

Draft Climate Change Strategy

A strategy to guide the Wellington Regional Council's climate resilience activities



greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao



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1. Executive summary

Climate change is often described as the biggest environmental challenge we face. The effects of climate change carry tough economic and social implications for central government, councils and communities, with increased risks to settlements, infrastructure and ecosystems from rising seas, storms and flooding.

While local government faces a number of limitations in addressing climate change, there is strong and growing recognition both internationally and within New Zealand, of the crucial role that councils can play in increasing climate resilience.

The purpose of this Greater Wellington Climate Change Strategy is to provide an overarching document to align and coordinate climate change actions across GWRC’s responsibilities and operations. It aims to build on work programmes

already underway, raise awareness of climate change drivers and impacts, and help co-ordinate regional effort through collaboration and partnerships. A further aim is to help strengthen information-sharing and integration across the Greater Wellington Regional Council’s (GWRC) departments, between councils, with central government, and with the community. The Strategy is intended to act as a guide for climate resilience activities across GWRC, and to provide clear strategic direction on GWRC’s intentions and priorities in this respect.

The draft Climate Change Strategy sets three overarching objectives that should guide GWRC’s climate change actions into the future. See Table 1.

Key actions have been identified for each of the strategic objectives. Progress on these actions will be measured and reported on and actions will be reviewed and updated on a three-yearly basis.

Table 1

Objective 1	Objective 2	Objective 3
Greater Wellington demonstrates a commitment to reducing GHG emissions across all its areas of influence, including its own operations, helping to create the conditions for a smart, innovative, low-carbon regional economy	Risks from climate change-related impacts are managed and resilience is increased through consistent adaptation planning based on best scientific knowledge	Understanding of the causes of climate change is improved, and community awareness of impacts and implications for the Wellington region is increased



2. Introduction

2.1 Background

Climate change is often described as the biggest environmental challenge we face.¹ The effects of climate change carry tough economic and social implications for central government, councils and communities, with increased risks to settlements, infrastructure and ecosystems from rising seas, storms and flooding.

As a coastal region, hemmed in to the east, west and south by the sea, the impact of even a small rise in sea level will be significant and expensive for some landowners across the Wellington region. Storms occurring on top of a higher sea level will affect public infrastructure such as transport networks and stormwater systems, as well as private homes and other buildings. In some flood-prone areas, reliance on increased protection alone will become progressively less feasible.²

While some of the impacts of climate change are now inevitable due to the accumulation of past and current greenhouse gas emissions in the atmosphere, the speed and magnitude of impacts in the longer term will be decided by how quickly countries – including New Zealand – reduce greenhouse gas emissions. At the national level, New Zealand has two key opportunities to move towards a low-carbon economy in 2015: First, the Government will decide on New Zealand's commitment to reducing emissions as part of negotiations for a new international climate agreement. Second, the Emissions Trading Scheme, central government's principal climate change policy tool, is scheduled for review.

At the local government level, there have been increasing calls for central government to provide clearer direction and support for councils in addressing climate change in their communities. While there is no clear legal mandate for local government in New Zealand to undertake climate change mitigation (emission reduction) activities, many councils have put in place policies that contribute to emissions savings across council operations and in the community. Councils do have clear legal obligations to undertake climate change adaptation planning, though council actions to plan and prepare for the impacts of climate change are often highly controversial and open to ongoing challenge and contestation from the community, particularly among those who are directly affected.³

While local government faces a number of

limitations in addressing climate change, there is strong and growing recognition both internationally and within New Zealand, of the crucial role that councils can play in increasing climate resilience.⁴

“Local governments have to deal with the problem as it's on their door step – whether there is a global agreement between national governments or not.”⁵

2.2 Purpose and scope

The purpose of this draft Greater Wellington Climate Change Strategy is to provide an overarching document to align and coordinate climate change actions across GWRC's responsibilities and operations. It aims to build on work programmes already underway, raise awareness of climate change drivers and impacts, and help co-ordinate regional effort through collaboration and partnerships. A further aim is to help strengthen information-sharing and integration across GWRC departments, between councils, with central government and with the community. The Strategy is intended to act as a guide for climate resilience activities across GWRC, and to provide clear strategic direction on GWRC's intentions and priorities in this respect.

The scope of the Strategy is defined as actions that fall within GWRC's current functions and spheres of influence in the Wellington region. Not all GWRC climate actions will occur as a direct result of this Strategy; the Climate Change Strategy serves as a means to codify GWRC's response to climate change and helps to set the climate platform for other plans and strategies to play out.

2.3 Planning context

This Strategy is a non-statutory document that is designed to fit with and complement key statutory documents such as the draft Natural Resources Plan, Regional Policy Statement, Long Term Plan, and Regional Land Transport Plan, and non-statutory documents such as floodplain management plans, the proposed Regional Natural Hazards Strategy, and GWRC's Corporate Sustainability Action Plan. It takes a long term view but contains actions to be completed in the near-term and will be reviewed on a 3 yearly basis.

Figure 1 illustrates connections and linkages between the Draft Climate Change Strategy and other key planning documents, as well as the guiding legislation under which plans and strategies are produced.

1 E.g. Parliamentary Commissioner for the Environment. 2014. Changing climate and rising seas: understanding the science.

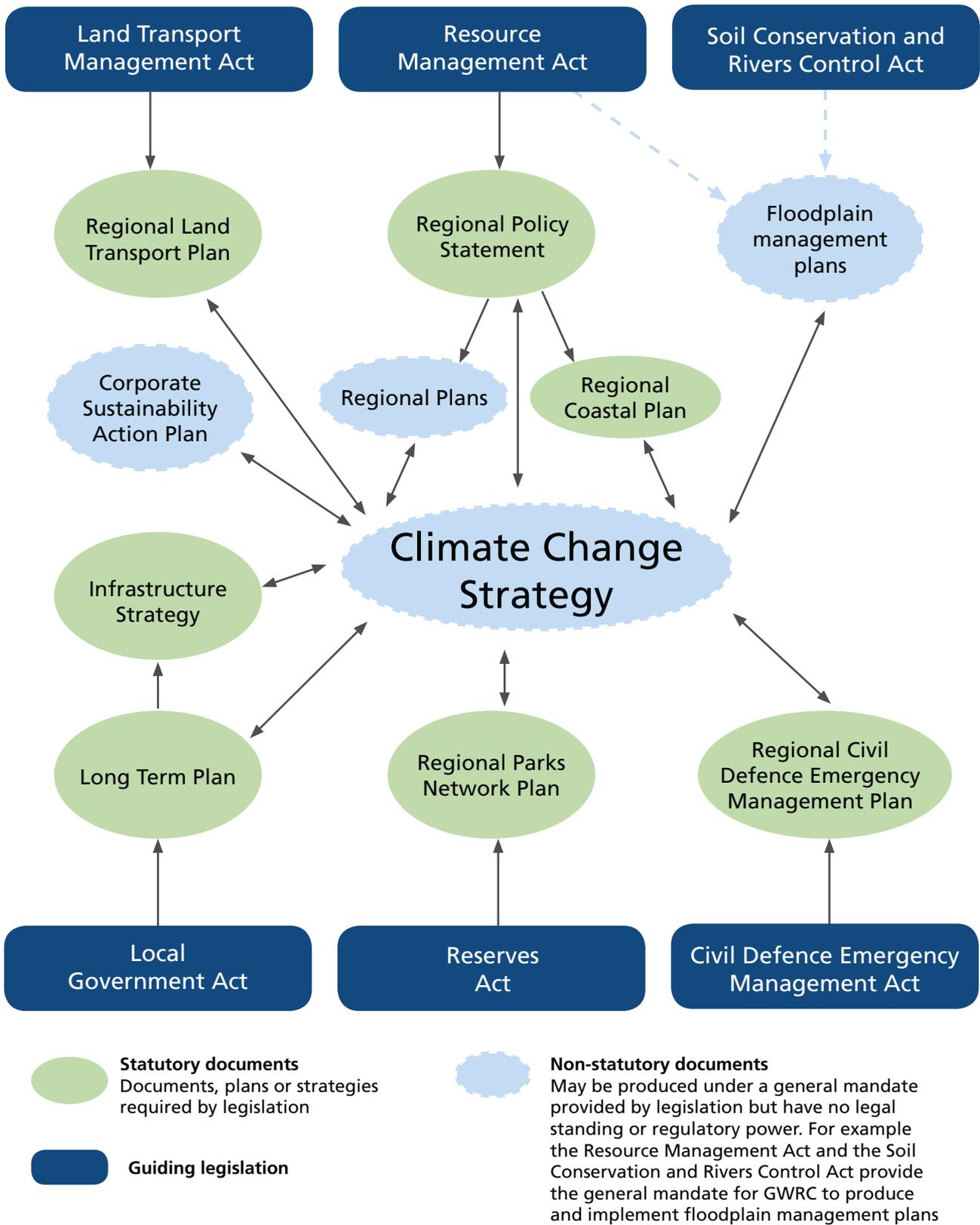
2 New Zealand Climate Change Centre. 2014. Climate change IPCC Fifth Assessment Report New Zealand findings.

3 A recent example is when Kapiti Coast District Council put coastal erosion risk on the Land Information Memorandum (LIM) reports of 1,800 houses in Paekakariki.

4 Pew Center on Global Climate Action. 2011. Climate Change 101: Understanding and Responding to Global Climate Change – Local Action. <http://www.c2es.org/docUploads/climate101-local.pdf>

5 ICLEI Local Governments for Sustainability. 2010. Press release: UN refers to cities as key governmental stakeholders supporting global climate action. <http://www.iclei-europe.org/cop16/>

Figure 1: The relationship between the Greater Wellington Climate Change Strategy and other key regional planning documents



3. Regional context

3.1 Greenhouse gas emissions in the Wellington region

In 2014, a consortium of councils in the Wellington region⁶ commissioned a report, Greenhouse Gas Inventory for the Wellington Region, which collected and presented data on the greenhouse gas emissions profile of the Wellington region, and the individual cities and districts within the region.⁷ The following figure demonstrates the contribution of individual emission sources to the total regional gross emissions⁸ for the 2012/13 financial year. Transport emissions contribute approximately 37% of the total gross emissions, with petrol use for road transport contributing about 18%. Agricultural emissions contribute about 33% of the emissions, with most of these resulting from enteric fermentation from animals. Emissions from electricity consumption are responsible for around 14% of the regional gross emissions.

6 Wellington City Council, Porirua City Council, Hutt City Council, Upper Hutt City Council, Kapiti Coast District Council, and Greater Wellington Regional Council.

7 URS New Zealand Ltd. 2014. Greenhouse Gas Inventory for the Wellington Region Report. <http://www.gw.govt.nz/assets/About-GW-the-region/Wellington-GHG-Inventory-Report-Final.pdf>

8 Gross emissions excludes emissions and carbon sequestration from land use, land use change, and forestry.

The dominant contributors of emissions are the transport, agriculture, and energy sectors to the regional emissions profile and the Strategy contains policies that aim to address emissions from those sectors where they are within the scope of GWRC's planning and operational functions.

3.2 Projected climate changes and key risks for the Wellington region

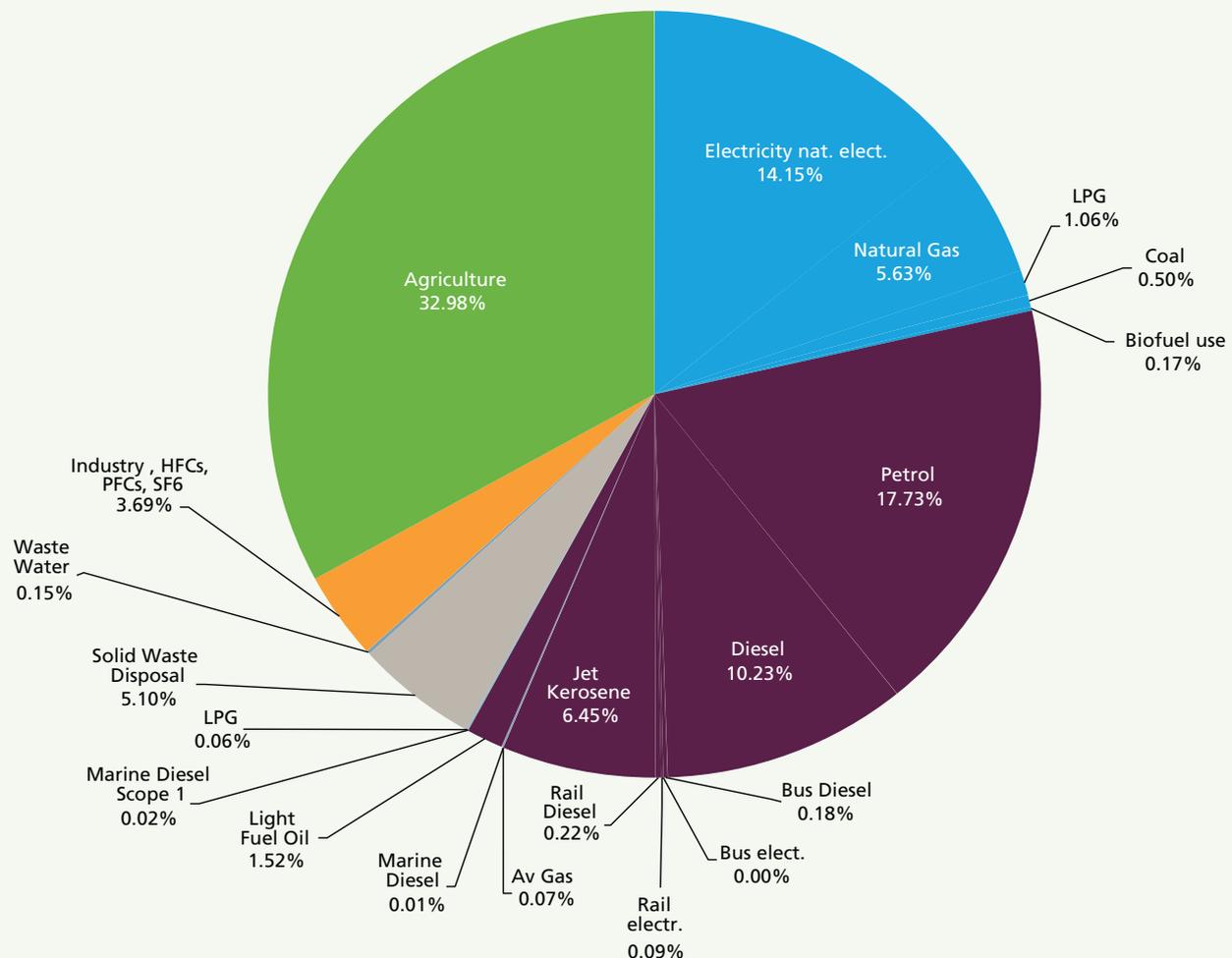
3.2.1 Projected climate changes

Sea level rise – currently tracking towards a 0.8m rise by the 2090s or ~1m by 2115 compared to 1990.

The Wellington region has a more complicated spatial and temporal pattern of long term relative sea-level rise than other parts of New Zealand due to its geographical position astride a complex network of faults.

These faults are associated with the convergence of the Australian and Pacific crustal plates some 20-40km beneath the surface. Recently Wellington city has been subject to slow-slip events that have produced an average subsidence of 1.7mm per year since 2000. Records over 6 years up to 2012 show subsidence varies across the region from

Figure 2: Wellington region gross emissions – contribution of individual emission sources



around 1mm per year on the Kapiti coast up to between 2 to 3mm per year along the Wairarapa coast.

Wellington Harbour has experienced an average rise in relative sea level of 0.2m in the last 100 years, which is relative to the inner-city land mass. Sea level monitoring in Wellington Harbour since 1990 shows that relative sea level is currently tracking towards a 0.8m rise by the 2090s or ~1m by 2115.⁹

The track being taken by recent sea-level rise in Wellington (and in other main ports in New Zealand) is consistent with the trajectory being taken by the global average sea-level rise, which are tracking close to the upper end of the range of sea level rise predictions published in the IPCC's AR4 report.¹⁰

Wind – *the frequency of extreme winds over this century is likely to increase by between 2 and 5% in winter, and decrease by a similar amount in summer.*

The frequency of extreme winds over this century is likely to increase by between 2 and 5 per cent in almost all regions of New Zealand in winter, and decrease by a similar amount in summer, and this is especially the case for Wellington and the South Island. There is forecast to be an increase in the annual mean westerly component of wind flow across New Zealand.¹¹

Precipitation – *overall there is expected to be a small increase in rainfall in the west of the region and a decrease in east. Very heavy rainfall events are likely to become more frequent.*

Rainfall will vary locally within the region. There is expected to be a small increase in rainfall in the Kapiti and Wellington areas, and less rainfall in the Wairarapa. In Masterton, it is likely that there will be little change in average annual rainfall. In Paraparaumu, average annual rainfall is likely to increase by 3% by 2090. Seasonal projections show that Wairarapa is likely to have much less rain in winter and spring, and more rain in summer and autumn. Very heavy rainfall events are likely to become more frequent, especially in the Tararua during north-westerly storms, and in Wellington city and south Wairarapa during southerly storms

Temperature – *average temperatures are likely to be around 0.9 °C warmer by 2040 and 2.1 °C warmer by 2090, compared to 1990.*

Based on research undertaken by NIWA and projections contained in the 2007 IPCC report, temperatures in the region are likely to be around 0.9 °C warmer by 2040 and 2.1 °C warmer by 2090, compared to 1990. By the end of the century Wellington is projected to have about 15-45 extra days per year where maximum temperatures exceed 25 degrees, with around 10-20 fewer frosts per year. Seasonal projected temperature changes, based on 1990 levels are a 1.8°C rise in spring and a rise of 2.2°C, 2.1°C and 2.1°C in summer, winter and autumn respectively.

3.2.2 Key climate change risks

Key risks for the Wellington region identified in the Regional Policy Statement are:

- (a) Sea level rise, exacerbating the effects of coastal erosion and inundation and river flooding in low lying areas, especially during storm surge
- (b) Increased frequency and intensity of storm events, adding to the risk from floods, landslides, severe wind, storm surge, coastal erosion and inundation
- (c) Increased frequency of drought, placing pressure on water resources and increasing the wild fire risk.¹²

3.3 GWRC's role in addressing climate change

GWRC is responsible for a range of roles and functions that relate to the climate change risks identified above, including:

- Natural hazards - avoidance and mitigation
- Biosecurity - regional pest management
- Maintaining indigenous biodiversity in the region
- Regional land transport planning and contracting passenger services
- Managing the effects of using freshwater, land, air and coastal waters through Regional Policy Statements and Plans, and the issuing of consents
- Flood protection
- Soil conservation
- Prevention or mitigation of any adverse effects of hazardous substances
- Identification and monitoring of contaminated land
- Maintaining the infrastructure that provides bulk water supply to the region's four cities
- Managing parks and forests and promoting and facilitating recreational activities
- Promoting regional economic development

Potential climate change impacts on GWRC's operations and infrastructure across the region include:

9 National Institute of Water and Atmospheric Research Ltd (NIWA). 2012. Sea level variability and trends- Wellington region. Prepared for Greater Wellington Regional Council.

10 Intergovernmental Panel on Climate Change. 2007. Climate Change 2007 – Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the IPCC.

11 Ministry for the Environment. 2008. Climate change effects and impacts assessment: A guidance manual for local government in New Zealand. <http://www.mfe.govt.nz/publications/climate/climate-change-effect-impacts-assessments-may08/index.html>

12 Greater Wellington Regional Council. 2013. Regional Policy Statement for the Wellington region.

Water supply and security

- Salt water intrusion into freshwater aquifers could occur as a result of rising sea levels and storm surges
- Regional droughts and changing rainfall patterns may result in water shortages
- Contamination of drinking water from storms and flash flooding
- Impacts on water storage e.g. extreme weather events affecting storage lakes

Maintaining regional biodiversity

- Changes in storm and rainfall intensity are predicted to increase disturbance to species communities
- Ocean acidification is expected to cause declines in carbonate communities
- Sea-level rise is likely to impact on coastal species, altering/ moving coastal habitats, changing inundation patterns, and increasing vulnerability to storm surges and tides
- Changes to seed production in plants related to warming e.g. increased in beech forests
- Changes to breeding patterns e.g. earlier egg laying in some bird species
- Climate changes may influence fertility, recruitment and mortality rates
- Decline in suitable bird habitat could increase the regional extinction risk
- Changes in marine species and habitat distribution e.g. giant kelp beds on the Wellington coast are at their northernmost limit and may be lost
- General uncertainty around how ecosystems will respond- some vulnerable sites may become unviable

Biosecurity – regional pest management

- Impacts on pest distributions – climate change may expose the region to a significant number of pest organisms that are already established elsewhere in the country
- A warmer average temperature and milder winters will affect the existing introduced species in the region – some plant species will flower or seed more vigorously and some animals will have better breeding and survival success

- Changes in survival or spread rates increases control costs and could jeopardise biosecurity control programmes
- Climate change will lead to different land use by farmers and other industries, potentially exposing the region to different risks and pathways for pests

Flood protection

- Floods are likely to become more intense, resulting in increased risk to major infrastructure including failure of flood protection measures
- The onset of climate change and its predicted impacts on river flow and flooding is expected to further increase the risk to communities along the Hutt River, which is already prone to flooding
- Potential changes in land use or river channels over the 21st century could significantly affect the characteristics of the catchment and hence the magnitude and timing of flood events.

Regional land transport

- Disruptions to rail and bus services due to storm events, coastal erosion and sea level rise
- Inundation of low-lying coastal land transport infrastructure (road and rail) caused by sea level rise and storm surge
- Heightened flood risk for sections of the road and rail networks that are already prone to flooding
- Inland erosion, instability, and increased storm events pose a risk to road and rail networks and infrastructure

Land management

- Changes in appropriate land use will have an economic impact on farmers and land owners
- Storm events and heavy rainfall will lead to increased erosion
- Changing rainfall patterns and drought may reduce water availability for irrigation
- Increased fire risk



4. Greater Wellington Regional Council's strategic approach

4.1 Vision

Greater Wellington Regional Council strengthens the long-term resilience of the Wellington region through climate change action and awareness.

Resilience means the capacity of the region to absorb and bounce back from shocks and disturbances,¹³ and to make decisions that are flexible and robust in the midst of ongoing change and uncertainty.¹⁴ This suggests an ability to maintain core functions in the face of hazard events and impacts. However, resilience is not simply about maintaining the status quo or enabling 'business as usual'. Resilience is also concerned with innovation and transformation into more desirable functions and forms.¹⁵ Resilience is about understanding processes of change and is a product of governments, businesses, communities and individuals with strong adaptive capacity.¹⁶ This is defined as the ability or potential to respond successfully to climate variability and change, and includes adjustments in both behaviour and in resources and technologies.¹⁷

The Strategy's vision acknowledges the key role that GWRC can play in contributing to the region's climate resilience. Many other stakeholders have a crucial role to play in addressing climate change and engaging in ongoing collaboration and partnerships is necessary to make material progress on this complex issue. GWRC is committed to working with the community, businesses, other councils and central government in pursuing the objectives of this Strategy.

4.2 Overarching objectives

The Strategy has three core strands that together span the range of areas that GWRC will focus on to achieve our vision: mitigation, adaptation, and awareness.

Mitigation

The overarching mitigation objective is

GWRC demonstrates a commitment to reducing GHG emissions across all its areas of influence, including its own operations, helping to create the conditions for a smart, innovative, low-carbon regional economy

The first step for climate change action is mitigation: the reduction of greenhouse gas emissions and removal of carbon from the atmosphere through planting trees and preserving forests. Mitigation activities aim to address the drivers of human-caused climate change so that the worst impacts can be avoided.

Amendments made to the Resource Management Act under the Resource Management (Energy and Climate Change) Amendment Act 2004 put legal responsibility for regulating greenhouse gas emissions more clearly in central government's hands by introducing provisions that exclude regional councils from considering the effects of greenhouse gas emissions on climate change when making rules to control discharges to air and when considering an application for a discharge permit. The amendments were designed to avoid double regulation (i.e. regulation of greenhouse gas emissions at both the central and local government level) and to enable greenhouse gas emission reductions to be addressed through central government's principal policy response to climate change, the Emissions Trading Scheme (ETS).¹⁸ To date the ETS has lacked regulatory certainty and the current price signal is considered too weak to incentivise behaviour change and low-carbon investments.¹⁹

In the face of slow progress towards meaningful action to reduce greenhouse gas emissions at the national and international level, many local governments around the world are demonstrating strong leadership and commitment to addressing emissions at the city and regional level.²⁰ The crucial contribution to climate change mitigation that can occur at the sub-national scale is increasingly being recognised internationally. Christiana Figures, Executive Secretary of the United Nations Convention Framework on Climate Change (UNFCCC) has said: "Climate change is not a one-person or a one-sector issue. It cannot be solved by one country or by one level of government; it requires everyone to work together."²¹

GWRC can help to create the conditions for a smart, innovative, low-carbon regional economy through its multiple roles as facilitator, partner,

13 Adger et al., 2011. Resilience implications of policy responses to climate change. *WIREs Climate Change* 2011. 2 pp. 757-766 DOI: 10.1002/wcc.133. Nelson et al., 2007. Adaptation to environmental change: contributions of a resilience framework. *Annual review of Environment and Resources* (32) pp. 395-429.

14 Haasnoot et al., 2012. Dynamic adaptive policy pathways: A method for crafting robust decisions for a deeply uncertain world. *Global Environ. Change*, <http://dx.doi.org/10.1016/j.gloenvcha.2012.12.006>

15 Folke, C. 2006. Resilience: the emergence of a perspective for social-ecological systems analyses. *Global Environmental Change* (16) pp. 253-267. Nelson, D.R. 2010. Adaptation and resilience: responding to a changing climate. *Wiley Interdisciplinary Review Climate Change* (2) pp. 113-120.

16 Satterthwaite et al., 2007. Building climate resilience in urban areas and among urban populations in low- and middle-income nations. Commissioned by the Rockefeller Foundation, International Institute for Environment and Development (IIED) Research Report, 112pp.

17 Intergovernmental Panel on Climate Change. 2007. Working Group II: Impacts, Adaptation and Vulnerability. Section 17.3.1 Elements of Adaptive Capacity.

18 New Zealand Government. 2002. Climate Change Response Act.

19 Luth Rickett, J., and Chambers, Lizzie. 2014. Reflections and Outlook for the New Zealand ETS: must uncertain times mean uncertain measures? *Policy Quarterly* – Volume 10, Issue 2. Pp. 57-66.

20 Carbon Cities Climate Registry. 2013. Local Response to Measurable Reportable Verifiable Global Climate Action. http://carbons.org/fileadmin/user_upload/cCCR/cCCR_2014/cCCR-2013-annual-report.pdf

21 R20 Regions of Climate Action. September 2014. Press release: New Compact of States and Regions launched at UN Climate Summit. <http://regions20.org/about/news/101-press-releases/148-new-compact-of-states-launched-at-un-climate-summit>

regulator, funder, planner, advocate and resource manager.

Adaptation

The overarching adaptation objective is

Risks from climate change-related impacts are managed and resilience is increased through consistent adaptation planning based on best scientific knowledge

The observed impacts of climate change are widespread and consequential. Climate change cannot be addressed through mitigation alone; adaptation planning is also essential to reduce vulnerability to the increasingly severe and pervasive impacts of climate change already occurring.²² GWRC has a clear mandate to undertake climate change adaptation planning as expressed through a range of legislation.

GWRC is mandated under Section 7 of the Resource Management Act 1991 (the RMA) to have particular regard to the effects climate change.

This requires explicitly considering whether the effects of climate change have significant implications for GWRC responsibilities, such as natural hazard management and the design and location of new infrastructure or assets.

GWRC also has a responsibility to integrate climate change adaptation into its long term planning under the Local Government Act 2002 (the LGA), as part of the mandate to meet the current and future needs of communities for good quality local infrastructure, local public services, and performance of regulatory functions in a way that is most cost effective for households and businesses. Under section 14 of the LGA, councils are also directed, in taking a sustainable development approach, to take into account:

- (i) the social, economic, and cultural interests of people and communities; and
- (ii) the need to maintain and enhance the quality of the environment; and
- (iii) the reasonably foreseeable needs of future generations.²³

Additionally, the Soil Conservation and Rivers Control Act 1941 gives GWRC the mandate to protect communities from flooding (the impacts of which are forecast to be amplified by climate change), and undertake physical works to mitigate erosion damage.²⁴

Further, the Civil Defence Emergency Management Act 2002 requires councils to improve and promote the sustainable management of hazards, many of which will be exacerbated

by climate change such as storm surge, erosion, and flooding. Councils are directed to coordinate planning across the four R's – reduction, readiness, response, and recovery.²⁵

Awareness

The overarching awareness objective is

Understanding of the causes of climate change is improved, and community awareness of impacts and implications for the Wellington region is increased

Some of the major challenges of climate change are its broad scope, the large number of actors and stakeholders involved, and its perceived intangibility. Since both local and central government are directly responsible for only a small proportion of greenhouse gas emissions, it is important that governments at all levels play an active role in raising awareness about climate change and encouraging businesses, communities and individuals to adjust their behaviour in ways that reduce emissions and improve adaptive capacity.

Central government policies and legislation can be used to raise the cost of activities that emit greenhouse gases, and local government policies can discourage or disallow activities that create vulnerabilities to climate change impacts. Policies and regulations can also be designed to reduce the costs of activities that lower emissions and promote adaptation.

Such policies and measures can encounter inertia, passive resistance or active opposition, particularly from those concerned about the imposition of a new cost. Working with the community and providing information and explanations is therefore vital for generating public and stakeholder support for policies that seek to address climate change drivers and impacts. Public engagement and participation can also motivate voluntary changes in habits, address the arguments of those who oppose specific actions and help to prepare younger generations for living in the world they will inherit.²⁶

4.3 Principles

In pursuing the Strategy's objectives, GWRC will be guided by the following principles:

- **Balance of immediate and long-term needs:** Acknowledge that climate change impacts will continue to take shape over the long term based on our actions today, but they are already emerging. The aim is to ensure our approach is one that finds a balance between immediate and long-term needs.

22 Intergovernmental Panel on Climate Change. 2014. Working Group II AR5 Report: Impacts, Adaptation and Vulnerability.

23 Local Government Act. 2002. s 14 h

24 Soil Conservation and Rivers Control Act. 1941.

25 Civil Defence Emergency Management Act. 2002. s 3

26 United Nations Environment Programme. 2006. Raising Awareness of Climate Change – A handbook for Government Focal Points. http://www.unep.org/delc/Portals/119/UNEP_Climate_Change_Handbook.pdf

- **Interaction must be supplemented with action:** Acknowledge that the trans-boundary nature and complexity of climate change drivers and impacts means that many stakeholders will need to act to develop a robust approach to managing those drivers and impacts, yet the coordination of a large number of stakeholders can be extremely challenging. GWRC is committed to undertaking mitigation and adaptation initiatives by identifying and following through on the actions we can undertake ourselves or directly influence.
- **Commitment to act in the face of uncertainty:** Acknowledge the tendency to not act until perfect information is available, and the reality that perfect information on the impacts of climate change will never be available as climate change scenarios are being revised and improved regularly. GWRC therefore commits to an approach that enables them to make decisions in the face of uncertainty.²⁷



²⁷ Adapted from ICLEI Local Governments for Sustainability, 2008. Cities for Climate Protection Australia Adaptation Initiative – Local Government Climate Change Toolkit. http://oceania.iclei.org/fileadmin/user_upload/Oceania/Documents/Toolkit_CCPAdaptation_Final.pdf

5. Focus and priorities 2015-2017

5.1 Policies

There are twelve policies that each relate to one of the three overarching objectives.

Overarching objectives		Policies
Mitigation	GWRC demonstrates a commitment to reducing GHG emissions across all its areas of influence, including its own operations, helping to create the conditions for a smart, innovative, low-carbon regional economy	1.1 Recognise the benefits stemming from the use and development of renewable energy and improved energy efficiency
		1.2 Promote and provide low emission transport
		1.3 Encourage cleaner production and disposal practices in business and agriculture
		1.4 Demonstrate a commitment to low emissions across all our corporate activities and investments
		1.5 Support and coordinate tree planting and ecological restoration projects and protect carbon sinks from the impacts of invasive species
Adaptation	Risks from climate change-related impacts are managed and resilience is increased through consistent adaptation planning based on best scientific knowledge	2.1 Consider the effects of climate change as an integral part of planning and decision-making
		2.2 Increase long-term adaptive capacity through the use of adaptive planning tools and techniques
		2.3 Identify key climate change information requirements
		2.4 Implement planning and policy measures that increase long-term resilience to climate change impacts
Awareness	Understanding of the causes of climate change is improved, and community awareness of impacts and implications for the Wellington region is increased	3.1 Share knowledge
		3.2 Link people with projects
		3.3 Advocate, empower and collaborate

5.2 Actions

Policies	Actions 2015-2017
1.1 Recognise the benefits stemming from the use and development of renewable energy and improved energy efficiency	Partner with other councils and agencies to support community-driven innovations in renewable energy
	Give particular regard to the benefits from renewable energy when considering resource consents and notices of requirement, and when making a change, variation or conducting a review of the regional plan
	Develop a framework to support and promote renewable energy generation, energy efficiency measures, and a secure and resilient transmission and distribution via the Regional Policy Statement and Regional Plan
	Improve household energy efficiency through providing a rating framework
	Explore opportunities for renewable energy generation in the Wellington region
1.2 Promote and provide low emission transport	Encourage active travel through school and workplace travel programmes
	Support carpool and carshare initiatives
	Increase public transport patronage through improvements to the regional passenger transport network
	Investigate use of sustainable (low carbon) fuel sources for passenger services
	Work towards full electrification of the regional bus fleet
1.3 Encourage cleaner production and disposal practices in business and agriculture	Work with businesses to reduce environmental impact
	Promote agricultural efficiency measures by working with farmers
	Work through the Regional Waste Forum to continually improve waste practices and increase recycling
1.4 Demonstrate a commitment to low emissions across all our corporate activities and investments	Implement actions in the GWRC Corporate Sustainability Action Plan relating to council buildings and installations, employee travel, waste and resources, and policies and procurement
	Seek council agreement to endorse divestment from fossil fuels by removing existing fossil fuel extraction investments and preventing future investments in fossil fuel industries
1.5 Support and coordinate tree planting and ecological restoration projects and protect carbon sinks from the impacts of invasive species	Support provision of legal protection of forest land which can sequester carbon and safeguard natural ecosystems against development
	Maintain Regional park and forest land in covenant for at least 50 years as part of the Permanent Forest Sink Initiative
	Advocate and provide incentives for tree planting
	Consider policy 1.5 when implementing Sustainable Land Use and Soil Conservation Plans
	Protect native forest and vegetation by maintaining large scale pest animal management programmes
	Work with community groups to facilitate and support tree planting and ecological restoration activities

Colour key: Actions to be undertaken by GWRC in conjunction with other partners

Policies	Actions 2015-2017
2.1 Consider the effects of climate change as an integral part of planning and decision-making	Develop a policy of assessing possible climate change implications of all projects/ proposals in council papers, reports and project plans
	Fully consider the effects of climate change when assessing resource consent applications and notices of requirement
	Where possible incorporate the aims, objectives and actions identified in this Strategy into regulatory and planning processes
	Assess whether climate change implications have been adequately considered when reviewing existing policies
	For each activity or hazard being considered, identify whether it is vulnerable to climate change, what the relevant climate factors are and, if appropriate, evaluate risks and priorities and weigh these against other risks and opportunities
2.2 Increase long-term adaptive capacity through the use of adaptive planning tools and techniques	Construct adaptation pathways maps in order to contrast and compare different flood management options in the region
	Use adaptive planning concepts to understand and evaluate the potential long-term consequences of different policy actions
	Support research into new technologies and new methods of adaptation to minimise risks from a changing climate
2.3 Identify key information requirements relating to climate change effects	Obtain up to date projections of climate change effects downscaled to the regional, catchment and local area level and apply this information consistently across all climate-relevant council plans and operations ²
	Provide sound technical input on the likely impact of localised climate change effects on regional resources, meteorological hazards and ecosystems to improve the overall robustness and adaptability of policy and operational approaches
	Develop an ongoing environmental monitoring programme that can be sustained over the long term to help assess regional climate change threats and vulnerabilities
2.4 Implement planning and policy measures that increase long-term resilience to climate change impacts	Integrate climate change mitigation and adaptation into regional spatial planning, including public investment and the management of private development
	Ensure that climate change is a prominent feature in the development of the Regional Natural Hazards Strategy
	Map the major watercourses/floodplains in the region with allowances for climate change based on the best available data
	Undertake modelling to assess potential effects of sea level rise on freshwater abstraction
	Assess future water storage requirements for Wellington region's water supply in the context of projected climate change effects
3.1 Share knowledge	Participate in national and international forums where there are opportunities to connect with other local government organisations so that experiences and learnings can be shared
	Identify successful local government examples of adaptation actions and evaluate their suitability for addressing climate risks in the Wellington region
	Commission, facilitate or otherwise support region-specific research into climate change impacts and implications where it relates to council roles and functions and where knowledge gaps exist, and make this information widely available
	Publicise and celebrate climate change and resilience success stories in the region to inspire positive behaviour change

Policies	Actions 2015-2017
3.2 Link people with projects	Engage university students in climate change projects through sponsoring student study programmes and internships
	Develop an online platform to serve as an information repository and a means to connect with others on climate change responses regionally and nationally
3.3 Advocate, empower and collaborate	Encourage and support communities and individuals to make their own contributions to combating climate change
	Strengthen ties with the insurance sector to help improve the market penetration of natural disaster insurance and realise the potential of insurance pricing and other financial products for risk-awareness, prevention and mitigation and for long-term resilience in infrastructure investment and business decisions
	Advocate for stronger measures to address climate change drivers and impacts with central government and other relevant parties



* Current projections are based on information contained in the IPCC's AR4 report. These will be updated with regionally downscaled data from the latest IPCC AR5 report when available from NIWA.

Colour key: Actions to be undertaken by GWRC in conjunction with other partners

Appendix 1

Actions 2015-17: modes of delivery, status of action, and departments responsible

Policies	Actions 2015-2017*	Examples/ modes of delivery	Status of action	Lead Departments
1.1 Recognise the benefits stemming from the use and development of renewable energy and improved energy efficiency	Partner with other councils and agencies to support community-driven innovations in renewable energy	Scale up Smart Energy Challenge	Underway and ongoing	Strategic Planning
	Give particular regard to the benefits from renewable energy when considering resource consents and notices of requirement, and when making a change, variation or conducting a review of the regional plan	Resource Consents Process	Underway and ongoing	Env. Policy, Env. Regulation
	Develop a framework to support and promote renewable energy generation, energy efficiency measures, and a secure and resilient transmission and distribution via the Regional Policy Statement and Regional Plan	Regional Policy Statement and Regional Plan	Underway	Environmental Policy
	Improve household energy efficiency through providing a rating framework	Warm Greater Wellington home insulation scheme	Underway and ongoing	Finance
	Explore opportunities for renewable energy generation in the Wellington region		Underway	Strategic Planning, Parks
1.2 Promote and provide low emission transport	Encourage active travel through school and workplace travel programmes	Active a2b, Spring to the Streets, Movin' March, Go by Bike Day, Walk to Work Day	Underway and ongoing	Sustainable Transport
	Support carpool and carshare initiatives	Let's Carpool	Underway and ongoing	Sustainable Transport
	Increase public transport patronage through improvements to the regional passenger transport network	Wellington Regional Public Transport Plan	Underway and ongoing	PT
	Investigate use of sustainable (low carbon) fuel sources for passenger services		Underway and ongoing	PT
	Work towards full electrification of the regional bus fleet		Underway	PT
1.3 Encourage cleaner production and disposal practices in business and agriculture	Work with businesses to reduce environmental impact	Take Charge Business Pollution Prevention programme	Underway and ongoing	Env. Reg.
	Promote agricultural efficiency measures by working with farmers		Underway and ongoing	Land Mgmt
	Work through the Regional Waste Forum to continually improve waste practices and increase recycling	Regional Waste Forum	Underway and ongoing	Strategic Planning

Colour key: Actions to be undertaken by GWRC in conjunction with other partners

Policies	Actions 2015-2017*	Examples/ modes of delivery	Status of action	Lead Departments
1.4 Demonstrate a commitment to low emissions across all our corporate activities and investments	Implement actions in the GWRC Corporate Sustainability Action Plan relating to council buildings and installations, employee travel, waste and resources, and policies and procurement	GWRC Corporate Sustainability Action Plan	Underway and ongoing	Corporate Planning
	Seek council agreement to endorse divestment from fossil fuels by removing existing fossil fuel extraction investments and preventing future investments in fossil fuel industries		Not yet started	Finance
1.5 Support and coordinate tree planting and ecological restoration projects and protect carbon sinks from the impacts of invasive species	Support provision of legal protection of forest land which can sequester carbon and safeguard natural ecosystems against development		Underway and ongoing	Biodiversity
	Maintain Regional park and forest land in covenant for at least 50 years as part of the Permanent Forest Sink Initiative	Permanent Forest Sink Initiative	Completed	Parks
	Advocate and provide incentives for tree planting	Wellington Region Erosion Control Initiative, Afforestation Grant Scheme	Underway and ongoing	Land Mgmt
	Consider policy 1.5 when implementing Sustainable Land Use and Soil Conservation Plans		Underway and ongoing	Land Mgmt
	Protect native forest and vegetation by maintaining large scale pest animal management programmes	Regional Pest Management Strategy	Underway and ongoing	Biosecurity
	<i>Work with community groups to facilitate and support tree planting and ecological restoration activities</i>		Underway and ongoing	Biodiversity, Parks
2.1 Consider the effects of climate change as an integral part of planning and decision-making	Develop a policy of assessing possible climate change implications of all projects/proposals in council papers, reports, and project plans		Not yet started	Strategic Pl., Dem. Services
	Fully consider the effects of climate change when assessing resource consent applications and notices of requirement		Underway	Env. Regulation
	Where possible incorporate the aims, objectives and actions identified in this Strategy into regulatory and planning processes		Underway	Env. Policy, Env. Reg.
	Assess whether climate change implications have been adequately considered when reviewing existing policies		Not yet started	All departments
	For each activity or hazard being considered, identify whether it is vulnerable to climate change, what the relevant climate factors are and, if appropriate, evaluate risks and priorities and weigh these against other risks and opportunities		Underway	Flood Pro., Env. Policy, Env. Reg.
	Identify climate change risks to GWRC's functions and services and their estimated consequences and costs, as well as actions to mitigate each risk in GWRC's Risk Register		Not yet started	Strategic Planning

* Current projections are based on information contained in the IPCC's AR4 report. These will be updated with regionally downscaled data from the latest IPCC AR5 report when available from NIWA.

Colour key: Actions to be undertaken by GWRC in conjunction with other partners

Policies	Actions 2015-2017*	Examples/ modes of delivery	Status of action	Lead Departments
2.2 Increase long-term adaptive capacity through the use of adaptive planning tools and techniques	Construct adaptation pathways maps in order to contrast and compare different flood management options in the region		Underway	Flood Pro., Strategic Pl.
	Use adaptive planning concepts to understand and evaluate the potential long-term consequences of different policy actions	Sustainable Delta Game workshops	Underway	Strategic Planning
	Support research into new technologies and new methods of adaptation to minimise risks from a changing climate		Not yet started	Strategic Pl.
2.3 Identify key information requirements relating to climate change effects	Obtain up to date projections of climate change effects downscaled to the regional, catchment and local area level and apply this information consistently across all climate-relevant council plans and operations*		Underway	Env. Science
	Provide sound technical input on the likely impact of localised climate change effects on regional resources, meteorological hazards and ecosystems to improve the overall robustness and adaptability of policy and operational approaches		Underway	Env. Science
	Develop an ongoing environmental monitoring programme that can be sustained over the long term to help assess regional climate change threats and vulnerabilities	E.g. Driver-Pressure-State-Impacts-Response (DPSIR) model to provide context for climate change threats	Not yet started	Env. Science, Biodiversity
2.4 Implement planning and policy measures that increase long-term resilience to climate change impacts	Integrate climate change mitigation and adaptation into regional spatial planning, including public investment and the management of private development		Not yet started	Strategic Planning
	Ensure that climate change is a prominent feature in the development of the Regional Natural Hazards Strategy	Regional Natural Hazards Strategy	Underway	Environmental Policy
	Map the major watercourses/floodplains in the region with allowances for climate change based on the best available data		Underway	Flood Protection
	Undertake modelling to assess potential effects of sea level rise on freshwater abstraction	Sustainable Yield Modelling for Waiwhetu Aquifer	Underway and ongoing	Water Supply, Env Sci
	Assess future water storage requirements for Wellington region's water supply in the context of projected climate change effects		Underway	Water Supply, Env Sci

Policies	Actions 2015-2017*	Examples/ modes of delivery	Status of action	Lead Departments
3.1 Share knowledge	Participate in national and international forums where there are opportunities to connect with other local government organisations so that experiences and learnings can be shared	Climate Change Impacts and Implications Research Programme (MBIE), Transforming Cities Thematic Research Initiative (University of Auckland), ICLEI	Underway and ongoing	Multiple departments
	Identify successful local government examples of adaptation actions and evaluate their suitability for addressing climate risks in the Wellington region		Underway and ongoing	Strategic Planning
	Commission, facilitate or otherwise support region-specific research into climate change impacts and implications where it relates to council roles and functions and where knowledge gaps exist, and make this information widely available		Underway and ongoing	Multiple departments
	Publicise and celebrate climate change and resilience success stories in the region to inspire positive behaviour change		Underway and ongoing	Communications
3.2 Link people with projects	Engage university students in climate change projects through sponsoring student study programmes and internships	Victoria University of Wellington Summer Scholar Research Programme, Worcester Polytechnic (USA) Interactive Qualifying Project	Underway and ongoing	Strategic Pl., Flood Pro., PT, Env Sci
	Develop an online platform to serve as an information repository and a means to connect with others on climate change responses regionally and nationally		Not yet started	Strategic Pl.
3.3 Advocate, empower and collaborate	Encourage and support communities and individuals to make their own contributions to combating climate change	competitions, open days, GWRC-led projects, and social support tools	Underway and ongoing	Multiple depts.
	Strengthen ties with the insurance sector to help improve the market penetration of natural disaster insurance and realise the potential of insurance pricing and other financial products for risk-awareness, prevention and mitigation and for long-term resilience in infrastructure investment and business decisions		Not yet started	WRS office
	Advocate for stronger measures to address climate change drivers and impacts with central government and other relevant parties		Underway and ongoing	ELT, councillors

Colour key: Actions to be undertaken by GWRC in conjunction with other partners

Appendix 2

Performance measures and level of GWRC control or influence

Objectives	Performance measures	Level of GWRC control or influence
Mitigation	Reduced energy consumption (kilowatt hours per capita)	GWRC cannot directly control energy consumption in the region but can exercise indirect influence through supportive policies in the RPS (policies 7, 9, 10, 11, 45, 55, 56, 57, 65 and 67) as well as providing a rating framework and promoting community awareness.
	Reduced private vehicle kilometres travelled per capita	GWRC can influence through improvements to the regional public transport network as expressed through the Regional Public Transport Plan, policies in the RPS (9, 10) and the Regional Land Transport Strategy, as well as advancing a regional integrated approach to spatial planning
	Increased (%) active and public transport mode share	GWRC can influence through improvements to the regional public transport network as expressed through the Regional Public Transport Plan, objectives in the Regional Land transport Strategy and promotion of active transport through school and workplace travel programmes.
	Increased energy efficiency of public transport fleet	Within the control of GWRC and public transport providers KiwiRail and NZ Bus
	GWRC's corporate emissions are measured and reported and a reduction in council emissions is demonstrated	GWRC has significant control over emissions generated through its own activities and, to a lesser degree, its investments
	Steps are taken to divest GWRC of investment in fossil fuel and coal companies	Within GWRC control
	Increased rates of afforestation and reforestation in ways that enhance carbon sequestration and indigenous biodiversity	GWRC has a significant role in biodiversity management in the region, as well as owning and managing large areas of park and forest land. GWRC can also exercise some influence over tree-planting activities on private land through the work of the Land Management department
Adaptation	A policy of assessing climate change implications of all council projects/proposals is implemented	Within GWFC control
	Increased participation in adaptation planning workshops among officers and councillors	Within GWRC control
	Downscaling of climate projections to the regional and local level is completed and this information is used to inform strategic planning	This is contingent on the delivery of work being undertaken by the Ministry for the Environment and NIWA
	Improved resilience of infrastructure to climate change impacts, informed by outcomes from the UN-Habitat Making Cities resilient campaign	GWRC can improve the resilience of its own infrastructure assets and can exercise some influence over the climate-resilience of regional infrastructure through policies in the Regional Policy statement
	Reduced vulnerability of communities to climate-related events	GWRC can exercise some influence on community preparedness and resilience, largely through the Wellington Region Emergency Management Office (WREMO)

Objectives	Performance measures	Level of GWRC control or influence
Awareness	Increased knowledge is derived through participation in regional, national, and international climate change forums	Within GWRC control
	More climate change and resilience focussed stories are shared with the community	Within GWRC control
	Increased mobilisation of venture capital for development of new enterprises in the region supporting mitigation and adaptation	GWRC can have some limited influence in this area, mainly through the work of the Wellington Regional Strategy office and WREDA
	Increased number of cross-council climate resilience collaborations in the region	Within GWRC control, though is contingent on the ability and willingness of other councils to collaborate
	Collaborations established with the finance sector to design and implement new financing tools that redistribute investment/performance risk and make regional investment in mitigation and adaptation more feasible and attractive	The ability to initiate connections lies largely within GWRC control, though design and implementation of new financing tools lies largely outside of GWRC control
	Ongoing collaborations are established with tertiary institutions to engage students in climate change research projects	This is largely within GWRC control, though does rely on availability of students and partnership opportunities with learning institutions

Appendix 3

Wellington region greenhouse gas emission projection scenarios

As part of the Wellington region Greenhouse Gas Inventory report project, URS New Zealand Ltd was commissioned by five councils in the region to develop illustrative emission projection scenarios. The emission projections combine recent regional emission trends (Wellington Regional GHG Inventory) with regional projections data (Regional Land Transport Model) and national projections data (Energy Outlook Model).

The aim of the emission projections outlined is to inform the policy and planning debate and to help develop a better understanding of several key questions:

- What emissions trend can be expected under Business as Usual (BAU)?
- What are the levers that the councils could pull to change BAU emission trends?
- Which levers have the most impact on the overall emissions?
- Which levers do the councils have direct control over and which are dependent on central government or market forces?

The scenarios are not meant to be policy predictive and are aimed at illustrating the potential emissions development based on high level assumptions. Similarly, the emission reductions described in the 'high ambition emission reduction' scenario are not based on a detailed cost benefit analysis and are only demonstrating potential impact of possible emission reduction initiatives. Furthermore, the application of national projection data at a regional level has some important limitations.²⁸

²⁸ The Energy Outlook Model uses national and international data and historic trends. These may differ from historic trends observed in the region.

Business as Usual Scenario

The BAU scenario assumes a continuation of the broad trends of key economic drivers and policy settings, as well as current technologies and fuel choices. This illustrates the current best guess, without additional policies and initiatives to reduce emissions. This does not necessarily represent our expectation of what is going to happen.

The key assumptions are:

- Moderate oil and carbon prices
- No further upgrades to the landfill gas collection systems and waste water treatment systems in the region
- No additional renewable electricity generation (above what is currently already planned)
- Continued growth in aviation emissions
- HFC, PFC and SF6 emissions following MfE projections for national emission trends
- Disestablishing of Wellington City's electric trolley busses in 2017. Busses are supplemented by diesel busses, similar to currently use bus fleet.

Under the Business as Usual scenario, net GHG emissions for the Wellington region are projected to increase from 1,683,376 tCO₂e in 2012/13 to 1,739,825 tCO₂e in 2019/20.

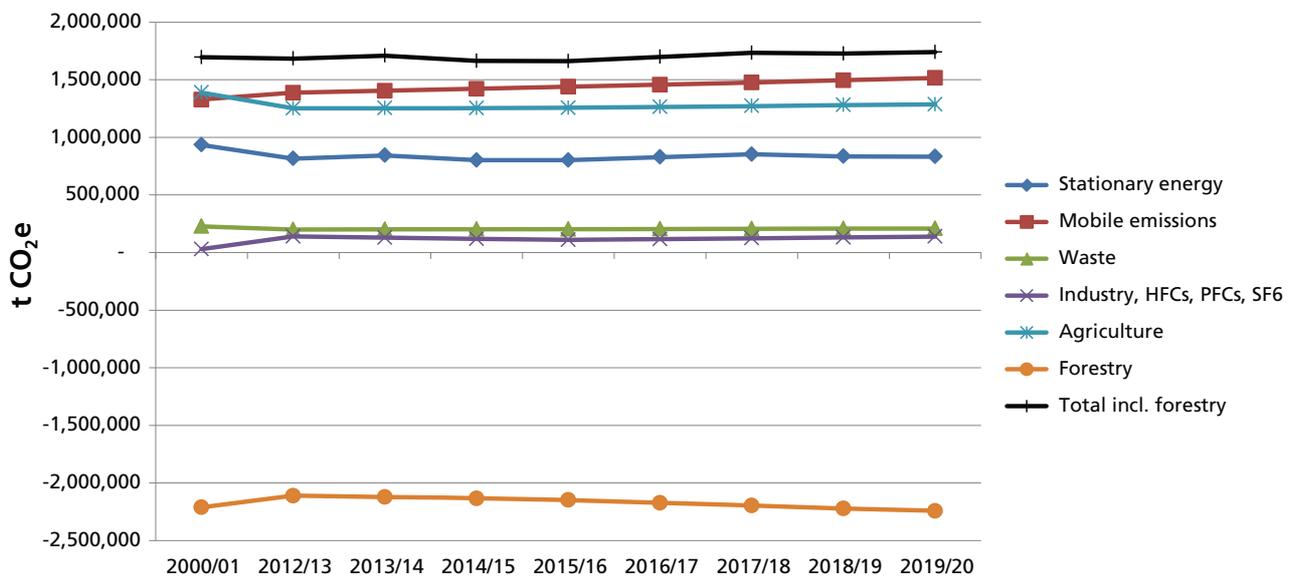
This represents a 3% increase, which is a reversal of the observed trend from 2000/01 to 2012/13.

High ambition emission reduction scenario

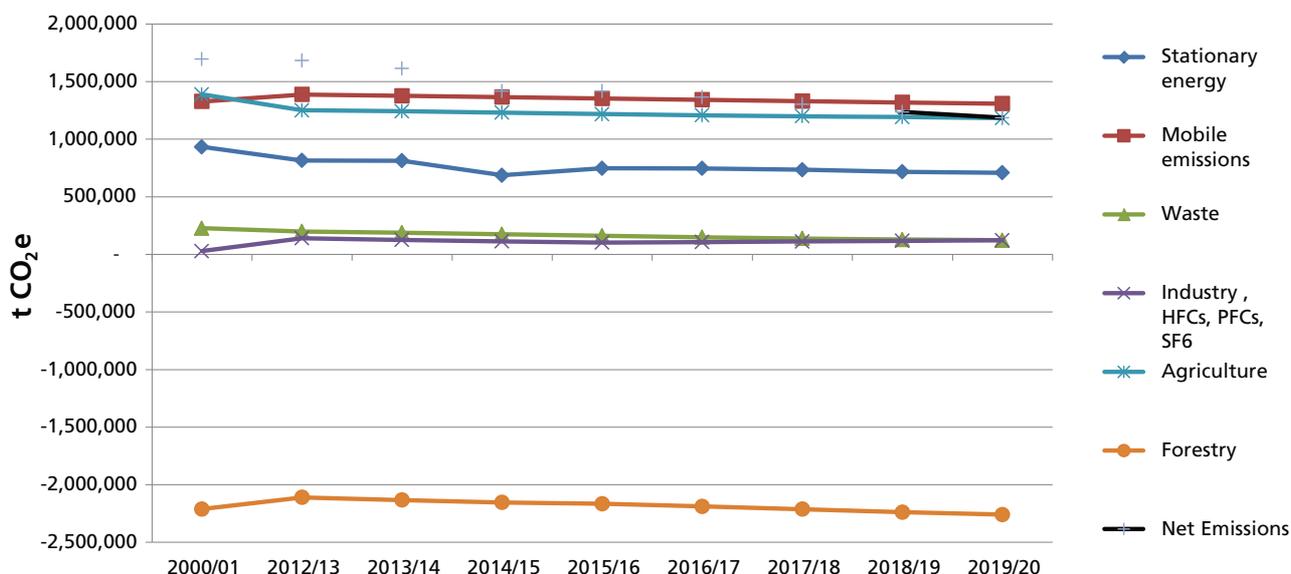
The high ambition scenario illustrates the changes that are necessary to achieve a 30% reduction in overall net emissions in the Wellington region. Key assumptions are:

- High oil and carbon price
- Significant development of additional renewable electricity generation within the region
- Significant improvements to landfill gas

Business as Usual – Wellington region GHG Emissions Profile Projection



High Ambition Emission Reduction Scenario – Wellington region GHG Emission Profile Projection



- collection and waste water treatment systems
- Additional reductions in agricultural emissions, on top of historic trends (+5% absolute)
- Reversal of LULUCF emissions and sequestration trend plus 50% increase in historic sequestration trend (i.e. an increase in carbon sequestration values)
- 25% reduction in trend for HFC, PFC and SF6 emissions projected by MfE
- Doubling of current electric busses and replacement of 50% of diesel busses with hybrid diesel busses
- Significant uptake of biofuel for land transport and aviation.

Under the high ambition reduction scenario net GHG emissions for the Wellington Region are projected to decrease from 1,683,376 tCO₂e in 2012/13 to 1,185,920 tCO₂e in 2019/20, which represents a 30% emission reduction compared to business as usual. The changes modelled in this scenario demonstrate potential emission reduction initiatives. There are likely to be other initiatives that have not been included in the scenario above.

To a large degree the emission reductions are influenced by factors outside the direct control of the local councils, such as GRP, carbon price and oil price. However, this scenario does illustrate that significant policy and infrastructure changes are necessary, in addition to market drivers, technology advancements and investments, to achieve significant reductions in overall regional emissions.

The figure below illustrates the high ambition emission reduction contributions of individual emission sources compared to the business as usual scenario and the following table presents the percentage contribution each source makes to the overall projected reduction.

High ambition scenario – contribution of individual emission sources

Emission source	Contribution to reduction
Electricity improvements	19.9%
Natural gas improvements	1.6%
Reduction in coal use	0.6%
Petrol improvements	13.4%
Diesel improvements	8.3%
Bus improvements	0.4%
Aviation improvements	16.0%
MSW improvements	14.7%
Waste water improvements	0.4%
Industry sector gains	2.9%
Agricultural sector gains	18.4%
Forest sector gains	3.3%
Total reduction (tCO₂e)	-556,000t

Closing comments

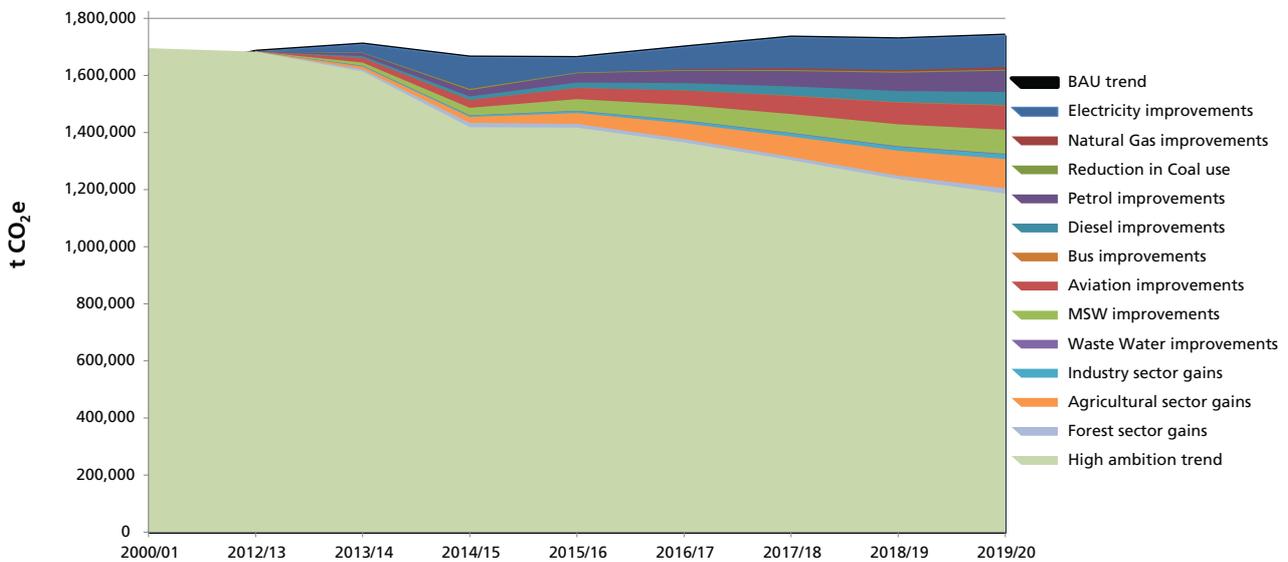
Under a BAU scenario, the GHG emissions of the Wellington region are expected to increase somewhat by 2020. This represents a reversal of the historic trend between 2000/1 and 2012/12, which indicated a small reduction in overall emissions. Under this scenario, ongoing annual improvements in energy efficiency and emissions intensity would be outpaced by increases in overall emissions due to assumed rates of population and GRP growth.

The emission reduction scenario illustrates that significant changes in energy production and consumption supported by high energy and

emission prices would be needed to deliver a 30% reduction by 2019/20 relative to 2000/01. Energy and emission price changes of this magnitude are unlikely to be feasible by 2020 without significant policy intervention by central and local government or unforeseen market developments. New regional renewable generation of the magnitude included in the high ambition scenario is unlikely to be feasible by 2020 given the time required for consenting and construction of new commercial generation, projected low national demand for new generation, and historical and current low uptake of distributed renewable generation.

Significant changes in transport behaviour are unlikely over the short timeframe of the projections, given relatively inelastic responses by the transport sector to energy pricing and the historically slow rate of behaviour change in shifting away from car travel. The feasibility, costs and benefits of more ambitious policy interventions would require careful evaluation. The uptake of biofuel for transport is outside the direct control of the local councils and may be difficult to implement.²⁹

High ambition scenario – sector contributions (30% reduction compared to BAU)



29 URS New Zealand Ltd. 2014. Greenhouse Gas Inventory for the Wellington Region Report. <http://www.gw.govt.nz/assets/About-GW-the-region/Wellington-GHG-Inventory-Report-Final.pdf>

The Greater Wellington Regional Council promotes **Quality for Life** by ensuring our environment is protected while meeting the economic, social and cultural needs of the community

For more information contact the Greater Wellington Regional Council:

Wellington office
PO Box 11646
Manners Street
Wellington 6142

04 384 5708

Upper Hutt office
PO Box 40847
Upper Hutt 5018

04 526 4133

Masterton office
PO Box 41
Masterton 5840

06 378 2484

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info@gw.govt.nz
www.gw.govt.nz

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