearoa, as well as ongoing maintenance and investment into core infrastructure assets, and a further focus on innovation diffusion in agritech.

This section draws together the preceding ones to set out how we might achieve the significant macroeconomic opportunities that our scenario analysis shows are available to New Zealand if we achieve a Tech-Renewable Leap future. Based on our research, we have determined that the key features of a productive, sustainable economy are:

1. **Innovation-driven growth:** Breaks from reactive adoption to lead global diffusion curves, capturing first-mover premiums in agritech, renewables, and digital systems. This is achieved by harnessing the benefits of an ecosystems approach, such as knowledge spillovers and economies of scale. In such an economy, an electrified and digitised core replaces fragmented legacy systems with interdependent electrification and digital tech - where power electronics enable smart systems, and digital infrastructure demands reliable power - for seamless, future-proof operations.

2. **Competitive positioning:** Differentiates NZ firms via premium, low-emission products and green credentials, outpacing commoditised rivals stuck in legacy models. To remain competitive, an interconnected export ecosystem builds critical mass for our small economy, delivering knowledge flows, skilled labour, linkages, and specialist services to meet evolving global standards. Such an approach would transform our currently under-utilised unique strengths, such as abundant renewables, research prowess, export networks, and tech sector, into engines of advantage.

3. **Resilient foundations:** Builds buffers against geopolitical risks and hazards through localised renewables, circular processes, and nature-based solutions - delivering 20-30% cost advantages over linear economies. Such an economy remains agile for emerging advantages, dynamically pivoting to new comparative strengths, and escaping path-dependent stagnation.

The evidence is clear: decarbonisation delivers significant productivity, competitiveness, and export benefits. Countries that have succeeded in creating clean, high-value economies - such as Denmark, Sweden, and South Korea - mobilised bipartisan consensus around long-run economic transformation, rather than treating energy, technology and climate policy as siloed, partisan issues. Stable signals on energy policy, stimulation of technology development, emissions pricing, investment incentives, and regulatory settings drive private investment and innovation confidence.

We see this growth trajectory as one which will take place over multiple horizons. Although the long-term vision is intended to be transformative, in the immediate term, there are some pragmatic steps that New Zealand can take to set us up for success.

Policy settings should drive the transition to **an economy that is advanced in digital clean technology, with a foundation in renewable energy, and strong on innovation diffusion and uptake.** A strong, predictable carbon price signal is essential to reinforce this direction, creating the economic conditions that reward low-emissions innovation and accelerate the diffusion and uptake of new technologies across sectors. Given that biogenic methane makes up a large share of New Zealand's emissions, **policy settings should actively build a strong foundation for innovation diffusion in agritech.**

Economic and innovation policy should build on New Zealand's key differentiators - its clean, green reputation, strengths in agriculture, renewable energy capacity, and robust research base - to position the country as a leader in sustainable, high-value production. This is the long-term vision for an economy that is both globally competitive and aligned with a low-carbon future.

In the near-term, we should **stay the course on the big set-pieces,** leveraging existing analysis and evidence. New Zealand has a strong base of existing strategies - the National Infrastructure Plan, Renewable Energy and AI strategies, and the Digital Strategy for Aotearoa. The key now is to act on these foundations rather than create new ones. Utilising evidence from existing plans will deliver faster, lower-cost progress, and provide much needed policy certainty to reduce investment risk.

Ongoing, consistent investment into core assets such as our energy, transport and water networks is needed to ensure the resilience of these critical lifeline utilities to climate impacts, and provide a strong foundation for businesses to grow productivity.

New Zealand has repeatedly shown that when policymakers look beyond short term pressures, they can fundamentally reshape the country's economic trajectory. The creation of an independent monetary policy framework in 1989 transformed how the nation manages stability; the New Zealand Superannuation Fund in 2001 established a long horizon approach to demographic and fiscal risk; KiwiSaver in 2007 shifted national savings behaviour and deepened domestic capital markets; and the 2019 Net Zero legislation, supported by an independent Climate Change Commission, reframed climate action as a structural economic transition. More recently, the same long term mindset has guided major shifts in infrastructure planning through the 2026 National Infrastructure Plan and in science and innovation through the 2025 *A pathway to the future* report.

A similar willingness to think systemically and act for the long term is now essential if New Zealand is to lift its productivity performance in a meaningful and sustained way.

Distilling these major shifts into specific actions requires input from both the public and private sectors. Given the size of New Zealand's economy, **government and business need to pull in the same direction,** rather than spreading ourselves too thin. We can make a virtue of our size to be laser-focused on high-value opportunities, targeting investment around a coherent set of related activities, to support flow of knowledge, maximise highly skilled labour, enable knowledge transfer and spillover effects.

The role of the lead entity

Literature on innovation ecosystems emphasises the value of central entities that facilitate collaboration, knowledge flows, and value creation beyond traditional localised or regional clusters.

The role of the lead entity would be to coordinate, oversee, and accelerate innovation involving multiple, sometimes siloed stakeholders: government, industry, researchers, iwi, investors, innovators. The form of the entity would be case specific but can be a dedicated PPP (like AgriZero^{NZ}), an existing or newly created government of business agency, or some other form.

A leading role is important because it prevents fragmented efforts and provides clear signals of long-term demand to innovators through predictable demand (test sites, demonstration opportunities, procurement), coordinated supply-side support (R&D, IP, finance) and regulatory facilitation to accelerate growth opportunities, beyond what would be possible with bottom-up diffusion.

Singapore exemplifies the lead entity model through JTC Corporation, which manages districts like Jurong Innovation (advanced manufacturing with A*STAR)[28] and Punggol Digital (cybersecurity via Open Digital Platform),[29] providing infrastructure, matchmaking, and incentives. Other small, advanced nations like Finland (via Sitra for cleantech ecosystems)[30] and Denmark (agro-food clusters)[31] similarly rely on public agencies as lead entities to drive coordination and innovation.

In New Zealand, AgriZero^{NZ} has already demonstrated how the public and private sectors can establish effective mechanisms involving multiple stakeholders to drive innovation.

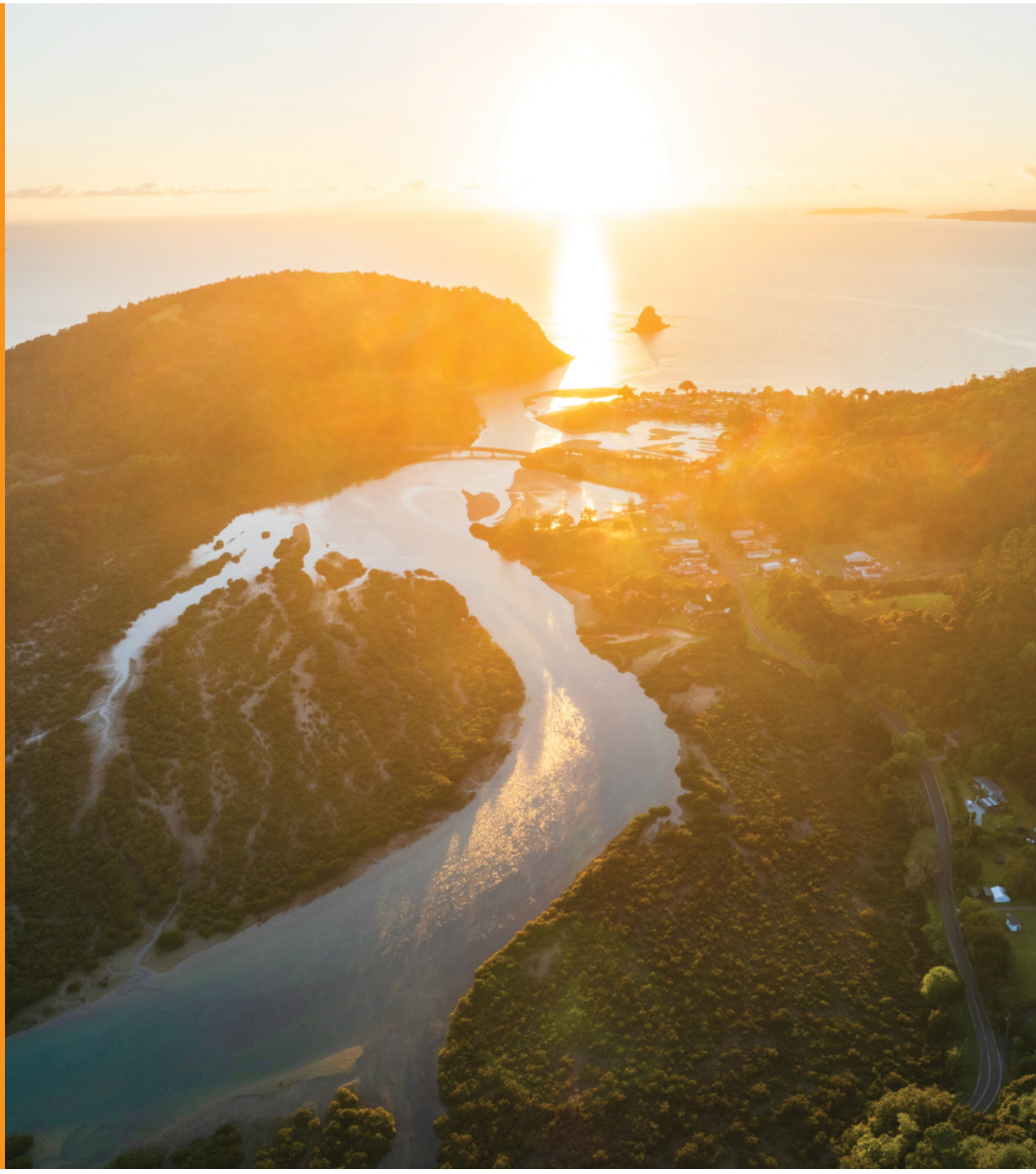
The SBC, leveraging the credentials of the CLC and its membership and its experience coordinating industry collaborations, can play a leadership role (as it did with AgriZero^{NZ}) in initiating such partnerships. Responsibilities for a lead agency could include:

- Scope and define goals, e.g. “decarbonise 50% process heat by 2035" with emissions budgets, KPIs, with agreement of government and private sector stakeholders.
- Identify barriers and enable their removal, including through running regulatory sandboxes, standards development, etc.
- Seek funding and contributions from a wide range of sources, including working with relevant partners to develop financing instruments, with a focus on de-risking investments.
- Be a knowledge broker: Publish ‘what works’ playbooks, host investor summits, and benchmark against international models to drive knowledge spillovers and economies of scale
- Provide international-facing orientation: Seek innovation and investment from overseas as well as domestically. Differentiate NZ firms via premium, low-emission products and green credentials, outpacing commoditised rivals stuck in legacy models.

The following recommendations identify actions for business and government to work together to achieve the economic potential out modelling shows is available to us if we get the roadmap to a more sustainable productive New Zealand right.

07

Recommendations



Action for business

The following sets out our recommendations for action by business and government and how they can work in partnership to achieve the ambition set out in this report.

This report has revealed there is a need for business to step up and show leadership when it comes to developing a shared economic vision for New Zealand. We will do this and work with government and other parties to agree to this shared vision to enable us to commit to long-term economic policies. This new action is:

RECOMMENDATIONS

1. **Lead and advocate for a shared economic vision for NZ:** Businesses should develop and get behind a shared economic vision for New Zealand, advocate for it, and align their capital, capability and leadership around a sustainable business growth model, rather than waiting for perfect certainty from government. This would signal long-term demand for clean energy, digital systems and low emissions input, giving innovators confidence to scale. We have shown this can be done in initiatives like AgriZero^{NZ}, which SBC helped initiate. Another example is the Climate Leaders Coalition – a voluntary grouping of like-minded businesses with a clear focus on productivity.

As we noted earlier in the report, business will continue to take a leadership role when it comes to sustainable economic growth and climate action. The following three points are actions our companies are already taking, and we will look to accelerate this work:

2. **Collaborate and partner to tackle shared bottlenecks:** Evidence indicates that symbiotic partnerships between multiple businesses can create significant benefits. Businesses should deepen collaboration through partnerships, joint ventures and buyer groups that aggregate demand, share infrastructure and standardise specifications to speed deployment and build capability. This is particularly valuable for scaling innovation from pilots to market uptake. To do this, we recommend that businesses form cross-sector collaborations (e.g., transport, energy, digital, logistics) to tackle shared bottlenecks. Business should also continue to actively partner with government to unlock systemic challenges that the private sector alone cannot solve for. This report proposes the establishment of public-private 'clusters' around specific, high potential themes to accelerate progress.
3. **Strengthen resilience to economic and environmental shocks.** Shift to renewable energy sources, particularly for transport and industry heat, signaling long-term economy-wide demand, while reducing exposure to global fuel volatility. Make use of technological advancement, like digital twins and real time monitoring to improve operational efficiency and resilience. Invest in strengthening the physical resilience of critical business assets against extreme weather events. Build geographically diversified, circular and low-waste supply chains to mitigate import dependencies.
4. **Build workforce readiness for a digitised, electrified economy.** Upskill and reskill staff in digital tools, data literacy, automation and process optimisation. Secure talent pipelines aligned with future technologies.

As we have noted in the report, to achieve this step-change in productivity and sustainable growth business needs to work alongside government. The following recommendations are high-level policy recommendations we believe are necessary to unlock the economic prize we have described.

Joint action for business and government

The following recommendations describe the key areas where government and business need to work together to unlock the economic prize we have described in this report.[32]

		RECOMMENDATIONS
PORTFOLIO	ENERGY	**5.** Develop a joint **business-government medium-term action plan for New Zealand's energy system** to create a clear long-term market signal for our future energy mix. A key tenet of the plan should be abundant, affordable renewable energy as a key foundation of New Zealand's economy, enabling economy-wide electrification. The plan would provide clarity to businesses regarding anticipated future energy demand and how it will be sourced, as well as providing greater clarity around energy costs (including identifying gaps that require private or public sector actions). This should be supported by measures to enable continued, rapid acceleration of investment in renewable electricity generation, increase energy efficiency (including accompanying distribution network and grid development), distributed energy, energy storage systems, firming technology and demand-side response.
		6. Establish a **public-private 'energy efficient process heat' partnership** to reduce industrial dependence on imported fuel, unlock electrification and other low carbon sources of energy to serve industrial process heat by converting an ambitious but realistic percentage of existing fossil-based process heat to low carbon, digitally enabled alternatives. This should be supported by scaling up of the Energy Efficiency & Conservation Authority's (EECA) commercial programme to enable co-investment and concessional loans for process heat conversions, energy efficiency measures, low-emissions heavy fleets and batteries. These measures should focus on reducing early adoption risks where financing barriers exist.
	TRANSPORT	**7.** Develop a **public-private national transport fleet resilience plan** to decarbonise our transport system as insurance against future fuel shocks. The plan should consider our transport network as an integrated whole, leveraging the strengths and efficiencies of different modes such as road, rail, shipping and aviation. This should include integrated and **coordinated electrification roadmaps** for heavy freight, rail, light vehicles and public transport, while recognising the potential of alternative fuels. Delivery of the light fleet and public transport aspects of the plan in key centres can be orchestrated by a 'resilient electrified urban transport' partnership. This would integrate NZ's abundant renewables, smart grid tech, and hazard-resilient design into urban ecosystems - enabling real-time energy management, EV integration, and microgrids that outpace fragmented city upgrades. Resilience of the network will be enhanced by ongoing investment into renewals and maintenance of key transport assets (road, rail and coastal) to ensure our networks can handle increasing climate damage, reducing delays and costly repairs. The plan should explicitly harness digital tech for smart charging, vehicle to grid (V2G), fleet optimisation, and demand orchestration and consider options to enable load shifting and affordability (e.g. avoiding peak costs), incentives to scale demand, and supply chain capability or enabling infrastructure barriers.

RECOMMENDATIONS

PORTFOLIO

TRANSPORT

8. Keep New Zealand globally connected and competitive through **maintaining pace with international expectations for sustainable fuel use in aviation and shipping.** Specifically, industry and government should partner to:

- Build on the SAF Industry Roundtable's and work with international partners to support NZ actual or virtual access to more efficient aviation fuels and technologies.
- Cooperate with Australian Government and industry to establish a green shipping corridor.

SCIENCE, INNOVATION AND TECHNOLOGY

9. Establish a **long-term innovation plan** focused on scale up and commercialisation of New Zealand-originated research, moving solutions from formation stage towards acceleration and rapid growth.

Key tenets of the plan should include:

- Incentivising New Zealand innovation and growth companies/technologies to stay on shore, so we reap the benefits of our investment (e.g., provide R&D tax credits for innovation in target sectors, like agritech and digital transport, and boost patient capital ecosystem).
- Continuing to use targeted initiatives to push proven solutions past the tipping point: Government should deploy focused policy and investment levers to accelerate proven technologies from acceleration into rapid growth, including clear sector roadmaps, stable policy signals, concessional finance and co-investment programmes for innovation that support the plans and clusters identified above and below.

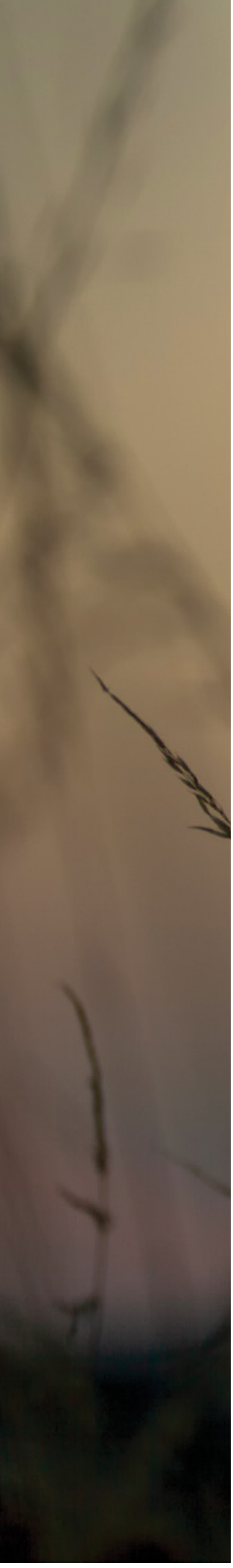
CLIMATE CHANGE

10. Improve the effectiveness of the New Zealand Emissions Trading Scheme (NZ ETS) to ensure it plays its part by setting a strong and predictable market-based carbon price that creates the incentives necessary for decarbonisation while delivering productivity gains.

This could be achieved by exploring the concept of an NZU price pathway forecast that links the NZU price to achieving the above policies and then requires any ETS reviews or policy/setting changes to be assessed against impacts on that NZU price pathway.

This set of 10 recommendations make up the roadmap for how New Zealand can lift its productivity and sustainable growth and achieve the economic opportunities this report has identified.

We look forward to working with government to develop and action these recommendations.



Glossary

ABBREVIATION / TERM	MEANING
AI	Artificial Intelligence
CLC	Climate Leaders Coalition
ESG	Environmental, Social and Governance
NZ ETS	New Zealand Emissions Trading Scheme
EU	European Union
EV	Electric Vehicle
FTA	Free Trade Agreement
GDP	Gross Domestic Product
GHG	Greenhouse gas
IoT	Industrial Internet of Things
OECD	Organisation for Economic Co-operation and Development
R&D	Research and development
SAF	Sustainable Aviation Fuel
SBC	Sustainable Business Council
SME	Small and medium-sized enterprises
tCO_2e	Tonnes of Carbon Dioxide equivalent
V2G	Vehicle-to-grid

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SBC and Climate Leaders Coalition (CLC) member Case Study Contributors:

- Chorus
- Christchurch International Airport
- DB Breweries Ltd. & Pioneer Energy
- Enviro NZ Services
- Genesis Energy and ChargeNet NZ
- Meridian Energy
- Ngāti Whātua Ōrākei
- Pāmu Landcorp Farming
- Port Nelson
- Toyota New Zealand

Other SBC member contributors:

- Air New Zealand
- AgriZero^{NZ}
- ASB Bank
- Auckland Council
- Auckland Transport
- AUT: Auckland University of Technology
- Fletcher Building Ltd. & The Golden Bay Cement Company
- Fonterra
- Kantar Insights New Zealand
- New Zealand Steel
- Silver Fern Farms
- Synlait Milk
- The Todd Corporation
- Transpower New Zealand
- Westpac Banking Corporation
- Woolworths NZ

Non-Member Contributors:

- EV Maritime
- Hayes Metals
- MacDiarmid Institute

About SBC

The Sustainable Business Council (SBC) is a CEO-led membership organisation of more than 125 businesses from all sectors, ambitious for a sustainable Aotearoa New Zealand. Members represent more than $175 billion of collective turnover, 42 per cent of GDP, and around 275,000 full-time jobs. Our network gives members the ability to take large-scale collective action. SBC is part of the BusinessNZ network and is the Aotearoa New Zealand Global Network partner to the World Business Council for Sustainable Development.

www.sbc.org.nz/about/our-members/sbc-members

About CLC

Formed in 2018, the Climate Leaders Coalition has a mission of having New Zealand business CEOs leading the response to climate change through collective, transparent and meaningful action on mitigation, adaptation and transition. Together their signatories represent 30% of GDP, employ around 9% of Aotearoa New Zealand's full-time employees, and have a collective turnover of $123 billion.

www.climateleaderscoalition.org.nz

About Beca

Beca, one of Asia Pacific's largest independent advisory, design, and engineering consultancies, is a member of SBC. Founded and headquartered in New Zealand for over 105 years, and employee-owned, Beca designs, creates and optimises assets and infrastructure to build a better future for clients and communities across Aotearoa New Zealand.

With sustainability at the heart of this kaupapa, we are passionate about the big picture, and delivering the social, environmental and economic outcomes needed for a more resilient, and prosperous tomorrow.

We understand the most positive impact we can have today is by working with our clients, our people and our communities – to achieve sustainable and prosperous outcomes for our planet tomorrow. This deep connection with people and place over so many years helps inform a truly holistic and learned approach to our work - kiawhakatōmuri te haere whakamaua

About Sapere

Sapere is one of the largest expert consulting firms in Australasia, and a leader in the provision of independent economic, forensic accounting and public policy services. We provide independent expert testimony, strategic advisory services, data analytics and other advice to Australasia's private sector corporate clients, major law firms, government agencies, and regulatory bodies.

'Sapere' comes from Latin (to be wise) and the phrase 'sapere aude' (dare to be wise). The phrase is associated with German philosopher Immanuel Kant, who promoted the use of reason as a tool of thought; an approach that underpins all Sapere's practice groups.

We build and maintain effective relationships as demonstrated by the volume of repeat work. Many of our experts have held leadership and senior management positions and are experienced in navigating complex relationships in government, industry, and academic settings.

We adopt a collaborative approach to our work and routinely partner with specialist firms in other fields, such as social research, IT design and architecture, and survey design. This enables us to deliver a comprehensive product and to ensure value for money.

Appendix 1

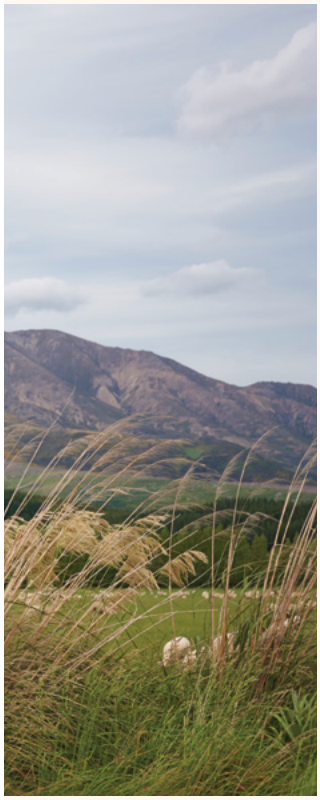
Case studies

Appendix 1

Case studies

Case Study

i. A partnership toward Zero-Emission Transport – Genesis Energy Ltd. and ChargeNet NZ Ltd.



ChargeNet one of New Zealand's largest EV fast-charging companies focused on the transformation of transport to cleaner energy. Following step-change growth in EV ownership (more than140,000 EVs and plug-in hybrids now on the roads) ChargeNet has delivered over 40.5 million kWh of EV charging and more than three and a half million charging sessions in the last decade.

ChargeNet's growth has been catalysed by a combination of private funding, grass-roots innovation, government co-funding and institutional investment. ChargeNet built on initial private investment by leveraging EECA co-funding (Low Emission Vehicles Contestable Fund) to accelerate the installations of charging points.

The rapid acceleration of New Zealand's charging network is creating valuable economic ripple effects. Electrification is supporting greater national energy independence and optionality. In 2024 domestic transport used over 4,200 kt of petrol and diesel[33]. With domestic fossil fuel needs met by import, the accelerated uptake of EVs represents an on-going opportunity to positively adjust NZ's balance of trade and re-allocate billions towards other national priorities. As fossil fuel infrastructure ages this shift also offers greater optionality in achieving a smooth replacement of critical infrastructure. At a household level, ChargeNet's growth is lowering travel costs.

Supporting the electrification of NZ's transport systems, and realising the economic benefits of electrification, requires coordinated attention on infrastructure development and dynamic participation in the energy supply system. Underwriting ChargeNet's growth is the on-going development of grid-scale renewable energy generation and action by lines companies to improve the ability to, and ease of, making network connections. Recently ChargeNet collaborated with Vector to pilot a new approach to dynamic load management. This ultimately enabled ChargeNet to offer greater energy supply to customers without creating additional upgrades for Vector. With variations in the useful life of different energy and charging assets, flexibility to up/down-scale capacity and lift-and-shift assets to match demand, is also important. Faster piloting and replication will help scale such initiatives. Alongside private and institutional investment, the Government is a key partner in seeding early-stage investments in critical infrastructure and innovations like this - what matters is investors' patient capital, a long view on the intergenerational value of infrastructure.

Case Study

ii. Rearing Surplus Dairy Calves for Beef Production (Dairy Beef Integration) – Pāmu Landcorp Farming Ltd.

Pāmu is transforming its dairy operations by integrating dairy beef production, rearing surplus dairy calves for high value beef rather than early slaughter, lifting calf retention from 49% in FY23 to a forecast 72% in FY26 and targeting 85% by FY28.

By shifting to dual purpose genetics, using superior beef sires and selective artificial insemination, and standardising calf rearing systems across farms, Pāmu has materially increased the proportion of calves reared and converted a former low value byproduct into productive beef supply. The development of specialist rearing capability and consistent operating practices has reduced system bottlenecks, improved throughput, and enabled rapid scaling, delivering a more efficient use of existing dairy assets while strengthening on farm profitability and supply chain resilience.

The initiative also delivers wider animal welfare and environmental benefits, reducing reliance on early bobby calf slaughter and improving lifetime productivity. It strengthens national beef supply, demonstrated by the uplift of more than 10,000 additional dairy beef calves reared in the Lower North Island in FY25. Supported by a collaborative venture with LIC and Focus Genetics, which is creating a breeding programme to supply purpose bred, high performing dairy beef genetics. The programme accelerates industry knowledge transfer and breeding improvement, while research shows dairy beef systems achieve 22–43% lower emissions and a 32–48% lower carbon footprint than traditional beef systems, contributing to a more sustainable, resilient and low carbon farming model.

Case Study

iii. Design & Commissioning of Electric Ferries for Inner Harbour Routes - EV Maritime Ltd.

EV Maritime are designing and commissioning electric commuter ferries, so that operators can replace diesel ferries with battery-electric vessels, improving operational efficiency and supporting the shift toward a lower-emissions maritime transport system.

Over a 25-year life cycle, electric ferries require higher upfront investment, but they deliver lower operating costs due to reduced energy consumption and maintenance needs, compared with hybrid or diesel vessels. As more operators adopt battery electric propulsion, the efficiency and emissions benefits scale across entire fleets, and charging infrastructure becomes more cost effective as it is shared among more vessels.

The secondary benefits of electric ferries are that they remove emissions and improve energy efficiency, contribute to better air quality in coastal areas, provide a low emission transport option for commuters, and support national emissions-reduction objectives. Each electric ferry avoids an estimated NZ$9 million per year in pollution related costs, including those associated with CO_2, NOx, and SOx emissions.

Case Study

iv. Installation of ground source heating and cooling in airport terminal building - Christchurch International Airport Ltd.

Christchurch International Airport Limited has replaced its diesel-based heating and cooling systems with ground source heat pumps, creating a more efficient, low emissions solution for terminal operations and delivering major productivity gains through lower operating costs and strengthened decarbonisation capability.

The shift to ground source heat pumps has generated significant economic efficiency improvements by removing reliance on fossil fuel systems and substantially reducing both operating and maintenance costs. The upgraded infrastructure avoids around 900 tonnes of CO_2 each year and has delivered a faster than expected return on investment through lower energy use, simplified maintenance, and the retirement of diesel, LPG, and associated water treatment systems, collectively saving around half a million dollars annually in operating and maintenance costs. Forward modelling shows that the system provides stronger payback and higher efficiency than conventional boilers and chillers.

Beyond direct financial gains, the programme delivers important secondary benefits that strengthen environmental performance, operational resilience, and community value. The new heat pump system has contributed to reducing Scope 1 and 2 emissions by approximately 93 percent from the baseline year, while also improving system reliability and reducing maintenance needs. By eliminating fossil fuel heating infrastructure, the airport has increased the availability and efficiency of its energy resources and reduced waste associated with legacy systems. The installation of visible, proven low emissions technology also provides broader community value by demonstrating practical decarbonisation pathways for other organisations. Operational safety and continuity are maintained through a fit for purpose design with redundancy and built in capacity to manage extreme weather conditions, ensuring uninterrupted airport operations.

Case Study

v. Landfill Gas Capture Programme – Enviro NZ Services Ltd.

Enviro NZ Services Landfill Gas Capture and Process Engineered Fuel (PEF) Programme expands methane recovery by converting it into an alternative fuel that replaces coal, delivering efficiency and productivity gains by reducing long-term operating costs and strengthening the resilience of resource supply.

Staged investments over more than two decades have enabled continuous improvements in landfill gas capture, including new gas wells, enhanced destruction technology, and upgraded operational systems. These improvements have led to a substantial reduction in emissions-related operating expenses and strengthened cost resilience by improving the efficiency of production processes and shifting waste from disposal into higher-value circular use. Although each investment requires moderate capital outlay, the scale of savings achieved demonstrates a consistently favourable return on investment and contributes to more stable long-term productivity.

The initiative also delivers strong secondary benefits that reinforce operational performance and environmental outcomes. Enhanced capture systems now achieve more than 90 percent methane-capture efficiency, enabling significant reductions in Scope 1 emissions and supporting Enviro NZ's broader decarbonisation commitments. The conversion of waste into PEF increases material recovery and diversion, reduces odour impacts, and supports a more circular resource system. These environmental and social gains improve community confidence and highlight wider opportunities to scale sustainable resource recovery practices across New Zealand.

Case Study

vi. Process Engineered Fuel (PEF) – Enviro NZ Services Ltd.

Enviro New Zealand's PEF Waste-to-Fuel Plant in Pōkeno converts hard-to-recycle plastics and other residual materials into Process Engineered Fuel (PEF), replacing coal in industrial processes and delivering major productivity gains by circularising waste streams, strengthening domestic fuel resilience, and enhancing product differentiation for both Enviro NZ and its industrial partners.

The initiative increases economic efficiency by transforming materials that previously had no viable recycling pathway into a valuable, locally manufactured energy product. By producing PEF as a domestic alternative to imported coal, the plant reduces long-term disposal costs, provides a stable supply of manufactured fuel, and improves resource availability for users such as Golden Bay Cement. Although the initial pilot required higher upfront capital and operational costs, transitioning to full-scale production demonstrates a clear pathway toward improved efficiency over time. The ability to replace coal on a one-for-one basis also reduces exposure to carbon-related costs, supports more predictable energy supply, and strengthens overall system resilience by sourcing fuel within New Zealand rather than relying on international markets.

Beyond core economic benefits, the initiative generates important secondary gains that support environmental performance and operational efficiency. By utilising hard-to-recover materials that would otherwise be landfilled, the Pōkeno plant contributes to significant waste diversion and reduces pressure on landfill capacity. Converting residuals into an industrial fuel enhances resource circularity, supports lower emissions through coal displacement, and extends the useful life of existing waste infrastructure. These benefits reduce maintenance demands across the waste system, improve whole-of-system efficiency, and demonstrate a scalable pathway for more sustainable long-term resource management across New Zealand industries.

Case Study

vii. Leadership to innovate sustainable materials - MacDiarmid Institute

The MacDiarmid Institute is a Centre of Research Excellence, a national network of innovators, scientists and entrepreneurs united around materials science and new technology. Working with five universities and GNS Science, the Institute aims to "collaborate to bring innovations to the marketplace where they can help address the big problems of our time and contribute to the New Zealand economy." Current focus areas gravitate around major global challenges, including clean water, renewable energy and climate change - all funding through the Centres of Research Excellence (CoRE) initiative by the Tertiary Education Commission (TEC).

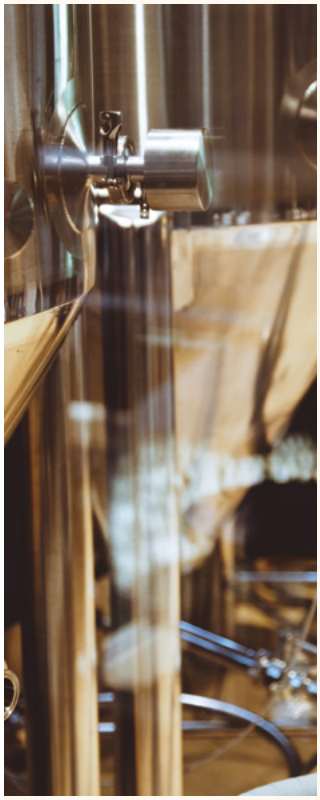
To deliver on its mission the Institute offers a suite of programmes and scholarships that build scientific capability, enable commercialisation and strengthen pathways between academia and industry. These include:

- Funding 3-6 month internships with New Zealand businesses, NGOs, and government agencies provide graduates with hands on experience solving real industry challenges while developing professional competencies;
- Career and Relevant-to-Industry Skills Programme (CRISP): Hosting workshops to support professional development of (post-doctoral) students;
- Biannual seed funding to support early-stage commercial ideas and help researchers progress concepts toward real world application;
- Research Assistant (Post PhD) Funding: Funding for Research Assistants (RAs) allows recent graduates to continue contributing to research, while building specialised skills that support innovation activity; and collaborating with the NZ Cleantech Mission, to co-author the New Zealand Cleantech Report 2024: Profiling the New Zealand Cleantech Sector.

By financially supporting innovators and researchers, embedding them into the clean-tech ecosystem, and supporting skills development, the Institute is a fulcrum for clean-tech acceleration and fostering a national culture of innovation.

Case Study

viii. Washdyke Brewery Steam Generation – DB Breweries Ltd. & Pioneer Energy Ltd.



DB Breweries (DB) and Pioneer Energy have partnered to replace coal-fired steam generation at the Washdyke brewery with 100% biomass-derived, reticulated steam, delivering major efficiency gains by avoiding new boiler investment, streamlining operations, and significantly improving emissions performance and energy security.

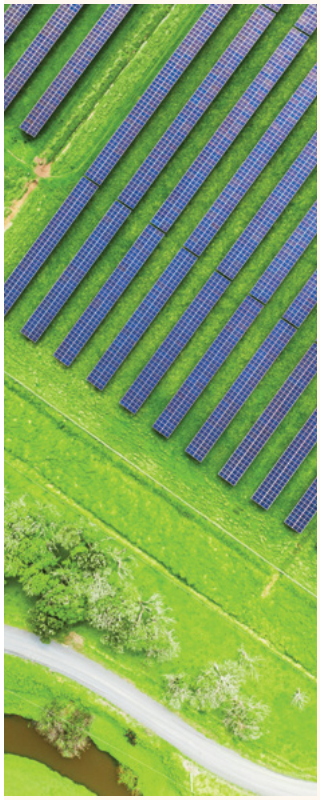
The fuel switch provides strong economic efficiency benefits by eliminating coal procurement and handling, avoiding the need for DB to own or operate a new biomass boiler, and securing a stable renewable steam supply from Pioneer Energy.

DB gains lower maintenance requirements, a materially reduced carbon footprint, and protection from rising fossil-fuel costs. The transition contributes to a 78% reduction in the site's emissions profile, with steam emissions falling by approximately 98%. The shift also aligns with DB's decarbonisation ambitions to reduce gross scope 1 and 2 carbon emissions and be net zero in production by 2030.

The partnership also delivers important secondary gains. Outsourcing steam generation allows DB to focus on core brewing operations, while Pioneer's growing biomass network creates efficiencies as more users join, lowering long-term energy costs and enhancing regional energy resilience. The model has already influenced neighbouring industrial park businesses, including McCain's, creating a local decarbonisation ripple effect. Strengthened resource availability and improved operational reliability further reinforce this as a scalable model for low-carbon industrial heat transitions across New Zealand.

Case Study

ix. Ruakākā Energy Park – Meridian Energy Ltd.



Meridian Energy is developing the Ruakākā Energy Park, a renewable energy project that combines a 100 MW maximum output (200 MWh storage capacity) battery energy storage system (BESS) with a 130 MW solar farm.

Meridian Energy is New Zealand's largest generator of electricity, all from renewable sources, and also one of the country's leading electricity retailers. Its generation portfolio includes hydro, wind, and an expanding range of solar and BESS assets. Through this integrated approach, Meridian further strengthens its offering by providing renewable electricity certificates that match a customer's energy use with an equivalent volume of renewable electricity supplied by Meridian to the New Zealand grid.

Investing in the Ruakākā Energy Park assets will strengthen Northland's energy security, reduce reliance on supply from the south, and support New Zealand's transition toward a resilient, renewable and net zero electricity system.

The BESS and solar components of the Energy Park deliver strong productivity and economic benefits. By sharing key infrastructure across both components, the development avoids duplicated construction costs and improves the overall investment profile of the solar component. The battery system also enhances portfolio performance by reducing the need for expensive thermal peaking generation during high demand periods and reducing reliance on long-distance electricity transfers.

Beyond energy and economic gains, Ruakākā is being designed as an environmentally restorative project. Wetland and habitat enhancement work supports local taonga species and improves water quality in alignment with iwi environmental values. The planned solar farm includes significant ecological restoration, including a new wetland to filter stormwater before it reaches nearby rivers.

Case Study

x. Crane Electrification – Port Nelson Ltd.

Port Nelson's Dual-Drive Crane and Wharf Electrification Project replaces an end-of-life diesel crane with an electric-diesel hybrid Dual-Drive unit and upgrades key wharf infrastructure, delivering operational efficiency gains, fuel savings, and a step-change in the Port's long-term decarbonisation pathway.

Electrifying crane operations unlocks substantial economic benefits for the Port. Cranes represent around 28% of Port Nelson's total fuel consumption, meaning the shift to electric-diesel hybrid technology provides immediate and ongoing fuel cost savings. The new Dual-Drive crane offers greater versatility, improved reliability, and higher asset utilisation, reducing downtime and boosting overall operational performance. Lifecycle analysis also shows a lower cost of ownership: where the mid-life overhaul costs of the crane fall will be significantly less for an electric crane compared to a diesel crane, strengthening the Port's long-term financial position.

The project also delivers important wider benefits, including a reduction in scope 1 emissions and strong alignment with Port Nelson's broader decarbonisation strategy. Electrifying the wharf infrastructure through new transformers, switchboards, cabling, and power connection points, supports the development of a modern, low-emissions Port. In addition, the introduction of a 400-volt electric crane system (the first 400-volt electric crane system in Australasia) further enhances the Port's environmental performance and supports more sustainable operational practices.

Case Study

xi. Low-emissions transport through Hiko - Ngāti Whātua Ōrākei

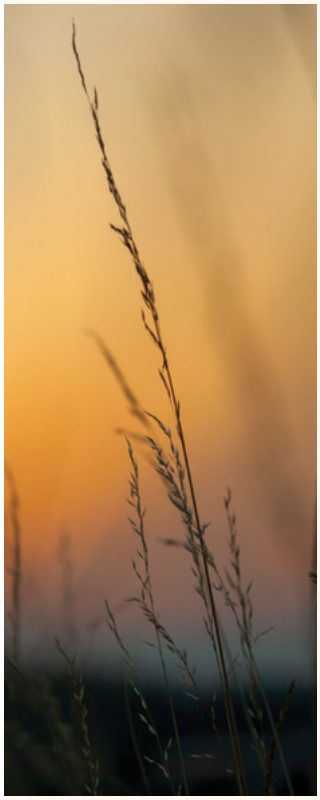
Ngāti Whātua Ōrākei is accelerating its transition to low-emissions transport through Hiko, a papakāinga decarbonisation initiative grounded in tikanga. The shared electric vehicle programme makes clean mobility accessible for whānau, replacing petrol trips with affordable, reliable EV travel that supports everyday needs across work, school and community life. To date the programme has already saved over 50 tonnes of CO_2e.

Hiko has become a practical expression of kaitiakitanga, enabling whānau to use electric vehicles without the burden of upfront costs. The cars are used daily for mahi, kura, sports and community activities, demonstrating that low-emissions transport can be both dependable and cost-saving. For many whānau, the programme has reduced weekly expenses while showing that sustainable choices can enhance, rather than disrupt, daily living.

Beyond transport, the wider programme is reshaping how the community lives with and cares for its environment. Regenerative papakāinga design integrates housing, energy and transport systems, while ecosystem restoration supports taonga species and improves water quality. These initiatives reduce long-term costs, strengthen resilience to climate and fuel volatility, and reflect the values of kaitiakitanga, whanaungatanga and tūrangawaewae at the heart of Ngāti Whātua Ōrākei's long-term strategy.

Case Study

xii. Ko Te Pūkākī: 2040: Taiao Regeneration Blueprint - Ngāti Whātua Ōrākei



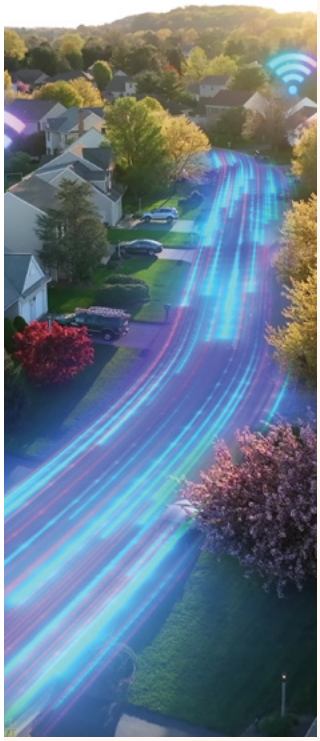
Ko Te Pūkākī: 2040 is Ngāti Whātua Ōrākei's long term taiao regeneration plan. It is designed to regenerate a thriving taiao by building resilience into natural and cultural systems. Ko Te Pūkākī: 2040 allows for the growth of the environment and the growth of their people, all while improving economic efficiency by reducing long term infrastructure, remediation, and climate related costs. It positions environmental regeneration as core infrastructure, rather than something that is optional, enabling disciplined planning and measurable gains in resilience and productivity.

Ko Te Pūkākī: 2040 also delivers cultural, environmental and social benefits that reinforce long term resilience. The programme restores native biodiversity, supports the return of kai, rongoā and materials, and enables whānau to actively participate in caring for te taiao. Regeneration is framed as an expression of mana motuhake and reconnects ecological restoration with cultural landscapes, mātauranga Ngāti Whātua Ōrākei, and identity, strengthening wellbeing, social cohesion, and intergenerational continuity.

The plan also strengthens economic value by protecting and enhancing natural capital that underpins place-based prosperity. Healthy ecosystems lower flood risk, improve water quality, support biodiversity and kai systems, and reduce the need for costly engineered solutions or future remediation. By embedding measurement, timelines and quality assurance, the programme reduces delivery risk and ensures investment decisions are informed, consistent, and scalable, resulting in more efficient use of resources over time.

Case Study

xiii. Ultra-Fast Broadband – Chorus Ltd.



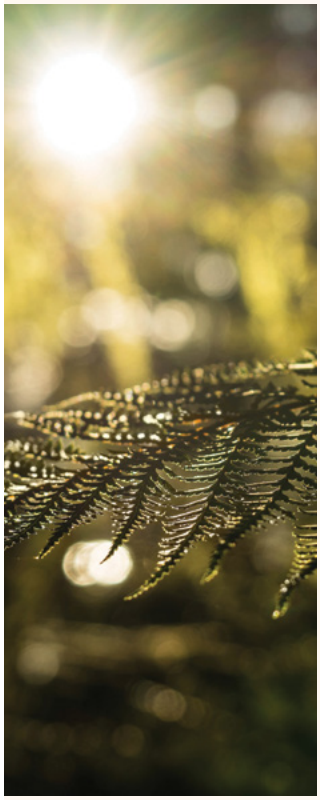
The Ultra-Fast Broadband rollout led by Chorus alongside Local Fibre Companies (LFC) was a nationwide programme to deliver highspeed broadband to more New Zealanders, providing faster, more reliable, and more energy efficient connectivity that has already translated into major national productivity gains.

The transition to Ultra-Fast Broadband has delivered substantial economic value for New Zealand. Between 2012 and 2023, productivity benefits from digital fibre infrastructure added $31 billion to New Zealand's GDP, with $8.8 billion of that in 2023 alone. Ultra-Fast Broadband drives productivity by enabling widespread digital adoption across households and businesses. Stronger broadband uptake is associated with higher GDP performance, and the reliability and capacity of fibre support cloud adoption, digital tools, and modern business models. As a result, businesses increasingly depend on fast, stable fibre connections to innovate, participate in global markets, and operate more efficiently.

Beyond its economic impact, Ultra-Fast Broadband delivers clear environmental and social advantages. It uses significantly less energy per user and requires fewer powered roadside components, making it a more sustainable technology than copper or fixed wireless systems. Fibre's passive design improves resilience, with fewer elements generally less vulnerable to storm related issues or flooding and much lower susceptibility to water related faults. Socially, fibre enhances digital equity by extending access to reliable highspeed connectivity and essential services, such as health, education, employment, banking, and government services, that are increasingly shifting online.

Case Study

xiv. Building Supply Chain Resilience Through Circular Economy Initiatives - Toyota New Zealand Ltd.



Toyota New Zealand is actively advancing supply chain resilience by embracing circular economy principles and collaborating with product stewardship schemes. The company's commitment to sustainable vehicle lifecycle management is evident through its dedicated efforts in recycling and repurposing vehicle components, and establishing closed-loop systems for hybrid batteries, tyres, and plastics. These initiatives ensure that valuable materials are retained within the supply chain, reducing reliance on virgin resources and increasing adaptability in the face of global disruptions.

A central focus has been battery recycling. Since the introduction of its first hybrid vehicle, the Prius, in 2003, Toyota NZ has witnessed a significant rise in hybrid battery volumes, making battery recovery and recycling a core part of its strategy. In early 2025, Toyota NZ partnered with Phoenix Recycling Group to process end-of-life nickel metal hybrid (NiHM) batteries locally. These batteries are dismantled in New Zealand and then shipped to Japan, where Toyota Tsusho, Toyota's material handling division sorts and refines the materials. The recovered resources are integrated back into the manufacturing process for genuine Toyota parts or repurposed for new products, exemplifying a robust closed-loop system that strengthens the supply chain by mitigating material shortages and reducing exposure to international market volatility.

Drawing on its experiences with NiHM battery recovery, Toyota NZ is now prioritising the lifecycle management of large lithium-ion Hybrid and EV batteries as these technologies become more prevalent in the New Zealand market. By proactively developing recycling and repurposing pathways, Toyota NZ ensures the continuity and resilience of its supply chain, supporting both environmental sustainability and economic efficiency. This approach positions Toyota NZ as a leader in sustainable mobility, demonstrating that supply chain resilience and circular economy practices can go hand-in-hand to deliver long-term value for business and community.

Appendix 2

The national imperative: demonstrating the link between case study microeconomic actions and modelled macroeconomic benefits

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The national imperative: demonstrating the link between case study microeconomic actions and modelled macroeconomic benefits

Our review of international practices and research papers indicated that there is a strong link between sustainability and climate action, and productivity. Using case studies from a range of business types and industry sectors we have sought to understand whether there is a similarly strong link in New Zealand.

To do this we have examined specific projects and actions being taken at the business level (micro), and how they might extend sector wide, collectively impacting New Zealand's GDP (macro). The macro view has been informed via Computable General Equilibrium (CGE) modelling based on learnings and data (where available) provided by case study participants.

To help frame the contribution the projects and innovations identified through case studies are making to the wider economy (and to support the macro-economic modelling) the case studies were initially mapped to their primary productivity channel, and then broadly grouped into sectors. These include:

- Agricultural exports
- AgriTech (digital) genetics
- Advanced manufacturing, construction, and infrastructure
- Process heat, renewable energy & electrification
- Zero emission transport, and
- Tourism

The figure below illustrates the mapping to channels and sectors. In several instances case studies could be mapped to more than one channel. Where this has occurred, we have tended to align to the more dominant channel.

For each sector, we show how the case studies can be linked to productivity and economic outcomes. This sector-by-sector approach allows us to highlight potential wider opportunities and implications for market access, compliance with international standards, and long-term business resilience.

PRODUCTIVITY CHANNEL	SUSTAINABLE GROWTH BUSINESS	GDP IMPACT MECHANISM
RESILIENCE	• DB Breweries + Pioneer Energy	*Process Heat, Renewable Fuels & Electrification*
	• Ngāti Whātua Ōrākei	*EV Transport*
	• Meridian Energy Ltd	*Process Heat, Renewable Fuels & Electrification*
	• Chorus	*Advanced Manufacturing & Construction*
	• NZ Steel	*Process Heat, Renewable Fuels & Electrification*
PRODUCT DIFFERENTIATION	• EV Maritime Ltd	*EV Transport*
	• Air New Zealand	*Tourism Market Growth*
	• TR Group	*Process Heat, Renewable Fuels & Electrification*
	• NZ Steel	*Process Heat, Renewable Fuels & Electrification*
	• Pāmu Landcorp Farming Ltd	*Avoided Loss of Agricultural Exports*
	• Enviro NZ Services Ltd	*Process Heat, Renewable Fuels & Electrification*
COST REDUCTION	• Meridian Energy Ltd	*Process Heat, Renewable Fuels & Electrification*
	• Port Nelson	*Process Heat, Renewable Fuels & Electrification*
	• Pāmu Landcorp Farming Ltd	*Agritech*
	• DB Breweries + Pioneer Energy	*Process Heat, Renewable Fuels & Electrification*
	• Christchurch International Airport	*Process Heat, Renewable Fuels & Electrification*
	• Enviro NZ Services Ltd	*Process Heat, Renewable Fuels & Electrification*
	• The MacDiarmid Institute	*Agritech + Advanced Manufacturing & Construction*
	• Ngāti Whātua Ōrākei	*EV Transport*

AGRICULTURAL EXPORTS

New Zealand's agricultural export businesses and organisations we spoke to are increasingly investing in initiatives to maintain access to their existing markets as well as opening access to new ones.

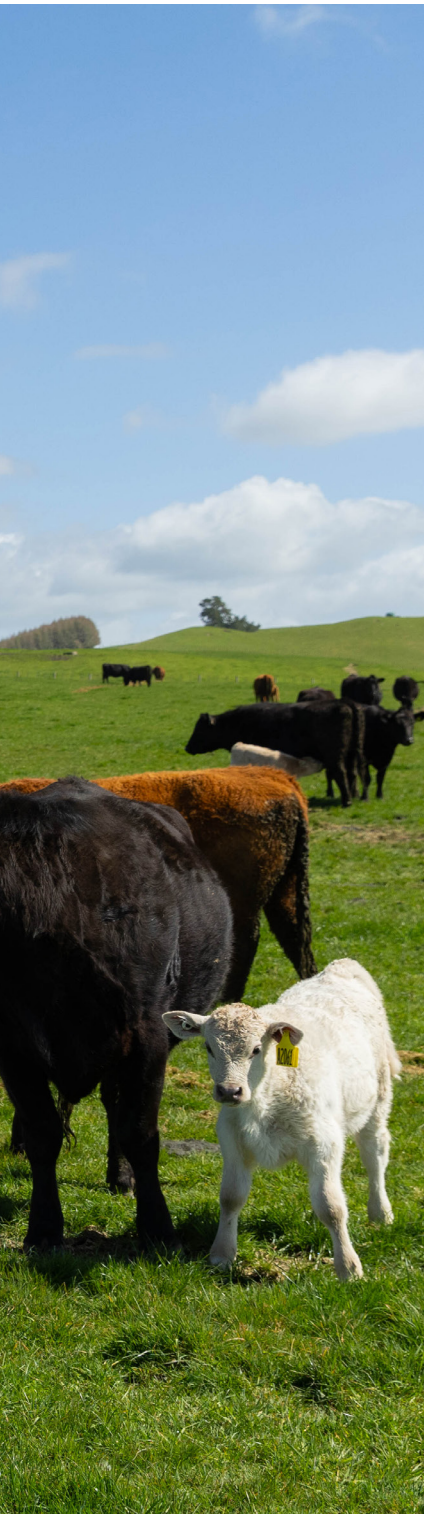
The prevalence of trade related mechanisms is increasing in many of our export markets. Although these mechanisms vary in their design, they all seek to safeguard nations' domestic and international commitments (i.e. Paris Agreement) and make imported goods subject to the same environmental, climate, and social standards that apply to domestical produced products.

Trade related mechanisms present both a risk and an opportunity to New Zealand's economy. As an export reliant nation there is a significant risk that we lose access to established markets as other nations gain competitive advantage over New Zealand by decarbonising faster, improving sustainability credentials, or just by simple factor of geographic proximity. The mitigating factors to these risks can extend beyond the control of individual businesses in New Zealand. For example, the value chain to take New Zealand goods to market is reliant on the national energy needed to produce or yield goods, transport networks and their supporting infrastructure. In addition, the size of New Zealand can mean that parts of the value chain are virtually monopolised, meaning that some risks cannot be mitigated unless we make changes together.

From an economic perspective, this suggests there is significant impetus for New Zealand to act to avoid losses from diminishing market access, competitive disadvantage, and declining export premiums as global standards around sustainability and decarbonisation become more stringent.

Some organisations we spoke to have a perception that New Zealand was already behind other countries and were concerned about NZ's ability to keep up and maintain access to overseas markets. In other words, the sustainability credentials of other export nations are on a faster improvement trajectory.

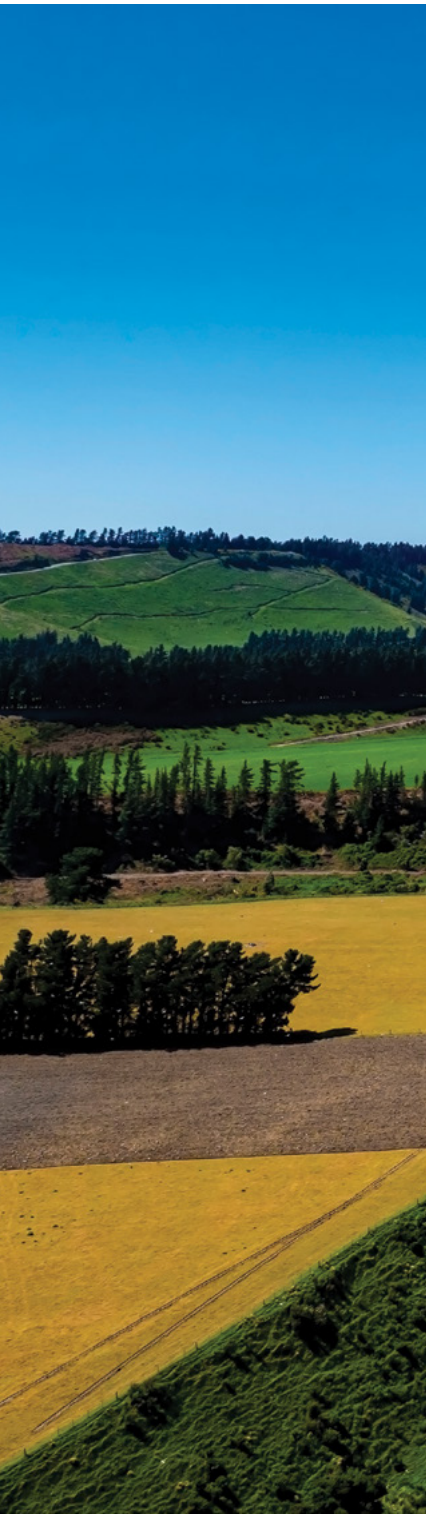
Despite the risks, New Zealand is well placed to capitalise on the opportunities presented by trade related mechanisms, and case studies we looked at did show that New Zealand companies are taking advantage of this already. We know the potential that already exists with our high proportion of renewable energy, and that this gives us a significant head start in terms of decarbonisation. However, as noted above if we are laggards across the value chain, this can turn a competitive advantage into a disadvantage.



Pāmu Landcorp Farming Ltd. provided an example of the opportunity that sustainable product differentiation can have. Across its farms, Pāmu is implementing a farm sustainability assurance programme – the New Zealand Farm Assurance Programme (NZFAP). This enables the company to offer sustainability-assured export products that command a premium in overseas markets.

Furthermore, the implementation of NZFAP and NZFAP Plus has driven improvements in farm management practices, particularly in environmental stewardship, animal welfare, and traceability. These standards not only enhance compliance with international market requirements but also foster a culture of continual improvement among farm staff. As Pāmu continues to expand its accreditation across more farms, the company can leverage its sustainability credentials to negotiate better terms with buyers and strengthen relationships with key export partners.

This approach demonstrates how a robust, accredited sustainability assurance system can translate directly into both operational and commercial advantages. By aligning with evolving global standards and responding proactively to market demands, Pāmu is setting a precedent for New Zealand's primary sector by showing that sustainability and profitability are not mutually exclusive but can be mutually reinforcing when embedded strategically within business operations.



AGRI-TECHNOLOGY

Two case studies we looked at demonstrate New Zealand's strengths in innovating and developing in the agricultural technology sector. Agri technology includes both physical innovations (such as improved genetics, precision equipment, and biological interventions) and digitally enabled approaches (such as data analytics, modelling, sensors, automation, and decision support systems) that allow agricultural inputs and processes to be applied more precisely and effectively.

AgriZero^{NZ}, a public-private partnership setup in 2023 to help farmers reduce emissions without compromising productivity or profitability, demonstrates how innovation can support New Zealand's agricultural sector across all three productivity channels with a focus on retaining global market access.

AgriZero^{NZ} operates as a innovation and commercial accelerator, with an ambition to ensure all farmers in Aotearoa have equitable access to affordable, effective solutions to reduce biogenic methane and nitrous oxide emissions, with a goal of supporting a 30% reduction by 2030 and enabling development and adoption of solutions to drive towards 'near zero' by 2040.

Its purpose is to undertake targeted investments and actions to accelerate development, commercialisation and/or deployment of effective and affordable solutions that will be used by New Zealand farmers and others to significantly reduce emissions.

This a proactive response to market forces, rather than a reactive approach which have tended to be the key drivers in many other case studies examined.

We can see entities like AgriZero^{NZ} contributing to sector and national productivity in several ways:

1. Direct potential productivity gains enabled through innovation that have a co-benefit of emissions reduction.
2. Supporting New Zealand producers to meet rising international sustainability and supply chain expectations, enabling ongoing access to premium customers and markets.
3. Commercial deployment and global export of mitigation technologies for agriculture.

Pāmu Landcorp Farming Ltd provides a further example of how agri technology and system level innovation can lift productivity in New Zealand's primary sector. Through its dairy beef integration programme, Pāmu has transformed the management of surplus dairy calves, shifting from early slaughter toward rearing calves for high value beef production. This change has lifted calf retention from 49 percent in FY23 to a forecast 72 percent by FY26, with a target of 85 percent by FY28.

At the core of the programme is the application of genetics, reproductive technology, and standardised operating systems to convert a former low value by product into productive output. By adopting dual purpose genetics, using superior beef sires through selective artificial insemination, and standardising calf rearing systems across farms, Pāmu has reduced system bottlenecks and improved throughput. These changes enable more efficient use of existing dairy assets, lower per unit production costs, and support scalable growth without proportional increases in land, labour, or capital inputs.

These examples not only strengthen the wider agricultural sector's competitive edge but also enable the positioning of New Zealand as a global leader in agri-innovation. The approach taken in the establishment and operation of AgriZero^{NZ} provides a clear example of how agricultural innovation (or any type of innovation) can be incubated, developed, and progressed toward large scale deployment.

ADVANCED MANUFACTURING, CONSTRUCTION & INFRASTRUCTURE

New Zealand's national fibre rollout, led by Chorus and Local Fibre Companies as part of the Ultra-Fast Broadband (UFB) program, exemplifies how forward-thinking, large-scale infrastructure can drive economic productivity and support a transition to a low-emissions, climate-resilient economy. With over NZ$5.5 billion invested so far and an additional NZ$1.7 billion committed for upgrades through 2028, the shift from copper to fibre is already delivering substantial returns. Between 2011 and 2023, fibre contributed NZ$31 billion to GDP, with projections indicating it could add NZ$163 billion in net-present value by 2033. Productivity impacts are clear: a 1 percentage point increase in broadband penetration lifts GDP growth by 0.14 percentage points, and a 1% rise in broadband connections increases economic growth by 0.32%. These effects are amplified by fibre's role in enabling cloud computing, AI adoption, digital services, weightless exports, and national innovation capacity, positioning digital infrastructure as a core productivity lever for New Zealand as a whole.[34]

Beyond direct economic returns, Chorus' fibre initiative has generated indirect benefits including enhanced digital equity, improved access to health and education services and more resilient public service delivery. By strengthening regional economic development and reducing dependency on high-maintenance, climate-prone legacy assets, fibre stands as a vital national infrastructure, much like New Zealand's renewable energy assets: delivering broad benefits across sectors, regions, and communities.

In the maritime sector, **EV Maritime** is a standout example of how New Zealand businesses are leveraging advanced manufacturing to boost productivity and growth. EV Maritime designs and manufactures electric ferries, targeting urban water transport and aiming to reduce emissions while supporting efficient public transit. Their vessels, such as the electric ferries developed for Auckland, showcase how green technology can unlock operational savings, improve reliability, and drive economic and environmental gains for cities. By partnering with local councils and transport agencies, EV Maritime is helping to future-proof urban mobility and position New Zealand as a leader in sustainable maritime solutions.

Similarly, **Hayes Metals,** an established New Zealand company, highlights how embracing innovative, sustainable practices can deliver productivity and environmental benefits. Hayes Metals operates one of the country's largest secondary lead smelters, processing recycled lead from batteries and other sources. By prioritising resource recovery and recycling, Hayes Metals reduces reliance on imported raw materials, supports circular economy principles, and lowers the environmental footprint of New Zealand's manufacturing sector. Their public commitment to environmental stewardship and investment in advanced smelting technologies demonstrate how legacy businesses can evolve to meet modern productivity and sustainability demands.

These case studies illustrate the broad, sector-agnostic benefits indicating how New Zealand can enhance productivity, resilience, and environmental outcomes, while reinforcing its reputation as a global leader in technological and sustainable progress.

PROCESS HEAT, RENEWABLE ENERGY & ELECTRIFICATION

The shift towards process heat decarbonisation, renewable fuels, and electrification is exemplified by New Zealand businesses such as **Meridian, NZ Steel, DB Breweries, EnviroNZ,** and **Christchurch International Airport.** By transitioning to alternative renewable energy sources through electrifying carbon-intensive operations or building out renewable generation infrastructure, these organisations are actively future-proofing their operational and commercial strategies. Representing more than two-thirds of the companies consulted across six distinct sectors, each has invested in projects designed to reduce fossil fuel dependency, strengthen business resilience, and lower ongoing operating costs. While initial capital outlays can be significant, the long-term economics (measured by Total Cost of Ownership (TCO) are increasingly attractive, demonstrating the financial viability of these sustainability initiatives.

Switching to renewables and reducing energy costs delivers a range of direct and indirect economic benefits. Firstly, organisations can achieve substantial savings on fuel and energy expenses by moving away from fossil fuels, which are subject to price volatility and supply chain disruptions. Renewable energy sources, such as biomass or electricity from renewable generation, offer more predictable and often lower long-term costs. These savings can be reinvested into other areas of the business, fostering growth and innovation.

Additionally, by lowering their energy costs and reducing exposure to fossil fuel price fluctuations, businesses improve their financial stability and resilience. This is particularly important in sectors facing global competition or regulatory pressures, where cost efficiency can be a key differentiator. The adoption of renewable energy and electrification also enables companies to access new markets or premium pricing, especially as demand for low-carbon products grows internationally.

Investments in renewable energy infrastructure also contribute to job creation and local economic development. Projects like **NZ Steel's** Electric Arc Furnace not only reduce operational costs and carbon emissions but also support innovation and skills development within the workforce, positioning New Zealand as a leader in sustainable manufacturing. Overall, the shift to renewables and energy efficiency strengthens competitiveness, reduces operating expenses, and supports long-term economic growth for both individual businesses and the broader economy.

In summary, by embracing renewable energy and reducing energy costs, New Zealand businesses are not only improving their environmental footprint but also unlocking substantial economic advantages. While conversion to more efficient and renewable energy and heat systems is well established in New Zealand, there is still significant potential for further adoption across the sector.

TOURISM – SUSTAINABLE AVIATION FUEL AND ECONOMIC RESILIENCE

Tourism is a cornerstone of the New Zealand economy, serving as a major contributor to GDP and regional development. For the aviation sector, which is responsible for bringing visitors to our shores, the most immediate and impactful decarbonisation lever is the adoption of Sustainable Aviation Fuel (SAF). Companies such as Air New Zealand who are collaborating on the development and uptake of SAF highlight that investment in SAF is driven not only by consumer demand and the imperative to decarbonise, but also by the broader national interest: safeguarding the competitiveness and appeal of New Zealand as a destination committed to low-carbon air travel[35].

The country's geographical isolation amplifies the need for reliable, sustainable air links. As international travellers become more discerning, prioritising travel that is low carbon, New Zealand risks losing its desirability if access to SAF is delayed or constrained. From a national economic perspective, the cost of inaction could be substantial. Delaying investment in SAF production and supply infrastructure could result in significant losses. For example, NZSAF estimates that a five-year delay in reaching 30% domestic SAF production by 2050 would cost New Zealand ~$1.0 billion over the period, due to supply chain challenges and higher production costs arising from delayed learning curves[33].

Beyond direct cost impacts, there are wider economic benefits at stake. Achieving the SAF production target by 2050 could create an estimated 5,700 jobs and generate ~$1.3 billion in gross value added (GVA)[33]. Conversely, failing to secure SAF and feedstock supply could undermine New Zealand's ability to maintain access to its air-travel enabled export markets, valued at approximately $2 billion[33]. Around 70% of these exports are destined for countries enforcing or proposing carbon border adjustment schemes regulations that, while not currently covering aviation, signal growing pressure to decarbonise cargo transport. In this context, New Zealand's remoteness becomes a liability if sustainable aviation options are not available, potentially affecting market access for exports and reducing the country's attractiveness to international customers.

Improving self-reliance in SAF production is vital. Enhanced fuel and feedstock security would reduce dependency on vulnerable supply chains, help future proof the tourism sector, and support New Zealand's reputation as a leader in sustainable travel. At the same time, investing in rail and electric coach transport can make low emissions travel options available to visitors moving within New Zealand, reducing reliance on high carbon domestic travel and strengthening regional connectivity. Together, these investments reinforce New Zealand's appeal as a remote yet accessible destination for low carbon tourism.

ZERO EMISSION TRANSPORT

Decarbonising New Zealand's vehicle fleet by transitioning to electric transport and expanding charging infrastructure represents a significant opportunity to boost national productivity. Shifting spending from imported fossil fuels to predominantly domestic renewable electricity reduces vulnerability to global energy price fluctuations and retains more economic value within the country. As transport is a major and growing source of emissions responsible for around 17–19% of gross emissions investing in fleet decarbonisation for both road and rail can lower economy-wide energy costs, decrease logistics expenses, and drive efficiency improvements, ultimately supporting GDP growth.

Community-led electric vehicle programs, such as those implemented by **Ngāti Whātua Ōrākei,** highlight the tangible advantages of decarbonising transport. These initiatives help lower upfront barriers, deliver substantial emissions reductions, and generate fuel savings for participating households and organisations. While individual savings may appear modest, scaling such programs across communities enhances access to essential services, shields households from volatile fuel prices, and builds the capability to expand sustainable transport alongside broader regenerative development goals.

From an operational perspective, widespread adoption of electric vehicles translates into lower running and servicing costs, providing more predictable transport expenditures for both families and businesses. Pooling access through shared mobility models further improves affordability and operational resilience, especially for those who previously lacked access to low-carbon transportation options. At the national level, electric vehicles remain less expensive to operate than petrol counterparts, offering savings that accumulate across large fleets and supporting New Zealand's long-term economic resilience.

Embracing electric transport anchors mobility to New Zealand's renewable energy grid, with new generation capacity strengthening supply security. For businesses, particularly those in freight and last-mile delivery, integrating electric vehicles and shifting to lower carbon modes such as rail or coastal shipping can reduce emissions intensity, enhance service quality, and differentiate products in increasingly sustainability-focused markets. By prioritising decarbonisation of its fleet, New Zealand can help future-proof its economy, drive innovation, and maintain its reputation as a leader in clean and efficient transportation.

GDP BENEFITS FROM SUSTAINABLE BUSINESS PRACTICES

From our engagement with businesses and analysis of contributions within sector groupings we can see benefits arising from both current and planned sustainable business practices. This forms a basis for economic modelling consisting of the following:

- **Agri-Technology** market expansion
- Avoided **Tourism** revenue loss
- Aggregate productivity improvements linked to:
  - Increased adoption of **Zero Emission Transport** solutions and associated infrastructure
  - **Process Heat, Renewable Energy & Electrification**
  - Innovations linked to **Advanced Manufacturing & Construction**
  - Avoided revenue loss from **Agriculture Exports**

Appendix 3

Assumptions for economic modelling

Appendix 3

Assumptions for economic modelling

SCENARIO NAME		Description	Detailed assumptions	Source
	CARBON PRICE ONLY	**Carbon price**	per ERP2	ERP2[36]
		Agri export shock (pastoral agriculture sector)	Share of sustainability-focused dairy customers is 30% by 2030 – we assume this figure applies to the pastoral sector. We assume 1/4 of that could be lost (i.e. 7.5% of agricultural exports)	Chapman Tripp (2024) Protecting New Zealand's competitive advantage,[37] plus own assumptions
		Agritech	0.9% of output from pastoral agriculture and horticulture is due to agritech in 2025.	Current uptake based on evidence on agritech share of exports,[38] which we determine to be 5% of pastoral and horticultural exports.
		Emissions reductions as a result of agritech	No breakthroughs from agritech	
		Advanced manufacturing	In 2025, 35% of the sector experiences productivity improvements of 22.5%. The uptake of advanced tech remains constant.	Productivity figure is the mid-point value from McKinsey (2022) Capturing the value the true value of Industry 4.0[39] [40]
		Tourism shock	Loss of 1% of annual tourism revenue by 2050, starting from 2035.	Based on Boeing (2025) Sustainable Aviation Fuel report[41]: the 1% is associated with the potential risk of travellers (business and domestic) that may stop travelling in the absence of SAF usage.
		Road transport electrification	Uptake of battery electric vehicles (light and heavy) is endogenously determined by the carbon price.	Results are validated against outputs from CCC's Reference scenario[42] for ERP4 advice
		Demand reduction and heat pumps for industrial process heat	Uptake is a function of carbon price Cost assumptions based on RETA	RETA[43]
	TECH-RENEWABLE LEAP	**Carbon price**	NZ Treasury shadow prices	NZ Treasury
		Avoided agri export shock	The agri shock in Scenario 2 is avoided	See assumptions in the Current Trajectory
		Avoided tourism shock	The tourism shock in Scenario 2 is avoided	Boeing (2025) Sustainable Aviation Fuel

		Description	Detailed assumptions	Source
SCENARIO NAME	TECH-RENEWABLE LEAP	**Agritech**	Output gain from 1% today of 18% by 2035 across pastoral agriculture and horticulture	Sapere (2020) The potential value for agritech in NZ. Current uptake is based on evidence on agritech share of exports, [44]which we determine to be 5% of pastoral and horticultural exports.
		Agritech	10% reduction in ruminant methane emissions from dairy and 1% from beef and sheep stock units by 2035 compared to 2025. 36% reduction in ruminant methane emissions from dairy and 5% from beef and sheep stock units by 2050 compared to 2025.	Based on CCC assumptions for uptake of low-methane breeding, and methane vaccine. We assume reduction in emissions intensity of livestock is primarily driven by these advancements
		Construction 4.0	Labor productivity increase of 22.5% by 2040, starting with 2030.	Productivity figure is the mid-point value from McKinsey (2022) Capturing the value the true value of Industry 4.0[45]
		Industry and advanced manufacturing	In 2025, 35% of the sector experiences productivity improvements of 22.5%. By 2035, these productivity improvements are experienced by the entire sector.	Mid-point value from McKinsey (2022) Capturing the true value of Industry 4.0[46] [47]
		Demand reduction and heat pumps for industrial process heat	Uptake is a function of carbon price Cost assumptions based on RETA	RETA
		Transport	Uptake of battery electric vehicles (light and heavy) is endogenously determined by the carbon price.	Results are validated against outputs from CCC's Demonstration Path scenario
		Aviation	e-SAF: Gradually increase e-SAF share of aviation fuel use by reducing its price relative to jet fuel by 15% by 2050.	This uptake is a much more conservative assumption on e-SAF compared to that in the *Transform and grow scenario* in Sense Partners report on future grid modelling,[48] where e-SAF price is 25% lower than jet fuel (resulting in e-SAF share of aviation fuel to be 4% by 2050).

Appendix 4

References

Appendix 4

References

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[1] New Zealand's Innovation Index. Source: https://www.theglobaleconomy.com/New-Zealand/GII_Index/

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[4] Digital technologies can be defined as the suite of data enabled tools and systems—such as precision agriculture, IoT sensors, digital monitoring platforms, cloud computing, smart machinery, robotics, digital twins, and advanced manufacturing systems—that collect, analyse, and act on real time information to optimise processes, automate tasks, and support better decision making. They enable everything from precision agritech that improves yields and reduces emissions, to connected manufacturing environments that use AI, sensors, and virtual prototyping to create efficient, resilient, and highly adaptive production systems.

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[8] As noted by the Productivity Commission (linked above) and Frontier Firms. Source: https://www.anzrsai.org/assets/Uploads/PublicationChapter/AJRS-27.2-pages-149-to-178.pdf

[9] https://www.oecd.org/en/publications/boosting-productivity-in-new-zealand-by-unleashing-digitalisation_05cc1b5c-en.html

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[17] Carbon Price Only scenario: New Zealand has low climate ambition, subdued pricing and has growing trade vulnerabilities in the face of evolving trade and consumer requirements for environmentally friendly goods and services. For the "Carbon Price Only" scenario, we assume a fixed price of NZD $50.00.

[18] These technologies include including precision agriculture, the internet of things, digital monitoring systems, cloud computing and many other digital technologies and supporting functions. They enable the analysis of digital farm data along with other relevant digital datasets such as soils and environmental data which leads to improved data-driven decision-making by farmers.

[19] The uptake is endogenously determined by the model, informed by fuel switch economic analysis undertaken as part of RETA programme.

[20] Transport electrification is endogenously determined by the model, given the assumed carbon price. The outcomes were then validated against results showing BEV as % fleet in CCC' modelling for EB4.

[21] Source: https://environment.govt.nz/assets/publications/climate-change/ERP2/New-Zealands-second-emissions-reduction-plan-Technical-annex-Amended-January-2026.pdf

[22] Net of economy-wide impacts from higher carbon prices in Tech-Renewable Leap.

[23] Agritech and avoided loss of agricultural exports.

[24] Net of GDP impact due to a higher carbon price compared to Carbon Price Only.

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[26] Adapted from Systemiq (2025) ACCELERATING THE BREAKTHROUGH OF CLIMATE TECHNOLOGIES. Available at: https://www.systemiq.earth/wp-content/uploads/2025/12/Tipping_Points_Systemiq_Dec25.pdf

[27] This qualitative analysis is derived from the case studies and interviews as part of this work. It intentionally represents a New Zealand centric (rather than a global) view of the stage of deployment of the technologies listed. It should be taken as indicative, but not representative of the complete situation in New Zealand.

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[32] We have not included a public-private partnership for agriculture since AgriZero^{NZ} already fills this role.

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