

I te timatanga, ko te kore
ko te po
na te po
ka puta ko te Kukune
Ko te Pupuke
Ho te Hihiri
Ko te Mahara
Ko te Manako
Ka puta I te whai ao
Ki te ao marama
Tihei Mauri ora

In the beginning there was a void
Within the void was the night
From within the night, seeds were cultivated
It was here movement began - stretching
There the shoots enlarged and swelled
Then there was pure energy
Then there was the subconscious
there was a void
Movement from darkness to light, from conception to birth
From learning to knowing
“Behold there is life”

Mauri Ora ki Mua

“Wellbeing now for wellbeing in the future”

DISCLAIMER

This report summarises the ideas and opinions expressed by Chief Science Advisors and some input from government officials during two workshops facilitated by the authors. Conversations at these workshops were designed to test a range of futures foresight methodologies taken from the DPMC-led Policy Project's toolbox. While the topic used for these workshops was identifying alternative futures for Aotearoa New Zealand, it is anticipated the tools demonstrated in this report would also be used by others in a wide range of contexts. The participating agencies wanted to identify appropriate foresight approaches to inform any shifts towards taking a longer-term approach to policy decisions, including transport and infrastructure investment decisions. This document does not aim to convey a widely shared, or fixed, view on what the future will look like for the future aspirations of all New Zealanders.

This report does not represent government policy, advice, or the views of any government agencies mentioned in this document.

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1 INTRODUCTION

This report summarises views from participants at two workshops on long-term futures and visions for wellbeing in Aotearoa New Zealand.

FUTURES THINKING

The workshops, held in late 2020, used the causal layered analysis methodology as an approach to Futures Thinking. The thinking involved members of the government's Chief Science Advisors Forum, He Rauhinga Tohu Putaiao, and a small group of government officials. They were facilitated by Professor Sohail Inayatullah, Inaugural UNESCO Chair in Futures Studies.

The purpose was to explore futures thinking and strategy development, challenge thinking and spark debate. Across the public sector there is increasing awareness of the need to take an intergenerational, outcomes-led view of investments and this report is an example of Futures Thinking using a robust tool.

Topics covered in the two workshops included:

The future as predicted, versus the future as a learning journey

The "used future" examining what traditional practices need to be challenged to create new futures


Emerging disruptions and possible transformations ahead

Scenarios to illustrate alternative futures

How to move from vision to reality, future to present, and how to link 2050 with 2020

Creating narratives and linking them to outcomes

The Infrastructure Commission
Te Waihanga &
The Ministry of Transport
Te Manatū Waka
commissioned this work
to shape their
long-term planning over a
30-50 year timeframe



These topics underpin a new approach to having conversations about our future and identifying narratives to underpin a period of rapid change. They support the approach taken by the first Wellbeing Budget introduced in 2019 by the New Zealand Government which marked an important milestone in the Government's programme of change, by making Budget decisions based on what matters to New Zealanders rather than traditional economic indicators of success. The Wellbeing Budget broadens the definition of success to one that incorporates natural resources, people and communities as well as the health of the country's finances.

It is informed by the New Zealand Treasury's Living Standards Framework which prompts thinking about policy impacts across different dimensions of wellbeing including long term and distributional issues and implications. While this report is a record of what was discussed with the Chief Science Advisors Forum, it aims to open our minds to a range of alternatives so that infrastructure planning and policies are guided by a national vision for intergenerational wellbeing outcomes. This work is the very start of the conversation and is intended to enable the development of resources which assist a much broader range of conversations across the country.

Infrastructure investments guided by long-term thinking and visions

Infrastructure investments are long-term, expensive commitments. Infrastructure – such as bridges, railway lines, ports, highways, windfarms, electricity transmission grids, and buildings – often last for decades or centuries. Investment decisions shape a long-term legacy on how our cities and towns grow, our economic productivity and prosperity, our environment, and people's wellbeing. Put simply, infrastructure decisions made today, affect current and future generations.

Although we build infrastructure for the future, the future is far from certain. Over the next 30 to 50 years our environment, population, cultures, technologies, economic sectors, and the social dynamics of Aotearoa New Zealand will keep shifting. This means that we need to avoid assumptions that past trends will continue on.

We also need to avoid short-term planning approaches, such as "what we build next, after what we have now".

We need to design the future we want as New Zealanders, through long-term visions and actions



To do this, it is important to imagine a range of alternative scenarios for the future. We can then examine a range of investment options with the potential to meet the opportunities and challenges of those futures. Planning for alternative futures can give us greater confidence that we are making the right investment choices today – fit for a future we want, and adaptive for the changes and disruptions we will experience in coming decades.

Workshop methodology and report

The following ‘commonly-used’ process¹ was used at the workshops, to guide the conversations captured in this report:

Horizon scanning

Identifying trends, drivers of change, and emerging issues that could significantly shape our future.

Alternative future scenarios

creating four potential futures, based on the trends/drivers of change, and the responses of decision makers to either go with the flow or to forge a different path.

A ‘preferred future’

Using the scenarios to identify key features of a future that improves wellbeing.

Backcasting

Identifying steps that could be taken to reach that preferred future.

The structure of this report mirrors this approach.

¹ More information about these tools can be found on the Department of Prime Minister and Cabinet’s Futures Thinking page at www.dpmc.govt.nz/our-programmes/policy-project/policy-methods-toolbox/futures-thinking#tools



Starting the conversations on future aspirations for Aotearoa New Zealand

This document does not aim to convey a widely shared, or fixed, view on what the future will look like, nor the future aspirations of all New Zealanders. The workshops aimed to develop initial visions of alternative futures for Aotearoa New Zealand, and implications for wellbeing.

The intention of the Infrastructure Commission Te Waihanga and The Ministry of Transport Te Manatū Waka is to engage with a wider group of communities, including our Treaty partners, to develop and refine these visions.

While conversations during the second workshop touched lightly on a few concepts held within Mātauranga Māori² (such as manaakitanga and mokopuna-tanga), the workshops did not specifically include Māori perspectives on knowledge and knowing. Nor did the workshops consider, or weave together, concepts of wellbeing, hauora and

infrastructure from a Māori perspective. These vital aspects will be addressed by the Infrastructure Commission Te Waihanga and the Ministry of Transport Te Manatū Waka in their work with Treaty partners.

²As the Waitangi Tribunal has noted, Aotearoa New Zealand has two founding cultures, one belonging to the people who followed Kupe to these shores, the other belonging to those who followed Captain Cook. Kupe's people, the people of Hawaiki, brought with them Hawaiki-an culture, science, and systems of knowledge that evolved on contact with Aotearoa. The defining principle of that culture was kinship. 'Mātauranga' can be literally translated as 'knowing' or 'knowledge'.

But 'Mātauranga Māori' refers not only to Māori knowledge, but also to the Māori way of knowing. It incorporates language, whakapapa, technology, systems of law and social control, systems of property and value exchange, forms of expression, and much more. It differs in fundamental ways from the Western systems of thought that underpin much of the law, policy and approach to infrastructure in New Zealand today.

ABOUT THE AUTHORS



Professor Sohail Inayatullah facilitated the workshops with Chief Science Advisors and officials in 2020, and is the co-author of this report.

He is Professor at Tamkang University, Taipei (Graduate Institute of Futures Studies) and Associate, Melbourne Business School, The University of Melbourne. In 2016, Professor Inayatullah was awarded the first UNESCO Chair in Futures Studies. In 2010, he was awarded the Laurel award for all-time best futurist by the Shaping Tomorrow Foresight Network. In March 2011, he was awarded an honorary doctorate by Universiti Sains Malaysia, Penang. He received his doctorate from the University of Hawaii in 1990.



Dr Ivana Milojević assisted Professor Sohail Inayatullah in the compilation of this report. She is a researcher, writer and educator with a trans-disciplinary professional background in sociology, education, gender, peace and futures studies. She has held professorships at several universities in Australia (The University of Queensland and The University of the Sunshine Coast), Serbia (University of Novi Sad) and Taiwan (Tamkang University) and was a Head of Brunei Futures Initiative at the Centre for Strategic and Policy Studies, Brunei Darussalam in 2016-2017. Since then, she has been Director of Metafuture.org and Metafu-

tureSchool.org. Milojević is the author of over seventy journal articles and book chapters, as well as the author, co-author and/or co-editor of a number of academic books. These include: CLA 2.0: Transformative Research in Theory and Practice (2015); Breathing: Violence In, Peace Out (2013); a special issue of Futures on Feminism/Gender V (2008); and Educational Futures: Dominant and Contesting Visions (2005, reprinted in paperback format in 2011).

2. SETTING THE SCENE



Our global environment



The long lifespan of infrastructure challenges planners to think about the long-term trends, or drivers of change, that influence what infrastructure will be needed, as well as how infrastructure

could be affected by these trends. We also need to scan the horizon for emerging issues that could drive or disrupt these trends over time.

Recent experiences with the COVID-19 pandemic illustrate how quickly the world can shift, and how a seemingly small event in one part of the world can ricochet into events with major global

consequences. Over the next 30-50 years, we can anticipate more fundamental changes in our world, many of which are interconnected.

Summarised briefly, these include:

- Environmental changes e.g. climate, water, biodiversity etc. affecting food production and resilience
- Shifting world geopolitics affecting trade and security

- Global economic uncertainty exacerbated by COVID-19

- Rapid technological changes such as artificial intelligence and robotics affecting how and where we work and live

- Social forces (e.g. migration, urbanisation, equality, aging and growing populations) affecting how we live, work and thrive.

Examples of how these interconnected changes may play out within an infrastructure context include:

In energy, decarbonisation efforts could see increased employment of electricity using renewable energy technologies. Consequently, electricity could account for a larger proportion of the end-use energy mix. As with any energy source the benefits of this, particularly in Aotearoa New Zealand, will need balancing against the risk of disruptive events and our ongoing need for resilience.

Other infrastructure sectors are also changing with technology. In health, increased use of ICT, telehealth and remote or decentralised health services can be expected to change health delivery models. In education, improved connectivity might underpin affordable, personalised education supported by an increasingly blended delivery. The consequence of these changes could

see reduced demand for traditional health and education buildings, along with the spaces and pathways to them.

Preparing for change, overcoming challenge and looking for 'win-wins' requires a clear vision for infrastructure which responds to wellbeing needs. To initiate discussion on this topic, three sets of questions were put to workshop participants by the facilitator regarding the 'impossible' future, the 'used future' and the potential disruptions that lie ahead.

THE IMPOSSIBLE FUTURE

What would be one thing that is impossible today, but changes everything in regard to wellbeing and its infrastructure implications if it becomes possible?

This question invites participants to imagine the impossible as a first stage of inquiry. It is a starting point for bridging the gap between now (the present) and the future. People frequently focus on current projects in the present, with a dominant narrative that 'we are busy' (i.e. we don't have time or inclination to think far ahead). In contrast, conversations about the future focus on the vision and the long term, and can be guided by a narrative of 'creating the impossible'.

*Answers by participants
focused on four main
topics:*



Valuing the environment
through a measurable, better, and deeper connection with the natural world, and "recognising our ultimate dependency on the environment we're part of". One concrete strategy that could transform everything regarding pollution and other environmental problems would be to initiate an investment process that fully considers the environmental impacts of investment choices made today on our future generations.



True Treaty partnership

achieved through a shift in decision-making based on Mātauranga Māori and te ao Māori, which participants believed would have a major and positive ripple effect, achieving a higher standard of wellbeing in Aotearoa New Zealand.



Social and cultural change

by “truly valuing all people in society”, “eliminating poverty” and the “total elimination of racism”. Moreover, developing and utilising tools to inspire collective action to overcome the “tragedy of the commons³” would also have a major impact.



New technologies

enabling decisions free from the limits of today’s science. If unbounded by these limits, much more would be possible. Some anticipated technological changes may include improvements in the development of 100% sustainable carbon neutral energy sources. These changes, seemingly impossible and with a high impact if they did occur, would enhance the likelihood of true wellbeing.

Thus, an environment-first approach, a transformed social and cultural worldview, and new technologies stood out as critical next steps to make the impossible – a society living in a maximised wellbeing state – possible.

³The tragedy of the commons is a situation in a shared-resource system where individual users, acting independently according to their own self-interest, behave contrary to the common good of all users by depleting or spoiling the shared resource through their collective action.

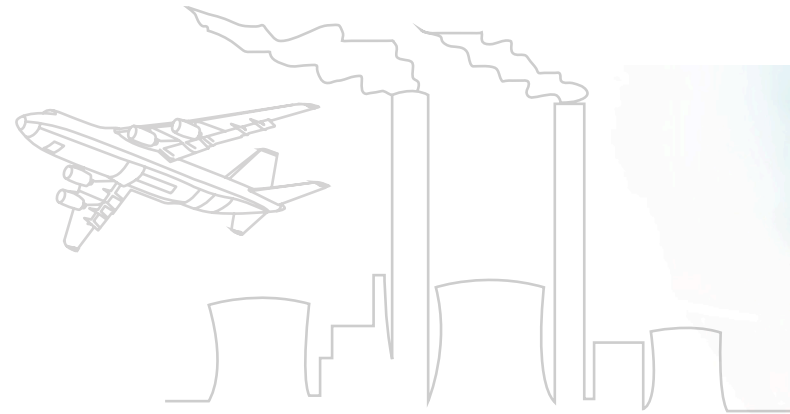
THE 'USED' FUTURE

What baggage needs to be left behind on the path to the preferred future?

The 'used' future is one in which we keep on trying to do what we have previously done, even though it is less relevant to a changing world and does not take us closer to our ideals.

This second stage of inquiry asks participants what is holding us back.

It encourages reflection on what aspects of our current reality prevent transformation toward wellbeing.



Participants answered that the weight of industrial civilisation is preventing change.

Specific aspects of this used future included:

- Siloed thinking, departments and 'committee culture'
- The dominance of the '9 to 5' work day
- The view that more roads necessarily lead to less congestion

- An expectation of endless growth
- A preferred view of self-reliance over collective action

- A paradigm of Gross Domestic Product (GDP) as the predominant measure of national success (meaning that value components, other than economic value – such as the environment, health, resilience – are ignored).

Other examples of the used future include:

- Punitive justice systems
- Employer/ manager lack of trust in workers' competence and probity
- A deficit model of education
- Challenges with legacy media and current forms of social media – fake rather than truthful news and information
- Supply side solutions (i.e. government influencing the supply of labour, capital, goods and services) as opposed to demand side solutions (i.e. influencing technology choices, consumption, behaviours, and social norms)
- Agricultural and horticultural practices that are not environmentally sustainable
- Individual ownership models
- (Re)building infrastructure on the coast despite anticipated sea level rise
- Short term decision-making cycles and short-term thinking that hinders intergenerational investment
- Promotion by tenure rather than by merit
- Policy driven by the centre rather than public driven policies that are inclusive
- The non-profit sector's volunteer-driven model in a modern commercial environment.

If some of these existing societal conventions shifted, there would be major implications for both infrastructure and wellbeing (which could be positive/negative, depending on what emerged in their place). For example, if by 2050 there were no offices as we know them, or the central business district is no longer a core place for doing business, what are the infrastructure implications? And what are the implications for wellbeing?





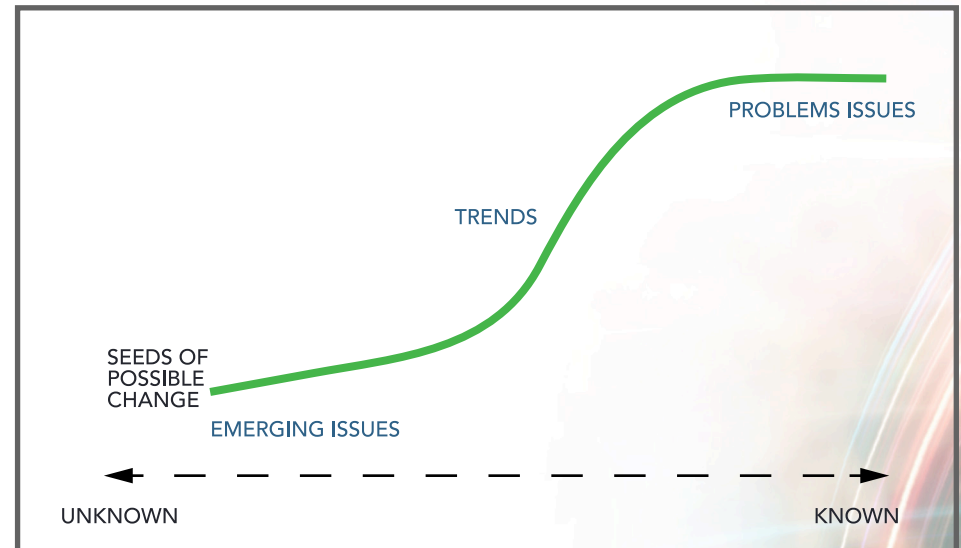
DISRUPTIONS AHEAD

What is likely to change?

The discussion on the 'used future' was followed by a discussion on anticipating emerging disruptions.

Workshop participants focused on which emerging issues they anticipate becoming important over the next 30 to 50 years.

They reflected on the emerging and 'weak signals' that could disrupt current trends, and the world as we know it. The intent of this question was to anticipate seeds of possible change before issues become trends and problems, as visually presented in this diagram (Molitor, 1977).



Participants highlighted several key areas of disruption.

These were: *New technologies*
– e.g. virtual reality; robotics; artificial intelligence; a single device controlling many aspect of our lives; 3D printing; emergence of new materials; bioengineering; gene modification; and artificial organisms.

Challenges to our natural environments
– e.g. climate change; water security; resource wars; ocean acidification; rising sea levels; decline of biodiversity including insect populations; antibiotic resistance.

Workforce disruptions
– e.g. living longer and working less.



Additional answers given by the participants were as follows:

Demographics

– e.g. global population changes; ageing; falling national populations throughout parts of Asia and Europe; and life expectancy increasing to one hundred years.

Education and work

– e.g. education through virtual reality; AI removing the need for some people to work, with less of the workforce being human.

Politics

– e.g. a decline of democratic norms and institutions; democracy and wellbeing connections; changes in the relative power of east and west; resource wars.

Economy

– e.g. going from a wasteful to a circular economy; changing perspectives of 'waste', more materials being continually reused; increasing proportion of exports are services.

Paradoxes of social media

– e.g. more information, connectivity, and crowdsourcing shrink credibility, erodes civility, and empowers 'group think' and populism.

People movement

– e.g. eliminating the need for some types of travel; inhabiting previously uninhabited areas; urbanisation or de-urbanisation.

Power and equity

– e.g. power across generations more equally distributed; inequality arising from the ability to purchase enhancements/extensions to life.



To illustrate the implications of these potential disruptions, the possibility that '50% of current jobs are replaced by Artificial Intelligence [AI] by 2050' was chosen for a deeper level of inquiry. Participants were asked what this would mean for society if this occurred, and what it could mean for infrastructure by 2050-2070.

Potential implications identified by participants included:

AI benefits

AI is in the home, workplaces, and in our governance systems. There are enhanced returns on capital and increased labour productivity. There is more human creative time, and there are more jobs in AI development.

AI creates deeper problems

Education is correlated with opportunity and thus there is greater inequality – the polarisation between the losers and the winners of the AI intensive world. There is less work overall, and work is not distributed as well.

The rise of the knowledge economy and urban dispersion occur simultaneously, potentially leading to less interaction amongst people and increasing loneliness.

AI changes the rules

New models for remuneration and reward are developed.

Critical uncertainties included: would demand for travel significantly drop as people continue working from home? Similarly, will people still be using existing transport infrastructure and modes and, if so, how much? Will rail and roads

be speedier and more attractive because AI can better manage efficiency? Or, alternatively, will there be a significant movement away from traditional transport infrastructure and towards the building of internet and digital infrastructure? If that becomes so, the second-order implications will mean a focus on digital security.

After discussions on the 'impossible future', the 'used future', 'emerging issues' and their implications, workshop participants embarked on the process of creating 'alternative futures.'
These scenarios are described in the following section.




3. ALTERNATIVE FUTURE SCENARIOS

Alternative futures were created through scenarios demonstrating progressive change.

This integrates the trends/drivers of change, with the responses of decision makers to either go with the flow or to forge a different path.

Four scenarios were developed:

STATUS QUO 


In the status quo future, even as the external world changes, decision makers favour the status quo. This could be because the weight of history is too heavy, or because there are insufficient capabilities to change.

MARGINAL CHANGE 

In the marginal change future, the world continues to change, but only a few policies are successfully implemented to intentionally shape the future. This may be due to political constraints, and/or the challenges of change management.

ADAPTIVE CHANGE 

In the adaptive change future, the external world continues to change, and decision makers adapt successfully to this changing world. Policies are adaptive, and implemented when needed.

RADICAL FUTURE 

In the radical scenario, decision makers lead the way and deliberately shape the future. The rules of the game are reshaped.

These scenarios move from status quo, to marginal change, to adaptive change and then finally to radical or transformative change.

In this way, the scenarios help to illustrate the possibilities and choices in front of us.

STATUS QUO

metaphorically 'sliding backwards'

In this 'status quo' future, the weight of the past continues. Aotearoa New Zealand fails to capitalise on its global reputation and keep ahead of the pace of change. We attempt "business as usual", while the world rapidly changes around us. For example, we are always playing catch up to infrastructure needs, short-term planning dominates, and structural problems of poverty, inequality and obesity prevail.



The trend of un-affordable housing continues with a rapidly diminishing proportion of people who are owner-occupiers. Parallel to this, with an increasingly casualised work force, there is a rise in rental housing insecurity. Significant increases in rates are passed on by landlords to tenants.

Low density housing and population increases magnify urban sprawl, with wealthier people concentrated close to city centres and lower income people forced to endure long commutes from city fringes.

Decision-making cycles reflect electoral cycles. Short-termism in planning continues, particularly with respect to infrastructure. Implementation of proposed changes does not occur. Large segments of the population are disenfranchised.

Individuals and society continue on the current economic trajectory, which is characterised by consumerism, growing inequality, urbanisation, fewer and larger economic units dominating the business landscape, and more individuals working in insecure 'gig' employment situations.

Addiction to consumption is coupled with material deprivation in some communities. Wellbeing declines since the adopted economic model reinforces inequity.

Environmentally, there is flooding along coastal Aotearoa New Zealand but little is done to address this issue.

Emissions reductions targets are not met. Nature is still viewed as an economic resource to be exploited, without any intrinsic value.

Infrastructure expenditure is at the bare minimum and is less than what is necessary to maintain or improve what we have, let alone invest in new things.

There are resource deficits and constraints among the four capitals (financial/physical, natural, human and social) which support wellbeing.

This leads to always playing catch-up with infrastructure replacement, leaky pipes, and environmental degradation.

At best, strategies to relocate people to strengthen the regions are implemented, but upgrades to regional digital infrastructure are minimal and this stifles growth.

People still travel at around the same time en masse and there is the continued prevalence of fossil fuel-cars over electric. Road congestion costs are high and may become severe.

How did this come about? Participants argued that this future could occur if investments stayed focused on the short term, government agencies did not anticipate change, engage in long-term planning or make the right type of investments.

Alternatively, plans made today are not implemented and are, for all practical purposes, shelved.

While some aspects of the 'status quo' scenario are predictable, most future headlines relate to governments and markets being surprised.

It is mostly external drivers outside of Aotearoa New Zealand that are determinants of change and status quo. External influences succeed in weakening the country.



At the worldview level, the drivers are complacency, risk aversion and a tendency not to embrace change.

Incrementalism and concerns over short-term costs win over long-term benefits.

Some previous successes are taken for granted – New Zealanders rested on their laurels and did not make the necessary changes.

The core metaphor of this approach is “she’ll be right” or perhaps more provocatively ‘sliding backwards’.

MARGINAL CHANGE

metaphorically 'at the crossroads'

In this future, only a few policy shifts have been successful. For example, there is a slow shift toward the uptake of renewable energy, and there are smarter roads and cars, and better hospitals. Globally, Aotearoa New Zealand is regarded as a steady, but slow change maker.



MARGINAL CHANGE

metaphorically 'at the crossroads'

While there are some incremental improvements, the traditional systems of production, employment, health, education and justice have not changed.

Wellbeing is primarily defined in physical terms.

Health is dependent on wealth.

There is a welfare safety net, but it is at the poverty borderline.

Only lip service is given to equity issues.

Rich suburbs are cleaner.

Child poverty, family violence, drug addiction, inequalities and racism remain.

Many New Zealanders choose to leave the country.

At the governance level, some decision-making is starting to extend beyond election cycles, but short-term political timeframes/cycles dominate and create uncertainty in the system.

Planning has extended to the medium term and there is a greater focus also on the environmental impacts of decisions, but environmental targets are not mature and are not met.

There is some implementation of proposed changes, but we continue to struggle with delivery of initiatives that transform our living experience. Large segments of the population remain disenfranchised.

The economic trajectory is similar to that envisaged with the 'status quo' (consumerism, growing inequality, urbanisation, fewer and larger economic units dominating the business landscape).

However, greater reliance on technology and industry 4.0 technologies may allow individuals to de-urbanise.

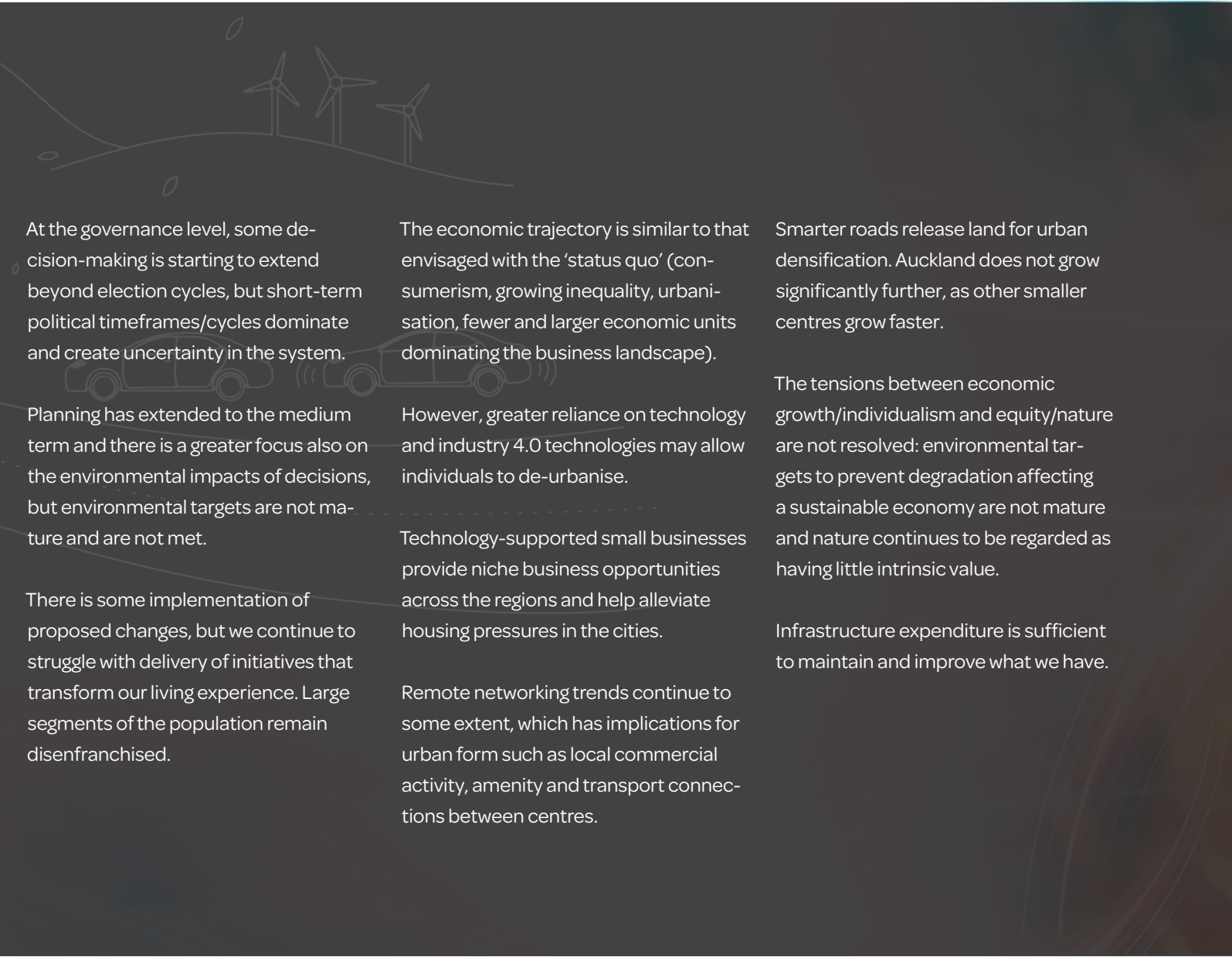
Technology-supported small businesses provide niche business opportunities across the regions and help alleviate housing pressures in the cities.

Remote networking trends continue to some extent, which has implications for urban form such as local commercial activity, amenity and transport connections between centres.

Smarter roads release land for urban densification. Auckland does not grow significantly further, as other smaller centres grow faster.

The tensions between economic growth/individualism and equity/nature are not resolved: environmental targets to prevent degradation affecting a sustainable economy are not mature and nature continues to be regarded as having little intrinsic value.

Infrastructure expenditure is sufficient to maintain and improve what we have.



There is an understanding that to invest in new things the price for using the system has to increase, and a growing acceptance of “user pays”.

There are some improvements in energy efficiency. There are still cars everywhere, but most of them are electric and driverless. There is some sharing of vehicles, but mostly they are still single occupancy.

Indeed, it is the wealthy who drive: the poor do not. Perhaps many employees work one day a week from home. There are still trains, but they are expensive. There are a few more bike lanes, but cyclists still do not feel safe on roads. Some cities have light rail, while rural communities continue to rely on cars and trucks.

How did this come about? While climate change is seen as a threat, nationally and globally, the minimum is done. Deterioration in equity and environment continues unabated.

Infrastructure, particularly ageing water infrastructure, continues to decline. While there is certainly a greater uptake of electric cars and virtual work i.e. less physical travel by and large, by 2050 there has been no significant change, except for a worsening of the contradictions.

The few successful policy initiatives have not made a significant difference. All in all, there are some beginnings of a shift, but the old infrastructure assets remain.

The industrial paradigm/worldview has not shifted; the dominant narrative is still GDP.

The core metaphor for this future is ‘At the crossroads’.

Other metaphors and narratives proposed to sum up this scenario included:

“I’m better off than 4 years ago” and “the faster horse”.



ADAPTIVE CHANGE

metaphorically 'sharing is winning'

In this future, Aotearoa New Zealand is recognised globally for having created a system to 'future proof' its wealth and wellbeing. Adaptive change results in deep policy shifts, developed through inclusive engagement with stakeholders. For example, a shift toward renewables, self-sustaining cities, reduced physical consumption, smart spatial planning and decentralised decision-making i.e. a flatter, greener, smarter, more equitable Aotearoa New Zealand.



“Sharing a positive and healthy future where people talk about ‘the bad old days’ of the climate change crisis and infrastructure choices that lacked a community focus.” – Prof Simon Kingham

Environmental management extends beyond what we can visualise and monetise; considering the environment becomes the norm and nature is deemed to have value.

For example, green infrastructure such as wetlands and their natural processes are harnessed to avoid building water treatment plants. There is reciprocity with nature.

Education is free and accessible for all. The health and social justice systems have been overhauled to focus on wellbeing and preventative models, increasing equity and targeting investment towards those initiatives delivering the highest outcomes.

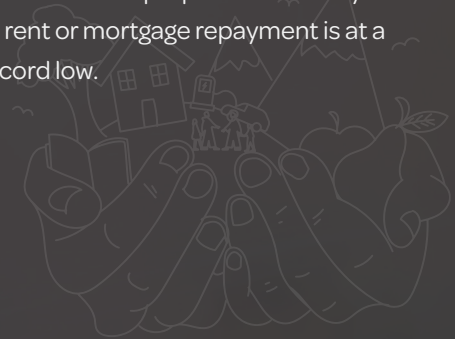
Equity and equality are evident – wealth no longer determines your experience of the system. Everyone can easily choose healthy/wellness options in all aspects of life.

New understandings of wellbeing encompass safe and affordable housing. People are no longer burdened by home loans their entire life. Houses start to be built in different kinds of ways, including community-centred modular housing. At a governance level, decisions are made in partnership with tāngata whenua⁴.

The decision-making process is evidence-based, streamlined and efficient. Moreover, planning is long-term and decentralised, giving people in the regions firmer control over investment and growth. All this leads to a greener, smarter, more participatory, and more equitable Aotearoa New Zealand.

Rapid advancements in technology and digital infrastructure give rise to broader uptake and an end to the digital divide. Spatial plans are decentralised: they are informed by local and shared real-time data using artificial intelligence.

Economically, significant expenditures on housing, transportation, health, and digital infrastructure are supported by export growth and earnings in the primary sector. De-urbanisation coupled with the growth of local, regional economies provide opportunities for small businesses and self-employment, providing workers with greater autonomy and wellbeing. More goods are locally produced. The proportion of salary to rent or mortgage repayment is at a record low.



⁴The Indigenous peoples of the land

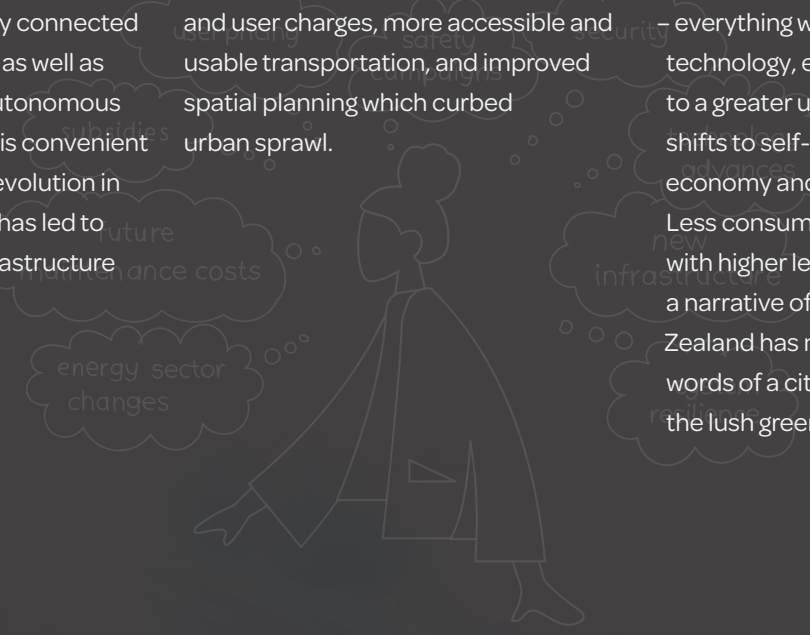
Infrastructure expenditure is more than we have been used to spending and has caught up, but there is also a clear policy movement toward a new national measurement of how infrastructure enables wellbeing. There is nationally connected affordable public transport as well as individualised and public autonomous electric vehicles. Transport is convenient and fits people's needs. A revolution in transportation investment has led to investments into digital infrastructure over physical assets.

How did this come about? First, the system to future proof everything that the government created, replaced the past-oriented worldview. There was a fair and sustainable approach to taxes, fees and user charges, more accessible and usable transportation, and improved spatial planning which curbed urban sprawl.

The overall approach to urban design and transportation were vastly improved. All this helped create high-density urban living, safe and affordable housing, and vibrant local eco-systems – everything within reach. Changes in technology, economy and policy leads to a greater uptake of renewables. Focus shifts to self-sustaining cities, a circular economy and reduced consumerism. Less consumption of goods is paralleled with higher level/better service. This is a narrative of success. Aotearoa New Zealand has made the transition. In the words of a citizen in the future: "I view the lush greenery outside the window,

take a deep breath of clean air, and think whimsically: do you remember the days of climate change and the housing crisis? I don't." Other words uttered by citizens of the future include: "I log into a virtual workplace at a local hub"; "We enjoy effortless transportation" and "Can you believe people used to ...".

The core metaphor is: 'Sharing is winning'. Other metaphors and narratives which summarised this scenario include: 'emerging butterfly', 'on the right track', 'agile living', and 'the glass half full is now full'.



RADICAL CHANGE

*metaphorically 'mokopunatanga
for our grandchildren's grandchildren'*

In this scenario, radical change rewrites the rules of the future. In this future, business and life are globally exceptional, successful policy shifts lead, creating novelty. For example, Aotearoa New Zealand leads the world in the new global happiness index (or a similar new measure) which combines measures of the four capitals (financial/physical, natural, human and social). Aotearoa New Zealand is more socially connected and socially conscious as a country. Emissions reduction targets have been met, climate change has been reversed globally, and absolute poverty has ended. Sentient AI ensures optimisation in the allocation of resources, communities are connected, and individuals and society benefit from real-time smart education and preventative health.



“My sense of ‘me’ has changed: my responsibility is to my legacy, and my decisions are made on behalf of our grandchildren’s children and their children. We are but temporary stewards of an ecologically-based civilisation journeying through the ages”

– Dr Alison Collins

Healthy food is affordable and readily available. People live balanced and fulfilled lives and are no longer lonely. Expertise is re-thought and people become experts of their own condition; communities tell their own experiences and are heard. The focus is on “a life well lived”, justice and peace for all. As societal conditions become just and overall improved, prisons are no longer needed. In this future, vulnerable children have become valuable children.

The wellbeing benefits of new investment, which includes physical assets and supporting systems and processes, are measured and considered. Digital equity is achieved; education and knowledge systems have been democratised. Physical and social structures are transformed to places of community wellbeing and healing. Public buildings have multiple and diverse uses. Of course, there are still problems, but the problems of 2070 would have appeared minor back in 2021.

New approaches to economic distribution enable individuals to live up to their economic potential through participation in education and or meaningful work as and where suits the individual. We have shifted from a linear economy (extracting resources, using them, and disposing of waste) to a circular economy (based on biodegradable and recyclable materials, renewable energy sources, and zero waste). The impacts of inequality are offset through the free and abundant provision of public services and social goods. Economic risks are mitigated through income insurances and policy which facilitates innovation and entrepreneurship.



Wellbeing thrives as economic needs are met and economic autonomy is facilitated.

This radical future has come about because prevention is first and foremost and empathy and social consciousness guide the way. For example, decision making is about taking an intergenerational view for our mokopuna (grandchildren), which requires thinking beyond a sense of me, consumption, and short-term election cycles.

Our decisions and worldview are framed by Mātauranga Māori⁵, which enables us to look back and think holistically over long-term timeframes including kinship relationships between people and the natural world.

The paradigm shift, therefore, is towards the intrinsic rights of nature, beyond which there is any tangible or intangible human benefit. Not only do we manage wellbeing and infrastructure to prevent degradation but to enhance and restore, to give back to nature. This is the idea of reciprocity and kaitiakitanga (guardianship and protection).

The metaphor for this future is the shift from 'bubbles' (e.g. isolation, silos) to 'braided rivers' (e.g. deep connections with self, community, economy, and nature). Other metaphors and narratives which summarise this scenario include: 'escaped from echo chambers', and the whakatauki (Māori proverb) "Hapaitia te ara tika pumau ai te rangatiratanga mo nga uri whakatipu" – foster the pathway of knowledge to strength, independence and growth for future generations.

While the scenarios explored divergent thinking, the next part of the process focused on convergent thinking, moving toward the vision and strategy.

That is, after the scenario process – after articulating alternative futures – participants focused on a 'preferred' future.

⁵In its Ko Aotearoa Tēnei report, the Waitangi Tribunal concludes that the Treaty envisages the Crown-Māori relationship as a partnership, in which the Crown is entitled to govern but Māori retain tino rangatiratanga (full authority) over their taonga (treasures). This partnership framework provides the way forward for the Crown-Māori relationship.

4. A PREFERRED FUTURE

After considering future scenarios, participants at the workshops were asked to discuss the question "What is your preferred future?".

They discussed the possible key characteristics of one potential preferred future for 2050 to 2070, in specific contexts.

These were:

A global context

A social context

A governance context

A technology, knowledge and economic context

An infrastructure context.



The global context

Globally, Aotearoa New Zealand leads the way in wellbeing. It is a principled world citizen, recognised as one of the happiest and most peaceful places to live and to work. This gives us strong standing on the world stage, and an influential voice. Aotearoa New Zealand is now viewed as the most desirable country in which to live.

New Zealanders live the way that we are perceived internationally. We “walk our own talk”, but also recognise that there isn’t one path to follow. We value diversity at home, as well as in our international relations.

We do not just embody wellbeing, we measure it and take pride in our results. Our wellbeing index includes metrics for social wealth and intergenerational equity. Data used in this index is credible and trusted. We capture data from the micro level (such as the health of each stream) to the macro level (such as the mood of the nation), and analyse and

report on this data in real-time. This enables us to track changes as they emerge, and to anticipate changes that could evolve into bigger shifts or issues over time.

While we used to feel small and isolated, and strived to be better than other countries (such as Australia), now we are less worried about judging our success against others. We measure our success by our own high standards and aspirations. Ironically, this has led us to be regarded as a model to the rest of the world. Scandinavia now aspires to be the Aotearoa of the North.

The social context

Wellbeing is at the heart of how we treat people. This is a world where everyone in Aotearoa New Zealand has enough to eat well, and lives in a warm, dry home. More than just these basics, this is a world where we recognise that everyone deserves the same respect, tolerance and opportunities. We aim to prevent problems, and weed out their root causes, rather than solve them.

This is recognised in our education, healthcare, and justice systems. Government agencies work closely with communities, and communities enjoy a greater degree of self-governance. Children live in a country that makes decisions based on their wellbeing.

This has led to a world beyond racism, where hate crimes have disappeared. This enables whānau and communities to thrive.

There is a real confidence in the future to come – “optimism in a life of dignity, worth living, and well-lived”.

Although this is a humane world, it’s not purely human. Artificial Intelligence (AI) has been harnessed to upgrade our wellbeing. For example, AI plays a major role in the health system. AI and humans work together in numerous areas. These include early diagnosis of diseases, real-time tracking of personal health data, and analysing changes over each person’s life journey.

Metaphors that symbolise this vision capture both personal freedoms (“a horse roaming free”) and communities working together (“holding hands”). The narrative of Aotearoa New Zealand being “100% pure” has shifted to “100% happy and engaged”.

The governance context

Governance in this world prioritises positive relationships between people, and between people and our environment. Policy decisions are evidence-based, and led by science from Māori and Western traditions.

The key to governance in this world is inclusiveness. This is spearheaded by the partnership between the Crown and Māori.⁶ Our roots as a society are well-grounded in Mātauranga Māori, in which “your own mana is enhanced by lifting the mana of others” (Prof Tracey McIntosh). Government policies made in partnership with Māori are inclusive of everyone, and focus on future generations.

A key metaphor that guides this world, from Mātauranga Māori, is Mokopu-natanga – a commitment to focus on the lives of our grandchildren and their grandchildren. Governing is about being a good ancestor and the whole collective, not just about “what’s in it for me”.

The notion of doing well and being successful, solely in monetary terms, is seen as crude. Instead, self-esteem is enhanced by helping others.

Social harmony is highly valued in this world. Unequitable power relations are disrupted – equitable health and wealth distributions are central to governance arrangements.

The way that we treat one another is also reflected in the way that we relate with the rest of our environment. We no longer see the environment as a ‘resource’ to exploit, but as a living system to look after. We also see ourselves as part of our environment, rather than seeing humans and nature as separate entities.

Human wellbeing is inter-connected with environmental wellbeing: this a fundamental governing philosophy.

The technology, knowledge and economic context intertwined

Technology plays an important part in creating smart and highly liveable towns and cities. This enables a shift from “working harder” to “living smarter”.

We have shifted from a linear economy (extracting resources, using them, and disposing of waste) to a circular economy (based on biodegradable and recyclable materials, renewable energy sources, decarbonisation and zero waste).

The shift to a ‘gig economy’ has been managed well, and has led to a more flexible, capable and productive workforce which has continued to grow the economy.

People value government services and are willing to pay because investment choices are targeted and benefits are tangible. We are self-sufficient in energy and food production and we export higher value products and services.

Over the long term, inflation targets have been met and our standard of living has greatly improved.

AI enhances the health of communities and our environment, and enables optimum use of infrastructure. Sensors capture an ocean of data on environmental health, social wellbeing, and infrastructure – and AI analyses and creates meaning out of this data in real-time.

Citizens, businesses, and government openly share data, based on high levels of trust, mixed with high levels of security for sensitive/private data. This leads to new forms of collective intelligence – “Our city has a mind – without fears of surveillance”.

A creative and entrepreneurial mindset prevails in this world. There is an appetite for doing things differently, and for taking risks (so long as no lasting harm is done to people or the environment). Failures are seen as opportunities to learn. This mindset constantly boosts productivity.

⁶ In its Ko Aotearoa Tēnei report, the Waitangi Tribunal concludes that the Treaty envisages the Crown-Māori relationship as a partnership, in which the Crown is entitled to govern but Māori retain tino rangatiratanga (full authority) over their taonga (treasures). This partnership framework provides the way forward for the Crown-Māori relationship.

The infrastructure context

Smart, nationally integrated infrastructure provides people with more choices than ever before about where to live, work, and play, thanks to well-connected regions and cities. A shift to emphasising the role of social infrastructure occurs and the resources available for health and education improves.

A spatial infrastructure asset register is fully developed. Integrated with sensors, an AI 'digital twin' of Aotearoa New Zealand improves planning and enables real-time decision making. This includes real-time asset management systems and a preventive investment model so that existing assets are employed optimally. Infrastructure becomes fully costed and the financing models for economically important, but commercially challenging, infrastructure are developed. Human effort is deployed to managing the system and writing the rules. Transformative infrastructure improvements are delivered with digital connectivity, including sensors on all major infrastructure, enhanced as a means of enabling much of the necessary change.

Significant changes to the Resource Management Act lead to improved management of our natural capital while enhancing social wellbeing outcomes. Water availability and quality improves, as evidenced by the improvement of our aquatic environment. The causal relationship between infrastructure services and wellbeing becomes understood. Wellbeing measures, including a digital wellbeing framework, are adopted.

Infrastructure contributes to a prosperous future where, in particular, environmental and social wellbeing flourish through a net zero carbon philosophy and efficient land use allowing more people to connect, all enabled by technological advancement.

5. BACKCASTING

– STEPS TOWARDS A PREFERRED FUTURE

The visioning of a preferred future was followed by backcasting – a process of ‘remembering’ the types of changes and steps that might happen in reaching a preferred future. Backcasting can help to make a preferred future more ‘real’ (i.e. tangible and possible). It bridges

the short-term, the medium-term, and the long-term (in this case to 2050) and provides a framework for possible action, but remains, in the case of this particular exercise, entirely aspirational. The table below summarises what might have happened on the way to a

preferred future as identified by participants. Workshop participants were asked two questions:

1. How did we get there (i.e. to this preferred future)?
2. What steps were necessary to create this preferred future?

It is important to note that this was a creative exercise and events are speculated and not advocated. That being so, the dates are indicative as change is rarely so simple or linear. It simply outlines some potential policy initiatives required if we were to aspire to this future.

A preferred future – some possible actions that might lead us to improving the environment and wellbeing and removing inequity	
Years 2021 to 2025	1. Wellbeing targets and measures are updated, implemented and published.
	2. Health care policy includes preventative measures such as nutrition, exercise and lifestyle choices. Seed funding is available to implement the policy in areas of deprivation.
	3. Legislative reforms are implemented which align the Resource Management Act (RMA), National Policy Statement on Urban Development (NPS-UD), Local Government Act and Land Transport Management Act to facilitate the achievement of important goals such as emissions reduction, housing supply and equality to enable better functioning towns and cities.
	4. Barriers to greater access to, and deployment of, distributed energy resources (DER) are removed which are aimed at improving reliability of supply and optimising costs.
	5. Waste management regulations are implemented in order to achieve a circular and less extractive economy in order to avoid environmental degradation.
	6. High-speed communications and digital connectivity are enhanced to improve access to public services and expand employment opportunities.

For more information on Backcasting visit www.dpmc.govt.nz/our-programmes/policy-project/policy-methods-toolbox/futures-thinking/backcasting

A preferred future – some possible actions that might lead us to improving the environment and wellbeing and removing inequity

Years 2026 to 2030	7. Funding needed to implement the wellbeing policy goals is increased. Government shows commitment to milestones #1 and #2. Some measures begin to show improvement.
	8. Funding for mental health care is increased and incarceration rates show signs of falling.
	9. Increased investment in education broadens work opportunities for students of all abilities. There are more teachers per student and they are more highly valued.
	10. Spatial design capitalises on the regulatory reforms (#3) which have removed constraints to transport and urban form. Signs of improved liveability in some places where this has been possible are evident.
	11. Building regulations are changed (again) to improve energy efficiency and earthquake resilience.
	12. Investment in apprenticeships and science education has resulted in a higher proportion of local labour designing, building and maintaining infrastructure assets.
	13. Electric vehicles comprise 8% of the light vehicle fleet as they have reached or exceeded price and range parity with internal combustion engine (ICE) vehicles.
	14. Revenue policy and methods of charging ensure the transport system is correctly funded and inequities are removed.

A preferred future – some possible actions that might lead us to improving the environment and wellbeing and removing inequity

Years 2031 to 2035	15. Tertiary education is free for all New Zealanders in order to increase job opportunities for those affected by systemic inequity.
	16. Housing has become more affordable. Regulatory reforms (milestone #3) have removed barriers to construction resulting in increased supply.
	17. A four-day working week and less structured working arrangements have become common. Liveability has generally improved.
	18. Emissions targets for the transport sector have been met for this period. Electric vehicles comprise 30% of the entire vehicle fleet resulting from policy settings which address upfront cost of ICE vehicles.
	19. All electricity is from renewable sources, in particular distributed energy resources (DER). Coal is no longer used to generate electricity.
	20. New process heat installations no longer select coal as an energy source. Price parity with electricity has been reached because of an increased supply of renewable electricity.
	21. The relationship between shoppers and shops and workers and employers has been changed by technology. Long term social consequences are unknown and are monitored.
	22. Existing measures of prosperity and wellbeing are expanded to include the environment. Policy now recognises that Nature has an intrinsic value and cannot be depleted and must be restored.

⁷Refer to the Dasgupta Review

A preferred future – some possible actions that might lead us to improving the environment and wellbeing and removing inequity	
Years 2036 to 2040	23. Housing affordability continues to improve. Supply and demand are evenly matched as a result of initiatives (building on milestones #3 and #17).
	24. New knowledge jobs are being created as a result of investments in education (building on milestones #10 and #16).
	25. Government grants enable remaining coal fired process heat installations to transition to electricity. The 2050 climate change targets appear to be achievable.
Years 2041 to 2045	26. Community medical facilities commonly offer preventative medicine and healthcare services building on milestone #2. Hospital admissions per capita begin to stabilise or decline; people are healthier.
	27. A significant upgrade to the electricity grid and telecommunications network has been completed. Reliability of supply is now assured and price volatility avoided. The cost of home heating is no longer a barrier for some sections of the population.
	28. Major cities have well patronised autonomous public transport with separate active mode corridors. Transport deaths and serious injuries are the lowest for 50 years. Reductions in heart disease, mental health conditions and emissions are discernible.
Years 2046 to 2050	29. New Zealand leads the world in novel food production as a result of investments in education (building on milestones #10, #13 and #16).
	30. New Zealand produces net zero carbon emissions. This has been achieved via the NZ ETS and renewable energy sources being used for most transport and process heat uses (building on milestones #19 and #26).
	31. Child poverty has been reduced through improvements in education, health care, energy costs and housing affordability over the previous 30 years.
	32. Improvements gained in wellbeing and employment have been preserved and inequities avoided.

6. CONCLUSION AND NEXT STEPS

One of our reflections was how the thinking was generalised. Most of the issues that surfaced are incredibly relevant across all of government.”

“Different agencies’ priorities going forward would be, I think, some of the outcomes of this meeting and the principles could be incredibly useful across government.”

“We hope the conversation will be reusable across a number of governmental organisations.”

Workshop Participants

“Where there is no vision, the people perish”, goes the ancient saying. Wellbeing needs to be the centre piece for a vision of Aotearoa New Zealand by 2050-2070. Vision leads reality, argues Fred Polak in his classic, *The Image of the Future* (1973). The image we have for the future helps to create what is possible. It enables and ennobles.

For visions of the future to succeed, they need to endure across time. Ultimately, they will be judged by whether they are realised which requires them to be widely understood and adaptive. Such visions are narratives of a world that people wish to create and avoid as circumstances change. They explore alternative possibilities from preferring the status quo, through to radical change.

The metaphors captured through this process describe emotive dimensions of the future which help us plan infrastructure much further out, recognising that the world 50 years from now will not look like the world today. This enables us to consider many possible pathways within the wellbeing context to arrive at the future we want.

To make sure a vision for the future is inclusive it needs to be tested. Next steps are to review the scenarios, the metaphors, and the back-casts with other groups. This can be done through workshop settings as well as survey research, to enable the voices of New Zealanders to participate in future visioning.

Professor Sokail Nayatullah Dr Ivana Milojevic

Next steps for Infrastructure Commission Te Waihanga

Te Waihanga plans to use this report as an input toward forming a vision and strategic objectives for its infrastructure strategy. It will also be considering the possible and plausible scenarios the infrastructure sector is likely to need to be aware of over the next 30 years. To assist in the development of the vision and strategic objectives, Te Waihanga may seek further input from the Chief Science Advisors and relevant public sector officials to help build on the findings of this report.

Next steps for the Ministry of Transport Te Manatū Waka

The Ministry of Transport plans to engage with a diverse range of stakeholders (Treaty partners, youth, civic and corporate leaders) to understand different perspectives on the future of Aotearoa New Zealand which will complement the futures foresight work described in this report. We will engage with our Treaty partners and stakeholders to identify transport and related sector investment options which give effect to the transformational steps proposed in the futures foresight work. This will include potential interventions across a variety of levers such as new infrastructure, adaptation, policy, regulation, pricing and user behaviour. Importantly, it will enable greater co-ordination in their use and promote greater confidence in short-term decisions and trade-offs that have been made or, are about to be made.





Workshop participants

Attachment 1:

The workshops were facilitated by Professor Sohail Inayatullah.

Chief Science Advisor Forum

Prof Juliet Gerrard	The Prime Minister's Chief Science Advisor
Dr Gill Jolly	GNS Science
Dr Kay Saville-Smith MNZM	Ministry of Housing and Urban Development
Prof Michael Bunce	Environmental Protection Authority (EPA)
Dr Susie Meade	Office of the Prime Minister's Chief Science Advisor
Hema Sridhar	Ministry of Defence
Prof Hamish Spencer MNZM	Ministry of Business, Innovation and Employment
Prof Gary Evans MNZN	Ministry of Business, Innovation and Employment
Dr George Slim	Office of the Prime Minister's Chief Science Advisor
Prof Ian Town FRACP	Ministry of Health
Prof Simon Kingham	Ministry of Transport
Prof Tracey McIntosh MNZM	Ministry of Social Development
Prof Ian Lambie ONZM	Justice Sector
Dr Alison Collins	Ministry for the Environment
Dr Matt Roskrug	Massey University

The following agencies had Officials in attendance

Ministry of Transport
Ministry for the Environment
Waka Kotahi
The Treasury
Ministry of Housing and Urban Development
Waka Kotahi
Ministry of Education
Te Puni Kōkiri
KiwiRail
Infrastructure Commission

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