

Climate Change Strategy

A strategy to guide the Wellington Regional Council's climate change response

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greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao



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Cover photos:

Top left – Waves battered the Wairarapa Line between Petone and Ngauranga, washing away the sea wall and badly damaging the track during the June 2013 storm event

Top right – A Wairarapa line train between Petone and Ngauranga at peak time

Bottom – Young children in native forest

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

Policies have been identified under each of the strategic objectives. Actions to achieve the strategic objectives and policies are outlined in an Implementation Plan that will be reviewed and updated on an annual basis. The Implementation Plan will ensure that the high-level vision, overarching objectives and policies outlined in the GWRC Climate Change Strategy translate into tangible, measurable actions over defined timeframes.

Table 1

Objective 1	Objective 2	Objective 3
Greater Wellington will act to reduce 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 and actions based on best scientific information	Community awareness of climate change mitigation and adaptation solutions increases and organisations and individuals know what they can do to improve the long term resilience and sustainability of the region



Aerial view of Wainui River in flood, 2004

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.

Analysis from the World Bank, the New Zealand Treasury and others indicates that the longer we delay reducing emissions, the harder and more expensive it will be.² The IPCC's Fifth Assessment report states that without additional mitigation efforts, warming will lead to a "very high risk of severe, widespread and irreversible impacts globally" and that while mitigation involves risks, these risks are not as great as those from climate change.

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 erosion and flood-prone areas, reliance on increased protection alone will become progressively less feasible.³ Options such as managed retreat will need to be considered.

As discussed in an Insurance Council of New Zealand position paper,⁴ the New Zealand Climate Change Centre promotes retreat from areas at greatest risk from natural hazards in its summary of New Zealand findings from the latest IPCC report.⁵

At the same time as posing major challenges, addressing climate change presents us with many opportunities and co-benefits. Transitioning to a low carbon economy creates a real opportunity to invest in a safe and prosperous future where everyone is better off. Taking action to cut emissions can produce benefits like cleaner air, greater energy security, better human health, reduced vehicle congestion, and more livable cities.

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.⁶

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.⁷

"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."⁸

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- 1 E.g. Parliamentary Commissioner for the Environment. 2014. Changing climate and rising seas: understanding the science.
 - 2 The World Bank. 2015. Climate Change Overview <http://www.worldbank.org/en/topic/climatechange/overview#1>
NZ Treasury 2014 Briefings to Incoming Ministers Information Release <http://www.treasury.govt.nz/publications/briefings/2014-climate-change/bim-14-climate-change.pdf>
2014 Whitehouse Report 'The Cost of Delaying Action to Stem Climate Change' https://www.whitehouse.gov/sites/default/files/docs/the_cost_of_delaying_action_to_stem_climate_change.pdf
2006 Stern Review on the Economics of Climate Change <http://siteresources.worldbank.org/INTINDONESIA/Resources/226271-1170911056314/3428109-1174614780539/SternReviewEng.pdf>
 - 3 New Zealand Climate Change Centre. 2014. Climate change IPCC Fifth Assessment Report New Zealand findings.
 - 4 Insurance Council of New Zealand. 2014. Protecting New Zealand from Natural Hazards. An Insurance Council of New Zealand perspective on ensuring New Zealand is better protected from natural hazards.
 - 5 New Zealand Climate Change Centre. 2014. Climate Change – IPCC Fifth Assessment Report: New Zealand findings.

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- 6 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.
 - 7 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>
 - 8 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/>

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. The Strategy does not cover Council Controlled Organisations (CCOs) or other arms length organisations. 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 link with.

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, Regional Land Transport Plan, and non-statutory documents such as floodplain management plans, asset 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 (see the following page) 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.

3. Regional context

3.1 Greenhouse gas emissions in the Wellington region

In 2014, a consortium of councils in the Wellington region⁹ 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.¹⁰ Figure 2 (p.6) demonstrates the contribution of individual emission sources to the total regional gross emissions¹¹ 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.

The dominant contributors of emissions to the regional emissions profile are the transport, agriculture and energy sectors 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 Dealing with uncertainty

Uncertainty about the exact extent and location of future climate change impacts is sometimes cited as a serious barrier to effectively responding to climate change risks and as a reason to delay action. Just like any area of complex science, uncertainty is a feature of climate science that will never go away. People and organisations make decisions every day based on less than certain information.¹²

The recommended approach for climate change planning and decision-making is one of risk management in the face of uncertainty. As described by the IPCC: "Risk management is easier for nations, companies, and even individuals when the likelihood and consequences of possible events are readily understood. Risk management becomes much more challenging when the stakes are higher or when uncertainty is greater. As the WGII AR5 demonstrates, we know a great deal about the impacts of climate change that have already occurred, and we understand a great deal about expected impacts in the future. But many uncertainties remain, and will persist. In particular, future greenhouse gas emissions depend on societal choices, policies, and technology advancements not yet made, and climate-change impacts depend on both the amount of climate change that occurs and the effectiveness of development in reducing exposure and vulnerability. The real challenge of dealing effectively with climate change is recognizing the value of wise and timely decisions in a setting where complete knowledge is impossible. This is the essence of risk management."¹³

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

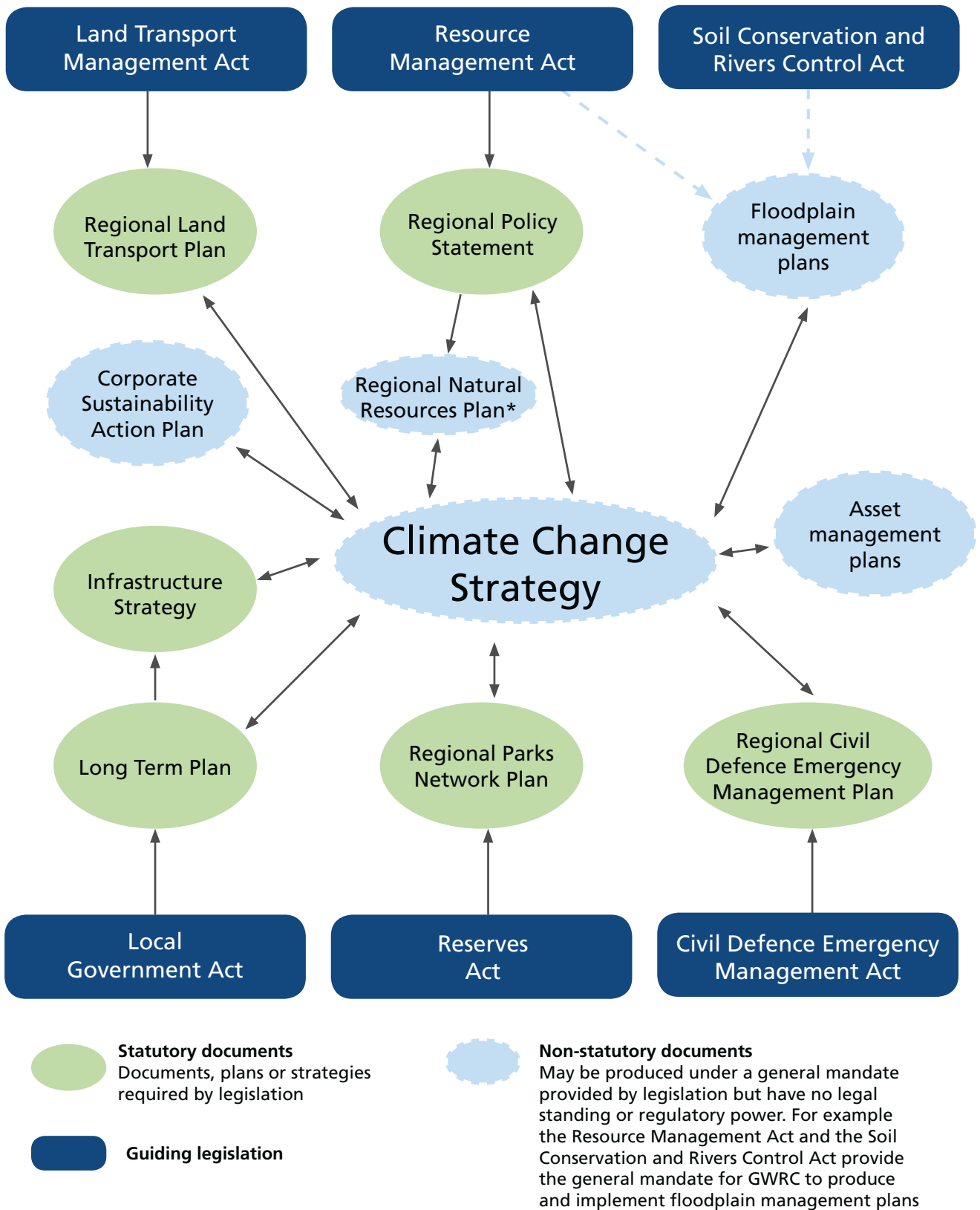
10 URS New Zealand Ltd. 2014. Greenhouse Gas Inventory for the Wellington Region Report. <http://www.gw.govt.nz/assets/About-GW-the-region/Wellington-GHG-Inventory-Report-Final.pdf>

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

12 Climate Outreach and Information Network. 2015. Communicating Uncertainty in Climate Science. <http://talkingclimate.org/guides/a-guide-to-communicating-uncertainty-in-climate-science/>

13 Intergovernmental Panel on Climate Change. 2014 Working Group II AR5 Report: Impacts, Adaptation and Vulnerability. FAQs, p.96

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



* The proposed Natural Resources Plan for the Wellington Region had not been finalised at the time of publication

3.2.2 Projected climate changes¹⁴

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 around 1mm per year on the Kapiti coast up to between 2 to 3mm per year along the Wairarapa coast.¹⁵

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 2115.¹⁶

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 is tracking close to the upper end of the range of sea level rise projections published in the IPCC's AR4 report.¹⁷

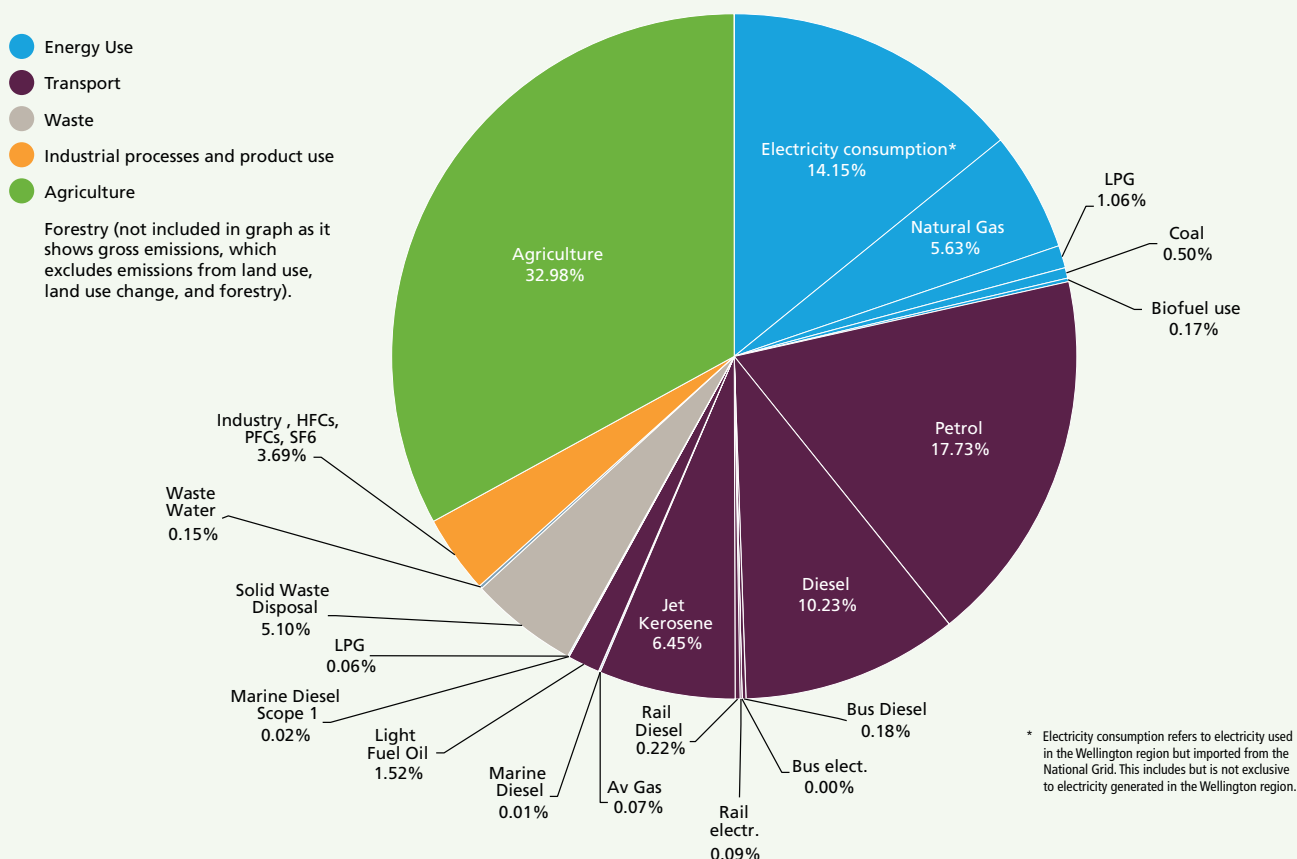
Wind – the frequency of extreme winds over this century is likely to increase by between 2 and 5% in winter, and decrease by a similar amount in summer.

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.¹⁸

14 Current climate change projections are based on the IPCC (Fourth Assessment) Report. These will be updated as soon as projections in the latest IPCC (Fifth Assessment) Report are downscaled to the regional scale.
15 National Institute of Water and Atmospheric Research Ltd (NIWA). 2012. Sea level variability and trends- Wellington region. Prepared for Greater Wellington Regional Council.

16 National Institute of Water and Atmospheric Research Ltd (NIWA). 2012. Sea level variability and trends- Wellington region. Prepared for Greater Wellington Regional Council.
17 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.
18 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>

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



Precipitation – overall there is expected to be a small increase in rainfall in the west of the region and a decrease in the 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 Kapiti and Wellington city, 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 by 2090, 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.¹⁹

3.2.3 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

¹⁹ Ministry for the Environment, 2008. Preparing for Climate Change: A guide for local government in New Zealand.



Waimeha Restoration group member helps plant at Waimeha Lagoon, Waikanae

- (c) Increased frequency of drought, placing pressure on water resources and increasing the risk of wild fire.²⁰

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:²¹

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. increases in beech forests

²⁰ Greater Wellington Regional Council. 2013. Regional Policy Statement for the Wellington region.

²¹ Note there is a degree of overlap between some of the issues identified under the various GWRC functions and operational areas listed below. Where appropriate, different GWRC departments will work together on mitigation and adaptation options.

- 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 is likely to 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 likely 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 and sustainability of the Wellington region through climate change action and awareness.

Sustainability is about improving the quality of human life while living within the carrying capacity of supporting ecosystems.²² Sustainability requires thinking long-term and proceeding in a way that sustains life and ensures we leave future generations with access to at least as much natural capital as we have now.²³

Resilience means the capacity of the region to absorb and bounce back from shocks and disturbances,²⁴ and to make decisions that are flexible and robust in the midst of ongoing change and uncertainty.²⁵ 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.²⁶ Resilience is about understanding processes of change and is a product of governments, businesses, communities and individuals with strong adaptive

22 IUCN/UNEP/WWF. Caring for the Earth: A Strategy for Sustainable Living. (Gland, Switzerland: 1991). (IUCN - The World Conservation Union, UNEP - United Nations Environment Programme, WWF - World Wide Fund for Nature).

23 Friends of the Earth Scotland <http://www.foe-scotland.org.uk/>; Thomas Jefferson Sustainability Council <http://www.tjpcdc.org/>

24 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.

25 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>

26 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.

capacity.²⁷ 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.²⁸ Resilience in this sense encapsulates several facets, including economic resilience, which is supported by the transition to an innovative low-emission economy and improved regional energy security.

The Strategy's vision acknowledges the key role that GWRC can play in contributing to the region's sustainability and resilience to climate change. 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 will act to reduce 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

27 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.

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

government's principal policy response to climate change, the Emissions Trading Scheme (ETS).²⁹ 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.³⁰

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.³¹ 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."³²

GWRC is committed to working with other partners and sectors to help to create a smart, innovative, low-carbon regional economy. This commitment can be realised through GWRC's multiple roles as facilitator, partner, regulator, funder, planner, advocate and resource manager.

GWRC's Corporate Sustainability Action Plan contains targets to reduce the emissions associated with its operations. GWRC has made a commitment within the 10 Year Plan 2015-25 to measure and report annually on its emissions and demonstrate a reduction in its corporate emissions. The 2014/15 GWRC carbon inventory will be used as a baseline to measure future increases or decreases in emissions.

Adaptation

The overarching adaptation objective is

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

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

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

30 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.

31 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

32 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-regions-launched-at-un-climate-summit>

pervasive impacts of climate change already occurring.³³ 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. Land use planning can have a significant effect on both greenhouse gas emissions and on vulnerability to climate change impacts. Controlling the effects of land use is a function of territorial authorities (city and district councils) through their district planning processes.³⁴

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.³⁵

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.³⁶

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.³⁷

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

34 GWRC can only control land use for the purpose of managing water quantity and quality

35 Local Government Act. 2002. s 14 h

36 Soil Conservation and Rivers Control Act. 1941.

37 Civil Defence Emergency Management Act. 2002. s 3



A section of track hangs unsupported after the June 2013 storm which caused unprecedented damage to the foundations of the track and seawall on the Wairarapa Line between Petone and Ngauranga

Engagement and awareness

The overarching awareness objective is

Community awareness of climate change mitigation and adaptation solutions increases and individuals and organisations know what they can do to contribute to the long term resilience and sustainability of the region.

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.³⁸

³⁸ 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

4.3 Implementation 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.
- **Interaction must be supplemented with action:** The complex and trans-boundary nature of climate change requires coordinated action across a large number of stakeholders to manage the risks. However, coordination of a large number of actors across different scales and jurisdictions is challenging. GWRC is committed to following through on the actions it can undertake itself or directly influence without getting side-tracked or held back by the inaction of others.
- **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 us to make decisions in the face of uncertainty.³⁹

³⁹ 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

4.4 Policies

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

Overarching objectives		Policies
Mitigation	GWRC acts to reduce 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 Seek to remove barriers to the use and development of renewable energy and improved energy efficiency in the region
		1.2 Promote and provide attractive and accessible low emission transport in our own fleet and in future public transport contracts
		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 information	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
Engagement and Awareness	Community awareness of climate change mitigation and adaptation solutions increases and organisations and individuals know what they can do to improve the long term resilience and sustainability of the region.	3.1 Share knowledge
		3.2 Advocate, empower and collaborate

Appendix 1

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.⁴⁰

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:

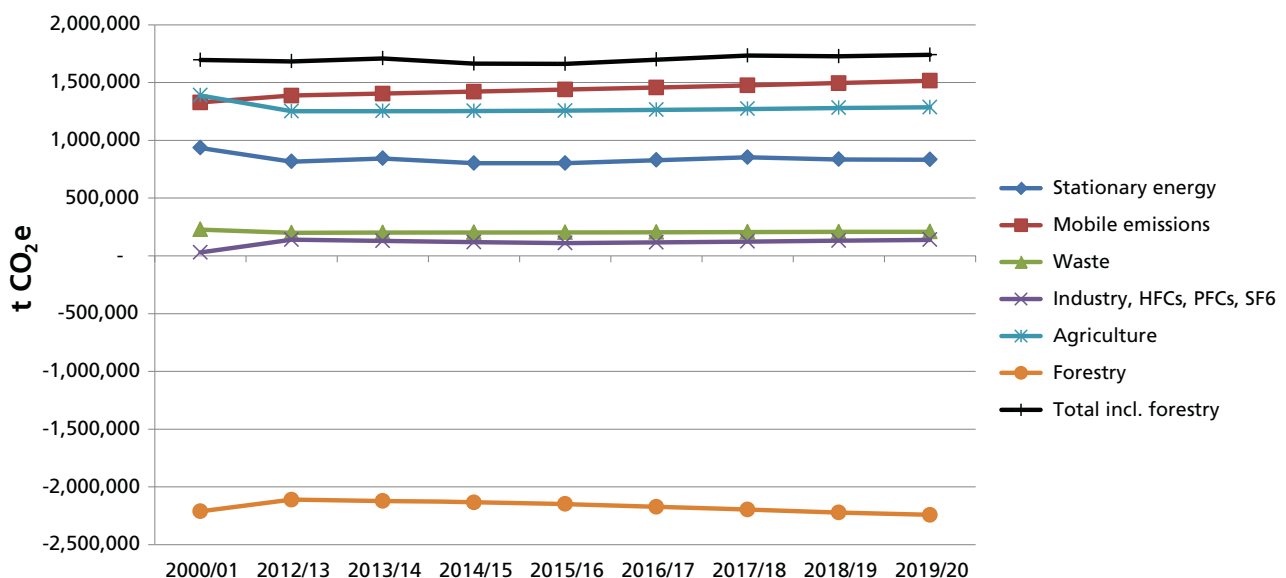
- Moderate oil and carbon prices
- No further upgrades to the landfill gas collection systems and waste water treatment systems in the region
- No additional renewable electricity generation (above what is currently already planned)
- Continued growth in aviation emissions
- HFC, PFC and SF6 emissions 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 the currently used bus fleet.

Under the BAU 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.

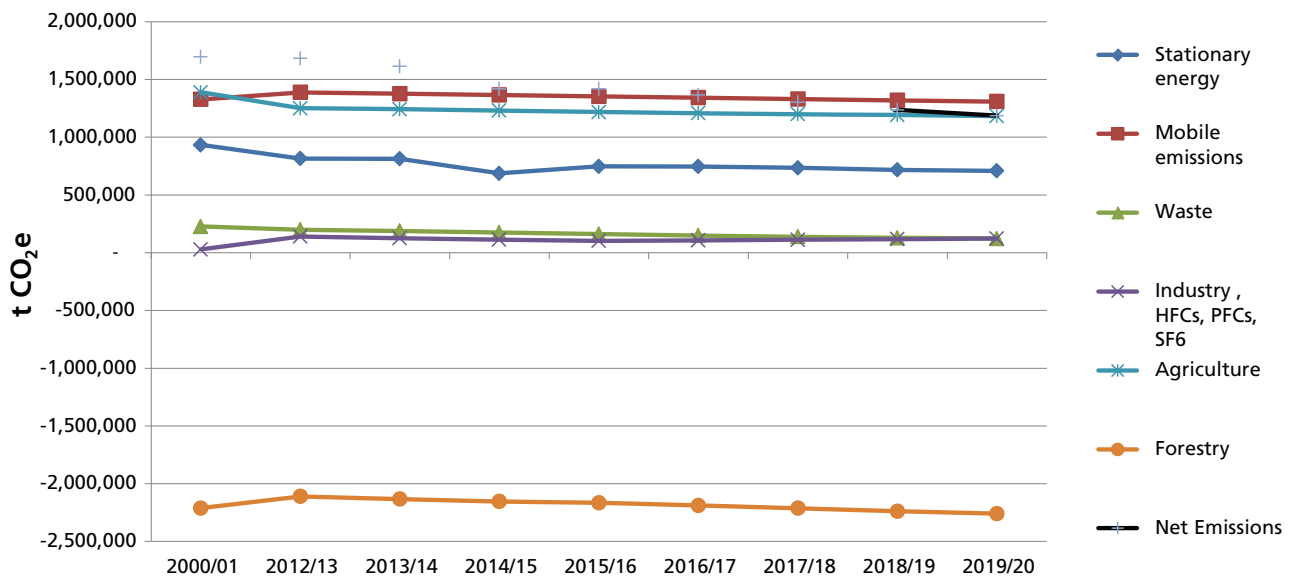
This represents a 3% increase, which is a reversal of the observed trend from 2000/01 to 2012/13.

⁴⁰ 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 – Wellington region GHG Emissions Profile Projection



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



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 collection and waste water treatment systems
- Additional reductions in agricultural emissions, on top of historic trends (+5% absolute)
- Reversal of LULUCF⁴¹ 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 Gross Regional Product, 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%
Solid waste 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

41 LULUCF = Land Use, Land Use Change and Forestry

Closing comments

Under a BAU scenario, the GHG emissions of the Wellington region are expected to increase by 3% 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.

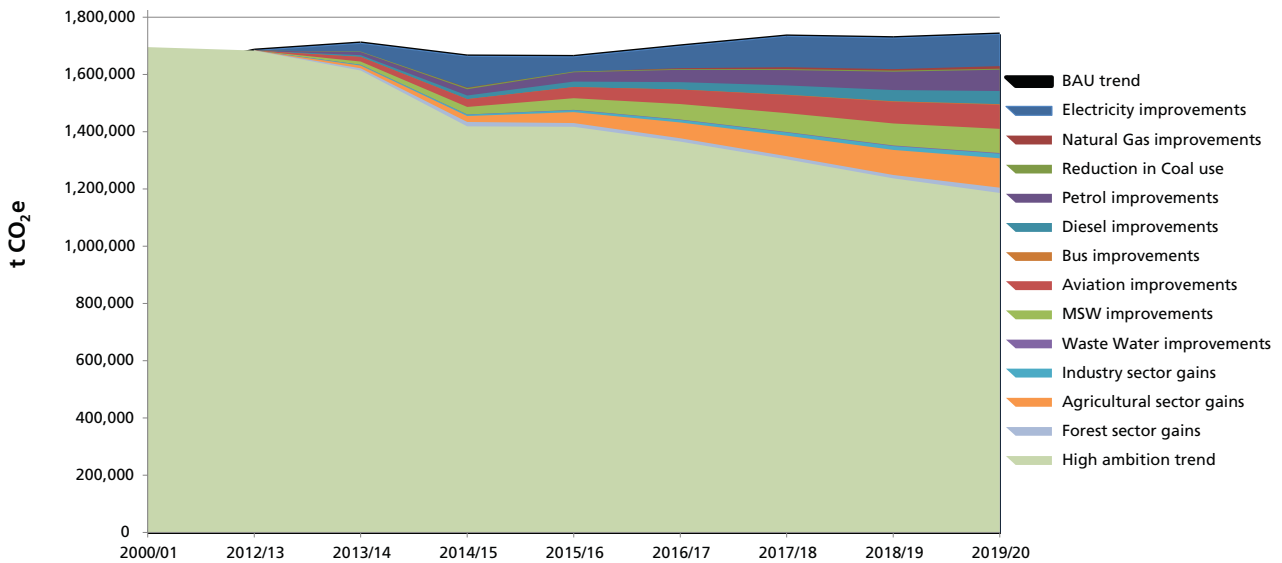
The emission reduction scenario illustrates that significant changes in energy production and consumption supported by high energy and emission prices would be needed to deliver a 30% reduction by 2019/20 relative to 2000/01. Energy and emission price changes of this magnitude are unlikely to be feasible 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.⁴²

⁴² 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>

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



The Greater Wellington Regional Council's purpose is to enrich life in the Wellington Region by building resilient, connected and prosperous communities, protecting and enhancing our natural assets, and inspiring pride in what makes us unique

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