Trends for the Waikato Region: A discussion

October 2022

Waikato
REGIONAL COUNCIL
Te Kaunihera à Rohe o Waikato

Contents

Executive summary

To support our ability to shape the future region we want, we need to be aware of the trends and events that shape our world, from local to global levels.

Waikato Regional Council's discussion document explores a range of national and global drivers of change exploring trends across political, economic, social, technological, legal and environmental (PESTLE) spheres that affect the Waikato region. This work was commissioned to inform the update of the council's strategic direction, and it will also be of value to others in the Waikato region to use for their planning purposes.

Forces of change

Drawing from stakeholder discussions, and reviewing trends analyses internationally, we see a range of significant forces of change (as at mid-2022, in a constantly changing world) that offer both challenges and opportunities.

There are multiple stresses on the global economy resulting from COVID-19, global conflict, technological change, supply chain disruptions and long-term underlying trends, such as climate change and unsustainable production and consumption, which do not fully reflect environmental costs.

Climate action is becoming increasingly urgent, as climate changes drive extremes in weather events, disruptions to food production and coastal land inundation. These magnify the stressors already facing the planet through loss of natural capital.

Māori development is accelerating across economic, environmental and social arenas.

Nationally, government reforms across a range of areas are significant drivers of change.

COVID-19 continues to exert impacts on the world, directly on people's health and further disrupting economic and political situations.

Technology is driving widespread changes in how we live, work and interact with each other; these offer economic opportunity and yet also carry a range of social and security risks.

Social and demographic change in Aotearoa is raising a range of priorities, including the needs of an ageing population, addressing inequality, and countering misinformation and division.

Geopolitical instability is threatening existing trade and institutional systems, reinforcing economic uncertainty.

PESTLE trends

We examined in more detail a range of political, economic, social, technological, legal and environmental trends.

P

Key **political** trends include international fragmentation and tensions, countered by new alliances emerging; increasing disinformation, allied with distrust of governments; and at a local level, increased expectations by communities of their government and systems.

E

Economic shifts and challenges include impacts of relatively high inflation; costs and risks from climate change; ongoing COVID-19 impacts; technological opportunities including those related to food production; impacts of demographic change and consumer spending patterns; and in Aotearoa, structural challenges of persistently low productivity growth in many industries, and ongoing housing affordability issues, but also opportunities from a growing and diversifying Māori economy.

S

Social changes include ongoing inequalities across social, economic and cultural spheres; changing population demographics; social division and disconnection; changing patterns of work and flexible working environments; and a growing focus on whānau wellbeing and resilience in policy.

T

In **technology**, we are seeing a combination of forces, including hyperconnectivity; inequities in technology access; volatility of new financial markets such as cryptocurrency and the challenge that this may pose for monetary policy; diversity in media platforms but growing centralisation of media ownership; economic opportunities, of big data and artificial intelligence alongside significant privacy and cybersecurity concerns; and a potential role in decarbonising transport.

L

Legal and **strategic** trends are marked by the growing pace of government reform in Aotearoa; and at the same time, growth of private investment in public good outcomes, such as through strategic philanthropy, impact investments and social procurement.

E

In the **environmental** arena, we see environmental tipping points getting ever-closer with six out of nine planetary boundaries now exceeding safe limits; land use and associated pressures adversely affecting soil and water quality, and biodiversity; the challenges facing vulnerable nations and communities in climate change (i.e. 'climate justice') taking greater prominence; the risk of community relocation; and widespread calls for changes in agricultural production.

Strategic response themes

We highlight for discussion a range of potential actions in these strategic areas.

- Financial and regulatory policy responses to a changing climate.
- Evolution of a new biotech economy, including the future of food.
- The value of our environment and natural resources to support ecosystem services such as biodiversity, and opportunities for enhancing green infrastructure.
- Land use and capacity, quality and extent of existing infrastructure for economic diversification, sustainability and to support improved wellbeing in the region.
- Transitioning to a low carbon transport system and the opportunities for mode shift.
- The challenge of water scarcity and the future availability of water.
- Comprehensive responses to social change.

Scenarios for the Waikato region in 2032

To conclude, we suggest a range of aspirational scenarios for 2032, offering potential pathways through which the Waikato can progress.

An innovation leader – with a diversified economy that attracts people to the region and builds the capabilities of the region's peoples

A resilient and sustainable region – that works in concert with the natural environment, is actively transitioning to net carbon zero, and fosters growing indigenous biodiversity

A connected and inclusive community – where people are connected across whānau, communities and governance, with a vibrant Māori culture and economy.

We have questions for discussion, in subsequent stages of this project, that we will seek feedback on through a range of forums in the Waikato.

How do we:

- harness community strengths?
- boost the region's economy?
- protect and enhance our environment and biodiversity?
- make government reforms work for the region?
- springboard from new technologies?

Introduction

To plan for the future of the Waikato region, we need to think about the direction global and national affairs are taking, and how the region can both respond to opportunities and adapt to challenges.

This discussion document looks at global and national trends across a range of areas to help inform Waikato Regional Council's strategic direction. It explores international, national and regional trends raised through discussions with regional council staff and councillors and looks at some of the most up-to-date thinking on the world that is rapidly changing before our eyes. We offer both insights and questions for consideration.

In this report, we explore each of the following.

- Forces of change that are shaping events, and our social and economic development patterns, both globally and in Aotearoa New Zealand.
- Political, economic, social, technological, legal and strategic and environmental (PESTLE) trends in the world, and their implications for Aotearoa and the Waikato region.
- Opportunities in seven strategic response areas that will inform Waikato Regional Council's strategic direction.
- Scenarios for the Waikato region in 2032.
- Questions to consider.

This structure is presented in Figure 1 to convey the way in which each area of discussion informs the next.

This document updates and builds on a PESTLE trends report published by Waikato Regional Council in 2019.

As this initiative unfolds, we will be reaching out to a range of forums to explore the trends and scenarios for the future, and the compelling pathways we need to take as a community to realise our desired low-carbon future, to provide good jobs and social equity for the people in our communities.

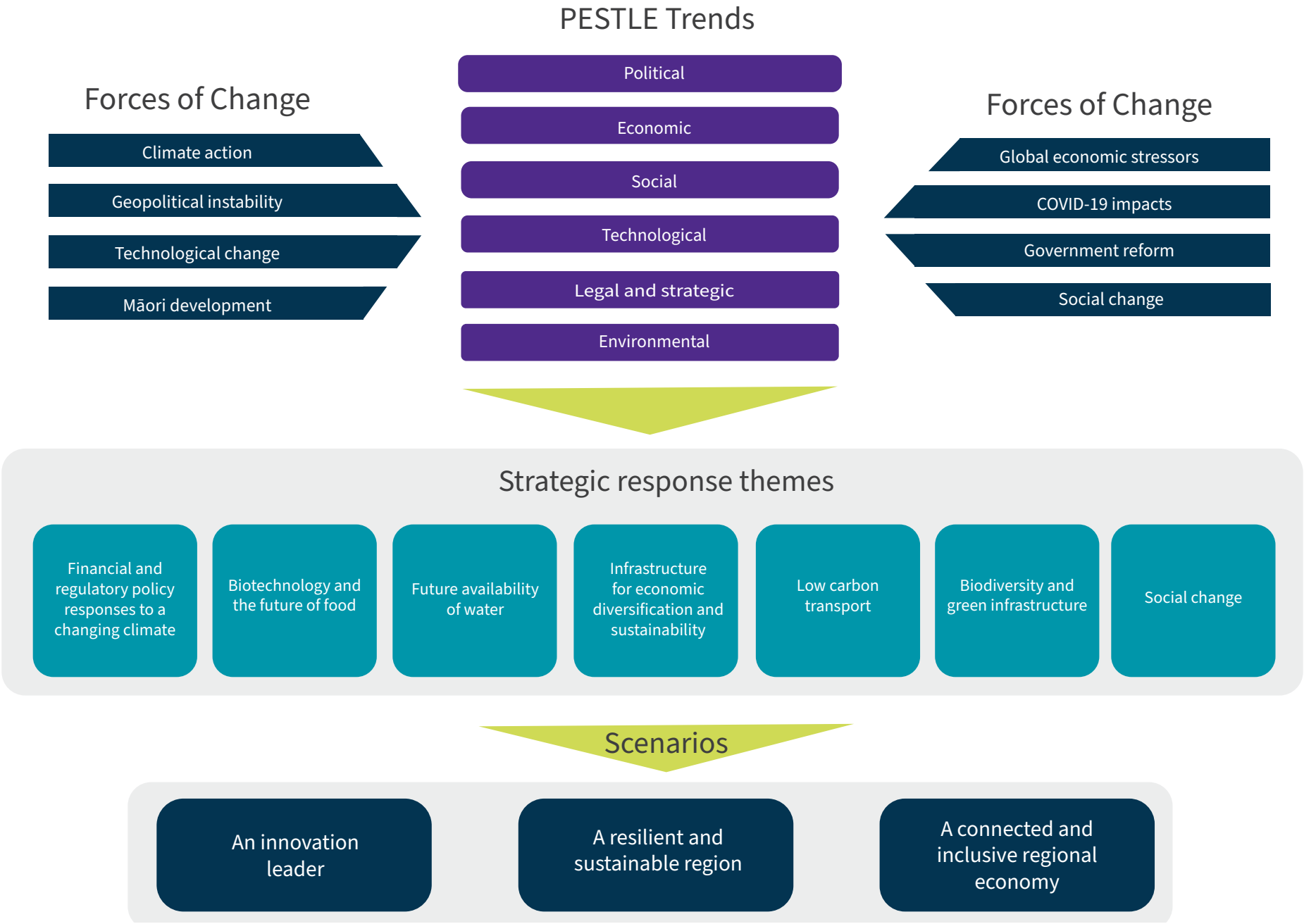


Figure 1: Structure of this review and key areas of discussion

Section 1
Forces of change

In this section, we set out significant global and national forces of change that are shaping events, patterns and policies that affect the Waikato region. These forces of change impact on the political, economic, social, technological, legal and environmental trends that we describe in more detail in subsequent sections.

The global economy is facing multiple stresses

The global economy is being shaped by long-term trends such as demographic shifts and economic development in Asia, and by other recent and emerging trends. More recent trends include the ongoing effects of the COVID-19 pandemic, new technologies and increased tensions between some nations. Many of the current global economic forces are challenges or threats, but there are also some new opportunities.

- Current economic conditions in many countries reflect the impacts of the COVID-19 pandemic and government responses to it, and the conflict in Ukraine.[1] Overall inflation rates are currently high in New Zealand and many of its main trading partners, driven by a sustained period of exceptionally low interest rates, quantitative easing, pent-up demand during the pandemic, associated supply chain disruptions, and rising oil prices reflecting increasing geopolitical tensions.[2]
- There is a risk that inflationary expectations will become embedded and higher inflation conditions may persist for several years. If this occurs, it will drive ongoing wage and cost pressures for businesses, while consumer purchasing power may reduce if wages don't keep pace with price inflation. Faced with inflationary pressures, many central banks are now raising interest rates and some are starting to engage in quantitative tightening, which will slow down growth in business investment and consumer spending and may increase the risk of a financial crisis triggered by defaults on sovereign and privately-held debts.
- Longer-term underlying trends of ecosystem and biodiversity decline, climate change, technological change and political shifts will also affect business costs and risks and hence economic outcomes. These trends are converging to weaken the forces of globalisation that have defined global trade over the past 30 years, causing trade patterns to shift.[3] This includes reconfiguration away from long and thin 'just in time' global supply chains towards 'shorter' and 'thicker' supply chains that may increase the costs of long-distance trade.[4]
- 'Superstar' firms and large e-commerce platforms are expected to become increasingly dominant in world markets, creating challenges and opportunities for New Zealand's small and medium-sized exporters.[3]
- Consumer and government spending will be affected by the ongoing demographic trend of ageing populations, and income-reducing impacts of climate change.
- Offsetting these headwinds, technological change and innovation will create new opportunities for economic growth that can be exploited if businesses and governments can adopt them effectively. This includes opportunities generated by electrification of transport and other sectors, alternative food production technologies, labour-saving automation and new markets for low-carbon products.
- While the economic impacts of the COVID-19 pandemic are mostly negative, it has also created some opportunities for regional growth arising from greater acceptance of remote work.

COVID-19 will have ongoing impacts

COVID-19 has shaped events globally over the past two years and its influence will continue to be felt for some time as it becomes endemic or embedded in global health affairs. The COVID-19 pandemic provided a vivid example of the weaknesses in international coordination on health crises, as well as weaknesses of existing institutions and funding to meet the challenges posed – although Aotearoa New Zealand has generally performed much more strongly than other nations overall.

- In terms of the direct health impacts, COVID-19 is expected over time to have less day-to-day impact on wealthier nations as vaccines become more responsive to variants, and antibody and antiviral treatments grow. These will likely lead to cases and deaths becoming increasingly disconnected, although cases are expected to remain widespread for some time to come, and the potential for re-infections is not yet clear.[5]
- Without concerted global action, poorer nations and poorer communities within wealthier nations will likely bear the brunt of COVID-19's health and related impacts for the foreseeable future, and deepening inequality.
- COVID-19 catalysed a range of economic trends, including expansionary monetary and fiscal policies, increased national debt and disrupted or diversified supply chains. COVID-19 also further extended very low interest rates in place in some countries since the Global Financial Crisis in 2008/09, although interest rates are now rising.[3]
- New variants are expected to emerge which may yet cause continued global disruption.[6] This is evident in the New Zealand winter surge, and may well be replicated on a larger scale in the northern winter. Entirely new pandemics remain a possibility.
- Countries globally are generally working towards the same level of day-to-day activity that existed pre-COVID, such as in travel, leisure and commercial activity. Yet the impact of COVID-19 will still be felt in the short term through significant supply chain disruption, particularly from China, parts of which at the time of writing remained in lockdown.[7]
- In the longer-term, COVID-19 impacts will be felt in a range of ways, such as the impacts of the disease itself (including long COVID); exacerbation of entrenched inequalities; and in the changes COVID-19 has brought about in daily life, such as increased working from home, reduced office occupancy and reduced indoor events attendance.[7]
- COVID-19 appears to be contributing to political turbulence in many nations, often through either dissatisfaction with deficiencies in managing COVID, or with the stringency with which COVID-related restrictions were being enforced.[8]

Climate action is increasingly urgent

The Intergovernmental Panel on Climate Change (IPCC) delivered its strongest warning to date about the climate crisis in its Sixth Assessment Report (August 2021), concluding that global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO_2 and other greenhouse gas emissions occur in the coming decades.[9] Furthermore, the World Meteorological Organisation's (WMO) predictions conclude a 50 per cent chance of global temperature temporarily reaching the 1.5°C threshold by 2026[10], and that today's activities and current policies have the world on track to warm by about 3.2°C by the end of the century.

Even short-term warming of 1.5°C could have dire impacts, the WMO has warned. The IPCC's second instalment of its 6th Assessment Report highlights the vulnerability of all life to these impacts. These include death, displacement, impacts to health and wellbeing, risks to food security including crop failure and reduced yields, impacts on livestock and fisheries, access to water and damage to infrastructure.[11]

- Warming is already driving or exacerbating recent extremes in weather events across the globe, making them more likely, more intense, longer-lasting or larger in scale.
- Globally, large-scale displacement is already occurring, particularly from sudden onset flooding events, as well as impacts of drought and rising temperatures in urban areas over more sustained timeframes.
- The NZ SeaRise programme has predicted a 30 centimetre sea level rise in 10 to 20 years when land subsidence is combined with climate-driven changes in sea levels.[12] The Waikato region is particularly exposed, with coastal communities on the west coast and the western and northern Coromandel and Hauraki Plains infrastructure especially vulnerable.
- With food production contributing 40 per cent of global greenhouse gas emissions, interest in more efficient production and food sources such as Alt-proteins is very high; noting, however, that these could have substantial disruptive effects on agricultural production in the region.
- The capacity of ecosystems to deliver essential services was already under stress before current events and climate change took their toll.[13] Changing weather systems, COVID-19 and the Ukraine conflict have further heightened weaknesses in current food supply systems, spurring the opportunities for redevelopment via investment in innovation and scaling of new technologies and processes.[14] These changes will also incentivise food production to shift closer to demand, and countries may seek to become more self-sufficient in food supply.
- The potential for insurers to abandon parts of the region's coastal and river settlements in the coming decade in response to inundation and flooding risk is a pressing reality.[15] Transitions will be costly for individuals and communities.

Geopolitical instability is threatening established systems and networks

Geopolitical instability is at a heightened state and as it intensifies so do its impacts. Effects on migration, supply chain, health and wellbeing, cost of living and the global economy will be amplified.

- Respondents from a McKinsey 2022 Global Survey rated geopolitical instability as the greatest risk to domestic economic growth. This was followed by inflation, volatile energy prices and supply chain distributions which have all been influenced by the recent invasion of Ukraine.
- Competition between the United States and China continues to increase, as China extends its presence in the Pacific and continues military exercises near Taiwan.[16] Russia's invasion of Ukraine continues to have catastrophic local impacts, has globally disrupted energy and food supplies, and isolated Russia economically.[17]
- With demographic shifts occurring and growing inequality, people are drawn to communities of similar values and belief systems. In turn, this can lead to siloed information and competition between groups.
- As we enter a period of slower economic growth and volatility, pressure will be put on global economic and political systems, leading to many groups feeling uncertain and distrustful of established institutions and governments.[3]

Technology is driving widespread changes in how we live and interact

Technology is at the forefront of change, with advancements in technology having widespread impacts across many sectors and aspects of our lives.[18,19] Often described under the banner of the Fourth Industrial Revolution, a range of technological advances are building on and amplifying the impact of each other. Notable trends include the following.

- Increased hyperconnectivity, with more of the population using the internet than ever before. Digitisation has changed many aspects of our life such as the way we work, learn, communicate and buy goods.[20]
- With digitisation there is potential for further democratisation of information and accessibility, however, misinformation also has risen with social media becoming host to divisive, harmful and fallacious ideas. [21]
- As technology, such as artificial intelligence and machine learning, becomes more accessible, businesses will be able to leverage the technology to optimise activity and profits. [22] Yet at the same time, cybersecurity and information privacy becomes ever more important as more data is shifted to online storage. New Zealand is vulnerable to cyber threats based on our internet infrastructure. [23]
- Technology could play an important role in our response to climate change through developing clean energy technology, assisting in decarbonising transport and carbon capture technologies.[24] Biotechnology is a further tool that can be used in response to climate change and the resulting issues in supply chains, with the potential to create drought-resistant crops and provide alternative foods and biofuels.[25]

Government reform in New Zealand is gathering pace

Within Aotearoa New Zealand, the pace of government reform is a significant driver of change within central agencies, local government policy and operations, and the broader economy. After a first term that was relatively cautious in its approach, the Government is demonstrating substantial appetite for reform across a range of spheres. These include the following.

- Health reforms that centralise health planning and activity with the aim of delivering more equitable, efficient and effective health services.
- Three waters reforms to improve the quality of drinking water and the management of sewage and stormwater services, with significant changes for local government operations.
- A multi-sectoral Emissions Reduction Plan, alongside an emissions budget, with proposed recommendations across a range of sectors; in response to the work of the Climate Change Commission. In addition, approaches to reducing agricultural emissions have been recommended through He Waka Eke Noa, the Primary Sector Climate Action Partnership.[26]
- Resource management and urban development reforms have been implemented, for example, the National Policy Statement on Urban Development and Medium Density Residential Standards, and more are in the pipeline.
- Changes to immigration policy that will affect the number and types of migrants to Aotearoa.

Social and demographic change has many impacts and opportunities

While people have come to expect and anticipate demographic change over time (such as the ageing population), recent years have seen some significant societal disruptions which were not anticipated or expected. These disruptions, and their effects, are likely to continue for the foreseeable future and become a driver of change.

- The ageing population continues to be a key driver of fiscal, healthcare and social policy.[27] An increasing proportion of public and private resources will be required to support older people, and to counter loneliness and isolation by supporting older people's engagement in society and employment and their access to community services.[28]
- The demographic makeup of the young population is changing as well. The proportion of young people in Aotearoa New Zealand who identify as Māori or Pasifika is growing, and they have a younger population profile.[29] The youthfulness of these population groups has implications for the cultural responsiveness of services and systems.[30]
- Increased societal division and disconnection are apparent. Political extremism and increased racial tension, inflamed by social media and misinformation, have created some significant protest movements across the world in recent years.
- Internationally, inequity and poverty are increasing, and addressing these is a longstanding challenge in Aotearoa. Equity has become a common lens through which policies and systems are examined. Yet, evidence indicates that the gap is widening between those who have, and those who have not, which can feed into societal and institutional distrust and the breakdown of feelings of citizenship.[31] Finding ways of closing the equity gap are likely to gain greater focus in the coming years.
- The increasingly flexible and fluid nature of employment is also contributing to societal change. Workers are moving jobs more often for a variety of reasons. For example, a long commute may no longer be an issue because they can work from home, they may not agree with the values and principles of their workplace, or they may feel less loyalty to a company because they are working from home more.

Te ao Māori is a growing feature of our economic, social and cultural development

The Māori economy is growing significantly, with most recent estimates indicating it is worth some $69 billion in assets, and is increasingly diversified.[32] Within this growth, the place of mātauranga Māori (Māori knowledge) is further developing and embedding into all aspects of Māori development. This ranges from the Treasury's Living Standards Framework to Vision Mātauranga within the science research and the science system, all of which seek to value and resource mātauranga Māori and aims to release the innovation potential of Māori knowledge, people and resources.

Te taiao (the natural environment) is a key focus for Māori. It involves environmental integrity and sustainability, solutions from mātauranga Māori, including indigenous knowledge and science. It applies to global, national and local environmental issues, including climate change, natural hazards, water, resource management, bio-protection and freshwater, estuarine and oceanic health.

Te Tiriti o Waitangi and Māori-Crown partnerships across government sectors are supporting and ensuring greater participation and involvement of iwi Māori in key governance roles, local and regional representation, policies, programmes and resourcing.

- Provisions in the Public Service Act outline how government can support the Crown in strengthening relationships with Māori, and how to bring a Māori worldview into each organisation.
- Three Waters reform includes upholding iwi/Māori rights and interests relating to water services. Local government and mana whenua will provide joint oversight and strategic direction which will set priorities for these entities and keep them to account. This further extends the already established place of co-governance, such as in national parks, conservation and resource management.
- Local and regional government throughout Aotearoa New Zealand have taken up the option of including Māori wards in local elections.

Responsibility for the revitalisation and maintenance of the language is shared between Māori and the Crown. *Maihi Karauna*, the Crown's Māori Language Revitalisation Strategy, sets three ambitious goals, which if achieved, will affect how Māori identity and te reo Māori are embedded in society:

- 85 per cent of New Zealanders (or more) will value te reo Māori as a key part of national identity
- one million New Zealanders (or more) will have the ability and confidence to talk about at least basic things in te reo Māori
- 150,000 Māori aged 15 and over will use te reo Māori as much as English.

Celebrating Matariki as a public holiday in June 2022 for the first time is a milestone for embedding Te Ao Māori into Aotearoa New Zealand fabric, and enables all New Zealanders to learn about and appreciate Māori cultural heritage.

Section 2

Political, economic, social, technological, legal and environmental trends

In this section, we look beneath the forces of change to explore key political, economic, social, technological, legal and strategic, and environmental trends, and their implications for Aotearoa and the Waikato region.

Political

International fragmentation and tensions are creating fault lines in established global systems

In the last five years, the world has entered a period of political uncertainty, volatility and instability that has intensified further as a result of a range of factors, including the fragmentation and weakening of historic alliances and institutions, the upheaval caused by COVID-19, and wars on different fronts, most recently in Ukraine. At the same time, an accelerating trend of misinformation on social media platforms, and cybersecurity attacks globally, have created an ever-more uncertain political environment.[16]

Currently, both China and the United States are seeking to increase their international influence and leverage, while at the same time Russia, at least in the short-term, has become more isolated and economically vulnerable through its actions in Ukraine. Alongside international political and economic tensions, many note an increasing divergence of views and contestation between different groups of identity, whether cultural, religious or ethnic, and with greater potential for conflict emerging.

The economic and societal challenges being faced globally have left large segments of the global population feeling insecure, uncertain about the future, and distrustful of institutions and governments that they view as corrupt or ineffective.[3]

New alliances are emerging on the environment, economy and international security

More positively, sustainability agendas are coming increasingly to the fore in policies, in a growing trend towards climate action. New alliances are forming in response to uncertainty, with new trade and security arrangements emerging, such as through the Comprehensive Trans-Pacific Trade Partnership, and the expansion of NATO. Yet, as many observe, the disruptions presented by disease, conflict, climate change, technology and financial crises will repeatedly test the resilience and adaptability of communities, states and international system, often beyond the capacity of existing systems and approaches.[3]

There is new momentum for change in Aotearoa across a range of fronts

Aotearoa New Zealand has not been immune from these global forces of change. The protests at Parliament in early 2022 highlighted a small but vocal group that united around a range of disparate views, fed by extremist online disinformation and conspiracy theories that recent analyses showed outstripped mainstream media at the peak of the protests.[33]

Specific to this country, a substantial policy reform drive has become evident since the 2020 elections, where a government less constrained by political alliances is seeking to make substantive change across a range of sectors, including local government, water, resource management, health and education.

New Zealand may be well positioned in terms of some potential external stresses. We were rated first for least corrupt and second for most democratic country in 2021. While the cost of living is increasing, we also have low unemployment and strong access to locally grown food sources; however, affordability of food, even locally grown, is a real challenge for many.

Technology assists community engagement and raises community expectations

The growth of technological capability, and the ability of people to make use of technology (in part due to COVID-19 isolation responses), has created a more engaged, at times demanding and even volatile relationship between communities and government. For local government, this both increases the opportunity for engagement, and at the same time increases the demands from communities for services and pressures on central and local government to respond. There is likely to be a persistent gap between what people demand and what governments and corporations can deliver.[3] These pressures may result in new models of governance and engagement in the future, which harness 'ground up' and community development approaches for more effective community decision-making and action.

Economic

Consequences of high inflation

Relatively high price inflation is the defining characteristic of many developed countries at present. There is little that people in the Waikato region can do to control inflation, but the region will have to weather the consequences of both inflation itself, and the RBNZ policy measures to control it. The impacts of inflation are typically distributed unequally across social groups, with those on lower incomes less able to accommodate price increases for essentials such as food and energy. This may increase social tension and contribute to changes in the political landscape if the impacts of inflation are not adequately addressed. Furthermore, the policy tools available to constrain inflation are blunt (largely, higher interest rates) and disproportionately affect people who have debts. This inflationary period and subsequent transition to lower inflation rates are therefore likely to feature social conflict and political change.

New challenges and opportunities for businesses

Aside from overall inflation and higher interest rates, businesses face several challenges arising from geopolitical instability, climate change and COVID-19.

- Energy costs and prices for other basic commodities including food are likely to remain relatively high in the short- to medium-term.[34]
- Climate change responses such as carbon pricing and other regulations will increasingly affect costs and incentives faced by producers in a range of industries, including agriculture, forestry, tourism and manufacturing.
- Climate change also creates financial and economic risks via the possibility that a global-scale climate-related natural disaster will lead to massive debt defaults (a so-called 'green swan' event).[35]
- The ongoing impacts of COVID-19 for businesses are uncertain, including future variants/waves and the potential productivity impacts if many workers suffer from long COVID-19 and/or ongoing re-infections.[36]

'Superstar' firms and large e-commerce platforms will become increasingly dominant in world markets.[3]

- Such firms are protected by barriers to entry including access to key technologies and data.
- Some governments will continue to promote national champions in key strategic markets. For example, governments in the United States, Europe, China and India have used regulation and other incentives or barriers to protect domestic firms in markets for key technologies such as mobile telephony, electronic payments, social media and e-commerce platforms.[37]
- Access to a small number of large e-commerce platforms is becoming essential to compete in international retail and wholesale markets.

Changing patterns of international trade create new pressures and opportunities for exporters

Several long-term trends are combining to weaken the forces of globalisation and shift international patterns of trade.[37] As well as a trend toward shorter and thicker supply chains, rising wages in developing countries, and technological changes such as automation and AI, are reducing the incentives of firms in developed countries to use offshore production in lower-wage countries. In addition, the growing middle class in Asia continues to shift economic influence and patterns of trade, while broader political shifts are leading to increased protectionism. These changes mean that exporters must adapt to remain successful, including seeking new markets.

New Zealand's exports are also relatively concentrated on and are exposed to risks in some key international product markets. In 2021, dairy products comprised around 23 per cent of New Zealand's total exports by value, which was more than double the second-largest category (meat and edible offal, at around 11 per cent of exports).[38] Harvard University's Atlas of Economic Complexity ranked New Zealand at 53rd out of 133 countries in terms of the diversity of its exports, down from 33rd in 1995.[39] New Zealand added only four new exported products between 2005 and 2020, valued at only around US$100 million, and of which 95 per cent was cigars and cigarettes.[40] In addition, New Zealand has become increasingly dependent on China as an export buyer, accounting for 28 per cent of exports by value in 2021, up from 16 per cent in 2015.[41] This pattern of falling diversification of exports and increasing dependence on China leaves New Zealand and the Waikato region vulnerable to external shocks and raises the question of what policy changes could support a greater variety of exported products.

Spending patterns are affected by demographic and climate change

Consumer and government spending in New Zealand and abroad will be affected by ongoing demographic trends and climate change.[37]

- Economic growth is expected to slow down in China due to COVID-19 impacts in the short term and convergence of wages and labour productivity to similar levels as in developed countries over the longer term.
- Pricing of goods and services is expected to increasingly internalise the costs of externalities (i.e. environmental effects), leading to changes in consumption patterns.
- Consumers, businesses and governments will face costs from adapting to and mitigating the impacts and risks of climate change.
- An ageing population in advanced economies and China, causing changes to consumer spending patterns and government finances.
- Even under optimistic scenarios, climate change is expected to reduce income levels relative to a world without climate change such that historic trends of long-term income growth may not be sustained.[37] This may require a rethink of fiscal and investment plans that were based on incorrect assumptions about future growth.

Regional economic growth is affected by national as well as global trends

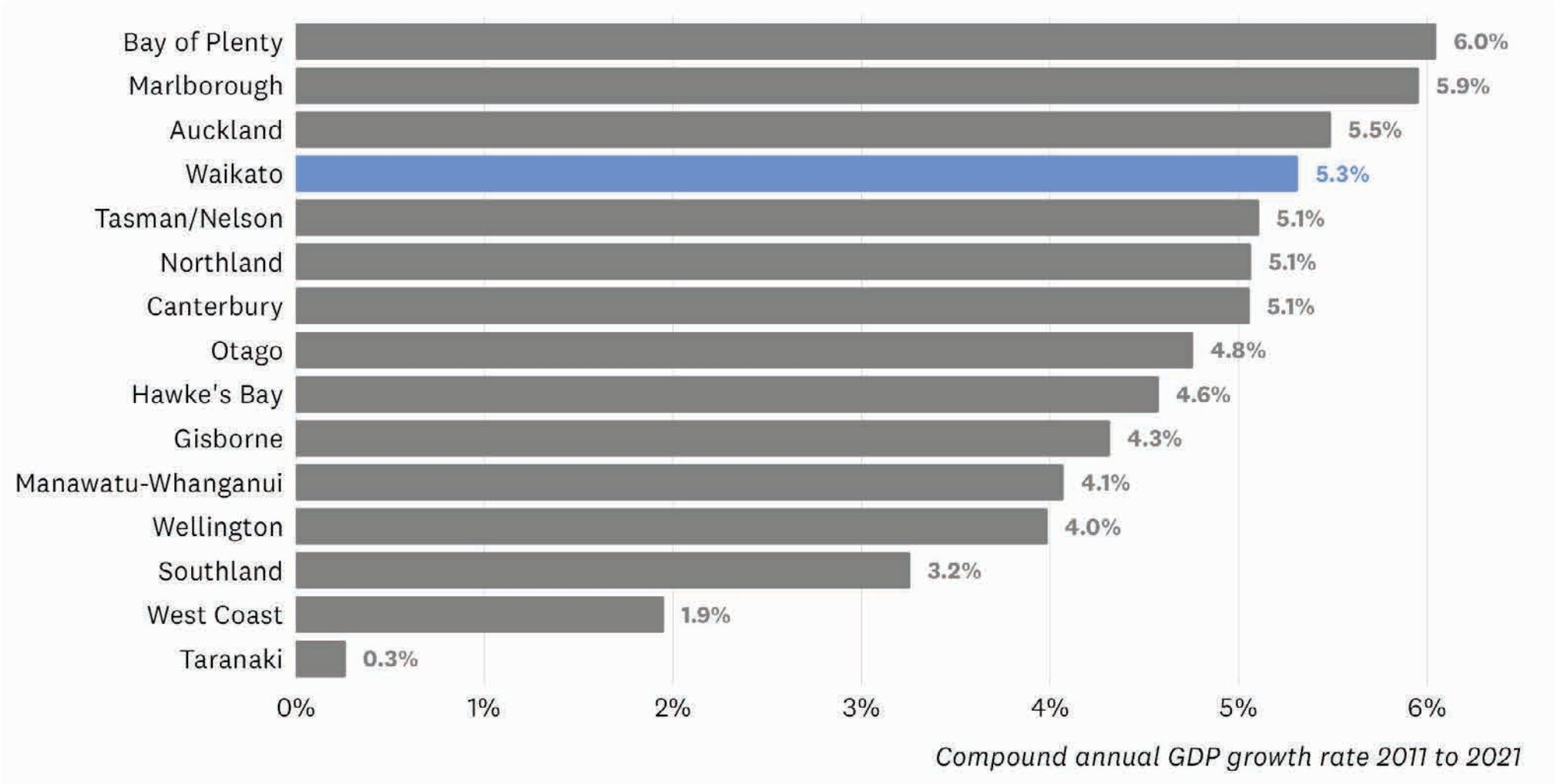
The Waikato region has an array of rich natural resources, and its proximity to Auckland and the Bay of Plenty brings significant economic advantages with access to key domestic and international markets. The region overall is very diverse, balancing the emerging metropolis of Hamilton as a centre of manufacturing and services, with local economies that have a variety of activities with comparative advantages in primary industries. The region also has a strong renewable energy infrastructure, particularly in hydro and geothermal. The region's Māori economy continues to grow as an economic force.[42] The creative sector in the Waikato is emerging from the COVID-19 responses with fresh energy, but nevertheless still affected by the constraints on their activity posed by successive periods of restrictions.[43]

The New Zealand economy is currently characterised by relatively robust economic activity with very low unemployment and labour shortages, but also relatively high inflation, rising interest rates and house prices that while currently falling in many regions, remain high and are unaffordable for many.[44] Of relevance to the Waikato region is what appears to be the start of a downturn in the national housing market, driven by the combined forces of higher interest rates, reduced net migration to New Zealand, some tax system changes, and increased housing supply enabled by central government policy changes such as the National Policy Statement on Urban Development (NPS-UD) and Medium Density Residential Standards (MDRS). At this stage, it is unclear whether this is a short-term downturn or whether policy changes have been sufficient to cause an underlying structural change in the housing market that will lead to sustained improvements in housing affordability. It is also unclear whether these changes will translate into higher or lower volumes of construction of new housing.

Population growth in Auckland is likely to be lower than in the past decade due to more restrictive immigration settings and an outflow of residents who have been unable to travel freely over the past two years.[45] This may also lead to lower economic growth in Auckland, with spillover effects on the Waikato region, given the interdependence of the two regions. If slower population growth and reduced housing prices in Auckland persist, these may combine to reduce the flow of residents from Auckland to Waikato and may also impact the Waikato region's population growth rate.

In the year ended March 2020, Waikato accounted for 8.6 per cent of New Zealand's total GDP, and over the past decade Waikato was the fourth fastest growing region in New Zealand (Figure 2). This proportion has remained essentially unchanged over the past decade, reflecting the fact that economic activity in Waikato grew at about the same rate as economic activity in New Zealand as a whole (2.5 per cent and 2.6 per cent per annum respectively).[46] Growth in total output per filled job in Waikato has been relatively slow, increasing at a compound annual rate of 0.3 per cent between 2011 and 2021, compared to a national rate of 0.7 per cent, across all industries.[47]

Figure 2: GDP growth rate by region, 2011 to 2021 (source: StatsNZ).



Unemployment remains very low in the region, sitting at only 3.9 per cent, well below the post-GFC high of 8.1 per cent. However, it is less clear whether the jobs people are in are high quality, well-paid roles with potential for development. A shortage of skilled labour suggests that structural imbalances in the labour market remain.

The fact that economic growth was faster than labour productivity growth (as measured by growth in output per filled job) over the past decade indicates that most economic growth was driven by population and employment growth, which in turn was driven by net migration to New Zealand (and the region), as well as natural population growth. It is not yet clear whether migration levels will return to pre-pandemic levels or if central government immigration policy settings will permit that to happen, at least in the short term. This may mean that sustaining reasonable levels of economic growth will require productivity growth to be substantially greater than it has been in the recent past, which may require new policies to support productivity-driven rather than population-driven growth.

Whai Rawa: The Māori economy is a growing force

The Māori economy is seen by Māori as a dynamic and evolving space of economic activity, stewardship of natural resources, issues around intergenerational wealth, maintenance of cultural identity and the wellbeing of the people. These wide-reaching aspects are important to inform policy, decision-making and the strategic development of economic activity from a Māori perspective.

The Māori asset base is increasingly diversifying from the primary sector and totals $69 billion, including $39 billion assets in businesses of 9,850 employers and $8.6 billion assets in businesses of self-employed Māori (18,600). Assets totalling $21 billion are in trust and Māori entities. The largest asset base is agriculture, forestry and fishing followed by real estate and property services. The annual contribution to production GDP was estimated at $17 billion (7.3 per cent of GDP in 2018).

The Māori economy is a significant contributor to the wider economy of Aotearoa, with Māori businesses employing higher numbers of skilled Māori. Investment by government in Māori economic development will contribute to Māori business playing a vital role in helping lift whānau Māori aspirations through a challenging time, while reinforcing New Zealand's economic security.

The Māori Economic Development Strategy, *He Kai Kei Aku Ringa*, remains a key focus for Māori supporting a range of strategies to grow future Māori workforce and Māori businesses and support rangatahi and regional development. It is led by Te Puni Kōkiri.

The Māori labour force makes up a rising proportion of the future workforce, increasing by 33 per cent between 2013 and 2018, and an increase of 47 per cent of the number of Māori in employment. This results in a much larger share of the working-age population in the years to come.[32] The Māori population is much younger than the rest of the population in Aotearoa, with 57 per cent under 30 years old. While the ongoing challenge of Māori being over-represented in deprivation statistics must be acknowledged, if these inequalities can be addressed, this will represent a real opportunity for the entire Waikato region, given the likely increase in the Māori share of the population

Ensuring relevant and quality education and training for the growing rangatahi Māori workforce is vital for the future of Aotearoa, and a focus on improving skill level through secondary and tertiary education and trades training is imperative for future proofing.

However, there is a danger that wealth inequality for Māori "will negatively affect economic growth by limiting innovation and productivity", and will undermine social cohesion.[32] In 2018, the average Māori household income was $83,200[32], compared with average annual household income (before-tax) from all regular sources at $105,719.[48] The Māori home ownership rate of 48 per cent[32], sits significantly lower than total home ownership rate of 65 per cent[49] – evidence of the income gap translating into an enduring wealth gap.

The physical infrastructure of the region is under stress

To meet the challenges of the future and provide a sustainable economic foundation, the infrastructure of the region needs to be fit for purpose. In stakeholder discussions informing this work, a range of challenges and concerns were raised regarding the ability of existing physical infrastructure in the Waikato region, particularly flood risk management and land drainage assets. Infrastructure, however, also extends to a wider range of other areas including stormwater and water treatment, roading and rail, and internet access. A robust regional infrastructure is needed to support sustainable development and diversification of economic activities (moving away from those with high external costs, which may involve abandoning some existing infrastructure). These included the following.

- Affordability of maintaining or replacing ageing assets.
- Future upgrades and new infrastructure will be required to meet higher environmental and sustainability standards, which will increase costs.
- Constrained local government funding sources for infrastructure and a need to partner with central government to deliver what the community wants.
- Ensuring the viability of stormwater and water treatment assets into the future.
- Climate change will affect the level of service that existing infrastructure can provide, and future infrastructure will need to be flexible to cope with risks.
- Lack of knowledge of the efficacy of nature-based solutions.
- Internet access in rural areas.
- Quality of roading and transport links across the region.
- Policy responses to climate change may also have an impact, with the cost of CO_2 emissions likely to make construction costs more expensive.

Given the long life of assets, high quality long-term planning is needed to ensure that the community derives the greatest possible benefit from its infrastructure expenditure. Two challenges were noted to achieve this:

- a lack of local expertise in infrastructure planning and maintenance, resulting in a need to rely on international contractors with higher costs and uncertain availability
- the incentives created by three-year political cycles that favour responding to immediate needs rather than longer-term planning.

Social

Demographic change raises opportunities and challenges for the future

In the Waikato region, the population is growing older and more diverse. The population of people over 65 is growing, with projections indicating that by 2028, 20 per cent of the region will be aged 65 years and over, up from 16 per cent in 2018.[50] At the other end of the life cycle, 34 per cent of the Waikato region are aged under 25, and among these young people there are proportionately more Māori and Pasifika. Taken together, in the future there will be greater ethnic diversity in the adult population. As indicated in Figure 3 and Figure 4 below, the Māori population has a much younger profile than the total population. This age-distribution profile is mirrored in the Pacific population. It should be noted, however, that these patterns are not uniform across the region, with Thames and Hauraki, for example, having a relatively older population, and Hamilton relatively younger.

Alongside the ageing population trend, the population group that lives with disability is growing and also experience inequity. In 2021, there were 118,900 people estimated to have an impairment in the Waikato.[51] This number is expected to increase over time, linked with the impairments experienced by an ageing population.

These trends create a double challenge for the Waikato region, of ensuring that older and disabled people are able to access the services they need and be able to engage in their community to combat isolation and disconnection; and creating systems that ensure young people can flourish, including enabling engagement in their communities, being able to contribute to decisions that affect them and involvement in developing solutions.

Figure 3: Age and sex distribution of total Waikato population, 2018 Census (source: StatsNZ)

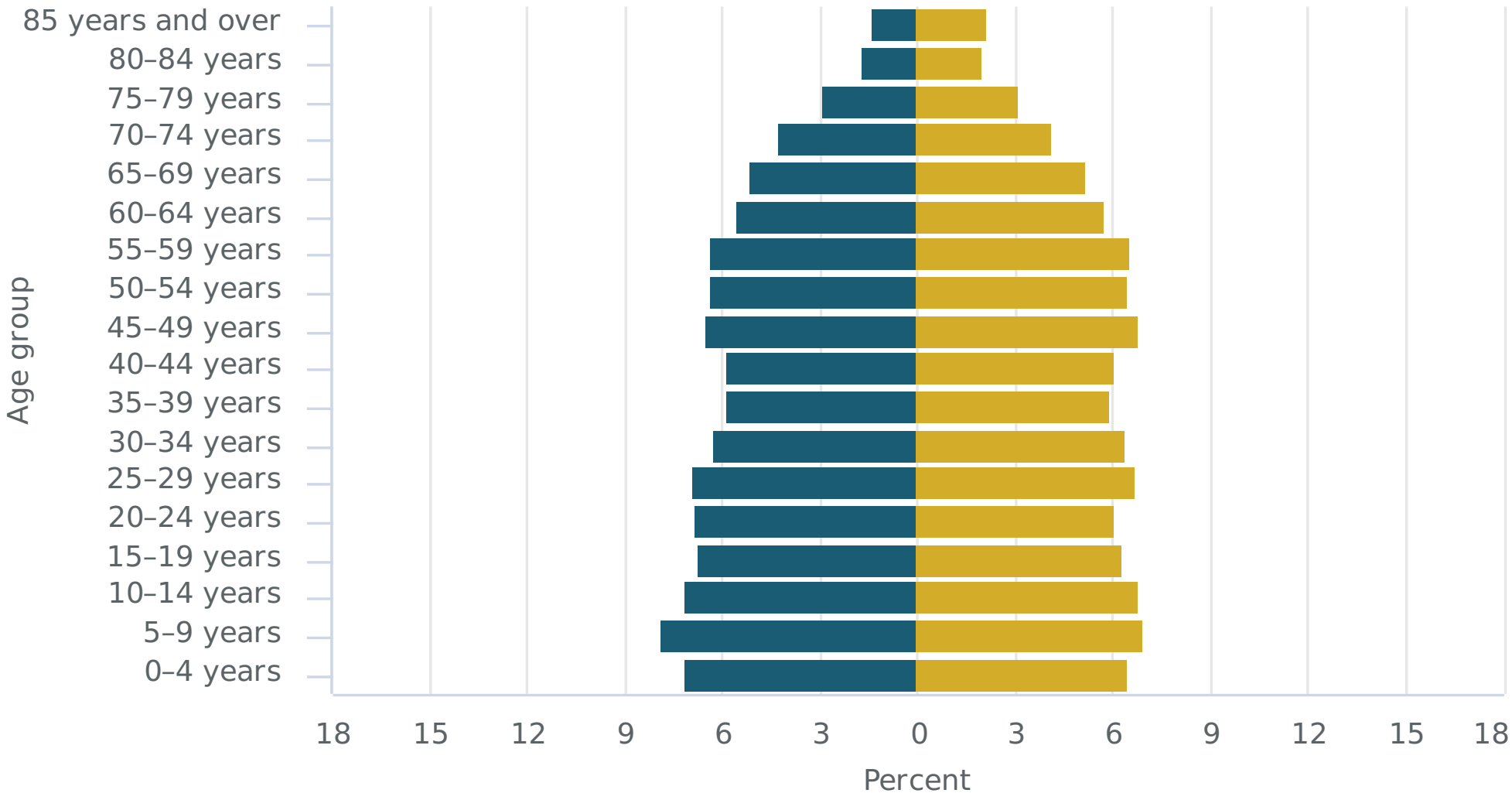
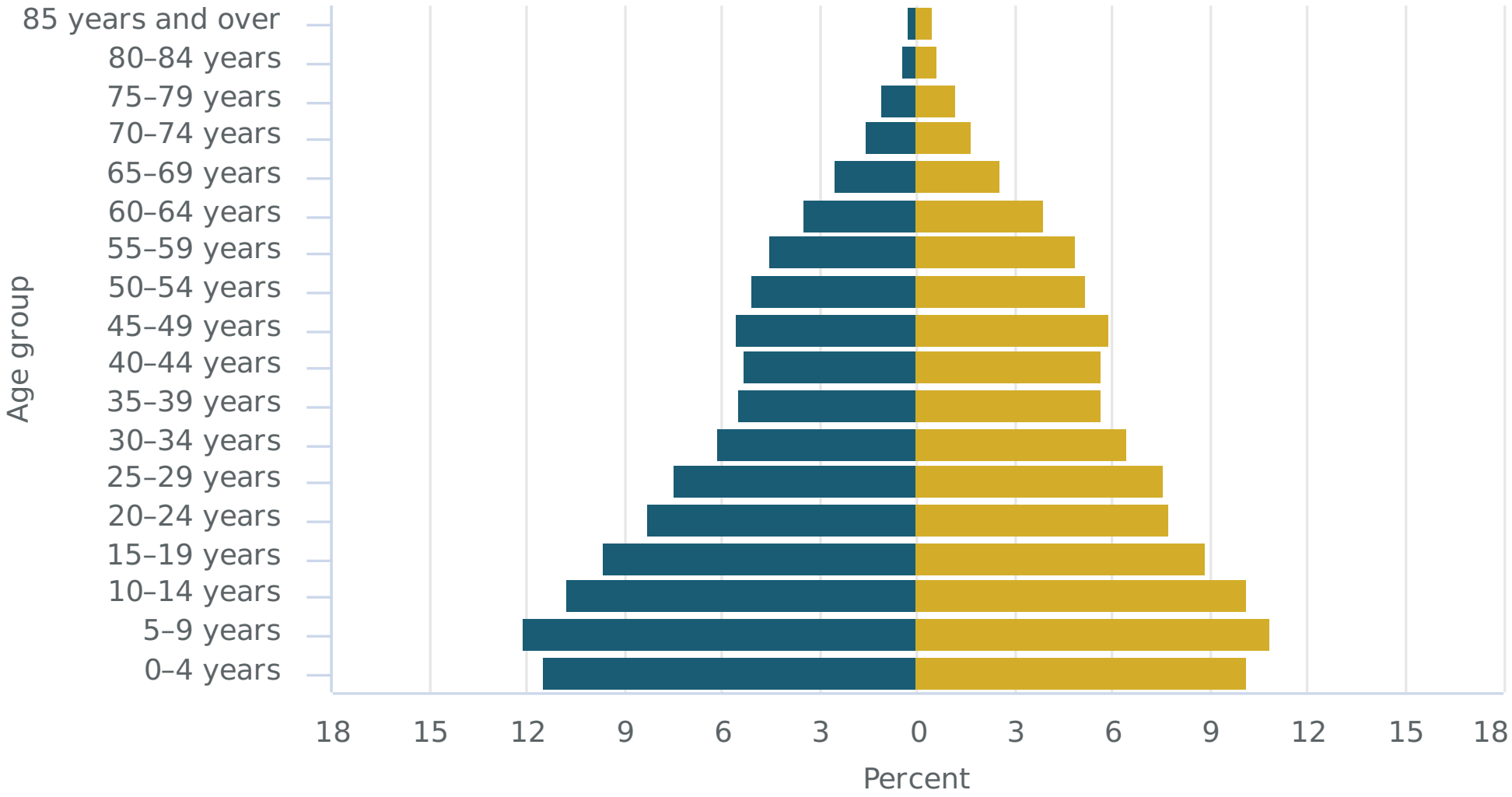


Figure 4: Age and sex distribution of Māori population in Waikato region, 2018 Census (source: StatsNZ)



Social inequalities are a persistent feature of demographic trends

The 2019 PESTLE report highlighted some key trends for demographic shifts that are influencing the Waikato region, namely an ageing population, and increasing ethnic diversity (particularly amongst younger populations). The 2019 report also highlighted the higher than average rates of social deprivation in the Waikato region and the intergenerational social issues that poverty and other associated issues create. Three years on, these trends are still relevant and important, in fact the social deprivation that exists in Aotearoa New Zealand is likely to have worsened with the fallout from COVID-19 and increases in cost of living.[52,53]

Social division and disconnection are becoming more evident

An ongoing issue is social division and disconnection. For example, in the Waikato region, a steady decline has been recorded in people agreeing that they experienced a sense of community with others in their neighbourhood, down from 63 per cent in 2006 to 56 per cent in 2020.[54] Internationally, there has been a downward trend in people's level of trust in government and institutions since 2007. At present, there is still high trust in the New Zealand public service with 80 per cent of New Zealanders trusting public services, based on their experience and 61 per cent of people having trust in the public service brand.[55] However, this may be lower for local government; for example, in 2020 only around one-third of Waikato respondents (35 per cent) said they have confidence that their local council makes decisions in the best interests of their area (acknowledging that differences in question wording will produce different results).[56]

These trends have been amplified by COVID-19, and demonstrated the power of misinformation that played out around the world and in New Zealand, with considerable polarisation and division evident.[21] With the World Health Organisation (WHO) warning of an infodemic, misinformation is likely to become more prevalent.[57] In 2021, 19 per cent of New Zealanders held three or more beliefs associated with misinformation.[58] Reform in this space is increasingly being demanded, particularly towards fixing social media algorithms, improved government regulation, improved digital literacy from the public, and collaboration from technology companies, government and the public.[56]

Increasing support for local business

People in Aotearoa New Zealand are increasing their support for local business. A 2021 MYOB consumer snapshot survey[59] indicated an upward trend in people supporting local business compared to before the pandemic. The same research also identified that over three-quarters of consumers always or often shop local. While the borders were closed there was a strong narrative about shopping local to help local businesses stay afloat, and this has likely contributed to this shift towards more locally-focused consumerism. Other factors that may have influenced this shift include fewer people working in CBD offices and more opportunity for those working from home to visit a local business during the working day or people wanting to reduce their carbon footprint.

Societal impacts of increasingly flexible working environments.

Unemployment is unusually low at present at 3.2 per cent, and employers are struggling to fill positions, particularly skilled positions. Data from 2020 indicates that 50 per cent of employers were expecting skill shortages in the next 12 months.[60] Added to this the cost of living increase and the increased prevalence of remote working, and a situation is created that favours employees who are more likely to move jobs to improve their income and working conditions. Businesses need to be able to respond more to the needs of workers to retain valued and skilled employees.

The COVID-19 pandemic led to a greater acceptance of remote work and improvements in technologies and work processes to support it.[61] This creates opportunities for geographic regions to compete for residents and workers based on quality of life offered to service workers with remote jobs. With an increasing proportion of workers able to work almost anywhere, quality of local amenities and housing may become more important than employment opportunities for some areas.

Many workers and workplaces are now more accepting of flexible working arrangements that include at least some time working from home. Recent New Zealand research indicates that up to 90 per cent of people who are able to work from home still want to be able to do this to some extent.[62] But working from home can also mean that employees start to feel isolated, insecure about their job and disconnected from their colleagues.[63] This has caused a rise in employers taking a more active role in supporting workers wellbeing and this is likely to continue in the future.

As more employers try to get people back to their offices post-pandemic, there are likely to be more requests from employees to have a 'hybrid' work environment (i.e. working time split between office and home).[64]

Volunteering has the potential to support inclusive communities, but the volunteering landscape is changing

Volunteering has been shown to create community connection and improve wellbeing.[65] Some 22 per cent of people in Aotearoa New Zealand do formal volunteer work (i.e. within an organisation). That percentage increases to 50 per cent when informal volunteering (i.e. helping someone from another household) is included. Māori and Pasifika are more likely to do informal volunteering.[66] The way people volunteer is also changing, with more people wanting to do episodic, one off volunteering rather than ongoing, formal volunteering. In addition, the existing volunteer workforce is ageing, and newly retired people tend to have more existing commitments and responsibilities, meaning they struggle to find time to volunteer.

Continued focus on whānau wellbeing and resilience

The ongoing focus on wellbeing for iwi, hapū, hapori and whānau in Aotearoa New Zealand is an ever-present theme. Whānau Ora continues to be a key approach and priority that coheres Māori around seeking improved outcomes for their people and for all people of Aotearoa New Zealand. The model operates to allow whānau to decide, and government agencies to enable, services to deliver local whānau-centred solutions that are joined-up and provide flexible supports through good relationships.[67]

The continued emphasis on Whānau Ora is revealed by two new recent prototypes based on the Whānau Ora model:

- Ngā Tini Whetū decentralises early support to whānau and tamariki at risk of entering into the care of Oranga Tamariki – Ministry for Children.
- Paiheretia te Muka Tāngata supports Māori and their whānau who are engaged in the corrections system through uplifting oranga or wellbeing of Māori.

Te Puni Kōkiri has a strategic focus on 'wellbeing monitoring' to monitor government departments and agencies that provide services to or for Māori and ensure public sector performance is improving Māori wellbeing and equity across the health, education, employment, housing and justice sectors.[68]

The healthcare reforms establishing the new Māori Health Authority for direct commissioning of services and capability and capacity development into the Māori health workforce recognise the critical role Māori providers and health workers played in the COVID-19 response and build on previous achievements of Māori-designed initiatives.

Technological

Hyperconnectivity is a global phenomenon

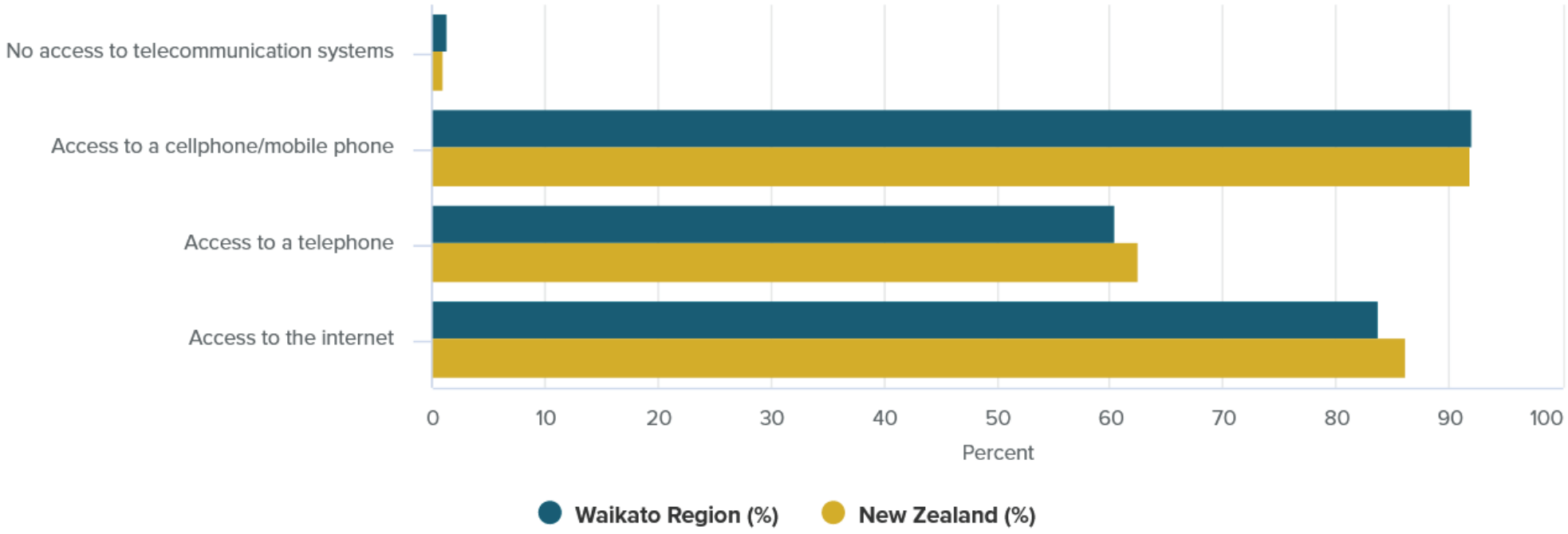
Hyperconnectivity continues to accelerate globally, and in Aotearoa New Zealand approximately 95 per cent of the population are internet users.[69] Looking beyond the number of connections, our usage is also increasing (increased by 57 per cent from 2019 to 2021).[70] The demand is not expected to slow, and COVID-19 provided another catalyst to increase our levels of digitisation.[71]

Hyperconnectivity has fed into the increased advancement of extended reality (XR). Extended reality is a spectrum from fully immersive virtual reality to devices like phones or glasses that create overlays to create augmented reality.[72] The uses of XR are expansive, including training simulations, rehabilitation and the metaverse (or Web 3.0). The metaverse is described as a hybrid of the internet today, which can be expanded into three dimensions creating an immersive experience. The metaverse goal is to create the digitisation of our lives, yet ensuring a balance between corporate profits and societal benefits is a constant and growing challenge.[73]

Digital equity is a critical issue for future generations

Digitisation has vastly altered our lifestyles such as in the way we work, shop and interact.[74] However, the growth in connectivity has not been even, and as a result digital inequality is evident in Aotearoa New Zealand and globally.[75] Internet access can support wellbeing by improving social connectedness, access to information and amenities, and may help with social isolation experienced by parts of our population.[76] Yet the shift to online engagement during the first COVID-19 lockdown highlighted the scale of inequality in this area, with the Ministry of Education identifying between 60,000 and 80,000 unconnected households where children were living.[77]

Figure 5: Access to telecommunications systems for households in the Waikato region and New Zealand, 2022 Census (source: StatsNZ)



The 2018 Census found, overall, the Waikato region has slightly lower levels of internet access (84 per cent) compared to Aotearoa New Zealand overall (86 per cent) (Figure 5). Other studies have shown Pasifika, Māori, those living in larger country towns and older members of society are comparatively less likely to have internet access.[78] For those who are limited in access to digital technology and skills, any shift in services to solely online engagement in itself restricts their access to the wider world. The challenge is to "move beyond a divide between those who are digitally included and excluded, and instead to encourage social inclusion in the digital age".[79]

Blockchain technology and cryptocurrencies are gaining a volatile momentum

Technologies such as blockchain have led to the development of non-fungible tokens (NFTs) and cryptocurrencies, and the latter have become the mainstream currency in virtual spaces.[80] Both NFTs and cryptocurrencies are surrounded by immense speculation and are currently extremely volatile, and have the potential to undermine monetary policies. Stable cryptocurrencies hedged against the USD have produced record losses, leading to individuals losing life savings.[81] Countries like El Salvador that adopted cryptocurrencies are now at risk of defaulting.[82]

Central banks across the world, including Aotearoa New Zealand, are still exploring blockchain technology and the value of digital currencies separate from or adjacent to traditional monetary systems.[83] At this stage, there is uncertainty about how central banks will respond to the challenges and opportunities of digital currencies, and what impacts there will be on the monetary policy and the operation of financial markets.

Media are diversifying their platforms but centralising their ownership

Social media use continues to rise, with 89 per cent of New Zealanders using social media; the time individuals spend on social media has also increased. The way we use social media is also changing, and platforms like TikTok are becoming increasingly popular especially with Gen Z. Other popular social companies like Meta and YouTube have followed suit by adding similar functionality to their platforms.[84] Social media continues to play an important role in social movements and major conflicts, with the Ukraine invasion demonstrating another dimension of war as both sides make use of social media to advance their agendas.[85,86]

Ownership of a range of media brands and platforms are increasingly being centralised, often with the aim of increasing their influence and forwarding their owners' particular agendas. *The Washington Post*, Fox News, Facebook, *Telegraph*, *The Daily Mail*, *Times* and the *Wall Street Journal* are just a few of the major media brands now owned by the 'super-rich', thereby increasing their personal power and influence and affecting how news is reported.[87]

These trends in media use and ownership are occurring at the same time as we see a decline in trust in mainstream media, along with the decline in trust in public institutions and growing polarisation of political views, both noted earlier. In just the last two years in New Zealand, public trust in mainstream media has dropped by 8 per cent in the past two years, from 53 per cent in 2020 to 45 per cent in 2022. Misinformation and disinformation were seen as contributing factors to a lack of trust in media.[88]

Big data and artificial intelligence create opportunities but also raise privacy and labour market challenges

Technological change and innovation more generally will create new opportunities for economic growth that can be exploited if businesses and governments adopt them effectively. The promises of artificial intelligence (AI) have been a trend in the technology space for years and its domination of the future has always been contested. Instead of AI's impact leading to large-scale unemployment, the labour market is expected to evolve with AI; there remains, however, a danger of populations who are less technology-supported being disadvantaged, and some workers will need support to transition to new roles.[22] AI is becoming increasingly more affordable and training time of models has also reduced, which will lead to more widespread uptake in the future.[89] Aotearoa New Zealand prides itself on working in technologically niche spaces, however, only one in five New Zealand organisations are reported to be AI mature.[90]

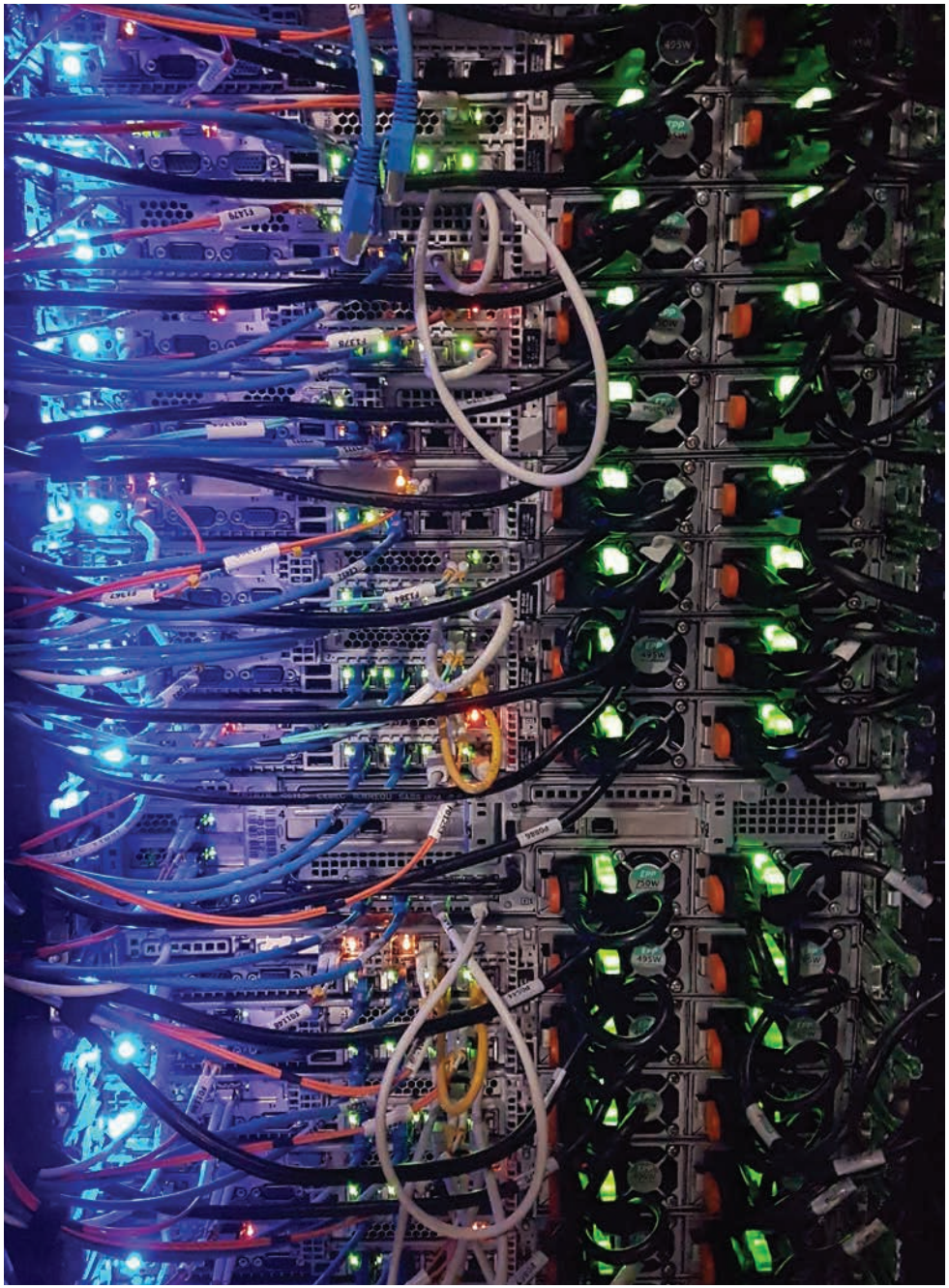
With increased digitisation, opportunities have arisen to collect data from all aspects. Data is continuing to be valuable for organisations, with more data captured, and improved AI-based analytics organisations can create more value from their business. Increased analytics may lead to data democratisation in companies, where everyone has access to data and are able to use it comfortably.[91] Government organisations also have a role to play in helping businesses to generate value by publishing datasets as open data. For example, open geospatial and asset management data can help businesses to manage operations and plan investments.

On the other side, consumers are becoming more concerned with who is collecting their data. Regulators in the European Union have called for a ban on ad targeting and Google Chrome has announced it plans to end support of third-party cookies in 2022.[92] What this will mean is the rise of 'zero-party data' which actively collects data with opt-in tools such as questionnaires, polls and quizzes. Customers get more control over what data they share, while organisations can collect more useful data for personalisation.[93]

Cybersecurity is constantly needing to adapt and respond to new threats

Cybersecurity is becoming increasingly important to manage the increase of cyber threats. The Waikato DHB cyber attack is a close example of how vital cybersecurity is for organisations and for protection of private data.[94] Password authentication is an area with the most security breaches online. Major technology firms like Apple, Google and Microsoft have committed to support passwordless sign-ins created by the FIDO Alliance. Users will be able to sign-in using verification like a fingerprint, face or device PIN intending to reduce the effects of phishing.[95]

Aotearoa New Zealand needs to constantly improve its security capability, both for the private and public sector. We are vulnerable to cyber threats due to our internet architecture, and limited cables connecting New Zealand to offshore. New Zealand has an overreliance on overseas software and companies for cybersecurity; however, to increase local cybersecurity and cloud infrastructure also has trade-offs such as cost and accessibility overseas. [23]



Biotechnology advances are growing rapidly, but can New Zealand keep up?

The bio-revolution is anticipated to accelerate, with biotechnology expected to be worth US$729 billion by 2025, yet the technology also comes with ethical considerations and serious risk.[25] Areas where biotechnology is expected to have the most impact include human health and performance, agriculture and food, consumer products and services, and materials and energy production.[96]

New Zealand is currently ranked fourth for innovation potential in biotechnology, with Hamilton containing 5 per cent of the national distribution of biotech organisms. Aotearoa New Zealand could potentially be a global leader, with its strengths in agriculture and plant-based biosciences. This is dependent upon intellectual property being sufficiently protected, and the extent to which industrial/production processes can be harnessed locally.

New Zealand has also developed biotech in the sustainability field such as biofuel, carbon capture and waste technology, and this will be important as the push for more sustainable options become greater.[97] Despite the recent advancement in biotechnology, there has been no review of GM technology in New Zealand since 2001 (covered by the 1996 Hazardous Substances and New Organisms Act). Some argue that the regulations are outdated as they were made before breakthroughs in biotechnology arose, such as more precise gene editing. Regulators have a difficult balancing act of keeping pace with technological advances and, at the same time, ensuring safe innovation is possible.[98]

There is a growing shift towards decarbonising transport, with technology seen to have a role

With pressures to reduce emissions and the constant need to improve efficiency, transport is undergoing a transformation. Transport is responsible globally for a quarter of energy-related carbon dioxide emissions, and is growing faster than any other sector. In New Zealand, transport contributes to 47 per cent of total domestic CO_2 emissions and 19.7 per cent of total greenhouse gas emissions, and we have one of the highest rates of car ownership in the OECD.[99, 100,101] The three major innovation trends in transport include electrification, shared mobility and automation.

The demand for electric vehicles (EV) has skyrocketed over the last year, as petrol prices increase, vehicle choice grows and prices become somewhat more affordable.[102] Electrifying the vehicle fleet will contribute to transitioning to a low carbon system, but also pose notable challenges. EVs on their own will not meet our carbon targets, and will do little to overcome congestion in our cities. The infrastructure for electric vehicles (EV) needs further development to support uptake, particularly in the EV charging network. Although cheaper to run, EVs also require more upfront costs. Furthermore, as more people transition to EVs there may be supply issues and consideration needs to be made for the lifecycle management of batteries.

In other areas, hydrogen power is making headlines in New Zealand with the introduction of hydrogen-powered freight in 2022.[103] However, creating green hydrogen from renewables may not be the most optimum approach and is currently commercially unproven; the Parliamentary Commissioner for the Environment has warned that having a large focus on green hydrogen could be an expensive mistake that makes it harder to achieve our climate goals.[104] Developments in biofuels will continue and may play an important part in aviation, along with regional electrification of flights. Improved mobile technology will create improved accessibility and information for public transport and ride-sharing options. There continues to be a drive for autonomous vehicles which advocates argue will improve road safety, reduce congestion and improve the delivery of goods.[,105]

Legal and strategic

The pace of government reform in New Zealand is accelerating

As noted earlier, the pace and scale of government reforms is a significant driver of change within central agencies, with major downstream impacts on local government.

Three Waters reforms are well underway, aimed at improving the quality of drinking water and the management of sewage and stormwater services.[106] The reforms are intended to place Te Mana o Te Wai – the health and wellbeing of water – at the centre of the system, in the wake of the Havelock North drinking water contamination. After much national debate, the Government announced in 2022 that it will progress with reforms, with significant changes forthcoming for local council operations. These will centre on establishing four regional public entities, that are owned by, but financially separate from, councils, with joint strategic direction and oversight through regional representative groups made up of local government and mana whenua.

Further reforms are underway in the resource management sphere.[107] Based on the recommendations of the Resource Management Review Panel, three new pieces of legislation are under development.

- Natural and Built Environments Act (NBA), as the main replacement for the Resource Management Act, to protect and restore the environment while better enabling development. Its intention will be to promote positive outcomes for both the natural and built environments and ensure that use, development and protection of resources only occur within prescribed environmental limits.
- Strategic Planning Act (SPA), requiring the development of long-term regional spatial strategies to help coordinate and integrate decisions made under relevant legislation. This is intended to enable more efficient land and development markets to improve housing supply, affordability and choice, and climate change mitigation and adaptation.
- Climate Adaptation Act (CAA), to address complex legal and technical issues associated with managed retreat and funding and financing adaptation.

In May 2022, the Government announced its *Emissions Reduction Plan* (ERP), alongside the previously released emissions and finance budgets.[108] The ERP requires changes across every sector of the economy, including transport, energy and industry, building and construction, agriculture, forestry, waste and fluorinated gases. This is intended to work towards achieving long-term emissions targets and contribute to global efforts to limit temperature rise to 1.5˚C above pre-industrial levels. Key elements include:

- improving access to affordable, sustainable transport options
- supporting sustainable, healthy and affordable homes
- reducing organic waste and managing it responsibly
- making use of innovation and technology to lower emissions.

From July 2022, health reforms come into effect which centralise health planning and activity with the aim of delivering more equitable, efficient and effective health services. Three new entities – Health NZ, Te Mana Hauora Māori (Māori Health Authority) and a public health agency – will replace the network of district health boards, primary health organisations and public health units. Localities commissioning and national service planning are expected to enable both community responsiveness and more equitable service access.[109]

These changes highlight a shift towards national and regional-level decision-making and local-level implementation. Across all these reforms, the intention is to achieve greater scale, consistency, efficiency, impact and equity for populations, but they also reveal a tension between regionalisation and community engagement and ownership of solutions. How these tensions will be managed and balanced is yet to be seen. The pace of reform also creates implementation challenges at regional and local levels, and which are exacerbated by capacity constraints in a tight labour market.

Growth of private investment in public good outcomes

Alongside government reform, there is a growing trend towards public good outcomes that are actively sought by private and philanthropic sectors. These models embrace the role of entities outside of the Government and community sectors in having a key role to play in delivering social wellbeing outcomes. In Aotearoa New Zealand, examples include the following.

- Philanthropic organisations, such as the Next Foundation and the Clare Foundation, which are actively investing in initiatives that seek system-level change, either in their own right, or as catalysts for innovation that lays the groundwork for public investment at scale.
- Impact-focused investments are gaining momentum, through corporate and philanthropic involvement in ventures that offer financial, social and environmental benefits. A range of organisations and initiatives are spearheading new financial models that internalise social and environmental costs. They include the Sustainable Finance Forum, the Government's Green Investment Finance corporation, and private investors such as the Climate Venture Capital Fund; all of which, through different means, are seeking investments that give a financial return to investors and deliver positive environmental impacts. Further, some philanthropic foundations, such as Foundation North, are testing the viability of investments in companies that offer positive environmental or social returns.
- Social procurement is becoming increasingly common here, in which both public and private sector purchasers target goods and services that offer additional social or environmental outcomes. For example, Amotai acts as a supplier diversity intermediary by connecting Māori and Pasifika businesses to social procurement opportunities around the country. Further, many government agencies are prioritising Māori, Pacific and Living Wage employers in their procurement systems.

Environmental

Environmental tipping points have been crossed

The planetary boundaries framework, published in 2009, demarcates a safe operating space for humanity. Water is one of the nine regulators of the state of the Earth system, and is the sixth boundary that scientists have assessed as being transgressed. Other transgressed boundaries are: climate change, biosphere integrity, biogeochemical cycles, land system change and, in 2022, novel entities, which includes plastic and other manmade chemicals.[110,111]

The planet's warming has driven or exacerbated recent extremes in weather events across the planet, making them more likely, more intense, longer-lasting or larger in scale. Recent events have included droughts in eastern and southern Africa, the western United States and Brazil, large-scale wildfires fires in Australia and the United States, devastating storms in the Pacific and the United States, and extreme rainfall across the globe. The IPCC's 2021 report found that New Zealand land areas have warmed by 1.1^{o}C between 1910 and 2020. The last 18 months have seen the country divided by weather extremes – with the west and south experiencing high rainfall and floods, while high temperatures brought prolonged drought to the north, including water shortages (Auckland).[112] New Zealand is also set to become increasingly vulnerable to storms moving towards the southern pole as global temperatures increase.

Land use and associated pressures have adversely affected soil and water quality, and biodiversity

Almost half of Aotearoa New Zealand's total land area is used for agricultural and horticultural purposes, placing particular pressure on the land and receiving environments such as waterways.[113] The Waikato region has experienced significant agricultural change over the past 15 years, characterised by large numbers of dairy conversions in particular, from forestry land (south) and dry stock. Farms have grown in size and increases in the use of nitrogen fertiliser and supplementary feeds have enabled more intensive stocking practices, bringing higher productivity. As of the 2021 dairy season, the Waikato region had the largest share of dairy cows in New Zealand, at 22 per cent. This growth has come at a cost. The impact of intensive farming practices on soil and water quality, biodiversity loss and reduced functioning of ecosystems for the Waikato region are clear, with significant efforts needed to reverse these downward trends and protect the environment into the future.

Water quality is deteriorating across intensively farmed areas of the region, particularly due to nutrient concentrations. Nutrients from nitrogen fertiliser and animal effluent enter waterways via groundwater, leading to low oxygen levels, weed growth and algae blooms. Bacteria levels in rivers are high, with over two-thirds of monitored sites deemed unsafe for swimming. The health of coastal waters is impacted by declining freshwater quality. Management by way of fencing streams and timing irrigation and effluent have made gains, however, are outstripped by more intensive practices.[114]

Water storage is a critical issue for Waikato region. The State of the Environment Report (to be published) indicates a decreasing rainfall trend across the region since the 1960s. At the same time, the region's demand for water has increased significantly, and there are now regulations in place requiring the needs of the river to be put first. There is increasing concern among Waikato communities over climate-related reductions in water availability and the implications for freshwater ecosystems, urban water supply, primary sector productivity and constraints on future growth.

Already we are seeing the impacts of a prolonged period of reduced rainfall on water resource supply and an increase in demand in parts of our region. Water allocations are approaching or exceeding limits in several major catchments. Projected effects of climate change are likely to exacerbate constraints on water availability and increase demand. The draft *Water Security Strategy* provides a clear description of the water security problem the region is facing and provides a set of recommendations to improve water security. It is expected that the draft strategy will be finalised in late September 2022, and will require extensive engagement with partners and stakeholders, including city and district councils and municipal water users, the primary sector, industrial water users and our iwi partners.[115]

Water storage is also a key area of concern for Waikato River iwi. There is continued need to restore and protect the health and wellbeing of the awa while looking at proactive solutions around securing future water supply for both the Waikato and Auckland regions. Waikato-Tainui has raised a range of fundamental concerns about the Waikato River, in particular:[116]

- the Waikato River is seen as 'tupuna awa' – it is a core pillar in tribal identity and essential to our wellbeing
- over two-thirds of Waikato-Tainui marae are reported to lack access to safe and consistent water supply
- there is growing demand and pressure on the over-allocated Waikato River catchment
- the current infrastructure is deficient and requires significant investment to ensure sustainability of supply
- water storage options and investment in north Waikato are required.

Soil quality continues to suffer, with compaction a common issue under intensive land use due to farm machinery and stock undermining structure. Contaminants from phosphate fertiliser are also building up in soils in parts of the region. Alarmingly, only 15 per cent of productive sites monitored across the region were found to have satisfactory soil quality for their current land use in 2019.[117]

Artificial drainage of organic soils (or peat soils) in the Waikato region changes their hydrology, stops the accumulation of peat and results in ongoing land subsidence and greenhouse gas emissions, including carbon dioxide and nitrous oxide. These former drained wetlands have become a net carbon source, and the greenhouse gas emissions mean they contribute to the region's greenhouse gas footprint. Conversely, protection of intact wetlands and restoration of drained peat soils could provide a mechanism for preventing future soil carbon losses; this could be critical to the Waikato region making a meaningful contribution to emissions reductions, as 68 per cent of the region's carbon emissions are due to agricultural activities.[118] This is potentially an important avenue for carbon sequestration, effectively buying time over the next 10 to 20 years while other effective sequestration and low-carbon technologies become viable.[119]

Loss of natural ecosystems and biodiversity are widespread globally

The impact of human activity (including through land use change, climate change and increased species competition) on biodiversity and natural capital is being observed globally, with ranges of species shifting, and earlier timing of key processes. Alongside changes in sea and land use, direct exploitation, invasive species and pollution, the pressure on ecosystems from human behaviour is at critical levels. The UK Natural History Museum has advised that the global 'safe limit' of biodiversity intactness is 90 per cent. This metric now sits at 75 per cent globally, risking processes vital to humans such as pollination and nutrient cycling.[120]

We continue to lose native vegetation across the region. Only 27 per cent of the Waikato region remains in native vegetation, with 19 per cent covered in native forest, while scrub, wetland, dune, geothermal and tussock vegetation make up the remainder. Very little remaining native vegetation occurs in lowland areas.

The role of natural systems in climate change mitigation was prominent on the agenda at COP26 in late 2021. Pre COP26, the inclusion of strategies to combat nature loss in countries' new climate action plans have been a growing trend,[121] and the Post-2020 Biodiversity Framework, currently in process, will strengthen the connection between nature and climate action. Private sector accountability is highlighted in the framework, calling for businesses to assess and report on their biodiversity dependencies and impacts.[122]

Urban development is reinforcing changes in climate patterns

The IPCC's commentary in the Sixth Assessment Report notes urban sprawl as one of the chief contributors to vulnerability to climate change impacts, including the loss of cultivated land and locking in high carbon lifestyles. This a particular challenge for the Waikato region, with greenfield expansion creeping along both ends of the Waikato Expressway and the loss of fertile, flexible land, and the vulnerability of many of the region's coastal areas to sea level rise. Impacts of Auckland's growth for the Waikato environment include demand for water, transport pressures and waste generation. The availability of water limits the ability of regions to absorb population growth, and support increases in economic activity.

Climate justice is a growing call to action

Across sectors and regions the most vulnerable people and systems are observed to be disproportionately affected. With approximately 3.3 billion to 3.6 billion people living in contexts that are highly vulnerable to climate change, existing inequalities will continue to deepen.[9] COP26 saw equity achieve greater precedence, with wealthy parties acknowledging disproportionate harm and agreeing to double yearly funding for adaptation projects by 2025; more recently, however, richer nations such the European Union and the United States appear to be stepping back from these commitments.[123,124]

As understanding of the connection between climate change and social justice increases, pressure on governments and businesses to recognise and address the imbalanced impacts of climate change will grow. Governments are increasingly prioritising equity in climate planning and the availability of resources to support this move are growing. For example, B Lab has created a Climate Justice Playbook on how businesses can integrate climate justice considerations into their wider environmental strategies through engagement with local communities and social groups.

Aotearoa New Zealand's first emissions reduction plan acknowledges equity, including in the establishment of a platform for Māori climate action, ensuring recognition and representation of Māori rights and interests in the climate response. A Māori strategy that prioritises mātauranga Māori, adaptation and mitigation aspirations and addresses barriers for the Māori economy are also proposed.[125]

Iwi have particular interests in supporting sustainable and healthy environments. Protecting the environment is core to iwi values, as they are seen as tupuna, and a part of wellbeing as iwi. Significant resources from Treaty settlements contribute to restoring environments across the rohe (regions).

Public concern about climate change is growing

Populations are increasingly concerned and frustrated by inaction. For example, a recent survey of 17 global markets[126] indicates that the perceived seriousness of climate change has reached its highest level since tracking began 23 years ago, with 63 per cent of respondents reporting that they consider climate change to be a "very serious" concern. This is reflected in civil unrest through climate protests worldwide as citizens seek to hold governments, decision-makers and industry more accountable; as well as consumer choices that are increasingly reflecting environmental concerns.

Community relocation is a key risk of rising sea levels

The risks of costal inundation became significantly less abstract to many New Zealanders when, in May 2022, the NZ SeaRise programme released a report that indicated the predicted 30 centimetre rise of the sea level in New Zealand is 10 to 20 years away, rather than 40 to 50 years as previously predicted, once land subsidence is taken into account.[12] The Waikato region is particularly exposed, with coastal communities on the west coast and the western and northern Coromandel and Hauraki Plains especially vulnerable. For Māori, there are numerous marae, cultural heritage and food gathering sites in coastal low-lying areas that are at risk of being lost by sea erosion and inundation, with 80 per cent of the marae situated across Aotearoa being built on low-lying coastal land or flood-prone rivers.[127]

Changes to agricultural production are widely called for

There is a drive towards reducing emissions from the agricultural sector, with the sector producing close to half New Zealand's greenhouse gas emissions, three quarters by ruminant livestock. He Waka Eke Noa has submitted recommendations on the detailed design of an integrated on-farm reporting and pricing system, to come into effect from 2025.[128]

Opportunities for investment to create more options for deeper emissions reductions is a priority area,[129] with the establishment of the Centre for Climate Action on Agricultural Emissions to develop and commercialise smart new products to reduce agricultural emissions, with a $710 million investment over four years.

The cost of implementing climate change responses is expected to increase business costs and impact the level of GDP.[125] However, investment in low emissions technologies and processes will open up new markets and reduce the risk of losing others. One example with strong relevance locally given the considerable contribution of primary industries to GDP is unprecedented investment in agri/foodtech globally. With food production contributing 40 per cent of global greenhouse gas emissions, and animal proteins requiring vastly more resources to produce than horticultural products (per kg), interest in alt-proteins is very high, but also pose significant risks to the Waikato regional economy. Changing weather systems, COVID-19 and the Ukraine conflict have also highlighted weaknesses in current food supply systems, spurring the opportunities for redevelopment via investment in innovation and scaling of new technologies and processes.[130]

Section 3
Strategic response themes

In this section, we explore seven strategic issues specific to the Waikato region, and potential areas of opportunity for action in each. Potential directions for each strategic theme have been developed from initial discussions with Waikato Regional Council teams. These will be developed further as we consult more widely with stakeholder groups to inform the Waikato Regional Council strategic direction.

1. Financial and regulatory policy responses to a changing climate

Financial and policy responses are important levers in responding to a changing climate and can help reduce the scale of impact. The need for this is pressing as the region looks to cope with a range of climate-induced hazards, including community displacement, farms and businesses that need to retreat, and disruption of freshwater access.

Financial paradigms, and the incentives or disincentives that accompany them, are commonly seen to drive behaviour, and shape what may be possible. Options to drive behaviour shifts include:

- financial incentives towards protecting and enhancing wetlands to improve sediment and nutrient behaviour in fresh water
- green incentives to build biodiversity resilience and indigenous planting in farming systems
- supporting shifts to lower emissions activity (e.g. from private transport to active or public transport)
- accounting for soil carbon changes
- taxation on use of non-renewable resources
- adapting the *Emissions Trading Scheme* to enable the most appropriate trees to be planted in areas where they can provide greatest benefit.

Working in tandem with financial incentives are a range of other policy responses, including:

- systematic monitoring and enforcement of regulations, including to strengthen financial incentives
- rezoning based on modelled climate change hazards and inundation to prevent inappropriate development in the wrong place
- regulatory tools to determine responsibility for adaptation planning between the central, regional and territorial layers of government
- climate leases that enable a managed retreat
- planning for flood defences and coastal infrastructure.

Insurance company behaviour will be an equally important catalyst for change, with coverage restrictions likely to come into force a decade or more ahead of forecast or actual inundation.

2. Evolution of a new biotech economy, including the future of food

The Waikato region has long been known for its highly productive and fertile land. Yet, recent trends across a range of areas have the potential to create significant change in the agricultural sector.

- Climate change and extreme weather events such as drought and flooding are impacting the productivity of farms.
- Changing land use and the loss of versatile land to residential housing is also creating limitations for the sector.
- Technology is enabling cheaper manufacture of alt-protein food products that have similar taste and texture to milk and meat, both of which are mainstays of Waikato agriculture.
- People are becoming more health, climate and ethically conscious in their purchasing behaviour, resulting in more plant-based foods being consumed on a regular basis, and increases in the purchase of organic and free-range meat sectors.

Collectively, these trends indicate that food production will be an area of significant change over the coming years, requiring food producers to be agile and adapt their practices. At this stage, there are more questions than answers about the changes that are required of the food production sector to adapt and flourish into the future. Key opportunities identified for the sector are:

- sustainable agricultural production working in concert with the environment
- ways to reduce the carbon footprint of the agricultural sector
- harnessing locally grown food and production, and developing local food strategies using zoning, to counter supply chain disruptions and the rising cost of fuel
- adaptation to new technologies and alt proteins.

Supporting the agricultural sector to explore the opportunities and adapt accordingly, to get the best use of land and optimise ecosystems, will help smooth the transition and ensure that agriculture is able to continue to benefit the Waikato region.

3. The challenge of water scarcity and the future availability of water

The availability of water is a critical area of concern for the region as it faces the future. More frequent and more extreme weather events, higher density of populations and reduced quality are all contributing to water scarcity.

Trends that we might see in the future to conserve and better manage water resources include:

- focused spatial planning for land and water resource use
- adapting industrial and agricultural water use
- water meters more widespread
- flood water capture, such as water tanks in urban homes
- recycled/grey water capture
- incentives/subsidies for the use of water tanks and grey water
- normalised water restrictions in summer.

4. Capacity, quality, and extent of infrastructure for economic diversification, sustainability and to support improved wellbeing in the region

Opportunities identified by stakeholders for using infrastructure to support economic diversification and sustainability include:

- transitioning to green infrastructure (discussed further below) that is more resilient to climate change and can also provide amenity benefits to the community
- optimising the potential of the region's awa to support economic activity while maintaining water quality
- further developing geothermal energy sources where ecological impacts can be minimised
- the opportunity via asset renewals to replace ageing infrastructure with new assets that are more resilient to climate change and are more flexible to support the community to adopt future new economic activities as they arise
- broadening the objectives of infrastructure investment to include supporting the wellbeing of people in the region, in addition to supporting economic diversification and sustainability.

There is an opportunity to explore how Māori world views and mātauranga Māori can support intergenerational and long-term thinking in infrastructure development.

More generally, there is a need for the region's infrastructure to support businesses and the community to be adaptable and flexible in responding to future challenges created by climate change and long-term economic trends.

5. Transitioning to a low carbon transport system and opportunities for mode shift

To meet the Government's net carbon zero target, the Climate Change Commission said that transport emissions need to "fall quickly, and significantly". In their 2021 report, two broad areas of focus were identified: firstly, phasing out imports of internal combustion engine light vehicles by the early 2030s, and secondly, reducing New Zealanders' reliance on cars. [131] In our cities in particular, we need fewer people driving, and driving less often. However, leaving this to people's individual choices to change their travel patterns, in a social and physical environment that is "hostile to alternatives", will critically undermine the changes that need to be made.[127]

To transition to a low carbon transport system, a critical contributor will be enabling mode shift to active transport (such as walking and cycling) or public transport (bus or rail). Ways of improving the uptake of active transport include:

- green corridors that make walking and cycling safe and enjoyable
- use of shading and protected walkways
- improved urban design, including planning for low-traffic neighbourhoods and access to a range of community resources within walking distances
- increased availability of micro-mobility and rideshare schemes or subsidising e-bike and e-scooter uptake
- safe, protected and well-lit cycle lanes.

Alongside active transport, options for increasing public and community transport uptake include:

- setting aside lanes specifically for public transport (whether buses or light rail) to enable faster travel, particularly in rush hours
- improving access to education, health and social facilities and services for the transport disadvantaged
- greater use of park and ride facilities
- subsidised or free public transport particularly for lower-income groups (such as for young people going to school or tertiary study or in lower paid employment[132])
- support awareness and use of community transport options for those in rural areas where public transport is not an option
- more frequent services and improved availability of bus and train routes and networks
- 'accessible mode shift' and 'universal design' to enable inclusion for both those living with a disability or older people, many of whom have limited mobility.

Another way to reduce carbon in the transport system is to reduce the need to travel altogether. Participants in discussions for this project raised the potential for city planning to foster neighbourhoods where people live, work and have access to all the services they need within a 20-30 minute walk or bike ride.

6. Natural resources, biodiversity and the potential for green infrastructure

With the right support, policies and incentives in place, the land, biodiversity and waterways of the Waikato region offer a range of opportunities for enhancing green infrastructure for flood risk management, carbon sequestration and other activities. In consultation for this project, the following areas of opportunity were identified for fostering biodiversity:

- supporting local biodiversity projects
- protecting and re-establishing wetlands, and establishing new wetlands in suitable areas
- creating significant natural areas (SNAs) in urban spaces and promoting their growth
- accelerating predator-free policies and actions
- incorporating mātauranga Māori into day-to-day activities and institutions so that land and rivers are valued as living entities, rather than simply resources to be used
- expanding education in schools and the community on the importance of biodiversity and green spaces.

Our natural assets have the potential to provide important sources for green infrastructure, such as through:

- protection of intact wetlands and restoration of drained peat soils as a mechanism for preventing future soil carbon losses and carbon sequestration
- protecting and enhancing freshwater coastal and marine systems as opportunities for carbon storage (also known as blue carbon)
- accelerating and expanding riparian planting on drains and streams
- mosaic planting on farms to maximise biodiversity.

Further expansion of renewable energy sources, such as solar and wind energy, will further reduce pollution and carbon emissions from fossil fuel use.

Urban centres and urban development offer rich potential for green infrastructure, including:

- use of green spaces in new urban developments
- expanding community initiatives for tree planting and community gardens
- green corridors
- use of living building approaches (a green building certification programme and sustainable design framework that visualises the ideal for the built environment).

Making these happen will require a range of new levers, including regulatory and resource management powers, financial incentives and funding, and political, industry and community leadership.

7. Comprehensive responses to social change

The demographic changes unfolding in the Waikato region indicate populations that are growing among both older and younger age groups. Māori and Pasifika populations have a disproportionately high number of young people.

Central government agencies, local government and the community and private sectors in the Waikato region all have a role to play in building a positive future for all, and countering inequities. In addition, fostering artistic and creative expression in all its forms adds to the vibrancy and diversity of communities and supports the Waikato economy, wellbeing and community connection.[133]

Despite the obvious challenges, there are also significant opportunities for the future, which include:

- ensuring access to social, health and community services for all, so as to live a full life, reduce isolation and disconnection, and support community participation
- enabling young people to flourish through improved access to education, jobs and training opportunities
- enabling older people and those living with a disability to flourish through improved access to education, employment and training opportunities, including voluntary work
- acknowledging and redressing injustices and inequities of the past, particularly in relation to Te Tiriti
- partnering in iwi and Māori community development, using models that reflect Māori world views
- investment by employers in training and development to counter mismatches between required and available skillsets
- partnerships with the creative sector in the Waikato to support inclusive and engaging connections between people and places
- fostering engagement of all population groups in community, local and regional governance.

Section 4
Scenarios for 2032

In this section, we present three sets of scenarios for the Waikato region in 2032, drawing together the strands of earlier discussions, and offering potential pathways through which the Waikato can progress towards becoming an innovation leader; a resilient and sustainable region; and a connected and inclusive regional economy. We also highlight the challenges we face if we fail to act sufficiently.

1. A resilient and sustainable region

What forces and trends are driving the need for this change?

- Global warming is making extreme weather events more likely, more intense, longer lasting, and larger. The Waikato region is vulnerable to rising sea levels, particularly in coastal communities on the west coast and the western and northern Coromandel and Hauraki Plains.
- Changing weather systems, COVID-19 and the Ukraine conflict have heightened weaknesses in current food supply systems, incentivising local food production and self-sufficiency in food supply.
- As of 2021, the Waikato region had the largest share of dairy cows in New Zealand, causing soil and water quality degradation, biodiversity loss, and reduced functioning of ecosystems.
- Only 27 per cent of the Waikato region remains in native vegetation, and what little is left continues to be degraded and removed.
- Water availability is a significant concern in the region, because of more frequent and extreme weather events, higher population density and reduced water quality.

What if we do nothing?

Native biodiversity continues to be lost, reinforcing decline of functioning natural ecosystems. Soil and water quality continue to decline, making agriculture more difficult and costly and less productive. The region relies more and more on imported food and a fragile global supply chain.

Carbon emissions continue to rise, and the impacts of warming are felt severely throughout the region. Extreme weather events are more frequent, and flooding threatens coastal communities, some of which are forced to retreat. At the same time, water scarcity means economic growth is severely curtailed by water availability and environmental limits.

How could we take action towards a different future?

- Investing in deeper emissions reductions by developing agricultural technology, enabling mode shift to active or public transport, and further expanding renewable energy sources.
- Conserving and better managing water resources and fostering biodiversity.
- Using infrastructure to support economic diversification and sustainability, as well as population growth and structural changes.

What would this future look like?

A diversified and sustainable economic base and environment

An increasingly diverse array of food production works to promote local food security while protecting native biodiversity, water and soils. Native biodiversity is protected through green corridors, the restoration and establishment of wetlands, significant natural areas in urban spaces, predator-free policies and actions, and education in schools and the community. Mātauranga Māori is incorporated into activities and institutions so that land and rivers are valued as living entities, rather than simply resources to be used.

Water resources are managed effectively for a growing population through spatial planning, widespread water meters and water tanks, flood water and recycled/ grey water capture, and normalised water restrictions in summer.

A resilient, low-carbon economy

Greenhouse gas emissions are declining rapidly across multiple sectors of the economy. Active and public transport are realistic and attractive alternatives to private transport in urban and rural areas. Renewable energy sources, such as solar and wind energy, are used across the region.

Green infrastructure has been developed and ageing infrastructure, where feasible, is being replaced with new assets that are more resilient to climate change and more flexible to support future new economic activities and structural population shifts and growth. Managed retreat from communities threatened by or experiencing inundation is being planned and undertaken in a way that gives certainty for those affected.

2. An innovation leader

What forces and trends are driving the need for this change?

- Increased hyperconnectivity and digitisation are changing the ways we work, learn, communicate and buy goods.
- However, digital inequality is high in Aotearoa New Zealand, and wider internet access could improve wellbeing, social connectedness, access to information and amenities, and reduce social isolation.
- Technology could play an important role in building future economic opportunities, while reducing negative human impacts. For example, our response to climate change could be driven by clean energy technology, decarbonising transport, carbon capture technologies, and biotechnology.
- The bio-revolution is anticipated to accelerate, and Hamilton has 5 per cent of the biotech organisations in Aotearoa New Zealand.

What if we do nothing?

The digital divide becomes entrenched, and a segment of society continues to fall behind because they do not have internet access. They are increasingly cut off from accessing information and amenities as more services move online. They fall further into poverty and rely more on government support and services to survive. The trend is exacerbated in an older and more diverse population who have traditionally suffered more from digital inequity.

The region's agricultural industry has suffered due to competition with alt-protein food products that are cheaper and 'greener' and the loss of arable land to residential housing. Some businesses have adapted by developing new products, but other regions were faster to adopt new food production technologies and, as a result, both investment and skilled workers – including climate refugees – have moved away.

How could we take action towards a different future?

- Reducing digital inequality to ensure access to social, health and community services for all to enable people in the region to live a full life, reduce isolation and disconnection, and support community participation.
- Investing private and public resources in technology, especially in areas related to clean energy, sustainable food production and biotechnology.

What would this future look like?

Wide digital literacy and internet access improves social connections and workforce skills

Waikato becomes an innovation leader by investing heavily to ensure the majority of people have both access to and the skills needed to use the internet. Most residents use digital tools in their work or studies, to communicate with others and in their daily lives. Digital tools cater to an increasingly older and more diverse population.

Those without internet access at home have public spaces where they can gain easy access. Digitisation has enabled people to connect with each other more easily, reducing isolation and improving wellbeing, especially among the large number of older people in the region.

A leader in biotechnology products, expertise and skills

The region has also invested in biotechnology research and development, creating world-leading firms in sustainable food production and low carbon products. The resulting industries have in turn invested in building a skilled local workforce, both attracting and retaining talent in the region.

3. A connected and inclusive community

What forces and trends are driving the need for this change?

- The population of the Waikato region is growing older and more diverse. By 2028, 20 per cent of the Waikato will be aged 65 years and over. At the same time, the proportion of young people who identify as Māori or Pasifika is also growing.
- Inequity and poverty are increasing, which will draw people to communities of similar values and beliefs, and in turn lead to siloed information and competition between groups.
- Workers are moving jobs more often and more people are working from home. This increased flexibility carries the risk of higher social isolation but also creates opportunities for geographic regions to compete for residents and workers based on quality of life.
- Workforce shortages and pressures are an opportunity for greater recognition and support of voluntary work, and work opportunities for those living with a disability. This will enable them to live lives that reflect their own aspirations and support an inclusive economy.
- The Māori economy is a significant and growing contributor to the economy of Aotearoa, with Māori businesses employing increasingly higher numbers of skilled Māori.

What if we do nothing?

Economic disparities continue to widen, and only a portion of the population can access public services. Local infrastructure and transport are no longer suitable for the increased population, which is now older and more diverse. Misinformation and social division increase, as people are drawn into insular groups that compete with each other for limited resources. Waikato loses workers to other regions that offer a better quality of life.

Growing numbers of older people are isolated and lonely, unable to keep pace with technological changes that would enable them to connect with others. Meanwhile, young people also feel increasingly disenfranchised and unable to contribute to decisions that affect their future.

How could we take action towards a different future?

- Increasing public and private resources to support older people, ensure they are able to access the services they need, and to counter loneliness and isolation.
- Enabling young people to flourish by engaging in their communities, contributing to decisions that affect them, and being involved in developing solutions.
- Ensuring relevant and quality education and training for the growing rangatahi Māori workforce.
- Fostering engagement of all population groups in community, local and regional governance.

What would this future look like?

An equitable and connected population

People are well-supported and connected with their whānau, neighbours, community and government. Everyone has equal access to social, health and community services, so they can live a full life and participate actively in their communities. A range of innovative governance approaches are enabling input into local and regional government. The creative sector supports and feeds into a dynamic relationship between people, places and institutions in the Waikato region.

Employers have invested in training and development to counter mismatches between required and available skillsets with a focus on secondary and tertiary education and trades training. As a result, skilled young people, including domestic and overseas climate refugees, are attracted to and retained in the region. At the same time, older people are able to play a vital role in both social and economic life in Waikato.

A vibrant Māori culture and economy

The iwi-led business and asset base continues to grow. Māori are increasing their presence in skilled employment across a range of sectors. Te reo and te ao Māori are increasingly celebrated in our daily lives. Iwi, hapū and Māori communities are recognised leaders in environmental conservation as kaitiaki of whenua, awa and moana.

Approaches embodied by Whānau Ora continue to enable whānau to decide on – and government agencies to enable – whanau-centred services that deliver joined-up, flexible, local solutions.

Section 5

Questions to consider

As a planet, we face a host of challenges that threaten and disrupt the systems, networks and ecologies that we are deeply connected to. As a region, we are likely to be buffeted by the winds of changes that these global forces send our way. Yet, as a region, we have choices in how we choose to respond to the challenges ahead. In this final section, we offer some questions for consideration that may help us reach the scenarios discussed earlier. We welcome your feedback.

Harnessing community strengths

- What are the opportunities for new forms of community engagement and governance?
- What is the untapped potential for partnering with iwi and hapū in the region?
- What opportunities can we tap into to support younger and older populations to flourish?
- What are the opportunities to increase community wealth building and reduce inequities?

Boosting the region's economy

- What are the risks and opportunities for the Waikato regional economy?
- What are the competitive advantages of the Waikato region, both nationally and internationally, in the light of the trends we see? Are those advantages sustainable?
- What might sustainable economic development pathways look like in the Waikato?
- What infrastructure is needed to support growth in diverse economic activities?

Reform that works for the Waikato region

- How can the Waikato region be better positioned in the central government's reform programme to deliver on our aspirations for the region?
- What are the opportunities for the Waikato region presented by the central government's reform programme (for example, RMA reform, regional spatial strategies or spatial planning)?

Protecting and enhancing our environment and biodiversity

- How can we restore and protect our natural resources and biodiversity for future generations?
- What are the opportunities and challenges presented by different community aspirations for the environment of the region?
- In what ways can Waikato apply mātauranga Māori responses to safeguarding and restoring natural systems?
- What are the differing needs of urban and rural settings in the Waikato region to transition to a net zero system?

Springboarding from new technologies

- How do we reduce the digital divide and improve digital skills for vulnerable communities?
- How can technology help deliver a more productive regional economy, and transition to a decarbonised future?
- How can the Waikato region best position itself to leverage the opportunities presented by new technologies, such as in green energy and biotechnology?
- What support and incentives do businesses and consumers in the region need to maximise the opportunities from new technologies?
- How do we educate on cybersecurity and make sure our businesses and institutions are cyber secure?

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He taiao mauriora	Healthy environment
He ōhanga pakari	Strong economy
He hapori hihiri	Vibrant communities

Technical Report 2022/47
ISSN 2230-4363 (Online)
Printed November 2022 #7233

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