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The future of logistics and transport

National Land Transport Programme

A Port on the Manukau

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ON THE COVER

During the next three years, $1.3b will be spent supporting New Zealand's rail network, restoring its condition, making it more reliable and resilient and providing a platform for growth. *Photo: Waka Kotahi NZ Transport Agency*

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In the next edition

The editorial team welcomes expressions of interest for submitting an article for the March 2022 edition of this journal, especially from young professionals (those under the age of 35). Contributors should in the first instance contact the editorial convenor, Murray King (email murray.king@xtra.co.nz) to discuss their article.

Deadline for the March 2022 edition: February 10.

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The future of logistics and transport

This article is the first in a series that our CILTNZ Vice President, Diane Edwards, will be publishing in our journal over the next year.

In the series, she will explore why it is important to understand what is happening in the world around us, including what is happening in other specialist domains and industries, and use this to think about our own strategies.

How geology and nuclear physics will impact transport and logistics

As an introduction to looking at the future, it is important to understand that disruptive change often comes from leftfield. Rarely does transformational innovation start within the industry it targets. We all know about Amazon, Uber, Airbnb. All very successful companies in retail, public transport, and hospitality respectively. Yet none of them started from within the industries they now dominate. As technology companies, they were not bound into existing business models, nor hindered by people suffering from "educated incapacity", i.e., those who know so much about how their own industry works that they are blind to any other way of doing things.

When change happens that we initiate, it is innovation. When it is innovation that others do that changes us, it is disruption. Businesses that ignore what others are doing are ripe for disruption. So, we do market intelligence, monitor our competitors, survey our industry, and do analysis of what the top transport and logistics companies are doing and what the experts think. This is important, of course, but I would argue not enough. For the reality in today's accelerating business environment is that the innovation that is ultimately going to change the way you do things, influence your markets, lure away your customers, are almost certainly going to come from outside your own industry.

In this series, I will look at some of the interesting changes that are happening across a number of fields and disciplines, that will potentially bring significant change to transport and logistics. Some of it will potentially make our lives easier; others will make us question whether our business models are fit for the future. The quality of your strategic analysis will determine which is which.

Here is an example for you to be thinking about, which has emerged from geology and nuclear physics. Nanodiamonds, also called microdiamonds, form in metamorphic rocks when the rocks are under extreme pressure. They are called nanodiamonds because they are typically less than 1 micrometre (0.001 of a millimetre). Geologists use them to identify continental collision zones and show that the crust has penetrated deeper than 120 kilometres below the surface.

Nuclear physicists also noticed that nanodiamonds are formed as a by-product of nuclear explosions and discovered they can be extracted from the nuclear waste of a power plant. The difference between these nuclear explosion nanodiamonds and those occurring naturally in rock, is the level of radioactivity. However, due to the size of the nanodiamonds, the radioactivity is miniscule and reportedly no greater than that occurring in nature (something being vigorously tested at present).

This is where it gets interesting. The radioactivity has the potential to create a long-life battery which could have a life of several hundreds or even thousands of years – yes, thousands of years! Generating a virtually inexhaustible source of energy from radioactive material has long been discussed and is already employed in a variety of non-diamond-based technologies. Microdiamond batteries have, until recently, been a theoretical concept, but current developments suggest the reality is closer than first thought.

NDB, Inc. is a company that is actively marketing nanodiamond batteries as the saviour of the planet. They believe that the batteries, which effectively convert radioactive decay energy from nuclear waste into energy, simultaneously find a use for discarded nuclear waste and solve the problem of limited life batteries. When these batteries are used to power vehicles, offices, factories etc., the need to burn fossil fuels diminishes, while the extremely long life means that the current issue of battery disposal almost disappears. The company, which won Orano 2020 (recognising innovation start-ups in nuclear physics) explains how this is done in the video at **https://youtu.be/z_P1VNh3Wt4**.

For anyone sceptical about this as an idea from naïve young entrepreneurs, or those needing some academic validation and detailed explanation, using nuclear diamonds as an alternative power source is discussed by Professor Tom Scott of the University of Bristol. One of his lectures on this subject can be seen at **www.youtube.com/watch?v=9fgf0bLuDFk**.

I am guessing that many of you working in the transport industry do not spend a lot of time monitoring the world of nuclear physics, so may not have heard about this emerging technology. However, its implications for transport and logistics are, I hope, now becoming more obvious. There are hopes that nanodiamond powered batteries for vehicles may come on to the market as early as 2024, subject to the normal regulative processes that need to happen. This could mean that many of the current electric vehicles coming on to the market could be obsolete, or hopefully could still be used but will need adaptation.

Of course, there are still many unknowns. The likely cost of a battery is not yet known. Governments, especially in New Zealand with its anti-nuclear stance, may hold up implementation while they explore safety and, I think cynically, worry about how they can replace the tax take on fossil fuels. There may be storage and fitting issues to overcome and perhaps there may be requirements to completely design vehicles. And in warehousing, existing infrastructure may be an issue, if not in the warehouse itself, then the infrastructure of the major power companies that supply them. No doubt there will be other challenges to overcome. Yet the change will come, and if not in two years, then maybe three or four.

When looking at the implications for your own company, armed with this knowledge it may impact your procurement, budgeting, and perhaps even your staffing levels. For a power company, it might go as far as challenging their long-term viability, at least under existing paradigms.

So, as I said at the start, there is huge value in researching well beyond our own industry across disciplines.

Diane Edwards
Diane is an experienced executive, change agent and business transformation facilitator, enabling organisations to prepare for the future of work through practical initiatives to transform the business to be agile, resilient and innovative.

All the projects and activities included in the 2021-24 National Land Transport Programme will ensure Waka Kotahi NZ Transport Agency, together with local government, deliver on the Government's transport priorities for the land transport system, as set out in the 2021 Government Policy Statement on land transport. *Photos: Waka Kotahi*

National Land Transport Programme

BY MATTHEW WALKER

The 2021-24 National Land Transport Programme (NLTP) was launched in September – a $24.3 billion joint programme of investment in Aotearoa's land transport system by Waka Kotahi NZ Transport Agency (Waka Kotahi) and our co-investment partners, local government during the next three years.

All the projects and activities included in the 2021-24 NLTP will ensure Waka Kotahi, together with local government, deliver on the Government's transport priorities for the land transport system, as set out in the 2021 Government Policy Statement on land transport (GPS).

These priorities aim to create a safe and more accessible land transport system that reduces the impact on the environment and provides a more efficient freight network to get goods to market using a combination of transport options – road, rail, and coastal shipping.

The 2021-24 NLTP – available at **https://bit.ly/3xHjcZ2** – is a programme of activities and projects that will continue to change and evolve during the next three years. This will be as a result of programme changes, delays with property purchase and resource consenting, funding no longer being available either through the National Land Transport Fund (NLTF) or from councils, or simply because there is not the capacity within organisations to progress activities as originally planned.

Even when a project or activity is included in the 2021-24 NLTP, it does not guarantee it will be funded. All projects/activities are still subject to a successful Business Case and funding being available when the project is ready to proceed.

Each NLTP, Waka Kotahi receives significantly more bids for funding than forecast revenue from the NLTF. For the 2021-24 NLTP, Waka Kotahi received $17.4b of bids from an original forecast revenue of $13.6b – boosted in the later stages of the programme's development to $15.4 by $2b in additional financing.

All activities and projects in the 2021-24 NLTP must therefore be prioritised for funding on a national basis, using the Investment Prioritisation Method which is developed to ensure the funding decisions deliver on the Government's transport priorities as set out in the GPS.

What is the GPS?

The GPS outlines the Government's transport priorities to guide investment in the land transport system during the next 10 years. It is reviewed every three years and determines how money from the NLTF will be co-invested with local government in a range of activities to maintain, renew, operate, and improve the land transport system.

GPS 2021 has four strategic priorities:

- **Safety** – developing a transport system where no-one is killed or seriously injured
- **Better travel choices** – providing people with better transport options to access social and economic opportunities
- **Improving freight connections** – for economic development
- **Climate change** – developing a low-carbon transport system that supports emission reductions, while improving safety and inclusive access

GPS 2021 sees the NLTF contributing to a wider range of outcomes than ever before:

- developing a safe, reliable heavy rail network;
- improving options in the way we move people and freight, including coastal shipping;
- helping meet housing demand;
- improving urban form;
- adapting to climate change; and
- reducing greenhouse gas emissions from transport.

Within the GPS 2021 there are 11 activity classes. These are: Road to Zero, Public Transport Services, Public Transport Infrastructure, Walking and Cycling Improvements, Local Road Improvements, State Highway Improvements, State Highway Maintenance, Local Road Maintenance, Investment Management, Coastal Shipping and Rail Network. These signal how funding will be allocated from the NLTF.

For each activity class, the GPS signals how funding will be allocated from the NLTF, setting upper and lower investment limits for each activity class, based on meeting existing commitments, maintaining the land transport system at current levels of service for safety and resilience, as well as meeting increased costs for construction, the impacts of climate change and maintenance costs.

GPS 2021 also sets investment expectations in relation to four Government Commitments:

- Auckland Transport Alignment Project (ATAP)
- Let's Get Wellington Moving (LGWM)
- The Road to Zero strategy
- The New Zealand Rail Plan

New activity classes

There are five new activity classes in the GPS 2021:

- Road to Zero which supports investment in activities that will help achieve a 40 per cent reduction of deaths and serious injuries on our roads by 2030.
- Public Transport Services and Public Transport Infrastructure activity classes that recognise the role of public transport in moving large numbers of people, and separating investment in making service improvements from building new infrastructure.
- Rail Network funding to improve access and mobility, transport both people and goods, support productivity and growth, reduce emissions, congestion, and road deaths, as well as strengthening social and cultural connections between communities.
- Coastal Shipping recognises the role of coastal shipping in providing a safe and sustainable mode for transporting large, heavy cargo, such as petroleum products, cement and aggregate, and the potential to grow the use of coastal shipping as an alternative to other freight transport.

There are five interchanges along the 22-kilometre Hamilton section of the Waikato Expressway, which takes SH1 east of the city. This is Greenhill Interchange which connects to the city's ring road system.

The Hamilton section of the Waikato Expressway joins the exiting SH1 at Tamahere where a lot of work has been done to keep local people connected, with ramps on and off the expressway and roads extended.

How the money is being spent?

Safety

In the 2021-24 NLTP, $2.9b will be spent on safety. The focus will be on safety infrastructure, speed management, road policing, road safety promotion and system management. Through the infrastructure and speed improvements programme, Waka Kotahi will continue to target high-risk state highways and local roads to help reduce deaths and serious injuries.

Nationally, it is planned to install 183 kilometres of median barriers, 75 roundabouts and make speed changes to 16,500km of local roads and state highways to prevent an estimated 213 deaths and serious injuries. On state highways, work is planned on 17 high-risk corridors throughout New Zealand, including 51 intersection improvements, 25 new roundabouts, and 164km of median barriers.

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A total of $7b will be invested across the state highway and local road network to maintain current levels of service for safety, access, and resilience.

On local roads, it is planned to invest in more than 1,074 projects, including 50 roundabouts, 190km of median barriers, and speed changes on 13,500km.

The $1.24b to be invested in the Road Safety Partnership Programme will provide road policing activities focused on restraints, impairment, distraction, and speed and include almost doubling enforcement of speed and drunk driving.

Public transport

More than $4.9b will be spent across New Zealand on public transport to make buses, trains, and ferries more reliable and improve the frequency of services, making it easier for people to move around without using their car. This is more than double the investment in the 2018-21 NLTP.

Significant investment is also being made in key projects in the ATAP and LGWM programmes that will bring about the transformational change needed for how people move about these two cities.

Of the $4.9b, $2.6b will be spent to maintain our public transport services, improve safety, and reduce travel times and $2.3b on key public transport infrastructure that will support growth, sustainability and provide travel choice.

Freight

With freight volumes expected to increase 40 per cent by 2053, Waka Kotahi needs to look at new ways of moving freight to reduce carbon emissions and ensure goods get to market on time.

For the land transport system to work most effectively, road, rail and coastal shipping all need to play their part in moving freight around the country.

Through this NLTP, significant investment will be made to improve freight connections to ports, airports, and distribution centres, as well as extending network access that supports High Productivity Motor Vehicles (HPMV) on both the state highway network and local roads, and improving safety and resilience to key freight routes.

Rail

During the next three years, $1.3b will be spent supporting New Zealand's rail network, restoring its condition, making it more reliable and resilient and providing a platform for growth.

Funding for He Mahere mō Ngā Ara Tereina ki Aotearoa, the NZ Rail Plan, has received priority funding through both the new Rail Network activity class and Public Transport Infrastructure activity class to meet the Government's investment commitment to strengthen the role of rail in moving people and freight.

There is also investment to progress rapid transit rail projects and a further $505 million for transitional rail projects started under the previous NLTP. Investment in metro rail is focused on Auckland and Wellington where a large-scale, reliable public transport is essential to support forecast growth.

State highway and local road improvements

More than $3.9b is being invested in state highway and local road improvements during this 2024 NTLP.

On the state highway network, the focus is on delivering existing programmes of work that improve safety, support better freight connections and emission reduction goals. Work will be completed on significant state highway projects, such as Te Ahu a Turanga I Manawatū Tararua Highway to reconnect the Manawatu and Hawke's Bay, the SH1 Waikato Expressway, and Puhoi to Warkworth Motorway extension to deliver better freight connections. In Wellington, the Northern Corridor improvements will help provide safer access to growth areas along the Kāpiti Coast and in Horowhenua and better travel options.

A total of $1.25b will be invested in local roads to improve levels of service on the network, including upgrading and resurfacing existing roads, upgrading intersections, improving, or replacing bridges and HPMV strengthening at key locations.

Local road and state highway maintenance

A total of $7b will be invested across the state highway and local road network to maintain current levels of service for safety, access, and resilience. Of the amount, $4.2b will be spent on local roads, an almost 20 per cent increase from 2018-21, and $2.8b or 30 per cent more on state highways. Discretionary funding has been prioritised for maintenance to help keep roads safe, avoid disruption for users, and avoid future costs restoring the network to sustainable levels of service.

Walking and cycling

More than $910m will be invested in cycling and walking during the next three years on new shared pathways, bike routes, walkways, and pedestrian facilities across the country. This investment has more than trebled from 2018-21. With our co-investment partners, more than 253km of new walking and cycling facilities were delivered during the last three years and the planned investment in 2021-24 will continue that momentum. Cycling numbers continue to grow as regions complete new cycleways, helping to reduce congestion and greenhouse gases and deliver better health benefits for New Zealand.

There is a growing number of cyclists using our urban networks. In Wellington the number of cyclists was up by 15 per cent on last year, while in Christchurch cyclist numbers have grown by 20 per cent and in Auckland numbers by 8.3 per cent since 2019. Investment is focused in our main cities where it has the greatest impact on reducing congestion by improving connections and making active travel safer.

What is the regional investment?

To make our towns and cities better places to live and reduce carbon emissions, the focus for the 2021-24 NLTP is on providing people with easy and affordable access to better travel options, such as new walking and cycling facilities and making public transport more attractive and easier to use, with better and more frequent services and bus prioritisation to reduce travel times.

In rural areas, where people are dependent on travel by private car, funding has been prioritised on activities that support an efficient and safe transport system. This ensures we keep communities connected and can get freight to market, helping regional economies to thrive.

In Northland, $751m is forecast to be spent in the region to create a safe, resilient network to get goods to export markets. Almost half ($344m) of the investment will be spent on maintenance and operations, with significant investment also on speed and infrastructure improvements along SH1, SH10 and local roads.

Forecast investment in Auckland is $7.3b, with the focus on continuing to deliver the ATAP, supporting population growth and the development of new communities with better access to more sustainable travel choices.

Waikato's significant contribution to the economic wellbeing of New Zealand underpins the $1.5b forecast investment in a safe, accessible system for the region to move people and goods inter-regionally. Almost half the funding ($781m) will be spent on maintenance and operations, and $224m to improve safety, with more than 20 per cent of Aotearoa's deaths and serious injuries being in the Waikato.

Forecast investment of $1.4b in the Bay of Plenty's land transport system will be targeted at supporting economic growth. The region has a significant role in producing and transporting goods, and needs to respond to high levels of population growth, which require safe, reliable access and better travel options to connect local communities.

For Gisborne's economy to grow and for people to access essential services such as health and education, the region relies on a resilient roading network. Almost two-thirds of the $209m forecast investment in this NLTP will be spent on maintenance and operations.

Forecast investment of $376m in the Hawke's Bay land transport system during the 2021-24 NLTP is targeted at improving safety and resilience while supporting the region's economy and forecast growth. More than 130km of the region's state highway network will be made safer with infrastructure improvements and speed management.

More than $447m is forecast to be invested in Taranaki to improve network safety, with trucks travelling more than 75 million kilometres on the region's roads each year, and resilient to get goods to market with Taranaki having the second highest average GDP per capita.

Forecast investment of $1.3b in the Manawatū/Whanganui region during 2021-24 will strengthen the region's position as an important freight hub connecting the central North Island while also supporting the local economy, regional development, and urban growth.

Forecast investment of $3.1b in Wellington is focused on getting more people using sustainable travel options to move around the region and improving the safety, reliability, and resilience of the overall transport network.

Through the top of the South – Nelson, Tasman, and Marlborough – the forecast investment of $289m will support good freight routes to ensure economic prosperity and greater numbers of people using public transport and walking or cycling in the main urban areas.

On the West Coast, maintaining the region's road and rail freight connections is essential for the region's recovery after its main economic driver, tourism, was severely impacted by COVID-19. More than half the forecast investment of $178m will be spent on network maintenance.

The forecast $1.2b investment in Canterbury during 2021-24 is targeted at improving safety across the region and building greater resilience into the road and rail network to boost the economy.

In Otago-Southland, it is forecast to spent $1.1b on a range of projects to make the network safer and support economic recovery and growth post COVID-19.

Our commitment is to deliver a land transport system that connects people, products, and places for a thriving Aotearoa.

For more information, visit **www.nzta.govt.nz/nltp**.

Matthew Walker

Matthew joined Waka Kotahi as General Manager Corporate Support in April 2020. Prior to his appointment, he was the Group CFO at Auckland Council. Matthew's career spans private and public sector experience and covers investment management, utility, and local government sectors in New Zealand and Australia.

Over the next 30 years, thee number of people who call New Zealand home will grow significantly, according to Te Waihanga Strategy General Manager Geoff Cooper. At the same time, New Zealand faces rising congestion, so our infrastructure system needs to be a part of the solution. *Photo: Linkbusiness.co.nz*

Building out of congestion not working

The New Zealand Infrastructure Commission Te Waihanga has given the Minister for Infrastructure a draft strategy for how infrastructure can support a thriving New Zealand.

BY JAMES PAUL

The overview of the Infrastructure Strategy doesn't mince its words; climate change, unaffordable houses, congested cities, and leaking pipes are serious issues we must wrestle with while our population continues to grow, and our infrastructure leaves a lot to be desired.

Published on 13 October, the 245-page strategy contains 67 recommendations to central and local government, as well as the infrastructure sector, on how to create an "infrastructure system that gets the best results for all New Zealanders both now and well into the future".

In preparing the draft strategy, with a vision of *Infrastructure lays a foundation for the people, places and businesses of Aotearoa New Zealand to thrive for generations*, more than 20,000 New Zealanders shared their views on issues through Te Waihanga's 'Our Aotearoa 2050'.

Some of the issues raised in that survey highlighted Kiwis' concerns with the time it takes to build new transport options, ageing schools and hospitals, as well as a need for more investment in our water networks, the creation of too much waste, and ensuring the environment is the top priority when it comes to making infrastructure decisions.

Therefore, the strategy sets a direction for a net-zero carbon economy, cities that are affordable and easier to get around, and a New Zealand that produces zero landfill waste. Additionally, the strategy identifies a pathway for more connected and prosperous regions, infrastructure that is resilient to the many shocks we face including the COVID-19 pandemic, and would make it easier to get things done.

So, it won't be enough to simply keep doing what we've always done, the report states. If we attempt to build our way out of the infrastructure problem, New Zealand will almost double its current spend – which is, currently, around 5.5 per cent of GDP. Over a 30-year period, this doubling of infrastructure spend is equivalent to around $31 billion per year, or around 9.6 per cent of GDP.

Therefore, the strategy recommends that in addition to investing in and building more infrastructure, it is paramount that New Zealand is smarter in how we plan, deliver, and use it, too. to do this, the strategy identifies four ways of achieving this: make better use of infrastructure; ensure better project selection; broaden funding and financing options; and streamline delivery.

Te Waihanga Chief Executive Ross Copland says it's our job to think about these challenges, but also to harness the immense opportunity our infrastructure offers. This means looking at the whole infrastructure system, and it also means looking at the way we fund and pay for it and its regulatory settings.

"Getting our infrastructure investment programme right will be critical to meeting these challenges. But we can't just build our way out. We have to find ways to get the biggest bang for our buck. This means encouraging people to drive at less congested times through congestion pricing and financially rewarding those who save water.

New Zealand's largest tansport construction project, Auckland's City Rail Link, has been judged the leader in delivering sustainable infrastructure by winning the NZI Transforming New Zealand Award. *Photo: City Rail Link*

"Within our cities, we need to ease planning restrictions that prevent people from living in areas already well served by infrastructure, we need to push back against NIMBYism and question the substantial increase of 'experts' that on many counts, have captured our consenting system.

"We also need a world class construction sector. Since 2000, the number of people working in heavy and civil construction has more than doubled, yet construction labour productivity lags behind the rest of the economy.

"The cost to build infrastructure has risen rapidly. There are many reasons for this, but a major factor is a labour shortage, now the worst since 1975. By 2024, we'll need around 118,000 more construction workers.

"Greater certainty is critical. Painting a clear picture of planned investment through a more sophisticated infrastructure pipeline is important and addressing the politicisation of infrastructure decision making is essential. This will give the construction sector and those sectors that support it, the certainty it needs to invest in training and people, modern plant and innovation to improve productivity."

A few of those crucial steps are changing the way we pay for services to better manage demand, taking a longer-term approach to urban planning, and removing barriers to building homes in the parts of our cities where there's already infrastructure.

The draft strategy includes recommendations for a more efficient infrastructure system, identifying a range of tools for funding infrastructure, encouraging the uptake of technology, as well as actions to overcome labour challenges and improve decision making.

It also includes strategic recommendations for growing New Zealanders' wellbeing and addressing long-term challenges like climate change and population growth.

Recommendations include:

- Considering congestion charging for some of Auckland's busiest roads and the potential for getting better use of Wellington's roads, while at the same time, funding public transport.
- Increasing housing opportunities in areas with infrastructure access, reducing costs and increasing housing affordability.
- Ensuring population and infrastructure planning are closely linked.
- Consolidating multiple infrastructure capital funds.
- Allowing for water meters to manage demand and encourage water conservation.
- Preparing infrastructure for the impacts of climate change.
- Helping councils to align infrastructure and planning decisions in areas where current boundaries don't reflect where people live and work.
- Reducing the amount of waste we create, particularly for products that can't be recycled.
- Increase technology use, including greater uptake of real-time data about infrastructure that can help with planning and maintenance, for instance, through digital twins.
- Standardising planning policy across New Zealand and requiring New Zealand cities to plan for significantly more growth.
- A material increase in funding to meet the infrastructure challenge and boost productivity, and options for ensuring that those who benefit most from infrastructure pay a fair share.
- Streamline consenting processes, particularly for infrastructure that helps meet national objectives like a zero-carbon economy, and reduce the regulatory burden on construction materials.

Infrastructure New Zealand (INZ) worked with Te Waihanga and held a series of workshops around the country earlier this year, allowing members to provide direct input to the draft strategy. INZ General Manager, Claire Edmondson, welcomed the draft strategy, saying it was a really good start.

"We need a strategy, and it's good to have a 30-year plan out there. It sets out a vision, but also highlights challenges showing we need to improve our system for planning and building infrastructure, and also make better use of what we already have.

"Most of the 67 recommendations address known issues, and work on some is already underway, including resource management reform, emissions reduction and a national digital strategy. It won't come as a surprise to anyone that we need to ensure the resource management system doesn't unnecessarily increase project costs, efficiency and smarter ways of getting things done.

"The sector will be particularly thrilled at the recommendation of an independent Infrastructure Priority List to build consensus around key projects and initiatives that address significant long-term problems. This will enable the sector to ensure it has the appropriate resources and supply chain to compete for and deliver this work.

"The sector will also be pleased with the recommendation for a national infrastructure skills plan to ensure we have the right people with the right skills to develop our infrastructure in the medium to long-term."

This draft strategy has been presented to the Minister for Infrastructure, Hon Grant Robertson, for feedback, which is to be provided by the end of December 2021. The final strategy will be given to the Minister by March 2022 to be tabled in Parliament when practicable, following feedback. Within six months of receiving the final strategy, the Government must provide its response.

Emissions reduction plan

What will New Zealand look like in the Climate Change Minister's "future that is more equitable, more prosperous, and more innovative – and all within planetary limits"?

BY JAMES PAUL

The Climate Change Response Act 2002 requires the Government to publish the emissions reduction plan by 31 May 2022, after it gave itself a five-month extension in September, setting out how New Zealand will meet its climate targets.

In October, the Ministry for Environment released its discussion document (the document) seeking comment from the public about what should be included in the plan towards transitioning to a low-emissions future.

Hon James Shaw, Climate Change Minister, wrote in the document's introduction that the plan will set the direction for climate action for the next 15 years and require action across a range of areas, including energy, transport, waste, agriculture, construction and financial services.

"You will see there is still work to do, but that is precisely why your feedback is so important. We also want to make sure that the emissions reduction plan reflects the part we must all play in the transition to a low-emissions future.

"Government policy will be crucial, but so too are the plans and strategies you will develop to reduce emissions in your own organisations and communities. We want to hear what these plans are – and how we can support you so that together we build a better, cleaner future.

"The final emissions reduction plan needs to pull together the collective effort of every part of Aotearoa. It needs to set out future policy and regulatory change, but also the action that can be taken in every business, every town and city, and every community."

Therefore, all greenhouse gases, other than biogenic methane, must reach net zero by 2050, and emissions of biogenic methane must be reduced to at least 10 per cent below 2017 levels by 2030, and to at least 24–47 per cent below 2017 levels by 2050.

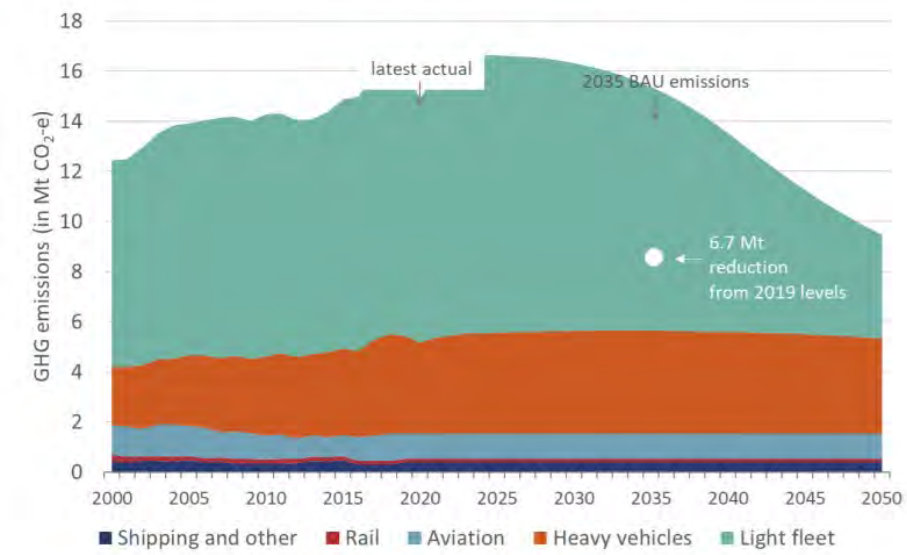
Reaching these targets is no small task, so what does this mean for transport? Currently, transport is our second-largest source of greenhouse gas emissions, responsible for approximately 20 per cent of gross domestic emissions and 43 per cent of total domestic CO2 emissions.

To achieve a zero-carbon transport system by 2050, the Climate Change Commission recommends reducing transport emissions by 13 per cent by 2030, and 41 per cent by 2035 (compared to 2019). This is equivalent to a 6.7 mega-tonne (Mt) reduction from 2019 levels.

"The scale of change to achieve these reductions and complete decarbonisation cannot be overstated," the document states.

"Decarbonising transport also offers opportunities to improve the wellbeing of

Figure 4: Ministry of Transport's emissions projections for transport



The Ministry of Transport forecasts that transport emissions will be nearly double where they need to be in 2035, unless we introduce major interventions to put us on a different pathway. *Photo: Ministry for the Environment*

New Zealanders. Air pollution, crashes and congestion from traffic impose a large cost on our health, environment and economy. For many people and communities, transport is not affordable or accessible.

"The transition could make transport more inclusive, safe, healthy and resilient, and better support economic activity. Many difficult decisions and major investments are needed to create sustainable travel options for them. The Ministry of Transport forecasts that transport emissions will be nearly double where they need to be in 2035, unless we introduce major interventions to put us on a different pathway. We need urgent, wholesale changes across the system to change this trajectory."

In order to change the trajectory, the Government needs to "use all our levers together in a concerted and coordinated way to achieve the scale and pace of change required". One of those levers is the regulatory system – including transport-specific laws, regulations, rules and standards, and changes to the resource management system so that urban planning supports lower emissions urban form.

Another is investment and funding – such as the Government Policy Statement on Land Transport, and economic incentives – such as fees and rebates to encourage the uptake of cleaner vehicles and fuels.

One interesting lever is the so called "leading by example and setting expectations" which the document gives an example of public sector procurement requirements for electric buses and cars; and setting expectations for Waka Kotahi NZ Transport Agency, Maritime New Zealand and the Civil Aviation Authority to incorporate emissions reductions into their decision-making.

But one of the most challenging levers to pull might be the document's "behaviour change tools", establishing public communication campaigns, while recognising that the biggest barrier is often a lack of good transport options.

This ties into the document's focus area of reducing transport emissions over the first three budget periods, yet is scant on detail. For example, the first focus area is reducing reliance on cars and supporting people to walk, cycle and use public transport.

The transport target for this is to reduce vehicle kilometres travelled (VKT) by cars and light vehicles by 20 per cent by 2035 through providing better travel options, particularly in our largest cities.

The document states that this could look like making public transport cheaper, implementing congestion pricing in Auckland while creating a model that other city councils can adopt, and investigating ways to raise revenue for transport in future, including to replace the land transport funding system.

Many would have already begun thinking about the Government's decarbonisation of public transport – requiring only zero-emissions public transport buses to be purchased by 2025, and an overall target of decarbonising the public transport bus fleet by 2035.

It is estimated that this pathway will reduce emissions by 51,400 tonnes for 2022-2025

"The amount of travel that people do in fossil-fuelled vehicles is at the heart of the transport emissions challenge. We cannot rely on just decarbonising the vehicle fleet quickly," the document states.

"Offering better options and managing demand to reduce VKT by cars is vital. Most of this reduction must be in our largest cities, where people are more likely to have other choices. Encouraging the uptake of public transport, walking, and cycling and managing demand on the transport network offers significant benefits beyond reducing emissions.

"This includes improved travel choice and accessibility, better health and safety, and less congestion. This ambitious VKT target will require the Government to also address the broader systems that affect transport, such as urban development and land-use planning."

There are other new strategies and policies the document seeks feedback on, related to transport, and there is a lot to do and not a lot of time to do it in. Arguably, one of the most important aspects of New Zealand's transition to a net zero economy is planning.

As the document puts it: "Decisions on land use and resources affect the emissions pathway we take, and can lock us into that pathway for generations to come".

In many parts of New Zealand, rapid outward growth has led to poorly functioning urban form and higher emissions. Strategic planning and investment can lower emissions over time by influencing urban form through locating medium- and high-density development and mixed-use centres to support active and public transport.

Therefore, planning can drive climate action in almost every sector, the document states. The total emissions contribution of urban areas is unknown, and a method to measure the emissions associated with urban development decisions is sorely needed.

This should incorporate the likely lifetime emissions of transport and energy use that would be enabled under different scenarios, and embodied emissions in buildings and infrastructure.

"Understanding the emissions impact could inform strategic, spatial and local planning and investment decisions, and drive emissions reductions going forward," the document states.

"There are major opportunities in planning and investing for a more compact mixed-use urban form, oriented around public and active transport."

Auckland's congestion across the network has worsened over the past few years. An average weekday motorway trip now takes almost 10 per cent more time than it did four years ago, and motorists now need to allow an additional 40 to 55 per cent longer for their trips to be assured of arriving on time. *Photo: iStock*

Congestion pricing investigation highlight its viability, acknowledges obstacles

Developing and implementing successful congesting pricing schemes throughout the world has proven its viability. So, can Auckland do the same or will public perception prove too difficult to overcome?

BY JAMES PAUL

Singapore, London, and Stockholm all have something in common. Despite having much larger populations than Auckland – bar Stockholm – their congestion pricing schemes have generated meaningful and sustained improvements in network performance, lifted public transport mode share, generated better environmental outcomes, and helped provide sustainable funding streams.

However, there were failed international examples of the scheme which were rejected, in part, due to social issues not being adequately addressed and the potential adverse community impacts. These negative aspects were amplified by poor and unclear communication – as is with most large projects – along with concerns over whether it was being motivated by revenue raising, rather than improving network performance.

All three cities were used as case studies in the Government's joint project with Auckland Council to investigate the viability of the scheme in the City of Sails, titled the Phase One Report: The Congestion Question. The report built upon the Auckland Transport Alignment Project's 30-year transport system vision, identifying "pricing as having a significant potential to manage travel demand and reduce congestion".

The executive summary of the report stated the collaborative analysis showed Auckland's congestion across the network has worsened over the past few years. An average weekday motorway trip now takes almost 10 per cent more time than it did four years ago, and motorists now need to allow an additional 40 to 55 per cent longer for their trips to be assured of arriving on time.

"Congestion is also increasingly a problem throughout the day and at weekends, not just in the peak times. Without congestion pricing, our analysis shows that congestion is expected to become more widespread, even after a significant programme of investment in roading, public transport and active modes.

"The proportion of car travel in severe congestion is projected to increase by around 30 per cent in the morning and afternoon peak, and 50 per cent in the interpeak. This means that Aucklanders' access to jobs, education and other opportunities will become more difficult, negatively impacting both the productivity and liveability of the city."

While the report acknowledged that international evidence from cities such as Singapore, London, and Stockholm showed

congestion pricing can be used successfully to influence travel demand and ease congestion, it was also aware of Auckland's unique problems and that navigating them represented "uncharted territory when it comes to developing and implementing a congestions pricing solution".

Therefore, the report determined that – with the technologies currently available to implement congestion charging – the most suitable and cost-effective solution for an Auckland iteration would be automatic number plate recognition.

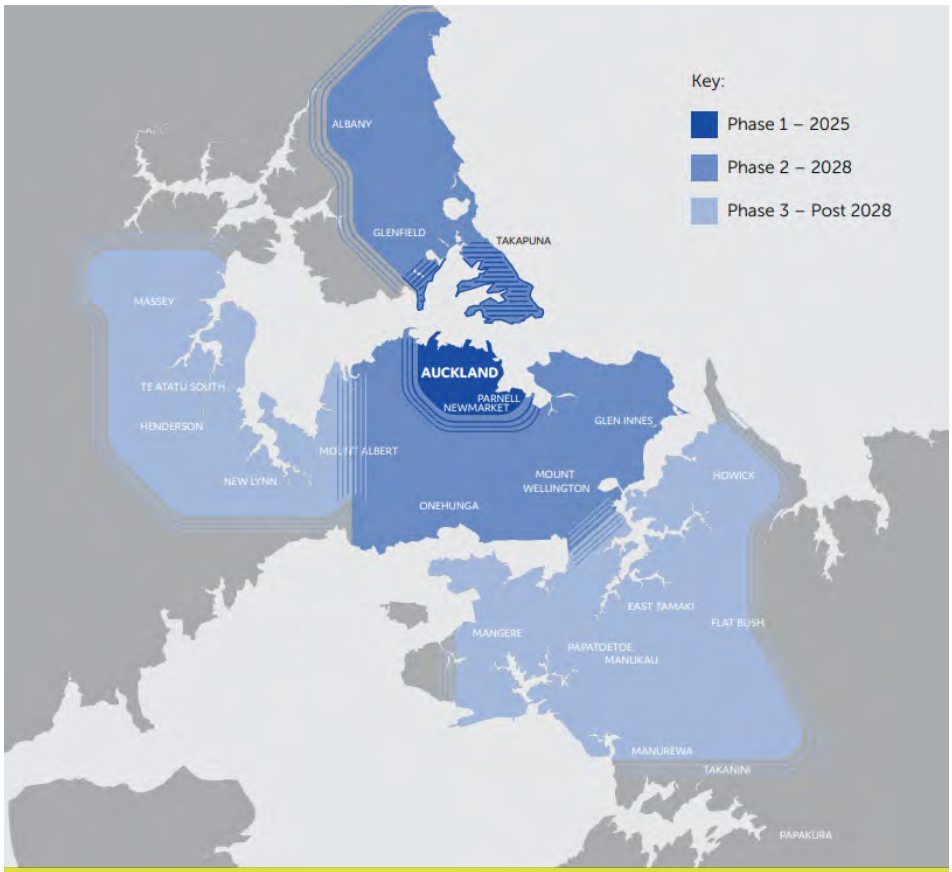
Looking to the near future, Global Navigation Satellite System (GNSS) could provide a more sophisticated solution but there is scant evidence of its success after Singapore's rollout of the GNSS Electronic Road Pricing network was delayed due to the impact of the coronavirus outbreak on global supply chains. The new infrastructure now was expected to be complete in mid-2023.

"Expansion and evolution of the current electronic Road User Charges system for heavy vehicles in New Zealand could be one pathway for any eventual implementation of GNSS-based systems for demand management purposes. Given the inherent uncertainty around how transport technologies might evolve, it is important that we consider the flexibility and scalability of any pricing option for Auckland," the report states.

The report identifies three existing technologies that could help implement congestion pricing:

- **Dedicated Short Range Communications** is very reliable but relatively expensive as it involves gantries or poles for antennae and beacons for each charging point, and each vehicle must be equipped with a small electronic 'tag' so they can be detected. Number plate recognition would still be required for enforcement.
- **Automatic Number Plate Recognition** (ANPR) converts images of number plates into digital information that allow a vehicle to be identified and matched to owner accounts and charging products, as well as enabling identification through the Motor Vehicle Register. It is already used in New Zealand's three toll roads to identify and charge vehicles.
- **Electronic Road User Charges** is currently used in New Zealand as an option to measure road use and pay road user charges for approximately 12 per cent of the heavy vehicle fleet. This is a GNSS-based charging system based on weight, vehicle type/configuration and road type.

The report noted the emerging technologies, such as GNSS, in-vehicle telematics that employ wireless communications that transmit data, and utilising a smartphone's applications to alert drivers to impending charge zones.



Indicative phases of an Auckland congestion pricing scheme from the Ministry of Transport's The Congestion Question Main findings. *Photo: Ministry of Transport*

However, each option presented significant obstacles to implementing, including GNSS which would require on board units to be installed in every vehicle, and still be supplemented by ANPR technology to service out-of-town and occasional users.

That is why the report made it explicitly clear that that any foray into congestion pricing would likely fail without public understanding, input, and support.

"While there may be several approaches to congestion pricing that could be effective, they are unlikely to be successful if people do not understand or accept its potential," the report states.

"The key impacts of congestion pricing on those using the transport system, businesses and households, including fairness, equity and distributional impacts, will also have to be carefully considered. There may need to be trade offs between addressing these impacts, such as through mitigations or exemptions, and the effectiveness of the overall scheme in reducing congestion."

Essentially, the report concluded that while congestion pricing "can improve things", but recognises that a "lack of public acceptance is the single biggest factor that has halted development of urban congestion pricing schemes internationally". Therefore, further work engaging the public was recommended in the last 2020 report.

This led to the Transport and Infrastructure Committee's inquiry, seeking public submissions early this year in March until May, informing their eight recommendations to government – one of which includes progressing legislation to enable cities to use congestion pricing as a tool in transport planning.

Additionally, they recommended that any revenue raised by a congestion pricing scheme be used to mitigate equity impacts and reinvest in public and active transport in the region where the charges apply, as well investigating the removal of the Auckland regional fuel tax.

The committee concluded that: "If implemented, congestion pricing in Auckland would be the first scheme of its kind in New Zealand, and could be implemented in other New Zealand cities in the future ... We hope to see the Government progress a congestion pricing scheme, taking into account the points and recommendations we have made".

CentrePort is progressing its vision to build a 21st century supply chain asset for the benefit of central New Zealand and the country. *Photo: CentrePort*

CentrePort — the port of choice for central New Zealand

BY JOHN TULLOCH

CentrePort's central location and natural sheltered deep-water harbour help make it the port of choice for Central New Zealand as a vital logistics supply chain asset for regional businesses and communities.

In addition to facilitating the movement of containers and bulk cargoes, CentrePort provides the infrastructure for the interisland ferry link, and a fuel facility supporting the supply across the lower North Island. CentrePort provides a marine service supported by two purpose-build tugs and two pilot launches.

A hinterland strategy of cargo aggregation and hubs connects shippers from Taranaki, Whanganui, Manawatū, Hawke's Bay, Wairarapa and Marlborough as well as Wellington to national and international logistics supply chains.

This strategy is supported by the CentreRail service which is a partnership with KiwiRail. CentrePort and KiwiRail have provided the CentreRail service since 2013. This connects businesses in Taranaki, Whanganui, Manawatū, the Wairarapa and Marlborough to global markets.

The inland hubs utilise long-haul rail transport to the port from key aggregation points. This improves efficiencies in logistics, creating a reliable, sustainable connection from these sites to the world.

BERL research estimates CentrePort-related activity supports over 26,000 jobs in central New Zealand and contributes to $2.5b to GDP.

CentrePort is owned by the Greater Wellington Regional Council (76.92 per cent) and Horizons Regional Council (23.08 per cent), so we truly belong to the people of central New Zealand.

Our People

At the heart of CentrePort's business are the 200+ employees and many more contractors who keep the business running 365 days a year.

Health and safety is our primary focus, and CentrePort is achieving continuous improvement in key measures as it strives to be a zero harm port.

With up to 1,000 people working on the ground at any one time, including staff, contractors and visitors, it's critical that the port has a supportive health and safety culture.

To help achieve this at our port, CentrePort is following best practice by driving a culture shift away from a top-down approach to one that's based on people focusing on their own and their peers' safety.

CentrePort also recognises that safety is good for business, and efficiency and productivity are key topics in every discussion on safety initiatives. Safety in design is a key element in our investments in new plant and when developing processes and systems.

Our people have stepped up since the arrival of COVID-19, ensuring the continued operation of essential service.

Regeneration

CentrePort is progressing its vision to build a 21st century supply chain asset for the benefit of central New Zealand and the country.

Since the significant damage caused by the 2016 Kaikōura earthquakes, and subsequent insurance finalisation in 2019, CentrePort has made significant progress in its regeneration.

We are engaging with stakeholders, customers and partners on our plan – a plan that reimagines what the port will look like in the future.

We've utilised international expertise with world class input from experts including Hamburg Port Consulting, economic consultants BERL and management consultancy KPMG.

Our regeneration approach has been developed using the UN Sustainable Development Goals and covers safety, resilience, technology, risk management, the environment and needs of the community, and regional and national economies.

The regeneration programme to date has seen the removal of 21 damaged or redundant buildings, repurposing of port land, ongoing land resilience works and the introduction of a carbon emissions strategy among other actions.

Major projects currently completed/ underway include:

- The return of container cargo by rail onto port after four years with the reinstatement of rail infrastructure damaged by the Kaikōura earthquake.
- Progress on the $38.6 million Thorndon Container Wharf reinstatement project that will double the operational length of the gantry cranes to increase operational capacity to meet customer requirements.
- Expansion of the Waingawa log yard capacity from 9,000 tonnes to 16,000 tonnes and procurement of additional land for further expansion.
- Ground resilience improvements throughout the port including installation of thousands of stone columns.
- Establishment of a new vehicle marshalling yard to support the StraitNZ Bluebridge operation, and expansion of a vehicle import space able to accommodate 400 units.
- The Seaview Wharf resilience project which will include upgrades to the wharf and dolphin structures.

Primary cargoes

Logs: The 'wall of wood' has continued with CentrePort continuing to achieve significant growth in volumes year on year. In FY21 volumes increased by 21 percent to a record 1.8m JAS. Overall volumes have nearly doubled in the past five years.

There has been significant investment in the Waingawa log facility just south of Masterton, This facilitates storage of 16,000 JAS (soon to be further expanded) linking to a rail service direct through to the port.

Containers: The strength of CentrePort's container service was enhanced in FY20 with the addition of the ANZEX/CNS/NCS service, providing importers and exporters with direct access to the growing North East Asia market. It is operated by the ANL, COSCO, OOCL and PIL shipping lines, providing internationally proven capability and capacity.

The service complements the existing three services:

- Kiwi Express/Capricorn, operated by MSC, which provides global links via a mix of direct calls and transhipment.
- South East Asia/NZS/NZE/KIX, operated by ANL, COSCO, OOCL and PIL, shipping directly to South East Asia.
- Trans-Tasman Kiwi, operated by ANL shipping directly to Australia.

The ongoing global logistics supply chain disruptions and COVID-19 impacts resulted in only modest growth in volumes in FY21, with 91,900 TEUs moved. The container operation will be enhanced by the completion of the Thorndon Container Wharf reinstatement project in early 2022. The operational width will be increased from 126 metres to 261 metres, increasing the efficiency of container exchanges and boosting productivity.

Fuel: The Seaview Wharf facility receives approximately a million tonnes of petroleum per annum. This supplies land fuel to the lower North Island as far north as southern Taranaki across to southern Hawke's Bay. The Burnham Wharf facility facilitates all the aviation fuel to Wellington Airport.

Vehicles: FY21 saw strong growth in volumes with a 21 per cent increase with over 26,000 units received. The vehicle operation has been enhanced with the expansion of storage area for 400 units, utilising land previously occupied by a redundant building.

Cruise: The port's cruise business remains on hold due to the Government ban on international cruise ship visits to New Zealand ports as a result of the COVID-19 pandemic.

After a record 2020 cruise season, with 112 vessels visiting the port, a new high of 135 ships was booked to visit in the 2021 year.

While the future remains uncertain, CentrePort is looking forward to welcoming international cruise vessels back into the port as soon as it's safe to do so.

Environment

The environment is one of the pillars of CentrePort's regeneration, which includes taking up the challenge of reducing carbon emissions.

CentrePort's carbon emissions reduction strategy goals are to reduce emissions by 30 per cent (excluding growth) by 2030 and to become a net-zero emitter by 2040. Achieving these goals is not just about planning for the future, it's about acting now.

Recent initiatives underway include:

- CentrePort's partnership with New Zealand Green Investment Finance (NZGIF) has provided a 'green credit facility' of $15 million. Some of this facility has been applied to the purchase of seven new, 100 per cent electric container-transfer vehicles and trailers. These new units will not only reduce our emissions by 230 tonnes per annum but enhance our productivity.
- The NZGIF facility has also been applied to the Rail onto Port initiative, which has reinstated rail infrastructure damaged by the 2016 Kaikōura earthquake. This has eliminated the need for 'road bridging' cargo from a nearby rail yard and further reduced our emissions.
- CentrePort's lighting system is being progressively upgraded with LED technology and this year electric forklifts and light vehicles have been introduced.

These initiatives are just the start, and CentrePort is exploring exciting new technology involving hydrogen and solar as it continues the journey towards being a net-zero-carbon-emitting business.

Community

Aligned to CentrePort's environmental goals, we have joined forces with ZEALANDIA and others to help protect one of Wellington's most precious waterways – the Kaiwharawhara Stream. The stream, which runs from the native wildlife sanctuary in Karori to an estuary into Wellington Harbour, is important for fish habitats and migration and is precious to Wellingtonians for recreation and its environmental values.

The restoration of the Kaiwharawhara Stream is part of the ZEALANDIA-initiated Sanctuary to Sea project.

Although CentrePort has been part of activities in the catchment for several years, including beach clean-ups, enviro school visits and ecological surveys, this year we have become a formal partner in Sanctuary to Sea.

Among a range of other community initiatives, CentrePort is proud to support the next generation of sailors through our long-running sponsorship of the CentrePort International Youth Match Racing Championship.

Every year in late summer, Wellington Harbour is alive with yachting action as a group of the top under-23 sailors from New Zealand and abroad battle it out for the match cup.

This is our longest-running sponsorship partnership, which is now into its 19th consecutive year. The event is organised by the Wellington Youth Sailing Trust, which supports the development of youth leadership through sailing.

John Tulloch
John is a communications / marketing professional with experience in the public and private sector, who has senior management experience and capability, leading teams of various sizes.

The future of aviation and urban air mobility

Innovation in New Zealand's aviation and urban air mobility industries have come on in leaps and bounds, so much so that just the thought of considering how Civil Aviation Authority's (CAA) rules for unmanned aircraft (or drones) would apply when people are travelling on such modes seemed ridiculous only six years ago.

It was an anecdote shared by the Ministry of Transport's Manager of the Strategic Policy and Innovation team, Richard Cross, at the latest Intelligent Transport Systems New Zealand (ITSNZ) webinar panel led by Director Armin Guttke. The panel focussed on how urban air mobility will integrate into our country's existing transport network.

Urban air mobility, also known as advanced air mobility, refers to urban transport systems that move people by air, and has been developed in response to traffic congestion.

"We all considered [the notion of people on unmanned aircraft] for about 30 seconds, and then I think we broke out into spontaneous laughter because it just seemed so unrealistic at the time," Mr Cross said.

"So, it's been really fascinating to be involved in this, and to see in the space of about six years, we've just transitioned to a completely different world where our biggest problem is really how do we keep up with the demand and resource this sort of work. In the scheme of things, it's a nice problem to have."

Mr Cross was discussing the merits and potential of aviation to change the way we deliver goods and services, and travel for personal reasons alongside Wisk's Asia Pacific Region Director Anna Kominik, Jude Rushmere from the Ministry of Business, Innovation and Employment's Airspace Integration Trials, CAA's Director of Emerging Technologies Programme Steve Smyth, and Shaun Johnson, Chief Executive of Merlin Labs.

The panel's first question was to discuss what integration with the broader transport system looks like for urban air mobility to support our path to net zero, in relation the Government's recently released draft Emissions Reduction Plan.

Mr Cross broke the question into two answers, stating that overcoming the basic perceptions of urban air mobility held by the public is the first stumbling block to making the technology a reality.

Because this technology is being developed by the private sector, Mr Cross said that many might believe that bringing urban air mobility to the fore is as simple as someone buying land and building vertiports – landing and take-off areas designated for helicopters and tiltrotors.

"But I think it's going to be a hell of a lot more complicated than that. I think there's going to be a lot of stakeholders that want to be involved in thinking about how this will fit within the transport system that we've got now," he said.

"I think [urban air mobility is] going to be its own thing; it's not a matter of 'this is going to replace cars', or 'this is going to replace aviation' as we know it today. I think urban air mobility is a technology that will find its own place in the transport system."

One of the key things regarding a well-integrated system is ensuring people consider, well in advance, how urban air mobility fits with the Government's transport goals and what the high-level outcomes are.

"And there's lots of things we don't really know yet ... like noise profiles and whether you have dedicated air corridors across cities. And now is the time to start thinking about where it might fit within an urban area, and how it might be used inter-regionally as well."

As for the technology's ability to support New Zealand's path to net zero, there is an opportunity to help decarbonise the aviation sector – a large source of emissions. But, again, careful consideration is needed about where it is implemented. Mr Guttke emphasised that a future system would need to look at all things "on balance" when considering the potential benefits of urban air mobility as part of the future transport system.

"New Zealand is really well placed in that regard, given that we've got such high levels of renewable electricity," Mr Cross said. Mr Rushmere agreed, stating that using the country's natural resources for powering electric aircraft wasn't impossible. Nevertheless, we shouldn't ignore the elements of urban air mobility that will not be electrically powered.

"So, we've got the likes of Merlin's aircraft development activities, converting existing type-certified aircraft which could potentially be converted to electrical propulsion in the future. But maybe an easier path which would align with decarbonising the broader aviation environment is the potential to move to sustainable aviation fuels.

"The recent government partnership with Air New Zealand to assist that, definitely examines whether that is a viable option for New Zealand as we progress. Another use of all that renewable energy could be to generate hydrogen, which is also another energy-dense, potentially viable fuel source; whether we're using it to combust or we're using it to power fuel cells, which generate electricity to provide propulsion on board."

Panellists were then asked about the Infrastructure Commission's draft 30-year strategy, and how and why urban air mobility could change the lack of public transport and the timing issues of getting around cities.

Ms Kominik raised a fundamental point, in that the current transport system suffers from inequities and accessibility issues, and so holding up urban air mobility as a solution or a fix to that is misguided.

So, the question then becomes about how people are accessing transport; are they able to access it in ways that are meaningful for them, which Ms Kominik says can touch on infrastructure and urban planning, as well as the transport system itself.

"But in terms of the opportunities that advanced air mobility, done well, should be able to provide, it is obviously utilising a resource that we currently – arguably – could do more with. And when it comes to ground-based infrastructure – roads, tunnels, bridges, rail lines – they all require significant investment and often disruption and displacement. Then of course, you've got to maintain them.

"So, I think there's a huge opportunity for advanced air mobility and urban air mobility, like what we're producing, and that is to actually support that middle mile transport. And that can be a long way, up to 1,900 kilometres, so we're talking about large areas.

"This then means it can start to contribute to a different a way of looking at our cities.

Rather than concentration in the CBD, it actually supports people to live further out, but still be able to come into the city."

In terms of what this technology could mean for people over the next 30 years, Ms Kominik believes we will come to view how we build and connect to our cities with a new perspective, utilising the "middle mile aircraft" to support new options to live differently.

Furthermore, the regional opportunities when applying this technology are even more exciting, Ms Kominik said.

"Some of these [short flights] will start to open up regions in such a way that we haven't seen before. So, there is real disruption coming. Exactly how that plays out is in our hands. We're firm believers that we should be talking about this actively to determine what we want from this industry and how do we want to use it, so we don't take what has been a traditional reactive approach – particularly in aviation. It's here and we have to think about it proactively."

From a CAA point of view, Mr Smyth said public safety is paramount, especially when developing drones (or flying taxis). An emerging aviation technology would need to go through the same rigorous standards as traditional aviation to ensure safety and reliability.

The industry is cognisant of how aviation accidents in the past have significantly impacted the tourism industry from overseas, and therefore, the industry needs to be careful to ensure that public confidence in new systems is imbued from day one, and is maintained throughout its lifecycle.

"Because it could have a very significant impact on the uptick, distribution, and the continuing success of some of these systems as they come in," Mr Smyth said.

However, as to when New Zealand will have autonomous air mobility, Mr Johnson believes that moving freight throughout the country is achievable within the next five years and people within this decade.

All the technical and certification challenges, and the standards that need to apply, either all exist now or are being worked on "frantically by really big organisations, such as NASA".

Mr Guttke drew parallels with the automotive industry having defined levels of autonomy that could be used to provide a comparative framework for future autonomous air mobility.

Mr Johnson said that "the bit that really behoves us all to concentrate on is the social licence piece, and building that public trust and awareness of what we do".

Wisk's Air Taxi. *Photo: Wisk*

Mr Johnson plays his part in the awareness space regularly by sharing some industry knowledge with friends who describe their fear of getting into an autonomous aircraft, highlighting pilot procedures when approaching a Queenstown runway.

"The approach can only be flown in by autopilot, it's only at the last – I think – 450 feet that the pilot sees the runway and takes control of the aircraft. So, autonomy to a large extent is already with us now and is safe, reliable, and trusted by people. It's just that they are not aware of it.

"So, building that awareness and how we're stepping through a very crawl-walk-run approach that chins the bar with all the standards that the regulators set is really the way forward. And I know for a fact that all of the start-ups in this space in New Zealand and around the world are working towards that goal."

To watch the ITSNZ webinar in full, go to **https://www.youtube.com/watch?v=hvd6h1nMmrc**.

About panellists:

Armin Guttke
Intelligent Transport Systems New Zealand
Vice President

ITSNZ is a member-based organisation, supporting, promoting, and advocating for a safer, more sustainable, equitable and efficient multi-modal transport system underpinned by technology. ITSNZ is the peak body for Intelligent Transport Systems and future transport in New Zealand, connecting industry, government, and academia.

Richard Cross
Ministry of Transport
Manager of Strategic Policy and Innovation team

Richard has had held various roles in the Ministry working primarily in the aviation sector and on strategic policy issues.

Anna Kominik
Wisk
Asia Pacific Region Director

Before joining Wisk, Anna held senior management roles in the public and private sectors working across Australasia and served as a consultant to boards, governments and the aviation sector. She is the independent Chair of the Electricity Retailers' Association of New Zealand and sits on the board of the New Zealand United States Business Council.

Jude Rushmere
Ministry of Business, Innovation and Employment
Manager of Airspace Integration Trials

Jude is an aerospace professional with over 25 years' experience of operating in safety critical environments. Jude joined Nova Systems in 2019 as the Programme Manager for New Zealand. Wellington based, he is responsible for managing Nova Systems' programme of work in support of their New Zealand clients.

Steve Smyth
Civil Aviation Authority
Director of Emerging Technologies Programme

Steve trained as a Royal New Zealand Air Force (RNZAF) navigator. He spent the next 30 years mostly in fighter operations and was a Tornado F3 squadron commander. Steve was responsible for RAF operational test and evaluation, including the Joint UAV evaluation unit. Steve managed the RNZAF's introduction into Service Programme and the CAA-led New Southern Sky Programme.

Shaun Johnson
Chief Executive of Merlin Labs

Shaun is an electrical engineer, with an Associate Diploma in Aeronautical Engineering, who has held a number of technical and leadership roles, across the New Zealand Defence and civil aviation sectors over the past 32 years.

A Port on the Manukau

BY MICK PAYZE, MARK OXLEY, AND SIAN JOHN

In August last year, Mick Payze and Mark Oxley, together with Richard Reinen-Hamill and Greg McKeown presented to CILT Northern Section on 'Auckland Port – Move it or Not?'.

They covered the shipping scene in New Zealand and the recent work on the options for Auckland's port commissioned by the Government and carried out by Sapere. They concluded that the port should move to a greenfield site on the Manukau. They discussed the engineering and sedimentation issues associated with the Manukau, and potential locations within that harbour and their links to the hinterland. They ended with a plea to get on with it. Now 12 months (plus) on, Mick and Mark, this time joined by Sian John, an environmental scientist, have presented a follow-up (**https://www.youtube.com/watch?v=bhzSJ1Jvril**).

The last 12 months

Over the last 12 months, an unforecast boom in the number of exports created unexpected issues for the world's supply chain. The largest ports have been struggling since 2020 Q4. In New Zealand, Auckland, in the throes of an automation programme, became congested. One service (Maersk) chose to reschedule all southbound sailings to call only at Tauranga. This created hinterland transport problems from Tauranga to Auckland through rail capacity constraints and a shortage of trucks and drivers. This begs the questions, are these two ports and our hinterland links nearer capacity than was previously thought?

The composition of the world's containership fleet is changing. Previous dominance by the old Panamax 3000 to 6000 twenty-foot equivalent unit (teu) size has given way to the new neo-Panamax size, 8000 to 17,000 teu, plus Feeders in the 1000 to 3000 teu range. Shipping Lines have also announced orders for many more ultra large container ships, ranging from 17,000 teu to a m assive 24,000 teu.

Very few ships were being ordered in the size range currently deployed in the North - South trade lanes. It is inevitable that larger ships, 7000 teu or more, will be deployed. This poses questions about the ability of New Zealand's ports to accommodate them. Are channels deep enough, do cranes have sufficient outreach, do quays have sufficient strength for the greater vertical loads from cranes loading at extreme breadths and horizontal loads for larger ships berthing?

There is a changing pattern in international container shipping. The ultra large container vessels deployed in the East - West trades need to be filled to obtain lower unit costs. Owners use feeder services to "relay the cargo" rather than make multi-port calls. The same will happen in the trades to and from New Zealand. Trade growth will mean the present ship size, mostly 3000 to 6000 teu ships, will become too small. Larger ships will be deployed. In order to maintain schedules, these larger ships will want to limit the number of port calls in New Zealand. Feedering will increase, ideally with a hub port in the Upper North Island (UNI) where the greatest hinterland cargo exchange is required.

The present situation

Previously, the Port Future Study and the Sapere Report concluded that Manukau is the preferred future UNI port. We now have the prospect of larger ships and the relay of transhipment cargoes through UNI ports. The existing ports are 50 years old. Auckland appears to be at capacity now, even after automation completes. Tauranga is seeking to extend its wharf by a much needed one berth and its associated stack area, which should add a buffer, maybe 400,000 teu pa.

Add in the demand presented by increased domestic coastal cargo and transhipping. Transhipped cargo needs to be handled twice at the hub port, and occupies stack slots while waiting for the onward ship. If all imports and exports to and from southern ports were transhipped, some 1.3 million teu pa more terminal handlings would be required. The present 1.8m teu annual throughput of Auckland and Tauranga would increase by up to 70 per cent. Even if it is only half this, it represents an increase of more than a third. Auckland and Tauranga would not be able to cope.

How long have Auckland and Tauranga got? The two ports are virtually at capacity now. Even with Tauranga's extra capacity, is it enough for 10 years? And what then? It is easy to see that a multi-berth increase is needed.

The Port Future Study and Sapere determined that neither Auckland nor Tauranga have much in the way of long-term expansion capability. Conclusion: a new port is required.

Sapere shows that economics massively favour Manukau over other existing or greenfield options and their analysis omitted some significant additional advantages. The round voyage distance from Manuaku to Lyttelton is 450 nautical miles, a day's steaming shorter than from the Waitemata, with really significant fuel savings and GHG reductions. Existing bulk cargoes could be brought closer to export port or final destination, for example steel and coal direct to/from the steel mill, and fuel imports could be through Manukau, improving resilience. Sapere also overstated dredging costs by about $1.5 billion, using $60/m3 instead of the more realistic $15/m3 used for other locations in their analysis.

It takes 10 years to consent, plan and build a new port. Auckland and Tauranga are on borrowed time. We might eke out 10 years, relaying from Australian ports as the backstop. But for resilience, we can't rely on Australian ports; we have no influence over their port development or industrial relations.

What is standing in the way of progressing a new port now?

- The *economics* stand up.
- *Engineering and operational* issues are satisfied. Manukau inner channels are wide, straight and deep. The Manukau Bar sedimentation is manageable. A Bar channel is attainable and safe for navigation. Airport height limitations can be addressed through risk analysis and careful location choice and design.
- *Hinterland connections* to road and rail networks are excellent.
- There are no *social issues* of significance. Sapere concluded that there are no 'fatal flaws' from Māori perspective, and that Māori would look to secure commercial opportunities.

The Environmental Challenge

The outstanding issue is the *Environment*. Sapere and their environmental advisors, Mitchell Daysh, concluded that any greenfield port is likely to present considerable consenting challenges. But this is not unique to greenfield sites; port expansion in any existing site also faces consenting issues. Therefore, it is 'better' to first determine what the best option is vis-à-vis economics and supply chain / shipping logistics and then, within reason, seek to overcome the environmental and consenting challenges. It is not necessarily the case that obtaining consent for a new port will be more challenging than for an existing port, as the "right" site for a new port can be selected.

Expectations of the New Zealand Coastal Policy Statement (NZCPS) and the Auckland Unitary Plan contain enabling policies and policies for the avoidance of adverse effects. Policy 9 states that *a sustainable effective national transport system requires an efficient network of safe ports*. But the need to avoid significant adverse effects on biodiversity and natural land/seascapes is preeminent and so it should be. We do not want port development at the cost of our natural environment, but these two things can coexist, as evidenced by port development examples from around the world:

- *Approach channel deepening*, Harwich Haven, England
  Potential intertidal erosion mitigated through sediment recycling (water column recharge).
- *Quay extension*, Port of Felixstowe, England
  Wave refraction attacking a seawall mitigated through habitat enhancement (intertidal bunds).
- *London Gateway*, Thames, England
  Adjacent to a European nature conservation site, with the effects offset through managed retreat/habitat creation and species translocation.
- *MainPort, Rotterdam*, Netherlands
  Reclamation over 3,125ha of habitat offset by the creation of a 31,250ha fishing exclusion zone/ marine conservation zone.
- *Port Mole, Libreville*, Gabon
  Reclamation and dredging (1.6Mm^3) controlled by a threshold-based management plan.

The solution is finer grained analysis and appropriate design and assessment. The job of planners is to consider the outcome in terms of the 'planning balance' and the Mitchell Daysh evaluation provides a very good starting point for this.

Deltaport, vancouver, and example of a sea-island port located in deeper water London gateway, located along a shoreline. *Photo: supplied*

How to progress

These examples show that port development could be achieved while complying with the NZCPS and the Resource Management Act. This requires the acceptance of some measured risk. Natural systems are dynamic and uncertain. It needs good data and information exchange, and adaptive management plans.

It needs shared responsibility and decision-making, but a single point of responsibility for delivery. This can be achieved through participatory forums and the acceptance of an iterative, flexible approach, including monitoring, reporting and response.

Conclusions

Where does this leave us? We have looked at the last 12 months:

- Looming congestion
- The increasing size of ships
- The increasing tendency to relay cargo

These have implications for Auckland and Tauranga. We need a new port, and the best choice is a new port on the Manukau. In reviewing the Sapere report we find that the economics, engineering, operations, hinterland access and social issues all stack up. The outstanding issue is that of environmental consentability.

Experience overseas has shown how other projects have overcome consenting challenges through proper planning leading to mitigation and compensation strategies, and adaptive management.

The Manukau project needs to be followed through to its conclusion, even if negative, although we see no evidence of any acceptable alternative. A sponsor is needed. It would seem incumbent on Government to empower a party to deliver.

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Infrastructure requirements under the spotlight as the number of electric vehicles rises

BY CALEB NICOLSON

Trucks and light commercial vehicles account for almost 20 per cent of New Zealand's 4.1 million registered motor vehicles, and trucks alone are responsible for transporting 91 per cent of the country's total freight (by weight). The repercussion is the transport sector is now responsible for around 48 per cent of our energy related gas emissions.

Major freight dependent organisations across New Zealand, the likes of New Zealand Post (NZ Post), Genesis, the Warehouse Group and Foodstuffs, have committed to reducing their carbon emissions and increasing renewable energy use over the next decade. With this goal in mind, they and many other organisations are looking to adopt electric vehicles into their transport fleets.

Genesis Energy has committed to 50 per cent of its heavy vehicle fleet being electric or hybrid by 2025 and is trialling the Fuso eCanter, Fuso's first factory production-run electric truck in the Southern Hemisphere. Similarly, NZ Post have introduced a range of electric vehicles into their delivery fleet, with a fleet now totalling over 400 electric vehicles and growing.

The industry is making positive progress in creating a cleaner and more sustainable transport industry. However, as we start adopting electric vehicles on this scale, we need to consider the complex electrical and operational requirements on industrial properties.

The operational challenges

A key challenge with electric trucks is the time required to recharge the battery following a trip, combined with the distance a vehicle can travel on a full charge.

A standard 600-kilowatt truck battery would take 13.8 hours to recharge on a quick charging station and would travel at most 500 kilometres per charge. For New Zealand linehaul movements, this becomes unsustainable as a B-double (a truck with two semi-trailers) would be unable to complete an entire trip, for example, the 880 kilometres from Invercargill to Picton, in one charge.

The alternative solution would be a swap and go system, with exchange stations developed along linehaul legs, which would require a surplus of batteries at truck yards to enable quick exchanges. This would require additional space and electricity to truck yards to ensure the performance of the batteries. However, this would result in immense infrastructure works along linehauls legs, which in New Zealand would take time to implement.

Medium rigid vehicles would be more suitable for electric due to the smaller battery requirements and faster 5-hour charging times. However, with a fixed battery, charging times would result in additional space. The land requirements would appear similar to a petrol station, but each vehicle would require the station for roughly 5 hours to fully charge.

Future-proofing industrial sites

In any scenario, industrial sites need significant electrical infrastructure upgrades and additional space for charging or the storage of batteries. A standard logistics facility is 600 to 800 kilowatts and with electric vehicles potentially requiring that level of power per truck for fast charge capability, facilities would need to significantly multiply their power requirements to the site.

New Zealand energy authorities will also have to complete major infrastructure upgrades from zone substations to industrial properties to accommodate this future increase in electrical demand for electric vehicles.

While these upgrades have not started and we are not certain of the electrical demand requirements for these vehicles, organisations building new facilities need to start thinking about integrating easy, effective solutions to future proof their site for the electric vehicle future.

This includes adding in-ground electrical conduits to future truck charge points at docks and parking, to prevent typical retrofitting headaches such as cutting hardstand slabs on operational sites.

Organisations need to look at increasing future electrical capacity provisions within new electrical infrastructure. This involves allowing additional space within electrical main switchboards and electrical plantrooms for the increased electrical capacity requirements. Similarly, as many businesses consider automation, they also need to take into account the impact automating aspects of their operations will have on electricity supply. Mapping this out during the design phase is crucial to future proofing industrial sites and accommodating growing electricity requirements.

Additionally, organisations will need to allow space directly adjacent to the existing High Voltage (HV) kiosks for new HV infrastructure to the site, which will be required for the predicted increases in the electrical demand.

These are simple, cost-effective measures to integrate into a building design allowing a smoother transition to electric trucks when they are fully adopted.

The demand for electric vehicles is rising as environmental, social and governance (ESG) standards become a critical metric in which organisations are being measured. Organisations going through long term transformational changes or are planning to move into new industrial properties can now include these elements to better prepare them for the electrical vehicle future. For New Zealand, there is still a way to go to ensure the required infrastructure is in place to accommodate the uptake of electric vehicles.

TMX

TMX has been operating in the New Zealand market successfully for more than five years with a client roster that includes New Zealand Post, Kathmandu, Kmart, and a number of the countries' largest retail and FMCG companies. In September 2019, TMX established a team in New Zealand and now has offices in Auckland and Christchurch supporting clients with engagements across supply chain, industrial property transactions and construction project management.

TMX's specialist team brings deep industry experience to optimise the entire value chain, from top-of-the-funnel demand generation right through to final fulfilment.

Caleb Nicolson
Caleb leads the TMX New Zealand office delivering a world class supply chain, industrial project delivery and property offer in the New Zealand market.