Meeting the climate challenge through digital technology

Research from Spark and thinkstep-anz



Spark nz



thinkstep anz

At Spark we believe that technology has the power to create change.

But it doesn’t create change on its own. It is people, harnessing the power of technology, that transform the way we live, work, connect, and play.

This is why, for many years, Spark has focussed not only on investing in the digital infrastructure and emerging technologies that enable change – but on sharing the possibility of these technologies with the change-makers themselves. New Zealanders.

We have shown the potential that the next generation of mobile technology can bring through our 5G Starter Fund, 5G Race Zone, and most recently, our 5G Street Museum. We provide a space for businesses to learn about the power of the Internet of Things (IoT), and co-create solutions with us, through our Innovation Studio. And we have recently built Aotearoa’s first standalone 5G network, enabling collaboration with other businesses to solve real-world challenges in a way that hasn't been possible before.

This research is the next step we are taking on this journey. We know the window to take action to avoid the worst impacts of climate change is closing fast, and that everyone must play a role in Aotearoa’s transition to a low-carbon economy. We also know that technology has a critical enabling role to play in that transition – by helping businesses to work smarter with fewer resources, by providing insights into the world around us that enable better decision making, and by connecting us virtually.

With that in mind, with our research partner thinkstep-anz, we set out to provide greater insight into the specific role technology can play, in Aotearoa, as we pursue our binding carbon budgets and work towards our long-term commitment of net-zero by 2050. Our hope is that by shining a light on the specific opportunities that exist by sector we can support decarbonisation across the economy, and ensure we harness the full potential that digital technology has to offer.

Spark is an enabling business – which means our success is measured in the success of others. And it is with that intent that we offer this research as a contribution to the national discourse on climate change, and to the combined efforts of the public and private sectors, iwi, and communities, to deliver the kind of transformational change we need, and that the next generation of New Zealanders deserve.

Ngā mihi,
Jolie Hodson

Spark CEO
and Climate Leaders Coalition Convenor



Succeed sustainably

When the government released its national Emissions Reduction Plan in June, it focused on proven and existing technologies. The study you'll read about here shows the huge role digital technology can play in moving Aotearoa New Zealand to a prosperous, low-emissions economy in a way that is socially fair.

We're pleased to partner with Spark on this study. It's an important one – for Aotearoa New Zealand's people, communities, businesses and, of course, the natural environment.

Like Spark, we're a member of the Climate Leaders Coalition, a group of New Zealand businesses working together to reduce their carbon emissions. Again like Spark, we're an 'enabling business'.

We enable organisations to succeed sustainably by providing the credible, science-based data and analysis they need to reduce their greenhouse gas emissions: to understand where to focus and what to do and to measure progress. We also help them tell their story.

On this project with Spark we've used data to understand the sectors and solutions where digital technology offers the greatest potential to help decarbonise Aotearoa New Zealand. This report is a starting point, to inspire collaboration and focus our collective efforts.

The study has national implications and we're excited to be part of the conversation. We're looking forward to continuing to support the technology industry and Aotearoa New Zealand to meet our crucial national goal: net-zero by 2050.

Ngā mihi,
Barbara Nebel

CEO thinkstep-anz



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Foreword Jolie Hodson
Foreword Barbara Nebel

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The Challenge

The time to act is now

The window to take meaningful action to prevent the worst impacts of climate change is closing fast.

This requires action across all sectors

Accelerating action towards Aotearoa's 1.5 degree commitment will require collaboration across all sectors of the economy, iwi, and communities across the motu.

Digital technology can enable cross-sector transformation

Digital technologies are rapidly evolving and converging, unlocking new use-cases that can support decarbonisation and broader sustainability benefits.

However, as a country, we have not yet been deliberate in exploring how they can be applied to support emissions reduction and economic transformation, meaning the role of digital technology is not prominent in New Zealand's first Emissions Reduction Plan.



Aotearoa's climate change context

New Zealand set its first emissions budgets in 2022, establishing binding carbon budgets that commit us to action to limit warming to 1.5 degrees and achieve net zero carbon by 2050. Over the next decade to 2030 we need to reduce our national emissions by 20%, and by 35% by 2035.

Our first national Emissions Reduction Plan was launched in May 2022 and is focused on proven and existing technologies to build momentum and action in the short-term. The Plan is structured around 'vertical' sectors, with the big savings projected to come from the three largest-emitting sectors – transport, energy and industry, and agriculture.

Digital technology has a smaller footprint in New Zealand. It is an enabler working 'horizontally' across sectors, supporting the current technologies included in the Emissions Reduction Plan with existing infrastructure that has been built over the last decade through both private and public sector investment. As such the digital technology sector does not feature prominently in Aotearoa's first Emissions Reduction Plan.

Digital technology: climate impacts and opportunities

Digital technology is an enabler of innovation, with the potential to enable decarbonisation across the economy, accelerate change, and reduce the cost of transition. The focus of this study is to identify and prioritise these enablement opportunities in order to inform action and ensure that New Zealand can realise the full potential of digital technology.

Alongside the opportunity to enable emissions reductions, it is necessary to address the footprint of digital technology itself. Global emissions from data centres and data transmission networks were approximately 300 Mt[1] in 2020, equivalent to 0.6% of global emissions.[2] Estimates of total sector emissions, including everything from embedded and use-phase emissions from electronic devices through to televisions and infrastructure, range between 1.8%-3.9% of global emissions.[3]

In New Zealand, the sector's footprint is smaller. For context, Spark's scope 1 and 2 emissions, including fuel, refrigerants and electricity use in mobile and fixed networks and data centres, were approximately 0.02% of national emissions in 2022.

We must continue to improve the efficiency of our networks and infrastructure, replacing legacy technologies with modern alternatives that have lower emissions profiles. With the majority of industry emissions coming through electricity usage, the sector can decarbonise by supporting the transition to 100% renewable energy.

[1] **1 Mt = 1 million tonnes of CO_2 equivalent**

[2] *IEA (2022), Data Centres and Data Transmission Networks, IEA, Paris* https://www.iea.org/reports/data-centres-and-data-transmission-networks

[3] *The real climate and transformative impact of ICT: A critique of estimates, trends, and regulations:* Charlotte Freitag, Mike Berners-Lee, Kelly Widdicks, Bran Knowles, Gordon S. Blair, Adrian Friday. https://doi.org/10.1016/j.patter.2021.100340

Our study

Spark and thinkstep-anz worked together to combine global and local perspectives to quantify emissions reductions opportunities and inform future action.

International research has highlighted the opportunity

International studies have estimated the potential for digital technology to enable emissions reductions globally. However, these findings don't consider New Zealand's unique context and emissions profile.

We have first-hand knowledge working with New Zealand businesses

Spark works with thousands of business customers and partners to apply digital technologies to solve sustainability problems on-the-ground. thinkstep-anz work across many sectors to measure and model environmental outcomes. We've taken our combined knowledge to model the specific emissions reductions opportunities of current and future digital technologies in New Zealand.

New Zealand has modelled emissions reduction pathways

Emissions reduction pathways have been modelled by the Climate Change Commission to support New Zealand's first Emissions Reduction Plan. These factor in current technologies and emissions reduction opportunities alongside New Zealand's agriculture-heavy emissions profile and widespread renewable electricity generation.

Findings and recommendations for action

We have modelled and quantified digital technology-enabled emissions reductions opportunities across different sectors.

We have identified a series of recommendations based on these findings, with the objective of ensuring New Zealand can realise the benefits of digital technology in addressing our climate challenge.

Our methodology

Our analysis focuses on short-term opportunities in the ten-year period to 2030, aligned to New Zealand's first two national emissions budgets. It includes:

Top down

Global literature review

"What emission reduction opportunities have been identified and modelled in the global context?"

Findings analysis

"Which opportunities are relevant to New Zealand and what impact could they have?"

Impact modelling

Identification and quantification of New Zealand-specific case-studies and use cases against Climate Change Commission pathways and models.

Informed by the common industry methodology GeSI SMARTer2030 report (2015).

Results

Scale and scope of opportunity

Bottom up

Analysis of national emissions reductions pathways

"What emissions reductions have been anticipated, and digital technologies have been included?"

Local investigation gathered through expert interviews

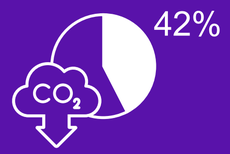
"Where are we currently supporting emission reductions, and where can we drive new emission reductions?"

Findings

Key findings

The role of digital technology in enabling Aotearoa New Zealand's decarbonisation extends well beyond connectivity.

Digital technology can enable emissions reductions through a wide range of mechanisms beyond connecting people virtually – including enabling secure access to remote services, connecting and monitoring physical assets and their environments, creating insights from data, optimising systems and processes, informing human decision making, influencing behaviour, and, creating low-carbon industries and jobs.



Digital technology is an enabler of a variety of actions that could collectively reduce annual emissions 7.2 Mt by 2030 – equivalent to 42% of Aotearoa's emissions budget targets.

Digital technology could enable up to 7.2 Mt of annual emissions reduction by 2030 against a 2019 baseline. For comparison's sake, this is 42% of the annual emissions reductions required for our carbon budgets to keep us aligned to a 1.5-degree pathway. This includes reductions already anticipated in current scenarios and included in New Zealand's Emissions Reduction Plan, as well as additional reductions not yet included in the Plan but modelled in this study.



We have modelled material digital technology-enabled emissions reduction opportunities in Aotearoa's largest emitting sectors:

2.9 Mt emissions reduction potential in Transport: through optimising fleet and the transport network and reducing travel through digital services

2.4 Mt emissions reduction potential in Energy and Industry: through optimising systems and processes and substituting centralised facilities for digital alternatives

1.9 Mt emissions reduction potential in Agriculture: through enabling precision agriculture and innovation across the value chain

Digital technology should be integrated into climate change mitigation and adaptation planning as a key enabler of New Zealand's long-term climate goals.

Digital technology has an important role to play in a just transition and as a 'horizontal' enabler supporting 'vertical' sector emission reduction plans. To drive action and inform long-term investment digital technology should be integrated into the Climate Change Adaptation Plan and Emissions Reduction Plan. We must also continue to invest in the foundations of a strong digital economy – infrastructure, skills, and equity – to ensure we can realise the benefits digital technology can bring.

How digital technology enables a low carbon NZ

types of technology used

- Mobile devices
- Mobile Access Edge Compute (MAEC)
- Smart devices (IoT) and platforms
- Cloud based software and services
- Cloud computing
- Artificial intelligence
- Data and analytics

Digital technology:



1 | **Connects people**
Enables interpersonal connection and secure access to digital services such as work systems, education and health

2 | **Connects things**
Enables data collection from systems and the environment, informing action and optimising smart systems and processes

3 | **Creates insights**
Harnesses data to create insights to inform efficient, responsible decisions by humans and automated systems

4 | **Influences behaviour**
Shares information and tools and connects communities to drive awareness, inform choices and encourage change

5 | **Drives innovation**
Creates new low carbon industries and new jobs, enabling transition and decarbonisation of existing industries

The foundations we need to realise the benefits of digital technology:

Digital infrastructure
- mobile and Internet of Things networks
- fibre and fixed networks
- data centres and network sites
- satellite
- international submarine cables

Digital capability
- talent
- intellectual property
- culture of innovation

Digital equity
- access to technology
- digital skills and pathways
- digital trust

Supportive regulatory environment

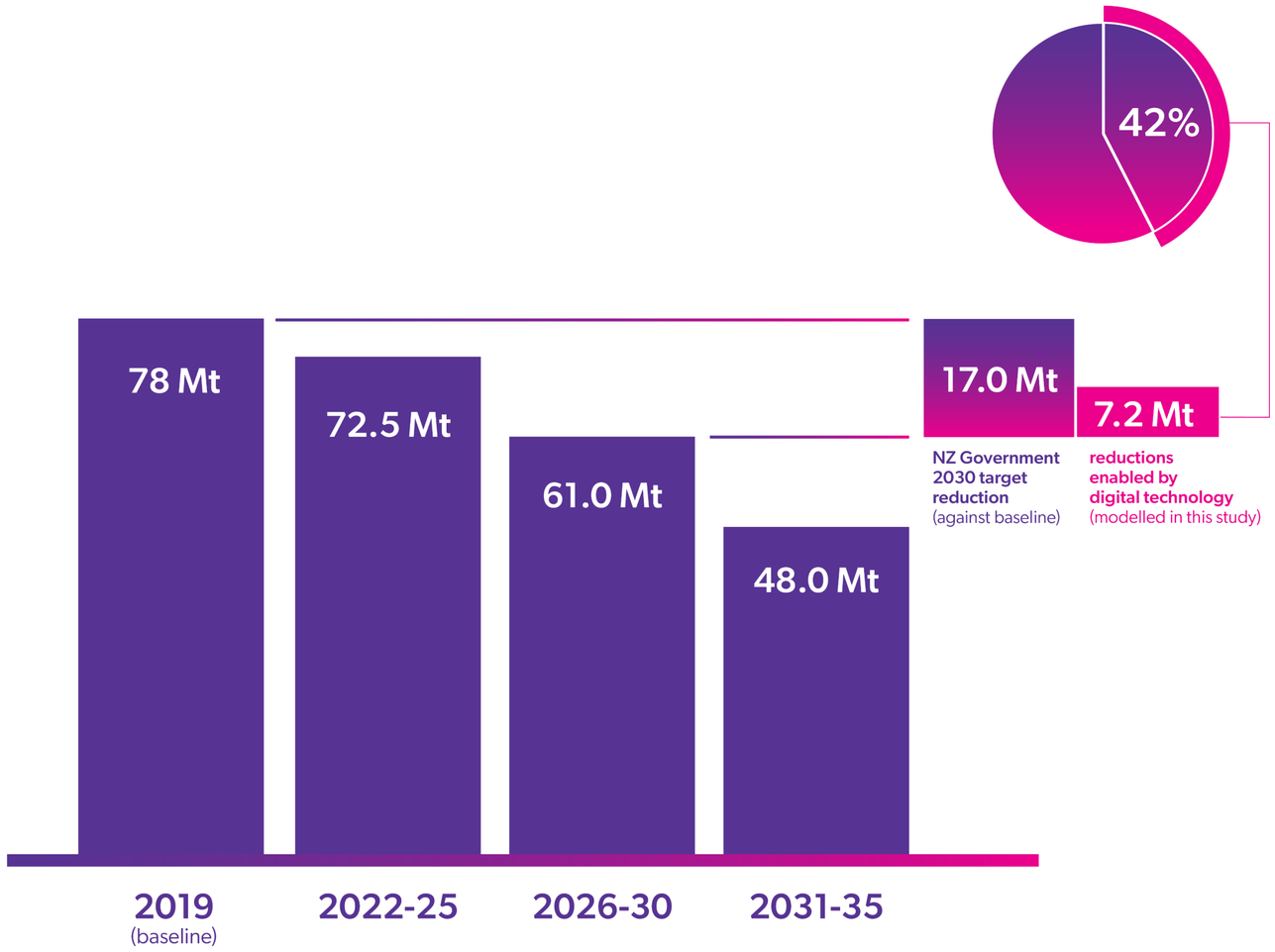
Funding and capital investment

Digital technology enables a variety of actions that could collectively reduce annual emissions 7.2 Mt by 2030 – equivalent to 42% of Aotearoa's emissions budget targets

New Zealand's Emissions Budgets established the total emissions reductions required over four- or five-year budget periods. The averaged annualised emissions budgets show the scale of decarbonisation required from a 2019 baseline, which equals a reduction of 17.0 Mt at 2030. We use this figure as a comparison point in order to demonstrate scale and to put our findings into context.

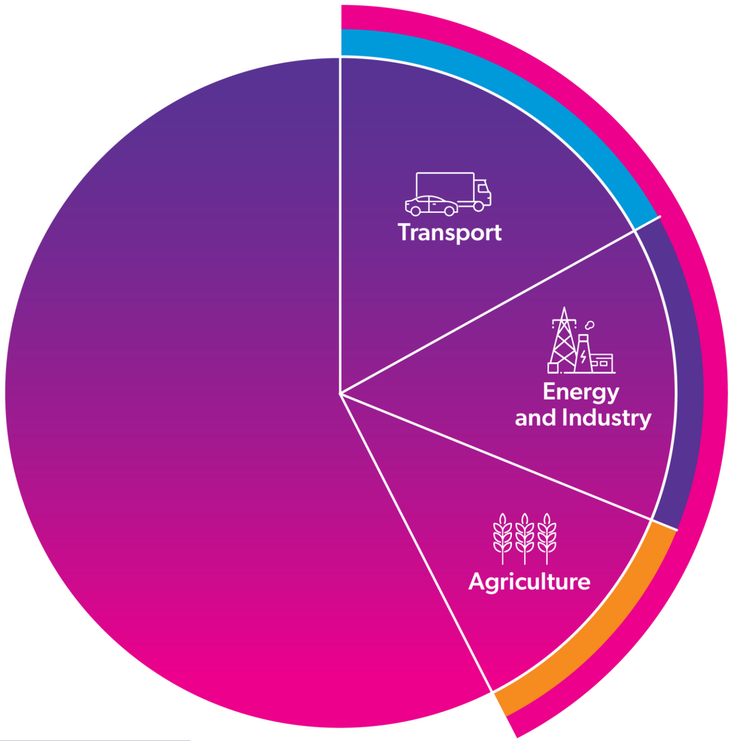
Our modelling has shown that 7.2 Mt of emissions reductions could be enabled by digital technology in 2030. This is equivalent to 42% of the 17.0 Mt emissions reductions we need to achieve over this period.

The reductions we have modelled include the enablement of actions already identified in the Emissions Reduction Plan, as well as new opportunities identified through this study.



New Zealand Government annualised emissions budgets

Digital technology enabled emissions reductions broken down by sector



17.0 Mt

NZ Government 2030 target reduction
(national Emissions Budgets against 2019 baseline)

7.2 Mt

reductions enabled by digital technology
(modelled in this study)

Transport 2.9 Mt
Energy and Industry 2.4 Mt
Agriculture 1.9 Mt

Emissions reductions modelled by this study

2.9 Mt

Transport

- Reduction in travel through remote work, E-Health, E-Learning, E-Banking, E-Commerce, remote monitoring
- Optimising business fleet, freight and logistics
- Accelerate EV transition by enabling rural connectivity and smart charging infrastructure

2.4 Mt

Energy and Industry

- Smart automated buildings reducing energy consumption
- Reduction in centralised facilities – e.g. E-Health
- Grid load smoothing through connected devices, e.g. EVs
- Industrial process automation and optimisation
- Reducing agricultural energy use
- Centralising IT infrastructure through cloud services*

1.9 Mt

Agriculture

- Precision agriculture – reduction in fertiliser application
- Precision agriculture – nitrous oxide inhibitor
- Robotics and smart sensors - improving animal health and productivity
- Precision agriculture – reducing pesticide use in horticulture

Additional opportunities identified but not modelled

Waste and fluorinated gases

- Identifying refrigerant leakage through remote system monitoring
- Tracking refrigerant utilisation
- Supporting the sharing economy to reduce unnecessary consumption
- Supporting the circular economy through asset tracking

Forestry

- Supporting decision-making in optimal land use
- Measuring and monitoring carbon sequestration

Agriculture

- Precision agriculture – reducing farm inputs/outputs e.g. brought in feed, water
- On-farm environmental monitoring to inform farmer decision making

*modelled but not included in the total

Transport



The Emissions Reduction Plan includes a comprehensive set of actions for making transport less emissions intensive, shifting to lower-emissions forms of personal transport, and improving the efficiency of the fleet. Digital technology will enable many elements of this.

In addition, measures to reduce the need for transport altogether can make a significant contribution. As Covid-19 demonstrated, digital technology can enable new ways of working and connecting that remove the need to travel unless necessary.

Ways digital technology can enable transport emissions reductions

- Reduction in travel through remote work, E-Health, E-Learning, E-Banking, E-Commerce, remote monitoring and control
- Enabling mobility as a service, car sharing, ride sharing, micro-mobility
- Encouraging behaviour change, transport mode shift, and public transport adoption
- Optimising business fleet, freight, and logistics
- Enabling a smart, integrated transport system, smart cities, and congestion charging
- Accelerating EV transition by enabling rural connectivity and smart charging infrastructure

Modelled savings

0.18 Mt **Fall in domestic business air-travel**

1.5 Mt **Fall in light passenger vehicle transportation**
(Including 0.40 Mt from remote working)

0.67 Mt **Reduction in freight emissions**

0.41 Mt **Enabling adoption of low-emissions vehicles**

0.15 Mt **Reducing light commercial fleet emissions**

Total savings modelled:

2.9 Mt

Opportunities

- Continue to embrace new ways of working and digital collaboration tools in businesses
- Build further remote digital access to services that reduce the need to travel
- Optimise logistics assets and networks through tracking and automation
- Continue to expand connectivity to charging infrastructure to support widespread EV adoption
- Reduce business vehicle use and fleet size and support EV adoption through asset tracking and data analysis

Energy and industry



Energy and industry includes electricity generation and industrial activities such as manufacturing and coal burner use.

The Emissions Reduction Plan includes actions to drive energy efficiency, manage demand, and shift away from fossil fuels.

In addition, savings can be enabled through transforming traditional in-person practices and services through digital tools such as cloud, to reduce the footprint and scale of offices, health and education facilities.

Ways digital technology can enable energy and industry emissions reductions

- Reducing IT/compute energy consumption by centralising IT infrastructure through efficient cloud services
- Improving efficiency of commercial and residential buildings through connected building management systems, smart home technology, and optimising lighting, heating and cooling
- Reduction in centralised facilities through digital services – e.g. E-Health, E-Learning, E-Commerce
- Enabling emissions reductions through smart grid technologies and controllable Distributed Energy Resources (DER), including EV charging, battery storage, and micro-renewables
- Industrial process automation and optimisation through monitoring, control and analysis, e.g., digital twinning and data science, informing operator behaviour

Modelled savings

0.44 Mt*	**Migration from on-premise to cloud solutions**
0.10 Mt	**Smart EV charging time optimisation**
0.61 Mt	**Reduction in centralised healthcare facilities**
0.57 Mt 0.42 Mt	**Reduction in residential and commercial building energy consumption**
0.53 Mt	**Process automation and optimisation**
0.14 Mt	**Reduction in on-farm energy consumption**

Total savings modelled:

2.4 Mt

Opportunities

- Accelerate transition to cloud-based IT platforms to realise shared efficiency gains
  *One-off transition saving, not included in total
- Connect and automate home and business EV charging to reduce the need for thermal generation at peak times
- Continue to expand telehealth services to reduce the footprint of centralised medical facilities
- Continue to enable smart, connected homes and commercial buildings that reduce consumption through efficiency improvements, automation, and behaviour change
- Continue adoption of digital technology to optimise manufacturing and industrial processes

Agriculture



The agriculture sector is New Zealand's most significant source of emissions, with a wide range of future emissions scenarios modelled.

Digital technology can support farmers by providing information to help understand the drivers of on-farm emissions and support them to make decisions to address them. It can also enable measurement and reporting to support incentives to adopt new technologies or make practice changes to reduce emissions.

Ways digital technology can enable agricultural emissions reductions

- Enabling precision agriculture: using data to inform decisions and improve farm system efficiency
- Enabling data collection and monitoring of multiple factors: soil, water, weather, animals, on-farm equipment etc.
- Automating systems and actions for precise use of farm inputs, guiding quantity, location, and timing of actions
- Informing decisions to improve farm efficiency, optimising use of fertiliser, bought-in feed, energy, water, pasture rotation, stock levels, planting etc.

Modelled savings

1.12 Mt	**Precision agriculture:** Reduction in fertiliser application
0.57 Mt	**Precision agriculture:** targeted application of nitrous oxide inhibitor
0.24 Mt	**Robotics and smart sensors:** Improving animal health and productivity
0.01 Mt	**Precision agriculture:** reduced pesticide use in horticulture

Total savings modelled:

1.9 Mt

Enabling broader benefits – biodiversity and broader value chain decarbonisation

- Supporting agricultural value chain efficiency, protecting quality, reducing waste and improving efficiency of transport and processing (with savings captured in process innovation in energy and industry emissions sectors)
- Biodiversity, water quality, animal welfare, and soil health are also improved through precision agriculture tools and changes in farming practices to reduce emissions

Supporting emissions measurement and incentives for decarbonisation

- Providing system support of an agreed national agricultural emissions reporting mechanism, informing farmers on farm emissions and incentivising action
- Supporting value-chain innovation that connects global customers that value sustainability with the farmers that provide their products to reward and incentivise sustainable farming practices

Other sources of emissions

	Fluorinated gases	Waste	Forestry
Key actions included in the Emissions Reduction Plan:	▪ Build the capability to shift to alternative low-emissions refrigerants ▪ Prohibit the import of pre-charged equipment ▪ Investigate prohibiting F-gases with high warming potential (GWP) ▪ Introduce a mandatory product stewardship scheme for refrigerants	▪ Enable households and businesses to reduce organic waste ▪ Increase the amount of organic waste diverted from landfill ▪ Reduce and divert construction and demolition waste to beneficial uses ▪ Explore bans or limits to divert more organic waste from landfill ▪ Increase the capture of gas from municipal landfills ▪ Improve waste data and prioritise a national waste licensing scheme	▪ Support afforestation ▪ Encourage native forests ▪ Maintain existing forests ▪ Grow the forestry and wood processing industry
Digital technology opportunities identified but not included in modelling:	▪ Tracking refrigerant utilisation ▪ Identifying refrigerant leakage through remote system monitoring	▪ Supporting the circular economy through asset tracking ▪ Supporting the sharing economy to reduce unnecessary consumption	▪ Supporting decision-making in optimal land use ▪ Measuring and monitoring carbon sequestration ▪ Supporting climate adaptation, fire risk monitoring

Digital equity in Aotearoa

Digital equity in Aotearoa

Digitisation has accelerated globally and locally due to Covid-19, with access to essential services like education and health moving rapidly to digital channels. This highlighted the importance of digital equity in our communities, particularly in times of change and transition.

Through the Paris Agreement and subsequent declarations New Zealand has committed to a just transition, supporting communities, regions, affected workers and vulnerable groups to transition away from carbon intensive activities and implement skills development and labour market policies that allow workers to shift to decent jobs in low-emissions sectors.

Unfortunately, right now, up to 1 in 5 New Zealanders may be digitally excluded some way[1]. The groups who are most at risk of exclusion include families on low incomes, seniors, Māori, Pacific peoples, those with disabilities, those new to Aotearoa, and our remote communities. With digitisation set to continue accelerating as businesses decarbonise, our country's digital divide requires urgent attention.

It is well recognised that digital equity is about more than having access to devices and a connection to the internet – it is also about having the skills to use technology, trust in the digital world, and the motivation to participate.



Digital equity[2] will exist when everyone can access and effectively use digital technologies to participate in our society, democracy, and economy. Digital equity is our ultimate goal.



Digital inclusion[2] refers to the initiatives and actions we undertake as we work towards digital equity. Digital inclusion is the means to achieve the goal.

1 https://www.digital.govt.nz/dmsdocument/237~the-digital-strategy-for-aotearoa/html
2 Digital Equity Coalition of Aotearoa (DECA) definitions of digital equity and inclusion

A Digital Strategy for Aotearoa

In September 2022 the New Zealand Government released the Digital Strategy for Aotearoa, with three strategic pillars – Mahi Taki (trust), Mahi Tahi (inclusion), and Mahi Ake (growth).

The strategy includes a commitment to develop a Digital Inclusion Action Plan. It outlines that the Department of Internal Affairs is leading work alongside relevant agencies (including the new Ministry for Disabled People), industry, Iwi Māori, and other community groups to develop this multi-year, cross-agency Plan.

Better coordination across the public, private, and community sectors will more effectively direct activity and resources to where the inclusion need is greatest.

It is also critical that digital equity is considered within the context of Aotearoa's just transition and embedded into the resulting plan. On the next page we summarise the just transition actions included in New Zealand's first Emissions Reduction Plan, including the implications for digital equity.

Just transition commitments in the Emissions Reduction Plan

Emissions Reduction Plan Commitment	Implication for digital technology sector and digital equity
Initiatives to boost transition-aligned growth in the economy, providing jobs in low-emissions industries	Digital technology will enable the creation of low-emissions industries, particularly through the development of emerging technologies and technology convergence, which requires ongoing investment by the public and private sector
Support for regions and communities to help them plan for a just, equitable and fair transition	This is strongly linked to co-investment in connectivity by the public and private sector and embedding digital capability locally to support the creation of low-emissions industries
Reforms to the education and training system to ensure it supports people to develop the skills needed for a low-emissions economy	Digital skills will be critical to embed in our education and training systems as they become more prevalent in low-emissions industries
Employment support, including retraining and skill-enhancement opportunities and access to income assistance to support workers and households	Digital skills retraining will support skill enhancement opportunities within workforces. Affordable access to digital technology will be critical to ensure existing inequities are not further widened as we decarbonise

Spark’s work in digital equity

Spark is committed to championing digital equity in Aotearoa. Our commitment starts with our purpose, to help all of New Zealand win big in a digital world. Digital equity is a key feature of our business strategy and sustainability framework, the sole focus of our charitable arm, the Spark Foundation, and it permeates our operations – from the products we create to how we do business. Every year Spark commits funding, and significant internal resources, to achieve its digital equity ambitions.

We have been actively working to improve digital equity for over a decade, through Spark Foundation’s direct investments into community-led solutions, and through the provision of subsidised broadband through our not-for-profit service Skinny Jump – which supports over 23,000 New Zealand homes. We are expanding our digital equity focus to make digital environments more inclusive – most recently announcing a commitment to closed captioning on our audio-visual content for the 800,000+ New Zealanders who are Deaf or Hard-of-Hearing.



Spark Foundation is a founding member of the Digital Equity Coalition Aotearoa (DECA), which is focussed on connecting and supporting the digital inclusion community in Aotearoa. Our objective in supporting the creation of DECA was to help bring together disparate community voices on this issue, to more effectively advocate for system change.

Find out more in our Digital Equity Commitment.

Community-led partnerships

- Spark Foundation funds people and community groups that are working on initiatives that align with its strategic priorities and vision
- Most, but not all, are focussed on supporting the next generation of Māori and Pasifika digital leaders
- Spark Foundation is an independent charitable trust governed by a Board that includes independent community representatives

Community investment

- Spark invests $1.7 million in the Spark Foundation and its Spark Give and Spark Volunteer programmes annually
- Spark has invested over $30 million into Spark Foundation’s activities over 10 years

Subsidised broadband for those in need

- Skinny Jump has been designed to operate on a not-for-profit basis – with the revenue generated covering the costs of free modems, our community partner network, product development, and customer care and education
- The commercial value of the data provided to households in need through Skinny Jump totalled over $4.5 million in FY22

Recommendations

Recommendations

Quantifying emissions reduction potential is only worthwhile if it directs action. We have identified a number of priority recommendations which underpin a draft roadmap for our industry to contribute towards New Zealand's long-term climate change response. Collaboration and partnership will be key to realising the potential of our industry, which means working across sectors, government agencies, and the community.



1 | National policy

- Build digital technology into the sector strategies for the next national Emissions Reduction Plan
- Integrate digital infrastructure into the next national Climate Change Risk Assessment and in the long-term Climate Adaptation Plan
- Continue co-investment by the public and private sectors into nationally significant digital infrastructure, including rural connectivity
- Integrate digital equity into the national Just Transition Plan
- Consider incentives to accelerate technology adoption such as the Australian Government's Small Business Technology Investment Boost



2 | Digital technology sector

- Engage with the key sectors identified in this report to raise awareness of current and future digital technologies that can enable emissions reductions
- Support sector-specific emissions reduction planning to help guide investment in digital infrastructure and technologies
- Investigate a sector-wide approach to scenario modelling and physical adaption risk for lifeline telecommunications infrastructure
- Champion disruptive digitisation opportunities with cross-sector relevance – for example disruption to workplaces of the future and the advent of E-Health and E-Learning, which deliver savings across multiple sectors



3 | Businesses in all sectors

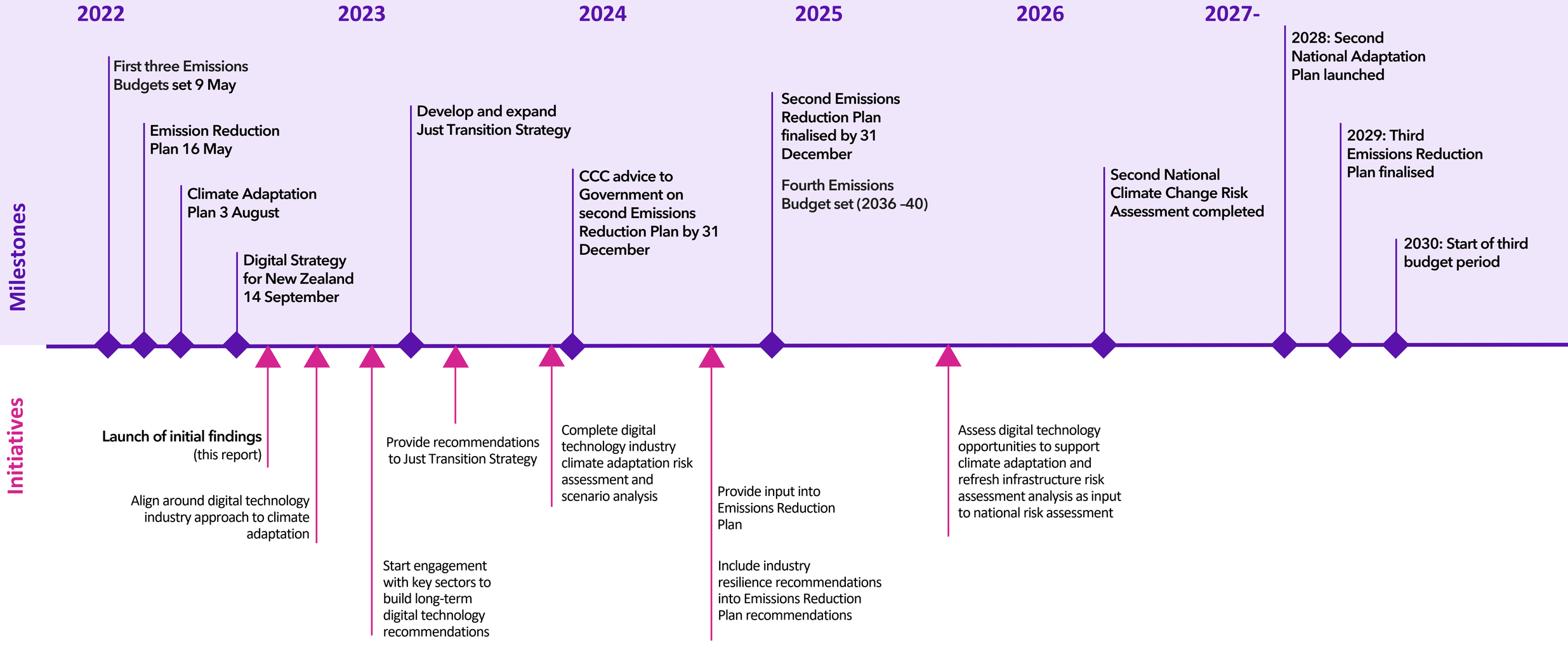
- Develop emissions reduction and transition plans that identify material sources of emissions
- Consider the role of digital technology in enabling these reductions and in reducing the cost of transition to a low-carbon future
- Integrate digital technology to automate monitoring, measurement, and reporting of emissions and other environmental impacts, to guide decision making
- Consider digital capabilities required in the workforce as decarbonisation accelerates



4 | All New Zealand

- Data is essential to inform decisions and to optimise and automate systems and processes. To automate and connect systems we need them to communicate and connect reliably and securely with each other.
- We should consider a national approach to open data and smart system connectivity to provide a platform for national action and innovation to address climate change and other environmental challenges.

A roadmap for action



Case studies

Hira Bhana uses precision agriculture to reduce environmental impact on farm



“As we expand, everybody's got more things to do, so sometimes they might not get around the crops as much as the older generation used to. With new technology, they can see exactly when water is needed. Having this technology, we can actually put on less water than what we were putting on in the old days. Sometimes less is more.”

Bharat Bhana – Hira Bhana Farm

The Bhana Family Farm exceeds 600 productive hectares, growing potatoes, onions, carrots, lettuce, cauliflower, cabbage, a bit of pumpkin and some seasonal watermelon. Over the years the Bhana family members have developed an incredible body of knowledge that allows them to maintain the farm.

However, the knowledge of water, climate, and plants, developed over years of trial and error, is difficult to pass on to others. The family recognised that to create a sustainable farm that was not reliant on generational knowledge, they needed to turn to technology.

Solution

An Adroit monitoring system has been installed across the farm to allow everyone to see exactly what is happening with the soil at any time.

Sensor data is delivered in real-time to the Adroit Platform a cloud platform hosted on AWS, via the specialised Spark IoT Private LoRaWAN network. The Hira Bhana team can view the data on the Adroit app, available on any connected device. They can see data visualisation views of what is happening across the farm, set customisable thresholds and alerts, download data, and use APIs for integration – supporting and improving their decision making on the farm.

The solution allows the Bhana team to automate farming processes, resulting in consistent, high-quality decision making.

Results

To demonstrate the potential of precision agriculture, we modelled the emissions savings from an emerging technology – the precision application of nitrification inhibitors to urine patches in paddocks. This technology can reduce emissions of nitrous oxide, a powerful greenhouse gas, and reduce nitrogen loss through leaching, which has water quality benefits.

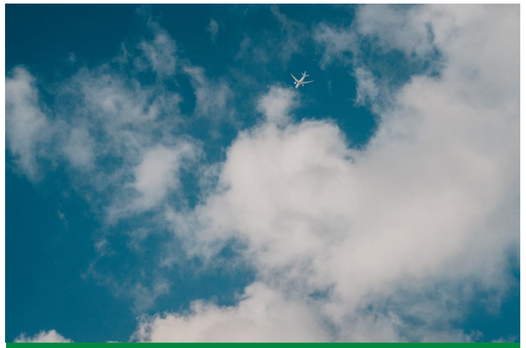
Cloud-based task management and navigation systems can support farmers to accurately navigate and direct on-farm activity, allowing precise application of farm inputs to the right field, orchard or row.

Potential national impact

Precision agriculture – application of nitrous oxide inhibitor:

0.57 Mt

The role of cloud in enabling emissions reductions in Aotearoa



"In our experience, embracing the cloud can deliver organisations a range of benefits, including greater speed and flexibility, the ability to manage and control costs, and the potential to develop new applications and services. Most organisations now see cloud as a significant business enabler, while as adoption increases so does the opportunity to streamline operations, better manage energy consumption, and realise benefits from the shift to hybrid work."

Richard Adams, CEO CCL, part of Spark Business Group

How does the cloud enable decarbonisation?

The cloud is the delivery of digital products and services over the internet, eliminating the need for traditional physical servers.

The use of shared infrastructure improves efficiency, reduces costs, and allows organisations the flexibility to scale resources up and down on demand, supporting innovation.

How has cloud been incorporated into this study?

Studies have found an 80% efficiency gain is possible from shifting traditional on-premise equipment and servers to shared cloud data centres[1]. We have modelled the emissions reduction possible for New Zealand from this shift in this study, which is 0.44 Mt.

We also recognise, however, that over the next decade this one-off transition gain will be moderated by data centre capacity growth as cloud services expand, meaning the overall impact over time will be neutral. For this reason while we have modelled the saving, we have not included it in the overall quantification of the emissions reductions that can be enabled by digital technology by 2030 (42%).

It is important to note that cloud underpins a wider range of other benefits modelled in this study and included in the overall quantification – including transport decarbonisation through remote working and remote access to services.

Results

The emissions reductions enabled by cloud include the direct benefits from replacing physical servers with shared cloud infrastructure, to the broader emissions reductions enabled by cloud computing across multiple sectors.



Reducing electricity use through migration from on-premise to cloud-based IT solutions:

0.44 Mt

One-off saving, not included in 2030 total



Supporting transport decarbonisation by:

Reducing vehicle travel by enabling remote working and remote access to shared services, e.g., E-Health:

1.5 Mt

Including 0.4Mt from remote working

Reducing domestic air travel through video conferencing and remote meetings:

0.18 Mt

[1] S&P Global: *The Carbon Reduction Opportunity of Moving to the Cloud for APAC (2021)*

A data-driven digital platform from MyEnviro helps farmers understand, share, and improve their environmental profile



"The MyEnviro platform helps drive our environmental progress by allowing us to visualise our emissions data, track actions and plan reduction mitigations across our operations footprint.

It's like a live story board of our current farming operation and our direction of travel into the future."

Mark Chrystall – Farmer, Taihape

Starting from a belief set that farmers need to combine outstanding instinct with outstanding information, MyEnviro set out to help farmers to record how they are using and managing their natural resources and make it easy for them to share this information with their stakeholders, including any regulated requirements.

Solution

With the help of Qrious, MyEnviro has developed a geo-spacial digital cloud platform hosted by AWS that helps create a digital environmental footprint for farmers. This supports farmers to prove and promote their environmental stewardship of their land as well as supporting community catchment objectives and reporting.

MyEnviro records changes in a farm's environmental management by digitising farm environment plans and integrating real-time, verifiable data and analytics on the things that matter – soil health, water quality, emissions, stock and pasture, and more.

By providing a data driven view, MyEnviro supports landowners to improve environmental stewardship, through an understanding of how their land is currently used, measuring progress on agreed milestones, and assessing how any changes implemented have made a difference to environmental outcomes on their property.

Results

MyEnviro is seeing increased appetite from farmers for digital tools that can support them to track on farm emissions and related actions.

MyEnviro is now working to integrate Adroit real time water and soil moisture sensors, connected over Spark's IoT networks, to MyEnviro's environmental platform. This will enable the delivery of cause-and-effect insights, providing decision making support to landowners and their catchment group. It is hoped that this real time data and analytics and AI capability can also enhance the national freshwater policy.

Westpac Mussels reduces travel through remote monitoring



“Spark and Adroit collaborating made it possible to find a game-changing tech solution for this specific and complex problem.”

Blair Stewart – Commercial Director at Adroit.

Family-owned Westpac Mussels exports to Europe, Russia, the Middle East and the US. To harvest mussels, the salinity in the sea must be within set levels. Measuring salinity has previously been done in two ways: using rain data, which can be inaccurate and lead to lost harvest days, and using legacy data buoys, which have to be cleaned weekly by sending a cleaning vessel out into the Firth of Thames to the mussel farm, at considerable cost.

Solution

Adroit supported Westpac Mussel farmers to improve the quality of its ocean salinity monitoring using a data buoy with an In-Situ salinity sensor, connected to a Libelium IoT logger. This measures ocean salinity every 15 minutes and sends the results to Westpac Mussels via Spark’s IoT Cat M1 network.

The new data buoy only needs cleaning eight times a year, reducing the number of boat trips out for cleaning purposes.

Results

More accurate salinity readings mean better harvesting decisions, fewer missed opportunities, and more total harvesting time. Plus, the new data buoy only needs cleaning eight times a year instead of 50, saving time and money.

Westpac Mussels impact

Sending the maintenance boat out 8 times per year, rather than 50 times per year. Cost saving of $50,000.

Saving: 21 tonnes

Evnex expands remote smart charging to support rural EV adoption



"The decarbonised electricity networks of the future will require hundreds of thousands of connected devices like smart electric vehicle chargers.

For this future to become a reality, we need low cost, secure and high-availability communications technologies.

Spark's CAT-M1 network is a fantastic initiative that has accelerated Evnex's rollout and improved our visibility of our network."

Ed Harvey – CEO Evnex

Evnex manufactures and installs smart electric vehicle chargers for home and business use. It facilitates the largest network of smart chargers in New Zealand (2500 and growing), helping ensure EVs are charged fast, safely, and with the lowest carbon emissions.

In 2021, they needed to effectively manage their distributed charging network in remote areas where less technology infrastructure was available. This was vital not only for them to effectively manage their equipment, but to ensure their network would provide sufficient reach to support EV drivers living in or travelling to more remote areas.

Solution

With both residential and commercial applications, Evnex has developed intuitive, scalable technology to enable load generated by EV charging to be balanced smartly across New Zealand's power supply, and to take advantage of renewable energy for charging. These benefits also support ease of user experience, additional safety features and supporting off-peak charging practices.

Following the upgrade of 263 Rural Connectivity Group cell sites to Spark CAT-M1 IoT technology, Evnex has been able to extend their charging network with real-time monitoring capability into more rural towns, homes, and isolated parts of the country.

Results

The extension of IoT network connectivity has increased the ability for EV charging companies like Evnex to set up chargers in remote locations. Being able to monitor and analyse EV charging data accurately means supporting a secure future for NZ's power supply.

Having more remote charging locations available helps Evnex bridge a barrier for consumers and businesses to own and use EVs in rural areas and create greater equality of support to EV use all over the country.

Real-time bi-directional data monitoring also means that Evnex can work with the national grid to shift electricity load caused by EV charging in cases of high network demand.

Demand-side optimisation to encourage and shift EV charging away from peak hour with thermal generation and substitute to overnight renewables:

0.10 Mt

Support 4% shift from ICE vehicles to EVs by removing barriers to faster adoption by increased charging infrastructure in rural areas:

0.41 Mt

Ngā mihi nui.

This research is a starting point for more kōrero to come. We recognise the vital role collaboration will play in realising the potential of digital technology to meet Aotearoa New Zealand's climate challenge. We look forward to working alongside our customers, the broader business community, the New Zealand Government, iwi, and our communities as we chart a just transition to a high-tech, low-carbon future.

Please get in touch if you would like to discuss any aspects of the research or recommendations.

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About Spark

Spark is New Zealand's largest telecommunications and digital services company. Our customers range from consumers and households to small businesses, not-for-profits, government, and large enterprise clients. Across all our services – mobile, broadband, cloud services, IoT, digital health, data and AI, digital services, and entertainment – we have relevance for almost every New Zealander.

www.spark.co.nz

About thinkstep-anz

thinkstep-anz is an independent sustainability firm with offices across Australia and New Zealand.

We have been helping businesses from many industries succeed sustainably for more than 15 years. Our services span sustainability strategy and technical solutions to make products, businesses and the built environment more sustainable. We also offer sustainability certifications, reporting and plain English communications.

We are a certified B Corp with a science-based target for reducing our greenhouse gas emissions.

www.thinkstep-anz.com

Reference Materials

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