
Knowing New Zealanders: To deliver a step change in regional walking and cycling

Carol Christie¹

¹Waka Kotahi NZ Transport Agency, New Zealand

Session 2.1, RHMZ1 Seminar Room, December 8, 2022, 11:00 AM

Mode shift is key to achieving emission reductions. Increasingly New Zealanders will need to shift from using private vehicles to more sustainable modes for their journeys. Since 2018 Waka Kotahi has been tracking New Zealanders walking and cycling attitudes and behaviours. Attitudes include several aspects of perceived safety, infrastructure impacts and barriers to using active modes. Behaviours encompass understanding the different needs of those who cycle or walk regularly, vs. occasionally or never. This evidence is helping to uncover how we might increase uptake of walking and cycling based on results from the five key urban areas in New Zealand. The beauty of such a focussed study is that knowledge can be gained on very specific topics such as understanding of cycling protective behaviours, e.g. 'taking the lane'. This session will spotlight some of the key findings, identify some regional nuances and provide some useful evidence on what is likely to help create a step change in walking and cycling in our communities.

Disabled people's experiences of transport in Aotearoa New Zealand

Bridget Doran¹

¹MRCagney, Hamilton, New Zealand

Session 1.1, RHMZ5/6 Modular Room, December 8, 2022, 11:00 AM

Disabled people are known to have diverse mobility and access needs, but their transport experiences in Aotearoa New Zealand had not been comprehensively investigated. This project investigated disabled people's experiences of transport in 2021.

A series of online and in-person workshops were hosted with disabled people and a survey was distributed. Over 15,000 disabled people provided their views on all forms of transport. Total Mobility providers and stakeholders were also interviewed.

The research report presents a bleak picture of the experiences disabled people have using transport in Aotearoa New Zealand. They report that the cost, effort, time and frustrations involved affect their decision to make a trip. Disabled people were more likely than non-disabled people to not leave their home at all in a typical week of New Zealand's Covid lockdowns. People reported benefits and challenges associated with the Total Mobility scheme. While people appreciate the subsidy, there are problems booking and using taxis, and many communities where Total Mobility is not available.

A new policy paradigm is proposed, focusing on inclusive access. Without it, disabled peoples' challenges using transport are likely to perpetuate for years to come.

A Generational Investment Case Study: Optimal approaches to VKT reduction

Jared Humm¹, Grace Michael¹

¹*Te Manatū Waka Ministry of Transport, Wellington, New Zealand*

Session 3.1 A, RHMTLT – Lecture Theatre, December 8, 2022, 11:00 AM

Te Manatū Waka is currently embedding a Generational Investment Approach (GIA) to support better investment and intervention advice, to provide a kete of choices based on evidence, expert judgement, and a whole of system view. It aims to align delivery plans with broader and longer-term system strategies.

This presentation will share how we applied a GIA assessment across a range of approaches achieving VKT reduction. We wanted to assess how the approaches would reduce VKT while delivering across other transport outcomes and giving sufficient weight to long-term benefits.

The GIA assessment conference used a Multi Criteria Decision Analysis process against a set of value criteria. This included having a panel of transport (and related sector) professionals rate approaches against the Transport Outcomes Framework and a future success criterion.

This assessment revealed that active and public transport interventions, and interventions that integrate land-use and transport, have the greatest potential to deliver both successful transport emissions reductions and wider co-benefits.

While demonstrating how the GIA approach can be used in different ways across the transport sector, key findings and insights from this case-study can support government transport agencies, and other key stakeholders to take an optimal, generational approach to VKT reduction.

Economics of urban infrastructure

Chris Parker¹

¹*The Treasury, Wellington, New Zealand*

Session 4.1, RHMZ3/4 Modular Room, December 8, 2022, 11:00 AM

Urban transport projects can affect land use, land prices, and housing affordability within and across cities in ways that current practice for cost-benefit analysis (CBA) fails to reflect. As well as impairing investment decision making, this undermines how projects are governed, funded, and financed. Chris will present his latest urban economics research, and will discuss new and quite different approaches to urban transport economics.

An improved transport system that enables kaumātua Māori to transition into healthier older age: NZPATHS

Sarah Colhoun¹, Sue Crengle¹, Rebecca McLean¹, Claire Cameron¹

¹University of Otago, Dunedin, New Zealand

Session 2.2, RHMZ1 Seminar Room, December 8, 2022, 11:20 AM

Māori health inequities are well documented, including within the transport system, however few studies have considered kaumātua Māori needs. Using the NZ Prospective Older Adult Transport and Health Study (NZPATHS) of 1181 older drivers (15% Māori) we describe kaumātua Māori and non-Māori transport practices and planning for driving cessation. For kaumātua Māori the private car was the primary transport mode; as driver (99%) and passenger (87%). Kaumātua used public transport (23%) and walked (for transport; 41%) significantly less than non-Māori (33% and 53% respectively). Fewer than half of older adults had thought about driving cessation, and very few had planned for it: Māori (4%), non-Māori (11%).

In our collective goal to reduce emissions, empowering Māori is a critical component of Aotearoa NZ's first Emissions Reduction Plan. Kaumātua Māori need consideration in all transport planning, with infrastructure that adequately meets needs. Our data indicate that many kaumātua are not well-prepared to transition to less driving or stopping altogether. As we work towards a reduced emission transport system that enables healthier and safer people, alongside transitioning to an ageing population profile, we need a system that ensures kaumātua have suitable non-car transport options to facilitate full participation in tikanga Māori and society.

Understanding progress towards long-term goals for the housing and urban development system

Biddy Livesey¹

¹Te Tūāpapa Kura Kāinga – Ministry of Housing and Urban Development (HUD), Auckland, New Zealand

Session 4.2, RHMZ3/4 Modular Room, December 8, 2022, 11:20 AM

The interaction between housing and transport is critical in minimising the contribution of urban development to carbon emissions. Using a 'theory of change' process, we have developed a set of indicators to measure progress towards the long-term goals for the housing and urban development system set out in the Government Policy Statement on Housing and Urban Development and MAIHI Ka Ora – the National Māori Housing Strategy. The goals include reducing emissions, adapting to climate change impact, and increasing Māori housing sustainability.

These indicators will track the changes we are anticipating in urban form over the next thirty years, including increasing housing density, improving access to active and public transport, and reducing the contribution of household travel choices to carbon emissions. The indicators show the results of work by central government, local government, iwi and Māori, builders and developers, housing providers, and others working in housing and urban development.

In this presentation, we will share our process to develop these indicators, outline some of the challenges and opportunities in creating a set of indicators for the housing and urban development system, and discuss connections with the Transport Outcomes Framework.

A narrative review of interventions to reducing Vehicle Kilometers Traveled

Vivienne Ivory², [Edgar Pacheco](#)², Sandy Fong¹

¹Waka Kotahi NZ Transport Agency, Wellington, New Zealand, ²WSP, Wellington, New Zealand

Session 3.2, RHMTLT – Lecture Theatre, December 8, 2022, 11:20 AM

Reducing light vehicle travel in NZ will play an important role in reducing emissions but it is not always clear how interventions can be effectively delivered in NZ tier 1 and 2 urban environments. Evidence from a narrative review of interventions to reduce VKT suggests there are multiple avenues to reduce VKT in NZ. They cover interventions seeking to avoid and/or reduce car trips as well as encouraging and enabling people to shift their travel from private vehicle to active and public transport. Combinations of interventions are most likely to be effective where they address the determinants of car travel and enable viable alternatives. However, assessing the effectiveness of interventions in the evidence base for the NZ context is limited by the information available in reports, and differences in the type of evidence and the type of intervention. Extracting the 'gold' from the plethora of evidence requires a nuanced approach that embraces the diversity of evidence methods and qualities. Addressing evidence gaps requires more effective avenues to support the evaluation of interventions and enable comparisons to be made across studies and projects. Strengthening and expanding the evidence base will inform with transition to decarbonising the transport system in New Zealand.

Nuisance for whom? The travel impact of surface flooding for disabled and older people.

[Emily Ward](#)¹, Lindsey Conrow¹, Simon Kingham¹

¹University of Canterbury, Christchurch, New Zealand

Session 1.2, RHMZ5/6 Modular Room, December 8, 2022, 11:20 AM

Transport systems are foundational, shaping the places that people can go, however, they are not equitable for everyone. Sea level rise and more intense rainfall are expected to create larger and more frequent floods as well as more widespread surface flooding. Existing research on how surface flooding impacts travel typically focuses on vehicle delays. The aim of this study was to better understand how increased surface flooding will impact the journeys of those who cannot drive and identify solutions for Ōtautahi (Christchurch). Interviews were conducted with disabled and older people, who are typically most reliant on public transport and have the highest accessibility needs. A basic spatial analysis was conducted to complement the qualitative data. Results indicate that poor weather tends to amplify existing transport barriers and further prevent people leaving their home. This research demonstrates the need to ensure that the concerns of people with physical impairments are considered in transport planning decisions, especially as the effects of climate change will likely see them disproportionately impacted. The research is in partnership with Christchurch City Council and sponsored by Waka Kotahi and the HOPE Foundation for Aging Research.

Integrating Land Use and Transport Planning in Aotearoa

Kiri Crossland¹, **Stuart Crosswell**¹, **Lewis Thorwaldson**¹

¹*MRCagney, New Zealand*

Session 4.3, RHMZ3/4 Modular Room, December 8, 2022, 11:40 AM

Well-integrated land use and transport planning improves peoples' access to the things they need and want to live a good life. Traditional planning has sought to achieve this by promoting mobility through private car travel, leading to unintended consequences for land use and transport.

We investigated what integrated planning means in Aotearoa, the current state of integration between land use and transport planning within Aotearoa, and opportunities to improve integration. This involved a policy stocktake of central government policy and local policy using Auckland and Hamilton as case studies; and interviews with public sector planning professionals.

We found that there is central government policy in place that supports integration but it can be undermined by the complexity of our current system and tension between legislative requirements. We will discuss the six most important factors undermining these policies and our recommendations for a combined approach to overcome them.

This work presents the opportunity to create a more effective planning system that leverages co-benefits to create better built environments for all New Zealanders.

The Worst Day on the Water – How understanding and analysing fatal accident can save lives

Jacob Halliburton¹

¹*Maritime New Zealand*

Session 2.3, RHMZ1 Seminar Room, December 8, 2022, 11:40 AM

Recreational boating in New Zealand encompasses one of the country's most diverse groups of people, places, equipment, and purpose. From fishing from a dinghy in coastal Northland, to kayaking a river in Southland; the sea and waterways can be rewarding but also dangerously unforgiving.

Every year around 17 people never make it back, and understanding these accidents is a key part of promoting and encouraging safe practices and behaviours.

This presentation will look at the journey from a fatal accident, through investigation, data and analysis, and the "so what". How the handling of unknowns, ambiguity, and specific technical data has matured to allow a picture of these accidents to form. How the input of multiple disciplines to enrich with behavioural research, accident theory, geospatial analysis, and more capable tools removes the database coding conundrums that existed in the past, and makes this journey relevant across the marine and transport sector.

Thinking outside the carpark: addressing access, wellbeing and forced car ownership in public housing

Sian Thompson¹

¹Kāinga Ora – Homes and Communities, Wellington, New Zealand

Session 1.3, RHMZ5/6 Modular Room, December 8, 2022, 11:40 AM

Kāinga Ora is building more medium and high density public housing developments, aiming to reduce emissions and improve well-being through supporting walkability and public/active transport. This also means fewer carparks.

However, these new developments are seeing increased parking disputes and frontline staff report public housing tenants need cars for shift work, children's sport and transporting large families. Existing research shows low-income groups use cars less and more efficiently than the general population, and often suffer 'forced car ownership'. Among other reasons, this is due to public transport service focusing on peak hour CBD commuting rather than journeys to other places at other times. Until this is rectified, public housing tenants are likely to need cars more than the general population.

This talk presents findings from mixed-method primary research investigating the drivers of forced car ownership, barriers to public and active transport for public housing tenants, and potential solutions. In a context of unsuitable non-car modes, providing carparks may be a necessary stopgap to support access and wellbeing. However, this produces unfriendly urban environments and does not solve forced car ownership. Close coordination between multiple agencies will be necessary to support access and wellbeing in the absence of a carpark.

Shifting the Gears' on Sustainability with Waka Kotahi and NZUP

Rebekah Pokura-Ward¹, **Shane Thompstone¹**, **Mark Kinvig¹**

¹Waka Kotahi NZ Transport Agency, Auckland, New Zealand

Session 3.3, RHMTLT – Lecture Theatre, December 8, 2022, 11:40 AM

Waka Kotahi through its NZ Upgrade Programme (NZUP) is 'shifting the gears' on sustainability.

Restoring and improving environmental and social outcomes is no longer just an "add on" - it's integral to the success of our projects.

The \$8.7B NZUP transport programme comprises 20 projects, and when complete will provide improved accessibility, mode choice, and unlock development opportunities to communities and businesses throughout Aotearoa.

Integral to the programme is 'shifting the gears' on how we view and treat our environment. We strive to do much better than what we have done in the past – we are committed to reducing our carbon footprint, improving environmental and social outcomes, and importantly leaving a positive legacy for future generations.

We will outline the policy context, frameworks and tools we have adopted to drive this commitment. This includes Broader Outcomes, the NZUP Balanced Scorecard and the ISC Infrastructure Sustainability certification to capture and measure our sustainability goals and performance.

We will showcase live projects throughout Aotearoa where we are actively piloting a raft of initiatives and innovations to reduce carbon and improve social and environmental outcomes.

We are on an exciting and challenging journey - we look forward to sharing it with you.

How spatial data science can support the shift towards lower emission transportation systems in Aotearoa

Vanessa Brum-Bastos¹, Lindsey Conrow¹

¹University of Canterbury, Christchurch, New Zealand

Session 3.4, RHMTLT – Lecture Theatre, December 8, 2022, 12:00 PM

Reducing reliance on cars and supporting people to walk, cycle and use public transport is one of the core goals to successfully transition to a low emission transportation system. Action 10.1.2 of New Zealand's emissions reduction plan highlights the need for quickly reshaping our streets to support public transport, active travel (bicycling, walking, scooting), and placemaking. Designing environments that encourage active transportation and support the use of public transport requires a profound understanding of who, why, where and when a transport mode is chosen. We live in a society that produces and collects unprecedented amounts of spatial data. These spatial data can be instrumental in supporting and encouraging active holistic transportation systems, though they are commonly underused and misunderstood. We will showcase spatial data science applications for transportation monitoring and planning as well as look towards future potential uses for the new datasets being created every day. More specifically, we will present on the use and validation of Strava data for understanding the spatial-temporal distribution of bicycling ridership patterns, the potential of citizen science for reporting on bicycling safety, and the potential of data from mobile phone apps for understanding mobility behaviour and demographics for sustainable and just transport planning.

Urban Safety: How do we design to account for the safety concerns that deter mode shift?

Anne Cunningham¹

¹Helen Clark Foundation, New Zealand

Session 4.4, RHMZ3/4 Modular Room, December 8, 2022, 12:00 PM

The Helen Clark Foundation builds on their previous state of play reports, in partnership with WSP, on how the design of our cities contributes to Aotearoa's equitable, liveable, sustainable future. Improving urban form makes it easier for people to use walking as one of their main forms of transport and will be critical to our successfully achieving our Emissions Reduction Plan targets. A key part of that is making our streets and public spaces safer, more accessible, and more appealing so that walking becomes a realistic option to people of all backgrounds. Our recent Urban Safety report focuses on how creating denser urban living increases demand for the urban public places that are essential for our health and well-being, as well as sustainable mode shift. This increased demand also has the potential to exacerbate the existing inequities that impact on perceptions of safety and so willingness to walk. We provide a summary of how particular groups, e.g. women, modify and limit their use of urban public space – and consider its causes: both social factors and environmental design. Then, an examination of how recent theoretical developments to CPTED (Crime Prevention through Environmental Design) can enhance how CPTED practice is used to develop not only urban liveability and sustainability – including a shift to walking and cycling. The presentation concludes with a series of recommendations for how central and local government, professional design and research organisations can better support the use of CPTED and safer city practices in Aotearoa.

Te Ara Mua Future Streets. Analysis of crashes five years following intervention

Kat Gilbert¹, Rebecca Luther¹, **Hamish Mackie**¹, The Future Streets Team

¹Mackie Research, Auckland, New Zealand

Session 2.4, RHMZ1 Seminar Room, December 8, 2022, 12:00 PM

Five years following implementation of Te Ara Mua - Future Streets, crashes were investigated for 5-years pre and post intervention periods in treatment and control areas.

In the pre-intervention period, there were 55 crashes in treated streets, which were reduced to 36 in the post-intervention period (35% reduction). Over the same time periods, a 2% reduction in crashes occurred in the control area. The most common crash movement codes shifted from rear-end/obstruction to loss of control. Pre-intervention 75% of incidents were non-injury and six involved pedestrians, whereas post-intervention 94% were non-injury and none, involved pedestrians.

Friesian Drive and Imrie Ave saw an 89% drop in incidents, with a 50% reduction at Mascot Ave. However, Orly Ave and Thomas Road saw an 82% increase in incidents although the severity of crashes improved from 72% non-injury pre-intervention to 91% non-injury post-intervention. Initial analysis suggests there has been an increase in violation-type crashes on these two roads. Overall, the analysis shows that safety has improved on the intervention streets, but with a remaining hotspot on Orly Avenue and Thomas Road, possibly related to increased use over time and vehicle interactions with cycle separators.

Incorporating equity in the cost–benefit appraisal framework

Eilya Torshizian¹, **Anthony Byett**², Eugene Isack¹, Alina Fehling¹, Milad Maralani¹

¹Principal Economics Limited, Auckland, New Zealand, ²ECPC Limited, Taupo, New Zealand

Session 1.4, RHMZ5/6 Modular Room, December 8, 2022, 12:00 PM

This study provides a methodology for assessing distributional effects of transport interventions using publicly available data and consistent with the current Waka Kotahi Monetised benefits and costs manual. Using a scenario analysis framework and various indicators, our identified method allows more measurement of equity effects to be included, as appropriate and as developed. The method also provides a crude assessment of the welfare effects and allows for higher weighting to be given to intergenerational equity. The outputs offer information on the benefits and disbenefits across impacts for different social groups. The results of applying this method to the Auckland Transport Alignment Project 2021–2031 provided information on distributional impacts across a range of outcomes, including user benefits, accidents, accessibility and affordability.

Gender Equality and the Role of Women in Decarbonising Transport

Wei-Shiuen Ng², **Danielle Bassan**¹

¹Te Manatū Waka Ministry of Transport, Wellington, New Zealand, ²International Transport Forum, Paris, France

Session 6.1, RHMZ3/4 Modular Room, December 8, 2022, 1:40 PM

Why is adopting a gender-based analysis necessary when considering decarbonising transport policies? How can we strengthen awareness of the gender, transport and climate change policy nexus? What role do governments play? This presentation will show findings from a joint FIA Foundation and International Transport Forum report that examined the linkages between gender equality, transport and climate change to help develop policies that can achieve both gender equality and decarbonising transport goals by 2050. Based on one to one interviews, it provided guiding principles with specific actions to help countries and companies align their gender equality and decarbonising transport goals.

Barriers to walking in urban Aotearoa: theory, users' experiences, objective measures, and professionals' views

Tamara Bozovic¹, Erica Hinckson², Melody Smith³, Tom Stewart²

¹University of The West of England, Bristol, United Kingdom, ²Auckland University of Technology, ³The University of Auckland

Session 8.1, RHMZ1 Seminar Room, December 8, 2022, 1:40 PM

In Aotearoa, over a quarter of the trips driven are shorter than 1km, suggesting important potentials of avoiding the use of cars in certain instances. Enabling walking (to destinations and to public transport) would contribute to transport equity, carbon neutrality, and public health. While it is understood that infrastructure retrofit is necessary, it is still not clear how to prioritise the improvements and allocate optimally finite resources for retrofit.

A recent PhD project focused on this topic. This presentation will cover its main findings, important for real-world changes relative to climate action, urban design, transport planning, or public health. The findings address:

- (a) a theoretical model linking environment to walking behaviours;
- (b) the diversity of pedestrians' needs and encountered barriers to walking, across ages and disability statuses;
- (c) the objective characteristics of barriers that can discourage people from walking to destinations that they perceive as being within a walkable distance;
- (d) the gaps in local and international design guidelines, failing to help identify those barriers;
- (e) the (dis)agreements between professionals in charge of delivering walking environments regarding users' needs and the priorities for retrofit;
- (f) systemic obstacles to improving walkability, spanning policy, evidence bases, planning, and decision-making processes.

Domestic Transport Costs & Charges Study: Marginal costs of transport infrastructure and services

David Lupton

Session 7.1, RHMZ5/6 Modular Room, December 8, 2022, 1:40 PM

Marginal cost is the cost of producing one additional unit. For most transport infrastructure and services, capacity is added in increments that can be quite large. Consequently, they generally operate with spare capacity and thus the cost of carrying a marginal unit can appear to be close to zero. However, reporting a marginal cost close to zero for every mode would provide little information for policy makers.

The marginal cost is non-zero when the service or infrastructure is operating close to capacity as in the case of congested roads. For road congestion, the marginal cost is the delay cost to all road users of a one unit increase in demand. To distinguish this from the cost of producing one more unit of supply, this is called the social marginal cost (SMC).

We apply this concept of social marginal cost to road congestion, port utilisation and road wear due to heavy traffic. We compare this with the long run marginal cost in each case to provide simple rules to determine whether additional capacity or road strength is justified.

How well do we know our travel? Then and now, here and there

Jennifer McSaveney¹

¹*Te Manatū Waka Ministry of Transport, Wellington, New Zealand*

Session 5.1, RHMTLT – Lecture Theatre, December 8, 2022, 1:40 PM

To enable a transport system that improves the wellbeing and liveability of New Zealand and New Zealanders we need to understand how, when, where and why we travel. The New Zealand Household Travel Survey is our primary source of this information. With over thirty years of information, this survey allows us to delve into our past and help predict what we might do in the future. In this presentation we will catch up on what the survey is currently up to; checking out some of our latest results and seeing how they compare to our past. We will also delve into odd corners of the survey to show you what nuggets of information exist and how you can use them.

Knowing New Zealanders: Impact of half price public transport fares

Carol Christie¹, Sandy Fong¹

¹*Waka Kotahi NZ Transport Agency, New Zealand*

Session 8.2, RHMZ1 Seminar Room, December 8, 2022, 2:00 PM

On 1 April 2022 the government introduced half price fares on all New Zealand public buses, trains and ferries. The country was emerging from the first wave of COVID-19. Travel patterns were in chaos. Public transport reliability was being impacted as drivers fell sick or had to isolate. Fuel prices were higher than ever. Inflation was impacting on household wallets. Amongst all these unusual extraneous factors, Waka Kotahi has used existing and new research data from a continuous journey monitoring survey to develop insights into the impact of half price fares on public transport usage. The analysis focusses in on new public transport journeys taken, journeys shifted from vehicle or walking / cycling, while identifying journeys that would have occurred even if there was no halving of public transport fares. This session will identify who has benefited, what lift in journeys has occurred and investigate the dynamics of other market forces on the utilisation of half price public transport fares.

The relative importance of life experiences, built environment characteristics and socialisation in active travel behaviour

Koen Faber¹, Simon Kingham¹, Lindsey Conrow¹, Dea van Lierop²

¹*University of Canterbury, Christchurch, New Zealand*, ²*Utrecht University, Utrecht, The Netherlands*

Session 5.2, RHMTLT – Lecture Theatre, December 8, 2022, 2:00 PM

Active travel is encouraged in the Netherlands for its many benefits, and, as a result, the country has among the highest rates of cycling in the world. Few countries have followed the Netherlands lead, and arguments are made that besides infrastructure, life experiences, cultural contexts and social norms are also important in promoting walking and cycling. To assess the relative importance of these factors in encouraging walking and cycling, research was carried out in The Netherlands and New Zealand, two countries with very different travel cultures, comparing the experiences of immigrants and the native population. Findings show that in both contexts, immigrants walk and cycle more than the native populations, with Dutch immigrants in New Zealand cycling the most. Socio-demographic characteristics, car and bicycle access and trip purpose all have significant effects on active travel behaviour. Besides these factors, the presence of facilitating factors in the built environment, supportive social networks and the normalisation of walking and cycling as transport modes can contribute to behavioural changes. Finally, continued active travel behaviour during childhood encourages life-long walking and cycling, as it enables individuals to imagine a greater mode choice set and to culturally identify themselves with using these modes.

Socioeconomic inequalities in greenhouse gas emissions from household travel in Aotearoa/New Zealand

Caroline Shaw¹, Ryan Gage¹, Mel Mcleod¹, Rhys Jones², Anja Mizdrak¹, Alistair Woodward²

¹University of Otago Wellington, Wellington, New Zealand, ²The University of Auckland, Auckland, New Zealand

Session 6.2, RHMZ3/4 Modular Room, December 8, 2022, 2:00 PM

Background: A just transition to a decarbonised transport system requires understanding current inequity in transport-related greenhouse gas emissions (GHGe). Methods: We used the population-based nationally representative NZ Household Travel Survey (2015-2017 data) to examine inequalities in GHGe from household travel by NZDep (an area measure of socioeconomic position [SEP]). Results: There was a broadly linear association between SEP and GHGe from household travel. The least deprived group emitted around 77% more GHGe per week from household travel than the most deprived [mean 64.8kg CO₂eq (95%CI 59.7 – 69.8) compared to 36.6kg CO₂eq (95%CI 33.6 – 39.6)]. Most of the difference was due to the additional 97km per week travelled by car by people in the least deprived groups. Air travel also showed significant inequities and was the second largest source of mean weekly emissions in the least deprived group. Conclusion: Despite limitations in both measures of socioeconomic position and GHGe-relevant travel in the survey, it is apparent there are profound inequities in GHGe for household travel in Aotearoa/New Zealand. Transport decarbonisation policy needs to focus on those who are currently privileged by the transport system and articulate what a fair transport system looks like and a just process for transformation.

Health effects from road-traffic noise - A New Zealand Case Study

Michael Smith¹

¹Altissimo Consulting Ltd, New Zealand

Session 7.2, RHMZ5/6 Modular Room, December 8, 2022, 2:00 PM

Long-term exposure to transportation noise can have detrimental effects on human health, amenity, and productivity. In addition, these effects have economic and social costs which are borne by the individual, the health system and the broader economy.

This paper discusses these effects, an assessment method, and the results of the Domestic Transport Costs and Charges (DTCC) study.

As part of DTCC, dose-response curves were been established from literature to estimate the population who are suffering from high annoyance, high sleep disturbance, or increased risk of ischemic heart disease. These impacts have been expressed in terms of the number of Disability Adjusted Life Years (DALYs), based on published Disability Weights for each condition, and then monetised using the Value of Statistical Life determined in New Zealand for the social cost of vehicle crashes.

There have been limited studies in New Zealand that have monetised effects from environmental noise, and there is no standardised method. This study largely adopts the methodology detailed in the European Environmental Agency (EEA) publication Environmental noise in Europe – 2020.

School Choice and School Travel: Implications for Transport, Health, Environment and Education

Sandy Mandic^{1,2}, Susan Sandretto³, Debbie Hopkins⁴, Gordon Wilson⁵, Gavin Kidd⁵, Enrique García Bengoechea^{6,7}

¹Auckland University of Technology, Wellington, New Zealand, ²AGILE Research Ltd., Wellington, New Zealand, ³University of Otago, Dunedin, New Zealand, ⁴University of Oxford, Oxford, United Kingdom, ⁵Dunedin Secondary Schools' Partnership, Dunedin, New Zealand, ⁶University of Limerick, Limerick, Ireland, ⁷Sport Ireland, Dublin, Ireland

Session 5.3, RHMTLT – Lecture Theatre, December 8, 2022, 2:20 PM

The absence of school zoning and availability of school choice leads to increasing home-to-school distance, reduced active transport and increased motorized transport to school. Using the BEATS Research data, this study compared sociodemographic characteristics, reasons for school choice and school travel patterns among 2,869 Dunedin adolescents based on their enrolment in the closest or a distant school and living within walkable or non-walkable distance to school. School choice reasons differed for enrolment in the closest versus a distant school. School travel patterns differed by distance, irrespective of the school choice. Overall, 43% of adolescents initially enrolled in the closest school, and only half of those lived within walking distance to school. Among adolescents who lived within walking distance to their school, 61% used active transport to school. However, 50% of adolescents enrolled in a distant school located beyond walking distance from their home and 78% of those relied solely on motorized transport to school, mostly by private vehicles. Therefore, school choice coupled with city design has implications not only for education but also for transport, health and environment. Cross-sector efforts and collaborations will be essential to develop strategies to minimise the negative consequences of school choice on motorised school travel.

Evaluation of the 2018 Government Policy Statement on land transport

Adrian Field², **Aaron Schiff**¹, Michael Blewden³, Julian King⁴, Hamish Mackie³

¹Schiff Consulting, Auckland, New Zealand, ²Dovetail, Auckland, New Zealand, ³Mackie Research, Auckland, New Zealand, ⁴Julian King & Associates, Auckland, New Zealand

Session 8.3, RHMZ1 Seminar Room, December 8, 2022, 2:20 PM

An independent evaluation for the Ministry of Transport examined the impact of GPS 2018 on transport investments and investigated factors that affected the efficiency and effectiveness of GPS 2018 at influencing transport outputs and outcomes while it was in effect from July 2018 to June 2021. This was informed by detailed analysis of transport investment data from Waka Kotahi and interviews with sector stakeholders.

Overall, the evaluation found some progress towards the significant shifts in investment strategy signalled by GPS 2018, particularly the intended change in the mix of investments towards public transport. However, some transformational aspects of GPS 2018 such as continued walking and cycling improvements, and new investment in transitional rail, road safety promotion, and rapid transit faced challenges in meeting expectations.

The factors underlying these challenges were found to be a mix of funding constraints, the need to develop new capacity and capability in the transport planning system, the fact that GPS 2018 was finalised relatively late in the planning cycle, and external factors including the COVID-19 pandemic. The research highlights the tension between the GPS as a tool for transformative change, whilst having sufficient consistency between successive GPS to build delivery momentum.

Domestic Transport Costs & Charges Study: Economic and Financial Overview and Findings

Ian Wallis

Session 7.3, RHMZ5/6 Modular Room, December 8, 2022, 2:20 PM

This presentation provides a high level quantification and assessment of the main economic/social cost, financial cost and user revenue aspects of the NZ domestic transport sector, as estimated (for 2018/19) in the MoT DTCC study. The main sub-sectors/modes covered in this assessment are:

- Roads - primary focus on the two main motorised sub-sectors, ie freight movements (trucks) and person movements (primarily cars etc).
- Rail (non-metro) - principally for rail freight movements, with limited longer-distance passenger services.
- Urban public transport - principally bus services (all regions), with substantial urban rail passenger services (Auckland, Wellington) and significant ferry services (mainly Auckland).

DTCC developed estimates for the main sub-sectors/modes of the following:

- total socio-economic costs, split between public sector costs, user monetary costs, user time costs, environmental costs, health costs and accident-related costs
- transport user contributions to these economic costs (PT fares, RUC, FED etc)
- output measures (principally person km and net tonne km)
- comparisons of socio-economic costs per output measure across sectors and modes
- financial performance and incidence of subsidies by mode and market segment.

Other domestic transport modes were analysed in DTCC, but in a less comprehensive manner: these 'modes' included walking, cycling, taxis/ride-hail services, micro-mobility services, and domestic shipping services.

Just (and healthy) transitions in transport: Strategies for promoting wellbeing and equity as we decarbonise

Kirsty Wild^{1,2}

¹Waka Kotahi NZ Transport Agency, Tāmaki Makaurau, New Zealand, ²The University of Auckland, Tāmaki Makaurau, New Zealand

Session 6.3, RHMZ3/4 Modular Room, December 8, 2022, 2:20 PM

The most recent IPCC 6th Assessment report concludes that we have a carbon budget of no more than 400 gigatonnes (Gt) of CO₂ left to share, if we are to keep global heating under 1.5°C. How can we divide this remaining carbon budget up in ways that ensure equitable access to this critical energy resource, while also promoting fair 'effort sharing' around the task of emissions reduction? Taking a global perspective, and drawing on a recent conceptual review for the World Health Organisation on 'just and healthy transitions' to low-carbon societies, I reflect on the special types of decarbonisation equity challenges we face in transport, and what promising strategies are emerging to help us come up with solutions that everyone understands to be just. I will discuss the new skills and types of science that are required as we move from climate change to climate action; the importance of addressing both energy poverty and energy overconsumption in transport projects; as well as the value of things like improving representational equity; greater demand-side ambition; and expanding our use of compensatory and redistributive mitigation measures.

Developing buy-in to the transformation of our transport system?

Vivienne Ivory¹, Roger Burra², **Jon Kingsbury**³

¹WSP, Petone, New Zealand, ²WSP, Wellington, New Zealand, ³Hutt City Council, Hutt City, New Zealand

Session 5.4, RHMTLT – Lecture Theatre, December 8, 2022, 2:40 PM

Hutt City Council recognised the need for an integrated transport strategy to guide decision-making. They wanted to bring community perspectives into decisions. Making the strategy meaningful required buy-in from across council and the community.

The Strategy was endorsed in May 2022 giving officers and elected members a clear understanding of the strategic issues and way forward.

How was this achieved? By using data to understand and reflect community concerns and needs, and fostering a conversation with the community about the issues, trade-offs, and possibilities for change.

Engagement included surveys and stakeholder interviews. The first community survey mapped over 1,000 journeys in Hutt City by mode and trip purpose. This identified pressure points and unsafe locations which were correlated with data on accidents and congestion.

A second survey highlighted what would help people change how they moved around. Findings showed that factors such as affordability and efficiency could make it harder for people to be less car-dependent and that failure to address barriers would make life harder for those without other options.

The engagement findings highlighted opportunities for improving wellbeing and health through an improved transport system and for reducing disadvantage in areas where there are no viable non-car options.

Implications from the study of Road Transport Accident Costs

Glen Koorey¹, Megan Gregory¹

¹Viastrada Ltd, Christchurch, New Zealand

Session 7.4, RHMZ5/6 Modular Room, December 8, 2022, 2:40 PM

ViaStrada investigated the costs of “transport-related accidents” on roads as part of the recent MoT DTCC study. The study calculated estimates of total, average and marginal (social) costs, based on willingness-to-pay (WTP) to avoid pain/grief/suffering from these incidents. Motor vehicle crash costs totalled \$5.65 billion annually, while costs associated with accidents only involving non-motorised users (e.g. pedestrian falls), were estimated at a further \$830 million annually. The marginal cost analysis found that congestion effects in urban and motorway environments, where the relative increase in crashes with VKT increase is dampened by the reduced cost per crash due to lower speeds, led to negative marginal costs.

The analysis in this work identified several potential questions and issues for further consideration, including:

- identifying the true costs in NZ for non-motorised user accidents
- reviewing the relative breakdown of crash cost components (loss of life, medical, legal, vehicle damage, etc)
- the lack of useful crash data split by truck types
- inconsistencies around the distinction between urban and rural crashes
- the implications of marginal crash costs that may be negative

This presentation will briefly summarise the road safety analysis undertaken and explore the implications for future investigation in this area.

Understanding barriers to using public transport: Māori interactions with the transport sector

Marie Mccarthy¹, Tess Breitenmoser¹

¹Tonkin + Taylor, Rotorua, New Zealand

Session 6.4, RHMZ3/4 Modular Room, December 8, 2022, 2:40 PM

Aotearoa New Zealand's transport sector connects people to their communities, providing access to work, education, and a myriad of opportunities. However, the nature in which this transport system has developed, and is able to provide for and respond to different populations and communities, is varied. This is particularly pertinent for Māori. This research explored existing information to provide an understanding of Māori interactions with, and aspirations for, the transport sector. We brought together a literature review and interviews with representatives from Waka Kotahi NZ Transport Agency. We found evidence that there are inequities faced by Māori in accessing and participating in the transport sector. This is compounded by distrust and trauma between some Māori and the sector, developed through a history of infrastructural development that has largely been exclusionary in nature. Interview insights posited a wealth of opportunity to improve this situation, such as integrating te ao Māori into the transport sector and transport planning, improving capability and capacity, and enabling a more holistic approach to be taken in transport decisions. There is also increasing interest by Māori to explore Māori economic opportunities as a sustainable method of participating across the sector.

Understanding Emission and VKT Pathways to Avoid, Shift and Improve in Tauranga

Craig Richards¹

¹Beca, Tauranga, New Zealand

Session 8.4, RHMZ1 Seminar Room, December 8, 2022, 2:40 PM

Aotearoa New Zealand's first Emissions Reduction Plan (ERP) has set ambitious targets that guide the scale and nature of change necessary at a local level.

To evaluate this scale of change required in Tauranga, and the effect of the various levers that can get us there, Tauranga City Council (TCC) and Beca have developed a Transport Emissions Projection Tool (TEPT). The TEPT uses transport modelling data to present VKT, mode share and emission outcomes in future scenarios. Users adjust various 'levers' that align to 'Avoid, Shift or Improve', (e.g. work from home, mode share, freight mode share, vehicle type and fuel efficiency) to see how different combinations can achieve the ERP targets (both VKT and emissions). These can translate into sub targets, like additional bus passenger kms, how many more people need to work from home, level of freight mode shift from road to rail, etc. This will be used to inform future transport and land use planning decisions.

This presentation will describe the objective, process and outcome of building the TEPT and some observations around the scale of change necessary for Tauranga to avoid, shift and improve our way to a climate friendly future.

Transitioning Streets for Tomorrow... Today

Geoffrey Haines¹

¹*Waka Kotahi NZ Transport Agency, Auckland, New Zealand*

Session 9.1, RHMZ1 Seminar Room, December 8, 2022, 3:30 PM

The Innovating Streets for People programme 2021-21 supported street space reallocation to enhance the safety, accessibility, and liveability of streets throughout Aotearoa New Zealand. The programme enabled adaptive urbanism and co-design practices to more easily and quickly deliver temporary solutions that demonstrate and build support for change, bring forward benefits, and enhance permanent solutions. The programme supported the delivery of 62 temporary walking and cycling projects, and approximately 89km of interim street treatments across the motu. A mixed-method evaluation showed that Innovating Streets for People projects can accelerate a range of benefits. In addition, a focus on continuous improvement, sector capability, and addressing system constraints, is needed to realise further programme potential.

This presentation will focus on how evaluation and practice-based learning from Innovating Streets for People has been integrated within the design of the Streets for People programme 2021-24 and Transport Choices package. The Streets for People programme is a similar \$30m programme to Innovating Streets. Transport Choices is a \$350m Government funded package from the Climate Emergency Response Plan aimed at encouraging and supporting people to walk, cycle and use public transport. The purpose of both programmes is to build momentum, capability and public support.

Greening the streets: assessing the co-impacts of a low emissions transport policy

Simon Kingham

Session 11.1, RHMTLT – Lecture Theatre, December 8, 2022, 3:30 PM - 3:50 PM

This talk will examine the impact of a range of policies designed to reduce GHG emissions on a broader range of transport outcomes. This will include potential impacts on crash injuries and fatalities, accessibility, economic prosperity, physical and mental health and resilience. It will also examine the impact of other ways of 'greening' our streets and what other outcomes they may have.

The Maritime Workforce

Elizabeth Vose¹

¹*Maritime NZ, New Zealand*

Session 10.1, RHMZ3/4 Modular Room, December 8, 2022, 3:30 PM - 3:50 PM

The maritime workforce has a critical function in both New Zealand and countries around the world. The role of seafarers in ensuring the movement of goods across the globe was highlighted during the Covid-19 pandemic, where they were essential in ensuring supply chains continued to operate. However, supply chain disruptions, border closures and travel restrictions as a result of the pandemic have caused problems in the recruitment, retention and welfare of seafarers, exacerbating pre-existing trends. The safe and secure operation of the maritime sector depends on sufficient numbers of seafarers who are adequately trained, and working in conditions that support their welfare. This presentation assesses emerging issues and trends in the seafarer workforce and offers a future outlook.

Detecting Work Time Breaches from Camera Sightings

Steven Hayman¹

¹Waka Kotahi NZ Transport Agency, New Zealand

Session 12.2, RHMZ5/6 Modular Room, December 8, 2022, 3:50 PM

Truck drivers operating in New Zealand are required to take rest breaks to reduce the risks of fatigue induced traffic incidents. The goal of the Work Time Breach project is to automatically identify trucks that may be involved in work time breaches.

We hope to enable industry, front-line staff and the New Zealand Police to intervene, thus reducing the prevalence and impact of fatigued driving on deaths and serious injuries.

We are currently in the early stages of development. For the proof of concept, we took historical data from the two existing Commercial Vehicle Safety Programme sites and compared expected travel times, time deltas and work time rules to flag vehicles.

What we have managed to verify is that vehicles flagged under the proof of concept have a higher rate of crashes in CAS when adjusted for VKT, however the accuracy of the proof of concept still needs to be validated. Proper validation of this approach requires opening logbooks.

It seems safe to say that the Work Time Breach work has the capacity for reducing risk on the transport network to a significant degree and could have a strong contribution to Waka Kotahi's Road to Zero Strategy.

Managing New Zealand's greenhouse gas emissions from aviation

Paul Callister, **Robert McLachlan**¹

¹Massey University, Palmerston North, New Zealand

Session 11.2, RHMTLT – Lecture Theatre, December 8, 2022, 3:50 PM

At COP26, New Zealand joined the "International Aviation Climate Ambition Coalition", committing to preparing 'ambitious and concrete' plans this year to reduce aviation emissions. New Zealand has very high aviation emissions by international standards and proven ability to increase them rapidly. However, many industry participants are now adopting "Net Zero 2050" targets. We examine the proposed industry pathways including more efficient aircraft, operational efficiencies, new technology aircraft, sustainable aviation fuel including bio- and e-fuels, as well as market based measures such as emissions trading schemes, carbon budgets, and passenger levies.

We find that pathways that include high growth, high proportions of sustainable aviation fuel, and technology with low readiness levels are unrealistic. The present advantaged status of the aviation industry combined with its highly skewed distribution and its role as a carbon-intensive luxury must be acknowledged and incorporated if a feasible way forward is to be found. Therefore, the underlying drivers of aviation demand and its alternatives are examined.

Understanding maritime connectivity for transport policy

Shrividya Ravi¹, **Shuqi Thng**¹

¹Te Manatū Waka Ministry of Transport, New Zealand

Session 10.2, RHMZ3/4 Modular Room, December 8, 2022, 3:50 PM

Maritime data sources are critical for trade and the COVID-19 pandemic has only increased this reliance due to the volatility of shipping services. For example, real-time feeds of AIS (Automatic Identification System) data are used to estimate changes in arrivals and departures of ships and subscriptions to shipping schedules to book cargo for the best available rates and routes. However, most maritime intelligence and data provisions are geared towards business needs rather than policymakers. In this talk, an analyst and a policymaker will describe how maritime data is used to generate insights on maritime connectivity, to support work on a freight and supply chain strategy.

Accelerating emission reductions by removing the need to plug in – Wireless (inductive) Charging of Electric Vehicles

Doug Wilson¹

¹The University of Auckland, Auckland, New Zealand

Session 9.2, RHMZ1 Seminar Room, December 8, 2022, 3:50 PM

The current predominant use of fossil fuels as the primary energy source in the transportation sector results in significant proportions of greenhouse gas emissions (GHG) being emitted into the atmosphere (approximately 17% in New Zealand). As a result, transport based emissions has intensified global warming and climate change effects.

Electric Vehicles (EVs) are still not widely adopted due to perceived shortcomings such as limited battery capacity and range anxiety, high initial vehicle purchase costs, limited charging opportunities and long charging times. Inductive Power Transfer (IPT) has been shown to be a safe, convenient, and reliable technology for wireless charging of Electric Vehicles (EVs) to overcome many of these problems and make EVs more appealing to potential users. However, there are some significant transport infrastructure and implementation issues that require consideration before a viable and sustainable system can be appropriately installed into transport infrastructure.

This presentation will discuss key opportunities in accelerating electric vehicle adoption by wireless and inductive charging technologies to meet New Zealand's recently published Emissions Reduction Plan (ERP) targets. The presentation will also discuss some of the key transport infrastructure system and policy challenges in various implementation strategies.

The presentation will highlight key findings to date from the MBIE Endeavour funded research programmes for both light and commercial fleet systems led by the University of Auckland and our US partners under the Advancing Sustainability through Powered Infrastructure for Roadway Electrification (ASPIRE), a National Science Foundation-funded Engineering Research Center in the US.

Identifying commuter patterns from the IDI

Ian Binnie

Session 9.3, RHMZ1 Seminar Room, December 8, 2022, 4:10 PM - 4:30 PM

In 2019 Waka Kotahi commissioned Motu to develop a new method for exploring commuter flows in New Zealand based upon confidentialised datasets within the Integrated Data Infrastructure (IDI) and Longitudinal Business Database (LBD). The method generates a quarterly series of Origins and Destinations for employees between 2005 and 2021. Developments since the foundational work include the addition of new datasets (including the 2018 Census) and the overlay of multi-modal travel time analytics (derived from Waka Kotahi's annual accessibility modelling). The data suggests a pattern of increasing commute distances across most of New Zealand. However, this growth is unevenly distributed with some locations (such as smaller and newer urban locations) growing faster than others. Segmented data may be useful for targeting efforts on vkt reduction – for example - the data can identify significant commuter flows without public transport options. There are also equity implications because initial analysis suggests that commute distances have grown most rapidly for employees that are less able to work from home – such as low skill workers in construction and retail.

Prevalence of drugged and/or medicated driving in New Zealand

Amanda Dudding¹, Sara Beccari¹, Jessica Bartle¹, **Malcolm Menzies**²

¹Ipsos, Wellington, New Zealand, ²Waka Kotahi NZ Transport Agency, Wellington, New Zealand

Session 12.3, RHMZ5/6 Modular Room, December 8, 2022, 4:10 PM

This presentation is about a 2021 research commissioned by Waka Kotahi, Drugged and/or medicated driving in New Zealand. The purpose of this research is to identify the overall prevalence of drugged and/or medicated driving in New Zealand and to understand the profile of those who have driven under the influence of drugs and/or medication. It forms a benchmark and framework to assess the impact of roadside testing regime if or when it is implemented.

The presentation will cover:

- The difficulties of conducting a survey to collect this data, including overcoming survey biases and creating a relevant list of drugs to measure
- The incidence of drugged and/or medicated driving in New Zealand and a profile of those who have done so
- The most common types of drugs and medications taken within 3 hours of driving
- Time of day and reasons for driving after taking drugs and/or medications.

Carbon footprint of freight movements within New Zealand

Patricio Gallardo¹, Sharee McNab¹, Susie Bingyu Deng², Jamie Hutchings³, Radnya Mukhedkar¹, Hamish Avery¹

¹Electric Power Engineering Centre, New Zealand, ²GeoHealth Laboratory, University of Canterbury, New Zealand, ³School of Mathematics and Statistics, University of Canterbury, New Zealand

Session 10.3, RHMZ3/4 Modular Room, December 8, 2022, 4:10 PM

Transport is the sector with the highest energy demand in New Zealand. Ambitious targets to reduce emissions from the sector have been set, but the best path forward to meet these targets is still unclear. In the context of freight transport, there are behavioural, technological, and infrastructure options that can support the transition to a low-carbon system. A comprehensive understanding of the current freight environment is critical for informing the future scenarios that support emission reductions. Public and private sources of freight data were collected and analysed to provide a snapshot of energy use and Greenhouse Gas emissions across transport modes, commodity types, and networks. The challenges faced in data wrangling and the methods for network analysis, transport modelling, and energy and emissions calculations are described. The outputs from this work can support further research for the identification of cost-effective pathways that can sustain emissions reduction and fulfil national emission reduction commitments. Insights from the data outputs will be shared as well as the potential to utilize these results for the study of future system topologies and capacities.

Air pollution health impacts of achieving transport sector emission reduction plan targets

Jayne Metcalfe¹, Gerda Kuschel¹

¹*Emission Impossible Ltd, Auckland, New Zealand*

Session 11.3, RHMTLT – Lecture Theatre, December 8, 2022, 4:10 PM

The health impacts of air pollution in Aotearoa New Zealand are considerable. The recently published HAPINZ 3.0 study (Kuschel et al 2022) estimates that emissions from motor vehicles alone result in 2,247 premature deaths, nearly 9,400 hospitalisations, over 13,200 cases of childhood asthma and more than 330,000 restricted activity days each year in New Zealand at a cost of more than \$10.5 billion.

A raft of initiatives has already been identified to reduce vehicle greenhouse gas (GHG) emissions to meet New Zealand's targets and obligations, and many of these have the potential to deliver significant air quality co-benefits. In response, we have been engaged by Manatū Hauora Ministry of Health to investigate the likely air pollution impacts of achieving the transport sector targets outlined in Te hau mārohi ki anamata, Aotearoa New Zealand's first GHG emissions reduction plan.

We are using the HAPINZ 3.0 health effects model to estimate impacts of motor vehicle air pollution in 2035 for a baseline projection compared against scenarios aligned to the transport sector targets in Te hau mārohi ki anamata.

This work is not yet complete so our presentation will outline key features of the methodology. Preliminary results will be presented if available.