Taituarā
Local Government Professionals Aotearoa

Inquiry into Climate Adaptation

Submission to the Finance and Expenditure Select Committee

June 2024

leadinglearninglinking

List of Recommendations

Taituarā recommends that the Finance and Expenditure Select Committee:

The Climate Adaptation Challenge

1. note the summary of what is known about the impact of change and the issues for New Zealand's adaptation challenge.

Funding

2. agree that a Climate Adaptation Fund be established
3. agree that any Climate Adaptation Fund be grounded in clear formulae and criteria
4. agree that any Climate Adaptation Fund be based on the design principles listed on page 14 of this submission
5. agree that the Climate Adaptation Fund be part pre-funded
6. agree that the price of emissions units needs to be increased significantly to support adaptation objectives
7. agree that emissions producing activity outside the emissions trading scheme should be taxed – both to support mitigation and adaptation objectives
8. agree that there should be a fair and equitable funding split between central and local government for climate change adaption implementation, not just managed retreat, which incentivises early action.
9. agree that some form of differential within the funding split – or as a top up – for vulnerable communities and councils with a limited ability to pay should be applied.
10. agree that legal, social, and business assistance and post-relocation costs as part should be part of the framework
11. agree that further research be undertaken to identify the incidence of the costs of climate change adaptation
12. agree that funding include support for those who rent to relocate from areas of managed retreat
13. agree that part of the revenues from the emissions trading scheme be used to provide support for the low-income to meet additional costs out of climate change adaptation and mitigation

Information Sharing

14. agree that funding for national climate projections and projections of sea-level rise be enhanced
15. agree that central government support research on the economic impacts of climate change (including the opportunities from climate change)
16. agree that part of the funding package in recommendations 14 and 15 above be devoted to producing guidance to assist local communities to translate this information to local level
17. agree that part of the funding package in recommendations xx and xx above include funding for resources and support that makes this accessible to the general public
18. agree that a climate adaptaton centre of excllence be developed
19. agree that central government lead development of a workfoce strategy for the acquisiton and devleopemnt of climate change related disciplines. The strategy would draw on expertise within central govenrment, local government and the private sector
20. agree that central govenrment consider mechanisms such as adjustments to immigration policy settings, the studenot loans scheme to attract and retain people into the climate change related diciplines. All players in devleopment of the strategy woul.d also explore other tools for workforce devleopment such as internships.

Planning Horizons

21. agree that the planning horizon for climate change impacts and adaptation should be standardised at 100 years. This extends to the Coastal Policy Statement, any statutorily mandated spatial plan or strategy and infrastructure planning in coastal and flood plan environments

Recommendations: Acquisiton of Land

22. agree that any future climate adaptation legislation include powers to acquire and manage land for climate adaptation purposes
23. agree that as an interim measure, the Public Works Act 1981 be amended to ensure the acquisition of land to support a climate adaptation measure is treated as a 'work' under this Act.

Continuation of Service

24. agree that legislation allow local authorities and other service providers to charge full economic cost or withdraw services where property owners choose to stay in areas where managed retreat has occurred or is occurring.

Design of Contestable Funding Pools

25. agree that the criteria and processes for applications for funding from central government should aligned to support adaptation objectives.

Introduction

Taituarā – Local Government Professionals Aotearoa (Taituarā) thanks the Finance and Expenditure Committee for the opportunity to submit to its Inquiry into Climate Adaptation (the Inquiry).

We would like to be heard in support of our submission if there is an opportunity to do so.

We particularly welcome the fact that Parliament unanimously agreed to establish the inquiry. Climate change is the public policy challenge of this century. Cross-party consensus is essential to building an enduring adaptation framework.

Boston (2023) observes that:
"Currently, relatively few countries have comprehensive national-level policy frameworks with respect to the many and varied costs of climate change adaptation – that is, frameworks which clearly enunciate the principles and related policies for determining who pays for what, when, and on what basis. Instead, current funding responses tend to be ad hoc, improvised, and unsystematic, and sometimes poorly administered and prone to corruptions."[1]

What is Taituarā?

We are an incorporated society of just over 1000 members drawn from local government Chief Executives, senior managers, and council staff with significant policy or operational responsibilities. Our primary role is to help local authorities perform their roles and responsibilities as effectively and efficiently as possible.

A national framework and legislation that enables communities to adapt to the impacts of climate change, including retreat / relocation, is urgently needed. It needs to address all hazards, and create the social licence, tools, and funding arrangements for a nationally consistent and affordable approach to climate adaption.

Local government is the key delivery partner for adaptation planning and we encourage you to work with Taituarā, Local Government New Zealand and the local government sector to ensure a joined-up response to climate adaptation across all of government.

[1] Boston et al (2023), Funding Managed Retreat, page 63.

We conclude that although this inquiry focuses on adaptation to a disrupted climate, many of the issues and options will apply equally to seismic and volcanic risks (for example the red-zoning of property after the 2010 and 2011 earthquakes). While the circumstances are different (for example Canterbury was the result of recovery planning post-disaster, we speak here of acting proactively) policymakers should never underestimate the power of precedent.

The Kiwi Climate Adaptation Challenge

Climate change is an all too real phenomenon.

The last report of the International Panel on Climate Change finds that global mean surface temperatures are currently around 1.1 degrees celsisus higher than in the last half of the 19th century and are expected to further increase. Global surface temperature has increased faster since 1970 than in any other 50-year period over at least the last 2000 years.[2]

Over the period 1909-2022 the mean annual temperature in New Zealand increased by about 1.26°C. Climate scientists predict that relative to 1986-2005, New Zealand will continue to warm by 0.7°C to 1.0°C by the year 2040, and between 0.7°C and 3.0°C by 2090.

New Zealand has been fortunate that there isgeneral acceotance of both the existence of climate change and of its anthropogenic roots. This extends to the scientific community, across most political parties (including those represented in the current Parliament) and amongst the general public.

The pace of the sea-level rise is expected to increase even under low emissions scenarios.

At around 15,000km New Zealand has the ninth longest coastline in the world. StatsNZ data shows that the annual mean coastal sea level rose at around double the rate between 1961 and 2020 compared with the previous 60 years at all four long-term monitoring sites.[3]

Under a low emissions scenario sea level rise arounds NZ is expected to be between 0,.28 and 0.55 metres under a very low emissions scenario and 0.63 and 1.01 metres under a very high emissions scenario. The former scenario is thought to be an increasingly unlikely one. According to the IPCC, if such regional variations in SLR are considered, then globally 'extreme sea level events that occurred once per century in the recent past are projected to occur at least annually at more than half of all tide gauge locations by 2100 (high confidence).

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[2] IPCC (2023), *AR6 Synthesis Report – Summary for Policy-Makers*, page 10. Retrieved from https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf on 27 May 2024.

[3] See: https://www.stats.govt.nz/indicators/coastal-sea-level-rise

Extreme weather events will increase in their frequency, severity, and in the scale of damage.

The Insurance Council of New Zealand advises that New Zealand has experienced more than 150 severe weather incidents records began in 1968. The Ministry for the Environment tells us that

- *"while significant knowledge gaps exist regarding projections for extreme heat, research indicates Aotearoa will follow the global trend of extreme heat events increasing in frequency, duration, and intensity*
- *the frequency of tropical cyclones is projected to decrease slightly over the South Pacific basin, with a predicted increase in severity. Tropical cyclone activity in the southern hemisphere is expected to decrease overall (Roberts et al, 2020)*
- *drought intensity is projected to markedly increase with the rise in greenhouse gas emissions. The most significant increases in drought intensity are predicted to be in the northern and north-eastern regions of the North Island*
- *atmospheric rivers near Aotearoa are projected to continue to get bigger and carry more moisture, which, upon landfall, can result in highly destructive precipitation."*[4]

The damage and economic cost from extreme weather events has intensified due to climate change. A recent study[5] found that $140M of the total $470M in damages from the 12 worst flood events in New Zealand over the period 2007-2017 were directly attributable to climate change. Extreme weather event losses for the four years prior to this year were:

2022 Jan 1	Annual total	Extreme weather	$324.94m
2021 Jan 1	Annual total	Extreme weather	$274.27m
2020 Jan 1	Annual total	Extreme weather	$206.28m
2019 Jan 1	Annual total	Extreme weather	$226.3m

The immediate costs of damage to physical assets during Cyclone Gabrielle and the Auckland Anniversary floods is estimated to be between $9 billion and $14.5 billion, with 'significant losses experienced across households, businesses and infrastructure'.[6]

In addition to the Auckland Anniversary Weekend floods and Cyclone Gabrielle events, extreme weather in the North Island between 21 and 28 February (2,801

[4] Ministry for the Environment (2023), Our Atmosphere and Climate, page 42. Retrieved from https://environment.govt.nz/publications/our-atmosphere-and-climate-2023/ on 28 May 2024.
[5] Frame et al, 2020, Climate change attribution and the economic costs of extreme weather events: A study on damages from extreme rainfall and drought.
[6] New Zealand Treasury, 2023, Impacts from the North Island Weather Events.

claims, $20,780,996) and again over 9-10 May (3,822 claims, $41,399,639) bring the total for climate related claims in 2023 to 119,435 – worth around $3.563 billion.[7]

Two-thirds of our population live in areas prone to flooding and rising sea levels.

Estimates of the costs associated with the risk this poses vary. One estimate is that $145 billion of private and public assets and infrastructure are already at risk from climate change in Aotearoa New Zealand - that is around 750,000 people and 500,000 buildings near rivers and in coastal areas are already exposed to extreme flooding.[8] Another recent estimate (August 2023) is that more than 282,00 homes (with an estimated replacement value of more than $213 billion) and associated structures (garages, decks, driveways, fences etc worth $5 billion) are in flood hazard areas.[9]

Auckland, Christchurch, Lower Hutt, Napier and Palmerston North cities are the most exposed to flood hazards in absolute terms. But per head of population Buller, Thames-Coromandel District, Wairoa, Central Otago and Gore districts are the worst affected. Northland (particularly Hokianga), Tairawhiti (East Cape), Waikato, and Bay of Plenty have clusters of vulnerable communities exposed to flood hazard, meaning that a significant proportion of the population of seven territorial authorities – South Waikato, Waitomo, Buller, Gisborne, Opotiki, Rotorua, and the Far North – may be in vulnerable communities that are potentially exposed to flood hazard.[10]

A study undertaken by Bell, Paulik and Wadwha[11] for the Parliamentary Commissioner for the Environment that found that there are at least 43,683 homes and 1,448 commercial properties within 1.5 metres of the average spring high tide. These properties have a replacement value of around $20 billion (in 2011 dollars!). The number increases significantly within the 0-3m elevation zone.

Tonkin and Taylor have estimated the cost of sea-level rise on local authority owned infrastructure. Their report concludes that at a mean sea level rise of 1.5 metres some 6000km of pipe is exposed, as well as more than 2000km of roads and almost 2000 buildings or facilities. The estimated replacement cost of this infrastructure is around $7.8 billion. At the 3 metre increment the estimated replacement cost is some $13.4 billion.[12]

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[7] September 15, 2023, 2023 climate disaster payouts top $2 billion - ICNZ | Insurance Council of New Zealand

[8] Ministry for the Environment, 2023, Our-atmosphere-and-climate-2023.pdf (environment.govt.nz)

[9] Paulik R, Zorn C, Wotherspoon L, Sturman J., 2023, Modelling national residential building exposure to flooding hazards. International Journal of Disaster Risk Reduction, p.94.

[10] Department of Internal Affairs, 2022, Vulnerable-Communities-Exposed-to-Flood-Hazard-August-2022

[11] PCE_National coastal risk exposure_NIWA Client report_

[12] See Simonson and Hall, 2019, Vulnerable – *The Quantum of Local Government Infrastructure Exposed to Sea Level Rise.*

Insurance retreat is inevitable.

Members will probably have seen media reports of individual property owners and small groups of property owners being unable to insure properties in flood-prone areas/areas assessed as a future flood risk.

In Auckland, Wellington, Christchurch and Dunedin full insurance retreat as a result of sea level rise is likely to occur for at least 10,000 properties by 2050. Partial insurance retreat will likely occur from 2030 in Wellington and Christchurch and only a few years later for Auckland and Dunedin. These figures are likely to be conservative ones.[13]

Climate change will have significant economic impacts. These arise both from the direct impact of a changing climate as well as the transition to a lower carbon economy.

Much of the public concern around climate change lies in the greater frequency and severity of adverse weather events and related hazards such as landslides. But the impacts of climate change goes far wider.

In 2023 Treasury and the Ministry for the Environment produced *Ngā Kōrero Āhuarangi Me Te Ōhanga: Climate Economic and Fiscal Assessment 2023*.[14] That (unsurprisingly) concluded that "*The economic and fiscal impacts of climate change are expected to be large, wide-ranging and unevenly felt*."[15]

We reproduce the two tables setting out the key results of their analysis in Appendix One. Some of the key points out of that analysis are that:

- agriculture, forestry, fisheries, and tourism are particularly exposed given their direct dependence on climate-sensitive natural resources. Due to New Zealand's high latitude, its primary agriculture may be less affected than in other countries, which could create demand for this country's products
- the transport and energy sector are also exposed due to their reliance on extensive physical networks
- regions with high populations located in low-lying coastal areas (such as Northland and Tairāwhiti) or those dominated by vulnerable sectors (such as Waikato and the West Coast) will also be more affected.
- households in areas with high natural hazard risk are likely to find it harder to get affordable insurance.

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[13] Insurance-Retreat-December-2020-Final-Report.pdf (deepsouthchallenge.co.nz) p.3.

[14] Treasury and the Ministry for the Environment (2023), *Ngā Kōrero Āhuarangi Me Te Ōhanga Climate Economic and Fiscal Assessment 2023 last retrieved on 25 May 2024 from*

[15] Treasury and Ministry for the Environment (2023), page 9.

Climate change will create 'winners and losers' in a purely economice sense. Adaptation must be proactive in identifying the opportunties may arise and ensuring that reseach, economic development, funding and onvestment strategies all support the realisation of these opportunities.

The impacts of climate change will be disproportionately felt by Māori. These impacts have both a distributional and a te Tiriti context that must form a crucial part of any adaptation.

Land held by iwi, hapū and Māori is situated in areas that are more likely to be vulnerable in that it is lower lying, situated in coastal areas, or in areas prone to slips and erosion. Some 191 Marae are situated with a kilometre of the coast, and in the Bay of Plenty alone 41 urūpa are likewise situated.[16]

Climate change poses risks to culturally significant sites such wāhi taupu, urūpa, sites for gathering or growing kai or kai moana either directly or thorugh the compromising of infrastructure (such as the loss of road access).

At the same time Māori communities may lack the economic resources to be truly resilient in the face of climate change. *Ngā Kōrero Āhuarangi Me Te Ōhanga* estimated that Māori comprise 23% of the workforce in emissions-intensive industries (compared to being 17% of the national population.

The realities of multiple ownership and the legal restraints on land use, administration and alienation also impede the development of economic and financial capacity to support adaptation.

As the Expert Working Group note 'Māori are already planning for climate change. A framework for planned relocation must enable this work to continue, rather than interrupting or changing it.'[17] We agree that the system should provide the ability for iwi, hapū and Māori communities to decide when adaptation planning is required, and for them to be technical advisors and decision-makers responsible for preparing their own local adaptation plans. Where adaptation planning is not Māori-led, a partnership approach should be taken as the Expert Working Group outlines. Clear national direction on engagement with iwi/hapu/Māori throughout the process would also be valuable.

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[16] Bailey-Winiata, 2021)' Ministry for the Environment, 2023, Our-atmosphere-and-climate-2023 .
[17] Report of the Expert Working Group on Managed Retreat, p.110

Recommendation: The Climate Adaptation Challenge

1. **That the Finance and Expenditure Select Committee note the above summary of what is known about the impact of change and the issues for New Zealand's adaptation challenge.**

Climate Adaptation Funding

Taituarā supports the creation of a New Zealand climate adaptation fund. To us this is **the** top priority for change to the system of local government funding and financing.

If the purpose of climate change adaptation is to improve the resilience of the community to the impact of climate change than the purpose of a climate adaptation fund should be to support communities to meet the financial costs of climate adaptation.

The decisions we take about adaptation funding now guide investment decisions for generations to come – ad-hoc solutions are to be avoided.

We have already observed that precedent carries powerful weight with issues that carry the policy, constitutional, environmental, economic, and cultural context of climate adaptation.

Adaptation decisions have (or at least are intended to have) long-term consequences, every bit as much as an infrastructure decision. They will be a feature of District Plans (or their successors under any resource management reform), spatial strategies (if these become mandatory) and long-term plans.

Ad-hoc decisions are the antithesis of the certainty that these require. The lack of contribution certainty and the lack of a clear decision-making process for it can delay much needed, long-term proactive investment and delay much needed recovery plans. In both cases, it is important to enable people to get on with their lives

The ad-hoc solution tends to favour those local authorities and other agents that are the best at lobbying, bigger communities over smaller ones, those that have a lower degree of deprivation – that is no articulate middle class – and, bluntly, those that are better 'connected' politically. Ironically, it favours supporting communities that are the opposite of those communities that are likely to have higher 'need' and can create further inequities.

A clear formula outlining the share of costs councils, the government, and others will be expected to pay pre and post an event is required, particularly for managed retreat/relocation.

A range of solutions and regular review of these will be necessary to cope with changing circumstances. To take one very likely scenario as the number of managed retreats multiplies – full pre-market value not likely to be an option for long.

The design principles for a climate adaptation fund should be common ground.

The Select Committee's terms of reference focus very much on the design principles for such a scheme. In our submissions to the Environment Select Committee and to other bodies (such as the Productivity Commission) we provided a 'starter for ten.' Any climate adaptation fund should be designed so as to:

- minimise the long-run costs of adaptation – decisions to protect or to relocate should be made with the knowledge of the total long-term cost (for example the total life cycle cost of any protective infrastructure such as stop banks, sea walls etc)
- complements and supports the overall set of regulatory, policy and practice measures in the overall toolkit for adaptation. For example, once the existence of a climate change risk is on a land information memorandum , any subsequent sale of the property is at the buyer's own risk and not liable for compensation in any managed retreat.
- incentivise decision-makers to avoid or reduce those activities that contribute to emissions – this is particularly relevant to the design of the funding streams; these can be used to send an economic incentive to avoid burning fossil fuels etc
- support personal responsibility and minimise moral hazard[18]
- align with signals sent by other agents such as finance and insurance - we have previously noted that insurance retreat from certain high-risk areas is a very real phenomenon now. Together insurance retreat and what we will call finance sector retreat provide an 'early warning signal' that managed retreat is on the cards long-term
- (in the words of Boston and Lawrence[19]) support distributive justice, including the fair opportunity requirement – that people should not be unduly disadvantaged for those things that they have little control over – need and ability to pay.,

Any climate adaptation fund should support, and be supported by, the National Adaptation Plan, regional (or sub-regional) spatial strategies and planning under resource management law.

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[18] Moral hazard is where an 'at risk' actor fails to reduce a risk to an optimal level because that person is likely to receive assistance or compensation.

[19] Policy Quarterly – Volume 14, Issue 2 – May 2018, Funding Climate Change Adaptation the case for a new policy framework (victoria.ac.nz)

Funding Sources

A fully functioning ETS and taxation of greenhouse gas producing activity that sits outside the ETS can provide revenues for a fund.

The discussion of a climate adaptation fund is academic without first canvassing where the money is coming from.

A balance must be struck between present and future adaptation needs. The bulk of climate adaptation will fall in the future, but adaptation needs to start now. For example, retreat from known areas of short-medium term high risk.

There is an economic and an equity case for prefunding future liabilities, in much the same way as the present-day New Zealand Superannuation Fund operates.

First, the exacerbator/polluter pays principle (from conventional public finance theory) suggests that those responsible for harm or damage (in this case the emission of gases that have created climate change) should contribute towards the cost of adaptation. Second, with the right design, the mechanism for contribution could be used to send at least some signal about the cost of activities that gave rise to climate change or avoid locating in areas at risk etc.

A fully functioning ETS is critical. Almost half New Zealand's emissions come from agriculture – from a mitigation standpoint and from a financial standpoint agriculture cannot be left not facing a price for carbon. If not in the ETS then through some other means. Any other exemptions should be few and minor.

A significant increase in the price of emissions units under the scheme will be required to better factor in the long-term cost of emissions. At the time of writing a NZ emissions unit cost around $45NZ[20] – as compared with around $145NZ in Europe and about $112NZ in the United Kingdom. Climate data released in 2021 by the Climate Change Commission indicated prices need to be over $NZ138 per tonne by 2030 and to $NZ250 per tonne by 2050 to meet New Zealand's international obligations.

Enforcement must be enhanced, including a deterrent increase in penalties for non-compliance.

A fully functioning ETS could also substitute for other environmental tax options that are advances as options. Equity applies here too – we want to avoid perceptions that any business or person is 'paying twice.'

[20] Carbon News – downloaded on 28 May 2024.

Another immediate, but contentious step that can be taken pending a fully functioning ETS is to place further taxation on automotive and other fossil fuel use. T Private vehicle use is not subject to the ETS as are the multiplicity of leisure vehicles such as motorboats and small aircraft. We say contentious because in recent times the use of a reduced rate of fuel excise was used to provide temporary relief form cost of living pressures, and the repeal of a regional surcharge in Auckland was a manifesto commitment.

In the same vein a temporary increase in the waste levy (currently $10 per tonne) could be entertained.

Some of the costs of adaptation should be borne by the beneficiary.

The beneficiary pays principle is another standard principle of public finance theory, Simply put, this principle that the cost of providing a good or a service should be met by those who benefit from the good or service.

This is sometimes referred to as the user pays principle – this would be incorrect. Climate adaptation is often associated with so-called spillover benefits – that is benefits accrue to people outside the direct area of business. To take an example – consider the estuary-side central business district protected by a stop bank. While the suburbs of our fictional city might not directly benefit from the protection but enjoy having a protected CBD 'open for business.'

This principle is most readily applied to the funding of protective works such as sea walls, stop banks etc. Options such as targeted rates are already in use in these instances.

One the other hand, there can be disputes about matters the areas of benefit and the existence or otherwise of spillover benefits. While it is fair to say that this principle incentivises personal responsibility. It is inequitable in that public understanding of the impacts of climate change was limited and even now is, at best, imperfect.

We have seen a variety of additional proposals for new funding tools that are variants on this theme. One suggestion that we support is the use of value-capture mechanisms – a levy on the value uplift as a result of a piece of expenditure. Value-capture is more closely associated with expenditures between economic development related expenditure.

Economic theory tells us that, in the long run, an asset's value reflects the income stream derived from ownership. Expenditure on matters such as protection options

enable property owners to enjoy the income stream (including the imputed benefit of owner occupation) for longer.

Value uplift does not necessarily mean an increase in rates revenue. In its report, *Using Land for Housing,* the Commissio*n* noted that some types of development project do not in themselves guarantee additional rates revenue. As the Commission notes:
"Rates are calculated in a top-down method; with a council first agreeing a LTP and a financial impact statement, then allocating the financial burden between ratepayers (as noted in s 23 of the Local Government (Rating) Act 2002). Where an infrastructure investment increases the rateable value of newly serviced land, this only causes the total rating burden to be reallocated among ratepayers. No new revenue is actually generated unless a council also increases its forecast expenditure. Nor is it possible to forecast what the rate take from a new development will be in the future, because it depends entirely on the council's expenditure plan (which is subject to change)."[21]

It can be difficult to establish a 'nexus' between the development, any uplift in value and the expenditure. There will need to be a statutory amendment to enable value capture and the processes through which the nexus is to be established and how an area of benefit is defined.

Another suggestion has been that development contributions (a charge assessed on developers to fund the capital costs associated with growth) could be used . We have significant reservations about such a proposal. Development contributions are assessed before development occurs and rely on a clear causal connection between development and the infrastructure to service it – often referred to as the 'nexus.' This is much less clear with protective infrastructure. We also consider that there is a contradiction between effective adaptation and enabling development to occur in at-risk areas.

A contribution from public revenues is also justifiable on economic and equity grounds.

A third principle is the 'public pays' principle which holds that on some level, adaptation expenditure is a public good. Some other form of national levy or tax may be appropriate on the basis that all New Zealanders benefit from managed retreat due to the minimisation of economic and social costs that would otherwise occur.

In our submission to the Environment Committee we also noted the following:

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[21] Productivity Commission (2015), *Using Land for Housing* – draft report, page 190.

- different regions have marked differences in their ability to raise revenue to pay for service
- different regions will face different levels of need to undertake different forms of adaptation. Some may face a high or short-medium term need, others may be immune or not face any real need for some years. Those with high need are not necessarily those with a high level of financial capacity to address these those needs[22]
- in the words of the Expert Reference Group "*The danger is that without a coordinated, cost-sharing approach, central government will only make adaptation decisions on an ad hoc basis under urgency following disasters. Thus, government is likely to invest primarily in locations where disasters have occurred recently, which may not necessarily be the places that face the greatest risk or need. This creates equity risks and can lead to poorer investment decisions than would be made if pre-emptive action is taken."*[23]
- co-funding provides central and local government with a degree of 'skin in the game' that better supports an ability to encourage optimal decision-making. The Expert Reference Group noted that a central government contribution to adaptation costs provides it with a 'seat at the decision-making table.' A decision-making right without a contribution would amount to spending someone else's money – in itself, a form of moral hazard.

Policy-makers should be looking for a tax that is broad-based (i.e. few exceptions) so that a low rate of tax can be applied (or, optimistically, hypothecated from within existing revenue sources), Realistically an hypothecated 'adaptation levy' additional to, or from within, any or all of income tax (including corporate tax)or GST would be a low cost means of collecting such an adaptation tax. Of the two, income tax has a better overall correlation to ability to pay,

The macroeconomic impact of climate change adaptation require adjustments to our framework for income support.

We have already seen both that climate change will have a significant and largely negative impact on the economy and that this may fall on those who are least resilient to it.

However funded, the cost of climate change mitagation and adaptation action will be felt in higher prices for energy and transport, and through these, goods and services across the board. Davis, Hart and Stubbing have recently estimates that the

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[22] For example, rural councils with a small rating base will struggle to meet the financial expectations.

[23] Report of the Expert Working Group on Managed Retreat, pp.187-188.

cost of livung impact for households arising *from the Emissions Trading Scheme alone* to be around $783 (with the largest increases in petrol and electricity).[24]

Overseas literature suggests that renters are often counted amongst the losers from climate change adaptation. Dundon and Camp (2021) found that:

- renters are often less prepared than homeowners for climate-related disasters (e.g. because they lack the incentives and/or authority to invest in making their rental property more resilient to potential impacts, such as floods)
- renters suffer various co-vulnerabilities including limited savings, significant levels of debt, and living in less weather-proof dwellings
- renters have less knowledge than homeowners of the risks affecting the area where they live. This is partly because most of the relevant information is provided to property owners rather than renters. Also, owners often do not disclose the risks to those who rent their properties
- renters are frequently transient and tend to reside in communities where they are less able to rely on neighbours for support in the event of a natural disaster
- managed retreat policies tend to give preference to homeowners over renters, with very additional little support being provided for low-income rental housing in areas designated for relocation. As a result, renters tend to remain in at-risk locations longer than owners and/or gravitate to such locations because the rents are low.

Yet those renting properties in areas subject to managed retreat are often given only limited public assistance. For instance, in the United States there is reliable evidence that both the direct impacts of climate change and governmental property buy-out programmes often leave renters significantly worse off.

These come alongside the direct costs of climate disruption itself such as increases in insurance premiums, increases in food prices through weather disruption and the like.

The point is that climate change, and funding climate action will necessitate some change to the framework for social assistance. Some of the more regressive impacts might be mitigated by returning part of the ETS revenues to lower income households. This *carbon dividend* can both partially mitigate the distributional impact on lower-income but can also create a higher level of public accptance of the ETS and support mitigation efforts in general.

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[24] Davis, Hart and Stubbing (2024), *Household cost-of-living impacts from the Emissions Trading Scheme and using transfers to mitigate regressive outcomes*, analytical note written for the Treasury. Last retrieved from https://www.treasury.govt.nz/sites/default/files/2024-02/an24-02.pdf on 28 May 2024.

What should be funded?

We turn specifically to the range of adaptation costs below – using the classification developed by the Expert Group on Managed Retreat. While developed specifically for managed retreat conversations there is some degree of crossover with other adaptation projects or processes and the funding framework will need to cover a significant number of activities to reduce long-term costs.

Successfully engaging on climate adaptation is multi-stage, central government support is justified.

The costs of public engagement will be significant and ongoing. Some centralised support for these processes is justified and may involve mechanisms other than direct funding support.

As the Committee will be aware adaptation processes are both highly complex and subject to a high level of public interest. The ideal community engagement process starts with, and seeks consensus on the nature of the issue, the options for resolving the issues and solutions. Done well these processes can take months or even years – retreat out of the post Canterbury earthquake red-zone is a good example. In the case of climate change the process will be resource intensive given the range of engagement tools - tactile models, simulations (such as virtual reality), face to face meetings, expert input – that are required.

A funding split is needed for the 'project costs' including managed retreat.

Despite considerable discussion in the past the critical issue of funding and financing climate adaptation has remained unresolved – in particular, the appropriate balance of private and public contributions[25] and the share between local and central government. As we have indicated the costs of adaptation, including managed retreat – especially where the community needs to relocate *en masse* – are likely to be large and likely to grow in future.

We are attracted to the Expert Working party's conclusions around funding allocation. We accept that councils should have some responsibility for funding adaption, and new infrastructure. We note that Boston and the Expert Working Party have recommended that local government should not fund managed retreat – 'there is likely to be merit in minimising, if not avoiding altogether, any cofunding arrangements, certainly those involving sub-national government'.[26] We recognise that this is unlikely to be politically palatable to central government and therefore accept that local government may need to contribute.

[25] Boston, J, 2023, Funding Managed Retreat, p.64.
[26] Ibid, p.175.

However, current funding tools and financing settings mean that councils are unable to meet the upfront costs of early adaptation alone, and in some cases will be unable to meet 'their share.' We therefore recommend alongside Crown investment that some form of differential will need to be applied to take account of factors such as deprivation, and council's ability to pay – not dissimilar to funding formulas for local roads.

It is highly desirable that any agreed funding split should incentivise early action, which implies it should be better than waiting for a disaster to strike. It will therefore be important to signal the appropriate funding splits for adaptation pre and post an event and offer an adequate level of financial assistance to encourage voluntary relocation that is favourable to compulsory purchase arrangements. It will be most important to ensure that the framework is both fair and seen to be fair if it is to endure.

We also note there are also some perverse incentives within the system – such as Waka Kotahi funding for replacement like for like but a lack of funding for much needed improvements, which may provide better long-term outcomes. We agree with LGNZ that guidance should be developed and policy settings changed to incentivise building back better post-event.

We also support a more generous approach to homeowners that must relocate and a system that differentiates between primary places of residence and second homes and prevents undue hardship.

Support for communities

The Expert Working Group recommended that funding for managed retreat build in funding for the provision of independent advice including legal support for affected parties. We note that where these services are provided at all under current practice, they are all privately funded (and rely on collectivisation or donation of work 'pro bono').

We see a need for some element of public funding - access to due process is critical to public acceptance of any decisions. The Committee may want to consider whether any funding support should be subject to means-testing (or other means of targeting) alongside appropriate safeguards (for example, a financial cap, or a limit on appeals).

Recommendations: Funding

That the Finance Select Committee agree that:

2. **a Climate Adaptation Fund be established**
3. **any Climate Adaptation Fund be grounded in clear formulae and criteria**
4. **any Climate Adaptation Fund be based on the design principles listed on page 14 of this submission**
5. **that the Climate Adaptation Fund be part pre-funded**
6. **that the price of emissions units needs to be increased significantly to support adaptation objectives**
7. **that emissions producing activity outside the emissions trading scheme should be taxed – both to support mitigation and adaptation objectives**
8. **that there should be a fair and equitable funding split between central and local government for climate change adaption implementation, not just managed retreat, that incentivises early action.**
9. **that some form of differential within the funding split – or as a top up – for vulnerable communities and councils with a limited ability to pay should be applied.**
10. **that legal, social, and business assistance and post-relocation costs as part should be part of the framework**
11. **further research be undertaken to identify the incidence of the costs of climate change adaptation**
12. **that funding include support for those who rent to relocate from areas of managed retreat**
13. **part of the revenues from the emissions trading scheme be used to provide support for the low-income to meet additional costs out of climate change adaptation and mitigation**

Climate Risk and Response Information-Sharing

Climate policy and climate adaptation are heavily information dependent.

Robust information about the likely future state is a necessary condition to identify the need for adaptive action. The definition and assessment of the adaptation options must likewise rely on quality information to determine what options are practicable and to assess the options.

The Parliamentary Commissioner for the Enviroment summarised the need for better direction and guidance on sea level rise as falling into three broad areas:

- the scientific assessment of impact on communites
- the process of engaging with the community and
- the planning and management decisions that follow.

These are a good summary statements of what the overall needs are, We expand on these below,

Even the best science and research loses some of its value if it is not accessible to the general public.

Falling under 'the scientific assessement of impact on communities we have identified the following (note that we take an intentionally wide view of the term scientific to include the social sciences such as economics):

1. a national set of projections of sea level rise and a nationally agreed methodology or set of methodologies for translating these to local level. These forecasts should be peer-reviewed (including by at least one person or agency from outside New Zealand) and regularly updated. A set should be ready in advance of the first regional spatial strategies
2. a nationally produced set of climate forecasts. As with the sea-level rise these forceasts should be peer-reviewed (including by at least one person or agency from outside New Zealand) and regularly updated. Agencies such as NIWA are producing these
3. robust analysis of the likely economic impact of climate change including sectoral impacts, and guidance on how to think about the local economic impact of cliamte change. This guidance must be comprehensive in that it should incorporate discussion of the economic opportunties (e.g cultivation different tyeps of agricultural and horticulural products might be enabled in areas where this is not currently possible). As we have seen, Treasury have produced an analysis of the potnetial impact on the Government's financial position but these is little else that is specific to New Zealand. This is perhaps the largest gap in the stock of information that is available now or in the foreseeable future

4. each of 1-3 is important in itsef, but the impact of each is blunted if it is not accessile to the community as a whole. More needs to be invested in resources that make the science accessible to the community e.g. "here's what sea level rise means for New Zealand."

There is a strong economic case for aggregating the production of climate science and research.

Quality information costs. Whakatāne District Council expended approximately $1 million compile the evidence to identify the level of debris flow risk to residents of the Awatarariki Fanhead, with the resultant retreat of 34 properties.[27]

The Expert Working Group concluded that:
"Because of significant economies of scale, and the need to maintain national consistency in the quality and availability of the data, we think this initial data gathering should not remain the responsibility of local government. It should be managed by a central government entity."[28]

We agree, and we'd also add that there is a shortage of the requsite skills in science and applied economics in New Zealand, and that there are synergies in clustering skills togther.

And one final comment, whatever agency or agencies undertake these roles will need access to people who are skilled in communicatios and in human learning (especially adult learning).

Engagement

There is good guidance on some of the general approaches to engaging on cliamte adaptation – for example, dynamic adaptation pathways planning is well covered in guidance from the Ministry for the Environment. But some other engagement needs for climate adaptation include:

- enhanced guidance as to what is deemed an unacceptable level of risk is essential. All conversations on adaptation begin with an identification that a risk exists and what the level of risk actually is (no risk, no need to adapt). The decision-makers assessment of risk is one of the more common and (possibly) more fruitful areas of challenge. These mix scientific judgemnt, local knowledge and policy judgement. No guide can ever replace all of these with hard and fast rules but criteria and some gudiance around what makes for a robust process would help. Guidance will be needed whatever approach legislation takes to a

[27] This is just the cost of risk assessments – we are advised that the cost of the retreat itself was around $17 million.

[28] Report of the Expert Working Group on Managed Retreat, pp. 197-198.

definition as we are sure this will be tested through the courts (probably in lower lying but wealthy areas)
- an assessment and explanation of te Titiri implications arising from climate change adaptation and guidance on how to contextualise these at local level
- alternative engagement and decision-making tools for circumstances where dynamic adaptation planning is not appropriate (smaller projects etc)

Case studies and shared learning are the 'core' of our adaptation engagement needs.

But most of all there is a hunger for case studies and shared learning around what works. Collectives such as the Aotearoa Climate Adaptation Network are compiling and sharing local government examples. But we would add that central government and private sector infrastructure providers (such as energy and telecommunications) have examples that they can share. For example, Spark or Genesis Energy may have lessons to teach about the withdrawal of service. We know that the New Zealand Transport Agency has and is considering matters such as replacement of lans transport assets after exteme weather.

Taituarā has recognised several high-quality examples of climate adaptation through its Excellence Awards (and elsewhere). Thames Coromadel District's Shoreline Managment Pathways Project won the 2023 GHD Award for Environmental Leadership.[29] In 2020 Dunedin City Council recevied a highly commended citation in the Ministers' Award for Council Community Relations for the restoration of Karitāne sandspit. [30]

Of course, there are many other examples. Probably the best known example in the sector is the ongoing DAPP process that is running over the Clifton – Tangoio stretch of the Hawkes Bay coastline and includes the retreat in and around Haumoana. More recently there have been the lessons learned from the voluntary 'buyout' process that Auckland Council ran to purchase some of the worst affected of the properties in the wake of Cyclone Gabrielle.[31]

Of course, there is an obvious gap in the examples available at present. Almost all of the examples are of adaptation to coastal hazards. That is no criticism. Coastal

[29] Thames-Coromandel undertook shoreline management planning for its 400km of coastline to reduce risks to people, property, the environment and tāonga associated with coastal hazards. The result is a set of 138 adaptation pathways specific to the aspirations and concerns of each community and the principles of kaitiakitanga.

[30] This was a partnership between Kāti Huirapa Runaka ki Puketeraki, the wider Karitāne community and the Dunedin City Council to co-design a sustainable solution to the erosion of Karitāne sand spit. The solution agreed upon was to construct a natural driftwood windbreak to trap and accumulate windblown sand.

[31] We can arrange for the Committee to view a recent webinar on this if this is of interest,

inundation and erosion are two of the leading edge impacts of climate change and rightly have 'come first'.

Here's the point, a repository of examples cannot be a static 'compile once' and walk away. Just as the risk profile changes, case law changes, public mores and risk tolerance changes

The centre of excellence model has appeal for climate adaptation

The Productivity Commmission recommeded the establishment of a centralised source of knowledge and guidance about climate change adaptation. It will need to have strong links to the scientific community to draw on up-to-date climate science and data as well as expertise in regulation and planning, community engagement and risk management.

More can be done to develop a workforce skilled in disciplines relating to climate change, especially climate change adaptation.

The disciplines that support climate change adaptation are in short supply within New Zealand (as they are elsewhere in the world). Pockets of climate expertise exist within central Government agencies (such as the Ministry for the Environment and the Climate Change Commission), some of the larger local authorities, and the consulting industry.

An overall assessment of workforce need and strategies is the place to start.

Taituarā is exploring with the Aotearoa Climate Adaptation Network the potential for qualifications ranging from post graduate diplomas to micro credentialing as part of an adaption professional development programme (National Adaptation Plan Action 3:29) to enhance capability and provide assurance. New Zealand is starting to see degree level courses offered now (suhch as the Bachelor of Climate Change offered through the University of Waikato).

Central Govenrment can support the aquisition and development of a workforce in similar ways to the means that it uses to support other sectors. Immigration policy settings can be adjusted to target those with backgrounds in climate science, environmental sciences (such as hydrology), resource planning and environmental engineering. The settings for the student loans scheme could be amended thorugh one or more of a partial foregiveness of debt and/or low or zero interest.[32] And both central and local government can use instruments such as internships to

[32] A mechanism such as debt forgiveness would need some qualification such as a minimum period of service within New Zealand – we would want to avoid subsidizing the climate workforce needs of others.

develop – thougn again no-one is keen to develop skills that go straight into the private sector.

Recommendations: Information Sharing

That the Finance and Expenditure Select Committee agree that:

14. **funding for national climate projections and projections of sea-level rise be enhanced**
15. **central government support research on the economic impacts of climate change (including the opportunities from climate change)**
16. **part of the funding package in recommendations 14 and 15 above be devoted to producing guidance to assist local communities to translate this information to local level**
17. **part of the funding package in recommendations 14 and 15 above include funding for resources and support that makes this accessible to the general public**
18. **a climate adaptaton centre of excllence be developed**
19. **central government lead development of a workfoce strategy for the acquisiton and devleopemnt of climate change related disciplines. The strategy would draw on expertise within central govenrment, local government and the private sector**
20. **central govenrment consider mechanisms such as adjustments to immigration policy settings, the studenot loans scheme to attract and retain people into the climate change related diciplines. All players in devleopment of the strategy woul.d also explore other tools for workforce devleopment such as internships.**

Other Tools and Support

In this section we turn to some of the other tools and support that local govenrment and local communities might need to support climate adaptation as well as some other points that did not fall neatly within the earlier three sections.

All climate adaptation planning needs to proceed from a shared and consistent timeframe.

Legislation sends slightly mixed signals about climate change and adaptation, particularly in the planning timeframes. The NZ Coastal Policy Statement requires those with obligations under that document to take a 100 year view. Assessments under the Building Act 2004 are set at 50 years. The Auckland Unitary Plan has a planning horizon of 30 years, as did regional spatial strategies under the (repealed) Spatial Planning Act and infrastructure strategies under the Local Government Act 2002.

There is a degree of commonality and stability in forecasts of temperatures and sea-level rise to around 2060. After that a higher level uncertainty and hence variability of outcome is forecast. To make the practical import apparent, the point where uncertainty really takes hold sits at the outer edges of some of the shorter-term of the above. We also observe that a person buying their first home today could still be invested in 2060.

Recommendation: Planning Horizons

21. That the Finance and Expenditure Select Committee agree that the planning horizon for climate change impacts and adaptation should be standardised at 100 years. This extends to the Coastal Policy Statement, any statutorily mandated spatial plan or strategy and infrastructure planning in coastal and flood plan environments

Current land-use planning legislaton will not support climate adaptation.

The Expert Working Group concluded that the Resource Management Act 1991 (and land-use planning as we currently conceive it) will not support adaptation. Specifiically:
"Issues with using the land-use planning system for planned relocation include the lack of legislated mandate, processes, powers, institutional arrangements, and funding to support planned relocation. In particular, gaps arise from:

- *the protection of existing uses by the planning system – this makes it very difficult to change existing uses to reduce risk, particularly in anticipation of risk, or before risk becomes intolerable*
- *the lack of a clear, specific, mandated requirement to reduce risk through planning for, and implementation of, adaptation (including relocation)*
- *the inability of the system to plan in the face of significant uncertainty*
- *the lack of national direction on when and how to plan for relocation (although there is national guidance on how to approach adaptation planning in a coastal context, there is no national consistency on when and how planned relocation becomes a valid response to risk, or on the role of risk tolerance)*
- *insufficient powers, tools, and mechanisms to carry out a planned relocation – in particular, to require action to be undertaken and to change ownership of land, resulting in adaptation plans that struggle to get implemented*
- *the lack of clearly articulated roles and responsibilities for enabling planned relocation, both from a planning perspective and from a funding perspective*."[33]

As you can see a wide range of powers are necessary to support adaptation. These include more general powers such as planning and the processes that support planning, powers to act in emergency situations, and powers to override other activities (for example, land-use plans under the RMA and whatever successor legislation may be coming).

Adaptation, where is has occurred, has been undertaken using what powers exist under the Local Government Act, and in some instances commercial agreements (such as the voluntary buyouts that have occurred post Cyclone Gabrielle.

A framework created by piecemeal amendments to other legislation runs the risk of inconsistencies between the different statutes (and even inconsistencies within the same statute), potential gaps in the overall framework as things simply get 'lost translation. We favour a single Climate Adaptation Act.

Decision-makers needs stronger and clearer powers to acquire land.

Retreat is one of the core tools needed to support adaptation and fundamental to retreat is the notion that the landowner surrenders the right to use or occupy the land (with compensation usually). The power to acquire land is therefore a key element of retreat.

Governments, central and local, need clearer stated powers to acquire land for retreat purposes. The Public Works Act 1981 governs the acquisition of land by public agencies for public works which a local authority are defined as: *"a work constructed or intended to be constructed by or under the control of a local authority,*

[33] Expert Working Group on Managed Retreat (2023), pp 8-9.

or for the time being under the control of a local authority". It is arguable that the acquisition of land to remove it from use to prevent development is actually empowered under this Act.[34]

The definition of "work" under the Act is very wide and applies to "every use of land" which the Crown or local authority is authorised to "construct, undertake, establish, manage, operate or maintain by or under this Act or any other Act." Again this is very oriented to building or operating works, rather than removing buildings.

These are not academic points – the compulsory acquisition of land is the decision most likely to be challenged of any in the adaptation context.

Further, the power to acquire is simply that. It may be in some cases, for example, where the risk is not expected to materialise for some years that options such a buying the property and renting or leasing to former owners for a limited time become feasible. (Managed retreat and acquisitions will involve multiple properties – the transactions costs of this tend to encourage public bodies to do as much as they can at the one point in time. These sorts of options can also provide for some transition for affected property owners).

For the reasons given above, the powers to acquire land for climate adaptation purposes should be part of any Climate Adaptation Act. The Public Works Act 1981 could be amended as an interim measure – and indeed we understand a review of the Act is planned for the near future.

Recommendations: Acquisiton of Land

That the Finance and Expenditure Select Committee agree that:

22. **any future climate adaptation legislation include powers to acquire and manage land for climate adaptation purposes**
23. **as an interim measure, the Public Works Act 1981 be amended to ensure the acquisition of land to support a climate adaptation measure is treated as a 'work' under this Act.**

[34] The situation is marginally better for the Crown in that the definition of works is a work or an intended work that is to be constructed, undertaken, established, managed, operated, or maintained by or under the control of the Crown or any Minister of the Crown for any public purpose … even where the purpose of holding or acquiring the land is to ensure that it remains in an undeveloped state." It is quite clear that acquiring undeveloped land is contemplated (DOC would be out of business otherwise) but again acquiring developed land is not.

Legislative frameworks must consider the implications of continuing to service climate-impacted areas.

This is a practical issue that has been encountered in other circumstances such as the so-called 'red zones' after the Canterbury earthquakes. As areas subject to managed retreat are vacated and only the 'holdouts' are left the cost of continuing to provide infrastructure to those properties increases and the risks involved in providing services increases (for example roads being washed out, utility lines damaged etc).

The cost of these services is as much a market signal as the cost and availability of insurance or the terms and availability of finance. Decisions to stay in place should be made cognisant of all of the costs and risks of such a decision – to do otherwise is to expect a subsidy from other ratepayers or customers.

Local authorities and other infrastructure providers should be permitted to use tools such as full cost recovery in these instances. There is some merit in allowing for withdrawal of service provided that sufficient notice is given to the landowner to enable them to put alternatives in place. Of course these options should be clearly signalled as potential consequences during the engagement phases so landowners are clear. There are additional consequences – for example a property needs road access as a condition of getting certificate of title.

Recommendation: Continuation of Service

24. That the Finance and Expenditure Select Committee agree that legislation allow local authorities and other service providers to charge full economic cost or withdraw services where property owners choose to stay in areas where managed retreat has occurred or is occurring.

Don't fund what you don't want more of – funding pools should be designed and operate in ways that do not undermine adaptation objectives.

And finally, we observe that central government funding tends to operate through contestable funding pools, where funding is rationed using application and/or business case processes. This is as it should be – these processes allocate scarce public funds to maximise value for money

The allocation of funds by agencies such as NZTA, and funding pools such as the Regional Investment Fund provide powerful incentives to behave in particular ways.

The criteria for these pools, particularly those of an economic development nature, should be designed in such a way as to support adaptation objectives. For example disincentivising investment in flood plain areas or in coastal areas at inundation risk and where suitable adaptive measures are not being undertaken.

Funding through agencies such as NZTA needs to be configured to support market signals. Insurance retreat impacts the life-cycle cost of an infrastructure network as well. The business case methodologies for new projects need to emphasise not just economic costs and benefits, but the strategic and delivery cases (i.e. does building this road on a surface in an area of accelerating coastal erosion make sense). Land transport providers need to signal what of their network is at risk – and in these cases maintenance and renewal funding should 'taper off'.

This points toward a strengthening of the links between adaptation planning and landuse/environmental planning discussed earlier.

Recommendation: Design of Contestable Funding Pools

25. That the Finance and Expenditure Select Committee agree that the criteria and processes for applications for funding from central government should aligned to support adaptation objectives.

Appendix One: Summary of Treasury/MFE Analysis of the Economic and Fiscal Impact of Climate Change

Summary of expected impacts	Key quantitative evidence (see relevant section for more detail, including limitations)	Key sources of variability
Economic impacts		
Macro-economic impacts › A fall in GDP growth due to expected damages to assets, lost productivity and supply chain disruptions. › New Zealand may be less vulnerable to physical climate risk than many other countries, in part due to its strong institutions and economic and fiscal resilience.	› The average of the modelled simulations by the Treasury indicated that the impact of increasing the frequency of droughts would cause GDP to be 0.5% lower in 2061 than the assumed counterfactual trend. A scenario with increased storms and/or floods estimates this impact would be a 0.7% decrease (Section 4.1 and Box 6.1). › NIWA analysis shows that sea-level rise of 30cm could expose an additional $6 billion worth of buildings, 409km of roads and one airport to coastal flooding (Box 4.6). › The Treasury estimated that physical climate impacts caused at least $120 million of private insured damages from floods, and $720 million in economic losses from droughts between 2007 and 2017 (Box 4.1). › There is a trend of increasing insured damages from weather-related events over the last decade (Figure 4.1). › Research for the Deep South Science Challenge projects that 10,000 houses in Auckland, Wellington, Christchurch and Dunedin could become uninsurable by 2050 because of coastal flooding hazards from sea-level rise (Box 4.5). › About 12% of bank lending in New Zealand is directed to the agricultural sector, which faces relatively high exposure to climate change (Box 4.4).	› New Zealand contributes approximately 0.17% of the world's gross greenhouse gas emissions. The future climate change New Zealand faces will therefore be heavily dependent on global action. › Adaptation choices by households, communities, businesses, and local and central government will affect long-run costs. › Policy choices by the Government will affect how the costs and risks associated with adaptation and building resilience are shared. › Impacts on the competitiveness of domestic sectors will depend on the relative impacts of physical climate change in New Zealand and abroad.
Sectoral impacts › Dependence on climate-sensitive resources means the primary sector and tourism are likely to be most affected. › Regions dominated by primary production or in low-lying coastal areas are expected to be particularly affected. › Extreme weather events and sea-level rise are likely to have a negative impact on the value and functioning of public assets and infrastructure (such as roads). › Households facing high natural hazard risk are likely to find it harder to get affordable insurance. › Māori are expected to face unique impacts from risks to sites of cultural significance, for example many marae and urupā are in coastal low-lying areas. › Physical assets will have increased risk of damage, with the potential for higher insurance claims and loss of financial value.		
Fiscal impacts › Key areas of fiscal pressures are expected to be: – additional costs for disaster response, for example costs of supporting the repair of essential infrastructure – investment to reduce risk for public assets, and any potential support for risk reduction measures for private assets – support for households, businesses and communities to transition to lower emissions or more resilient ways of operating. › Lower economic activity and crystallisation of climate-related fiscal risks are likely to negatively impact Crown revenue.	› Net core Crown debt could be higher by 3.77% of GDP in 2061 from increased storms and droughts that could result from climate change (Box 6.1). › NZIER estimate that climate change could cause an increase in the annual growth of the Crown liability for natural hazards from 5.3% to 5.5%-5.7% through to 2050, due to increased risk from storms and floods (Box 6.1).	› The choices of key actors, in particular central and local government, will have large implications for how fiscal impacts are realised. For example, choices around: – risk management and adaptation policy settings, including how risks and costs may be shared between individuals, the private sector, local authorities and central government – the use of any redistributive and compensatory policies to address the broader equity impacts of climate change.

Table 2: The transition to a low-emissions economy – summary of economic and fiscal implications

Summary of expected impacts	Key quantitative evidence (see relevant section for more detail, including limitations)	Key sources of variability
Economic impacts		
Macro-economic impacts › GDP is expected to continue to grow, although at lower levels relative to baseline counterfactual scenarios. › Additional investment in key mitigation technologies beyond baseline counterfactual levels is expected to be required to meet New Zealand's emissions targets.	› The CCC estimated that achieving New Zealand's domestic targets in line with its modelled demonstration pathway: – could reduce the rate of GDP growth over the period 2020 to 2050 by 0.04% and the level of GDP in 2050 by 1.2% compared to its modelled counterfactual (Table 5.1) – could require an additional $38 billion of capital investment in key sectors through to 2050 beyond the investment assumed under its counterfactual scenario (Box 5.1). › Findings from Treasury modelling of the impacts of NZ ETS prices on household expenditure indicate that petrol, electricity and other price changes will be regressive, and Māori households will be more negatively impacted (Figure 5.2). › Recent modelling indicates that introducing a price on agricultural emissions is likely to result in significant land-use change and a reduction in aggregate net revenue for the agriculture sector (Box 5.2).	› The pace of technological innovation and New Zealand's rate of uptake of low-emissions technologies will influence overall economic costs. › The economy's ability to efficiently reallocate resources toward, and enhance productivity in, low-emitting activities will be a key determinant of economic costs. › Behavioural shifts at a household level will affect the pace of the transition and overall economic impacts. › The timing and impact of domestic policy choices will affect overall transition costs and how they are distributed across the economy. › The effect of any disruptive changes on social cohesion will have implications for how the economy functions.
Sectoral impacts › The composition of the economy is likely to significantly change, with the land and energy sectors and others reliant on fossil fuels particularly affected. › Adverse impacts from changing consumer prices over time are likely to disproportionately affect lower-income households. › Māori are especially vulnerable to transitional impacts, being over-represented in lower-income households and in high-emitting sectors. › The financial system faces some degree of risk from transition-related business closures. › The transition has the potential to provide significant co-benefits, for example through improvements in health and environmental wellbeing.		
Fiscal impacts › Key areas of fiscal pressure are expected to include: – publicly funded measures to support domestic emissions reduction and investment in offshore emissions reduction – international climate finance contributions – support for disrupted households, businesses, communities, and other measures to support the objective of an equitable low-emissions transition. › Impacts on Crown revenue are likely to be negative. Adverse impacts on GDP are expected to reduce revenue bases. Changes in the transport system will have some adverse impacts on revenue over time. › The Crown asset base is expected to require changes in both nature and scale to support the transition. › Since late 2021 cash proceeds from NZ ETS auctions have been used as the basis for public spending on climate change as funded through the recently established CERF.	› Based on the illustrative scenario analysis in this report, the cost of offshore mitigation purchases required to meet NDC1 (in addition to domestic action) represents a significant fiscal risk under all scenarios considered (Section 7). › Illustrative modelling indicates that, depending on future auction prices, the cash proceeds from NZ ETS auctions over the period 2023 to 2026 could range from $2.4 billion to $6.2 billion (Table 6.4). › Illustrative calculations based on CCC modelling indicate that the fiscal cost of direct support for additional investment (beyond considered counterfactual levels) in a range of key mitigation technologies through to 2050 could be around $4 to $12 billion, assuming the Crown contributes 10% to 30% of investment costs (Table 6.2).	› Key policy choices include the mix and timing of domestic mitigation measures, how current and future governments choose to leverage available spending and non-spending levers, the balance of effort toward domestic and offshore mitigation action, the ambition of future emissions targets (for example future NDCs), and the use of balance sheets to fund the transition (for example low-emissions hospitals). › The volume required and purchase price of offshore mitigation to support achieving New Zealand's NDC1 will be influenced by both domestic policy decisions and wider developments, including a shifting international context. › Fiscal flows from the NZ ETS depend on variables such as regulatory settings, supply and demand.

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