POLICY Quarterly

Co-governance
and the Case for Shared Decision Making

Editorial – Where does the truth lie?

Questions of governance continue to loom large. Locally, vigorous debates have engulfed the governance of water utilities and resource management. For various reasons, the idea of co-governance has become particularly contentious. In this issue of *Policy Quarterly*, Carwyn Jones provides an informed, measured, and helpful analysis of the purpose, role, and contribution of co-governance in Aotearoa New Zealand. Those contesting the 2023 general election should read this article carefully.

But if there are governance challenges locally, spare a thought for the wider global context. With nearly 200 nation states and weak international institutions, humanity is struggling to protect the global commons, not least the planet's atmosphere and oceans. Indeed, the record thus far has been abysmal. This applies specially to mitigating climate change, protecting biodiversity, and safeguarding the marine environment.

Preventing armed conflict between and within nations poses similar challenges. For instance, Russia's invasion of Ukraine in early 2022 constituted an unequivocal breach of its obligations under the United Nation's Charter 'to maintain international peace and security' (Article 1). Its actions have graphically revealed the limitations of our current mechanisms for global governance. Regrettably, as one of the five permanent members of the Security Council, Russia can veto any sanctions proposed by the Council. Yet the continued existence of such veto powers by the victors of a war three generations earlier underscores humanity's failure to modernize its global institutions.

Meanwhile, the stunningly fast development of generative artificial intelligence (AI) poses different, but no less troubling, governance issues.

Such issues were highlighted recently by Dr Geoffrey Hinton, a brilliant and influential AI expert. Hinton resigned from Google in late April. An important reason, according to a tweet, was so that he 'could talk about the dangers of AI without considering how this impacts Google'.

These dangers include the development and use of super-intelligent, autonomous lethal weapons, whether by rogue states or non-state actors (e.g. the Wagner Group).

Another danger, according to an interview Dr Hinton conducted with the *New York Times*, is a world where many people will 'not be able to know what is true anymore'.

Hinton is not alone in highlighting such risks. Sir Patrick Vallance, a former chief scientific advisor to the British government, raised similar concerns at a parliamentary hearing in London in early May. A critical question he said, as reported in *The Guardian*, was how to ensure that AI did not 'distort the perception of truth'.

The problem here is simple to state: AI is exceptionally fast and can make it hard, in multiple ways, to verify the authenticity of content and distinguish fact from fiction.

One of these is the mass production of 'fake news', that is, misleading or distorted information, whether in the form of emails, articles, or videos. A related risk is content that, although technically valid, is presented in a misleading manner. For instance, vital details may be omitted from a news report, thus giving a slanted perspective.

'Deepfakes' are even more concerning. These are images or videos that have been deliberately manipulated. For instance, a deepfake might show politicians doing something they did not do or making comments they did not say. Determining whether such images are true or not may be very hard.

Deepfakes pose another risk. Suppose a politician is caught on camera saying something deeply offensive or behaving illegally. In a world where deepfakes are commonplace, 'outed' politicians can simply claim that the reported incidents are not true – they are a deepfake. Who, then, is to determine where the truth lies?

Yet the truth matters – everywhere, all the time. It is essential for building and maintaining trust. It is vital for business transactions and informed policymaking. It is fundamental to the conduct of academic research and the publication of journals like *Policy Quarterly*. Without truthfulness, rigorous scientific inquiry becomes impossible, as does genuine technical progress.

Truth also underpins responsible government and democratic politics – in all its forms and at all levels, whether national, regional, or local. If citizens are unable to 'know what is true', free and fair elections become non-viable. How will voters know what candidates have actually said? And how will governments be held to account? Accountability, after all, depends on knowing what is true and fair.

But can a world dominated by fake news and deepfakes be prevented? Put bluntly, is a tyrannical, dystopic future avoidable? And, if so, how?

In a global 'village' of instant communications, the task is beyond the capacity of any individual country: collective action is vital. This must include well-designed regulation and oversight of digital platforms and the use of AI, along with tools for verifying, to the extent that this is possible, whether specific content is authentic. Unchecked social media data collection must be curbed. Robust transparency will be essential.

Securing international agreement on an effective regulatory framework, however, seems doubtful. For one thing, the strong constitutional protection of 'free speech' in the US complicates any regulatory interventions. And what happens in the US matters globally.

For another, nation states have powerful incentives to compete (e.g. to secure technological superiority) rather than collaborate.

In short, the current low-trust global environment seems destined to accelerate the assault on truth, thereby undermining trust even further. No wonder Dr Hinton is worried.

Jonathan Boston – Editor

Carwyn Jones

CO-GOVERNANCE
and theCase for Shared Decision Making

Abstract

This article explores some of the key features of co-governance, or shared decision making, between Māori and the Crown. Co-governance models create the conditions for making better decisions by sharing decision making with Māori where Māori communities have a distinctive interest. Such models are able to draw on the distinctive experiences, knowledge and expertise that Māori communities can bring. Shared decision making enhances the legitimacy and durability of decisions by giving effect to rights under te Tiriti o Waitangi. The article also identifies some key principles of effective co-governance and provides some brief examples where shared decision making is being implemented to illustrate the range of situations in which such models are applicable.

Keywords   co-governance, shared decision making, Treaty of Waitangi, Māori rights, Treaty settlements

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'Co-governance' is a term which has been the subject of considerable political debate in recent times. That debate has often taken place without much examination of what the concept might or might not include. In reality, 'co-governance' is a term which captures a whole range of different ways of sharing decision-making authority. This article points to some key benefits of co-governance, identifies principles for effective shared decision making, and concludes with a brief survey of a small number of examples of existing and proposed models of shared decision making.

Co-governance and benefits of shared decision making

In understanding co-governance, it may be useful to first consider the concept of governance. One explanation of governance is as follows:

> Governance is a system that provides a framework for managing organisations. It identifies who can make decisions, who has the authority to act on behalf of the organisation and who is accountable for how an organisation and its people behave and perform. (Chartered Governance Institute UK and Ireland)

'Co-governance', therefore, reflects a system which has a framework for *shared* decision making, authority and accountability. Put simply, co-governance is a mode of shared decision making and shared responsibility over something or some place. It can apply to any form of shared responsibility where there are separate groups that have interests.

Shared decision making is not an end in itself. Fundamentally, models of shared decision making are about making better decisions. Shared decision making contributes to better decisions in two ways: first, by bringing a wider range of interests, experiences and perspectives to the substantive decision; and secondly, by providing opportunities for a more

mechanisms for decision making to be shared between the Crown and a particular iwi in relation to the governance of significant lands or waterways in instances where the iwi has historically, in breach of te Tiriti, been excluded from exercising decision-making authority (for example, Te Awa Tupua (Whanganui River Claims Settlement) Act 2017). This is often in circumstances where ownership and control was wrongfully asserted by the Crown. The intention of these mechanisms is not merely to increase the diversity of decision makers per se, but rather to include decision makers from those communities that have distinctive rights and interests in the specific land or waterway in question, distinctive

account of citizens' rights cannot command legitimacy and are likely to be unsustainable in the long term. Far from undermining our democratic institutions, where shared decision-making models are used to better recognise and provide for Māori rights, the legitimacy of our democratic institutions is strengthened.

Therefore, we should consider in which aspects of public policy development and implementation, and broader government activity, will shared decision-making models be appropriate and beneficial. At one level, the question to determine whether a shared decision-making model should be adopted is a straightforward one: do Māori have distinctive rights or interests in the subject matter, alongside the legitimate interests of government and other New Zealanders? While that question is simple, the answer might not always be obvious. And it may also lead to other questions, including between whom, specifically, should decision-making authority be shared?

The Waitangi Tribunal adopted this basic framework in recommending that shared decision making should be a component of environmental governance in Aotearoa. In its 2011 report *Ko Aotearoa Tēnei*, the Waitangi Tribunal noted that a Treaty-compliant system of environmental governance should be capable of delivering the following:

> … the Treaty partnership requires that Māori are genuinely sharing decision making with the Crown – participating as decision makers, not merely providing advice to decision making bodies.

inclusive process, which better understands and recognises the range of rights that are relevant, leading to enhanced legitimacy, effectiveness and durability of decisions made.

The central function of shared decision-making models is to create space for different sets of voices to participate in decision making. Allowing for a greater diversity of perspectives to contribute to decision making is, in itself, helpful for making better, more carefully thought through and tested decisions (Goyal, Kakabadse and Kakabadse, 2019). However, shared decision making is not simply about increasing, in a general way, the diversity of decision makers within an organisation. More specifically, shared decision-making models seek to include particular voices – voices from communities that have a distinctive interest in the decisions that are being made. For example, Treaty settlement agreements have often established

knowledge and experiences in relation to it, and who continue to exercise distinctive relationships with it.

In addition to enabling an organisation to draw on a broader range of relevant experiences and perspectives, shared decision making can lead to more effective and durable decisions through enhancing the legitimacy of the process (Melnychuk and de Loe, 2020).

In the context of shared decision-making models between Māori and the Crown, the recognition of Tiriti rights is often a key catalyst for adopting such models. While the sharing of decision-making authority can be a useful mechanism as partial redress for historical breaches of te Tiriti, it is perhaps an even more important mechanism for helping the Crown to meet its Tiriti obligations now and into the future. Governmental decision-making structures and processes that do not properly recognise and take

- *control* by Māori of environmental management in respect of taonga, where it is found that the kaitiaki interest should be accorded priority;
- *partnership* models for environmental management in respect of taonga, where it is found that kaitiaki should have a say in decision making but other voices should also be heard; and
- *effective influence and appropriate priority* to the kaitiaki interests in all areas of environmental management when the decisions are made by others. (Waitangi Tribunal, 2011, p.112)

The Tribunal further noted that 'It should be a system that is transparent and fully accountable to kaitiaki and the wider community for its delivery of these outcomes' (ibid.).

The partnership models envisaged by the Tribunal are models of effective shared decision making. The Tribunal notes that

the Treaty partnership requires that Māori are genuinely sharing decision making with the Crown – participating as decision makers, not merely providing advice to decision making bodies. The Tribunal's view was that 'kaitiaki control' (that is, effectively, Māori decision making) will be appropriate where there is a taonga at stake in which the Māori interest is strong, and where there are no sufficiently strong counterveiling interests which may be affected (such as, perhaps, another party's property rights). Where there are strong and legitimate counterveiling interests, a partnership or shared decision-making model will be appropriate.

In the case of environmental governance, identifying a taonga in which Māori have rights or interests can be straightforward. Land that has been alienated in breach of te Tiriti, rivers or mountains that sit within the rohe of a particular iwi or hapū, would clearly constitute taonga in which a specific Māori community has rights. However, there are many other areas of government policy in which we can identify distinct Māori rights and interests. The Treaty of Waitangi guidance issued by the Cabinet Office (Cabinet Office, 2019) asks policymakers across government to consider how any policy proposal might affect Māori differently from other New Zealanders and whether there is any aspect of the issue that Māori consider a taonga. As the courts and Waitangi Tribunal have long held, 'taonga' are not limited to concrete, physical things but may also include intangible things that are highly valued, such as health and wellbeing or te reo Māori. In these and other policy areas, such as justice, education and climate change, Māori are likely to have distinct interests or feel particular impacts from policies in these areas. In order to give effect to te Tiriti rights, shared decision-making models ought to be considered across all these areas.

The necessity for Tiriti-consistent models of shared decision making in these broader areas of policy is becoming ever more urgent. The increasingly visible and severe impacts of climate change suggest that it is no longer a sensible option for us to continue to do things the way we have always done and to make decisions in the way governments and public institutions

have traditionally made them. The same urgency can be seen in the need to address inequities across a range of social policy areas. It is important that we do not rely on the same policy machinery and governance settings that have created our current circumstances. Giving effect to te Tiriti moves us away from systems that have proven harmful or simply ineffective to date. Shared decision making and genuine recognition of the authority of tino rangatiratanga would promote different ways of understanding and approaching aspects of our climate change response, including urban planning and

transport, and economic resilience, as well as equity-informed social policies for a just society that supports the health and wellbeing of all people and communities in Aotearoa.

Whereas, in the case of environmental governance, it is relatively clear with whom government ought to be sharing decision making, when it comes to broader policy issues it may not be a specific iwi, hapū or whānau that holds the rights and interests at stake. Sometimes, the implementation of social policy can be addressed on a local or regional basis, as with a number of accords arising out of Treaty settlement agreements (including the framework for the Wairoa region that is discussed below). In other instances, it may be that decision making ought to be shared at a national level, with a national representative body, such as the National Iwi Chairs Forum, appointing appropriate individuals to share decision making with Crown appointees. Or it may be that specialist Māori organisations, such as Te Hunga Rōia Māori o Aotearoa (the Māori Law Society) or Te Rōpū Whakakaupapa Urutā (the grouping of Māori health experts that came together to respond to Covid-19), are

appropriate bodies for government to share decision making with in relation to some matters. There is no 'one size fits all' model.

Many public and private organisations in Aotearoa are recognising the value of adopting te Tiriti-led approaches and implementing shared decision-making models. A small number of examples of such models are outlined later in this article. Before considering those different mechanisms, it is helpful to identify some key principles that underpin effective shared decision-making models.

Effective shared decision making between Māori and the Crown requires much more than adding Māori participants to established Crown decision-making processes.

Principles of effective shared decision making

Effective shared decision making is grounded in relationships and agreed principles. It is not simply a question of changing the numbers of decision makers representing particular communities of interest that sit around the decision-making table. The Office of the Auditor-General's 2016 report *Principles for Effectively Co-governing Natural Resources* (Office of the Auditor-General, 2016) identified four key principles for establishing and maintaining effective relationships for shared decision making:

- Having a shared understanding of purpose
  Parties need to understand each other's objectives and aspirations and build and maintain a shared understanding of purpose, which will be necessary for working towards common goals and outcomes. The arrangements for shared decision making should be regularly reviewed to ensure that those arrangements continue to be fit for purpose and support the shared objectives.
- Working together

Effective shared decision making requires that the parties work together to establish and maintain robust processes for planning and decision making. Parties should develop mechanisms that reflect their joint understanding of their decision-making authority and support the shared purpose. Maintaining effective shared decision-making processes will involve a commitment of time and resources from the parties to ensure decisions are fully informed by the aspirations of both parties and that options are co-designed as well as co-determined.

• Getting people with the right experience and capacity

The parties need to ensure that there are processes in place for sound financial management and transparent reporting. In organisations where decision making is shared between Māori and the Crown, it is likely that there will be important lines of accountability to both Māori and the Crown. For example, in the wānanga governance reforms referred to below, it is envisaged that some wānanga may wish to have formal accountabilities back to iwi, as well as maintaining reporting to relevant government agencies.

Effective shared decision making between Māori and the Crown requires much more than adding Māori participants

decision making and help to deliver on the mission of the organisation. That is consistent with the key principles identified in this section.

The examples that are briefly outlined in the next section illustrate some of the mechanisms that are currently proposed or are already being used to implement principles of effective shared decision making across different areas of public policy.

Models of shared decision making

There is no single model for how organisations share decision-making authority. Sharing decision-making authority can be achieved in a number of different ways and can be applied to any organisation, subject matter, or type of decision. Many organisations have already adopted mechanisms for shared decision making and, consequently, there are many examples of successful structures and practices for shared decision making that are already in operation or currently being implemented in Aotearoa.

To give some indication of the range of shared decision-making models currently operating or being implemented, this section provides brief descriptions of four mechanisms for shared decision making between Māori and the Crown. The Waikato River Authority and the proposed water services reforms are examples of shared decision making in environmental governance/management of natural resources. The Wairoa Region: Social and Economic Revitalisation Strategy Framework and the new governance arrangements for wānanga are examples of shared decision making in relation to social and economic policies and their implementation.

The reform of the management of drinking water, storm water and waste water infrastructure and services (formerly known as 'Three Waters') is often pointed to as an example of co-governance.

Having people involved who, collectively, have the necessary mix of skills and experience is important for effective governance in general, but particularly essential for effective shared decision making. A key purpose of shared decision making is to bring particular voices into the governance of the organisation. In relation to the governance of natural resources, this might mean that people with a particular community connection to specific lands and waters are involved. For governance in a broader policy context, it may be people with experience of the impact on Māori communities of relevant policies that are required. In the context of shared decision making between Māori and the Crown, people with knowledge and experience of te Tiriti and the purpose of shared decision-making models may be necessary.

• Accountability, transparency and financial accountability

to established Crown decision-making processes. As outlined above, sharing decision making can contribute to better outcomes and strengthens the legitimacy of our public institutions. But the effectiveness of sharing decision-making authority is limited if it is only applied to one part of a decision-making process. For example, if the governing board of a company or public entity invites mana whenua to appoint 50% of the board members but does not change anything else about the board's structure, its relationship with management, the process for setting budgets and strategic plans, or mechanisms for monitoring and reporting on performance, then the impact of including mana whenua appointments will be limited. Ideally, shared decision making would be reflected in all aspects of governance, with Māori having a say in the design of organisational structure and governance arrangements and decision-making style and processes, and input into an agreed set of values which will guide

Waikato River Authority
The Waikato River Authority is a result of the settlement of historical claims in relation to the Waikato River. The authority is established by the Waikato–Tainui Raupatu Claims (Waikato River) Settlement Act 2010.

The authority has a ten-member board, with five members appointed by Māori (specifically, by the iwi of Tainui, Te Arawa, Tūwharetoa, Raukawa and Maniapoto) and five members appointed by the Crown.

The purpose of the authority, as stated in the Act (s22), is to:

- set the primary direction through the vision and strategy to achieve the restoration and protection of the health and wellbeing of the Waikato River for future generations;
- promote an integrated, holistic, and co-ordinated approach to the implementation of the vision and strategy and the management of the Waikato River;
- fund rehabilitation initiatives for the Waikato River in its role as trustee for the Waikato River Clean-up Trust.

By including appointments from the five iwi, decision-making authority is shared with specific communities of interest, bringing distinctive knowledge, expertise and relationships to the decision-making process. Central to the operation of the authority is the clear statement of agreed purpose.

Water services reform programme
The reform of the management of drinking water, storm water and waste water infrastructure and services (formerly known as 'Three Waters') is often pointed to as an example of co-governance. Under the Water Services Entities Act 2022, the yet to be established regional water entities will each have a regional representative group as a high-level oversight body. Each regional representative group will be comprised of equal numbers of mana whenua and local government members. The primary functions of the regional representative groups are to appoint and remove board members of the water services entities, participate in setting strategic direction and peformance expectations, and review the performance of the entities. The regional representative groups are required to make decisions by consensus where possible or, where consensus cannot be achieved, by 75% of the regional representatives present and voting. Shares in the water services entities will be held by territorial authorities, with the number of shares allocated to each territorial authority dependent on the population of its district.

The Water Services Entities Act therefore also provides for distinct voices to share decision making through the regional representative groups. The composition of those groups is intended to include those communities with distinctive rights and relationships to water resources and the local environment more broadly. While there is provision for equal numbers of mana whenua and local government representatives, the emphasis on consensus decision making could help to support a shift to more collaborative decision making, based on common objectives.

Wānanga reforms: Education and Training Amendment Bill (No 3)
Another form of shared decision making can be seen in the proposed new framework for wānanga, Māori tertiary education providers. The recently introduced Education and Training Amendment Bill (No 3) would establish a new framework for wānanga that 'better recognises the mana and rangatiratanga of wānanga, and the unique role that wānanga play in the tertiary education system'. A central component of the bill is the provision for new governance and accountability arrangements for wānanga. The three existing wānanga, which are currently Crown entities, will be able to either 'reconstitute themselves as a Crown entity wānanga, with bespoke purpose, functions, and governance arrangements; or convert to a non-Crown entity wānanga (that is primarily accountable to iwi, hapū, or another Māori organisation while retaining some accountability to the Crown, and has a bespoke purpose,

functions, and governance arrangements)'.

The proposed reforms in relation to wānanga provide a good example of the ways in which formal financial and governance accountability can be jointly located with the Crown and Māori in shared decision-making models.

Wairoa Region: Social and Economic Revitalisation Strategy Framework
The Wairoa Region: Social and Economic Revitalisation Strategy Framework (New Zealand Government, 2021) formed part of the settlement of the historical claims of the iwi and hapū of Te Rohe o Te Wairoa. The framework is intended to establish new relationships between the settling iwi and government agencies with broad

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responsibility for social and economic development policies. It sets out the way in which the parties will work together to develop a strategy to improve the social and economic circumstances of people in the Wairoa region. The government agencies that are party to the framework are: the Ministry for Primary Industries; the Ministry of Business, Innovation and Employment; the Ministry of Social Development; the Ministry of Education; and Te Puni Kōkiri.

Although this is only a framework for how a strategy will be developed, it is grounded in some important principles.

First, the Crown formally acknowledges, in the framework agreement, the mana motuhake of the iwi and hapū of Te Rohe o Te Wairoa, and the framework also records that the government agencies listed

above will support the iwi and hapū of Te Wairoa mission for mana motuhake and their vision of their tikanga, including:

a) *Te Kawa o Te Wairoa*: recognising the customary philosophies and practices of the iwi and hapū of Te Rohe o Te Wairoa; and

b) *Mana Whenua*: recognising the role the iwi and hapū of Te Rohe o Te Wairoa have as stewards of those customary roles through whakapapa and maintenance of te ahi kā roa.

The framework also records the following core principles which guide the relationship between the parties:

a) *Mana Motuhake*: Respect for the authority, autonomy, relationships and mandates of the parties and their individual roles, responsibilities and practices;

b) *Anga Whakamua* – kia puāwai, kia tutuki ngā wawata: Be forward looking and seek to achieve results that benefit the people of the Wairoa region;

c) *Kanohi e kitea*: The importance of engaging with the iwi and hapū of Te Rohe o Te Wairoa; and

d) *Kōrero Pono*: Open, honest and transparent communication.

Alongside the wānanga reforms, the Wairoa Region: Social and Economic Revitalisation Strategy Framework shows the applicability of shared decision making outside of environmental governance. It also illustrates how a framework for shared decision making can be structured around agreed principles to bring organisations and communities with specific interests,

relationships and expertise together to deliver on common goals.

The examples briefly outlined in this section illustrate that shared decision making can be implemented through various kinds of structures and processes and can be applied to a wide range of subject matter. Consistent with principles identified above, in each of these examples there is a clear, common purpose that Māori and the Crown are working towards and an agreed framework for making decisions and exercising shared decision-making authority.

Conclusion

There are significant benefits to adopting models of shared decision making. These models can be structured in various ways in order to be tailored to the particular organisations involved, the subject matter that decision makers will be addressing, and the aspirations of those communities that have distinctive interests in or perspectives on decisions to be made.

The benefits of shared decision making arise from being able to draw on different expertise, knowledge and experiences, and from the enhanced legitimacy of processes that include specific communities of interest and appropriately recognise relevant rights and obligations. This produces better substantive decisions, which are likely to be more durable and effective. Shared decision making, therefore, should not be viewed as an end in itself. Rather, it is a mechanism for improving outcomes for distinct communities that are

particularly affected by the decisions made and for taonga that are the subject of those decisions (for example, lands, waterways, health and wellbeing).

Shared decision making is not something new or unknown. In many ways, it could be seen to be central to any form of corporate governance and a core part of living in a democratic society. Shared decision making is not a concept that was created through the settlement of historical Treaty claims. While there is much to learn from the shared decision-making mechanisms that have been created through the negotiated settlements, there is no reason for shared decision making between Māori and the Crown to be defined or limited in any way by the mechanisms that are used in settlement agreements.

Shared decision making is relevant to the full range of subject matter that our public institutions address and any decisions that will have an impact on Māori communities ought to include Māori voices in the decision-making process. Te Tiriti provides a framework for establishing shared decision-making models and there is real value to us all in developing innovative approaches that draw on the distinctive knowledge, experience and relationships that sit within Māori communities. Shared decision-making models offer us opportunities for more inclusive processes, driven by agreed principles and objectives, and, ultimately, better outcomes for us all.

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Paul Callister and Robert McLachlan

Decarbonising
Aotearoa New Zealand's aviation sector
hard to abate, but even harder to govern

Abstract

Aotearoa New Zealand ranks sixth in the world for total per capita aviation emissions. Our geographic isolation, our globally dispersed families and our large tourism industry make international aviation especially significant. Domestic aviation is also important, in part due to a lack of passenger rail services. We need to decarbonise aviation. Yet, uncertainties of future technologies and responses to prospective policies make it a challenge to prescribe a definite course of action. We suggest that a wide range of policies, including emissions budgets, a sustainable aviation fuel mandate, emissions trading and fuel tax reform, and a rethink of tourism are essential.

Keywords decarbonising aviation, sustainable aviation fuels, emissions reduction

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The challenge

Recent extreme weather events in New Zealand have brought renewed attention and urgency to mitigation of, and adaptation to, climate change. While 2022 saw the greatest weather-related economic losses on record (including the March 2022 North Island floods, insured losses $120 million, and the August 2022 Nelson floods, $67 million), these events were dwarfed by the record-breaking January 2023 Auckland flooding, followed two weeks later by Cyclone Gabrielle, with insured losses estimated at $1.65 billion (Evans, 2023). Scenes of flooding in Auckland International Airport brought home the irony of air travellers making the problem worse – an extreme and tragic instance of the 'flyers' dilemma' (Higham, Cohen and Cavaliere, 2014).

For the big picture we can refer to the sober assessments of the Intergovernmental

Panel on Climate Change (IPCC) reports, including its latest in March 2023. These point out the stark difference between warming of 1.5°C and 2.0°C. Among many impacts, they see the potential for widespread impacts to ecosystems, people, settlements and infrastructure resulting from increases in the frequency and intensity of climate and weather extremes, and substantial damages, and increasingly irreversible losses, in terrestrial, freshwater and coastal and open ocean marine ecosystems. There is the potential for a 6m sea level rise at 2.0°C and 25m at 2.5°C. The latest report states that '[t]here is a rapidly closing window of opportunity to secure a liveable and sustainable future for all'

(IPCC, 2023). Tipping points, described as walking into an increasingly dense minefield, lie ahead (Kemp et al., 2022).

Or, we can refer to social commentary such as that of the New Zealand cartoonist Chris Slane.

Globally, aviation's overall contribution to greenhouse gas emissions is currently smaller than that of sectors such as agriculture or road transport. It is estimated that aviation accounts for around 2.5% of global annual CO_2 emissions and 4% of current global warming (Klöwer et al., 2021). But aviation stands out as an extremely carbon-intensive form of travel, in which a very small proportion of the world's population contributes a

disproportionate share of emissions (Erikson et al., 2022; Gössling and Humpe, 2020). In studies of how individuals in wealthy nations can reduce their emissions, avoiding flights, especially long-distance ones, is high on the list of recommendations. While aviation is already an important contributor to global warming, it is the global growth scenarios, potentially still mainly using fossil fuels, that are of particular concern.

Due to a number of factors, including our geographic isolation, being a country of migrants with families spread across the world, and our large tourism industry, international aviation is especially significant for Aotearoa New Zealand. Domestic aviation is also important, in part due to a lack of fast, affordable and frequent passenger rail services.

Not surprisingly, we have high emissions. Aotearoa New Zealand's aviation emissions rose 116% between 1990 and 2019 to reach 4.9 MtCO$_2$, with international emissions tripling.[1] Aviation emissions rose from 8% to 12% of gross CO_2 emissions, faster than global growth. Pre-Covid, New Zealand ranked sixth in the world for per capita aviation emissions (i.e., including international and domestic emission), at 1 tonne CO_2, about ten times the world average. It ranked fourth for per capita domestic aviation emissions (more than Canada, a much larger country physically) and sixth for international emissions (Global Sustainable Tourism Dashboard 2022). On a per capita basis,

Table 1: Two scenarios for decarbonisation

Degrowth	Green growth
There are not enough minerals to build either renewable energy nor batteries and other technological advances needed for green growth projects.	There are enough minerals, especially as we switch to newer and cheaper processes (e.g. away from cobalt and rare earths).
We cannot build and maintain enough renewable energy to supply ever-rising demand.	We can build enough renewable energy to replace fossil fuels.
We will not have breakthroughs in battery technology any time soon that will allow large, longer distance regional electric planes.	Such breakthroughs are just around the corner.
Biofuels are an environmental disaster taking away valuable land for fuel production, relying on feedstocks that are unsustainable (e.g. palm oil) or in short supply such as used cooking oil.	Biofuels, from waste, wood, algae and corn are the answer for long distance flying and can be scaled up quickly.
Exponential growth of use of materials and energy is unsustainable.	Growth in demand for aviation is a natural response to economic growth, and society should plan to accommodate it.
Material and energy use should be minimized and should prioritize human needs.	Material and energy use should grow and be allocated in response to demand.
In an 'Avoid/Shift/Improve' framework, the focus is primarily on 'Avoid', but in some areas, 'Shift'.	The focus is on 'Improve'

New Zealanders emitted seven times more than people living in the UK and nine times that of Germany in domestic aviation (Ritchie, 2020).

Frameworks for considering decarbonisation of aviation
Scientific research can tell us much about the past and our current-day conditions. But while science can give us some signposts about the future, much is uncertain, especially when projecting out to mid-century, a date used in many emissions-reduction scenarios. Decision making is therefore often carried out within a framework of ideology and beliefs. This is especially important for aviation. Consider two quite differing frameworks for decarbonisation, 'degrowth' and 'green growth' (Boston, 2022; Millward-Hopkins et al., 2020) (see Table 1). We will keep these two belief systems in mind as we examine possible policy approaches to the decarbonisation of aviation.

Green growth is the dominant policy position around the world, at least insofar as efforts have been made to reduce emissions at all. To degrowthers, the green growth agenda – even if it could be realised – would still not constitute true sustainability, because of issues of overshooting planetary boundaries. Yet green growth risks sliding into the extremist fringes of eco-modernism and techno-optimism: namely, the belief that technology and economic growth will solve all environmental and human development challenges without fundamental changes to society or affluent lifestyles. These extremist positions we reject. There is, however, an intermediate position, which is becoming mainstream in the 'progressive climate' movement exemplified by, for example, Greta Thunberg (see Box 1).

There is a fundamental difference between land transport, where low-emission alternatives, from walking to electric vehicles, exist (but fast-enough adoption is still difficult), and air transport, where low-emission alternatives do not yet exist. The resulting uncertainties are a challenge to policy development and adoption. As long as there are no realistic low-emission aviation options, there is a risk of 'technologies of prevarication', promises of solutions in the future that act

Box 1 Greta Thunberg and the 'progressive climate' movement

"To have a chance of minimizing further irreparable damage, we have to choose: either we safeguard living conditions for all future generations, or we let a few very fortunate people maintain their constant, destructive search to maximize immediate profits. (https://twitter.com/GretaThunberg/status/1625061065301151744) [T]he idea that countries such as Germany, Italy, Switzerland, New Zealand, Norway, and so on will be able to achieve such enormous reductions within a couple of decades without major systemic transformations is naïve." (Thunberg, 2023, p.5)

"Until recently, you could argue that it was possible to save the climate without having to change our behaviour. But that is no longer possible. Our leaders have left it too late for us to avoid major lifestyle and systemic changes … our number one priority must be to distribute our remaining carbon budgets in a fair and holistic way across the world as well as repay our enormous historical debts … People keep asking us climate activists what we should do to save the climate. But maybe the question itself is wrong. Maybe, instead, we should start asking what we should stop doing?" (Thunberg, 2023, p.240)

to delay the adoption of known (behavioural, organisational, logistic) mitigation measures now. The prevention of greenwashing (United Nations, 2022) and rigorous technology assessment are therefore important, but there are limits to the latter's reliability.

'Making net zero aviation possible'
The aviation industry knows what the challenge is and has contributed to many decarbonisation studies. Here we focus on a major report, *Making Net-Zero Aviation Possible: an industry-backed, 1.5°C-aligned transition strategy* (Mission Possible Partnership, 2023). The report begins:

At current emissions levels, staying within the global carbon budget for 1.5°C might slip out of reach in this decade [the 2020s]. Yet efforts to slow climate change by reducing greenhouse gas (GHG) emissions run into a central challenge: some of the biggest emitters of greenhouse gases into the atmosphere — transportation sectors like aviation, shipping and trucking, and heavy industries like steel, aluminium, cement/concrete, and chemicals manufacturing — are the hardest to abate.

The collaborative report was backed locally by Air New Zealand and Sounds Air, as well as globally by a wide range of industry interest groups, including oil companies and producers of alternative fuels. The report works within the concept of a net zero goal for 2050. The authors see two components of net zero. One, which we will not focus on, is reducing aviation emissions by 5–10% by direct air capture of carbon dioxide. However, most current emissions (90–95%) in each sector need to be reduced by in-sector measures: this is 'in line with the Science Based Targets initiative, which prescribes "long-term deep decarbonization of 90%–95% across all scopes before 2050" as the single most important target for a net-zero world' (ibid., p.31).

The report studies four major levers that the authors suggest will move the industry towards net zero emissions. These are:
- reduction in air travel demand (from videoconferencing, from a shift to rail, from consumer education, and from pricing measures);
- efficiency improvements;
- sustainable aviation fuels; and
- novel propulsion (hydrogen, battery-electric and hybrid) aircraft.

Figure 1: The 'Prudent' scenario from *Making Net-Zero Aviation Possible*, showing 135% traffic growth over 2019–50 combined with a pathway to net zero
This scenario requires 100% sustainable aviation fuels by 2050 worldwide, of high quality enabling 90% well-to-wake emissions reductions.
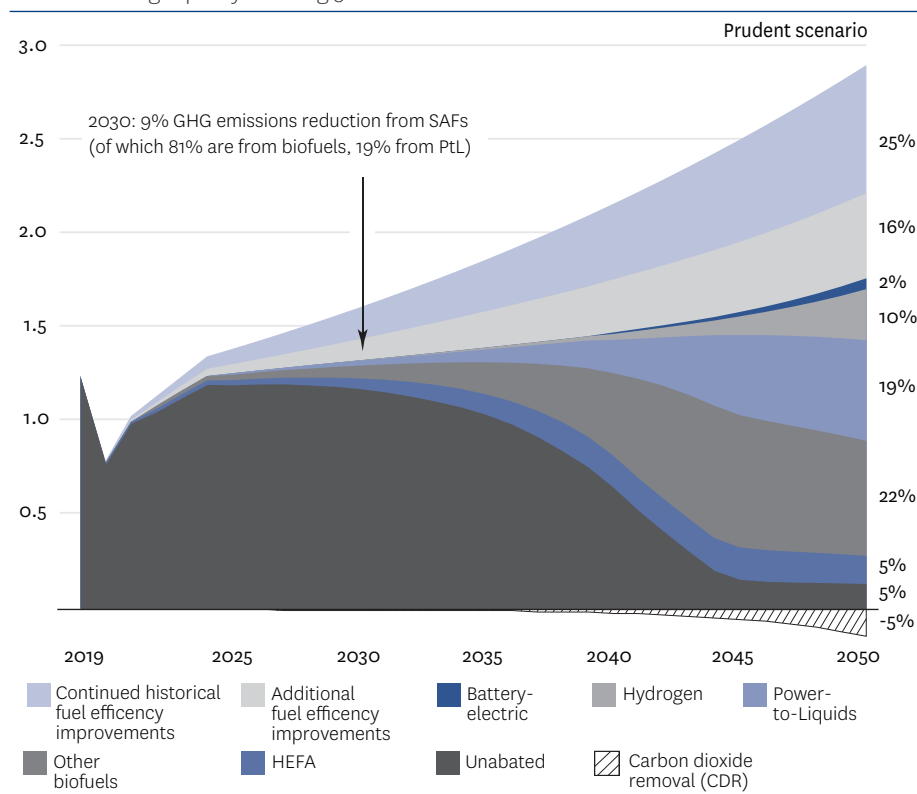
Source: Mission Possible Partnership, 2023, p.10

The novel propulsion aircraft have almost no impact until 2040, and are expected to contribute only 12% of total emissions reductions by 2050.

The technology pathways in *Making Net-Zero Aviation Possible* are a useful guide. However, we emphasise that there is considerable uncertainty over their capacity to be realised, even in a narrow engineering context. They would require New Zealand to invest an estimated NZ$36 billion by 2050 in new aircraft and sustainable aviation fuels; 29 terawatt hours (TWh) of new renewable electricity, which would likely come from wind and solar (ten times our current amount); and enormous amounts of biomass.

The scenarios for efficiency improvements, at 2% per year, are ambitious. For reference, consider the Airbus A320/321/neo family of aircraft. (Air New Zealand has just begun operating the A321neo domestically). The A320neo, introduced in 2016, uses 15–20% less fuel than the A320, introduced in 1988. This constitutes a rate of improvement of only 0.6% per year. The next major aircraft design from Airbus is expected in the early 2030s, pending the success of engines now under development. Thus, there is potential for only one further aircraft upgrade cycle before 2050. In addition, the current fleet will need to be upgraded to the most efficient available models, and this process takes time.

Even with these assumptions, it is hard to reconcile the *Making Net-Zero Aviation Possible* scenario with a safe future. In the 'Prudent' pathway (Figure 1), global aviation emits 25 GtCO$_2$ over 2020–50, while the aviation carbon budget for a 67% chance of limiting warming to 1.75°C is 22.5 Gt, and for 1.5°C, 12 Gt (Graver et al., 2022).

The following thought experiment illustrates the limitations of the modelling approach used in *Making Net-Zero Aviation Possible* and many other similar studies. Imagine running the model under a requirement of even more rapid decarbonisation: instead of net zero in 2050, ask for true zero in 2040, say, or 2030. The model would tell you how much sustainable aviation fuel of what types would be needed, and how efficient the aircraft would need to be. But it would not tell you whether those outcomes would be achievable.

Growth

Traffic volumes form a fundamental input to aviation emissions pathways. A common approach to modelling traffic volumes is to assume that growth will continue in an almost unrestrained fashion, based on past behaviour and on the principle identified by Schafer and Victor (2000) that widely diverse groups of people spend a constant proportion of their time and income on travel. Rising incomes and falling ticket prices therefore lead to faster travel modes: i.e., to more flying. Projections of global GDP doubling by 2050 lead to 135% growth in air traffic in the *Making Net-Zero Aviation Possible* study. Most of this growth is expected to take place in developing nations, indicating faster traffic growth in those regions.[2]

Predictions of faster traffic growth lead to an anticipation of more inputs (sustainable aviation fuel plants, feedstock plantations, new aircraft, hydrogen, electricity, airports, land use etc.), which can act as a spur to their development; but it also leads to greater total carbon emissions, other things being equal. Further, it creates a risk that some parts of the system may materialise (more passengers, airports and aircraft) but not others (sustainable aviation fuels and zero-tailpipe-emission aircraft), thereby missing emissions-reduction targets.

Inequality

As noted earlier, air travel is highly unequally distributed. Ivanova and Wood (2020) found that the lowest-emitting 90% of EU households have air travel emissions averaging 0.1 tonnes CO$_2$ per person (compatible with a '1.5°C lifestyle'); 9% of households average 0.8 tonnes; and the remaining 1% average 22.6 tonnes. Its high income elasticity of demand classifies air travel as a highly carbon-intensive luxury. At the global level, Gössling and Humpe (2020) found that in any given year (pre-Covid), 1% of the world's population are extremely frequent flyers, emitting 10 tonnes of CO$_2$ each on average and causing half of all aviation emissions; another 10% fly less and emit 1 tonne of CO$_2$; and the remaining 89% do not fly at all.

We do not have complete data on the distribution of air travel in Aotearoa New Zealand. The Household Economic Survey

asks people if they have an overseas holiday at least once every three years: over all households in 2019, the proportion is 43%, while the range is from 5% in the bottom decile of material deprivation to 80% in the top decile. (Overseas holidays are not considered relevant to deprivation and are not a component of the deprivation index.) Thus, roughly 2.8 million New Zealand residents did not holiday overseas in a given three-year period, but a total of 9 million overseas trips were made by the other 2.1 million residents.

The New Zealand Household Travel Survey yields information on domestic travel emissions. The highest-emitting 20% of households fly domestically 25 times as much as the lowest-emitting 20%, while their emissions from private cars are only 1.6 times higher. Emissions from private cars are regressive, given that both the wealthy and the poor are heavy car users; emissions from aviation are progressive, given that it is the well-off who fly the most (Shaw, 2022).

Climate justice

Equity is written into the Paris Agreement, and a broad wing of climate action considers equity to be essential to addressing the existential crisis of climate change. Procedural equity concerns the process of decision making and the engagement of affected communities. Distributional equity deals with the spread of costs and benefits across society. Structural equity recognises historical, cultural and institutional structures that advantage some groups and disadvantage others. Transgenerational equity considers the balance of costs and benefits between present and future generations.

All four types of equity are relevant to climate change, and especially to aviation, which features marked distributional differences across and within countries. It is clear, however, that not everyone will agree on exactly what is a fair distribution of costs and benefits. Hall (2022), in a study of adaptation finance, assesses policy proposals under four allocative principles: polluter pays, beneficiary pays, taxpayer pays and ability-to-pay.

For aviation, equity points to 'polluter pays' as the preferred principle, although costs borne by the polluter (the airline)

… the extreme unsustainability of 'business as usual' has finally prompted a renewed sense of urgency and the emergence of a coalition behind the goal of net zero aviation by 2050.

would likely be passed to beneficiaries (the passengers). However, there are other beneficiaries which could be considered: the tourism industry, and (for business travel) the employer. Proposals for frequent flyer levies cross into 'ability-to-pay' territory.

Without a just approach, the aviation industry globally risks damaging or losing its social licence to operate. Indeed, the extreme unsustainability of 'business as usual' has finally prompted a renewed sense of urgency and the emergence of a coalition behind the goal of net zero aviation by 2050. New Zealand has contributed to this process, first as a founding member of the International Aviation High Ambition Coalition at COP26, then in the negotiations at the International Civil Aviation Organization (ICAO) that resulted in its own net zero 2050 resolution, and also through the sustainability work programme of Air New Zealand.

Science-based targets

Extensive work is underway charting courses for the world, for various economic sectors, for nations and for companies. Of particular relevance here is the guidance provided by the NGO Science Based Targets initiative (SBTi) for aviation. While some corporate targets are based on the 'absolute contraction' method – grandfathering in emissions from some reference date, along with a specified rate of reduction – for aviation, SBTi guidance is based on the sectoral pathway approach, specifically the pathways of the International Energy Agency (IEA) Sustainable Development Scenario. These allow aviation 2.9% annual passenger growth and a doubling of its present share of the global carbon budget. Targets for individual companies are based on industry-wide emission intensities needed to meet this global budget.

Air New Zealand's SBTi target is a '28.9% reduction in carbon intensity by 2030, from a 2019 baseline. This equates to a 16.3% reduction in absolute emissions over the period' (Air New Zealand, 2022). Such a target is far better than the status quo and the overall initiative is extremely positive.

However, there are some concerns about the SBTi process in general.

- The IEA Sustainable Development Scenario involves enormous amounts of carbon dioxide removal and storage (10 Gt a year), a technology which is unproved at scale and which is itself energy intensive.
- It requires other sectors (e.g., land transport) to decarbonise far more rapidly, which is not easy.
- The modelled passenger growth is a global figure, most of which is expected to be in developing nations, not wealthy nations.
- The global pathway involves gross CO_2 emissions from fossil fuels falling 10% over 2019–22 and 25% over 2019–30; in reality, emissions have not fallen at all over 2019–22. The IEA net zero 2050 pathway, which leads to a 50% chance of limiting warming to 1.5°C with no overshoot, involves CO_2 emissions falling 36% between 2019 and 2030.
- The pathways will only be achieved in a sector if all companies meet the targets. In reality, there will be some laggards, and the most ambitious

Table 2: Terms of reference of the leadership group Sustainable Aviation Aotearoa*

Provide industry leadership on efforts to deliver Aotearoa capabilities for net zero aviation, integrating best practice.	Promote and mobilise private sector efforts to decarbonise aviation, while keeping the network safe and reliable.	Identify and optimise the strategic, economic, and international benefits for the industry, while overcoming the barriers and constraints the industry may face in achieving this goal.
Consider what barriers, including regulatory and investment barriers, need addressing to enable a smoother decarbonisation pathway.	Work to accelerate and enable the commercial operation of zero emission aviation systems in Aotearoa, including SAF, zero emission aircraft, and innovation.	Foster greater collaboration across sectors, such as between airlines, airports and enabling infrastructure, like electricity providers and generators.
Contribute to and identify opportunities to take forward in updating Aotearoa's State Action Plan, submitted as a voluntary ICAO report.	Consider the Climate Change Commission's review, under clause 5R of the CCRA, of the inclusion of emissions from international aviation in the 2050 target.	Accelerate the design, manufacture, testing, certification, infrastructure and commercial operation of zero emission aviation in Aotearoa through sustained investment in research and development, and fostering of greater collaboration across sectors.

· Sustainable Aviation Aotearoa includes representatives from Te Manatū Waka, the Ministry of Business, Innovation and Employment, the Ministry for the Environment, the Civil Aviation Authority, Airways, Ngāi Tahu, Tainui, three airlines and the airline body BARNZ, four airports and NZ Airports.

companies and sectors should aim higher.

· The submission and evaluation process is private, and the reporting, verification and responsibility for meeting the target lies with the company. At present, of all companies signing up to SBTi, 28% do not report their emissions and a further 26% report their progress only partially (Science Based Targets, 2022). A report from the New Climate Institute analysed the climate plans and actions of 24 multinational companies affiliated with the 'Race to Zero' (1.5°C-aligned) campaign. It found that most are of low integrity, further raising doubts about voluntary corporate initiatives and highlighting the need for independent scrutiny.

Finnegan (2019) has considered the role of institutions in promoting long-term climate policy. With data from the EU and North America, he found that proportional representation and concertation are both associated with more stringent policy. Concertation is a process of allowing peak industry bodies privileged access to the formation of government policy, ensuring their support both publicly and privately. It is also associated with costs falling more on consumers than producers and with compensation for producers. Unfortunately, experience in New Zealand so far with He Waka Eke Noa, a concertation-like process, has not seen these successes, while even simpler parts of the country's first emissions reduction plan (2022), such as in the electricity sector, have seen pushback from producers.

At present, the aviation industry in New Zealand is not aligned behind progressive climate goals. The tourism industry, a significant beneficiary, is struggling to adapt to a new vision of fewer, higher-value tourists. The airport sector is focused on rapid growth: Christchurch Airport's long-term strategy involves 175% growth in international passengers over 2015–40, as well as the construction of a new wide-body-capable airport at Tarras. The industry body NZ Airports submitted to government that 'A positive narrative and greater public understanding are necessary to counterbalance the perceptions – often noisily promoted – that aerospace activities (including aviation) have generally poor outcomes for the environment', followed by the straw-man argument that the alternative is no flying at all: 'New Zealand without aviation is a distant, small, isolated society and economy with a rapidly deteriorating standard of living' (Ward, 2022).

In contrast, Air New Zealand's sustainability planning has long been world leading, and has now resulted in a net zero 2050 strategy as well as the adoption of their SBTi target for 2030. Air New Zealand had about 40% of the total New Zealand aviation market in 2019, and is majority state owned. The regional airline Sounds Air is hoping to shift to hybrid electric aircraft by 2028; even if that date is highly optimistic, it does demonstrate a commitment. These developments raise the prospect of an alignment of the wider industry (including tourism) behind sustainability.

What we are doing in New Zealand

Aotearoa's first emissions reduction plan was released in June 2022. It aims to set the direction for climate action for the next 15 years. The plan has only a very short section on aviation. It acknowledges the role of aviation in moving both freight and people nationally and internationally, and suggests there is a need to improve its sustainability 'alongside improving alternatives to interregional air travel in some places' (Ministry for the Environment, 2022, p.189). Three key initiatives were set out: to develop and set specific targets for decarbonising domestic aviation in line with our 2050 targets; to implement a sustainable aviation fuel mandate; and to establish a public–private leadership body focused on decarbonising aviation. This body, Sustainable Aviation Aotearoa, has now been established (see Table 2). The members are heavily drawn from the industry itself, and there appears to be under-representation from the tourism industry (Parliamentary Commissioner for the Environment, 2021) and for the interests of the environment.

In the aviation sector, the emissions reduction plan has been somewhat overtaken by events, as the updated State Action Plan provided to ICAO will now need to be aligned with our ICAO net zero 2050 pledge and our other commitments under the High Ambition Coalition. (These cover both domestic and international aviation.) Unlike other sectors, aviation has not yet been given a target for mode shift or traffic reduction. Adoption of the 'Avoid–Shift–Improve' framework would remedy this.

Sustainable aviation fuel

Air New Zealand is aiming for a 10% biofuel share by 2030. The initial feedstocks are tallow and used cooking oil, which have a good life-cycle emissions reduction of around 80%, but are very limited in supply. Producing biofuel from oilseed crops is a mature technology (indeed, 10% of the world's grain is used for biofuel), but it impacts on the supply of food for humans and of feed for livestock, and increases the pressure to shift natural ecosystems to agriculture. In addition, the energy requirements for aviation are extreme. Consider, for example, diverting the entirety of New Zealand's current 134,000 ha of grain production to oilseeds for biofuel. This would produce about 134,000 tonnes of fuel – just one-fifteenth of our jet fuel consumption in 2019.

The biofuel mandate for land transport has been dropped: the government was concerned about its impact on consumers, while environmentalists were concerned about its impact on food, animal feed and land use. The arguments are stronger for its use in aviation: it forms the greater part of all pathways, and its higher cost, if passed onto airfares, leads to a progressive, not regressive, impact on consumers. Concerns about the sustainability of feedstocks remain, however, leaving a major question for New Zealand as to the wisdom, timing and structure of investments in wood-based biofuel. The development of domestic biofuel industries is challenging even the most biomass-supportive countries, such as Sweden (Mossberg, Söderholm and Frishammar, 2021). The most viable pathway is to produce biocrude from wood (either waste wood or whole logs), which would likely need to be refined overseas (BioPacific Partners, 2021; Indufor, 2021).

Modelling for Channel Infrastructure NZ (the former Marsden Point oil refinery) (Channel Infrastructure NZ, 2022) forecasts jet fuel use (including efficiency improvements and new aircraft, but not sustainable aviation fuels) relative to 2019 levels to grow 16% by 2030 and 66% by 2050. Fossil jet fuel, based on a scenario from Air New Zealand, would remain steady until 2030 and fall 56% by 2050. The emissions savings associated with sustainable aviation fuels in this forecast

> The uncertainties of both future technologies and the response to prospective policies make it impossible to prescribe a definite course of action for New Zealand at present.

are already quite ambitious: assuming sustainable aviation fuels with an 80% life-cycle emission reduction, 17% of all jet fuel must be sustainable by 2030. And still, these forecasts fall far short of net zero by 2050, once again illustrating the conflict between traffic growth and sustainability. A report from the Royal Society reaches similar conclusions as to the extreme land and energy requirements of alternative fuels (Royal Society, 2023). Channel Infrastructure has commissioned research into domestic production of biofuels and e-fuels made from renewable electricity, water and carbon dioxide. E-fuels are cleaner and can potentially require fewer resources than any other liquid fuel; they can be made anywhere. They form the main part of Peeters and Papp's (2023) net zero pathway for tourism.

Pricing

Emissions pricing is a core component of New Zealand's climate response. It is likely to remain so, even as complementary measures are added, most notably the Climate Emergency Response Fund. It is unlikely to be an effective tool to reduce aviation emissions if used in

isolation: first, aviation has high costs for technological abatement; second, this high price may be hard to implement, as was demonstrated early in 2023 when the government declined to follow the advice of the Climate Change Commission on Emissions Trading Scheme (ETS) settings; third, there are unresolved debates as to whether purely price-based measures can be effective (Alexander and Floyd, 2020; Hall and McLachlan, 2022). On the other hand, the underpricing of jet fuel relative to other fossil fuels has likely led to overinvestment in aviation, a situation that is unfair and unsustainable. Correcting it provides an opportunity to undo some of the regressive effects of carbon pricing. Similar remarks apply to the zero rating of international travel for GST, which should be removed. Because the increased demand due to rising incomes outweighs plausible levels of taxation, pricing is more about equity and levelling the playing field with other uses of fossil fuels, than reducing demand.

Any pricing mechanism must be carefully designed to both achieve and reward emissions reductions. Existing systems, like the New Zealand ETS and the EU's 'Fit for 55' package, are hybrids that combine pricing and quantity measures. 'Fit for 55' includes a sustainable aviation fuel mandate, a strengthened ETS with revenue recycling, and fuel tax reform. Although not yet compatible with ICAO's net zero goal, it shows a realistic forward path.

Quantity-based instruments must also be carefully designed. Simply bringing aviation into the existing multi-year carbon budgets, with no additional measures that directly reduce emissions, risks passing the responsibility for overall reductions to other sectors.

The way forward

Knowing the benefits brought to people by transport, policymakers are often reluctant in their efforts to mitigate the environmental damage it causes. This cannot continue … Constraining demand immediately is essential to reducing aviation's climate impact – otherwise our [global] carbon budgets will be breached too soon. Various

mechanisms could be used to do this, including a moratorium on airport expansion in wealthy parts of the world, as well as a frequent-flyer levy. (Larkin, 2022)

There is no way around the fact that transport decarbonization means reducing the use of cars, trucks and planes and the simultaneous removal of fossil fuels from them. (Anable and Brand, 2022)

The uncertainties of both future technologies and the response to prospective policies make it impossible to prescribe a definite course of action for New Zealand at present. We suggest that it will be necessary to press on all levers and to learn from experience. However, our analysis of the global situation as presented above indicates that the following aspects are critical.

- There should be consistency with our obligations as members of the High Ambition Coalition.
- International and domestic aviation should be considered together.
- There should be a sequence of emissions-reduction targets for both domestic and New Zealand-related international aviation to 2050 and beyond, either decade by decade or aligned to the domestic carbon budget periods.
- There should be regular monitoring and reporting to ensure that progress is on track to meet the targets.

Equity considerations imply that the targets should follow stricter pathways than for sectors where emissions are more evenly distributed or are essential for basic human needs.

- The right to development and the need for international equity suggest that a relatively lesser burden should be placed on aviation between New Zealand and small island developing states.

Possible policies

Some combination of emissions budgets, a sustainable aviation fuel mandate, emissions trading, and fuel tax reform are essential. Beyond these, we can consider the following.

> Although many challenges around technology and scalability remain, ... a fuel mandate with strict sustainability criteria is the best prospect to lower emissions of long-haul flights.

The tourism industry is a beneficiary of aviation. A renewed tourism strategy, focused on reducing emissions and building on the report of the Parliamentary Commissioner for the Environment (2021), needs to be a component of our plan. Simon Upton's practical suggestion of a departure levy, modelled on that which exists in the UK, is a small step towards a solution and could be phased out as emissions reduce and/or alternative mechanisms are implemented. (See also Peeters and Papp, 2023.)

Frequent flyer schemes increase the price of essential goods such as food in order to subsidise flying. They also normalise frequent flying and incentivise the more emissions-intensive classes of travel. They should be prohibited (Callister and McLachlan, 2023). Or different options to implement them should be explored. Frequent flyer *levies* have resonated with the public in surveys and citizen's forums, and are progressive (Zheng and Rutherford, 2022) and appear to appeal to a common sense of fairness. How they might actually operate is the subject of debate.

Communication and education on the environmental impacts of aviation, and the challenges of technological solutions, can build support for an overall plan. Our experience agrees with that of Upton, who encountered widespread denial and cognitive dissonance.

An agreement with the industry to a shared commitment to a sectoral pathway is essential. For example, airlines operating in New Zealand would need to be required to be SBTi-1.5°C compatible.

Fuel efficiency standards can encourage the uptake of more efficient aircraft, by either banning or penalising the least efficient models.

Public investment in the industry (e.g., in airport expansions) should be tied to a commitment to reduce emissions and a mechanism to ensure its delivery. Until this is in place, there should be a moratorium on airport expansion.

Voluntary action plays an important role in climate change mitigation, especially in the early stages of mitigation of a sector. Individuals and organisations can reduce their aviation emissions either by travelling shorter distances, taking fewer flights, reforming their travel policies, or by 1.5°C-aligned procurement. Three important examples are the public service, which, through the Carbon Neutral Government Programme, is to become carbon neutral by 2025; the tertiary sector, which has already markedly reduced staff air travel; and companies that have net zero targets in place (certified, for example, through Toitū Envirocare). Those that are acting now already feel an obligation to do so, which can in time influence norms of behaviour more widely (United Nations, 2022).

While all aviation can be reduced by avoiding air travel (e.g., by holidaying closer to home), domestic aviation is also influenced by shifts to other modes. One reason that New Zealand has such high domestic aviation emissions compared to other similar-sized countries is the poor state of passenger rail. The long-term development of passenger rail offers co-benefits in connecting communities, addressing equity for non-drivers, making travel more pleasant, and lowering energy use, pointing to a role for out-of-sector funding.

Research into wood-based biofuel and e-fuel should continue. Although many challenges around technology and scalability remain (Callister and McLachlan, 2022), a fuel mandate with strict sustainability criteria is the best prospect to lower emissions of long-haul flights.

Conclusion
In Aotearoa New Zealand there has been a strong emphasis on international tourism for several decades, many exporters are dependent upon air travel for freight and visiting foreign markets, many people think a regular overseas holiday is their right, and a significant part of the population has close relatives who live overseas. Yet, as for all other parts of the economy, decarbonising of aviation needs to happen and ambitious reduction targets are essential.

Technological abatement of aviation is difficult and uncertain and, even if possible, is unlikely to come quickly. But the governance issues may be even more difficult. While international action will be vital, locally there will be a significant political challenge in building a cross-party agreement and a broad social licence for the large emissions reductions that are needed. If the new technologies do not come quickly to the rescue, reducing international and domestic air travel in this part of the world will be required. This means moving away from the 'Improve' strategies and adopting the 'Avoid' and 'Shift' policies. Demand management solutions will be required if targets cannot be achieved in other ways.

1 International aviation emissions are reported to the UNFCCC by the country of departure of flights, but are not generally included in national emissions reporting and targets.

2 Partial confirmation comes from the UK Climate Change Committee's Balanced Net Zero pathway, which involves aviation growth of 25% by 2050 and no net increase in airport capacity, and the draft UK Jet Zero policy, which assumes growth of 54%. Air New Zealand's Science Based Targets initiative suggests that they are anticipating that traffic will be 18% higher in 2030 than in 2019, i.e. 1.5% p.a. growth.

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Gabriella Rutherford-Carr and Kate Meyer

The Value of 'Planetary Facts'
science-based product data and disclosures beyond carbon

Abstract

A system that enables businesses to quantify the environmental impacts of products, contextualise this data with scientifically determined limits (planetary boundaries), and communicate it with buyers in a way that is easy to understand has the potential to drive significant pro-environmental decision making and outcomes. An immense proportion of global decisions occur through a product lens. There is evidence of both business and purchaser demand for a system that supports easy-to-understand environmental data about products with scientific context. Governments and policymakers have a pivotal role to play in the successful implementation of such a system.

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The climate is changing before our eyes. Impacts are now evident in every region of the world, some already irreversible (Skea et al., 2022). The past decade has witnessed an uprising of grassroots initiatives – such as Extinction Rebellion and School Strike for Climate – demanding climate action. There has been a notable increase in commitment by governments to reduce greenhouse gas emissions, from declarations of a climate emergency to the establishment of carbon taxes, emissions trading schemes and decarbonisation funds. Many businesses have also brought climate change to the forefront of their strategies and decision making, setting and meeting emissions reduction targets they have established based on what is scientifically needed to limit global warming to 1.5°C.

However, climate change is not the only global environmental crisis facing humanity. Human activity has pushed global ecosystems beyond at least six of nine critical environmental limits known as the 'planetary boundaries' (Steffen et al., 2015). Exceeding such boundaries is the single greatest threat to humanity (Behlert et al., 2020). Returning to and remaining within the planet's environmental limits will require effort at every scale of human activity, from individual lifestyle choices to

business activity and government investment. Yet, most people are not even aware of the nature and implications of planetary limits. Those who are lack the information and tools they need to make decisions that align with a future within these limits.

A significant proportion of the global decisions that drive market behaviour occur through a product lens. For many businesses, scope 3 emissions – i.e., emissions associated with the goods and services purchased by businesses – account for over 70% of their total carbon footprint (Deloitte, n.d.). Globally, household consumption contributes significantly to human impacts on planetary boundaries.

two key components. First, they have developed a methodology that enables businesses to use Planetary Accounting consistently and robustly to quantify the impacts of their products and services on the planetary boundaries. Second, they have worked with focus groups to establish a concept design for a new generation of eco-labels which communicate this data in a way that is easy to understand.

The purpose of this article is to demonstrate the need for a system like Planetary Facts – one which makes it easy for businesses and their customers to access and understand the environmental impacts of products and services in the context of planetary boundaries. We begin by

with business operations and associated reduction targets – has become common practice over the past couple of decades. Initially, organisations typically set emissions reduction targets based on what they felt was achievable, or that aligned with industry benchmarks or 'best practice'. While this approach did often lead to emissions reductions, the scale of these did not relate the scale of the environmental challenge, and the short-term view comprising year-to-year reductions promoted incremental changes, such as energy efficiency initiatives and the establishment of travel policies, rather than the systemic-level change that is needed to avoid catastrophic environmental outcomes.

Since 2015, in response to the Paris Agreement, there has been a global shift by businesses and governments to underpin decarbonisation efforts with scientifically determined goals or 'science-based targets'. For example, many businesses are now setting targets for greenhouse gas emissions based on the pace of emissions reductions needed to limit global warming to 1.5°C above pre-industrial levels. Governments are also incorporating scientifically derived budgets into emission management tools.

The link between science and activity is important because it highlights the magnitude of change needed, and because it provides a mechanism to align ambition levels – promoting a sense of confidence that others are working to the same end.

Understanding the scale of environmental change needed through setting science-based targets encourages decision makers to shift away from incremental solutions and towards innovation and systemic change. Specific science-based targets vary by target, sector, methodology and geography. However, committing to a 1.5°C-aligned target means roughly halving greenhouse gas emissions between 2020 and 2030, and then reaching net-zero emissions by or before 2050.[1] This scale of emissions reductions will not be achievable for most organisations, regions or countries through incremental change. Armed with this insight, government officials and business executives can see more clearly that many business-as-usual activities (such as the use of fossil-based energy) will need to be

Understanding the scale of environmental change needed through setting science-based targets encourages decision makers to shift away from incremental solutions and towards innovation and systemic change.

For example, household consumption is linked to over 60% of greenhouse gas emissions and between 50% and 80% of total land, material and water use (Ivanova et al., 2016).

In our view, a key, yet underutilised, lever for change is a system that makes it easy for businesses to quantify the impacts of their products and services on the planetary boundaries, and to disclose this data in a way that is credible and easy for the general public to understand.

Planetary Accounting is a scientifically peer-reviewed framework that links existing environmental accounting systems (such as life-cycle assessments) with the planetary boundaries (Meyer and Newman, 2018). The Planetary Accounting Network (PAN), a New Zealand-based charitable trust founded by Kate Meyer (creator of Planetary Accounting and a co-author of this article), has established a new system they call 'Planetary Facts', which comprises

demonstrating the value of scientific context in accelerating environmental action by providing examples from the carbon and climate change space. We then show the need to extend this approach beyond carbon and introduce the planetary boundaries and Planetary Accounting Framework. We draw on historical evidence from the use of existing eco-labels and nutritional labels, combined with consumer engagement studies, to set out the potential outcomes of a system like Planetary Facts. Finally, we present the key opportunities and challenges in implementing such a system and highlight the important role of policy in actualising such a system to leverage change.

The value of science for accelerated climate action

The quantification and disclosure of organisations' carbon footprint – i.e., the greenhouse gas emissions associated

fundamentally altered. There is already evidence of positive environmental outcomes stemming from science-based targets. Many businesses are making significant investments to systemically change their operations, from global giants such as Microsoft, which is committed to using renewable energy to run its data centres (Shoemaker, 2022), to New Zealand firms such as tourism operator RealNZ, which has committed to retrofitting the iconic *Earnslaw's* coal steam engine to use wood chips, biofuels or hydrogen (Roxburgh, 2022).

Before the advent of science-based targets, there was a reluctance to 'over-commit' compared to one's competitors. Businesses and national governments were nervous that committing to targets that were more ambitious than others' would result in a market disadvantage because of the costs associated with meeting these targets. The movement towards setting science-based targets has levelled the playing field. It promotes a sense of trust that others are committing to similar levels of ambition, which is in turn enabling better collaboration for industry change. For example, in New Zealand, over 100 companies have now joined the Climate Leaders Coalition, committing to setting and disclosing science-based targets for their operations (Climate Leaders Coalition, 2023). This constitutes commitments that align with what is scientifically necessary to limit warming to 1.5°C for nearly half of New Zealand's gross emissions. In their latest review of signatory achievements, the Climate Leaders Coalition found that 57 of their signatories had reduced emissions in 2022 despite the challenging economic environment, and that almost all signatories had reaffirmed or increased their planned investment for emissions reductions (Climate Leaders Coalition, 2022). While it is too early to say with certainty whether signatories will achieve their targets, the market risks associated with failure to meet disclosed targets are high – i.e., companies are unlikely to disclose such targets unless they have every intention of meeting them.

Beyond carbon

The connection between science and climate action to date has led to increased greenhouse gas emissions reductions. However, as noted earlier, climate change is not the only global environmental crisis. There are eight other critical planetary boundaries, and we are exceeding at least six of these (Steffen et al., 2015; Persson et al., 2022; Wang-Erlandsson et al., 2022).

The terms 'planetary boundaries' and 'planetary limits' are somewhat misleading. The planet will not cease to exist if global warming exceeds 1.5°C, or even 15°C. A better way to describe what is meant by these terms would be 'acceptable environmental limits for humanity'. The idea of planetary limits can be traced back to as early as the 1600s and estimates of Earth's 'carrying capacity' – the number of people the planet could support (Cohen, 1995). The problem with this, and with other early approaches to defining planetary limits, is that the results depended on assumptions regarding what constitutes an acceptable lifestyle and the level of technological advancement (Meyer and Newman, 2020).

Modern humans evolved during a geological epoch called the Pleistocene (Rightmire, 2008). The climate in this epoch was highly variable, oscillating between short periods as warm as or warmer than recent history, and long glacial periods (Pisias and Moore Jr, 1981). During this time, human survival depended on hunting and gathering for food (Dillehay, 2008). Approximately 11,500 years ago a new geological epoch began, the Holocene (Roberts, 2014). The Holocene has seen an unusually stable global climate, with average global temperature ranges of only ±1°C (Marcott, 2013). With these stable temperatures came the advent of agriculture and a period of rapid

development from hunter-gatherers to modern settled societies. The Holocene is the only state we know humanity can thrive in (Rockström et al., 2009). It follows that humanity should aim for the future to remain in a similar Holocene-like state.

The planetary boundaries framework, first published in 2009 (Rockström et al., 2009), is a breakthrough in defining planetary limits because it avoids making any assumptions regarding population, lifestyle or technology. Rather, the planetary boundaries are environmental limits derived from the underlying assumption that we ought to try to maintain a 'Holocene-like' state. They are now widely viewed as the non-negotiable scientifically

> Decisions made through a climate-only lens can result in perverse outcomes through impact shifting – the reduction of one environmental impact at the cost of increases in others.

determined global limits for the environment.

The planetary boundaries set out the 'safe' limits for:
- climate change;
- freshwater change;
- stratospheric ozone depletion;
- atmospheric aerosol loading;
- ocean acidification;
- biogeochemical flows;
- novel entities;
- land system change;
- biosphere integrity.

We are beyond the limits for climate change, biogeochemical flows (nitrogen and phosphorus run-off into waterways), land system change (deforestation), biosphere integrity (biodiversity loss) (Steffen et al., 2015), freshwater change (Wang-Erlandsson et al., 2022) and novel entities (the release of man-made substances such as chemicals and plastics into the environment) (Persson et al., 2015). Atmospheric aerosol loading (air pollution) is not measured at a global scale,

but the limit is exceeded in many regions (Steffen et al., 2015). Exceeding even one planetary boundary puts the future of humanity at risk (idid.).

Many organisations that are aware of the need to look beyond carbon have taken the position that they will first get their emissions in order and then focus on other environmental impacts. This is not a scientifically valid approach. Decisions made through a climate-only lens can result in perverse outcomes through impact shifting – the reduction of one environmental impact at the cost of increases in others. We are dangerously beyond the limits for biosphere integrity, land use change and biogeochemical flows;

Network, 2020). A recent consumer study which asked 32 respondents about their greatest environmental concerns found that deforestation was a greater concern than global warming, which was closely followed by waste (Hay et al., n.d.). When asked which environmental impacts they consider in their purchasing decisions, respondents ranked waste the highest.

Incorporating a planetary boundary lens into decision making mitigates market and governance risks as it is unlikely that either market or policy drivers will demand a greater response than scientists, and it is essential to the long-term future of humanity. However, the planetary boundaries were not intended to be used

prime example of how individuals can bring about a rise of collective action. Her first solitary protest in 2018 has led to a global movement with millions demanding climate action, described now at the 'Greta effect' (Morath, 2019).

A significant proportion of the global decisions that drive market behaviour and environmental outcomes occur through a product lens. As previously stated, household consumption contributes to over 60% of global greenhouse gas emissions and between 50% and 80% of total land, material and water use (Ivanova et al., 2016). In wealthier countries, the impacts of household consumption are even higher. Household consumption in New Zealand in 2020 had a carbon footprint of approximately 40 MtCO$_2$e (Statistics New Zealand, 2020). To put that into context, New Zealand's 2020 national carbon footprint was 78 MtCO$_2$e (ibid.). The national consumption of fossil fuels (from energy industries, manufacturing and construction, and transport combined) resulted in approximately 31 MtCO$_2$e that year (Ministry for the Environment, 2020).

There is compelling evidence that many consumers want to make environmentally sustainable purchases. Global grassroots movements such as School Strike for Climate and Extinction Rebellion are disrupting business-as-usual activities to demand change. A recent IBM Institute for Business Value study of global consumer behaviour found that 57% reported they would change their purchasing habits to reduce negative environmental impact (Haller, Lee and Cheung, 2010).

Despite the increase in organisational-level reporting and disclosure, very little has been done to date to enable consumers to link their behaviour or purchasing decisions to the environmental outcomes they want. Eco-labels – discussed in detail in the following section – provide limited information with little context. More than 50% of consumers find the way businesses talk about their social and environmental commitments confusing (Colmar Brunton and Sustainable Business Council, 2021). Despite the growing motivation of consumers to make good choices, the purchasing decisions made by these same individuals are almost certainly sending

> Global grassroots movements such as School Strike for Climate and Extinction Rebellion are disrupting business-as-usual activities to demand change.

delaying our response in addressing these limits while we work on reducing emissions reductions does not address the underlying risk that we fundamentally and irrevocably change the biophysical state of the planet. Continued impacts such as deforestation or biodiversity loss could lead to catastrophic environmental collapse even in the absence of greenhouse gas emissions.

A carbon-only or carbon-first approach is also inefficient and presents significant market and governance risks in addition to environmental risks. Market and policy drivers are already moving towards a wider environmental perspective. For example, in 2020 an initiative was announced to establish a Taskforce on Nature-related Financial Disclosures (TNFD, 2022), with the aim of creating a set of guidelines to assist organisations to be transparent and disclose nature-related financial risks and opportunities. The Science Based Targets Network is working to support citizens, cities, companies and countries to underpin targets relating to biodiversity and natural systems with science (Science Based Targets

for decision making; they set out environmental limits at a global scale, but do not answer the question of what needs to be done to return to and stay within these. Planetary Accounting is a framework that translates these global limits into metrics and budgets that make sense at the scales we make decisions, enabling us to link these decisions with what is scientifically necessary at a global scale (Meyer and Newman, 2020, 2018).

The value of a product lever
Given the scale of the environmental crisis, it may seem that decisions made by individual consumers are unlikely to drive significant change and that policy, regulation and other change mechanisms should target action at a business or government scale. There is no doubt that change at these scales is necessary.

However, the importance of consumer-level change as a lever for a global transition to human activity within the planet's limits should not be underestimated. Greta Thunberg's 'school strike for climate' is a

conflicting signals to the market – i.e., encouraging the continued development of products and services that are contributing to the degradation of the planet's ecosystems.

Further, it is not only consumers who are faced with making purchasing decisions through the lens of products and services. Businesses and governments are actively seeking to procure products and services that align with their organisational-level targets for environmental and social outcomes. While life-cycle assessments and enviromental product disclosures (see below) are sometimes used to provide environmental data to these corporate customers, this data lacks scientific context, is difficult to understand, and is only available for limited products and sectors.

Eco-labels, life-cycle assessments and environmental product disclosures
With increasing purchaser motivation to buy sustainable products, there is growing demand for eco-labels (i.e., labels which communicate the environmental performance of a product) (Yokassa and Marette, 2019) and the disclosure of environmental product data. Eco-labels date back to 1978, when the Federal Republic of Germany launched the Blue Angel eco-label scheme to differentiate environmentally sustainable products. The scheme was launched with 100 products and grew to over 12,000 by 2016 (Prieto-Sandoval et al., 2016). The widely acclaimed Brundtland Report in 1987 (World Commission on Environment and Development, 1987) highlighted the potential for eco-labels to drive better consumer choices, particularly regarding energy efficiency and limiting chemical use.

Now, in 2023, there are 456 labels used in 199 countries and across 25 sectors (Ecolabel Index, 2023). There are several international agencies that provide guidance and regulation for eco-labels, including the Global Ecolabelling Network, the ISEAL Alliance and the International Organization for Standardization (ISO). However, there is no requirement for companies to align their labels with any of these standards or guidelines. Eco-labels can be generally categorised as:
· multi-criteria eco-labels which indicate the overall environmental preferability

of a product: for example, New Zealand's 'Environmental Choice';
· self-declared environmental claims which communicate a particular aspect of the product: for example, the recycling symbol;
· quantified product information labels, which disclose the magnitude of environmental impact across one or more metrics: for example, carbon footprint labels.

The advantage of multi-criteria eco-labels is their relative simplicity: they provide a mechanism to communicate compliance with broad and potentially complex criteria. However, the quality of the criteria behind these labels is variable.

Without considerable further investigation, it is difficult for purchasers to establish what is behind these labels and whether a given label demonstrates high performance or not. Environmental claims are a useful mechanism to communicate specific information, such as the recyclability of a product or its packaging. However, there are increasing concerns that companies are using eco-labels to make unsubstantiated or misleading claims, often referred to as 'greenwashing', as so many existing eco-labels do not provide a holistic, easy-to-understand view of environmental performance (Cobbing, Wohlgemuth and Vicaire, 2023; Consumer, 2023).

These limitations have led to an increased demand for quantified product information which discloses environmental impact data about products and services and leaves the consumer to draw their own conclusions from this. Environmental impact data is typically based on life-cycle assessments (LCA), an environmental accounting process that systematically quantifies and evaluates the environmental

impact of a product or service through all life-cycle stages – from the extraction of raw materials, through manufacture and processing, to use and eventual disposal. The advantage of this approach is that results can be generated across a broad range of environmental metrics, providing a holistic view of environmental performance. The disadvantages are that these assessments are expensive and labour-intensive to complete; variations in assumptions and data quality mean results cannot be robustly used to compare different products; and the results are difficult for a layperson to understand.

LCAs are not generally used as the basis for consumer labels. However, they

> ... there are increasing concerns that companies are using eco-labels to make unsubstantiated or misleading claims, often referred to as 'greenwashing' ...

underpin environmental product disclosures (EPDs), independently verified and registered documents that communicate the results of an LCA according to a predefined set of rules. These are typically used for business-to-business communications to enable the direct comparison of similar products. EPDs have been widely used in the construction sector. However, while they provide a better basis for comparability than life-cycle assessments, they are also expensive to produce, difficult to understand, and lack scientific context.

Carbon labels are beginning to infiltrate the market: Unilever have announced that they will add carbon labels to all of their 70,000 products (Rathi, 2020). The European Commission has established new product environmental footprint (PEF) labels, based on LCAs, as a mechanism to provide robust and consistent labelling. These are currently in a pilot phase, but the expectation is that they will be formally launched in 2024. While PEF labels may address some of the major challenges of

eco-labels, by providing a credible and consistent calculation methodology, they do not support the comparison of different product categories and do not include any scientific context.

Eco-labels and purchasing decisions

There is much debate in the literature regarding whether eco-labels have been effective in changing consumer behaviour. Studies have reported high use across many countries (D'Souza, Taghian and Lamb, 2006; Langer and Eisend, 2007; Potter et al., 2021). An American study in the late 1990s reported that around half of all adult consumers search for eco-labels when shopping (American Demographics, 1999).

A more recent Australian study suggested that environmental labels influence 76% of consumers' purchase decisions (D'Souza, Taghian and Lamb, 2006). Sigurdsson et al. found that consumers were willing to pay 23.1% more for fish fillets with eco-labels (Sigurdsson et al., 2022). Another study showed that the positive emotions experienced by consumers when they purchase products that they perceive to be environmentally friendly encourages increased engagement with eco-labels (Prieto-Sandoval et al., 2016).

Unfortunately, consumers are often confused by eco-labels and are wary of the claims made (Langer and Eisend, 2007; Haller, Lee and Cheung, 2020). Several studies cite complexity, proliferation, and lack of clear credibility as barriers to eco-label use for purchasing decisions (Langer and Eisend, 2007; Yokessa and Marette, 2019; Nilsson, Tunçer and Thidell, 2004).

Meis-Harris et al. (2021) identified six characteristics that have an impact on whether eco-labels influence behaviour:

trust, visibility, environmental credibility, values clarity, market penetration and policy integration. These findings are supported by Potter et al. (2021), who found that eco-labels need to be backed by certification schemes to earn consumers' trust. Another study cites five key aspects which help to make eco-labels credible: ownership, structure, stakeholder coverage, quality assurance traceability, marketing system and transparency (Nilsson, Tunçer and Thidell, 2004).

Studies have also expressed concern over the potential for organisations to greenwash their customers, intentionally and unintentionally, by disclosing positive impacts and omitting negative impacts (Darnall and Aragón-Correa, 2014; Langer and Eisend, 2007; Potter et al., 2021). For example, a product could get a US Department of Agriculture Certified Organic eco-label to highlight that it does not use pesticides or chemical fertilisers without reporting on the carbon emissions it took to ship the product internationally (Darnall and Aragón-Correa, 2014).

In 2022 the Planetary Accounting Network ran focus groups with 32 participants to obtain qualitative feedback regarding the demand for environmental data about products in the context of the planetary boundaries, and to better understand key opportunities for and barriers to the use of labels disclosing such data. Respondents were pre-qualified as having basic environmental awareness, and were then categorised via a self-assessment questionnaire into 'novice' and 'aware' groups, with approximately 50% of attendees in each group.

Respondents (particularly those in the 'environmentally aware' category) reported

that they perceived a demand for labels that communicate environmental data related to planetary boundaries in some consumer groups (Hay et al., n.d.). Of note was that both groups highlighted the importance of product performance being linked to a scientific perspective rather than an industry comparison perspective – with comments such as 'put the safe limit on it', 'what does industry standard mean? It could be quite bad' and 'put the ideal limit, then you can see how far it is from the ideal'. The results supported the findings of other studies regarding the importance of independent certification, transparency, credibility and traceability. Additionally, respondents from both groups indicated that eco-labels were more likely to have an impact on purchasing decisions for some products than others: in particular, consumers would put more consideration into infrequent purchases (ranging from the example of a T-shirt to a cell phone or washing machine) or regular purchases (e.g., milk); in contrast, very few consumers felt that environmental information would affect their selection of a chocolate bar or other 'whim' purchases.

A key criterion highlighted by both groups was the amount of time they would be willing to spend to understand the label. For smaller purchases in particular, respondents indicated that if they were unable to understand the label 'at a glance' it would be unlikely to influence their decision. In contrast, for larger purchases they would hope to be able to interrogate the data in some detail – for example, by accessing information online to supplement an eco-label. Several respondents agreed that if a label had sufficient market saturation, they would spend some time to become familiar with the label to be able to understand it quickly in future.

Brown et al. (2020) argue that while eco-labels are not perfect, they are an important mechanism to get better sustainability data and metrics and equip organisations to understand and communicate the nuances and environmental trade-offs of products, with the ultimate goal of revolutionising industries to move towards a more circular economy. There is evidence that, despite current limitations, eco-labels can have a positive impact on commercial activities by increasing the perceived value of environmentally friendly products, and

> There is evidence that, despite current limitations, eco-labels can have a positive impact on commercial activities by increasing the perceived value of environmentally friendly products ...

driving an ongoing eco-innovation process where consumers' ever-growing environmental expectation of products works as a driving factor for organisations to continue developing and improving their products, production and supply chains (Thøgersen, Haugaard and Olesen, 2010; Prieto-Sandoval et al., 2016; Wagner, 2008).

In summary, while the evidence that existing eco-labels drive better purchasing decisions is mixed, there is convincing evidence to suggest that labels that provide a wholistic view of environmental performance, are easy and quick to understand, have substantial market penetration, and are independently certified would drive better purchasing decisions, influencing environmental performance of products, and ultimately leading to positive environmental outcomes.

Planetary Facts

The Planetary Accounting Network is working on a system called 'Planetary Facts' which aims to address some of the gaps in the existing spectrum of eco-labels identified above: i.e.,

- to create a methodology that enables a credible and consistent approach to quantifying environmental impacts of product systems on the planetary boundaries; and
- to establish a label and communication system that presents this data in context and that is easy and quick to understand.

Planetary Accounting is a framework that enables the outputs of existing environmental accounting standards, including life-cycle assessments, to be linked to the planetary boundaries. However, as previously discussed, LCAs are not suitable to be used to generate comparisons between products, unless they are produced following an identical protocol, EPDs, that are only suitable for comparison of products within a given product category, and both are prohibitively expensive for many companies. As such, there are several key challenges that need to be addressed before an approach like Planetary Facts could become a practical reality:

- acquiring robust data across a global spectrum of products and services, considering both
  (a) accuracy of data, and
  (b) cost of data acquisition;

- establishing a calculation methodology that provides sufficient consistency to enable robust comparisons between products;
- designing a labelling and communication strategy that conveys relatively complex data to consumers in an easy-to-digest format.

PAN has been working with industry partners to build on existing LCA and EPD frameworks to establish a calculation methodology that addresses the challenges with the draft methodology now being piloted on products to test the sensitivity of key assumptions.

The purpose of the Planetary Facts system is not only to enable communication of this information to customers, but also to enable businesses to improve the performance of their products and supply chains. By providing easy to understand environmental data in scientific context, businesses will have the same increased context for decision making that has been provided through the advent of science-based targets for carbon at an organisational level. For the first time businesses will be able to see how far from 'ideal' their products and services are.

There are many examples where products designed to be 'environmentally friendly' have achieved significantly lower environmental footprints than traditional products. For example, low-carbon blended cements have carbon footprints approximately 30% lower than traditional cements (CarbonCure, 2022). It follows that making environmental data easier and more affordable to access and contextualising this with science will enable better solutions

based on holistic and systemic improvements to products and services.

PAN's Planetary Facts implementation pathway includes a pragmatic approach to addressing data gaps and improving data availability and affordability of assessments, as well as mechanisms for independent certification. In parallel with the establishment of the methodology and the implementation pathway, PAN has worked with consumers to co-design consumer communications that address the third challenge, including the establishment of a labelling system that scales (in size and complexity) according to product value

> There was no onus ... on organisations to disclose specific criteria, so many reports presented a glowing account of the efforts organisations were making ... and omitted the disclosure of any negative information.

and size and the establishment of supporting communication needs.

If a system such as Planetary Facts meant that even half of the 57% of consumers who report that they would purchase sustainable products opted for products and services with 25% lower impacts (a conservative level of improvement, given that this is a level of improvement already achieved on many products), the net result would be savings in the order of magnitude of 2.5 billion tonnes of greenhouse gas emissions and 380 billion litres of water – i.e., almost 5% of global impacts. The outcome of a successful implementation could be far greater than this as products shift from achieving less harmful to positive environmental outcomes, and as the proportion of consumers making pro-environmental purchasing decisions increases.

The role of policy

In the early days of sustainability reporting,

these reports were typically used to highlight positive environmental or social effort, in a similar way to many existing eco-labels today. There was no onus (regulatory or market-driven) on organisations to disclose specific criteria, so many reports presented a glowing account of the efforts organisations were making on one or two focus areas and omitted the disclosure of any negative information.

Over time formal standards emerged for sustainability reporting, such as the Global Reporting Initiative (GRI) standards (GRI Standards, 2021). These standards specify what should be disclosed, discouraging imbalanced reporting. For example, while it does not dictate a specific

'an ongoing and systematic overvaluation of emissions-intensive activities' (Ministry for the Environment, 2023).

Carbon accounting is nuanced, so it lends itself to creative interpretation of standards. For example, some companies only report on greenhouse gas emissions associated with their assets (e.g., vehicle fleets, gas boilers) and purchased energy (including mains electricity and gas); these are known as their 'direct' emissions. Others include emissions across some or all of their supply chain (e.g., emissions from business flights), known as their 'indirect' emissions. A 1.5°C-aligned carbon target for direct emissions may appear more ambitious than a 2°C-aligned carbon

management, and metrics and targets, including organisations' carbon footprints and associated targets.

There were two key goals behind the TCFD framework. The first is to make the financial system more stable by improving stakeholder access to reliable and transparent information on organisations' exposure to climate risks and opportunities (TCFD, 2022). The second is to encourage a market-driven transition to a more sustainable economy by incorporating climate risks into pricing decisions, thus generating greater understanding amongst the collective market (Edwards, Yapp and Mackay, 2020).

By 2020 the TCFD had attracted 1,037 supporters among NGOs, other organisations and stock exchanges. TCFD reporting has now become part of the regulatory framework in many jurisdictions, in the European Union, Singapore, Canada, Japan and South Africa, with some countries introducing mandates based on the principles of the TCFD (Meyer, n.d.).

New Zealand's mandatory reporting requirements, which are based on the recommendations of the TCFD, apply to approximately 200 entities for financial years beginning on or after 1 January 2023 (Ministry for the Environment, 2023). The incorporation of the framework into legislation has driven the standardisation of reporting requirements for affected New Zealand organisations (including the level of inclusion of indirect greenhouse gas emissions). Time will tell how much impact this consistent approach to disclosure will have, but the intention is that it will increase stakeholders' ability to understand and contrast different organisations' approaches and commitments, generating market pressure to reduce emissions as well as climate-related risks (ibid.).

Lessons derived from corporate disclosures highlight the important role of policy in the eco-labelling space. While market drivers are already generating voluntary interest in such an approach, without supporting policy and legislation, the uptake of a system of science-based environmental disclosures for products – such as Planetary Facts – risks being ad hoc and slow, with a significantly reduced potential environmental benefit.

> … the disclosure of environmental information about products is currently piecemeal, confusing, and of limited value in driving pro-environmental market behaviours.

list of environmental impacts that should be disclosed, the GRI standards state that organisations should describe their performance against goals and targets on topics that represent the organisation's 'most significant impacts on the economy, environment, and people' (ibid., p.16). The Greenhouse Gas Protocol's Corporate Standard, which sets out the, now internationally recognised, methodology for assessing the carbon footprint of an organisation was published in 2001 (Greenhouse Gas Protocol, 2023).

However, the private sector movement towards carbon/sustainability disclosures and science-based targets has been a predominantly market-driven movement to date. As such, despite the existence of reporting and carbon accounting standards, the quality of the information presented by companies continues to vary significantly (De Stefano and Montes-Sancho, 2022; Ministry for the Environment, 2023). The New Zealand Productivity Commission observes that the inconsistency of reporting has resulted in

target for indirect emissions. However, for many organisations, indirect emissions constitute over 70% of their total carbon footprint (Deloitte, n.d.). A 2°C-aligned carbon target across all emissions could entail more ambitious net carbon reductions than a 1.5°C-aligned carbon target for direct emissions. Some companies leverage these nuances to make their claims seem more impressive than they really are. Even where they don't, the complexity behind the standards makes the comparison of different organisations' greenhouse gas emissions and targets very challenging, rendering these disclosures of limited value to all but the savvy reader.

However, a global movement to legislate carbon disclosures has begun, with New Zealand at the forefront. A new framework has been developed by the Task Force on Climate-related Financial Disclosures (TCFD), which was created by the G20's Financial Stability Board in 2015 (Edwards, Yapp and Mackay, 2020). TCFD disclosures are structured around four core elements: governance, strategy, risk

Conclusions

Human activity has led to the exceeding of at least six critical planetary boundaries. Contextualising climate-related decision making with science has accelerated emissions reductions. However, climate change is only one of the planetary boundaries. Further, this scientific context has not yet been applied to a product lens, through which a significant proportion of global decisions are made.

Market and regulatory pressures are already motivating businesses to invest in environmentally conscious practices. However, they don't currently have the tools they need to quantify the impacts of their products on planetary boundaries in order to improve product performance, or to disclose this to their customers. Many decision makers are already using environmental information, including eco-labels and EPDs, to decipher what they do and don't buy. However, the disclosure of environmental information about products is currently piecemeal, confusing, and of limited value in driving pro-environmental market behaviours.

There is compelling evidence that a system which provides businesses and customers with the tools and information they need to understand the environmental performance of products in a scientific context could lead to better purchasing decisions, improved product environmental performance, and an ongoing eco-innovation process that leads to globally significant positive environmental outcomes. To be successful, the system would need to include mechanisms to make data across all of the planetary boundaries easy and affordable for businesses to access. Data would need to be independently verified, and disclosed against scientific benchmarks in a way that is easy to understand and consistently presented across different types of products.

Market drivers are already leading to the creation of systems such as Planetary Facts that link science and environmental data at a product level. Governments have a key role to play for the successful implementation of a system that enables a product lever to drive change towards a future within the planet's limits.

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1 The definition of 'net-zero' varies but best practice suggests this should not be achieved by paying for carbon offsets.

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Kevin Jenkins

Synthetic Data and Public Policy

supporting real-world policymakers with algorithmically generated data

Abstract

Good policy is best developed by drawing on a wide array of high-quality evidence. The rapid growth of data science and the emergence of big datasets has materially advanced the supply and use of quantitative evidence. However, some key constraints remain, including that available datasets are still not big enough for some analytical purposes. There are also privacy and data security risks. Synthetic data is an emerging area of data science that can potentially support policy decision making through enabling research to work faster and with fewer errors while also ensuring privacy and security.

Keywords synthetic data, data science, public policy, privacy, AI

'Synthetic data' – data that is algorithmically generated to approximate the real world – can potentially improve and expand the research and evidence necessary for sound public policy. It can be valuable when real data is limited or when privacy concerns limit access to real datasets.

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This article explains what synthetic data is and the key benefits it offers, and briefly summarises the methods and tools used to generate it (called 'synthesis'). The article discusses the rapid development and expanding use of synthetic data for different purposes, and considers the relevance of this new technology for public policy by looking at some public sector use cases, including in Aotearoa.

Finally, the article looks at some challenges and risks, and discusses how they could be addressed and how public sector use of synthetic data could be facilitated.

Being synthetic

'Synthetic world' is a great Jimmy Cliff song from the early 1970s, apparently centred on fake, two-faced friends (and drug abuse):

> So you see, my patience is growin' thin
> With this synthetic world we're livin' in.

'Synthetic data', on the other hand, is something altogether more faithful to the
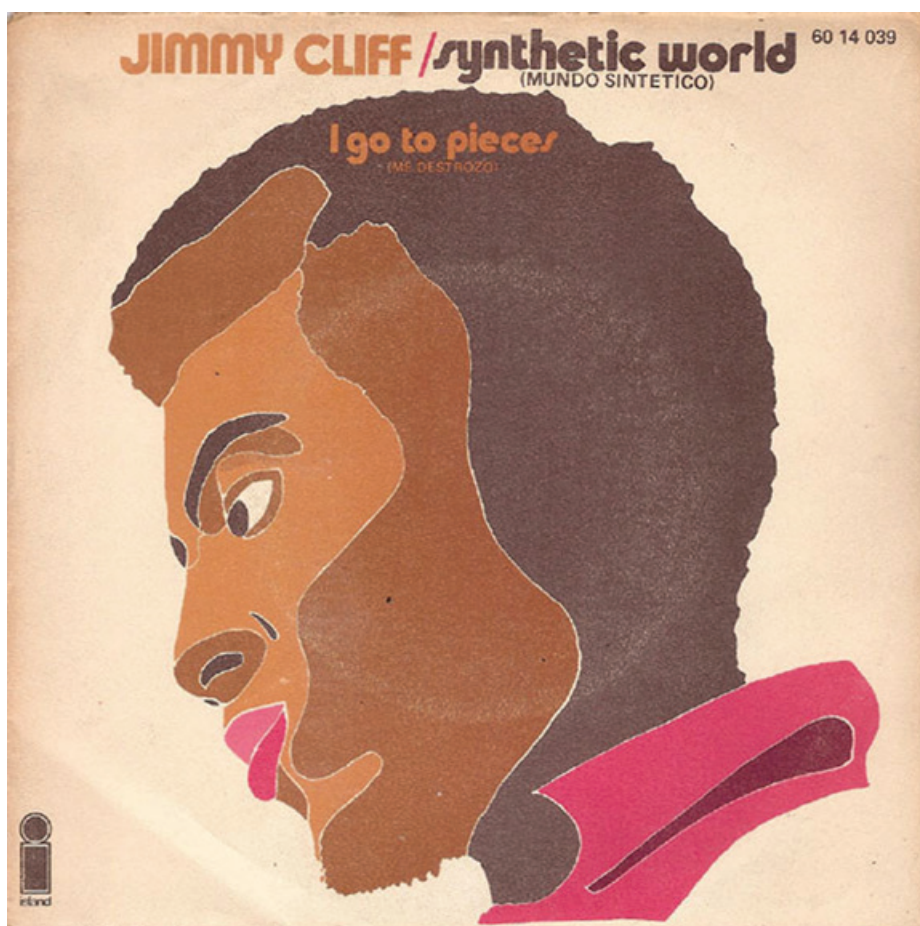
real world than the fakery that Cliff was complaining of, and so is something well worth getting excited about. It can lead to positive changes for people in the real world through ensuring that policy decisions are better informed and can be made more quickly, and with less error, while also ensuring privacy and security. However, it is not yet a mature technology, and it faces methodological, ethical and philosophical challenges, with obstacles to acceptance and uptake.

Artificial intelligence (AI) is developing exponentially and bringing lots of opportunities for improved services, but also lots of regulatory challenges. Turbocharging that development through adding synthetic data may also turbocharge those regulatory challenges. But AI is only one domain where synthetic data is likely to upend traditional approaches to data-driven insights, meaning yet more regulatory challenges.

What exactly is 'synthetic' data?
Synthetic data is data that has been generated from real data and that has some or all of the same statistical properties as the real-world dataset it stands in for (MIT

Laboratory for Information and Decision Systems, 2020). Data scientists refer to the process of generating synthetic data as 'synthesis'. The basic idea is simple: you use a model to capture the relationships in the real-world dataset, and then you use the model to generate synthetic data that preserves those relationships (Emam, Mosquera and Hoptroff, 2020).

Unlike 'dummy data', which is randomly generated fake data used to test systems before they go live with real data, synthetic data is generated to preserve the statistical relationships and patterns of the original real-world dataset. An analyst working with a synthetic dataset should therefore get results similar to what they would get with real data. As Paul Calcraft and colleagues explain, a synthetic dataset is:

generated at random but made to follow the structure and some of the patterns of the original data set. Each piece of information in the [synthetic] data set is meant to be plausible (e.g., an athlete's height will usually be between 1.5 and 2.2 meters, and would never be 1 kilometer), but it is chosen randomly from the range of possible

values, not by pointing to any original individual in the data set.

Data that is generated in this way reveals very little, if anything, about any individual in the original data set, but still represents the data well as a whole. (Calcraft et al., 2021)

As Calcraft et al. make clear, the 'randomness' of the selection from within the possible value range is only partial and relative – this depends on the extent to which the synthetic dataset preserves the relationships and patterns in the original dataset. This article will come back to this point in its discussion of 'lo-fi' and 'hi-fi' synthetic data – the higher the degree of fidelity, the more relationships are preserved, and the less random is the selection process.

Synthetic data can play a role even when our understanding of the underlying relationships is more tenuous. For example, synthetic data can be generated when real data is unavailable but we have a theory about the relationship between variables. There can also be a hybrid, where we have *some* historical data and we make some basic assumptions about the distributions and correlations within that data.

Synthetic data is a fast-growing, critical technology
An early use of synthetic data was in 1993 with a synthetic version of the United States census, which allowed the Census Bureau to release samples without disclosing the microdata (Kaloskampis, 2019). Since then, technological advances have led synthetic data to become enormously more sophisticated.

Synthetic data isn't widely talked about outside data science circles, but that's probably about to change. AI commentator Rob Toews believes this new technology is approaching 'a critical inflection point in terms of real-world impact. It is poised to upend the entire value chain and technology stack for artificial intelligence, with immense economic implications' (Toews, 2022). The tech research and consulting firm Gartner predicts that over the next ten years synthetic data will start to massively overshadow real data in AI models (Dilmegani, 2021, and see Figure 1). By 2024, Gartner projects, 60% of data

used for AI and machine learning will be synthetic data (White, 2021).

Rob Toews claims that 'the rise of synthetic data will completely transform the economics, ownership, strategic dynamics, even (geo)politics of data' (Toews, 2022). He cites Ofir Zuk, CEO and founder of synthetic data startup Datagen, claiming that the total addressable market of synthetic data and the total addressable market of data will converge.

'A substantial missed opportunity'?
Governments are looking at synthetic data and there are now a growing number of public sector use cases. However, some commentators are arguing that we should pick up the pace. Paul Calcraft writes that synthetic data 'is not yet a widely known technology in government, even among government analysts and researchers … this is a substantial missed opportunity' (Calcraft, 2022).

Stefanie James and colleagues illustrate how the technology for creating synthetic data has matured at a faster rate than the rate at which it has been adopted within organisations (James et al., 2021 – see Figure 2).

So synthetic data is here and growing fast, but what is it good for?
From scarcity to abundance
Cem Dilmegani of tech industry analysts AI Multiple summarises a central problem that synthetic data can address:

> Despite its success in a wide range of tasks, deep learning has an important limitation: its data-hungry nature. Collecting and labeling huge data with desired properties is costly, time-consuming, or unfeasible in some applications. (Dilmegani, 2021)

Synthetic data can replace data scarcity with abundance. It can augment real-world data when simply more volume is needed, and also balance real-world data when specific kinds of data is needed. As Rob Toews writes, 'synthetic data technology enables practitioners to simply digitally generate the data that they need, on demand, in whatever volume they require, tailored to their precise specifications' (Toews, 2022).

The development of autonomous vehicles is a good example. Given the risks

Figure 1: Projection of relative use of synthetic and real data in the AI sector
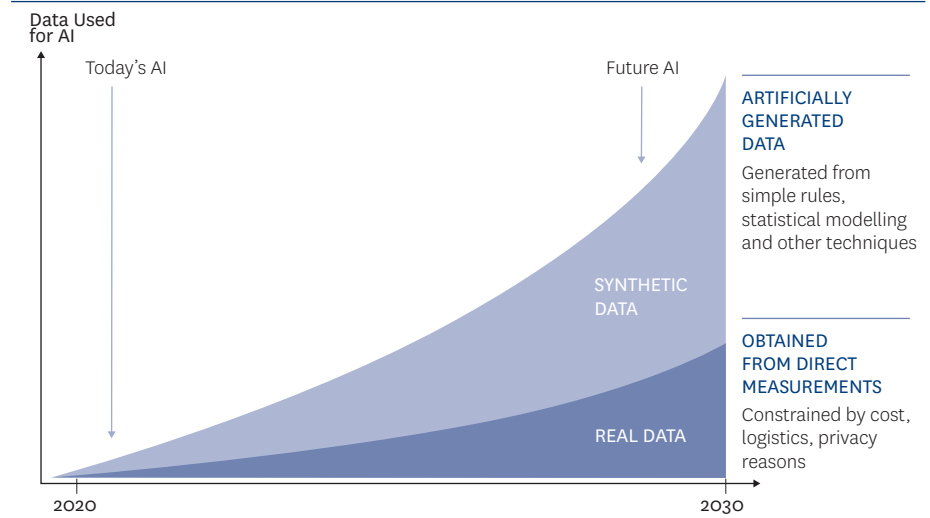
Source: Adapted from Dilmegani, 2021

Figure 2: Rate of development of synthetic data technology versus rate of adoption
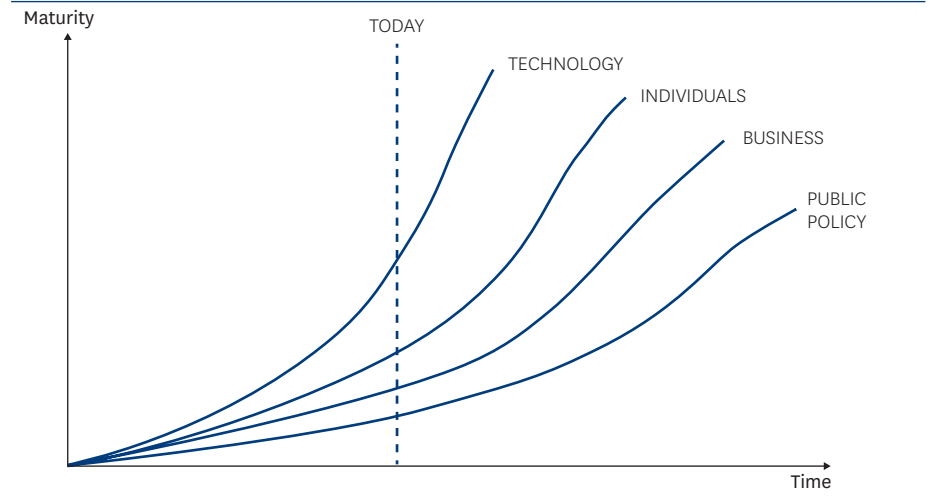
Source: Adapted from James et al, 2021

they pose for all road users and pedestrians, the equivalent of hundreds of years of driving is needed to encompass a sufficiently wide set of scenarios. Already by 2016 Waymo had generated 2.5 billion miles of simulated driving data compared to 3 million miles of real-world driving data; by 2019 it had simulated 10 billion miles.

Big synthetic datasets can also better account for rare outlier events – 'edge cases' – by including them in the dataset at appropriate frequencies, and can also simulate conditions that have not yet been encountered (Dilmegani, 2022).

In general, more data can lead to better predictions (Krenchal and Cury, 2022), and so, for governments, more effective policy.

Analysis and insight without infringing privacy
Synthetic data can also represent real data when confidential information is

involved. The US Census Bureau has used the technology for this purpose: it provides high-fidelity synthetic data built on a linked underlying dataset which combines the real-world census data with administrative tax and benefit data.

For the 2020 US census, the Census Bureau decided to release high-fidelity synthetic data that incorporated a form of 'differential privacy'. This is an advanced technique to further reduce the risk of an individual being identified, basically through adding random values – 'noise' – to the dataset at controlled levels. Notably, differential privacy allows government census agencies to precisely quantify the probability of an individual being identified through the synthetic dataset (Calcraft et al., 2021).

Using synthetic data addresses several different kinds and levels of privacy risks: 'singling out' – the possibility of

Figure 3: Benefits of synthetic data

BENEFITS OF
SYNTHETIC DATA

Overcoming
real data usage
restrictions

Preserves
relationships
in data

Creating data to
simulate not yet
encountered
conditions

Immunity to
common
statistical
problems
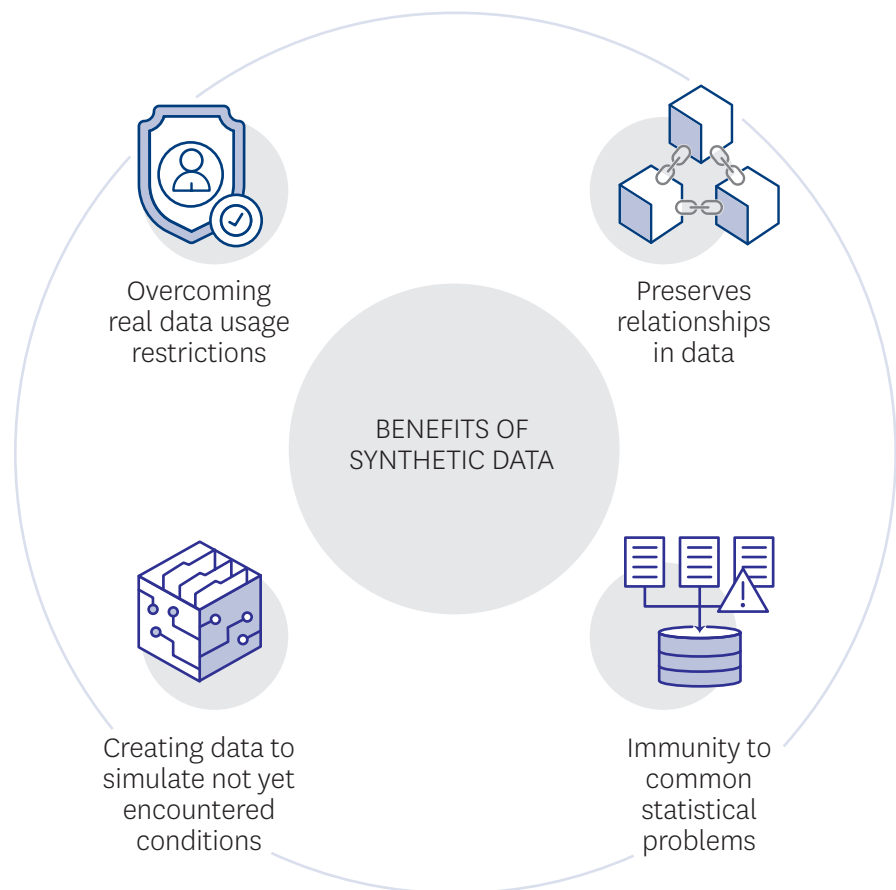
Source: Adapted from Dilmegani, 2018

distinguishing and identifying individual people; 'linkability' – the ability to link two or more data points concerning the same data subject within one or more datasets; and 'inference' – the possibility of deducing, with significant probability, the value given to other attributes within the dataset (Article 29 Data Protection Working Party, 2014). This can remove constraints in various situations, including allowing long-term research to continue when regulations limit the length of time that data can be stored.

Synthetic data technology could therefore have implications for the use of Māori data, as for indigenous populations elsewhere, by providing greater privacy protections. As Karaitiana Taiuru writes:

Māori communities are especially vulnerable to privacy-related risks that come with (for example) the collection and storage of data on individual persons. The risk of individuals and whānau being re-identified through anonymised data is heightened when dealing with minority groupings and

with sparsely distributed populations such as Māori. (Taiuru, 2020, p.8)

Synthetic datasets could potentially allow for meaningful analysis of data on Māori communities and individuals while better protecting privacy and Māori sovereignty over their data as taonga.

As an example, in an early Australian use case of synthetic data, Yogi Vidyattama and colleagues addressed the problem of a lack of data on indigenous disadvantage. They explained that 'spatial micro-simulation' techniques had usually been used to derive small area estimates of various social and economic indicators, with these estimates in turn used to help allocate government and community programmes for indigenous communities.

However, for previous applications, a record unit file from a survey dataset has always been available on which to conduct the spatial microsimulation. For the case of indigenous disadvantage, this record unit file was not available due to the scarcity of the Indigenous

population in Australia, and concerns from the ABS [Australian Bureau of Statistics] about confidentialising the file. (Vidyattama, Tanton and Biddle, 2013.

As a solution, Vidyattama and colleagues built a synthetic unit record file containing the same number of observations as the real-world survey file, and then applied spatial microsimulation to that synthetic dataset in order to generate the necessary small area estimates.

Reducing error and bias
Synthetic data can also sometimes be more faithful to the real world than real-world data, when the real-world dataset contains known sources of error and the synthetic data is corrected to remedy this.

One assessment has some 85% of the algorithms currently in use as error-prone, largely due to bias, which is in turn often due to samples under-representing women, non-white people, and other groups (Krenchel and Cury, 2022). Synthetic data could be part of the answer to this bias, because it can analyse real-world data and observe and compensate for bias, and it can generate much larger datasets that can better accommodate smaller groups and edge cases (Brouton Lab, 2022).

New Zealand's census provides an example. We learned from our last census that we under-sample minority groups in Aotearoa, and so any analysis of the census data will carry over that bias. But a synthetic dataset based on the census could add in a correction so that the synthetic data is more representative than the original, by adding records to make the synthetic dataset more in proportion to what we expect the data to contain.

With real-world data, the challenges involved in protecting privacy and combating bias can also sometimes be related, and inversely so: de-identification to protect privacy tends to amplify bias by removing minorities that could be re-identified. By contrast, synthesising data reduces the need for de-identification in the first place (see Box 1). What's more, it allows the option of generating synthetic data from the de-identified real-world dataset by creating extra records, as a compensatory virtual over-sampling.

Democratising data?

Finally, synthetic data can potentially have major implications for the relationships that Meta/Facebook and the other digital behemoths have with the rest of us, as their commercial and social power rests on their command of and ready access to oceans of customer data. Synthetic data can potentially enable lots of AI and other startups to drive innovation. People other than data scientists would be able to readily build dashboards, and synthetic data also lends itself more to crowdsourcing innovation (Kohli, 2021).

So, synthetic data can potentially level the playing field, which would in turn present another wave of public policy and regulatory challenges; but that's a topic for another article.

Generating synthetic data

The process of generating synthetic data from a real-world dataset is called, logically enough, 'synthesis', and there are different techniques.

A key group of techniques are 'deep generative models' – or DGMs – which Lars Ruthotto and Eldad Haber describe as one of the 'most hotly researched fields' in AI in recent years. These are 'neural networks' that are trained to analyse samples and recognise and approximate complicated probability distributions involving a large number of different dimensions and variables. 'When trained successfully, we can use the DGM to estimate the likelihood of each observation and to create new [that is, synthetic] samples from the underlying distribution' (Ruthotto and Haber, 2021).

GANs and VAEs

One of the most popular deep generative models for synthesising tabular data (as opposed to images or text) is 'generative adversarial networks', or GANs. 'Adversarial' here refers to the fact that GANs pit two neural networks against each other in a contest.

The first network is called the 'generator', and, in the original application of GANs to images, it would create new images, such as human faces that are similar to real faces. The second network is called the 'discriminator': it looks at images of both real and created faces without being told

which are which. The generator keeps trying to fool the discriminator and the discriminator keeps trying to see through the deception. Over time the discriminator's success rate drops below 50% – in other words, no better than guessing at whether an image is real or synthetic.

Data scientist Alex Wang says that while deep generative models have been shown to work for images, audio and molecular synthesis, their application to tabular data is still at an early stage, with various unresolved challenges.[1] GANs, and also another type of model called a VAE (variational auto encoder), can work well with tabular data, and in some cases the two types – GANs and VAEs – have been combined. These approaches to generating synthetic data have demonstrated quite high 'utility values' (that is, a high degree of fidelity to the relationships in the real data) working from complex datasets and are a very active area of research (Emam, Mosquera and Hoptroff, 2020).

Language AI is of course a fast-moving area. Before ChatGPT burst on the scene in late 2022, Daniel Yogatama from the AI firm DeepMind, a next-generation synthetic data technology involving 'massive foundation models' can generate unstructured text at a new level of 'realism, originality, sophistication and diversity', and often indistinguishable from human-written text:

> This new type of synthetic data has been successfully applied to build a wide range of AI products, from simple text classifiers to question-answering systems to machine translation engines to conversational agents. Democratizing this technology is going to have a transformative impact on how we develop production AI models. (Toews, 2022)

Choosing the right synthesis method

Data scientist Marianna Pekar says that there is no one right way of synthesising data, and that it always depends on the underlying dataset:

> As a rule of thumb, the generation method should be suited to the complexity of the underlying data. Machine learning and deep learning

Data scientist Marianna Pekar

models are the only real practical techniques for handling high data complexity, but on the other hand deep learning models can perform poorly on simple datasets.[2]

Marianna adds that, as with just about any human activity, an element of subjectivity creeps into the choice of method: different analysts choose a method they prefer and continuously optimise it (Emam, Mosquera and Hoptroff, 2020).

Verifying a synthetic dataset's 'utility'

The original 1970 vinyl of Jimmy Cliff's 'Synthetic world' would probably have advertised it as 'hi-fi'. Fidelity is a central property of synthetic data too. Unlike completely random dummy data used simply to test new systems, synthetic data is useful because it is faithful, in key respects, to the original data.

Data scientists use the term 'utility' to describe the value and usefulness of synthetic data. In turn, utility depends centrally on the fidelity, or similarity, of the synthetic dataset to the real dataset.

In assessing and measuring a synthetic dataset's utility and the degree of fidelity, data scientists apply various empirical tests: for example, testing for 'prediction accuracy', which assesses the ability of the synthetic data to replicate the results of a prediction analysis performed on real data.

Marianna Pekar emphasises that using the right synthesis techniques is crucial for achieving a high degree of fidelity and utility while also minimising the risk of re-identification. High fidelity and utility does not necessarily mean a greater risk of re-identification and therefore of a privacy

breach, but it *may* do if you haven't applied the right synthesis techniques and tools.

Hi-fi and lo-fi synthetic data

Consider a dataset with the height and weight of a group of athletes: low-fidelity synthetic data would represent the patterns of height and weight, but it would provide no information about the relationship between the heights and the weights – for example, whether the taller people tend to be heavier. High-fidelity synthetic data, by contrast, would include that relationship. The data in the high-fidelity dataset is partially random, in that it doesn't relate to any real data points, but it is generated around the line that represents that height–

established by Data to AI Lab (DAI), which has links to the Massachusetts Institute of Technology (MIT). This is an open-source and scalable collection of libraries offering the latest tools to all, whether students or large organisations (MIT Laboratory for Information and Decision Systems, 2020).

Public sector examples in the Anglosphere

Since the groundbreaking US census example from the early 1990s, there have been several US public sector examples in the area of health records. Here's one high-profile use case:

> The National Institutes of Health used synthetic data to replicate their database

referred earlier to the creation of a synthetic dataset in Australia as a solution to a lack of available data, because of small populations and privacy concerns, on social and economic indicators for indigenous populations (Vidyattama, Tanton and Biddle, 2013).

Stefanie James et al. cite the 'Simulacrum', a synthetic dataset project from the UK health sector:

> The Simulacrum imitates data held by Public Health England's National Cancer Registration and Analysis Service. Scientists get access to Simulacrum synthetic data[;] once the scientific query is refined scientists are able to submit a request to Public Health England to run queries on the real data. Public Health England will provide aggregate and anonymous data back to the scientist. Scientists are able to publish results based on the synthetic data. (James et al., 2021)

> [New Zealand use cases of synthetic data] demonstrate how this new technology can contribute to addressing a variety of critical issues for Aotearoa – here, climate change and dependency on fossil fuels, the housing affordability crisis, and social services and wellbeing.

weight relationship – and potentially many other relationships within the data.

But it's not that high fidelity is good and low is bad. It may be that you don't need your synthetic dataset to be faithful to many of the statistical relationships in the real-world dataset, and that low fidelity meets your purposes perfectly.

Use cases: synthetic data in the real world

The concept of synthetic data was first applied commercially at scale in the autonomous vehicle sector in the mid-2010s (Toews, 2022). Use cases in other sectors quickly followed, including robotics, geospatial imagery, banking, and genome studies into diseases.

Although the biggest users and innovators continue to be in the autonomous vehicle sector, a distinct synthetic data sector is growing quickly too. One example is the Synthetic Data Vault

of more than 2.7 million COVID-19 patient records, creating a dataset with the same statistical properties but none of the identifying information that could be quickly shared and studied by researchers the world over. The aim was to help identify better treatments without infringing on the privacy of the people involved. (Krenchel and Cury, 2022)

The US Office of the National Coordinator for Health Information Technology is also using publicly available health data to generate a synthetic dataset which will be used for testing and refining analyses, as a prerequisite for researchers being granted access to real data.

In the UK, this was also the intention driving low-fidelity synthetic data being produced for the Ministry of Housing, Communities and Local Government and its 'Troubled Families' project. I also

Three synthetic data use cases in Aotearoa

The following three examples do not exhaust the list of public sector use cases in this country. However, they demonstrate how this new technology can contribute to addressing a variety of critical issues for Aotearoa – here, climate change and dependency on fossil fuels, the housing affordability crisis, and social services and wellbeing.

Modelling the impact of wind farms on New Zealand's national grid

Back in 2009, in an early use of synthetic data here, NIWA and MetService created synthetic ten-minute wind datasets at 15 actual or potential wind farm sites across the country, to help the Electricity Commission model the impact of wind farms on the national grid (NIWA, 2009, n.d.). Wind data at ten-minute to hourly time scales is a key factor in modelling the performance of wind farms. However, little of this data is publicly available, whether for existing or proposed sites, and so it was decided to simulate it.

The project team first developed an hourly synthetic dataset, drawing on several years of archived wind data for the

whole of New Zealand based on a 12km grid (called NWP wind data, for 'numeral weather prediction').

By developing a robust statistical relationship between these hourly NWP winds and hourly speeds observed at hub-height at wind farms it was possible to produce an hourly synthetic wind dataset which preserved the statistical properties of the hourly observed data. To then obtain a ten-minute synthetic dataset with all the desired properties of the ten-minute wind farm observations, realistic ten-minute fluctuations in wind speeds for these wind farm sites were then superimposed on the hourly time-series. (NIWA, n.d.)

Particular attention was paid to accurately simulating the frequencies of wind speeds that are outside the operating ranges of the turbines.

The outcome was a realistic synthetic dataset for uses such as preparing generation scenarios during storms, calculating wind power's contribution to total capacity, and estimating seasonal variations in wind-power generation.

Policy responses to a housing affordability crisis in Auckland

More recently, Mario Fernandez and three colleagues used synthetic data to simulate some of the levers that local and central government could use to affect housing prices and affordability in Auckland, such as direct intervention on the supply side and subsidies (Fernandez et al., 2022). Specifically, they simulated a retention-and-targeting programme (where houses are temporarily retained for sale to households earning below an income threshold), and subsidies to raise deposits through shared ownership.

Fernandez and colleagues (all employed by or affiliated with Auckland Council at the time) wanted to address three questions: what annual rate of growth of affordable housing would solve the affordability crisis; consequently, how long would it take to solve the crisis; and how much would that policy package cost?

The team constructed a sample of about 13,000 synthetic households,

Figure 4: Construction of the sample of synthetic households
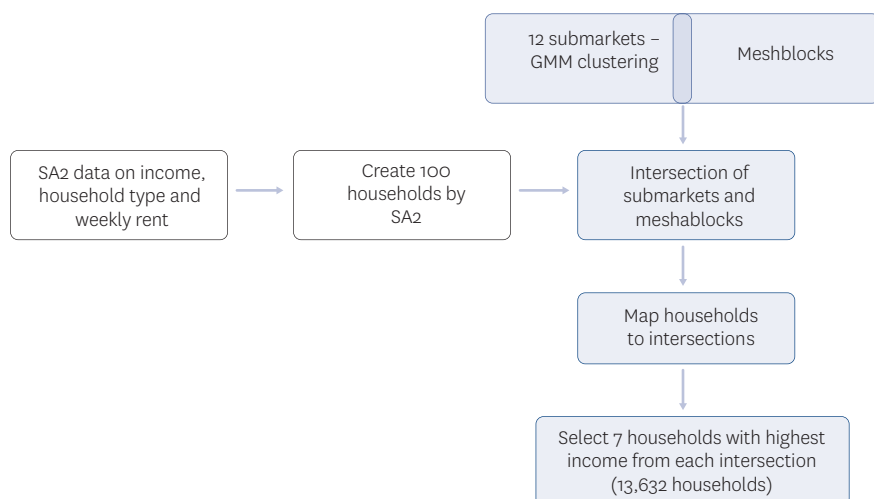
Source: Adapted from Fernandez et al., 2022

representing households searching for and bidding for a new dwelling in Auckland. The model worked by running two rounds of bidding: first, households bid for a dwelling in their local submarket; second, if they were outbid locally, they then bid in two adjacent submarkets above and below.

This simulation was run in two different supply scenarios, each with 6,000 dwellings: a 'competitive' market scenario, reflecting the current housing stock with an average price of $1.5 million, and an 'affordable' market scenario with an average price of $833,363. The aim was to simulate market behaviour and estimate the rate of housing take-up in each scenario, and to explore whether the distributions of prices set by developers and the income of households lead to more affordable housing.

The simulation included a number of variables, including latitude and longitude; distances to the nearest beach, waterway, road, open space, school and CBD; and sales price, floorspace, slope and elevation.

The approach gave the authors confidence to identify a possible package of policies to materially improve the affordability of housing in Tāmaki Makaurau. They wrote:

Results in this paper should be interpreted as the boundaries of what is feasible and realistic in the realm of affordability policies … Its scope is a blueprint for the design of policies in other cities where unaffordability has become extreme. (ibid.)

Synthetic data meets social services and wellbeing

Marianna Pekar, whom I mentioned earlier, is currently working with VUW-based data scientist Alex Wang on an exciting three-year research project involving New Zealand's Integrated Data Infrastructure (IDI). The research is funded by the Informatics for Social Services and Wellbeing Programme | Te Rourou Tātaritanga, through the MBIE Endeavour Fund, and its aims include evaluating the synthesising of datasets in a key area of public policy – social services and wellbeing. This particular research, which builds on previous investigations, is supervised by Professor Binh Nguyen of the School of Mathematics and Statistics at Victoria University.

The Integrated Data Infrastructure is a large research database which holds de-identified microdata about people and households. It covers life events and use of government services like education, income support, justice and health. The data comes from government agencies, Statistics New Zealand surveys and NGOs. The data is linked and integrated together to form the IDI. The IDI is therefore a powerful tool for evidence-based policymaking in Aotearoa. Researchers use it mostly for cross-sector research that provides insights into our society and economy.
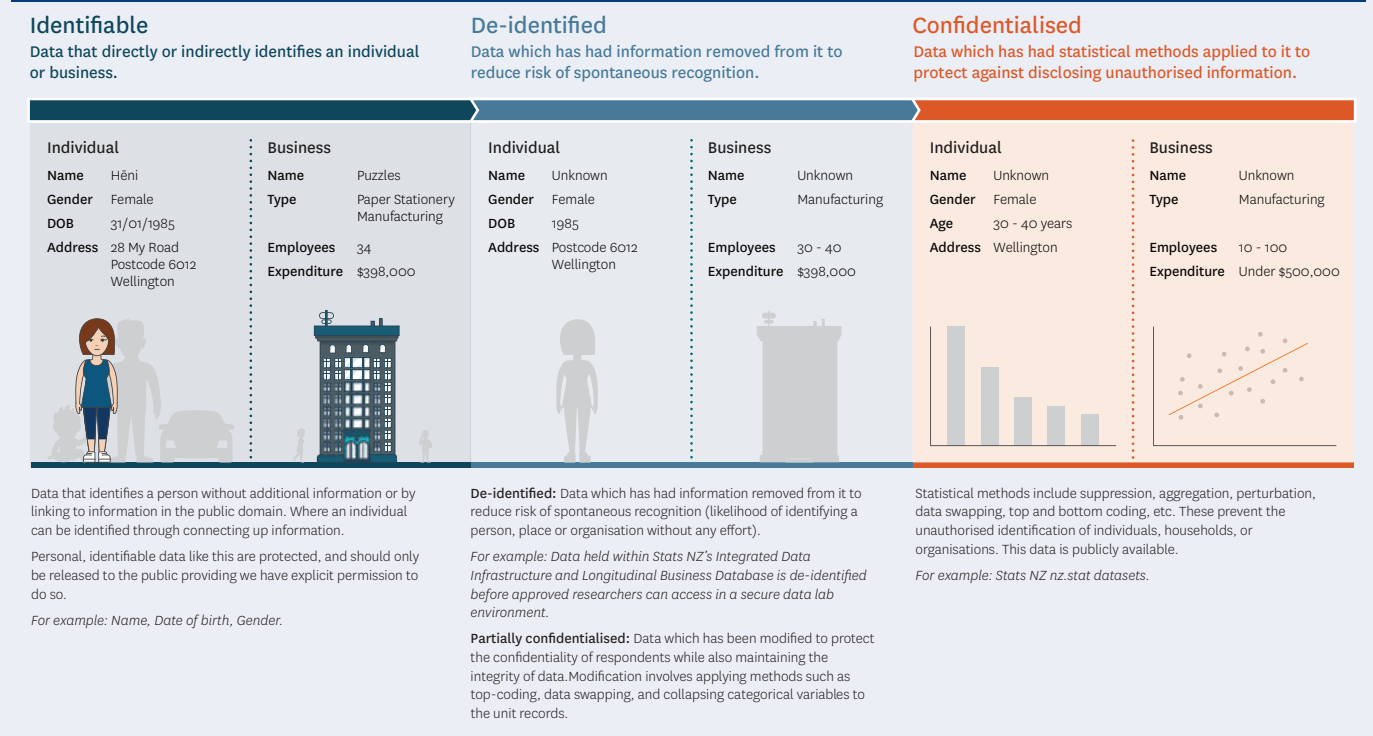
So, why would one want to synthesise data in the IDI? Well, even though the data is de-identified, it's still too granular to be made public, because there would be a high

BOX 1 Privacy and the IDI: understanding 'de-identification' and 'confidentialisation'

Statistics New Zealand gives a simple example of these different terms (Statistics New Zealand, 2018). 'De identifying' data about a named individual would remove their name and give just their gender, the year of birth rather than their precise birth date, and just their postcode and city or area. But after that de-identification there would still be some risk of spontaneous recognition – recognition without any effort. By contrast, 'confidentialising' this item of data would give just the person's gender, a ten-year age bracket, and the city or region where they live.

Figure 5: Degrees of identification of data

Identifiable
Data that directly or indirectly identifies an individual or business.

De-identified
Data which has had information removed from it to reduce risk of spontaneous recognition.

Confidentialised
Data which has had statistical methods applied to it to protect against disclosing unauthorised information.

Individual		Business	
Name	Hēni	Name	Puzzles
Gender	Female	Type	Paper Stationery Manufacturing
DOB	31/01/1985		
Address	28 My Road Postcode 6012 Wellington	Employees	34
		Expenditure	$398,000

Individual		Business	
Name	Unknown	Name	Unknown
Gender	Female	Type	Manufacturing
DOB	1985		
Address	Postcode 6012 Wellington	Employees	30 - 40
		Expenditure	$398,000

Individual		Business	
Name	Unknown	Name	Unknown
Gender	Female	Type	Manufacturing
Age	30 - 40 years		
Address	Wellington	Employees	10 - 100
		Expenditure	Under $500,000

Data that identifies a person without additional information or by linking to information in the public domain. Where an individual can be identified through connecting up information.

Personal, identifiable data like this are protected, and should only be released to the public providing we have explicit permission to do so.

For example: Name, Date of birth, Gender.

De-identified: Data which has had information removed from it to reduce risk of spontaneous recognition (likelihood of identifying a person, place or organisation without any effort).

For example: Data held within Stats NZ's Integrated Data Infrastructure and Longitudinal Business Database is de-identified before approved researchers can access in a secure data lab environment.

Partially confidentialised: Data which has been modified to protect the confidentiality of respondents while also maintaining the integrity of data. Modification involves applying methods such as top-coding, data swapping, and collapsing categorical variables to the unit records.

Statistical methods include suppression, aggregation, perturbation, data swapping, top and bottom coding, etc. These prevent the unauthorised identification of individuals, households, or organisations. This data is publicly available.

For example: Stats NZ nz.stat datasets.

Source: Stats NZ, 2018, www.data.govt.nz, Creative Commons 4.0, (brief introductory text removed)

re-identification risk. So IDI security is tight: researchers are vetted and must use the data onsite, where it is stored in secure locations. And before research results can be published, the researchers have to 'confidentialise' the data – for example, by aggregating it and suppressing small counts.

The shared research environment of the IDI is unique in the world and is a taonga of New Zealand (Jones et al., 2022). However, it is not the right environment for applying resource-intensive methods that take in microdata inputs. Data synthesis can bring benefits for the use of IDI data by potentially allowing for more tabulations at more granular levels (for example, lower levels of geography) that aggregation rules currently prohibit, and by also allowing for known sources of error to be corrected.

Pekar and Wang's research project is looking at relevant use cases to assess the advantages and disadvantages of using different methods of synthetic data generation for different purposes. This includes using low-fidelity synthetic data generated outside the IDI for training and to demonstrate methods. It also includes using high-quality synthetic datasets generated inside the IDI environment to assess the advantages of using advanced machine-learning methods outside the IDI.

An additional phase of the research looks at the tests and requirements that synthetic data should need to pass before being released from the secure IDI environment. The project team is working closely with the statistical methods team from Statistics New Zealand to determine a selection of suitable statistical tests that strike the balance between fidelity and mitigating the risk of re-identification.

Synthetic datasets generated from the IDI also have potential benefits that go beyond the scope of this particular research.

Researchers would be allowed to leave the secure IDI environment (the data labs operated by Statistics New Zealand) and work remotely. After completing their research, they would also be able to make the data more broadly available for others to test reproducibility and for secondary analysis.

Researchers would also have the freedom to apply resource-intensive methods with microdata as input: for example, Explainable AI (XAI) techniques to detect bias and hidden relationships between inputs, models and outputs, and agent-based micro-simulation to model future outcomes (with micro-simulation, users do 'what-if' analyses and run novel scenarios) (Emam, Mosquera and Hoptroff, 2020).

Challenges and risks involved with using synthetic data

There are sceptics about the use of synthetic data. For example, Neil Raden,

an actuary, has concerns around privacy and anonymisation: he suggests that anonymising data does not work when some personal information is necessary for the model to draw inferences – for example, in medical research (Raden, 2021). He is also concerned that anonymisation might sometimes be reversible.

Other challenges that commentators have pointed to include variable user acceptance, because it is a new technology and users are still learning its limitations and learning to trust it (Dilmegani, 2018). Calcraft et al. (2021) add structural barriers like lack of knowledge, technical capability, and legal concerns within public sector bodies.

Raden (2021) also reminds us of the undeniable point that the quality of synthetic data relies on the quality of the real-world data it's based on, as well as on the quality of the model that generated it.

Of course, synthetic data technology cannot magically generate knowledge and insights that we would not otherwise have access to through conventional real-world research and analytical techniques. If we have no data on a particular variable, then synthetic data technology will not create it. Similarly, if the real-word data contains systematic biases, those biases will be carried over into the new synthetic dataset unless those biases are known and corrected for.

Mikkel Krenchel and Maria Cury (2022) see the answer to these challenges as being transparency and data literacy:

[W]e believe the social and human sciences ought to get involved. The input most crucial to making sure the synthetic data revolution does not simulate low-quality reflections of the world we live in (or worse, create worlds we didn't intend) is small, not big, data. In a synthetic data world, the quality of the initial, small dataset from which the synthetic data is derived, is absolutely paramount. And so is a deeply contextualized understanding of that dataset itself – where it came from, what it can be used for, what it explains, and what it doesn't. This is the kind of context that is difficult to obtain, make sense of, or relate to underlying structures and biases.

Figure 6: A simple flow diagram of the joint research project 'The Impact of Synthetic Data Generation Techniques in IDI Research'
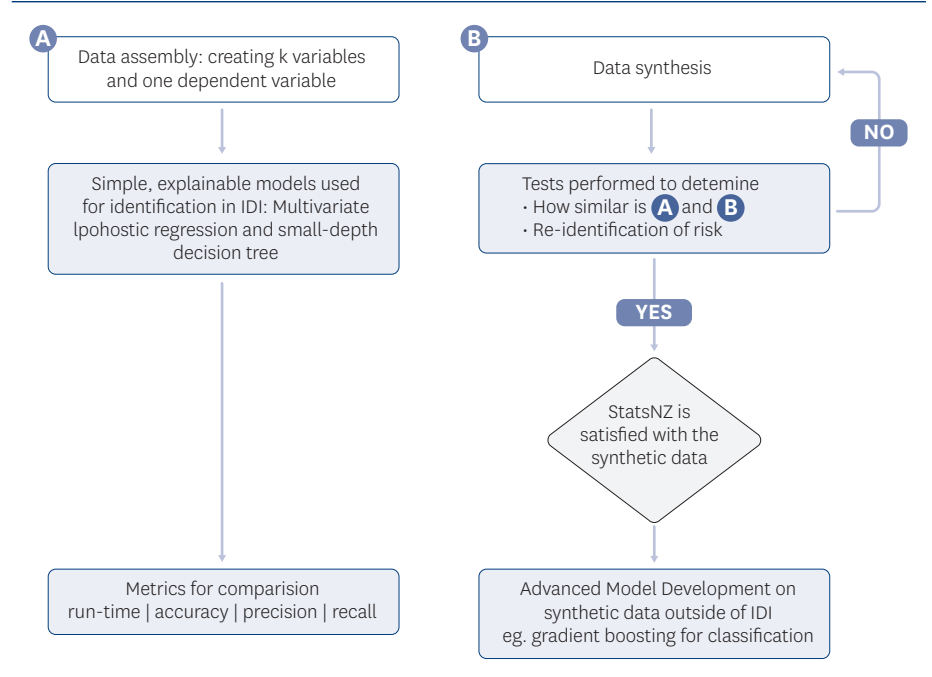
Source: Marianna Pekar

Krenchel and Cury wonder if the future will see an 'AI dance' between human imagination and intuition and its machine counterpart. They are justifiably definitive, though, that

[t]he stakes are too high to leave these important decisions to data scientists alone – social scientists and philosophers (as well as policymakers) have a role to play. Otherwise, the effects of this data revolution could be disastrous.

How to facilitate the role of synthetic data in helping develop sound public policy

Paul Calcraft and colleagues in the UK have looked at how synthetic data can accelerate public policy research without privacy risks, and they made some recommendations to the government partnership body, Administrative Data Research UK (Calcraft et al., 2021). These included using lo-fi synthetic data across government and researchers to reveal whether data for a given policy is available and usable; for writing and testing code before access to real-world data is available; and to provide quicker access where there are data security issues.

They also recommended the development of a cross-government synthetic data repository accessible to accredited researchers and government policy analysts (reminiscent of the rules of access to the IDI here). This would assist with the discovery of available data, with the design of more informed research questions and plans, and with establishing a semi-automated pipeline generating lo-fi synthetic data at the end of each project.

Stefanie James et al. (2021) also discuss some technical and organisational measures to guide the effective, efficient and economical use of synthetic data. They emphasise that whoever synthesises the data needs not just technical capability but also knowledge and understanding of privacy requirements and risks. In order for the synthetic dataset to be trusted, documentation about its utility should also be embedded within it, and the organisation needs to ensure transparency and an audit trail.

The organisation also needs to have the necessary infrastructure, tools and data-sharing processes, whether in-house or bought as a service. James et al. also recommend that organisations take the opportunity to build end-to-end pipelines so that synthetic datasets can be used for multiple purposes, not all of which will be known in the design phase.

Proper training of their people would presumably be critical to organisations successfully managing the risks and

opportunities presented by synthetic data, training that covers not just technical issues but also the ethical ones.

Many rivers to cross

'Many rivers to cross', the title of another Jimmy Cliff hit, aptly describes the challenges that will need to be overcome for synthetic data to meet the optimistic predictions. However, the potential gains are considerable. By effectively allowing for important data to be made public, synthetic datasets allow for public policy researchers and analysts to subject each other's work to the same scrutiny and checking for reproducibility that goes on in the natural sciences. This potentially means not just better, more effective policy, but also greater transparency and therefore greater trust that significant policy decisions are based on sound evidence.

The rise of synthetic data is an international phenomenon that has now seen several notable use cases in Aotearoa. There is, however, an opportunity here to increase the pace of adoption and ensure that the full benefits of this new area of data science are realised.

1 Conversation with the author, September 2022.
2 Conversation with the author, September 2022.
3 Conversation with the author, September 2022.

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Peter Hodder

CouncilMARK™
Revisited: measuring the effectiveness of New Zealand's local government once more

Abstract

This article reviews the results of the second tranche of assessments for CouncilMARK™ , Local Government New Zealand's voluntary quality enhancement programme. Those councils that were reassessed generally showed either a modest improvement or no change in the four priority areas assessed (governance, financial decision making, service delivery and communication). The business and corporate focus of CouncilMARK means that it yields scores that diverge markedly from those obtained by the New Zealand Local Government Survey, which focuses on public and business perceptions of council activities. The implementation of CouncilMARK has not arrested the decline of voter turnout in local body elections. Moreover, there have been no changes to either the programme's priority areas or its procedures that recognise recent local and international research which consistently advocates a more people-focused approach to the activities of local government.

Keywords local government, quality enhancement, reputation, citizen involvement

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In August 2016, CouncilMARK™ was introduced by Local Government New Zealand as a voluntary quality enhancement programme for local authorities in New Zealand. The framework and its associated processes are comprehensively described on CouncilMARK's website (Local Government New Zealand, 2023b), including the template to guide the assessors in their work on the four 'priority areas'.[1] Because the final reports were intended to be read by the public, the priority areas originally had 'catchy' titles: 'Leading locally' (LL), 'Investing money wisely' (IMW), 'Delivering what's important' (DWI) and 'Listening and responding' (LAR); recent reports have replaced these titles with corporate-speak: 'Governance, strategy and leadership', 'Financial decision-making and transparency', 'Service delivery and asset management' and 'Communicating and engaging with the public and business'. This change serves to remind the reader that CouncilMARK is rather more focused

on the processes of a council's business rather than on outcomes related to meeting the needs and aspirations of ratepayers, particularly, and other stakeholders more generally. This may account for the discrepancy between CouncilMARK measures and the components of the reputation index developed by the New Zealand Local Government Survey (Local Government New Zealand, 2017): the public and citizens consistently rate councils' performance lower in the survey than do the business-focused assessors in CouncilMARK (see Table 1). That said, case studies based on councils described as 'high-performing' are a welcome recent addition to the CouncilMARK website, although currently only two are featured (Local Government New Zealand, 2023a).

About half of New Zealand's local authorities have participated in CouncilMARK, with the uptake from regional councils being particularly low (only three out of 11), and no unitary councils participating.[2] About 30 councils participated in an initial CouncilMARK assessment, an analysis of which was published in Hodder (2019). Since 2019 there has been initial involvement in CouncilMARK by four more councils (Bay of Plenty Regional Council, Ōtorohanga District Council, Waitaki District Council and Whanganui District Council). In addition, some of those councils which participated in the initial assessment have made themselves available for re-assessment: this is the focus of this article. The current status of all participants in CouncilMARK is given in Appendix 1, with the participant councils in the second assessment shown in bold type. This table enables a comparison to be made of performance of councils which is not currently provided on the CouncilMARK website, and resembles the approach taken by the New Zealand Qualifications Authority (NZQA, 2022–23) in respect of quality assessments of tertiary education providers, contrasting with the inter-agency comparisons available in, for example, health (e.g., 'How is my DHB performing?', 2019–22 (Ministry of Health, n.d.)) and the completion of tertiary education programmes (e.g., Tertiary Summary Tables, 2017–21 (Education Counts, 2022)).

Figure 1: Histogram of CouncilMARK scores

Upper: Councils undertaking only the first assessment, for which the weighted average score is 6.0.
Lower: Councils undertaking first and second assessments; the weighted average score for the initial assessment (shaded blue) is 5.08, the weighted average score for the second assessment (shaded grey) is 5.92 (Compiled from appendix 1)
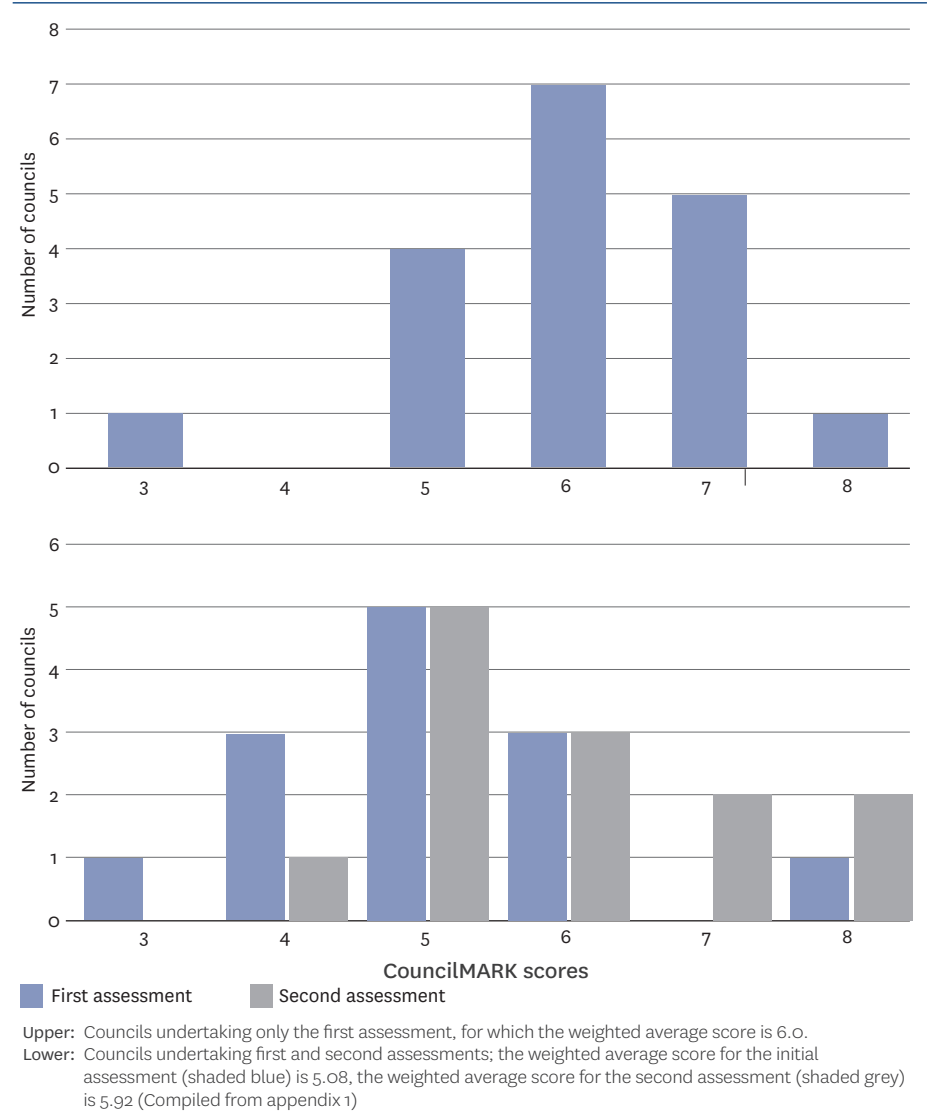
Enhancing the capability of local government: the purpose of CouncilMARK

Motivation for councils to undertake a second assessment will obviously have varied: some will have wished to demonstrate their commitment to a culture of self-improvement; some may have been disappointed with their initial assessment and sought their activities to be seen in a better light by their ratepayers. Conversely, those councils that did not participate in the second assessment may have been satisfied with the way their activities and achievements were portrayed in the first assessment and/or did not consider that a second assessment represented value for money, at least for them. Histograms showing the CouncilMARK scores in the first and second assessments are shown in Figure 1.

The weighted average CouncilMARK score for the first assessment is higher for those councils that decided not to undertake reassessment (6.0) than for those that decided to undertake reassessment (5.08), suggesting that 'getting a better result' may have been a motivation for reassessment (although see also Figure 2). Interestingly, the average CouncilMARK score after reassessment (5.92) is about the same as for the initial assessment of councils that decided against reassessment.

An analysis of the sentiment of the short overview at the start of each report indicates that the trend of sentiment or tone of this text[3] with the CouncilMARK score is less positive for councils that chose not to participate in a second assessment than for councils that chose to participate; this is shown in Figure 2. In other words, the non-participants may have been discouraged from undertaking reassessment by the tone of the initial

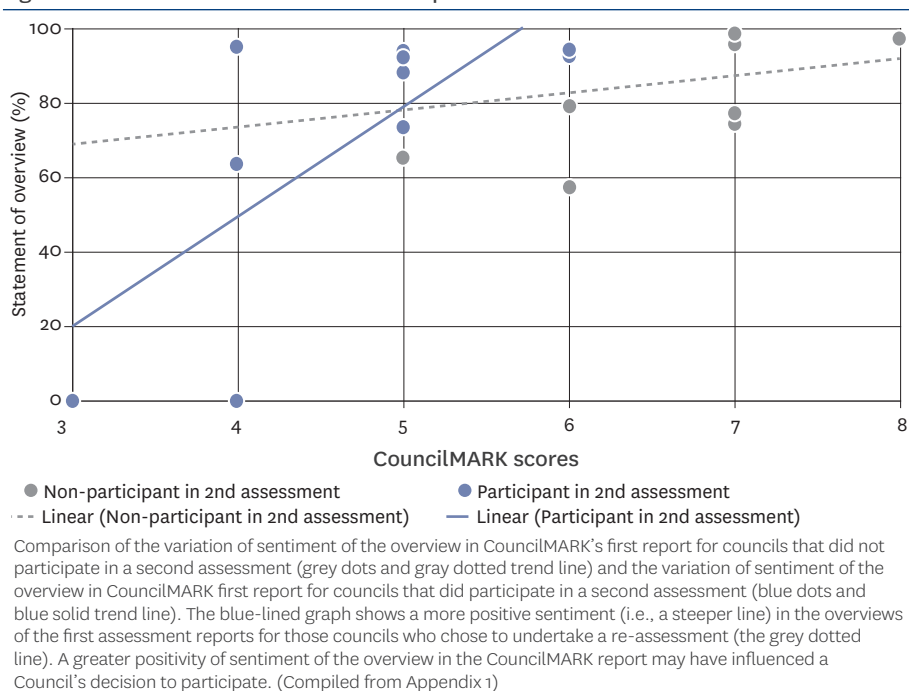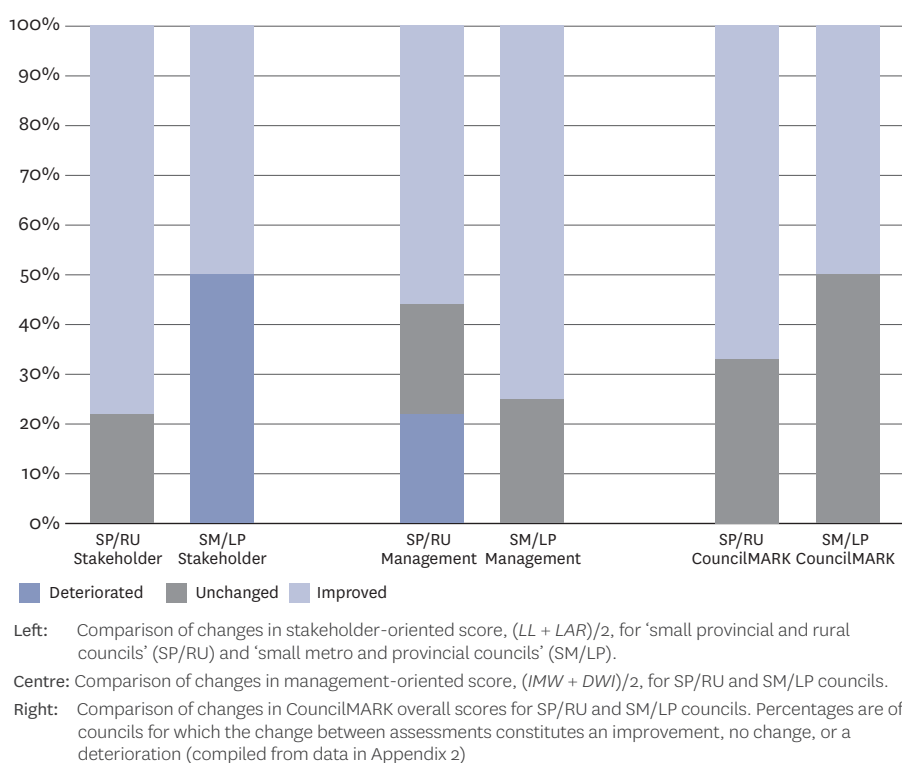Figure 2: Variation of sentiment score of report overview with CouncilMARK score

Comparison of the variation of sentiment of the overview in CouncilMARK's first report for councils that did not participate in a second assessment (grey dots and gray dotted trend line) and the variation of sentiment of the overview in CouncilMARK first report for councils that did participate in a second assessment (blue dots and blue solid trend line). The blue-lined graph shows a more positive sentiment (i.e., a steeper line) in the overviews of the first assessment reports for those councils who chose to undertake a re-assessment (the grey dotted line). A greater positivity of sentiment of the overview in the CouncilMARK report may have influenced a Council's decision to participate. (Compiled from Appendix 1)

Figure 3: Comparison of changes between assessments by type of council

Left: Comparison of changes in stakeholder-oriented score, (LL + LAR)/2, for 'small provincial and rural councils' (SP/RU) and 'small metro and provincial councils' (SM/LP).

Centre: Comparison of changes in management-oriented score, (IMW + DWI)/2, for SP/RU and SM/LP councils.

Right: Comparison of changes in CouncilMARK overall scores for SP/RU and SM/LP councils. Percentages are of councils for which the change between assessments constitutes an improvement, no change, or a deterioration (compiled from data in Appendix 2)

report rather than the grade awarded in the assessment process.

Comparison of reassessments with initial assessments potentially provide an opportunity to evaluate CouncilMARK as a tool for measuring the capability of councils' self-improvement in performance over time. As at February 2023, 13 district councils had taken up the opportunity for a second CouncilMARK assessment and have received the report thereon.[4] The raw data and changes are shown in Appendix 1, summarised in Appendix 2, with selected comparisons shown in Figure 3.

Appendix 2 reveals that improvement in DWI ('Delivering what's important') - including the marks scores occurred for two-thirds of the councils that were reassessed, leading to an average increase of one unit of score. Variability in council performance was greatest for IMW ('Investing money wisely'), with only modest increases in the average scores for LL ('Leading locally'), IMW and LAR ('Listening and responding'). There was a modest increase in the average CouncilMARK score. The fact that almost 60% of the councils participating in reassessment achieved a positive change in their overall score – and, moreover, that no participating council decreased its overall score from the initial assessment – suggests that this use of CouncilMARK as a tool for performance improvement may be adding some value. The upward trend for reassessments probably results from some combination of three influences: (1) councils being better prepared and knowing the assessment 'system'; (2) a concern to show that councils are getting better at what they do; and (3) the councils are performing better.

Figure 3 considers the variation of the parameters related to stakeholder orientation and management orientation and CouncilMARK scores for the two types of council represented in the reassessments, 'small provincial/rural' (SP/RU) and 'small metro/large provincial' (SM/LP).

More of the SP/RU councils show an increase in the LL and LAR scores (and thereby the 'stakeholder-oriented score') than do the SM/LP councils. Conversely, more SM/LP councils show an increase in the DWI score (and thereby the 'management-oriented score') than do the SP/RU councils. These differences could result from a greater effort being made by small provincial/rural councils to engage with their communities than small metro/ large provincial councils, and/or that the latter are better resourced to manage infrastructure and finance than the former.

Consideration of a correlation between CouncilMARK results with voter turnout

Voter turnout in elections has been declining for some time. Prior to the 2022 local government elections, there was publicity about this in public media, and Local Government New Zealand included on its website a campaign to foster voting. Political commentator Bryce Edwards has recently observed:

Table 1: Comparison of the average scores obtained for the components of a reputation index with those for corresponding components of successive CouncilMARK assessments

Year of survey or assessment	Instrument	Components of reputation index			Overall reputation index (as %)*
		Performance score (P, as %)	*Leadership score (L, as %)*	*Communication score (C, as %)*	
2017	Reputation survey	27%	26%	30%	28%
		Components of CouncilMARK score			Overall CouncilMARK score (as %)
		(IMW+DWI)/ 2 %	*LL %*	*LAR %*	
2017-2020	CouncilMARK assessment	56%†	56%	64%	56%
2020-2022	CouncilMARK re-assessment	63%‡	64%	69%	66%

Time (vertical label on left spanning the CouncilMARK rows)

* Calculated as [(0.38*P) + (0.32*L) + (0.31*C)]

† Values on this line are calculated as percentages, being (CouncilMARK score of component or overall * 100/9). CouncilMARK ratings range from C to A (neither of which has so far been awarded; see asterisk footnote to appendix 1), corresponding to scores ranging from 1.0 to 9.0. The scores aredetermined from the initial assessments of those councils that underwent re-assessment (data from appendix 1)

‡ Values on this line are calculated as percentages, being (CouncilMARK score of component or overall * 100/9). CouncilMARK ratings range from C to A (neither of which has so far been awarded; see asterisk footnote in appendix 1), corresponding to scores ranging from 1.0 to 9.0. The scores are determined from the results of the reassessment (data from appendix 1)

…there is absolutely no evidence to support the view that the low voter turnout reflects contentment. In fact, there is strong evidence throughout the country that the public's unhappiness with councils has reached an all-time high. Surveys carried out by local authorities show that dissatisfaction with individual councils is very strong this year. For example, in Wellington, when the public were asked this year about satisfaction with Council decision-making, the number of those who are "satisfied" dropped to a new low of only 12 per cent, while those who said they are "dissatisfied" jumped to 52 per cent. Similarly, those who believe that the council makes decisions that are in best interests of the city has plummeted from 50 per cent to just 17 per cent this year. It seems that throughout the country there is a similar level of anger and disenchantment with local politicians, which should dispel any rosy idea that lower voter turnout is in some way positive. Those pushing the 'contentment theory' of low voter turnout also have to grapple with the fact that non-voters are disproportionately made up of the poor and marginalised of society. Evidence shows it's the wealthier demographics that vote in much larger numbers than others. (Edwards, 2022)

The CouncilMARK results for councils that have participated in two rounds of the assessment provide an opportunity to compare change in voter turnout between the 2019 and 2022 elections with their overall CouncilMARK scores and with the derived parameters (stakeholder-oriented score (LL+LAR)/2), and management-oriented score (IMW+DWI)/2). From the information in Appendix 1, it can be shown that there is a slight positive trend between the change in voter turnout between the 2019 and 2022 local authority elections and the change in the stakeholder-orientated score (i.e., (LL + LAR)/2). This suggests that there might be the weakest of influences of CouncilMARK participation and improved voter turnout. However, there is a strongly negative trend between the change in voter turnout between the 2019 and 2022 local authorities and either the change in the management-oriented score (i.e., (IMW+DWI)/2) or the overall CouncilMARK score.

Comparison of CouncilMARK with the reputation survey and independent research findings

Although the negative trends referred to above could be inferred to mean there is an adverse influence of aspects of CouncilMARK on the voter behaviour described in Olsen (2022), a more reasonable interpretation may be that there is no direct association between voter behaviour and CouncilMARK scores. This interpretation is consistent with the mismatch between the reputation survey (which is focused on the perceptions of citizens and businesses) and CouncilMARK (which is focused on the perceptions of leaders of corporate business), as is apparent from Table 1. Given the current government's expectations that councils will take a 'well-being' approach to their activities, incorporating economic, environmental, social and cultural dimensions (see Grimes, 2019) – a position in part at least supported by Taituarā in its proposed 'transition to community connectedness' and 'transition to learning-empowered communities' (Taituarā, n.d.) – it is surprising that CouncilMARK has not been modified to take some account of these expectations.

Instead, CouncilMARK appears to perpetuate the notion that a council should do things *to* its ratepayers and citizens rather than doing things in association *with* its ratepayers and citizens. By comparison, 'Revitalising citizen-led democracy', a theme of the Review into the Future for Local Government (2022, pp.40–53), might have been influenced by recent overseas research, epitomised by the statement in Mangan et al. affirming 'the recognition of a need to move to a more entrepreneurial and problem-solving role of both staff and elected councillors, which recognises and develops the skills of citizens rather than one of overseeing delivery', complemented by the notion of :

developing more co-productive ways of working with citizens … This finding resonates with the academic literature which suggests that enthusiasm for engaging the public in co-productive

activities has gained significant traction in recent years, particularly with respect to overcoming some of the fiscal pressures that have been imposed by austerity. (Mangan et al., 2016, p.10)

Some testing of the application of these ideas in practice has also been undertaken (e.g., University of Birmingham, 2020; Mussagulova, 2020). Such investigations highlighted – among other matters – the need for professional development of councillors. This is an issue noted as a development needed in New Zealand both by the Review into the Future for Local Government (2022, p.21, recommendation 18) and in an earlier report by the Productivity Commission (2020, p.23).[5]

In addition, research identifies as paramount the commitment by council staff to meeting the needs of citizens, a commitment articulated by Mark Rogers,

chief executive of Birmingham City Council:

it is no longer relevant or acceptable for public sector leaders to promote, let alone deploy, the concept of benevolent municipalism in which the 'great and good' (some of whom aren't always that great or that good) believe that they know what's best for the citizen. Hierarchical power is, rightly, giving way to networked authority, the roots of which are firmly in the community. We do not exist in our own right. The political leadership is elected and the officers are appointed by the democratically mandated. We are all here to serve others – and that is the only kind of power we are entitled to wield: we rule only in order to serve. (Needham and Mangan, 2014, p.4)

Recent international research and local reviews of local government thus provide an opportunity for CouncilMARK to 'step up' and reposition itself as a worthwhile measure of council performance of the things that matter to ratepayers and citizens, rather than continue with its current, very narrow managerial and corporate focus.

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1 Templates are available for 'territorial local authority', 'regional authority' and 'unitary authority'.

2 There are 11 regional councils (Northland, Waikato, Bay of Plenty, Taranaki, Hawkes's Bay, Horizons, Wellington, West Coast, Canterbury, Otago, Southland) and 6 unitary authorities (Auckland, Gisborne, Marlborough, Nelson, Tasman, Chatham Islands), the latter being territorial authorities also fulfilling the function of a regional council.

3 'Play around with our sentiment analyzer', https://monkeylearn. com/sentiment-analysis-online/. This online tool gives percentage and polarity of sentiment of text, the latter being either positive, neutral or negative.

4 The initial assessment for Far North District Council in 2017 and the subsequent assessment in 2021 does not show on the CouncilMARK website as at 6 March 2023.

5 In early 2023, Local Government New Zealand launched a professional development programme for council and community board members, Ākona, https://www.lgnz.co.nz/ news-and-media/2023-media-releases/akona-our-new-learning-development-programme-is-here.

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Appendix 1

CouncilMARK™ results as at March 2023

Participating Council (Councils that participated in CouncilMARK re-assessment shown in bold)	Report date	CouncilMARK Priority areas				Council MARK Overall rating*	Sentiment polarity and score (%) of Report Overview	Voter turnout	
		Governance, strategy, and leadership Leading Locally (LL)	*Financial decision-making and transparency* Investing Money Wisely (IMW)	*Service delivery and asset management* Delivering What's Important (DWI)	*Communicating and engaging with the public and business* Listening and Responding (LAR)			2019†	2022‡
Bay of Plenty Regional Council (RC)**	December 2020	6, Better than competent	5, competent	5, Competent	6, Better than competent	6, BBB	+94.3%	43.2%, FPP	
Central Hawke's Bay District Council☐ (SP/RU)	**November 2021**	**8, Stand-out**	**7, Performing well**	**7, Performing well**	**8, Standout**	**8, AA**	**(-71.9%)**		**43.89%**
	October 2018	**7, Performing well**	**4, Variable**	**3, Areas for improvement**	**7, Performing well**	**5, BB**	**+73.4%**	**56.7%, FPP**	
	Latest-earlier	**+1**	**+3**	**+4**	**+1**	**+3**		**-12.81%¶**	
Dunedin City Council (LM)	February 2019	6, Better than competent	8, Standout	6, Better than competent	7, Performing well	7, A	+95.8%	46.3%, STV	48.21%
								+1.91%	
Environment Canterbury (RC)	August 2018	7, Performing well	6, Better than competent	6, Better than competent	5, Competent	6, BBB	+79.1%	45.0%, FPP	
Far North District Council☐ (SM/LP)	**April 2021**	**5, Competent**	**6, Better than competent**	**5, Competent**	**5, Competent**	**5, BB**	**(+79.98%)**		**41.5%**
	October 2017	**4, Variable**	**5, Competent**	**4, Variable**	**6, Better than competent**	**4, B**	**N56.4%**	**47.5%, FPP**	
	Latest-earlier	**+1**	**+1**	**+1**	**-1**	**+1**		**-6.0%**	
Greater Wellington Regional Council (RC)	March 2018	6, Better than competent	8, Standout	7, Performing well	8, Standout	8, AA	+97.4%	43.4%, STV	
Hastings District Council (SM/LP)	October 2017	7, Performing well	6, Better than competent	6, Better than competent	7, Performing well	7, A	+74.1%	44.1%, FPP	32.95%
								-11.15%	
Hauraki District Council (SP/RU)	February 2019	8, Standout	5, Competent	**7, Performing well**	8, Standout	7, A	+98.1%	48.8%, FPP	40.6%
								-8.2%	
Horowhenua District Council☐ (SM/LP)	**August 2021**	**5, Competent**	**5, Competent**	**6, Better than competent**	**6, Better than competent**	**5, BB**	**(+52.6%)**		**45.07%**
	July 2017	**4, Variable**	**5, Competent**	**4, Variable**	**5, Competent**	**4, B**	**+95.2%**	**55.9%, FPP**	
	Latest-earlier	**+1**	**0**	**+2**	**+1**	**+1**		**-10.83%**	
Mackenzie District Council☐ (SP/RU)	**August 2021**	**5, Competent**	**3, Areas for improvement**	**5, Competent**	**6, Better than competent**	**4, B**	**(+79.1%)**		**54.56%**
	May 2018	**4, Variable**	**5, Competent**	**4, Variable**	**5, Competent**	**4, B**	**+63.9%**	**61.4%, FPP**	
	Latest-earlier	**+1**	**-2**	**+1**	**+1**	**0**		**-6.6%**	
Manawatū District Council☐ (SP/RU)	October 2019	5, Competent	5, Competent	7, Performing well	6, Better than competent	6, BBB	+94.2%	44.3%, FPP	44.35%
								+0.05%	
Masterton District Council☐ (SP/RU)	**February 2021**	**5, Competent**	**6, Better than competent**	**7, Performing well**	**7, Performing well**	**6, BBB**	**(+94.0%)**		**46.68%**
	October 2017	**5, Competent**	**5, Competent**	**5, Competent**	**5, Competent**	**5, BB**	**+93.9%**	**43.9%, FPP**	
	Latest-earlier	**0**	**+1**	**+2**	**+2**	**+1**		**+2.78%**	
Matamata-Piako District Council☐ (SM/LP)	July 2017	5, Competent	7, Performing well	5, Competent	6, Better than competent	6, BBB	+81.4%	51.3%, FPP	40.93%
								-10.37%	

CouncilMARK™ results as at March 2023 (continued)

Participating Council (Councils that participated in CouncilMARK re-assessment shown in bold)	Report date	CouncilMARK Priority areas				Council MARK Overall rating*	Sentiment polarity and score (%) of Report Overview	Voter turnout	
		Governance, strategy, and leadership Leading Locally (LL)	Financial decision-making and transparency Investing Money Wisely (IMW)	Service delivery and asset management Delivering What's Important (DWI)	Communicating and engaging with the public and business Listening and Responding (LAR)			2019†	2022‡
Napier City Council□ (SM/LP)	July 2017	7, Performing well	7, Performing well	6, Better than competent	6, Better than competent	7, A	+77.2%	50.8%. FPP	39.54%
								-11.26%	
Nelson City Council (SM/LP)	October 2017	4, Variable	4, Variable	5, Competent	5, Competent	5, BB	+90.2%	53.4%, FPP	51.14%
								-2.26%	
New Plymouth District Council (SM/LP)	July 2022	7, Performing well	7, Performing well	7, Performing well	7, Performing well	7, A	(+94.4%)		45.1%
	February 2019	6, Better than competent	6, Better than competent	5, Competent	7, Performing well	6, BBB	Not available	45.3%, STV	
	Latest-earlier	+1	+1	+2	0	+1		-0.2%	
Northland Regional Council (RC)	In preparation							40.2%, FPP	
Ōtorohanga District Council (SP/RU)***	December 2020	3, Areas for improvement	4, Variable	4, Variable	3, Areas for improvement	3, CCC	N51.0%	47.6%, FPP	44.05%
								-3.6%	
Porirua City Council (SM/LP)	July 2017	5. Competent	6, Better than competent	4, Variable	7, Performing well	6, BBB	+56.9%	41.0%, STV	37.3%
								-3.7%	
Queenstown Lakes District Council (SM/LP)	July 2017	5, Competent	6, Better than competent	4, Variable	7, Performing well	6, BBB	+79.4%	50.3%, FPP	43.05%
								-7.25%	
Rangitikei District Council□ (SP/RU)	June 2022	5, Competent	6, Better than competent	6, Better than competent	5, Competent	5, BB	(+71.6%)		46.0%
	October 2017	5, Competent	7, Performing well	5, Competent	5, Competent	5, BB	+91.9%	47.4%, FPP	+79.4%
	Latest -earlier	0	-1	+1	0	0		-1.4%	
Ruapehu District Council□ (SP/RU)	February 2021	5, Competent	5, Competent	5, Competent	7, Performing well	6, BBB	(+48.9%)		48.91%
	July 2017	4, Variable	3, Areas for improvement	6, Better than competent	7, Performing well	5, BB	+88.0%	50.6%, STV	
	Latest-earlier	+1	+2	-1	0	+1		-1.69%	
South Taranaki District Council□ (SP/RU)	November 2020	6, Better than competent	5, Competent	5, Competent	6, Better than competent	6, BBB	(+96.9%)		39.3%
	October 2017	6, Better than competent	6, Better than competent	6, Better than competent	5, Competent	6, BBB	+92.5%	48.3%, FPP	
	Latest-earlier	0	-1	-1	+1	0		-9.0%	
Tararua District Council□ (SP/RU)	October 2018	5, Competent	6, Better than competent	5, Competent	6, Better than competent	5, BB	+65.1%	52.1%, FPP	48.11%
								-3.99%	
Taupō District Council (SP/RU)	July 2022	6, Better than competent	7. Performing well	6, Better than competent	6, Better than competent	7, A	(+93.8%)		46.05%
	February 2018	5, Competent	6, Better than competent	5, Competent	6, Better than competent	6, BBB	+92.3%	54.4%, FPP	
	Latest-earlier	+1	+1	+1	0	+1		-8.35%	

CouncilMARK™ results as at March 2023 (continued)

Participating Council (Councils that participated in CouncilMARK re-assessment shown in bold)	Report date	CouncilMARK Priority areas				Council MARK Overall rating*	Sentiment polarity and score (%) of Report Overview	Voter turnout	
		Governance, strategy, and leadership *Leading Locally (LL)*	*Financial decision-making and transparency* *Investing Money Wisely (IMW)*	*Service delivery and asset management* *Delivering What's Important (DWI)*	*Communicating and engaging with the public and business* *Listening and Responding (LAR)*			2019†	2022‡
Upper Hut City Council☐ (SM/LP)	**November 2021**	**5, Competent**	**4, Variable**	**5, Competent**	**4, Variable**	**5, BB**	**(+86.4%)**		**43.15%**
	August 2018	5, Competent	4, Variable	5, Competent	5, Competent	5, BB	+91.6%	43.9%, FPP	
	Latest-earlier	0	0	0	-1	0		-0.75%	
Waikato Regional Council (RC)	October 2017	6, Better than competent	8, Standout	7, Performing well	6, Better than competent	7, A	+89.6%		
Waimakariri District Council☐ (SM/LP)	**July 2020**	**7, Performing well**	**8, Standout**	**7, Performing well**	**7, Performing well**	**8, AA**	**(+91.1%)**		**44.6%**
	October 2017	8, Standout	7, Performing well	6, Better than competent	7, Performing well	8, AA	Not available	47.0%, FPP	
	Latest-earlier	-1	+1	+1	0	0		-2.4%	
Wairoa District Council☐ (SP/RU)	**April 2021**	**6, Better than competent**	**4, Variable**	**5, Competent**	**7, Performing well**	**5, BB**	**(+85.3%)**		**53.2%**
	October 2017	3, Areas for improvement	4, Variable	5, Competent	5, Competent	3, CCC	N46.4%	51.4%, FPP	
	Latest-earlier	+3	0	0	+2	+2		+1.8%	
Waitaki District Council (SM/LP)***	December 2020	6, Better than competent	5, Competent	7, Performing well	7, Performing well	6, BBB	+72.7%	55.8%, FPP	45.5%
								-10.3%	
Whakatāne District Council☐ (Small Metro and Provincial)	October 2017	4, Variable	5, Competent	5, Competent	6, Better than competent	5, BB	+88.3%	52.0%, FPP	45.3%
								-6.7%	
Whanganui District Council (SM/LP)***	April 2020	4, Variable	5, Competent	6, Better than competent	5, Competent	5, BB	+96.8%	44.1%, FPP	46.44%
								+2.34%	

* CouncilMARK ratings: C, underperforming; CC, areas of improvement (required in more than 2 areas); CCC, areas of improvement (required in two areas); B, areas of improvement (required in one area); BB, competent; BBB, some areas of strength, overall competent; A, some areas of strength and leadership; AA, strong grades in most priority areas; AAA, exemplary

** Types of council: RC, regional council; SP/RU, small provincial and rural; SM/LP, small metro and large provincial

*** Excluded from any analysis involving 2019 local authority elections because CouncilMARK report post-dated the election

† 2019 Local Authority Election Statistics. Electoral process used: FPP, First-past-the-post; STV, single transferable vote, https://www.dia.govt.nz/Services-Local-Elections-Local-Authority-Election-Statistics-2019#three

‡ Final voter turnout results – Vote 22. https://www.votelocal.co.nz/final-voter-turnout-results/ Data for regional councils were not included in the compilation

¶ The voter turnout in 2022 declined in most council areas, despite pre-election media publicity about historic trends in voter turnout and a campaign by Local Government New Zealand https://www.votelocal.co.nz/final-voter-turnout-results/

☐ This Council is a member of 'Communities for Local Government' (https://www.communities4localdemocracy.co.nz/), which "is a new local government action group committed to working with central government to ensure all New Zealanders have access to safe drinking water and that all of our local communities continue to have a say on the use of assets purchased on their behalf using ratepayer funds". In essence, the group is opposed to the ownership arrangements envisaged in the Three Waters Reform (https://www.dia.govt.nz/Three-Waters-Reform-Programme).

Appendix 2

Changes in CouncilMARK™ scores between successive assessments (compiled from Appendix 1).

Participating Council	Type*	Change in scores for CouncilMARK Priority areas				Change in CouncilMARK Overall rating	Changes in derived parameters†	
		Governance, strategy, and leadership Leading Locally (LL)	*Financial decision-making and transparency* Investing Money Wisely (IMW)	*Service delivery and asset management* Delivering What's Important (DWI)	*Communicating and engaging with the public and business* Listening and Responding (LAR)		*Stakeholder oriented score* (LL + LAR)/2	*Management oriented score* (IMW+DWI)/2
Central Hawkes Bay‡	SP/RU	+1	+3	+4	+1	+3	+1	+3.5
Far North ‡	SP/RU	+1	+1	+1	-1	+1	0	+1
Mackenzie‡	SP/RU	+1	-2	+1	+1	0	+1	-0.5
Masterton	SP/RU	0	+1	+2	+2	+1	+1	+1.5
Rangitīkei	SP/RU	0	-1	+1	0	0	0	0
Ruapehu‡	SP/RU	+1	+2	-1	0	+1	+0.5	+0.5
South Taranaki‡	SP/RU	0	-1	-1	+1	0	+0.5	-1
Taupō	SP/RU	+1	+1	+1	0	+1	+0.5	+1
Wairoa ‡	SP/RU	+3	0	0	+2	+2	+2.5	0
Average SP/RU	SP/RU	+0.89	+0.44	+0.89	+0.67	+1.0	+0.78	+0.67
Improved	No., (%)	6, (67%)	5, (56%)	6, (67%)	5, (56%)	6, (67%)	7, (78%)	5, (56%)
Unchanged	No., (%)	3, (33%)	1, (11%)	1, (11%)	3, (33%)	3, (33%)	2, (22%)	2, (22%)
Deteriorated	No., (%)	0	3, (33%)	2, (22%)	1, (11%)	0	0	2, (22%)
Horowhenua‡	**SM/LP**	**+1**	**0**	**+2**	**+1**	**+1**	**+1**	**+1**
New Plymouth‡	**SM/LP**	**+1**	**+1**	**+2**	**0**	**+1**	**+0.5**	**+1.5**
Upper Hutt‡	**SM/LP**	**0**	**0**	**0**	**-1**	**0**	**-0.5**	**0**
Waimakariri‡	**SM/LP**	**-1**	**+1**	**+1**	**0**	**0**	**-0.5**	**+1**
Average SM/LP	SM/LP	+0.25	+0.5	+1.25	0	+0.5	+0.13	+0.88
Improved	No., (%)	2, (50%)	2, (50%)	3, (75%)	1, (25%)	2, (50%)	2, (50%)	3, (75%)
Unchanged	No., (%)	1, (25%)	2, (50%)	1, (25%)	2, (50%)	2, (50%)	0	1, (25%)
Deteriorated	No., (%)	1, (25%)	0	0	1, (25%)	0,	2, (50%)	0
Average, all participating councils		+0.69	+0.46	+1	+0.46	+0.85	+0.58	+0.73
Improved	No., (%)	8, (62%)	7, (54%)	9, (69%)	6, (46%)	8, (62%)	9, (69%)	8, (62%)
Unchanged	No., (%)	4, (31%)	3, (23%)	2, (15%)	5, (38%)	5, (38%)	2, (15%)	3, (23%)
Deteriorated	No., (%)	1, (8%)	3, (23%)	2, (15%)	2, (15%)	0	2, (15%)	2, (15%)

*SP/RU, Small provincial and rural; SM/LP, Small metro and large provincial
† For details on these parameters, see Hodder (2019)
‡ This Council is one of 30 members of 'Communities for Local Democracy' (https://www.communities4localdemocracy.co.nz/)

Derek Gill

Government as a Digital Standard Bearer

Abstract

This article explores the key role the government can play in promoting the digital economy through the uptake of global digital standards. The potential of digital standards can be illustrated by the revolutionary impact in the 20th century of the introduction of barcodes on logistics, and the impact of standardised containers in accelerating the growth of world trade and global economic integration. In the 21st century, will digital platforms and standards play a similar role in enabling economic development in the information age?

The key challenge in the digital standards space is for the government to find the sweet spot that is the equivalent of the Goldilocks zone – neither too hot nor too cold: this is where the government acts as a digital standard bearer – establishing the overall regulatory regime and then acting as an agile fast follower, not the leader getting out in front or going alone.

Keywords digital government, data standards, GS1 global standards, New Zealand Business Number (NZBN)

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Introduction – digital government is lagging behind the digital economy[1]

The Australian Productivity Commission and New Zealand Productivity Commission observed in a 2019 report:

> Digital technologies have transformed nearly every aspect of daily interactions between households, firms and governments … The efficiency and effectiveness of interactions with government agencies – from registering a motor vehicle to completing a tax return – have been improved using digital technologies. But 'digital government' remains far from a reality.

The report goes on to conclude:

> Despite the plethora of government policies and bodies in this space, the process of digitalising government services has not kept up with technological developments, nor with firm and consumer use of digital technology … digital government on both sides of the Tasman is something of a patchwork – some government

Box 1 **Chronology of the main digital government initiatives in New Zealand**

2000: E-government strategy adopted, and a special unit established in the State Services Commission

2005: National Digital Strategy adopted (updated in 2008)

2009–17: Better Public Services goals include two result areas focused on digital (updated in 2017):
- Result 9: Business gains value from easy and seamless dealings with government
- Result 10: People have easy access to public services, which are designed around them, when they need them

2010: Role of government chief information officer (GCIO) created as the functional leader of the ICT strategy based in the Department of Internal Affairs

2013: Government ICT strategy and action plan for New Zealand approved by the government (updated in 2015). The New Zealand Data Futures Forum established (phased out in 2018)

2015: Four functional leads created: government chief digital officer, government chief data steward, government chief information security officer and government chief privacy officer

2015: Digital Government Partnership established with stakeholders from government agencies (disestablished in 2019)

2016: ICT strategy updated, replacing the action plan with an integrated work programme

2019: Strategy for a Digital Public Service released

2022: Digital Strategy for Aotearoa released

services are highly digitalised, integrated and provide a good user experience, while others are confusing, siloed and still partly paper-based. (Australian Productivity Commission and New Zealand Productivity Commission, 2019, pp.1–3, 63)

Nevertheless, New Zealand, while slightly behind pacesetters like Korea, Denmark and Estonia, ranks reasonably highly in world surveys on digital government and the digital economy.[2] One 2017 survey ranked New Zealand's digital economy a 'standout among standouts', meaning a country that is both highly digitally advanced and exhibiting high momentum, but without being in the top group of countries on either dimension (Chakravorti and Chakravorti, 2017). In effect, New Zealand is a top-rate second-rate player in the digital space.

The New Zealand digital economy is something of a paradox
New Zealand's digital economy is thriving: there are many successful games producers,

a number of software providers (such as Xero) have gone global, and Trade Me is the only instance (outside China) where eBay has been beaten by a local product. In the public sector, the power of information technology has been successfully harnessed in a number of specific applications. The New Zealand Companies Office has long been a world leader, and New Zealand has consistently ranked first in the World Bank's ease of doing business index. Despite these leading-edge examples, we do not seem able to scale up these innovations across the public sector. New Zealand's digital government approaches have not been enduring: changes of government result in new strategies being developed. And despite digitisation's obvious 'network' effects and clear association with economies of scale, there is little obvious central leadership, with responsibilities spread across a range of agencies and roles.

Box 1 highlights the changing institutional arrangements and plethora of digital strategies, which generally had a short 'use by' date. It is an open question how much these top-down arrangements

contributed to the development of digital government in New Zealand. The New Zealand experience shows that it is possible to achieve high rankings for digital government and the digital economy from bottom-up initiatives without much contribution from top-down digital strategies. Arguably, the most important drivers arose from the wide-ranging public management reforms of the 1980s and 1990s, which enabled individual public agencies to more readily take the initiative to adopt ICT into their business models

The government plays a pivotal role in society. Its monopoly on the exercise of coercive powers makes it uniquely well placed in the digital space to promote standards (see Box 2) and develop platforms based on datasets with universal coverage, but the use of that coercive power is a two-edged sword. There are restrictions on how that information can be used because of other policy objectives, such as privacy and the need to protect against re-identification. Data re-identification or de-anonymisation involves matching anonymised or de-identified data with other data to identify the individual concerned. Re-identification is a problem because government-held data on citizens and business data can be used for unintended purposes, including for criminal use.

Transformational change through standardisation
Recent world economic history provides two examples of transformational change brought about by standardisation: barcodes and container sizes.

Since the 1960s the introduction of barcodes and associated data standards has affected labour productivity in two ways: they increased labour productivity by accelerating work throughput; and they generated labour cost savings from a combination of automation, eliminating tasks, reducing errors and removing duplication. But the transformational change brought about by barcodes involves much more than cost reductions. They profoundly affected the supply and logistics sector, and enabled the growth of market research through the improved visibility of consumer behaviour (Basker, 2011).

Containerisation has been a major driver of globalisation. Use of containers

started in the 19th century and developed slowly thereafter, but the breakthrough came in 1956 with the introduction of standardised containers. Containers provided more than just a better means of shipping goods from one port to another; they transformed the whole logistics chain from factory to the final destination. The growth in containerisation led to dramatic reductions in transport costs, which transformed production through allowing global value chains. The impact of international standardised containers was more important for the growth of world trade after World War II than successive rounds of tariff reductions (Levinson, 2006).

Global data standards could be transformational

In the digital space, both public and private data standards are important. While New Zealand has a significant high-tech sector, it is largely a technology taker, so the relevant private standards are largely developed offshore. New Zealand has been active in contributing to the development of several global public digital standards, but is generally more of an adopter (and adapter) of public standards rather than an initiator.

There is also a plethora of competing private standards. ICT development is led out of the private sector, and this has produced a wide array of both proprietary and open standards. Bluetooth is a classic example of an open standard. Apple is an example of an ecosystem of proprietary private standards.

The government has an important role to play in supporting the adoption of global data standards that can be readily adapted to a range of applications. The potential role of the state can be illustrated by examining the impact of GS1 digital standards, including a case study of the New Zealand Business Number (NZBN), a digital platform based on GS1.

GS1 – a key part of the global digital standard architecture

GS1, an international non-profit organisation, is a key part of a global ecosystem of public and private standards, along with domain-specific regimes such as the International Standard Book

Box 2 Standards can be a two-edged sword

Standards can be hugely beneficial by reducing switching costs to consumers and enabling producers to achieve economies of scale. As Swan observed, 'Several detailed econometric studies have established a clear connection at a macroeconomic level between standardisation in the economy, productivity growth and overall economic growth ... Estimates vary somewhat from study to study, but overall, the growth of the standards catalogue over recent years may account for between one eighth and one quarter of productivity growth over the period' (Swann, 2020, p.i).

The benefits of standards extend beyond cost savings and productivity gains to include the building of competencies, reducing barriers to entry, building network effects and increasing trust between trading partners (Swann, 2020).

However, standards can have a downside if they aren't set well, particularly if they are derived with a specific technology in mind. Standards development is often very path dependent (examples include VHR vs Betamax videos; Phillips vs Robertson flathead screws). The potential for lock-in is particularly high with the use of proprietary solutions based on one technology or business model.

Private standards, even though they are voluntary, can have similar effects to non-tariff measures introduced by governments in creating non-tariff barriers. Research in the food sector commissioned by the APEC Business Advisory Council discusses how private standards mimic non-tariff measures introduced by regulation: for example, the requirement by some businesses for standardised package sizes for fresh fruit precluded trade in pineapples (APEC Business Advisory Council, 2016, pp.66-7).

Number (ISBN), GPS for geo-spatial data and SWIFT in international finance.[3]

GS1 provides global data standards that can be applied to the global supply chain by regulators, public border agencies, exporters, logistics providers, wholesalers, retailers and consumers. The aim is to have standards created by industry, for industry, with GS1 acting to facilitate a dialogue among business and technical experts. These standards are developed through a global standards management process which is a community-based forum for businesses to work together and develop standards-based solutions (GS1, n.d.-a).

Significant gains and untapped potential
Studies of the impact of GS1 on both non-tradeables and the trade sector in New Zealand show that, while GS1 has yielded significant gains, considerable potential gains have yet to be realised.

A report by NZIER (NZIER, 2019) identified several applications of GS1:
• E-commerce: GS1 data standards support e-commerce through the accurate representation of product

characteristics such as specifications, location and origin. For example, Amazon requires a unique product identifier, known as a GTIN (global trade item number), to create new listings; Google adopted the GTIN in 2015.[4]
• E-invoicing: a joint study by the Australian Taxation Office and New Zealand government (Australian Government, Australian Taxation Office and New Zealand Government, 2018) estimated that e-invoicing using standards could result in cost savings for the Australian economy of A\$28 billion over ten years.
• Product compliance: a scoping study of electronic tracking of construction materials showed a reduction in the incidence and cost of non-compliance, saving the industry NZ\$23 million annually (Dowdell, Page and Curtis, 2017).
• Exporting: automated information in the export supply chain using GS1 standards reduced manual entry errors, resulting in Australian meat exporters

saving an estimated A$14 million each year (GS1, n.d.-c; GS1 Australia, n.d.).

- Traceability: GS1 data standards can be used to trace the origins of imported food. Some consumers are willing to pay more for traceable food compared to food that is not traceable: Koreans indicated they were willing to pay 39% more for traceable imported beef products compared to non-traceable products (Lee et al., 2011).
- Authenticity: standards can also be used to protect against counterfeiting (GS1, n.d.-b).
- Product recall: GS1 standards provide a platform for product recall.[5]

NZIER studied the impact of GS1,

The gains from standards architecture rise exponentially with increased uptake

GS1 is an interesting case because it is a particular type of public good – a club good that is non-rival but excludable. GS1 provides an excellent example of how a standards architecture has network effects: the more businesses adopt the architecture, the more valuable it is to everyone in the club. Metcalf's law – that the gains raise exponentially with increased uptake – highlights the potential opportunity. The state has a particularly important role to play as a digital standard bearer where regulatory approvals such as safety checks and customs clearance are an integral part of value chains.

Several global digital standards are underway

There are several multi-country initiatives underway to promote the adoption of international standards, such as the European Commission's Strategy on Standardisation (European Commission, 2022) and the International Chamber of Commerce (ICC) Digital Standards Initiative (ICC, 2023). The ICC initiative is aiming to address the fragmentation in current attempts to digitise the global trading system by mapping out what standards already exist (and how they co-exist), exploring how they can best be leveraged to help drive wider adoption, and creating new frameworks to unify digital trade processes.

But there are costs

History teaches us that there are also considerable obstacles to the process of standardisation. For example, standardising container sizes was highly path dependent, and switching costs were a major obstacle. While there were major network effects and spillover benefits, these were often dissipated rather than concentrated on those actors that faced the switching costs. The government played a pivotal role in ensuring the potential network effects of standardised containers were realised.

Once standards are established, switching costs are higher and vested interests (including accreditation and certification agencies) have an interest in their continuation. History provides numerous examples of 'standards wars', in which inferior technical standards end up dominating standards with superior performance – such as QWERTY over Dvorak keyboards, VHS over Betamax video format, and Phillips over Robertson screw heads (Shapiro and Varian, 1999).

> The government has a crucial supporting role by proactively encouraging adoption of common standards and not going it alone by developing bespoke stand-alone regulatory regimes or unique standards for public data services.

focusing on the effect of these data standards on labour costs and labour productivity with existing penetration of the wholesale and retail industries (non-traded sector). It found that the labour productivity gains of using the GS1 data standards had directly increased GDP by NZ$417 million, or 0.15%, annually. This estimate is a conservative indication of the contribution of GS1 to the New Zealand economy, because it only focuses on the impact of labour productivity. Additional contributions include:

- connectivity, by making further connections easier;
- credibility gains by having one source of truth – the source documents – for all accredited parties in the supply chain; and
- insights gained by generating more granular data to support better data analytics.

The New Zealand Business Number leverages the GS1 system

The New Zealand Business Number (NZBN) is an archetypal platform where the government provides trusted curated data in readily available formats, including APIs that enable the private sector to develop value-added processes. NZBN provides a model example of how the government can play a key role by providing open platforms that anyone can build on. The business case recognised the spillover benefits accrued to all the members of the network, which went way beyond the direct benefits to individual members. By requiring all public agencies to adopt the NZBN platform, the government is playing an important role in enabling the uptake of digital approaches. This is an interesting precedent for the wider adoption within the New Zealand government of global data standards.

Are global digital standards the next big thing?

Container sizes and barcodes both provide historical examples of how standardisation generated significant, indeed transformational, change. These examples highlight the potential for further transformational change from the widespread adoption of global standards generally. The discussion of GS1 standards has highlighted the significant impact on

both tradeable and non-tradeable sectors of more widespread adoption of global data standards. The government has a crucial supporting role by proactively encouraging adoption of common standards and not going it alone by developing bespoke stand-alone regulatory regimes or unique standards for public data services.

Policy implications – what is to be done?
The preceding discussion has focused on digital platforms and standards. That is not to say that the government is limited to a supporting handmaiden role in the wider digital space. The Australian and New Zealand productivity commissions' joint 2019 report highlights a wide range of policy issues where the government must take a lead, including consumer protection, competition policy, taxation and cyber security. Digital exclusion – lacking the capability, opportunity and motivation to use the internet to realise meaningful benefits – also needs to be addressed. Emerging artificial intelligence tools like ChatGPT raise new challenges. Small countries can't afford to go it alone, as any domestic requirements need to be nested in wider international agreements and practices.

There are several features of the digital domain that make designing robust public interventions difficult, including the speed of technological development, the presence of competing, often proprietary, standards, privacy (including data disaggregation), and the competing 'data realms' – the US, the EU and the great firewall of China. In a domain as dynamic as digital, the risk of government failure is as real as market failure risk.

The research that this article draws from has used New Zealand cases to explore the role of the government in promoting the digital economy through the uptake of digital platforms and standards. It suggests that the state can play an important, but ultimately limited, role in supporting the development of the digital economy. The discussion of standards highlighted the importance of the adoption of global standards rather than developing stand-alone domestic standards. Cross-country standards initiatives – the European Commission's Strategy on Standardisation and the ICC's Digital Standards Initiative – provide a window of opportunity to expand the role of standards globally.

The government has the power to pick winners, and this gives it influence over outcomes associated with digital government. However, just because the government can select a particular platform or standard does not automatically mean it will be good at comparing options and understanding market trends. Historical examples of the difficulty of picking winners are the failed attempt to apply the New Zealand E-government Interoperability Framework (State Services Commission, 2008), which also had a short (two-year) shelf life, and the failure of the government interoperability standard (GOSIP)[6] when the private sector was

rapidly innovating with new desktop software, such as email, spreadsheets and word processing.

In response, governments interested in the potential of digital government can equip themselves with two sources of sectoral knowledge. First, governments need a high-quality trusting relationship with business leaders at the forefront of standards and platforms so that they have access to the latest trends and emerging themes. This access to emerging areas of interest is particularly important in the high-tech sector, where new platforms or technologies can disrupt and displace others. Second, access to private sector knowledge needs to be balanced by having the capability within the bureaucracy to act as an independent and impartial interpreter. Currently that capability is spread across several different agencies, with four distinct roles: the government chief digital officer, the government chief data steward, the government chief information security officer and the government chief privacy officer.

The New Zealand experience also emphasises the importance of bottom-up initiatives in securing the potential gains from adopting digital technologies. That is not to say that top-down initiatives are not important. Digital strategies are useful for lending legitimacy and support to digital government initiatives by general direction setting and articulating a shared narrative. More importantly, top-down initiatives can be required to provide some of the prerequisites needed to achieve the full potential of digital technology.

These top-down initiatives need to focus on where there are significant network effects, and where credible private solutions are not

> The approach to digital government has focused on technical standards, such as web access to support the government digital architecture ... rather than the digital transformation of New Zealand ...

readily available. Digital identity is a good example of such, as there are significant network effects but the market for identity solutions is fragmented, with many competing technologies being used. The NZBN provides an example of a platform that meets that prerequisite by providing a single accepted form of standardised digital identity for corporate entities.

Conclusion – government as a digital standard bearer, leading by being a fast follower
The New Zealand government does not appear to have a sustained focus on the potential role of global data standards, and global standards more generally. The approach to digital government has focused on technical standards, such as web access to support the government digital architecture (part of the government chief digital officer's mandate), rather than the digital transformation of New Zealand (for which the mandate lies with the Ministry of Business, Innovation and Employment).

Global data standards could fall under the Digital Strategy for Aotearoa recently developed by MBIE, but there was no mention in the consultation document of the role of global standards and how this issue could be addressed, and the final strategy has no sustained discussion of data standards and one passing mention of ISO standards (New Zealand Government, 2022). While the issue of global data standards, and standards generally, is on the radar of MBIE departmental officials involved, there is no evidence of substantive policy analysis underway to move the issue forward.

While much has been achieved from applying digital technologies to government services in New Zealand, these improvements have been patchy and often incremental rather than transformative. Looking forward, the government's main role needs to be as a fast follower, not a leader. This approach requires actively tracking and building on the lead that others have taken rather than going it alone or proactively picking winners. An active supportive role will be critical in achieving network effects and accelerating important initiatives, such as digital identity. The government's main roles are to establish the overall legal framework and then to be a fast follower and digital standard bearer.

1 This article in drawn from the New Zealand country chapter in a forthcoming book, *Promoting Digital Government and Online Public Services*, being published by the Economic Research Institute for ASEAN and East Asia later in 2023.
2 The United Nations survey ranks New Zealand fourth on e-participation and eighth on e-government of 193 countries – see https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/122-New-Zealand. Similarly, the OECD ranks New Zealand 12th out of 37 countries in its Digital Government Index – see https://www.oecd-ilibrary.org/docserver/4de9f5bb-en.pdf?expires=1643676906&id=id&accname=guest&checksum=0B153FFF2ED7FDE0A5AA4F2A6DAF2CE2.
3 Incoterms, or International Commercial Terms, a series of predefined commercial terms published by the International Chamber of Commerce relating to international commercial law, is another example of standardisation.
4 https://sellercentral.amazon.com/gp/help/external/200317470; https://developers.google.com/search/blog/2021/02/product-information.
5 The GS1 classification code GPC is used in the OECD Global Recalls portal as a mandatory attribute https://globalrecalls.oecd.org/.
6 The Government Open Systems Interconnection Profile (GOSIP) was a technical standard for open networking products used by governments in the late 1980s and early 1990s. In practice it went out of use, apart from the odd specialised security application, with the arrival of the internet.

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Michael Fletcher

Were We Being Sold a Lemon?

Analysing the distributional implications for those Labour's proposed social insurance scheme would have covered

Abstract

In February 2023, the Labour government announced that it was shelving its proposed income insurance scheme for now, but indicated that the scheme may be revived if Labour is re-elected in October. The proposal raised many equity and efficiency issues, including the inequities of a two-tier system which favours workers who would be covered by the scheme ahead of others who would not. This article focuses on differences in outcomes *within* the insured group. Using a family vignette methodology, it finds that the scheme, layered on top of existing welfare provisions, would have been highly regressive and poor value for money for many low- and middle-income families.

Keywords social welfare, social insurance, unemployment insurance, model-family analysis, New Zealand

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At his second post-Cabinet press conference as prime minister on 8 February 2023, Chris Hipkins announced that the government was shelving its proposed New Zealand Income Insurance Scheme. The dropping of the scheme was part of a so-called policy reprioritisation first signalled by his predecessor, Jacinda Ardern, in late 2022, and which involved ending, deferring or amending a number of major government policy initiatives ahead of the October 2023 general election. Behind-the-scenes policy and legislative work for the social insurance scheme was already well advanced. Although ministers never gave a firm timetable publicly, a September 2022 briefing note released to me later by the Ministry of Business, Innovation and Employment (MBIE) included a timeline that had legislative drafting instructions for the Parliamentary Counsel Office completed by mid-September and the bill introduced to Parliament in December 2022 (Ministry of Business, Innovation and Employment, 2022). The obvious delays in this MBIE timetable suggest that

the idea of dropping the policy was possibly being actively considered from sometime towards the end of 2022, well before Jacinda Ardern's January announcement that she had decided to step down as prime minister.

Hipkins' comments were ambiguous as to whether the social insurance proposal was being axed or just deferred. He stated that 'social insurance will not proceed as previously proposed' and also signalled a wider consideration of options, stating that 'work will be continuing to consider the best ways to address inequalities in the current system in the longer term, when the economy is better positioned to make that change' (Hipkins, 2023, p.1).

Questioned at the press conference, however, Hipkins also noted that there are a range of options to deal with inequities in the system and that 'the income insurance that was on the table was one possible option for doing that but that there are others as well' (ibid., p.5). It is therefore quite possible that the insurance proposal will resurface next year if Labour wins the election. Given this, the analysis in this article remains important and will, it is hoped, help inform comparisons with alternative policy options.

The article uses a family vignette methodology to analyse the net benefit scheme contributors could have expected to have gained from the scheme if they experienced a job loss. The net benefit in excess of existing welfare entitlements, rather than the gross insurance payout, is a critical parameter for assessing the proposal for contributors because it compares scheme levy contributions

against the additional financial support provided by the insurance scheme. It is an aspect of the central policy issue for the scheme, that of additionality. As one submission expressed it: 'How much additional support would social insurance add to existing institutions to cushion families' short-term consumption when people lose jobs?' (Chapple, 2022, p.13). Welfare and social assistance programmes are, of course, only one such institution, but the net benefit of insurance cover over and above the existing set of programmes provides a baseline before considering other sources, such as private savings, potentially available for consumption-smoothing purposes.

Information and transparency issues
The analysis in this article is based on the design of the scheme as set out in *A New Zealand Income Insurance Scheme: a discussion document*, which was released on 2 February 2022 by the Future of Work Tripartite Forum, a committee comprising government, Business New Zealand and the New Zealand Council of Trade Unions (NZCTU) representatives (Tripartite Unemployment Insurance Working Group, 2022). At the time of writing, efforts to find out if, and if so how, the final version of the scheme the government intended to introduce differed from the discussion document proposal have been unsuccessful. In September 2022 I sought information from MBIE relating to advice provided on the scheme, but my request was declined, citing section 9(2)(f)(iv) of the Official Information Act 1982 relating to maintaining the confidentiality of advice tendered by ministers and

officials. I renewed that request after the prime minister announced that the scheme was no longer being progressed. After the maximum response time of 20 working days, I received a reply refusing to release most of the relevant documents, citing section 18(d) of the Act, which says that information does not have to be released if it is already or will soon be publicly available. With wonderfully Orwellian use of language, the MBIE letter stated that most of the papers I had requested were to be 'proactively released' and would be on their website within eight weeks.[1] By making use of two different sections of the Act, MBIE has been able to create a 12-week delay in providing me with information that should be released. I am currently waiting on a decision by the ombudsman as to whether a gap of up to 12 weeks between my request and release of the information is an acceptable interpretation of 'soon' in the context of this section of the Act. Desirably, it would have been the system set out in these documents that I would be modelling below.

Even if technically within the letter of the law, MBIE's (and ministers' offices?) behaviour suggests a focus on information management that is not in keeping with good public policymaking and inclusion of the public's views. While I have yet to see the content of the papers, this appears to be reinforced by the fact that two of the withheld Cabinet papers, 'New Zealand Income Insurance: detailed design' and 'New Zealand Income Insurance: agreement to proceed', are dated 16 June 2022. This date, which suggests the details of design were basically settled and agreed by Cabinet, is almost three months before the MBIE paper 'Report summarising NZII submissions' went to ministers (13 September 2022). The clear implication is that the time and effort New Zealanders spent on the 255 public submissions on the discussion document had little or no impact on the design of the scheme.

The insurance scheme as proposed in the February 2022 discussion document
The broad parameters of the scheme as it was proposed were very simple, even if the detail would be far from straightforward. Eligible contributors were to receive 80% of their prior earnings for a period of up to

> Eligible contributors were to receive 80% of their prior earnings for a period of up to six months if they lost their job as a result of displacement … or because they had to stop work because of a health condition or disability.

six months if they lost their job as a result of displacement (redundancy or lay-off) or because they had to stop work because of a health condition or disability. It was proposed that a cap on the maximum level of earnings that would be covered be set equal to the existing Accident Compensation Act cap, which in 2022 was $130,911 per annum. The self-employed would not be covered and neither would many workers on temporary migrant visas (although the latter would have to pay the levies). Eligibility to receive a payout would require a minimum of three months' levy-paying employment in the previous 18 months. The discussion document proposed that a work-test obligation would apply to those receiving insurance payouts, although the conditions of this work test were to have been unusually light, as a person would not be required to accept any job that had lesser pay or conditions than their previous employment. In addition to the insurance cover, employers would have been required to pay four weeks' 'bridging payment' or compulsory redundancy pay (at 80%) in the case of job displacement (but not if the employee leaves their job because of sickness). This requirement was intended to reduce the incidence of gaming of the scheme by collusion between employers and employees. Existing redundancy agreements in individual and collective employment agreements would remain over and above the insurance provisions unless they were negotiated away by the parties.

Many Western developed countries have Bismarckian social insurance-based schemes to cover social security in the event of job loss, while New Zealand, Australia and the United Kingdom have Beveridgean tax-funded income support provisions.[2] While, on the face of it, the insurance-based schemes can be thought of as focusing on compensation for loss (for those who qualify), whereas the tax-funded approach is based on meeting minimum needs, the distinction is in fact more blurred. Different countries use the design parameters of their social insurance schemes in different ways to focus the schemes more or less tightly on protection against hardship and on meeting need. For example, the Scandinavian countries typically have a high replacement ratio (the percentage of

Figure 1: Comparison of replacement ratio and maximum payment of proposed New Zealand scheme and Danish, Swedish and German unemployment insurance schemes
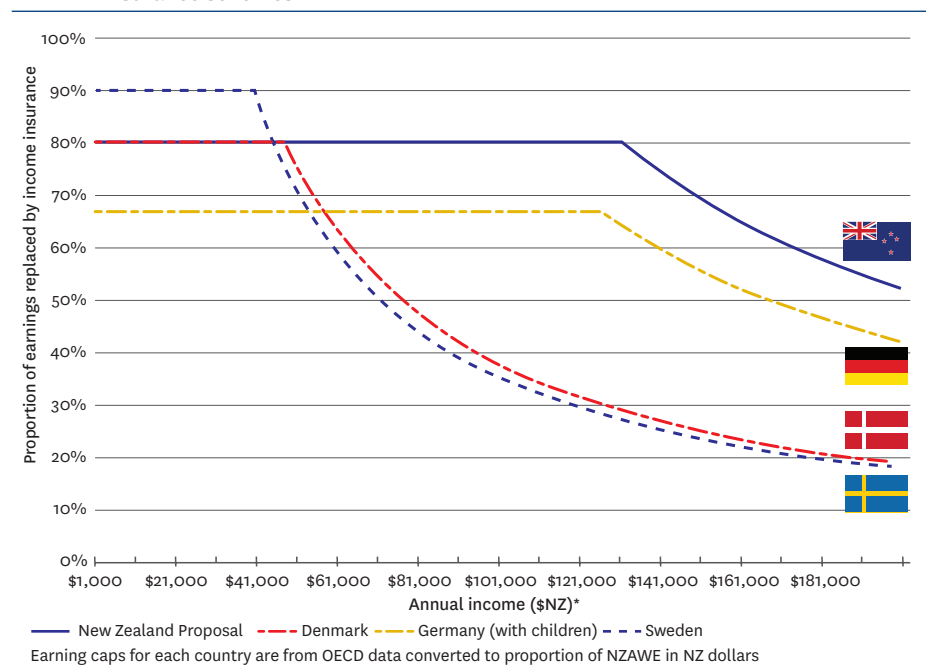
Source: Fletcher, 2022. Notes and sources: Data on schemes are taken from the OECD tax–benefit model policy descriptions (2020 year). Data on average weekly earnings are taken from the OECD database (2020 year). In the case of Germany, the replacement ratio for people without dependent children is lower than shown in this figure (60%). The earnings cap for each European country has been converted to a proportion of the New Zealand average weekly earnings to allow cross-country comparisons. Other methods of comparison, such as PPPs or direct currency conversions, would produce slightly different results.

prior income that is replaced) but a low earnings cap. Germany has a somewhat higher cap, but a lower replacement ratio (60% or 66% for people with dependent children).

New Zealand's proposal is unusual internationally in that it would have had both a high cap and a high replacement ratio (see Figure 1). These two parameters were taken from the existing accident compensation (ACC) scheme, presumably for no other reason than that they already existed in that scheme. And yet critical to ACC is its removal of the right to bring court proceedings for compensation for personal injury (Accident Compensation Act 2001, s317). The *quid pro quo* for the removal of this right (which the Woodhouse Committee responsible for the design of ACC described as a 'legal lottery') were two of the Woodhouse report's guiding principles for ACC, namely real compensation, and comprehensive entitlement. No legal right is being removed in the case of the social income insurance proposal, however, so this is not a justification for the same near-universal cap and high replacement rate.[3]

Moreover, the insurance scheme proposal is inconsistent on the comparison with ACC. A key part of the concept of real

compensation under ACC is that earnings-related compensation continues without limit (until age 65) for as long as the injury continues to cause an inability to earn. The insurance scheme, on the other hand, is limited to a maximum of six months.[4] In short, despite the claims of some proponents, the income insurance proposal had little in common conceptually with ACC, and the choice of the high cap and high payout ratio must be judged on their own terms, not in relation to ACC. As the section below highlights, a key element of this judgement is the very regressive nature of the proposal, even among that part of the population that would have been covered by it.

Vignette analysis method

This article uses a vignette approach to analyse the net effects on family income of the proposed scheme. Family or household vignettes are frequently used in assessing the consequences of social policy changes and proposals (Bradshaw et al., 1996; Hakovirta and Hiilamo, 2012; Skinner et al., 2017). The vignette approach cannot cover all situations, nor can it provide estimates of population-wide gains and losses, but it has the advantage that it can elucidate the complex interactions between

multiple policies and programmes to isolate the overall net income effects for different family and household types at different income levels.

In this article I consider four different family compositions:
- a couple with two dependent children;
- a couple with no dependent children;
- a sole parent with two dependent children;
- a single person.

Thirty-two per cent of the New Zealand population aged 18–64 years live in couple families with dependent children (i.e., under 18 years), a further 32% live in couple families with no co-resident

inclusion of these programmes would reduce the net gain from insurance cover in most families with children.

Each of the four model family types is analysed at three different gross earnings levels:
- the 2022/23 minimum wage ($848 per week or $44,096 p.a.);
- the June 2022 median wage ($1,189 per week or $61,828 p.a.);
- the proposed maximum earnings cap for the insurance scheme ($2,518 per week or $130,911 p.a.).

The adult or adults who work are assumed to work full-time (40 hours per week) or to have been working full-time

scheme conditional on the family experiencing a job loss and receiving the maximum entitlement of six months' insurance payout. Net gain is calculated as the difference between the family's net income after the job loss event if receiving insurance and their net income after the same job loss in the absence of the scheme (or, equivalently, if they are not eligible for insurance) for the six-month period. The comparison takes into account earnings, welfare entitlements (or, alternatively, the insurance payout entitlement), and any accommodation supplement or Working for Families tax credit entitlements. The cost of the insurance levy itself is not included here as it is accounted for separately. This outcome measure is a measure of the maximum the model families can gain from the introduction of the scheme if they experience a job loss.

The employer-paid 'bridging payment' is not included in the analysis as it is not part of the insurance scheme itself. It is a regulatory policy change that could be implemented irrespective of the insurance scheme.

The second outcome measure is the ratio of the net gain from the insurance scheme to the annual levies the same family and their employer(s) would be required to pay for the scheme. This measure can be thought of as a 'return on investment' or net value of the insurance: how frequently would the family have to experience a job loss (and receive the maximum six-month payout) for the total cost of the levies to equal the net gain from scheme coverage.

> Taking the minimum wage and median wage examples together shows that for the bottom half of the earnings distribution, the net benefits of the insurance scheme, … are relatively modest compared to the gross payout amounts.

dependent children, 7% live in sole parent families with dependent children, and 29% live as a single person family unit.

In the analysis, the families are treated as stand-alone family units. In situations where families share accommodation, the results would be the same as long as the assumptions regarding each family unit's share of total household accommodation costs are unaffected. For example, a group of four single people may flat together but the results of the analysis are the same if the assumptions about each person's rent and, therefore also their accommodation supplement payments, are not affected.

In the interests of simplicity, the children are assumed to be school-aged, and the childcare and out of school care and recreation subsidies, as well as the Best Start tax credit for under three-year-old children, are not included in calculations. Because these are income-targeted (except Best Start for 0–12-month-old children),

before the job loss. In the couple families the assumption is that one of the two loses their job.

Housing costs are assumed to be at least equal to the amounts of rent or mortgage payments that would entitle the family to the maximum accommodation supplement in accommodation supplement area 1, which covers Auckland and some other high housing-cost locations. These amounts are set out in the Appendix. Where housing costs are higher than is assumed here, the calculations would be unaffected. If housing costs were lower than these figures, the net gain from a payout under the insurance scheme would be higher, but, equally, the need for an insurance cushion would in most instances be correspondingly lower as housing costs are typically a substantial and relatively inflexible part of a family's budget.

Two outcome measures are used. The first is the net dollar gain from the insurance

Results

The results of the analysis are summarised in Table 1. Column (b) is the family's total net income prior to job loss. It comprises gross earnings plus any Working for Families and accommodation supplement entitlements less income tax and ACC levies. The income insurance scheme levies are not deducted from this figure as they are itemised separately in column (c), which is the total of both employer and employee levies. Column (d) is the gross (i.e., pre-tax) payout by the insurance agency following the job loss. It equals 80% of the person's prior gross earnings for the six-month period.

Table 1: Summary of results for each family type

(a)	(b)	(c)	(d)	(e)	(f)
Each adult earning:	Annual net family income after tax, ACC levy, WFF & AS	Annual levies (total worker and employer)	Gross (pre-tax) insurance pay-out (6-months)	Maximum net gain from insurance scheme after job loss (6 months) over & above status quo	Ratio of maximum net gain from pay-out to annual levies
Couple 2 children					
Minimum wage	$83,406	$2,452	$17,638	$4,871	2.0
Median wage	$98,801	$3,438	$24,731	$8,945	2.6
Insurance scheme maximum	$189,941	$7,279	$52,364	$38,896	5.3
Couple no children					
Minimum wage	$75,666	$2,452	$17,638	$9,472	3.9
Median wage	$98,801	$3,438	$24,731	$16,057	4.7
Insurance scheme maximum	$189,941	$7,279	$52,364	$38,896	5.3
Sole parent, 2 children					
Minimum wage	$67,281	$1,226	$17,638	$3,332	2.7
Median wage	$70,733	$1,719	$24,731	$7,032	4.1
Insurance scheme maximum	$94,970	$3,639	$52,364	$21,404	5.9
Single person					
Minimum wage	$42,214	$1,226	$17,638	$4,828	3.9
Median wage	$50,454	$1,719	$24,731	$6,775	3.9
Insurance scheme maximum	$94,970	$3,639	$52,364	$26,416	7.3

Source: Author's calculations

Column (e) reports the first outcome measure: the net gain from being covered by the insurance scheme in the event of a job loss on the assumption that the family receives the maximum period of six months insurance payouts. Column (f) is the second outcome measure: the ratio of column (e) to column (c); that is, the ratio of the net gain resulting from insurance entitlements should a job loss occur to the annual total levies payable by that family and their employer(s).

How much extra would families who experience a job loss have gained from the insurance cover?

The net gain figures in column (e) are based on the maximum unemployment duration that would be covered. If the person was out of work for less time, the net gain would be correspondingly less. For example, if they received insurance payouts for three months, the figure would be half that in column (e). In reality, the average duration would be less than six months, although the high payout ratio and light job search requirements could be expected to result in some moral hazard effects lengthening average unemployment durations.

Column (e) shows that the extra support the scheme would provide minimum wage families is substantially less than the gross insurance payout. For the sole parent earning the minimum wage, a six-month gross payout of $17,600 results in a net gain of $3,300; for the couple with children and the single person it is approximately $4,800. Only in the case of the minimum wage couple family with no dependent children is the amount higher, at $9,500. If the model families are earning median wages, the net gain is somewhat higher, but still far less than the gross payout of 80% of lost earnings. For the single person the net benefit from scheme coverage is $10,050, for the sole parent family it is $7,000, and for the couple with two children, $8,900. Again, the figure is higher for the couple with no dependents, at $16,100. The higher gain for

this family type is due to two things: first, the fact that New Zealand's main welfare benefits are very tightly targeted on joint couple income, whereas the income insurance would be assessed on individual income; and second, that this family type's income is not cushioned by Working for Families tax credits, which apply only to people with children.[5]

Taking the minimum wage and median wage examples together shows that for the bottom half of the earnings distribution, the net benefits of the insurance scheme, while not insignificant, are relatively modest compared to the gross payout amounts. This conclusion is emphasised by considering the second outcome measure, the ratio of the maximum net gain from receiving the insurance to the total annual cost of the levies in column (f). This column provides an indication of the extent to which the insurance proposal represented value for money for the different model families at different levels of earnings. For example, looking at the first row, a couple with two

Figure 2: Net benefit from insurance scheme in event of job loss and maximum payout time, by families' earnings levels
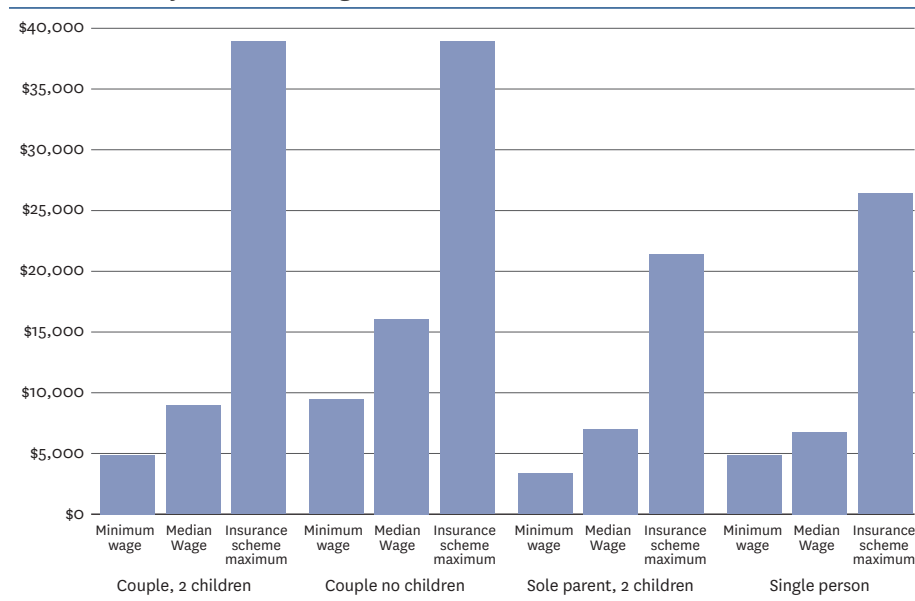
Source: author's calculations

children and both partners on the minimum wage would need to experience a job loss and six months' unemployment for that worker every two years for the total levies that are paid to equal the difference between the insurance payout and existing social security provisions. For a minimum wage sole parent, the equivalent figure is every 2.7 years, and for the single person and couple without dependents it is approximately 3.9 years. At median wage earnings the ratios range from 2.6 for the couple with children to 5.9 for the single person. Few people or couples are likely to experience repeated job losses that frequently over their working lives. Moreover, it was proposed that a person would not be eligible to receive more than six months' payout every 18 months, so the job loss events would need to be spaced out with almost 'perfect' regularity for the cumulative levy payments to be less than the payouts.

These figures are based on the total payroll levy of $1.39 per $100 of wage from each of the workers' and employers' contributions. The total levy cost is highly relevant as it represents the overall cost effectiveness of the scheme. At the same time, it is also important to consider the potential benefits from the worker's perspective, as, at least in terms of legal incidence, they pay only half of the levy. Considering only the levy on workers, the figures in column (f) would be twice what is reported in the table. However, based on international evidence, it is likely that much

of the employer levies would be passed on to workers by way of reduced wage increases, so that the final incidence of the employer levy rests on the worker. This was set out in detail in advice provided by Inland Revenue to the working group developing the scheme (Inland Revenue, 2021).

The figures in column (f) can therefore be thought of representing something between the two ends of the feasible range from the point of view of the employees only. To the extent that the family does not bear the final incidence of their employers' levies, job losses would need to be less frequent than implied in column (f) for the benefits to match levy costs; but to the extent that the duration out of work is less than six months, then job loss events would need to occur more frequently than implied by column (f).

Regressivity

Figure 2, which plots the data in column (e) of Table 1, highlights how regressive the scheme would be. Social unemployment insurance schemes are often regressive because payouts are linked to prior earnings. However, the fact that this scheme would have been layered on top of New Zealand's pre-existing tax-funded and targeted social security provisions makes it far more regressive in its net impacts than simply replicating the labour market inequality of gross wage differences. For the two couple family examples, there are differences in the net value of six months'

insurance payouts between the minimum wage earners and the scheme maximum earners of $29,400 and $34,000. And in the cases of the single person and the single person with two children the differences between minimum and maximum earnings situations are $21,600 and $18,100 respectively.

The regressivity is greatest in the upper half of the income distribution. The main winners from the proposal would have been higher-earning individuals or families where one or both workers earn well over the median wage. Even then, of course, that is only true of people with a relatively high risk of job loss combined with a low probability of being able to find comparably remunerated work reasonably quickly. Many higher-earning workers face relatively low risk of job loss, or a high probability of being able to find similarly well-paid work quite quickly if they are laid off.

Discussion

One major criticism made of the insurance proposal was that it would have created a two-tier welfare system, with significantly more generous support for insurance recipients than for welfare beneficiaries plus a 'Koru club' level of work-test, case management service and active labour market support compared to that provided to beneficiaries by Work and Income (Child Poverty Action Group, 2022; Fletcher, 2022; Bertram, 2022; Chapple, 2022). As Bertram noted in his submission on the proposal,

> [f]aced with the obvious insufficiency of New Zealand's present levels of welfare benefits to sustain a 'civilised living standard' for all, the Task Force has turned away from the task of bringing the welfare system up to scratch, and has chosen instead to promote an opt-out arrangement for waged workers, enabling them in the event of redundancy or illness to maintain their living standards (often well above the level required to ensure 'civilised' levels of consumption) without being reduced to the stigma and misery presently associated with receipt of a welfare benefit. (Bertram, 2022, p.4)

The discussion document made the claim that the scheme would be complementary to the main welfare system (Tripartite Unemployment Insurance Working Group, 2022, p.9), and, in a similar vein, the minister of finance, Grant Robertson, argued that the scheme would 'fill a gap in our welfare system' (Tibshraeny, 2022). In fact, however, and as others have pointed out, the scheme as proposed was not a complement to the existing system but rather an imperfect substitute, providing an alternative for some of the population and in some circumstances (Chapple, 2022; Bertram, 2022).

The vignette analysis presented here does not address the disparities between people covered by the scheme and people who are not. Rather, the focus is on disparities within the group that would have been covered by the scheme. The results show that, based on the Tripartite Forum's proposed design, the proposal was highly regressive and would apparently have represented poor value for money for most who were covered by it. The main groups likely to have benefitted would have been higher-paid workers with a moderate risk of job loss and unemployment, plus some low- to middle-income earners facing an unusually high risk of repeated job losses and repeated spells of unemployment. For a large number of low- to middle-earning people the scheme would have provided some additional assistance in the event of job loss, but the likely net benefit to them would have been negative.

One rationale for the scheme that was put forward in the discussion document and supported by the NZCTU and ministers was that the scheme would reduce what is called wage scarring, whereby workers who experience a lay-off end up in a lower-paying job once re-employed. There is evidence that this effect does occur (Dixon and Maré, 2013), but there is little or no evidence to support the idea that a high-rate insurance payment would substantially reduce this problem. The theory put forward was that the wage-scarring effect is caused by low benefit payments forcing redundant workers to take sub-optimal jobs quickly rather than searching longer for a better job match. However, there are many other reasons that may account for the observed post-redundancy wage effect. Moreover, the

available empirical research suggests that a higher out-of-work benefit rate is not a major factor in reducing wage scarring (Hyslop and Townsend, 2017). Hyslop's conclusion is that '[w]hile the studies were "pretty thin", there was not particularly strong, if any, evidence such schemes [as the NZII proposal] improved employment outcomes, at least when that was measured by the pay rate of the jobs people later landed' (Pullar-Strecker, 2022).

So, if the scheme proposed by the working group fails on both efficiency and equity grounds, what of alternatives? Consideration of alternatives is outside the scope of this article and requires far more

information and analysis than was provided in the discussion document. However, it is possible to point to some potential reforms to New Zealand's existing income assistance system – including two that were part of the discussion document proposal – which deserve close consideration.

The first picks up on the bridging payment idea included in the discussion document. Redundancy cover for workers is relatively poor by international standards in New Zealand (OECD, 2017) and there is no compulsory redundancy legislation. Even a modest compulsory redundancy scheme, paid for by employers, would go a long way to meeting the consumption-smoothing problem facing laid-off workers. Such a scheme could be designed to help workers with insecure or short-tenure jobs by, for example, being 'one week's redundancy for every two (or three or four) weeks worked'. Even if limited to, say, six or eight weeks' maximum payout it would provide an effective buffer for many. The

scheme could, if preferred, be targeted by setting a cap on the maximum weekly payout. Employers and employees would, of course, be free to negotiate additional redundancy agreements over and above the statutory minimum. The legal incidence of the cost of compulsory redundancy would fall on employers, although, as in the discussion above, it is likely that a considerable part of the final incidence would end up being transferred to workers through reduced wage increases.

A second aspect of the insurance proposal which may be worth including in some limited form in the welfare system is an element of individualisation of

> One major criticism made of the insurance proposal was that it would have created a two-tier welfare system, with significantly more generous support for insurance recipients than for welfare beneficiaries ...

entitlements. While social (and private) insurance is usually based on the individual's circumstances because of its compensation-for-loss basis, social assistance benefits are typically assessed on joint couple income based on the family's need (and combined with an assumption that couples share their incomes). There is scope for considering modernising the welfare system to incorporate a degree of individualisation. A relatively simple and targeted way of doing this would be to introduce a disregard on spousal income up to some limit for the purposes of abatement of a person's benefit. For example, if the spousal income disregard was set equal to average full-time weekly earnings, only spousal income above that amount would be taken into account (along with the person's own earnings) when benefit abatement is calculated. Applying the same spousal disregard would also help address a major problem facing other beneficiaries whose benefit

entitlement is affected by their partner's income if they enter in a new relationship while on benefit. This is particularly a problem for long-term beneficiaries, such as those living on the supported living payment or on sole parent support.

Lastly, while the Labour government has raised core benefit rates significantly in recent years, they remain low in comparison to minimum living costs and to wages (the single adult rate is less than half the adult minimum wage). A substantial increase in rates would help cushion the income shock of job loss as well as providing much needed assistance to all beneficiaries. Such an increase would be costly. But, then, so too was the estimated $3.3 billion annual cost of the insurance scheme.

1 Letter, 9 March 2023, from MBIE to author.
2 Although named after Lord Beveridge's 1942 report proposing a post-war social security system for the UK, New Zealand's system had been in place since 1938 and Beveridge paid close attention to New Zealand's Social Security Act 1938 when developing his proposals for Britain (Stewart, 2015).
3 One argument that has been put forward is that using the same parameters as the ACC scheme has the benefit of simplicity. Even on its own terms this is arguable, but any putative simplicity is swamped by the massive added complexity inherent in introducing a second tier to unemployment and sickness income support that would apply to some people and some circumstances but not others.
4 With a possible retraining option of up to 12 months.
5 The design of the Working for Families tax credits has other issues, not least of which is the high effective marginal tax rates associated with them. However, these issues, and the options for solving them, are separate from the insurance proposal.

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Appendix

Accommodation cost assumptions for vignette analysis

	Weekly accommodation cost of at least:	
	Rent	Mortgage
Couple with two children	$609	$644
Couple with no children	$470	$497
Sole parent with two children	$578	$607
Single person	$315	$330

The difference between the rental amount and the mortgage amount is due to the fact that the accommodation supplement has a higher entry threshold requirement for mortgage payers than it does for renters.

Jennifer Wilkins

The Mana Kai
Framework
a degrowth lens

Abstract

The Mana Kai Framework is a set of values, goals and objectives to improve the food provisioning system in Aotearoa New Zealand, developed through a round of nationwide consultations, with the ultimate purpose of informing a national food strategy. This article builds upon Mana Kai, finding that the consultation process assumed only a growth economy in future; a second round of consultation using a degrowth lens, it is argued, would produce a valuable alternative framework. This could prove fruitful towards the stated Mana Kai aspiration to ignite a social movement to drive significant systemic change, and could, alongside the existing framework, inform a national food strategy that is ready for growth and degrowth futures, both of which are plausible, thereby ensuring a more resilient food system in Aotearoa New Zealand.

Keywords degrowth, food system, Mana Kai Framework, national food strategy, Māori values, plausible future

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Experts have been calling for an Aotearoa New Zealand national food strategy for some years. Drivers include the need to address obesity (Mackay et al., 2020); the need to respond to food insecurity, exacerbated by Covid-19, as highlighted by University of Auckland health experts Elaine Rush and Sarah Gerritsen (Science Media Centre, 2021); and the opportunity to capitalise on New Zealand's 'rising international reputation' as a food producing nation by supporting sustainability and adaptability to new technologies and consumer demands (Bardsley et al., 2020).

Concerns have deepened. The cost of living rose more than 8% in 2022, with fruit and vegetable prices rising the most, worsening food insecurity and affecting nutritional intake (Statistics New Zealand, 2023). Food prices may rise further. Recent extreme weather events caused by La Niña and climate change have resulted in catastrophic flooding, including across some of the country's most productive landscapes, destroying whole farms that were established over generations. The prospect of repeat flooding in future hangs over decision making about where and how to rebuild those system assets.

The Mana Kai Framework: a degrowth lens

Aotearoa's food system is ripe for a nationwide strategic approach to improve social outcomes, environmental sustainability and systemic resilience. The development of the Mana Kai[1] Framework in 2022 to inform a national food strategy could not have been timelier.

Persistent local and global uncertainties are signs that even greater complexity and challenges may lie ahead and that the rules and order of the 20th century may no longer apply in many situations. Emerging 21st-century perspectives are vital to incorporate when developing new policies and strategies that are intended to be transformational. In light of this, this article projects a degrowth lens onto the Mana Kai Framework to encourage a second look at new threats to, and opportunities for, the New Zealand food system.

Table 1: Complete Mana Kai Framework of Values, Goals and Objectives (based on Mana Kai, 2022c, p.9)

Mana o te Whenua — Natural Energy of the Environment	**V1: Tuakana/Teina (social order)** G1: As kaitiaki (guardians), kai collection and production protects and enhances our environment O1: We have halted the loss of biodiversity and are demonstrably restoring natural habits on farm and in the oceans by 2030 O2: Improved nutrient utilisation and reduced containment run-off enables a measured improvement in waterways quality by 2027, and reversal to a healthy state by 2040 O3: The food system takes a leadership role in enabling Aotearoa New Zealand to achieve its international decarbonisation commitments	**V2: Atua (gods)** G2: The mauri (lifeforce) inherent in our kai is protected and respected O4: The Mana Kai Pou is developed and adopted by 2023 with 200 food and health organisations as signatories O5: We are internationally recognised as being trusted leaders for our regenerative land and ocean kai collection and production systems by 2040 O6: The animals required to be used in our kai systems are protected through welfare codes that define global best practice	**V3: Ngā Nuinga (collective breath)** G3: A collective mindset to sharing abundance with all O7: National food waste is halved by 2030 O8: 500 Aotearoa New Zealand food companies have made public, verifiable pledges to contribute to enhanced food resilience by 2025 O9: That there are community food security plans for local food systems in place, incorporating additional land for food commons, and being implemented across the majority of local government entities by 2030
Mana o te Tangata — Harvesting and Fair Distribution of Food	**V4: Mātauranga (knowledge)** G4: Indigenous knowledge and world class science integrated seamlessly O10: Indigenous knowledge is fully integrated into innovative, world class research activities conducted seamlessly across the Aotearoa New Zealand food system O11: Innovation spending in the food system is increased to and sustained at 2% or above of the producer gate value of land and ocean production O12: A Mātauranga embedded food curriculum is piloted across selected schools by 2027 and established in all schools by 2031	**V5: Manaakitanga (hospitality)** G5: Our mana comes from hospitality and generosity in sharing kai with community and visitors O13: Zero food poverty in Aotearoa New Zealand by 2035. O14: Our hospitality thrives creating future fit employment opportunities and economic outcomes that benefit all New Zealanders.	**V6: Rangatiratanga (self-determination)** G6: Governance and stewardship align with Te Tiriti O15: The diversity of governors and leadership of food organisations reflects our communities and Te Tiriti o Waitangi by 2030 O4: The Mana Kai Pou is developed and adopted by 2023 with 200 food and health organisations as signatories O16: The Sustainable Agricultural Finance Initiative is adopted by lenders to secure capital for regenerative transition by 2025
Mana Kai — Sustenance from Food	**V7: Ohaoha (economy)** G7: Economic returns from healthy, sustainable food creates prosperity that benefits all New Zealanders O17: The value of food exports grows by 25% by 2030 through securing more value in market for the attributes inherent in a Mana Kai based food system O18: 25,000 new future fit jobs, decent roles that are well paid, that are attractive to New Zealanders are created in our food system by 2030 O19: Indigenous ingredients are grown and available to domestic consumers by 2030	**V8: Tikanga (customs)** G8: Kai is central to our culture and the way we use it in our lives reflects our national identity O4: The Mana Kai Pou is developed and adopted by 2023 with 200 food and health organisations as signatories O20: National Food Celebration festival is held annually as part of our expression of Matariki by 2024	**V9: Hauora (health)** G9: Our food delivers nutrition, wellbeing and joy O21: Aotearoa's childhood obesity, malnutrition and food insecurity are halved by 2030 O22: Ultra-processed food consumption reduced by 2% per annum O23: Healthy, sustainable eating guidelines are developed, widely promoted and incorporated into setting food policy by 2030

The Mana Kai Framework

The Mana Kai Framework[2] is an output of an ongoing project, the Mana Kai Initiative, formed in 2021 to assist in transforming Aotearoa New Zealand's food system for the benefit of all New Zealanders by articulating the values of the food system and aspirational actions for system change.

The initiative's leadership comprises senior figures from a range of public, private and not-for-profit organisations convened by the Aotearoa Circle, itself a voluntary initiative between public and private sector organisations concerned with, or about, natural capital, including large businesses, banks and consultancies, as well as research and innovation institutions and local and central government bodies. It was decided early on to build a framework using te ao Māori (the Māori worldview), leading to the key appointment of a Māori chairperson and engagement with an expert in tūpuna (ancestral) wisdom, who built an initial framework from nine Māori values, published in April 2022 (Mana Kai, 2022a).

The initial framework was used to catalyse and analyse key themes from a round of consultative kōrero (dialogues) involving more than 250 participants from 120 organisations across the public, private and civil society sectors. The result was a set of goals and objectives for the food system. These were added to the nine values to produce a complete framework (see Table 1), published in November 2022 (Mana Kai, 2022c). This was supplemented with a plan for acting on priority action areas (Mana Kai, 2022b).

The next step for the Mana Kai Initiative is to help realise the framework and the priority areas action plan by enabling a 'broad social movement [to engage in] creating significant systemic change [towards] a food system that is sustainable, inclusive, accessible, affordable, nutritious, and prosperous' (Mana Kai, 2022c, p.36).

Why reflect on Mana Kai?

Several Mana Kai objectives are undoubtedly ambitious and would require true systemic change, such as fully integrating indigenous knowledge into innovative, world-class research activities. Others are incremental, although bold, such as growing the value of food

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exports by 25% by 2030. Some potential food sector responsibilities are missing, including reducing greenhouse gas emissions other than carbon dioxide, such as methane and nitrous oxide; improving food sector resilience to future energy scarcity following a shift from fossil fuels to renewable energy, while keeping within the 1.5°C carbon budget (Slameršak, Kallis and O'Neill, 2022).

Are any of the objectives conflicting? Is systemic change achievable given the deep-set ideologies underpinning existing systems? Looking back from an uncertain but imaginable future, are these objectives ambitious enough?

Perhaps the best way to approach these questions – and pose further pertinent questions – is to examine the framework from an alternative, more radical angle. This could add value through challenging key assumptions and opening up new lines of sight towards the purpose of the framework. A degrowth lens is proposed.

What is degrowth?

Degrowth is many things. Like Mana Kai, degrowth is a framework for a social movement (Demaria et al., 2013), guiding multifaceted kōrero on how to universally meet basic human needs

through provisioning systems that operate within global and local planetary boundaries (Fanning et al., 2020). This is comprehensive and ambitious, concerned with nutrition, shelter, water, energy, income, education, health, networks, equality, equity and democracy.

The new research field of degrowth brings together expertise in ecological economics, history of economics, macroeconomics, anthropology, political science and technology studies. It is based in both the physical and social sciences and its arguments have been adopted by the Intergovernmental Panel on Climate Change (IPCC) to confront the conventional common sense that a good life within planetary boundaries depends on economic growth (IPCC, 2022a, 2022b). Only degrowth mitigation pathways stay under 1.5°C global warming, meet sustainability goals, assume historically experienced rates of GDP–energy decoupling, and avoid using negative emissions technologies (Keyßer and Lenzen, 2021). The 'decent living energy' scenario, for instance, projects 2050 global energy use as low as 1960 levels while provisioning a global population three times larger, assuming 'a massive rollout of advanced technologies across all sectors, as well as radical demand-side changes to reduce consumption – regardless of income – to levels of sufficiency' that are, nonetheless, 'materially generous' (Millward-Hopkins et al., 2020).

Degrowth is political (Asara et al., 2015). Scholars unite with, and often are, community, human rights and political activists (Kallis et al., 2018). The social and environmental ideas of the 1970s that were squashed by the notion of sustainable development (Tulloch and Neilson, 2014) are being politicised once again. Degrowth is only one example of this resurgence; other examples include the rising voices of indigenous peoples (e.g., the People's Agreement of Cochabamba (World People's Conference on Climate Change and the Rights of Mother Earth, 2010)), the increasing use of legal recourse to challenge greenwashing (Eversheds Sutherland, 2021), growing assertions of legal personhood and non-human rights (Butts, 2019) and protest by normally docile groups, such as school students and

scientists. With so much at stake in the 21st century, a second depoliticisation seems unlikely.

Degrowth is a critique of the growth paradigm (Schmelzer, 2022) and, in particular, capitalism as the cause of severe and widening wealth and income inequalities between and within nations (Piketty, 2014). If the capitalist system recompensed the real value of direct labour and social reproduction, there would be no surplus and, therefore, no growth (Kallis, 2018). Instead, capitalism pursues growth through global expansion that 'presupposes the perpetuation of colonial arrangements' (Hickel, 2021), driving extraction, pollution and emissions that lead to environmental injustices and ecological debt, and it relies on exploitation through the cheapening of labour and nature amounting to unequal exchange worth at least $10 trillion per year appropriated by the Global North from the Global South (Hickel, Dorninger et al., 2022). Many people in rich nations are cognisant of this imbalance to some extent, yet turn a blind eye both personally and professionally when making consumption and production decisions. Those people who are interested in degrowth are trying to imagine a different economic paradigm: a post-growth socioecological economy in which universal wellbeing is prioritised and the interconnected limits of nature are respected.

Degrowth applies globally but is not a blanket approach. No country is meeting all its citizens' wellbeing needs while operating within planetary boundaries (Fanning et al., 2021). Ideally, all countries would stabilise their economies within a desirable range of socioecological performance, described by the 'environmentally safe and socially just space' of Doughnut economics (Raworth, 2017). Specifically, rich nations cause 74% of ecological overshoot (Hickel, O'Neill et al., 2022) and 85% of excess carbon dioxide emissions (Hickel, 2020b), resulting in the tragic crises of biodiversity loss, climate change and inequality being experienced mostly in the Global South. Thus, an initial focus of degrowth is to downscale less necessary production and consumption in, and for, wealthy Global North nations, while assuring the wellbeing of those affected by this change, both domestically and abroad. Downscaling throughput means replacing economic patterns that demand high

> From a degrowth perspective, New Zealand must continue to develop a wellbeing economy, but also downscale aggregate production and consumption by two-thirds by eliminating less necessary inputs and outputs to operate within planetary boundaries.

material and energy use. A core degrowth objective is to design a smooth transformation process for adapting to aggregate metabolic downscaling in the medium term, and steady, low metabolic activity in the long term.

Degrowth is, therefore, a project for a radical social transformation (Barlow et al., 2022). Ideally, this would be democratic, happening bottom up through citizen action and top down through political change. The business sector, sitting between these layers, would be subject to market shifts and regulatory change, domestically and internationally.

Degrowth is a policy platform for building a 'Post-Growth Deal', rather like a Green Deal without growth. The impetus for this has been building slowly for several years but is now speeding up. Scientists and citizens urged the European Parliament in 2018 to plan for a post-growth future (O'Neill et al., 2018). In May 2023 the Parliament is holding a Beyond Growth

conference facilitated by five political groups. Themes include, for instance, meeting the needs of working people and the role of trade unions in a degrowth transition. Most recently, the European Research Council awarded a €10 million Synergy Grant to a six-year project to develop a Post-Growth Deal, incorporating research on modelling wellbeing, post-growth policy packages, modelling provisioning systems, developing political alliances for transition, and practical steps for realisation (European Research Council, 2022). This is the leading edge of degrowth.

Is degrowth relevant?

Degrowth is relevant to Aotearoa New Zealand, one of the world's top 30 richest nations based on GDP per capita (World Bank, 2020). As with other rich nations, New Zealand's wealth does not indicate a capability to deliver acceptable outcomes simultaneously on environmental and social fronts.

New Zealand exceeds biophysical boundaries by factors of 2.3 on land use change, 3 on ecological footprint, 3.5 on material footprint and 3.7 on carbon dioxide emissions (University of Leeds, 2021). In other words, the nation consumes more than three times its fair share of Earth's resources and atmosphere.

At the same time, New Zealand is experiencing an intergenerational diminution in social wealth. Wellbeing economy data reveal a relatively healthy population with long life expectancy and high levels of social cohesion, trust and skills, and an older generation that has avoided poverty through an economic system favouring home ownership. Areas of real concern, however, include child poverty, school attendance, literacy and numeracy, housing quality and affordability, and psychological health among teens and young adults. Up to 10% of the population is experiencing low wellbeing in at least four areas, with this burden disproportionately falling on disabled people, sole parents and Māori and Pasifika peoples (Treasury, 2022).

From a degrowth perspective, New Zealand must continue to develop a wellbeing economy, but also downscale aggregate production and consumption by two-thirds by eliminating less necessary

inputs and outputs to operate within planetary boundaries. This indicates an urgent need for behavioural and systemic change, while putting policy and institutional structures in place to protect existing levels of wellbeing and ensure improvements are made where there are shortfalls.

Degrowth is relevant to the food provisioning system because it is one of the country's most obvious sources of environmental overshoot. It exceeds boundaries for methane and nitrous oxide emissions by a factor of ten and is about to exceed the boundary for phosphorous application, based on production, while carbon dioxide emissions are well above sustainable levels, based on consumption (Andersen et al., 2020). The Mana Kai Initiative notes that New Zealand is losing 192 million tonnes of soil per year (although it does not clarify how much soil loss is due to the food system versus other land uses), and that the agriculture sector accounts for nearly 50% of the country's greenhouse gas emissions (Mana Kai, 2022a).

Yet, the food system under-delivers for some New Zealanders. As the Mana Kai Initiative points out, at least 15% of the population was food insecure at the start of the pandemic, and that is believed to have risen now to 20% – one million people (Mana Kai, 2022c). Nutritious foods produced locally can retail domestically at export prices that are unaffordable to many New Zealanders, leading to food insecurity and over-reliance on cheaper, ultra-processed foods, some of which are imported. This malnourishment is connected to our alarming obesity statistics and high prevalence of non-communicable diseases (Mana Kai, 2022a). The Mana Kai Framework attempts to respond to the tensions that limit our ability to meet prosperity, nutritional and nature goals within New Zealand. Degrowth responds to those same tensions, locally and globally. Degrowth is, therefore, an appropriate, radical, alternative perspective for reflecting upon the Mana Kai Framework.

Reflection 1: values
Global North or Western values are typically anthropocentric. Anciently

> To Māori, nature is a 'unified spiritual-socioecology', and the Māori economy is 'an environmental economy' in which economic success must not come at the expense of people (present and future) or nature …

formed connections with nature that involved systems of useful knowledge and that had mental, emotional, physical and spiritual value were lost to Europeans some centuries ago. This is traceable to the scientific revolution of the 17th century, when reductionist ideas like mind–body dualism, nature as a machine and the separation of values and facts were brought to the fore. The 20th century saw somewhat of a shift from that mechanistic paradigm to an ecological appreciation, with a new emphasis on holism and systems thinking (Capra and Luisi, 2014). Yet how to authentically rekindle ancient connections with nature is a continuing 21st-century challenge that both Mana Kai and degrowth attempt to address.

Mana Kai values are Māori values developed through consultation with an 'expert in tūpuna wisdom' (Mana Kai, 2022c, p.11), giving the initial framework authenticity as a basis for inclusive kōrero.

Māori values are cosmo-centric and biocentric. They extend from pūrākau (legends) that form part of kaupapa Māori (the Māori body of knowledge) underpinning te ao Māori. Māori people trace their whakapapa (genealogy) back to

their original tūpuna (ancestors), Tāne, the atua (god) of man and forests, and his parents, Ranginui, the sky father, and Papatūānuku, the earth mother. In the Māori creation story, Ranginui and Papatūānuku were separated by Tāne to let light into the darkness where he and his nature-siblings existed. Soon, however, Tāne fought with his brothers, Tāwhirimātea (god of weather), Tangaroa (god of the sea), Rongomātāne (god of cultivated foods), Haumia-tikitiki (god of uncultivated foods), Ruwaimoko (god of volcanoes and earthquakes) and Tumatauenga (god of war). The latter triumphed and ate kai from his brothers' realms so it was no longer tapu (sacred). Tāne then created the first woman by forming earth into a human shape and endowing her with life, and she was sustained by the kai that was no longer tapu (Cowan and Pomare, 1930).

In this worldview, Māori people and nature have a familial relationship; a oneness. The word for land, whenua, also means placenta. When Māori introduce themselves they explain their whakapapa as the relationships they have with people and place. Nature is the tuakana (older sibling), to whom humans, as teina (younger siblings), have a responsibility to act as kaitiaki (guardians). This role demands tino rangatiratanga (self-determination) and mātauranga Māori (Māori knowledge). To Māori, nature is a 'unified spiritual-socioecology', and the Māori economy is 'an environmental economy' in which economic success must not come at the expense of people (present and future) or nature (Rout et al., 2021).

Degrowth is a Global North (European) framework which borrows from non-Western value systems and communities around the world for whom economic growth is not a purpose. Inspirations include Buen Vivir in Latin America, Eco-Swaraj in India, Ubuntu in South Africa and Gross National Happiness in Bhutan. We must turn to key scholars for their findings about emerging degrowth values. Parrique (2019) posits three universal values – autonomy, sufficiency and care – as forming the 'moral philosophy for degrowth'. Kallis, Varvarousis and Petridis (2022) pick out respect for nature, slowness, moderation, simplicity, solidarity,

Table 2: Potential Values Alignment Between Mana Kai and Degrowth

Mana Kai Values	Degrowth Values
	Societal dépense Ritualised destruction of community surpluses to slow down or avoid capital growth and the extraction of new resources. The opposite of accumulation and austerity.
Tuakana/Teina (social order) The social order of humanity and the natural world. Acknowledging that we are the teina (junior) and should respect nature, our tuakana (senior), and fulfil the role of kaitiaki (guardians)	**Care for people and nature / solidarity and stewardship** Solidarity means protecting those who are vulnerable, even at personal cost, requiring empathy and compassion. Stewardship is solidarity between humans and non-humans, requiring ecological sympathy. The opposite of exploitation.
Atua (gods) Connection of food to Atua and recognising that Atua give food its mana in the form of distinctive traits, quality, richness and succulence	
Ngā Nuinga (collective breath) A collective mindset where everyone has joint responsibilities to share and trade local food resources (not limiting its access) so that abundance is shared and tasted by all	**Commoning** The active process of pooling common resources to enable a good life beyond consumerism, expanding the commons, which is the vast the array of self-provisioning and governance systems that flourish outside the market and the State
Mātauranga (knowledge) Precious knowledge, wisdom, technology and innovation we have learnt (and continue to learn) on how to harvest, farm, fish, forage, gather, cook and package our food	
Manaakitanga (hospitality) Our hospitality and generosity to share our food with our people, visitors and then the rest of the world	**Sufficiency/moderation/distributive justice** A principle of distributive justice to ensure a good life for all. Involves distributing resources fairly to meet human needs, a duty of distributive justice toward past and future generations, and societal norms around upper and lower limits such that no one should have too little and no one should have too much
Rangatiratanga (self-determination) Governance, stewardship and assurity that Te Tiriti o Waitangi is honoured so that our food goals also help our societal goals be achieved	**Autonomy/self-determination** Having the will and the agency to take decisions critically and deliberately as an individual or a community without outside influences imposing their external beliefs, norms, and codes of conduct and, therefore, being free to invent their own futures
Ohaoha (economy) Economic benefits and food industries created to distribute wealth and sustain the food ecosystem as well as the business and employment opportunities for our people	
Tikanga (customs) Unique cultural processes and engagements we have that respect the relationship food producers and consumers have with food produced	
Hauora (health) Nutrition, happiness, togetherness and wellbeing shared and consumed through eating and producing quality food	**Slowness/voluntary simplicity/conviviality** A return to human mastery over time such that life is not dominated by the fundamentalism of speed which destroys diverse forms of human experience. Conviviality refers both to communal ways of living and to operating society with responsibly limited technologies

conviviality and self-sufficiency. They describe locations in the Mediterranean region and 'the world's "Souths" more generally' that exhibit values of slowness, moderation and conviviality as examples of 'real-existing degrowth' as opposed to 'Occidental values of utility, perpetual advancement and growth'. D'Alisa, Demaria and Kallis (2015) highlight commoning and societal dépense as particular degrowth values, remarking that 'a degrowth society would have to build new institutions to choose in a collective way how to dedicate its resources to basic needs on the one hand, and different forms of *dépense* on the other'. *Dépense*, an unfamiliar term, refers to unproductive expenditure of social surplus in ways that give collective character to society, but purposely limit accumulation that could fuel investment in productive growth. Classical outputs of *dépense* include the pyramids of Egypt and the churches of Europe in the Middle Ages (Kallis, 2019).

Some degrowth values may align with Māori values, both having socioecological foundations. Mika et al. (2022) argue that

Māori values centre on collective wellbeing as opposed to self-interest and have spiritual and material elements. Degrowth, too, is centred on wellbeing, although it does not have a spiritual element.

Exploring similarities and differences between Māori, Mana Kai, growth and degrowth values could initiate deeper kōrero on the belief systems that guide understandings of plausible pathways towards, and aspirations for, a secure future food system in Aotearoa. Potential alignments between degrowth and Mana Kai values are indicated in Table 2.

Reflection 2: ideology

Mana Kai leadership chose to ground the framework in te ao Māori for several reasons, including that 'Māori value-based business models are often naturally "triple bottom line" and can provide authentic insights into viable transition pathways' (Mana Kai, 2022a, p.15).

The term 'triple bottom line' references sustainable development ideology, which theorises an economy in which GDP growth, social progress and environmental protection are three coequal pillars. Thus, the Mana Kai Framework assumes growth paradigm beliefs.

Degrowth is opposed to triple bottom line thinking and our current understanding of sustainable development.

Sustainable development was forged from two ideas: development and sustainability. Development is the Western, mid-20th-century idea that poorer nations should grow their economies to emulate wealthier nations. Since the 1980s, 'developing' nation industrialisation and growth have been imposed through structural adjustment programme loans from the International Monetary Fund and World Bank. Contemporary sustainability emerged in the 1970s, following the rise of environmentalism in the 1960s and the publication in 1972 of the seminal study *The Limits to Growth*. Sustainable development was first defined as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (Brundtland, 1987).

Over the last five decades the United Nations has, through an evolving sustainable development agenda,

Sustainable Development Goal 8 calls for aggregate global GDP growth of 3% per year, which is incompatible with reductions in aggregate global resource use and carbon dioxide emissions in line with a carbon budget for staying within 2°C of global warming ...

depoliticised the social and environmental movements of the 1960s and 1970s, neutralising their power to mobilise society around radical ideas, and it successfully enshrined economic growth as a sustainability pillar and goal. For example, Sustainable Development Goal 8 aims to 'promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all'. The New Zealand government used similar language in its first voluntary national review on progress towards the implementation of the UN 2030 Agenda for Sustainable Development, stating a belief in 'productive, sustainable and inclusive development to ensure no one is left behind' (Ministry of Foreign Affairs and Trade, 2019).

Degrowth does not oppose non-growth sustainability goals, but does oppose sustainable development framing because tensions between the three pillars of economic growth, social progress and environmental protection can only be

relieved in two ways, both of which are unsatisfactory.

The first way is absolute decoupling, whereby economic growth occurs without an increase in climate and ecological impacts. This is a stronger effect than mere efficiency improvements (relative decoupling); however, it is only theoretical. The global energy system could theoretically become largely based on renewable energy, with negative emissions technologies (NETs) removing as much carbon annually from the atmosphere as is produced, enabling the world to reach net zero emissions. But there is no empirical evidence to suggest that absolute decoupling can occur at the scale and pace needed to halt and reverse the climate and biodiversity crises before dangerous tipping points could reasonably be expected to be reached (Parrique et al., 2019). Thus, reliance on speculative technologies to perpetuate elite Western ways of living poses an unacceptable risk to all beings. Despite this clear knowledge, even 'climate progressive' nations rely on promissory NETs in their climate legislation, emissions pathways and carbon budgets. Without NETs, their necessary rates of mitigation would be significantly greater, demanding profound changes to their economies (Anderson, Broderick and Stoddard, 2020).

The second way in which sustainable development tensions are relieved is through trade-offs, whereby one (usually weaker) party relinquishes some of its goals to those of another (usually stronger) party. The trinity of coequal sustainable development pillars is a false narrative. The Sustainable Development Index shows that there are not yet any socioecologically developed nations with world-class performance on both social and environmental indicators at any level of national income. Countries with high gross national income per capita and high performance on social indicators, such as Norway and Australia, perform extremely poorly on environmental indicators (Hickel, 2020c). Responsible consumption and production is 'associated with trade-offs, especially regarding economic progress' (Kroll, Warchold and Pradhan, 2019). Meanwhile, Sustainable Development Goal 8 calls for aggregate

global GDP growth of 3% per year, which is incompatible with reductions in aggregate global resource use and carbon dioxide emissions in line with a carbon budget for staying within 2°C of global warming (Hickel, 2019). Furthermore, the Sustainable Development Goal framework fails to explicitly incorporate environmental justice (Menton et al., 2020).

The idea of the triple bottom line was developed in the late 1990s as an agenda to 'focus corporations not just on the economic value that they add, but also on the environmental and social value that they add – or destroy' (Elkington, 2004). It has become the framework for corporate sustainability, incorporating sustainable development theory into business and surfacing in corporate sustainability reporting of social, environmental and financial performance. Yet the global effect of more than two decades of business sustainability practice has been so underwhelming that John Elkington, the founder of triple bottom line thinking, has gone as far as to propose its 'strategic recall' as a management concept (Elkington, 2018).

A fundamental criticism that may explain the failure of the triple bottom line approach to business sustainability is that it is non-systemic (Srivastava, Dixit and Srivastava, 2021). Each bottom line, or pillar, is managed, measured and reported independently.

Not only is business sustainability performance divided into pillars, but business sustainability is also firm-centric. Bringing the triple bottom line lens to the Aotearoa New Zealand food provisioning system could severely atomise efforts, with organisations becoming overly focused on their own sustainability outcomes under the mistaken mechanistic belief that the success of the system will be defined by the success of the existing parts (i.e., firms). Private firms, including those represented within the leadership group of the Mana Kai Initiative, often have growth-based, competitive business models that are challenging to align with systemic approaches.

Degrowth is a radical social transformation to provision a good life for all within planetary boundaries. It takes the holistic view that systemic change is as much about emergent novel structural change arising from the chaos of disruption,

> *Without tino rangatiratanga, Māori values may be vulnerable to being co-opted and reshaped by the dominant Pākehā culture, rather than standing as an equal partner in a truly bicultural dialogue towards policy solutions …*

as it is about changing the quality of existing components. Provisioning systems are a combination of physical infrastructure and technology systems, and social (government, community and market) systems that mediate the ways in which resources are used to create social outcomes (O'Neil et al., 2018). In the degrowth scenario, provisioning systems would be radically transformed by social forces striving for sufficiency and equity. Individual businesses could not hope to isolate from, or overcome, this momentum in order to drive change the way they individually see it, or to set a sustainability direction and standard. A degrowth business is not an entity, but rather a process within a larger system of processes (Nesterova, 2022).

Reflection 3: distribution

The initial Mana Kai Framework includes the Māori value ohaoha (economy), translated as: 'Economic benefits and food industries created to distribute wealth and sustain the food ecosystem as well as the business and employment opportunities for our people' (see Table 2). The consultative kōrero adapted this value to produce the following

goal in the complete Mana Kai Framework: 'Economic returns from healthy, sustainable food creates prosperity that benefits all New Zealanders' (see Table 1).

Through the consultation process, a highly consequential change of language occurred between the initial and complete Mana Kai frameworks: 'economic benefits' became 'economic returns'; and 'wealth distribution' has been reconceptualised as 'prosperity that benefits all'. Whereas the original value implies direct distribution of wealth to people, the subsequent goal implies a process of making private returns that are converted into a universally shareable form of prosperity. Mana Kai literature repeatedly expresses the belief that food export revenues generate wealth, presumably providing taxes that enable the New Zealand government to fund public services, as a form of prosperity benefitting all in the form of meeting wellbeing needs. 'The exports we send to the world are a vital source of wealth and prosperity, helping to fund the schools, roads and hospitals that underpin our society' (Mana Kai, 2022a, p.4); 'We believe that only in ensuring the strength and resilience of te taiao [the natural world], will we ever be able to create a food system that can deliver the abundance we seek to meet both our domestic needs and to create the economic prosperity that underpins the functioning of our society' (Mana Kai, 2022c, p.5).

The notion that national prosperity relies on private export revenues is a common dairy industry claim (Kerrigan, 2019) and was often repeated in consultation kōrero: 'Many contributors highlighted the importance of the role that food plays in enhancing the health of our people and our communities. The dual role that the system plays in also making a material contribution to our national economic prosperity was featured in many visions'; 'Food is responsible for much of our financial prosperity as a nation, given the significant returns we derive from exporting products to consumers around the world' (Mana Kai, 2022c, pp.5, 8).

Following this logic, greater export revenue (economic growth) would be needed to fund further public services (greater prosperity). It has even been said by a New Zealand agri-business leader that while 'NZ produces enough food to feed

40 million people, it should look to feed 800 million' (Burke, 2017). Presumably, more people would be nourished, more wealth would be generated for business owners and greater prosperity would trickle down to New Zealanders.

Such growth optimism (not to mention energy blindness), no doubt drove the revenue growth objective in the complete Mana Kai Framework: 'The value of food exports grows by 25% by 2030 through securing more value in market for the attributes inherent in a Mana Kai-based food system' (see Table 1).

Reflecting on this from a degrowth position, several questions arise. The first question goes back to ohaoha and asks whether Māori enterprises find they must compromise their idea of ohaoha to fit the Western economic context because they lack the autonomy to build an 'environmental economy' that is true to Māori values (Rout et al., 2021). Without tino rangatiratanga, Māori values may be vulnerable to being co-opted and reshaped by the dominant Pākehā culture, rather than standing as an equal partner in a truly bicultural dialogue towards policy solutions (Paulson, 2018).

The second degrowth-related question is whether improving wellbeing really does require private sector growth. There is a commonly held narrative that the private sector funds the public sector through taxation, and this justifies growth goals. The degrowth counter-narrative is that public services are production, not expenditure. According to modern monetary theory, governments do not tax individuals and the private sector to raise funds; they tax to remove the power to spend and to control inflation, and, vice versa, they can issue currency to create the means for public production. The United States government funds its military in this way (Kaiser-Schatzlein, 2020). The New Zealand government could issue its own currency to produce public services, mobilising labour and resources around socially necessary production with the greatest use value. By contrast, the private sector is organised around production with the greatest exchange value, whether it is socially necessary or not (Hickel, 2020c).

A third degrowth-related question is around how to ensure that a sufficient

> The people of New Zealand who rely upon the food system for their nutrition and a healthy environment … or their livelihood … all deserve a national food strategy that prepares us for several plausible futures, including a degrowth future.

amount of food is produced for use value as opposed to its exchange value. Export pricing pushes some local produce out of the affordability range for some New Zealanders, reducing their access to fresh, nutritious food. Food is a human right and could be produced as a public service. Much of the Aotearoa food system could be run on a not-for-profit basis by worker cooperatives, for instance. This would make food much more affordable and accessible; it would bring direct democracy into production decision making and enable distribution of economic benefits directly to workers. Some food system jobs could be funded through a public job guarantee scheme. Degrowth perspectives like this are radically different, yet they are not unfamiliar or untested at small scales. They offer a socioecologically regenerative logic for the food system in 'sharp contrast to the just-in-time supply chain of the agrifood sector characterised by capitalist logic, production for trade, market dynamics, profits and state regulations' (Nelson and Edwards, 2021).

A final degrowth question is whether New Zealand's food production should

downscale or upscale for the overall global social and environmental good. Current volumes, types and methods of food production in New Zealand are detrimental to local environments and the global atmosphere, contributing to New Zealand's overshoot on planetary boundaries. Yet, as has been pointed out, five million people are producing enough food to feed 40 million on a planet where many are starving.

Reducing aggregate food production by two-thirds to fit within planetary boundaries would produce enough to feed only 13 million people (5 million New Zealanders and 8 million others), assuming the business-as-usual food system. A change in the production mix (Willett et al., 2019) could potentially feed millions more people within planetary boundaries. We might also take more responsibility for optimising the downstream impact of New Zealand food exports, ensuring that they retain their quality as nourishing foods and don't become ingredients in ultra-processed foods of doubtful health value, and that exported foods reach people who need them, not those who are already well fed.

In the degrowth view, as global provisioning systems generally shift towards sufficiency and equity and as capitalism becomes less relevant, poorer nations would free up labour, energy and resources currently committed to superfluous production for Global North overconsumption, and direct these towards meeting their own needs, such as food production.

Downscaling production would be anathema to many New Zealanders, who still recall, or know about, the economic impact of losing tariff-free access to the UK market for 50% of New Zealand exports when the UK joined the EEC in 1973. While more than ten years of planning went into reducing the impact, what followed were two decades of minimal growth, 'painful' economic restructuring and privatisation of state assets (Spence, 2019).

By contrast, a degrowth-led downscaling of the New Zealand food production system to eliminate environmental overshoot would ideally be a democratic, planned and smooth process,

supplemented with communications that expose economic myths and explain new ways of thinking in straightforward language.

Degrowth is a potential future that must be considered. The future for the Aotearoa New Zealand food system may not be, as some might imagine, continued growth into export markets with ever higher value-added products, but could be a rapid closing off of key markets that are increasing their local resilience and pursuing ambitious climate and biodiversity goals, shutting out food-producing nations that cannot meet increasingly strict environmental criteria for market entry.

In recognition of these looming challenges, the policy landscape is perhaps the fastest growing area of degrowth research, with attention focused on 'universal basic incomes, work-time reductions, job guarantees with a living wage, maximum income caps, declining caps on resource use and emissions, not-for-profit cooperatives, holding deliberative forums, reclaiming the commons, establishing ecovillages, and housing cooperatives' (Fitzpatrick, Parrique and Cosme, 2022).

Conclusion

This degrowth reflection on the Mana Kai Framework contributes ideas that may not have been heard during its early development and the round of consultative kōrero. As the Mana Kai Initiative states: 'it is recognised that we will not have heard every perspective, or every good idea people have about where our aspirations should sit for our food system and actions and initiatives that can assist in moving it forward'; the Mana Kai Framework is the 'beginning of a journey' (Mana Kai, 2022c, p.6).

The Mana Kai Framework perpetuates economic growth as a driving factor in the New Zealand food system, while the more radical degrowth idea for transformative systemic change has not been reflected. This may risk limiting ambition to incremental improvements of the existing system. If widely applied, as the Mana Kai Initiative hopes, use of the growth-based framework may not lead to transformative systemic change and could condemn New Zealand to a future food system that is unable to perform as well as hoped on more ambitious social and environmental goals, some of which may be set beyond its shores.

To remedy this, a second round of kōrero, starting from the initial Mana Kai Framework of nine te ao Māori values, would examine the food system through a new perspective that is not tied to growth-based assumptions. This article has sought to pose questions and provocations that might be useful for that kōrero process, but not to presuppose solutions.

When the future is uncertain and the past is not a reliable guide, a flexible and precautionary approach is needed (Boston, 2022). The people of New Zealand who rely upon the food system for their nutrition and a healthy environment (which is all of us) or their livelihood (which is a great many of us) all deserve a national food strategy that prepares us for several plausible futures, including a degrowth future. A degrowth Mana Kai Framework could sit alongside the existing growth-based Mana Kai Framework. This plurality of perspectives could inform and future-proof a national food strategy and would be useful for scenario planning. Overlapping ideas between the growth and degrowth frameworks would point to 'no regrets' options for immediate action.

It is not implausible that degrowth-based economic, social and political architectures could emerge in other nations in the not too distant future, or that an international degrowth-linked trading bloc could form involving some of New Zealand's key export markets. Businesses, communities and government should be preparing for a degrowth future, at least as a resilience measure, if not also proactively as an opportunity to transform local provisioning to meet wellbeing goals.

A degrowth Mana Kai Framework, being a more radical version, could inspire a younger, ardent social movement to push for sweeping changes to New Zealand's food provisioning system for the longer term – their lived future.

Degrowth's credibility as a serious field of scholarship is not in doubt. It is an appropriate and valuable perspective for reflecting upon the Mana Kai Framework – or, indeed, any instrument for strategic change in Aotearoa New Zealand. The current lack of knowledge about degrowth within mainstream policymaking and business decision making is an obstacle to bringing degrowth considerations into strategy.

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1 Mana Kai means sustenance from food.
2 The author has not been involved in producing the Mana Kai Framework.

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Not Just a Free Lunch
a logic model and evidence review for the Ka Ora, Ka Ako | Healthy School Lunch programme

Abstract

Ka Ora, Ka Ako provides free, healthy lunches for 220,000 learners in low-equity New Zealand schools. Costing over $260 million annually, it represents the largest government investment in child nutrition in generations. Early evaluations indicate success in achieving programme aims of delivering nutritious food, improving learners' wellbeing, and easing financial stress for families. However, international evidence and emerging local data indicate the programme can achieve the above and more. This article presents a programme logic model drawing on local data and a review of relevant international literature on universal school food provision with the aim of identifying potential long-term outcomes and impacts at multiple levels: for learners, whānau, schools, communities, and food systems.

Findings indicate that the Ka Ora, Ka Ako programme has the potential to:
- improve children's nutrition and educational outcomes, as well as improve child and whānau food security;
- enrich school learning environments;
- boost local economies (through creation of jobs paying a living wage) and enhance local foodscapes (including availability and affordability of healthy foods) through food system engagement in schools, with whānau and communities; and
- increase food system resilience (e.g., shorter supply chains and relationship building), and encourage broader food system transformation

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(e.g., reformulation, waste and packaging solutions) with leverage from new procurement models.

While Ka Ora, Ka Ako can contribute to these pathways, some implementation areas within the programme demand further attention to achieve optimal results. Recognised areas for improvement include ensuring high quality of food, providing more avenues for engagement from children and parents, addressing perceived challenges to integrate Ka Ora, Ka Ako effectively with mātauranga Māori, and improving waste management. Given the high potential for Ka Ora, Ka Ako to contribute to multiple beneficial outcomes, continued investment and expansion of the programme is warranted.

Keywords school food, child wellbeing, nutrition, education, food systems, equity

Background

One outcome of the New Zealand Child and Youth Wellbeing Strategy launched in 2019 is for children and young people to be happy and healthy. This is no small task given New Zealand's poor track record in children's mental health (ranked last out of 38 OECD and European Union countries) and physical health (ranked second worst on childhood obesity) (UNICEF, 2020). A further outcome states that children 'have what they need', which includes regular access to nutritious food and other aspects of material wellbeing, such as income and housing (Department of the Prime Minister and Cabinet, 2022). Yet, despite recent gains, there are still 12.5% of New Zealand children living in households where food runs out often or sometimes; for Māori and Pasifika children this rises to 22.4% and 38.2% respectively (Duncanson et al., 2022).

In 2020 a government-funded free school lunch programme was launched to alleviate food insecurity, address poverty and to improve children's wellbeing and learning at school. Named Ka Ora, Ka Ako (be well, and thereby learn well), the programme was introduced initially as a two-year pilot, providing a free and healthy lunch to 10,000 learners attending primary schools with high levels of disadvantage. In May 2020, as part of its response package to the global Covid-19 pandemic, the government expanded the scheme to reach over 220,000 learners at around 1,000 primary and secondary schools throughout New Zealand (Treasury, 2020), awarding approximately $263 million for the 2022/23 fiscal year (Minister of Education, 2021).

Schools are selected based on the Equity Index, a measure of the socio-economic barriers faced by enrolled students. Nationally, 25% of schools with students facing the greatest socio-economic barriers are eligible to participate. A universal approach is used and all students within a participating school receive the same lunch. Funding is allocated at a maximum 'per child, per day' cost of $5.40–$8.00, depending on student year level, and it must cover food purchasing, preparation and delivery (if required), packaging, kitchen hire and kitchen staff wages. Workers in the programme must receive at least the New Zealand living wage (around 5% higher than the legal minimum wage).

Schools may adopt one of four delivery models: external suppliers source the ingredients and create and deliver lunches (73% of schools); schools employ staff at the school to fulfil the same tasks (internal model: 23%); service provided by local iwi and hapū (2% of schools); or other models for remote schools where shelf-stable food is stored at the school and reheated (2%) (Vermillion Peirce et al., 2022). Schools and suppliers determine their own menus in accordance with nutrition guidelines that have been co-developed by the Ministry of Education and the Ministry of Health to ensure lunches are healthy and nutritious.

Ka Ora, Ka Ako aims

Overall, the programme aims to improve food security, wellbeing and overall health for learners, improve school attendance, support child development and learning, improve behaviour, concentration and school achievement, and reduce financial hardship for families (Ministry of Education, 2021). After more than three years of delivery in many schools, limited independent evaluation information is available describing the impacts of the programme.

This article asks:
- What is the international evidence on what universal school food programmes can achieve?
- What is the Ka Ora, Ka Ako programme's progress to date; what are its strengths, weaknesses and risks?

Study design

This study outlines impact pathways for the stated objectives of the programme. We critically discuss other potential impacts as expected from the programme logic, and collate evidence from New Zealand and around the world to provide a consolidated evidence base for the observed and expected immediate and long-term impacts of the programme. We provide a rapid narrative review of peer-reviewed research and recent unpublished monitoring data.

We have prioritised evidence from systematic reviews and meta-analyses of school food programmes, where possible, and have supplemented this with additional peer-reviewed research, the latest findings from 'Nourishing Hawke's Bay' implementation research, and Ministry of Education programme evaluations of Ka Ora, Ka Ako. In addition, expert opinion and unpublished monitoring data gleaned through consultations with Ministry of Education staff involved in the programme and its evaluation, as well as stakeholders from other relevant agencies (Ministry of Health, Ministry for the Environment, Ministry for Primary Industries, Department of the Prime Minister and

Cabinet, Ministry of Social Development), have been included. These observations are important in highlighting potential impact pathways which may need more specific evaluation. Where necessary, we have extrapolated the potential or expected impacts of measurable programme outcomes based on available evidence.

Outcomes and pathways to achieving the potential impacts of the programme are described at five levels: child, whānau, school, community and food system. We categorise the outcomes into three classifications: what Ka Ora, Ka Ako is already achieving; potential outcomes not yet achieved; and theoretical (potential) outcomes. Detailed programme logic tables including comprehensive evidence collected can be found at: https://figshare.com/s/b6f737b6c137f80ee520

Theory/framework
The social-ecological model conceptualises the social world in five spheres, or levels, of influence: individual; interpersonal; institutional/organisational; community; and social structure, policy and systems (McLeroy et al., 1988). The social-ecological model is popular in the field of health promotion, including nutrition, interventions. In particular, this model has been used to assist in the planning and evaluation of multiple-component nutrition programmes (Gregson et al., 2001).

In this instance, the individual is the ākonga/child/learner, the interpersonal level is the child's family/whānau/household, and the institutional/organisational level is the participating school or kura they attend (Figure 1). After the community, the fifth level is conceptualised as the New Zealand food system as a whole, both regional and national. Notably, here the effects flow both ways between levels. The system, for example, influences the community, and thereby the school, household environments and, ultimately, the child. By the same token, impacts on the child have flow-on effects that expand to the broader food system over time. Thus, the programme logic underpinning Ka Ora, Ka Ako conceptualises inputs, outcomes and impacts at these different, but interlinked, levels.

Figure 1: A modified social-ecological model for school food programme impacts
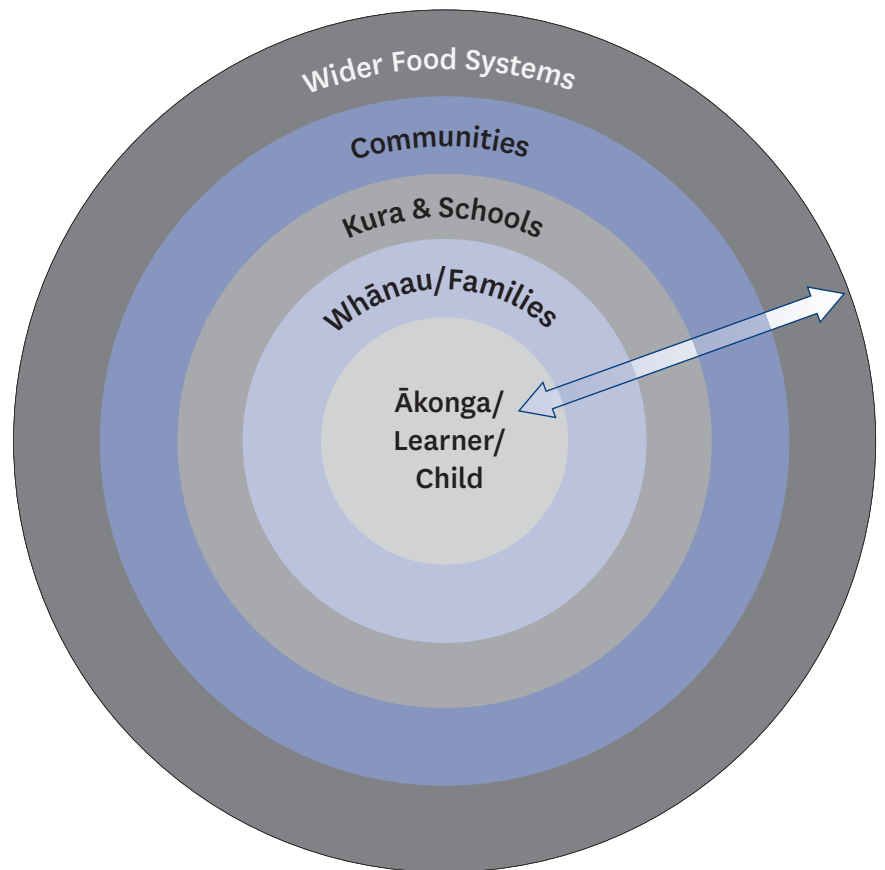
We start by presenting evidence related to observed and potential programme outcomes and effects at the level of ākonga/learner/child, followed by whānau/families, kura and schools, the community, and, finally, broader food systems. These terms will be used interchangeably throughout the article except for kura and schools. A kura is a school which uses Māori language as the medium of teaching, and we will refer to kura and schools throughout.

Outcomes and impacts
Ākonga/learner/child impacts
Figure 2 illustrates the multiple outcomes that can be achieved at the ākonga level and the pathways to achieving these positive outcomes. Specific pathways are selected for discussion below.

Satiety and food security
The first interim evaluation in two regions asserted that Ka Ora, Ka Ako contributed significantly to reducing hunger and food insecurity in primary schools, in terms of students' self-reported satiety (feeling of fullness), and the reliable availability and consumption of healthy

kai (food) (Vermillion Peirce et al., 2021). While satiety and food security are separate concepts, increased food security as a programme outcome is supported with convincing international evidence. A systematic review of universal free lunch programmes found that the two studies focusing on food security (Dalma et al., 2019; Petralias et al., 2016) reported significant reductions in food insecurity. The review found the greatest decreases occurred among food-insecure households with hunger (Cohen et al., 2021). The second evaluation of Ka Ora, Ka Ako with secondary school learners found that with regard to satiety, 54% of participating learners had enough food everyday compared to 40% in schools not receiving the lunches (Vermillion Peirce et al., 2022).

Engagement in school
A core proposition underpinning Ka Ora, Ka Ako is that providing a lunch to those who need it will help keep them in school. Neither the pilot nor the final Ministry of Education evaluation of Ka Ora, Ka Ako detected overall increases in attendance

Figure 2: Child-level programme outcomes and impacts
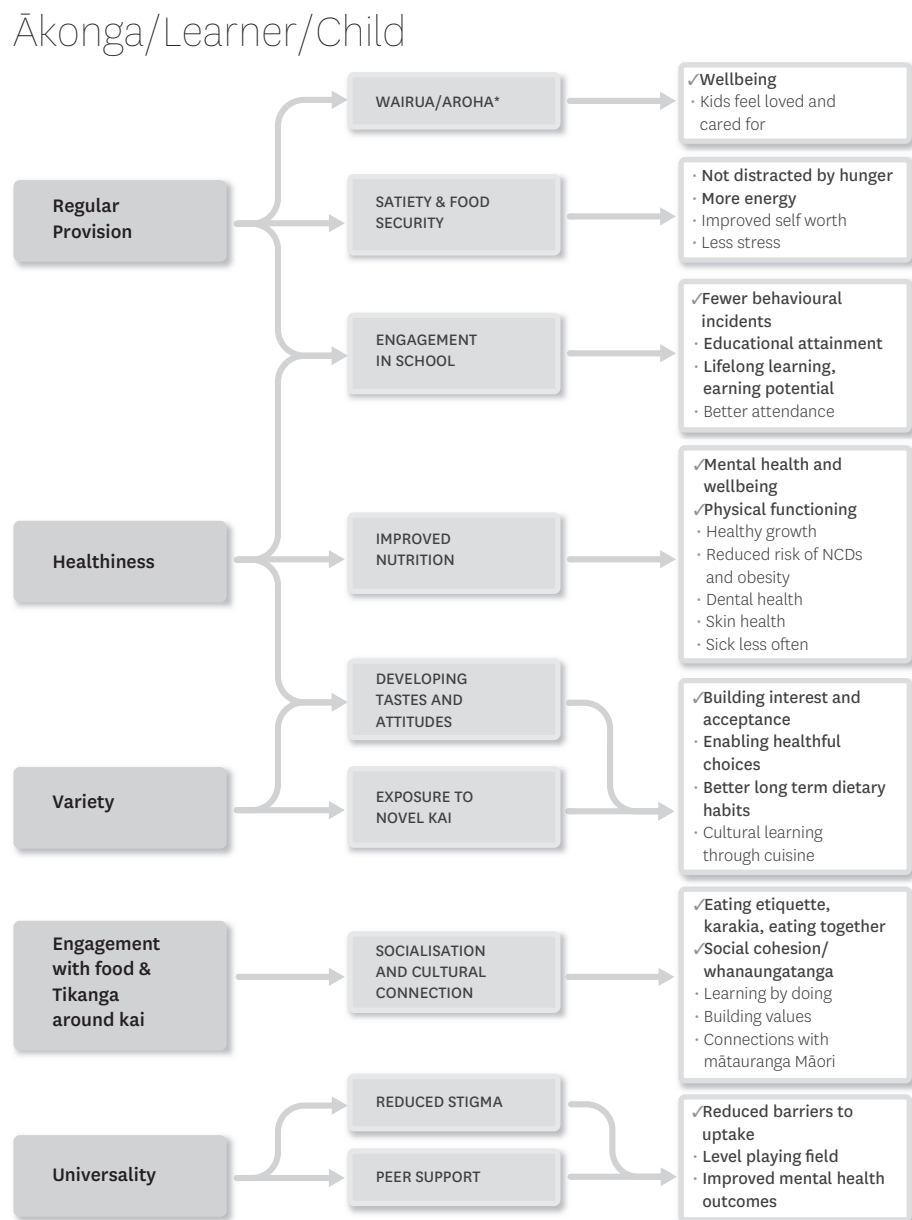
Ākonga/Learner/Child

From the left to the right: the columns refer to mechanisms, outcome areas, and outcome impacts, respectively. These outcomes are categorised as: observed in the Ka Ora, Ka Ako programme already (bold text with a tick mark); not necessarily observed in New Zealand but international evidence exists for the outcome (bold text); and potential / theoretical outcomes (plain text). NCDs: non-communicable diseases. *Te reo Māori (language) terms are used in the Figures to reflect the terms generally used during conversations with school staff and stakeholders. Wairua: the spiritual; aroha: love and compassion; tikanga: customary and cultural practices; kai: food; karakia: ritual incantation/prayer; whanaungatanga: connections and relationships; mātauranga: knowledge.

*Te reo Māori (Māori language) terms are used in the figures to reflect the terms generally used during conversations with school staff and stakeholders. Wairua: the spiritual; aroha: love and compassion; tikanga: customary and cultural practices; kai: food; karakia: ritual incantation/prayer; whanaungatanga: connections and relationships; mātauranga: knowledge.

(Vermillion Peirce et al., 2021, 2022), though the aggregate data may not show significant differences in the most at-risk individuals. Systematic review evidence has also shown mixed results for attendance (Cohen et al., 2021). However, a study investigating the long-term impact of universal primary school lunch provision in Sweden over ten years found that the programme had substantial positive effects on educational attainment (years of education completed) (Lundborg, Rooth and Alex-Petersen, 2022).

Improved nutrition and health impacts
In the first interim evaluation, Ka Ora, Ka Ako performed 'exceptionally well' concerning diet quality, wherein 39% more lunches had at least one vegetable, and 15.7% fewer lunches had snacks and sweets when compared to the lunches eaten by primary and intermediate ākonga in non-participating schools. Participating primary and intermediate learners consumed on average 0.9 more servings of vegetables, and 0.5 fewer snack items, with the largest gains observed in disadvantaged learners (Vermillion Peirce et al., 2021). A separate nutrition evaluation of programme menus across all school levels found that 77.5% of the 18 analysed key nutrients were above 30% of recommended daily intakes (RDI) for the given age groups. However, five nutrients (energy, carbohydrates, iron, calcium and iodine) were consistently below 30% of RDI or international standards, and sodium levels were slightly higher than recommended upper limits and international standards, indicating some space for improvements, which are now underway (de Seymour et al., 2022). Significant self-reported improvements in children's physical functioning and reduced disease (impaired health-related quality of life) risk were also measured as programme outcomes of Ka Ora, Ka Ako (Vermillion Peirce et al., 2021, 2022).

A positive association has been established between consumption of nutrient-rich foods – including wholegrains, fish, fruit and vegetables – and cognitive processing in children (Cohen et al., 2016). A systematic review found that school meal provision policies increased learners' overall intake of fruit and vegetables (Micha et al., 2018), and experimental research further suggests potential benefits to long-term eating behaviour (DeCosta et al., 2017). Moreover, increased dietary quality has been associated with improvements in mental health, dental health and skin health among children (Conner et al., 2017; Evans and Johnson, 2010; Hernández-F et al., 2021; Jacka, 2017; Puloka et al., 2017; Vora et al., 2020). However, further research is needed to establish the connection between free school meals – independent of other public health interventions – and health outcomes, with particular attention to the more immediate theorised effects, such as improved dental and skin health.

Peer support and reduced stigma
Due to the stigma effect of assigning a selective group of students to receive a free meal, evidence indicates the importance

of implementing a universal school lunch programme for all students (Ansell, 2016; Bhatia, Jones and Reicker, 2011; Jonkers, 2021; Leos-Urbel et al., 2013; Mirtcheva and Powell, 2009; Spray, 2021; Wahlstrom and Begalle, 1999). A comparison between selective and universal programmes in a South Korean longitudinal analysis observed that students in selective groups had significantly lower self-esteem and academic performance compared to their counterparts in universal school meal programmes (Yu, Lim and Kelly, 2019).

Socialisation and cultural connection through food
The second Ka Ora, Ka Ako evaluation suggested that all students eating together – consistent with tikanga Māori – may contribute to social cohesion without judgement among students (Vermillion Peirce et al., 2022) and student reports from focus groups support this (McKelvie-Sebileau, Swinburn et al., 2022).

Whānau impacts
Figure 3 displays the multiple outcomes and flow-on effects for households. Specific pathways are selected for discussion below.

Lower cost and less time on meal preparation
Several studies suggest that universal free school meal provision, particularly among low-income families, may be positively associated with improved household finances (Cohen et al., 2021). For example, annual savings of £330 per child for food insecure families were observed by the Scottish government as a result of its free school meals programme (Beaton, Craig and Jepson, 2014). In Ka Ora, Ka Ako, whānau attested to the programme's financial assistance in keeping up with the high cost of living (Vermillion Peirce et al., 2022). While household savings have been observed in Ka Ora, Ka Ako, parents have noted the challenge of providing lunches when the programme pauses during school holidays (McKelvie-Sebileau, Swinburn et al., 2022).

A counterargument exists that similar gains in household income can be achieved through an exact cash transfer to households, which would empower parents to provide school lunches for their children at the same cost. This argument, however,

Figure 3: Whānau-level programme outcomes and impacts
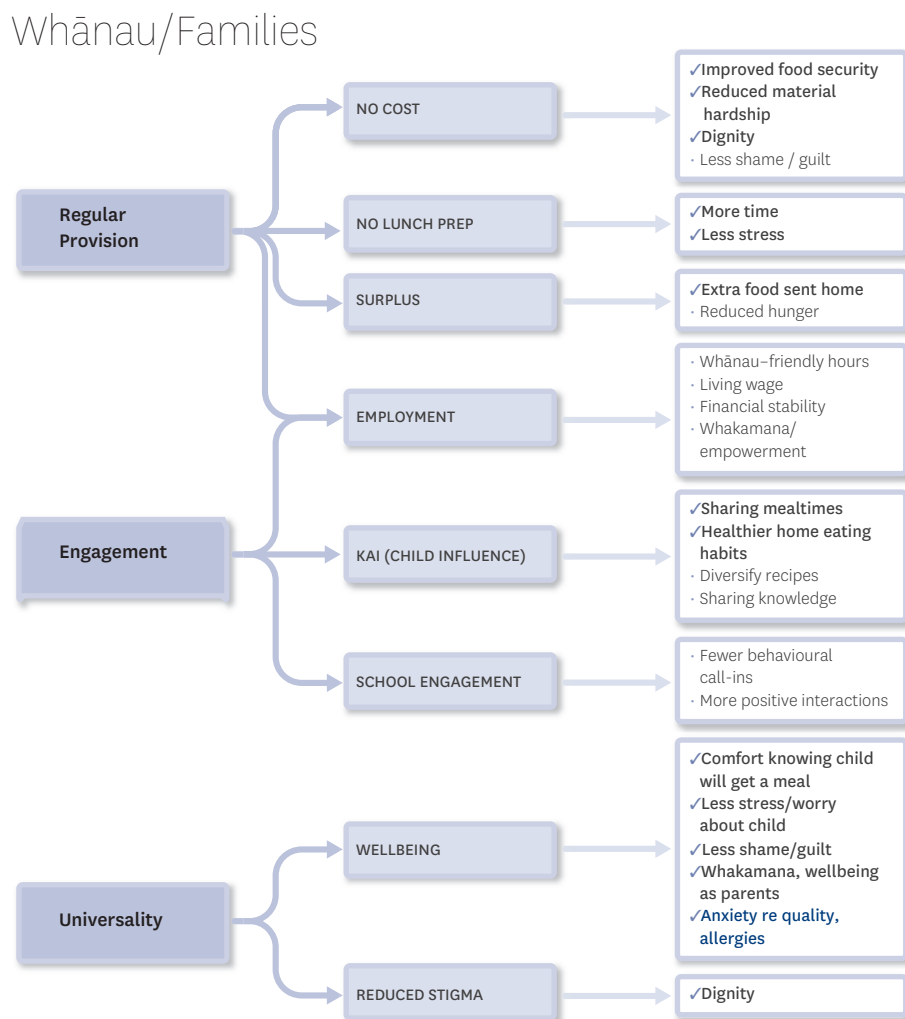
Whānau/Families

From the left to the right: the columns refer to mechanisms, outcome areas, and outcome impacts, respectively. These outcomes are categorised as: observed in the Ka Ora, Ka Ako programme already (bold text with a tick mark); not necessarily observed in NZ but international evidence exists for the outcome (bold text); and potential / theoretical outcomes (plain text). Disadvantageous outcomes shown in blue text. Te reo Māori terms used in the Figures reflect the terms generally used during conversations with school staff and stakeholders. Whakamana: empowerment.

does not account for the parents' ability to provide nutritional meals – a central component and understanding of Ka Ora, Ka Ako – due to insufficient nutritional knowledge, time, purchasing power, discretionary spending, abilities/beliefs of parents, and a surrounding obesogenic environment (ibid.; Swinburn et al., 2019).

Engagement – diffusion of knowledge
A growing body of evidence suggests a reciprocal relationship whereby children's fruit and vegetable consumption affects that of their parents, and vice versa (Heim et al., 2011; Reagan et al., 2022). Whānau participating in focus groups in Hawke's Bay believed that the programme was making children more adventurous eaters and this was benefitting those cooking for the household (McKelvie-Sebileau,

Swinburn et al., 2022). They related instances of children asking for food they had discovered at school to be served at home. However, the study noted that such benefits could be undermined in circumstances when there was a negative perception of the quality or palatability of the school lunches, or where other unhealthy food could be bought in or around the school or brought from home, reducing uptake of the lunches (ibid.). This requires further in-depth investigation.

Whānau wellbeing
In the Ka Ora, Ka Ako impact evaluation report, a case study described a parent who previously experienced stigma with their child receiving food parcels; however, this was no longer the case with Ka Ora Ka Ako, and they reported experiencing increased

Figure 4: School-level programme outcomes and impacts
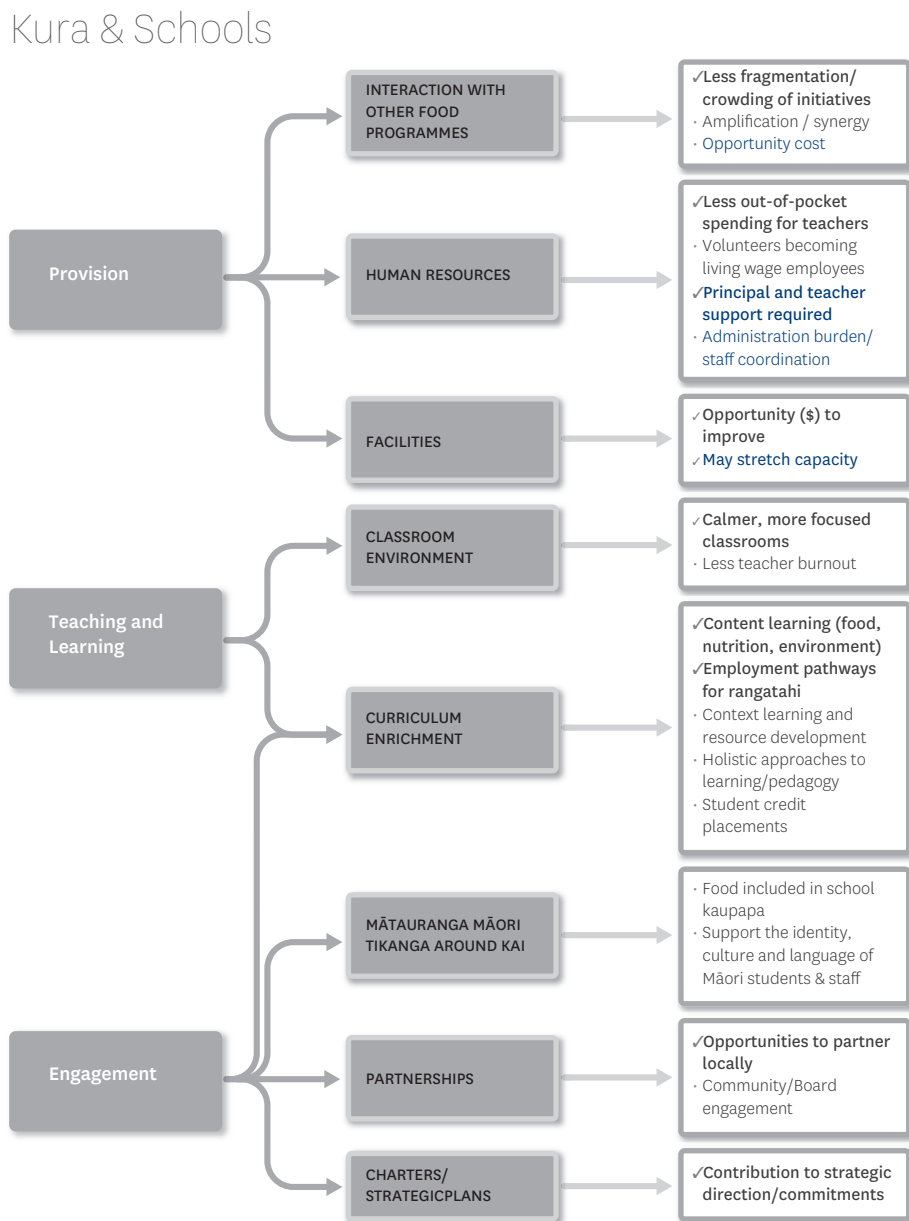
Kura & Schools

From the left to the right: the columns refer to mechanisms, outcome areas, and outcome impacts, respectively. Outcomes are categorised as: observed in the Ka Ora, Ka Ako programme already (bold text with tick mark); not necessarily observed in NZ but international evidence exists for the outcome (bold text); and potential / theoretical outcomes (plain text). Beneficial outcomes are shown in black text and disadvantageous outcomes in blue text. Te reo Māori terms used in the Figures reflect the terms generally used during conversations with school staff and stakeholders. Mātauranga: knowledge; tikanga: customary and cultural practices; kai: food; kaupapa: principles; rangatahi: young people.

School and kura impacts
Figure 4 depicts the potential effects of Ka Ora, Ka Ako on participating schools and kura. Specific pathways are selected for discussion below.

Classroom environment and curriculum
Benefits for children receiving school lunches are expected to flow into the classroom, even if such benefits are concentrated among the most food-insecure children (Pianta, la Paro and Hamre, 2008). These benefits may include classroom environments where students are more ready to learn. One of the school principals involved in the Nourishing Hawke's Bay study asserted that full stomachs lead to better capacity to learn (McKelvie-Sebileau, Swinburn et al., 2022). Students at Rotorua Girls' High School were described as being 'more alert' since the start of the programme and 'the afternoons are more calm' (Vermillion Peirce et al., 2022).

In addition, employment pathways for senior students can be provisioned through student credit placements in the Ka Ora, Ka Ako programme. While this has obvious benefits for the child, it also exists as a form of curriculum enrichment for the school (Vermillion Peirce et al., 2021). Some principals in the Nourishing Hawke's Bay study mentioned that involvement in the meal process provided children with opportunities to improve their financial literacy or organisation (McKelvie-Sebileau, Swinburn et al., 2022). Internationally, school mealtime is also utilised as a pedagogical tool, wherein students are educated on food and sustainability (Pellikka, Manninen and Taivalmaa, 2019).

Operational considerations
Principals participating in the Nourishing Hawke's Bay study from schools and kura using internal models noted more administrative burden, as they became an employer of more staff and needed to oversee the purchasing of food and management of the kitchen (McKelvie-Sebileau, Swinburn et al., 2022). However, they felt the benefits outweighed the burden with respect to educational values and better quality kai. Further, internal model schools are paid directly, which

self-esteem and confidence instead (Vermillion Peirce et al., 2022). Several whānau participating in the Nourishing Hawke's Bay focus groups shared that it is a relief to know their children were fed at school (McKelvie-Sebileau, Swinburn et al., 2022). Providing the same food for everyone, eating together, and learning about the kai was believed to be mana-enhancing, and to fit well with whānau aspirations. The Ka Ora, Ka Ako programme was further described as 'less whakamā (shame-inducing) than having to ask for food parcels through agencies'.

Whānau did note that, if the programme was removed, childrens' learning would suffer and it would increase family strain (ibid.) This is important, as studies have suggested that the most likely reason for reluctance of families to participate in selective school meal programmes is the associated welfare stigma (Leos-Urbel et al., 2013; Yu, Lim and Kelly, 2019). Offering universal free access to a school meal programme can create more equitable outcomes whereby more students of lower-income whānau participate in the programme.

means that in the same way a supplier pays their staff to fulfil administrative tasks, so, too, can an internal model school fund their administrative costs. External model school principals generally reported less administration, unless there were problems with the quality of the food or deliveries from the external supplier (ibid.). Some principals noted increased food waste, though added that direct comparisons cannot be made as several children did not previously bring food to school (Glassey, 2023; McKelvie-Sebileau, Swinburn et al., 2022).

Local partnerships and engagement with mātauranga Māori
Programme outcomes of Ka Ora, Ka Ako extend to opportunities for community partnerships between schools, councils, experts and local food suppliers, which, in turn, improve community engagement, social cohesion and resilience. Through the direct inclusion of an iwi/hapū provision model and engagement processes, including teaching and learning around kai and strengthening school connections with Māori businesses and iwi providers, the Ka Ora, Ka Ako programme aims to provide a pathway for integration of mātauranga Māori in school lunch provision. This is important when we consider that around half of the students receiving the lunches are of Māori ethnicity (Vermillion Peirce et al., 2022). For Owhata School, with an iwi/hapū provider model, the programme created valued connections between the kura, hapū, whānau and community (ibid.).

Recent qualitative research with principals of five Ka Ora, Ka Ako schools actively incorporating mātauranga Māori in their school environment revealed a perception that the programme does not fit with their school values, which are bound in a te ao Māori worldview (Glassey, 2023). The principals stated that essential elements for the incorporation of mātauranga Māori were missing. Many struggled specifically with perceived rigid requirements of the nutritional guidelines in place at the time and felt that due to this, their children or their whānau could not be a part of the process around kai – i.e., the growing or preparing of it. Schools acknowledged the programme's value in achieving food security at school, but

Figure 5: Community-level programme outcomes and impacts
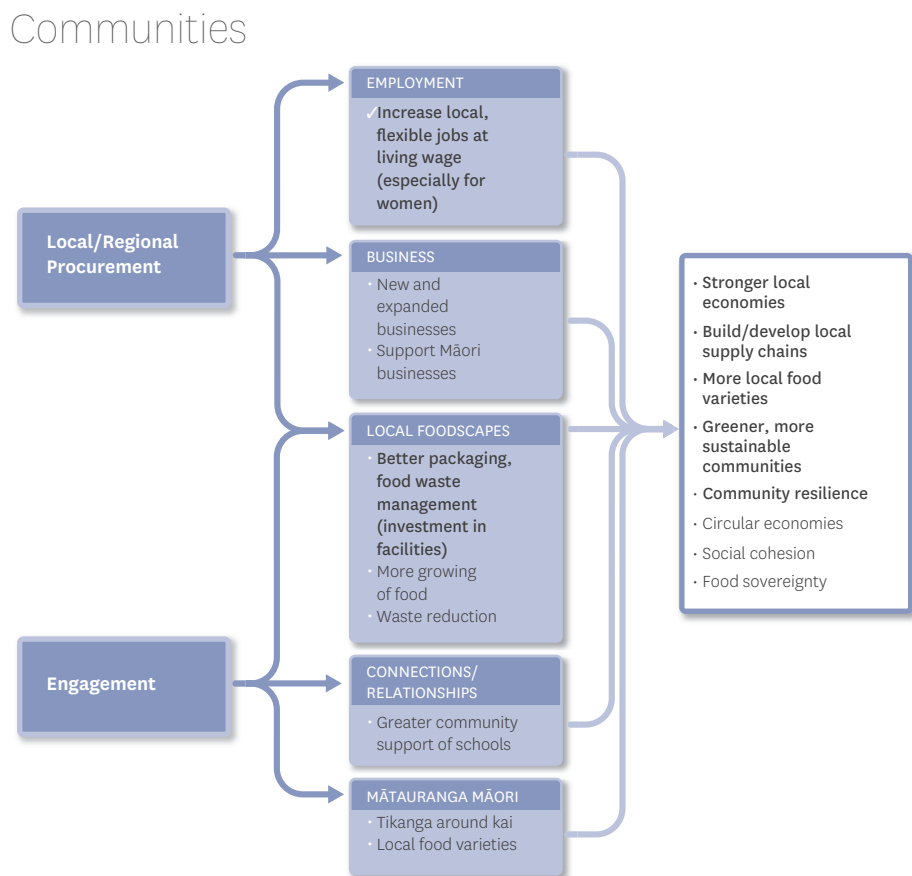
From the left to the right: the columns refer to mechanisms, outcome areas, and outcome impacts, respectively. Outcomes are categorised as: observed in the Ka Ora, Ka Ako programme already (bold with tick mark); not necessarily observed in NZ but international evidence exists for the outcome (bold); and potential / theoretical outcomes (plain format). Te reo Māori terms used in the Figures reflect the terms generally used during conversations with school staff and stakeholders. Tikanga: customary and cultural practices; kai: food

felt it could be improved so that tamariki and whānau could learn more about how to be food-secure at home (e.g., by growing their own food) and provide food for their family with limited nutritional ingredients. It was important for this group of principals to teach about kai based on mātauranga Māori and a te ao Māori worldview, and this was more difficult within the Ka Ora, Ka Ako programme structure (though there is no indication of whether this was for internal or external models). Of note also, the nutritional guidelines have been updated in 2023 to provide more flexibility (Ministry of Education, 2023).

Community impacts
Figure 5 displays the multiple outcomes and flow-on effects for communities. Specific pathways are selected for discussion below.

Local economy, businesses and employment
The programme design was expected to increase local, and flexible, jobs at living wage, benefitting particularly those 'on

the periphery of employment'. The Ka Ora, Ka Ako supplier survey conducted by the Ministry of Education in March 2022 indicates that at least 2,455 jobs (1,306 full-time and 1,149 part-time) were retained or created in supplier businesses or school kitchens by Ka Ora, Ka Ako (Ministry of Education, unpublished data). However, further research is required to assess the economic impacts for communities from increased employment from the lunch programme, in particular looking at the effects of different supplier models (i.e. internal, external, iwi/hapū).

Local foodscapes
Ka Ora, Ka Ako seeks to improve engagement between learners and their food, and between schools and the community. This in turn offers potential to improve the healthiness and environmental sustainability of local 'foodscapes', connecting rural and urban landscapes (Sonnino, 2013). An example of local foodscapes in action is

Figure 6: Food system-level programme outcomes and impacts
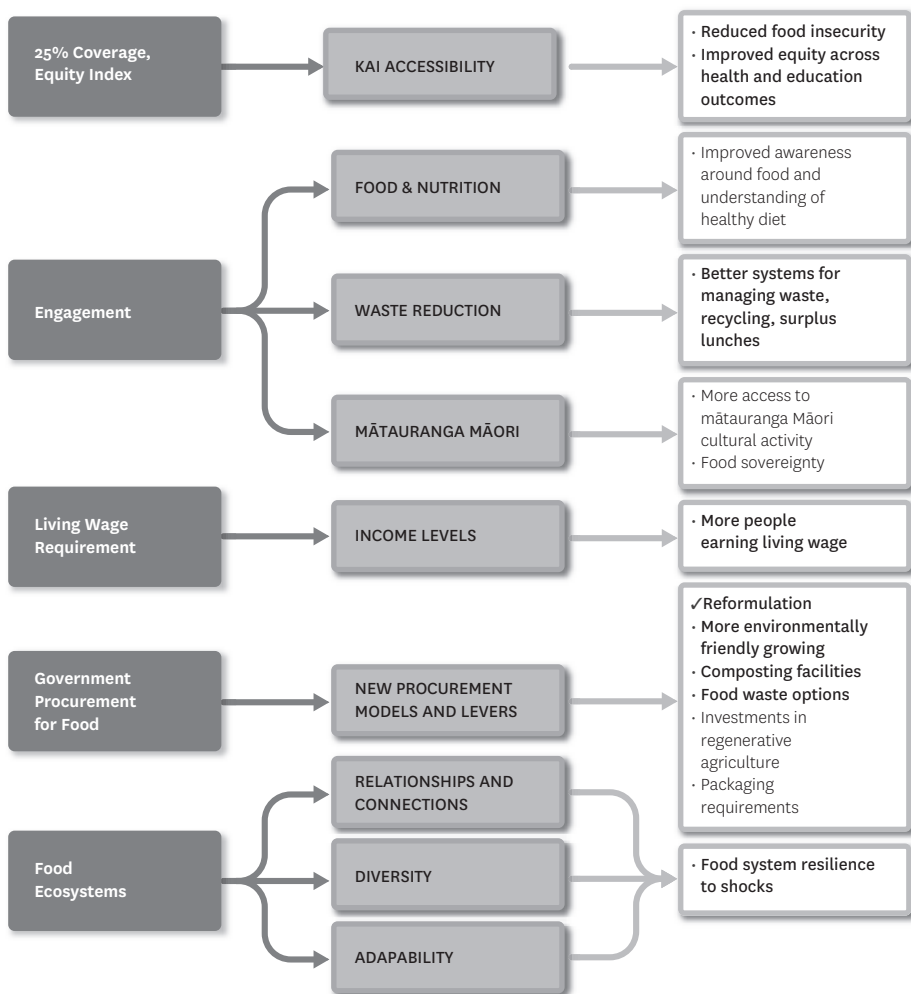
From the left to the right: the columns refer to mechanisms, outcome areas, and outcome impacts, respectively. Outcomes are categorised as: observed in the Ka Ora, Ka Ako programme already (bold with tick mark); not necessarily observed in NZ but international evidence exists for the outcome (bold); and potential / theoretical outcomes (plain format).

Mātauranga Māori and food sovereignty

As briefly covered in the section on school impact, there have been challenges observed in the full incorporation of mātauranga Māori within Ka Ora, Ka Ako, indicating that the programme is not achieving optimal engagement in this area. Therefore, while Ka Ora, Ka Ako has demonstrated a reduction of food insecurity for children in communities, it may be limited in its ability to contribute to food sovereignty without further concerted action and support.

Food system impacts

Figure 6 displays the multiple outcomes and flow-on effects for the broader food systems. Specific pathways are selected for discussion below.

Reducing inequities

Reduced inequities in communities have broad benefits to health systems and the economy. Nutritious school meal programmes have the potential to improve both nutrient intake and food security, which have flow-on effects to attendance and cognition, with greater educational attainment leading to higher income, and, thereby, positive impacts on the economy (Nugent et al., 2020; World Food Programme, 2013). Improving children's nutrient intake is likely to result in a lower burden of non-communicable diseases, which therefore reduces the pressure on the health budget (Nugent et al., 2020). A systematic review reported that universal free school meals may (by reducing food insecurity) reduce associated societal costs of education systems and health care, which were estimated to account for US$1.2 billion in 2015 in the United States (Cohen et al., 2021). This kind of food system-level impact is not yet available in New Zealand, though trends in food security will soon be available nationally (Ministry of Health, 2019) and regionally (McKelvie-Sebileau, Gerritsen et al., 2022).

New government procurement models

Government food procurement models can drive change at a systems level, with opportunities to enable shifts towards a healthier and more sustainable food system. For example, Copenhagen has recently transitioned their public procurement

the school meal reform in Scotland. The East Ayrshire Council sought to partner with local producers, loosening rigid guidelines of class 1 vegetables to welcome organic producers and attract small-scale producers (Morgan and Sonnino, 2008). Starting with just 12 schools, the programme evolved to include every primary school in the district. Ninety per cent of the food is fresh and unrefined, 70% is local and 30% is organic, and food miles were reduced by 70% (Sonnino, 2013). Alongside its environmental benefits and reinforcement of food system resilience at a community level, there were also economic benefits for local suppliers and the programme's social return on investment was estimated to be £6 for every £1 invested (Sonnino, 2013). No equivalent data or investigation is yet available for the impact of Ka Ora, Ka Ako.

Connections and community resilience

It is well recognised that strong and diverse networked community relationships contribute to increased resilience. For example, adaptable supply chains and interdisciplinary partnerships with the incorporation of local and regional food markets were key to increasing the effectiveness of food aid by the United States Department of Agriculture in the wake of Covid-19 (Thilmany et al., 2021). In Finland, several schools serve surplus from school meals to the local community at a discounted price. This initiative enhances social sustainability by providing cheap and nutritious meals to the community, while concurrently reducing food waste (Pellikka, Manninen and Taivalmaa, 2019). In Hawke's Bay, surplus lunches are redistributed through the food rescue network (McKelvie-Sebileau, Swinburn et al., 2022).

of foods to organic foods, without increasing the government food budget. An investment of below 2% of the budget was paid over ten years, which required a transition in production, purchasing, meal preparation and consumption, in order to make the processes more efficient and lower cost (Martinez, 2015).

South Korea offers a universal free, eco-friendly school lunch programme, costing about US$2.6 billion (or NZ$4.2 billion) annually (Gaddis and Jeon, 2020). The government has extended its relationships with the corporate environmental regime and local food networks to facilitate an eco-friendly programme. For food companies and farmers to access the multi-billion-dollar school meal market, precautionary infrastructure – activities that create a stable market for sustainable producers, such as sourcing policies, development of supply chains and certification standards – are employed by the government which require sustainable production practices by food companies and farmers. This example demonstrates how market-driven approaches can help drive systemic change.

The Ka Ora, Ka Ako school food procurement model includes novel approaches such as the contractual wage requirement – set by the Public Service Commission – for suppliers and internal schools to pay at least the living wage, and a commitment to a 'social procurement model' involving participatory agreement design with iwi and hapū partner suppliers.[1] There have been reports of product development and reformulation, showing the potential of Ka Ora, Ka Ako – and its associated nutrition guidelines for procurement – in changing the landscape of foods available in New Zealand through demand for healthier options and reduced waste.[2]

Food system resilience and environmental footprint
As highlighted in the above example of South Korea's eco-friendly school lunch programme, building cross-sector relationships is a key driver of food system resilience (Gaddis and Jeon, 2020). Knowledge shared, and connections made around growing food, eating and food rescue, and shortening and diversifying supply chains, may contribute to greater

> [I]nternational evidence indicates the potential of universal school food programmes to: improve dietary habits over time, for children and their households; reduce children's risk of dietary non-communicable diseases later in life; increase participating learners' educational attainment and earning potential in the long-term (generating inter-generational social mobility), and contribute to positive changes in the community and broader food system

food system resilience at a larger scale. A global systematic review of sustainability in school feeding programmes found that economic benefits included access to markets for farmers, price support

and increases in income. Social benefits involved better livelihood, food security and social inclusion. Environmental benefits included increased production of organic foods and diversification of crops (dos Santos et al., 2022).

An additional environmental benefit pathway could exist if Ka Ora, Ka Ako were to increase provision of plant-based meals. For example, in 2019, France introduced mandatory meat-free Monday for school meals. From 2022, meals for French school canteens must consist of 20% organic products, and at least 50% 'quality and sustainable' products (Ministère de L'agriculture et de la Souveraineté Alimentaire, 2022). Given the relatively large scale of school lunch provision, this could be expected to have a modest effect on food-related greenhouse gas emissions (Kidd et al., 2021). This procurement focus could also have wider impacts on product development. Moreover, a normalisation of plant-based eating through school lunch provision could have cascading effects on children's dietary preferences outside school (Lazor, Chapman and Levine, 2010). Further, extension of the school lunch programme could justify further investment in waste management facilities and infrastructure that could benefit wider food systems.

Discussion
Impacts of the Ka Ora, Ka Ako programme in Aotearoa New Zealand
Evaluations and qualitative studies of Ka Ora, Ka Ako have highlighted the programme's success at three levels. For students, the programme has provided them with more nutritious food, reducing hunger, broadening their taste preferences, and improving physical functioning and mental wellbeing – especially for those who self-reported being most food insecure prior to the programme. For whānau, financial and other stresses are reduced. And at the school level, the programme contributes to calmer classroom environments, more conducive to learning. Further, there is evidence of a modest boost to community employment.

Potential future impacts for Ka Ora, Ka Ako from international evidence
In addition to observed impact,

international evidence indicates the potential of universal school food programmes to: improve dietary habits over time, for children and their households; reduce children's risk of dietary non-communicable diseases later in life; increase participating learners' educational attainment and earning potential in the long term (generating intergenerational social mobility); and contribute to positive changes in the community and broader food system. Specifically, the size of Ka Ora, Ka Ako means that it has the potential to have a significant impact upon local and regional food systems. The provision of nutritious school lunches currently responds to needs arising from food insecurity. A future in which Ka Ora, Ka Ako supports the transformation of local and regional food systems could see the root causes of food insecurity being addressed by increasing local control over food resources, and increasing knowledge amongst young people about the physical, social, cultural and environmental effects of the food they eat.

Gaps for further monitoring and evaluation

Several theorised programme outcomes and impacts have yet to be observed, such as improvements in children's dental health and skin health, which are known early markers of improved nutrition; changes to participating learners' educational attainment; and economic impacts to communities as a result of increased employment opportunities. These gaps in data should be prioritised for further monitoring and evaluation.

Further development in the design of Ka Ora, Ka Ako

This evidence review also highlights areas where Ka Ora, Ka Ako may not be reaching its full potential. First, the question is raised about inclusion. Research has shown that many children experiencing food insecurity attend schools that are not currently eligible to receive the lunches (McKelvie-Sebileau, Gerritsen et al., 2022). Based on the benefits of Ka Ora, Ka Ako, health groups such as the Health Coalition Aotearoa are calling for the programme to be extended from 25% to 50% of schools in Aotearoa. Where the programme is

implemented, three areas were recognised as shortcomings: alleviating hunger compared to increasing food security and long-term food sovereignty; enhancing uptake through whānau and student involvement and quality of food; and allocating benefits to Māori learners.

While Ka Ora, Ka Ako addresses the symptoms of food insecurity, the programme does little to address the root causes of the issue, which also prevents long-term food sovereignty. There are a number of examples of school food programmes having a significant effect on local and regional food systems. These changes have led to much greater local involvement in production – changes to how and what food is produced – providing a way of addressing the three interlinked issues of food insecurity, environmental sustainability, and population health and nutrition (Rojas et al., 2017). Ka Ora, Ka Ako has the potential to support further investment in local employment – beyond programme food preparation – leading to a more widespread increase in household incomes. Further, better understanding is needed of how more engagement could leverage healthier and more affordable foodscapes. Though this is not currently a focus of Ka Ora, Ka Ako, it is worth noting that this theoretical pathway exists, as an area where further investment could achieve greater system-level benefits. It is also a pathway that has been followed in several international cases.

Uptake of the lunches is an important pathway to achieving the potential of this programme. Some parents have expressed the view that Ka Ora, Ka Ako needs to provide whānau with more agency – for example, through consultation on menus and addressing anxiety around allergies. Research and media coverage have highlighted issues with perceptions of poor quality or insufficient amounts of food being served, particularly when the food is provided by an external caterer (Clark-Dow, 2023; Northland Age, 2022). Much research already exists on the factors that influence uptake of lunches (Everitt et al., 2023) and parental perceptions are fundamental, particularly for primary school-aged children (Bailey-Davis et al., 2013; Martinelli et al., 2020, 2021). Opportunity remains, therefore, to

strengthen children and whānau engagement in food through curriculum and other strategies.

The third area of shortcoming pertains to Māori learners. The interim evaluation of Ka Ora, Ka Ako observed negative impacts on mental wellbeing for participating Māori students (Vermillion Peirce et al., 2022). The impact upon health and wellbeing for Māori children is less certain when viewed through the lens of ākonga hauora, a framework for measuring Māori wellbeing. Still, a tension exists for schools already trying to implement mātauranga Māori and develop 'kai culture'. These findings indicate that the current model of delivery is missing out on the opportunity to do broader things, primarily through learning and engagement. Notably, the Ministry of Education has commissioned further work to understand and respond to these concerning findings through an independent kaupapa Māori evaluation of Ka Ora, Ka Ako, which will closely examine the programme's impacts on ākonga and whānau Māori.

Conclusion

Ka Ora, Ka Ako is much more than a programme to fill hungry children's stomachs. As shown in this evidence review, the provision of universal school meals is vastly more impactful than other food provision services, such as food parcels. The programme has much to offer for learners, whānau, schools and kura, communities, and the food system more broadly. Our social-ecological model illustrates how impacts at these various levels then flow on and influence each other, reaching well beyond the New Zealand government's stated programme aims (Ministry of Education, 2021).

Outstanding elements of the programme, among others, were highlighted as:
- provision of highly nutritious food;
- significantly reducing hunger at school among ākonga taking part in the programme, particularly the most underserved;
- participating children experiencing significant benefits in physical functioning and mental wellbeing, particularly the most underserved;

- reducing financial stress for whānau of participating ākonga;
- universality of the programme, reducing stigma and other barriers to uptake;
- fostering school environments more conducive to learning;
- creation of community jobs at living wage;

Further potential benefits, not yet monitored, include:

- opportunities for food system engagement in schools and kura, with whānau and communities;
- potential to increase food system resilience (e.g., shorter supply chains and relationship building); and
- opportunities for broader food system transformation (e.g., reformulation, waste and packaging solutions) with leverage from new procurement models.

While Ka Ora, Ka Ako can contribute to these pathways, recognised areas for improvement include ensuring the quality of food (particularly from external suppliers) for children's uptake, providing more avenues for engagement with parents, addressing perceived challenges to effectively integrating Ka Ora, Ka Ako with mātauranga Māori, and improving waste management. Further work by the co-authors to build a simulation model of Ka Ora, Ka Ako and to assess the value for investment is underway.

1 Personal communication, Sheryl Ching, director of special projects, Ministry of Education, 8 September 2022.
2 Personal communication, Jasmin Jackson, service delivery manager – special projects, Ministry of Education, 28 September 2022.

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