6 Outcomes from the current system

Key points

- The purposes of the three main planning Acts suggest that the main outcomes sought from the planning system are:
  - the maintenance of or improvements in environmental quality;
  - the supply of local infrastructure and services in a timely and cost-effective manner and to desired standards; and
  - the safe and reasonably easy movement of goods and people.
- Available data provides a mixed picture of performance.
  - Air quality generally complies with national standards, is good by international levels, and has improved against some measures. Yet air quality problems remain in some smaller New Zealand cities and towns.
  - The proportion of New Zealanders serviced by safe drinking water has increased over time, reflecting more effective regulation, support from central government and increased investment from local authorities in water treatment.
  - Freshwater quality is generally lower in waterways that flow through urban areas. The sources of pollution in urban waterways typically include sewage leaks and stormwater run-off.
  - Net and total greenhouse gas emissions have increased by 54% and 26% respectively since 1990.
  - Development capacity has failed to keep pace with demand in New Zealand's fastest growing cities. Substantially as a result, housing affordability has deteriorated significantly over the past 25 years. People on lower incomes feel the burdens of this deterioration most heavily.
  - Urban congestion levels have been broadly steady for the past 10 years, and traffic-related accident and fatality rates have been falling since the 1970s. Despite improvements, New Zealand has a relatively high rate of traffic-related deaths compared with other developed countries.
  - New Zealand has low levels of public-transport use by developed world standards. The rates of use have been broadly stable since the early 2000s.
  - More New Zealanders live in dwellings connected to systems for treating sewage than the OECD average. New Zealand sewerage systems perform somewhat poorly against a number of international benchmarks.
- The ability of councils to change outcomes through the planning system depends to a large degree on whether local government is the primary actor. Changes in technology and consumer preferences, and central government policy, can be more significant factors. However, the muted effects on many urban and environmental outcomes point to weaknesses in the design and operation of the New Zealand planning system. Underlying political dynamics have constrained the effectiveness of the planning system for both urban and environmental outcomes.

Chapter 5 discussed the nature of the urban planning system in New Zealand, its evolution, and some of its strengths and weaknesses. But how has the New Zealand urban planning system performed? In other words, has the planning system delivered the outcomes expected of it? If not, why has it not delivered those outcomes?

The planning system as a whole currently has no single purpose statement. However, the three main Acts and related material provide guidance, and suggest the following main outcomes currently sought from the planning system.

- *Protection and enhancement of the environment:* the Resource Management Act (RMA) is an environmental management statute, with a particularly broad definition of the 'environment' (Chapter 5).
- *The efficient, effective and appropriate provision of infrastructure and local public services:* the Local Government Act (LGA) explicitly identifies these as falling within the purpose of local government.
- *Safe, efficient and effective land transport:* as stated in the purpose of the Land Transport Management Act (LTMA), and reinforced by the specific priorities of the Government Policy Statement (GPS).

Broadly speaking, therefore, where the planning system was performing well, we might expect to see:

- the maintenance or improvements in key environmental measures (eg, air quality, water quality, ecosystem health);
- the supply of local infrastructure and services in a timely and cost-effective manner and to desired standards; and
- the safe and reasonably easy movement of goods and people.

This chapter reviews recent developments in these environmental and urban outcomes, and considers the contributions of the planning system. Consistent long-term data is not available for all of these outcomes; so, in some cases, proxy measures have been used. In other cases, some judgements have been made about which outcomes to focus on. For example, a large number of environmental outcomes could potentially be reviewed. Given the focus of this inquiry on *urban* planning, the Commission has decided to focus on those environmental outcomes most closely connected to cities, urban development and land use. These include:

- air quality;
- drinking and recreational water quality; and
- climate change.

For urban outcomes, the Commission has focused on four measures that reflect the purposes of the current Acts, are essential to the effective functioning of cities, or both. These measures are:

- the availability of sufficient development capacity to respond to changing social and economic needs;[48]
- the speed and safety with which people and goods can move around a city;
- the extent to which essential infrastructure and services (eg, roads, water treatment, waste management, public transport) keep pace with demand and are maintained; and
- the ability of local residents and governments to fund essential infrastructure and services over time.

6.1 Air quality

Air quality in New Zealand is measured against a number of indicators. The National Environmental Standards (NES) for Air Quality set ambient air quality standards, which regional and unitary councils must give effect to through their plans and policies. The standards set thresholds for five pollutants (PM10 (see

[48] The supply of sufficient development capacity is not currently an explicit goal or requirement under the three planning Acts. However, proposed amendments to the RMA and the proposed National Policy Statement on Urban Development Capacity will make it a clear role and obligation for councils.

particulate matter below), nitrogen dioxide, carbon monoxide, sulphur dioxide and ozone), and outline how many times these thresholds can be exceeded.[49] Air quality is also assessed against other guidelines or benchmarks, principally those developed by the World Health Organization (WHO) and the Ministry for the Environment (MfE).

As this section discusses, available evidence suggests air quality has generally improved since the Resource Management Act came into force. A recent study by the Environmental Defence Society (EDS, 2016) supports this conclusion. While noting the difficulty in attributing improvements solely to the RMA the EDS concludes:

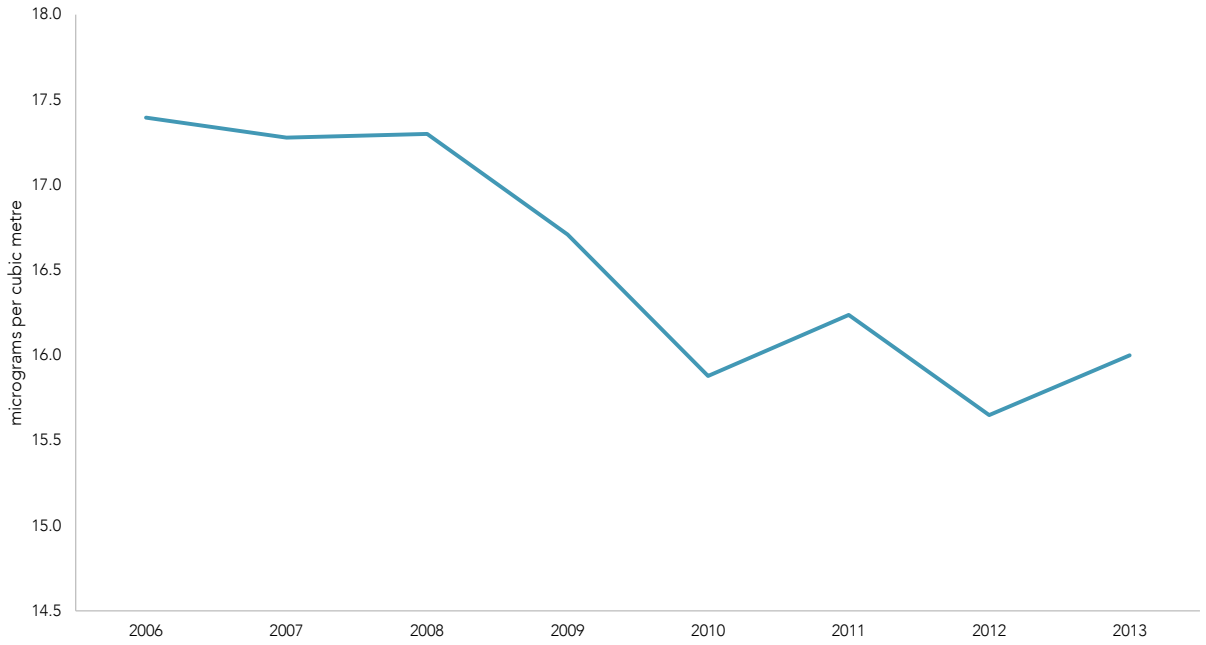
> A combination of regulatory change and technological improvement has improved New Zealand's air quality, primarily motivated by human health concerns. This […] illustrates that where technical solutions are available, and national direction is clear, good environmental outcomes can be achieved. (EDS, 2016, p.33)

Exposure to particulate matter

A key measure of air quality is the presence of particulates in the air. Two indicators of particulate matter pollution are PM10 and PM2.5. PM10 particles have a diameter of 10 micrometres (or microns) or less, and PM2.5 particles have a diameter of 2.5 micrometres of less. To put these measurements in scale, a human hair has a diameter of 50 micrometres. Airborne particle pollutants can be naturally-occurring (eg, from sea spray) or human-made (eg, wood and coal fires), and can cause a range of health problems, including respiratory diseases, heart attacks, strokes and cancer. Monitoring of PM10 levels has been mandatory in New Zealand since NES was introduced in 2004, while monitoring of PM2.5 is currently voluntary.

Average PM10 concentrations have fallen in recent years (Figure 6.1) and are low by OECD standards, although many monitored sites fail to meet the national standard of one exceedance each year. Exceedances are typically seasonal, with most occurring in winter (when households need heating) and in the South Island (where wood burners are a more common form of household heating).

Figure 6.1 National yearly average concentrations of PM10, 2006–2013



Source: Ministry for the Environment / Statistics New Zealand.

WHO data from 2012 to 2014 suggests that major New Zealand cities have broadly similar PM10 and PM2.5 levels to major Australian cities (Figure 6.2), and both countries have very low levels of particulate pollution by international standards (Figure 6.3). However, some smaller New Zealand cities and towns – especially in

[49] For some pollutants (ie, ozone, and the higher sulphur dioxide threshold) no exceedances are allowed.

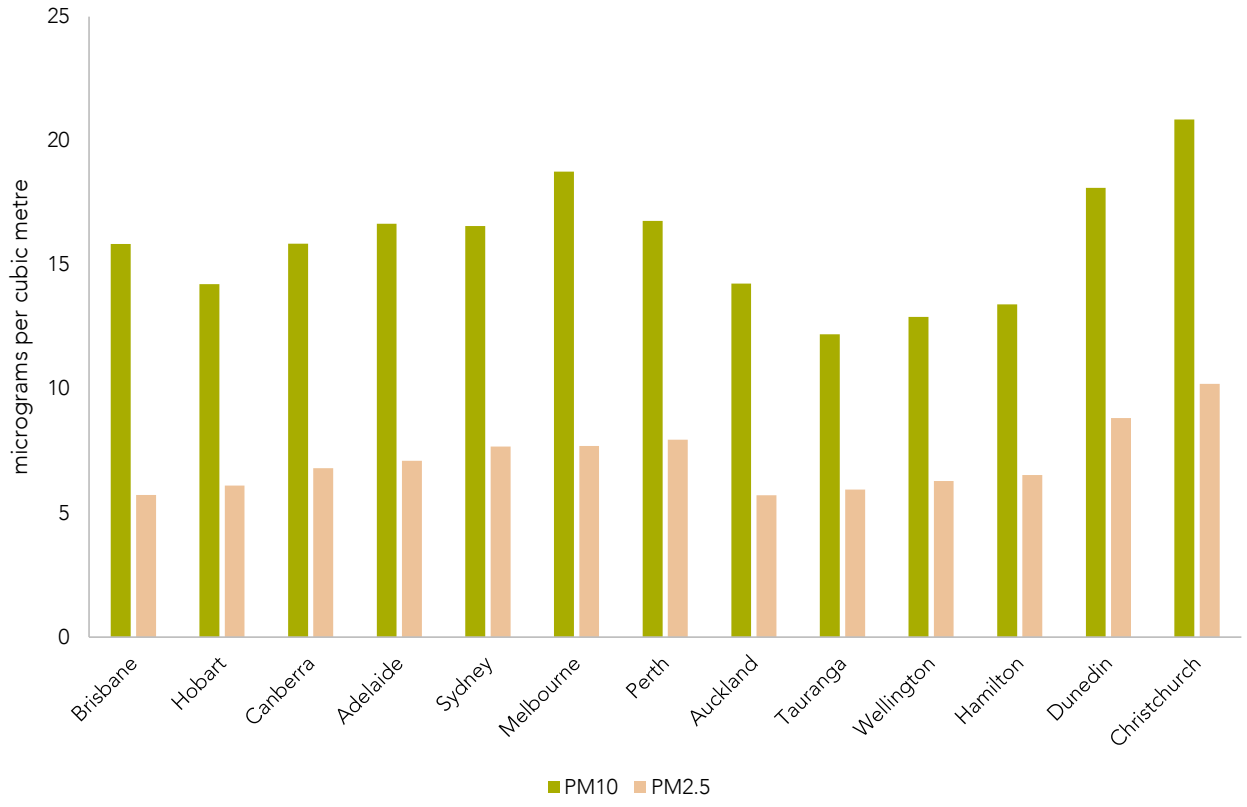
the South Island - have comparatively high levels of particulate pollution, with Timaru described in media coverage as having the worst level of air pollution in Australasia (Hudson, 2016).

Despite recent improvements, PM10-based air pollution in New Zealand has significant health effects. In 2012, air pollution from human-made PM10 was linked to approximately:

- 1 000 premature deaths;
- 520 extra hospital admissions for cardiovascular and respiratory diseases; and
- 1.35 million restricted activity days, when symptoms prevented everyday activities such as work or study (Ministry for the Environment / Statistics New Zealand, 2014).

Young people are particularly vulnerable to the effects of air pollution. A third of all estimated hospital respiratory admissions due to human-made air pollution in 2006 were children aged 1–4 years (Kuschel et al., 2012).

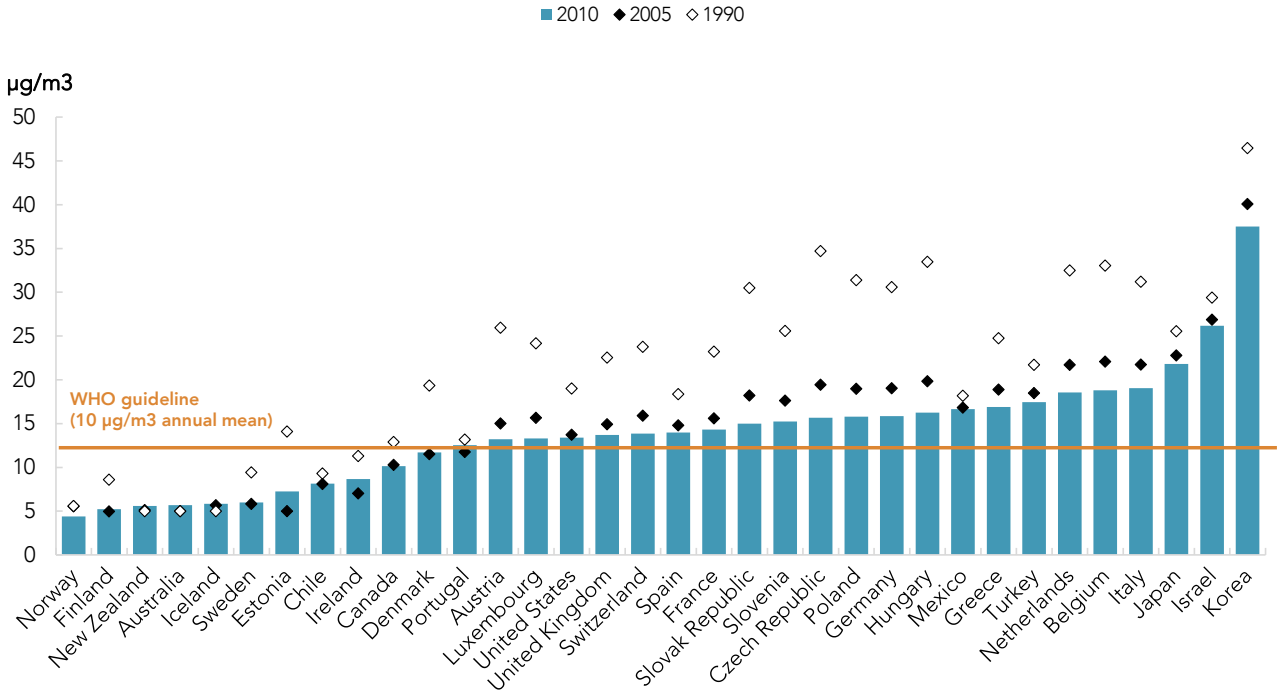
Figure 6.2 Yearly average particulate levels in major Australian and New Zealand cities



Source: Productivity Commission analysis of World Health Organization data.

Notes: Results are from different points across the 2012 to2014 period. WHO have converted some results to provide comparability.

Figure 6.3 Yearly average PM2.5 exposure levels of an average resident, by OECD country



Source: OECD, 2015c.

Note: The symbol µg refers to microgram.

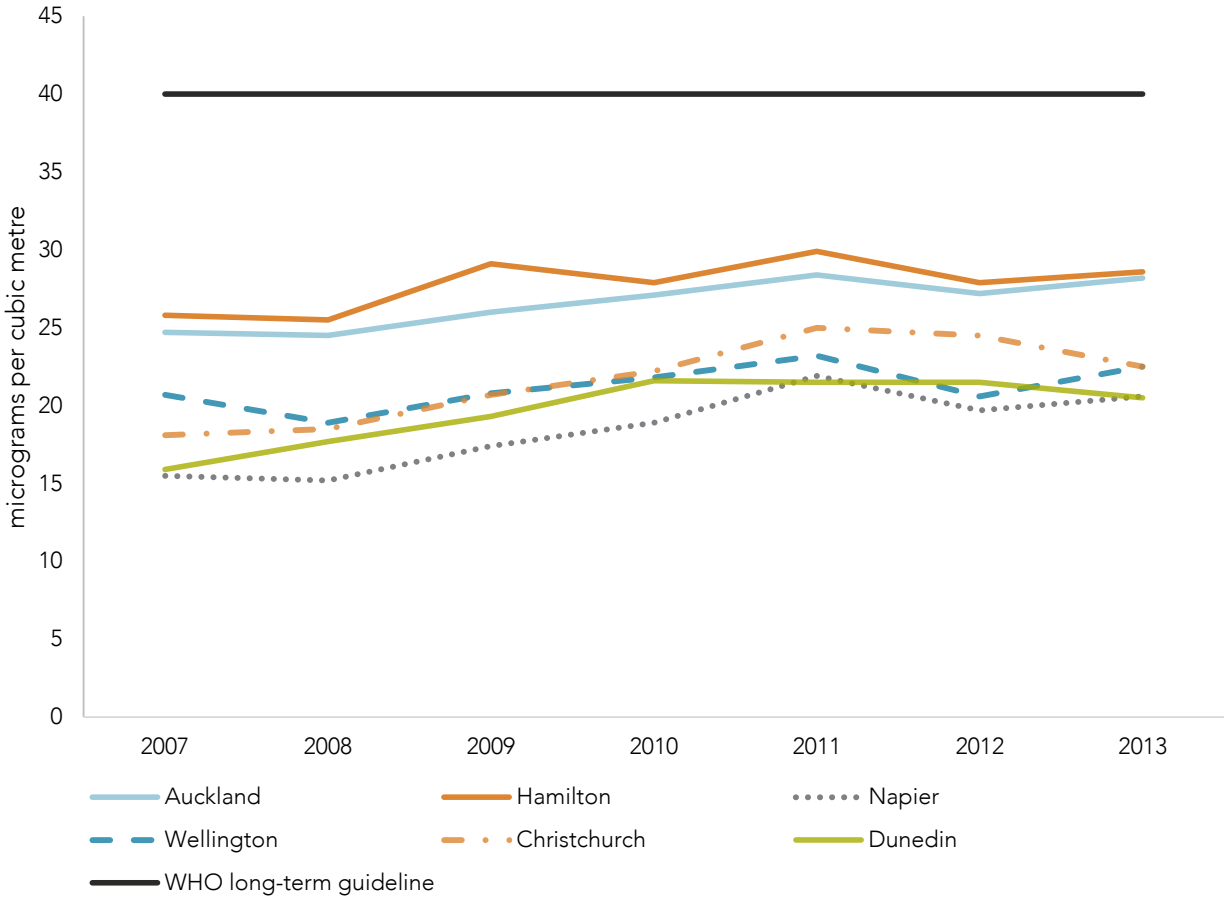
Exposure to nitrogen dioxide

Nitrogen dioxide is a pollutant associated with motor vehicle use. It has been linked to respiratory illnesses, such as asthma, and impaired lung development and function. According to the Ministry for the Environment and Statistics New Zealand,

> 97 percent of 122 monitored sites likely met the WHO long-term guideline (measured using screening methods) for nitrogen dioxide. Between 2010 and 2013, 3 to 6 sites (about 2–5 percent of sites) 'likely' exceeded this guideline in each of these four years.
>
> The 'likely' exceedances occurred close to busy local roads and state highways in major urban centres (Auckland, Hamilton, Wellington, and Christchurch). No 'likely' exceedances occurred at monitored urban areas away from busy roads, and concentrations were much lower than those at busy local roads and state highways. (Ministry for the Environment/Statistics New Zealand, 2015, p. 37)

Nitrogen dioxide levels at major state highway monitoring sites over time appear largely stable, and below WHO long-term guidelines (Figure 6.4).

Figure 6.4 Yearly average nitrogen dioxide concentration levels at six highway sites, 2007–2013



Source: Ministry for the Environment / Statistics New Zealand, 2015.

Exposure to carbon monoxide

Exposure to carbon monoxide can reduce the body's ability to absorb oxygen, with adverse impacts on heart, brain and general health. In New Zealand, the main sources of carbon monoxide emissions are the burning of wood or coal for household heating, and motor vehicle use.

Carbon monoxide levels at monitoring sites in New Zealand sit below national standards, often considerably lower. In 2013, 18 of the 21 monitoring sites had concentration levels less than half the national standard. Where trends in carbon monoxide concentration levels can be determined, they tend to show improvements:

> Between 2005 and 2013, annual concentrations decreased significantly in 44 percent of monitoring sites (7 of 16) where trend assessments could be conducted. The trend of the remaining nine sites is indeterminate – showing neither a significant increasing or decreasing trend. (Statistics New Zealand, 2015b)

Exposure to sulphur dioxide

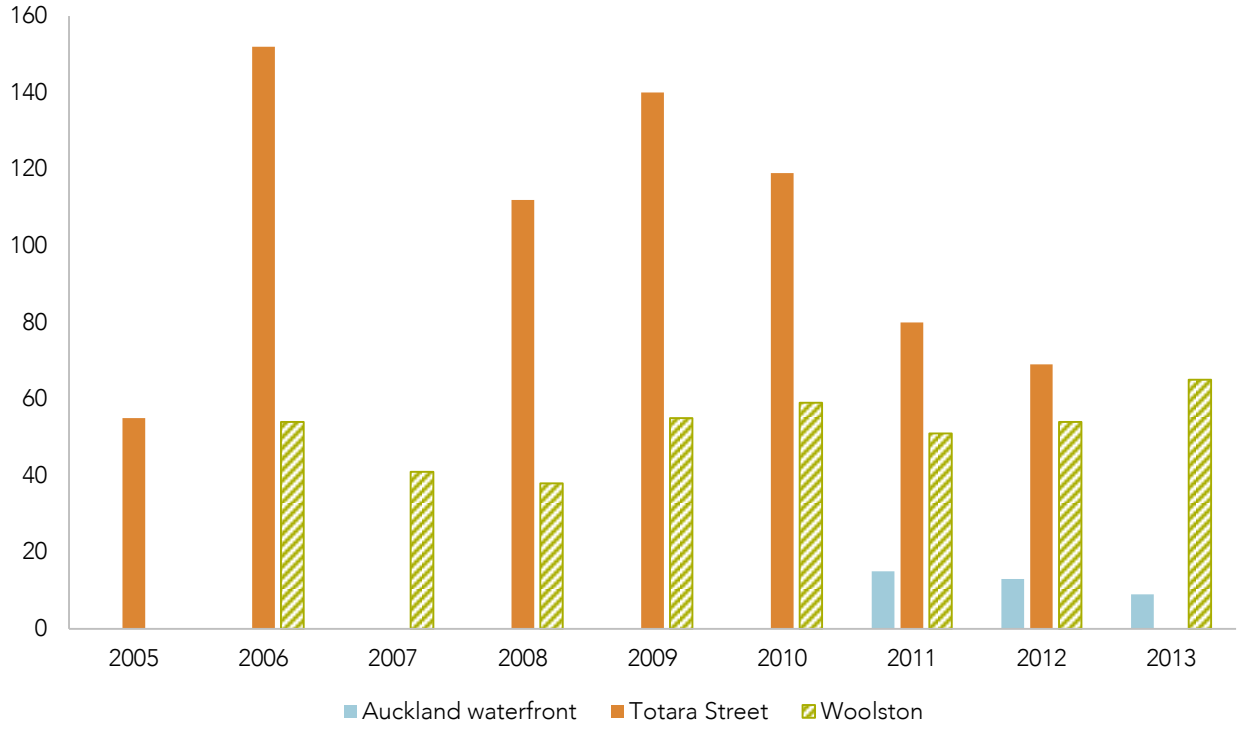
Sulphur dioxide is associated with respiratory and cardiovascular illness. The main source of sulphur dioxide emissions in New Zealand is industrial processes. According to MfE (2016b), "[s]ulphur dioxide levels in urban areas have decreased significantly since the 1970s and are generally below the ambient standard and guideline levels".

The Air Quality NES sets two standards for sulphur dioxide – one at a lower level (a one-hour average of 350 micrograms per cubic metre) which may be exceeded 9 times over a 12-month period, and a second at a higher level (a one-hour average of 570 micrograms) which may not be exceeded at all. New Zealand has a few monitored sites (Woolston in Christchurch and Totara Street in Mount Maunganui) that have exceeded

the 350 micrograms per cubic metre threshold on multiple occasions[50]. The higher 570 micrograms per cubic metre threshold has been breached twice each at Woolston and Totara Street.

The WHO has set a short-term daily guideline for sulphur dioxide at a much lower level than the NES – 20 micrograms per cubic metre. Although these are not part of the NES or ambient air quality guidelines issued by MfE, performance against the WHO daily guideline is monitored and reported on. Air quality at the Woolston and Totara St sites regularly breaches this guideline (Figure 6.5).

Figure 6.5 Exceedances of WHO sulphur dioxide daily guideline, 2005–2013



Source: Ministry for the Environment / Statistics New Zealand, 2015.

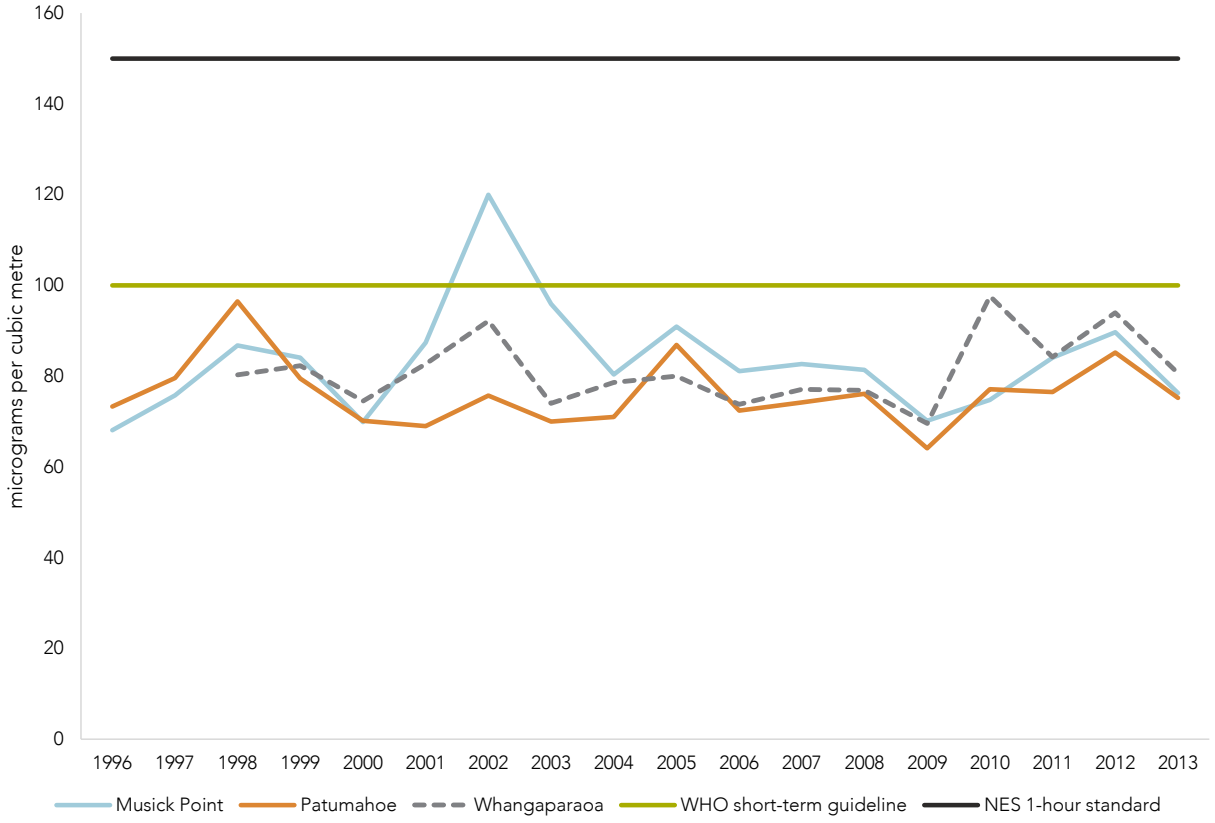
Notes: No valid data are available for Totara Street in 2007 and 2013, for Woolston for 2005 and for the Auckland waterfront for 2005–2010.

Exposure to increased levels of ozone

Ozone occurs naturally in the environment at outer heights of the atmosphere. At lower heights ozone is a pollutant, created by the reaction of other chemicals, such as nitrogen oxide, with sunlight. Exposure to increased levels of ozone is linked with increased mortality, cardiovascular and respiratory illnesses. In 2002, New Zealand experienced one period of elevated ground-level ozone levels (attributed to bushfires in Australia). Apart from this instance, ground-level ozone levels have remained below WHO guidelines; the NES standard has not been breached since its introduction.

[50] Both sites have significant industrial operations. This includes fertiliser, asphalt, and other chemical plants in Mt Maunganui, and a gelatine production factory in Woolston.

Figure 6.6 Maximum ozone concentrations in 8-hour periods, 1996–2013



Source: Ministry for the Environment / Statistics New Zealand, 2015.

F6.1 Air quality generally complies with national standards, is good by international levels, and has improved against some measures. Although air quality problems remain in some smaller New Zealand cities and towns.

6.2 Drinking and recreational water quality

Drinking and recreational water quality is assessed in a number of ways in New Zealand.

- Drinking water is assessed against the Drinking-water Standards for New Zealand, which are regulations set under the Health Act 1956. Regional councils are also required under the National Environmental Standard for Sources of Human Drinking Water to ensure that effects of activities on drinking water sources are considered in resource consent and regional plan decisions.
- Fresh water will be measured against the revised National Policy Statement on Freshwater Management (NPS-FM), which sets "national bottom lines" for a number of water quality attributes. Implementation of the NPS is in its early stages; the deadline for full implementation is 31 December 2015. The deadline can be extended to 2030 if "the 2025 timeframe will affect plan quality or it would be impracticable for the council to fully implement the NPS-FM by 2025" (Ministry for the Environment / Ministry for Primary Industries, 2015, p. 14).
- Coastal water is not measured against quantitative national standards, but activities affecting coastal water are regulated under District Plans, Regional Plans, Regional Coastal Plans and the New Zealand Coastal Policy Statement (NZCPS). National guidelines measure the suitability of fresh and coastal water for recreational purposes.

Quality of drinking water

The Drinking-water Standards for New Zealand set minimum bacteriological, protozoal and chemical requirements. Large zones (ie, areas with more than 10 000 people), which are almost all located in urban areas, had the highest level of achievement with the standards (Table 6.1).

Table 6.1 Proportion of population served by compliant water supplies, by zone size

	Large zone (10 000+ people)	Medium zone (5 001–10 000 people)	Minor zone (501–5 000 people)	Small zone (101–500 people)
Bacteriological achievement	99.1%	92.4%	89.1%	74.5%
Protozoal achievement	88.4%	63.1%	48.2%	25.0%
Chemical achievement	100%	95.1%	92.6%	99.0%
Overall achievement	88.4%	60.2%	46.1%	21.0%

Source: MoH, 2016b.

Compliance with the drinking water standards (and their predecessors) has been gradually increasing over time, reflecting tighter regulation,[51] increased investment from local authorities in water treatment, and some financial support from central government (primarily for small suppliers).

Table 6.2 Proportion of population served by compliant water supplies, 2010–2011 to 2014–2015

	2010–11	2011–12	2012–13	2013–14	2014–15
Bacteriological achievement	97.3%	95.8%	96.7%	97.2%	96.8%
Protozoal achievement	79.1%	79.8%	79.2%	80.8%	80.0%
Chemical achievement	97.1%	95.7%	95.3%	97.4%	98.7%
Overall achievement	78.5%	76.7%	76.9%	79.0%	79.4%

Source: Ministry of Health, 2013, 2014, 2015, 2016.

Note:

2. The decline between 2010–11 and 2011–12 was partly due to the Canterbury earthquakes.

F6.2 The proportion of New Zealanders serviced by safe drinking water is high and has marginally increased over time, reflecting tighter regulation, support from central government and increased investment from local authorities in water treatment. Compliance with drinking water standards is higher in more populous areas.

Quality of fresh water

The quality of fresh water in New Zealand has been the topic of considerable debate. National data shows mixed trends in terms of whether freshwater quality is improving or declining (Table 6.3), and evidence shows considerable damage to water bodies (eg, Verburg et al., 2010).

[51] Since the amendments in 2007, most water suppliers have required local authorities to comply with standards (although deadlines for compliance varied, depending on the type of supplier). Before the 2007 amendments, this compliance was voluntary.

Table 6.3 Trends for water clarity, nutrients and macroinvertebrates at NIWA sites, 1989–2013

Variable	Trend	Sites showing a statistically significant increase (%)	Sites showing a statistically significant decrease (%)	Sites showing an indeterminate trend (%)
Clarity	Improving	64	9	27
Total nitrogen	Deteriorating	60	14	26
Nitrate-nitrogen	No trend	52	27	21
Ammonia-nitrogen	Improving	4	78	18
Total phosphorous	No trend	38	30	32
Dissolved phosphorous	Deteriorating	51	14	35
Macroinvertebrate community index (MCI)	No trend	5	13	83

Source: Ministry for the Environment / Statistics New Zealand, 2015.

Note:

3. Figures may not add to 100% due to rounding. The MCI scores the diversity of taxa observed at a site based on their tolerance to pollution. Taxa are groups of one or more populations of an organism or organisms that taxonomists view as forming a unit. Those taxa which are characteristic of more unpolluted conditions score more highly than those that dominate polluted streams, and generate a higher MCI score.

Freshwater quality is generally lower in waterways that run through urban land, and highest in areas where indigenous land cover is dominant (Table 6.4).

Table 6.4 Median water quality scores by dominant land cover, 2009–2013

	Urban land cover	Pastoral land cover	Indigenous land cover	Exotic land cover
Nitrate-nitrogen (lower is better)	709 mg/m^3	403 mg/m^3	39 mg/m^3	191 mg/m^3
Ammonia-nitrogen (lower is better)	25 mg/m^3	14 mg/m^3	4 mg/m^3	11 mg/m^3
Total phosphorous (lower is better)	47.7 mg/m^3	32.1 mg/m^3	10.0 mg/m3	24.2 mg/m^3
Dissolved phosphorous (lower is better)	18.5 mg/m^3	13.5 mg/m^3	5.5 mg/m^3	19.0 mg/m^3
E.coli (lower is better)	440 E.coli/100 mL	190 E.coli/100 mL	20 E.coli/100 mL	67 E.coli/100 mL
Water clarity (higher is better)	1.5m	1.1m	2.6m	1.7m
MCI (higher is better)	79 (poor)	100 (fair to good)	120 (excellent)	110 (good)

Source: Ministry for the Environment / Statistics New Zealand, 2015.

These differentials reflect the impact on fresh water of:

- fertiliser and effluent run-off or leaching from agriculture;
- industrial discharges;
- run-off from roads and other human-made surfaces in urban areas; and

- discharges from city stormwater or sewage systems.

However, the level, nature and sources of pollutants differ somewhat between regions and waterways. Three examples are noted below.

- An independent scoping study of the Waikato River identified three major pollutants – mercury and arsenic (from nearby geothermal activity), cyanotoxins (from agricultural nutrient run-off) and faecal contaminants (from poorly treated rural water supplies) (National Institute of Water and Atmospheric Research Ltd, 2010).
- Analysis of rivers and streams in the Wellington region pointed to the following as major contributors to poor water quality (Perrie et al., 2012):
  - municipal wastewater discharges;
  - agricultural nutrient run-off;
  - sediment loss from farmland, forestry and urban development;
  - sewer infrastructure leaks;
  - urban stormwater discharges; and
  - stock access to streams
- An Environment Canterbury overview of river water trends in the region highlighted "contamination from metals and hydrocarbons in storm water runoff from roads and roofs", "sediment inputs from construction activities", stream modification (eg piping, culverts) and faecal contamination from "wildfowl, storm water runoff and sewage overflows" as putting pressure on urban streams and rivers (Stevenson, Wiks & Hayward., 2010, pp. 54, 57).

F6.3 Freshwater quality is generally lower in waterways that flow through predominantly urban areas. The sources of pollution in urban waterways typically include sewage leaks and stormwater run-off.

Quality of coastal water

Unlike the NPS on Freshwater Management, the NZCPS does not set quantitative standards for coastal waters which must be given effect to in RMA plans. However, national guidelines measure microbiological water quality in marine environments, which regional councils use. Regional council monitoring reports covering coastal New Zealand cities differ in their assessments of the state of marine water and environments.

- In Auckland in 2015, the Council assessed 72% of beaches as safe to swim at,[52] but assessed only 25% of monitored marine water sites as "excellent" or "good". Major contributors to the poor marine water quality results were suspended sediments from rural land use, agricultural fertiliser and wastewater discharges. Marine water quality parameters (suspended sediment, total oxidised nitrogen and total phosphorous) had changed little over the past 10 years. Concentrations of lead and copper in marine sediments were declining, while zinc concentrations were increasing in some sites (Auckland Council, 2015a).
- In the Wellington region, 64% of beach sites had recreational suitability grades of "good" or "very good" (Greenfield, Ryan & Milne, 2012). Most coastal environments in the region were found to be "generally in good condition", but showing "some 'early warning' signs of stress" from either sedimentation or nutrient enrichment" (Oliver & Milne, 2012, p. ii). Stormwater and sewage leaks or overflows were considered to be "the main source of microbiological contamination at beaches in or

[52] Graded A means "very low risk of becoming sick and it is safe to swim almost all of the time") or B ("low risk of becoming sick and it is safe to swim most of the time" (Auckland Council, 2015, p. 161).

near urban areas" (Greenfield, Ryan & Milne, 2012, p. ii). Between the 2001/02–2005/06 and 2005/06–2009/10 monitoring periods 51% of monitored beaches showed no change in bacteriological water quality, while 33% improved (Greenfield, Ryan & Milne, 2012).

- In the Bay of Plenty, 85.7% of open coastal sites received a "suitability for recreation" grade of "good" or "very good" in 2014/15. Estuaries in the region scored considerably lower, with half graded "fair" and 7.1% graded "poor" (Scholes & McKelvey, 2015).

Indications are that the quality of coastal water has improved over the longer term. The Parliamentary Commissioner for the Environment (PCE, 2012) described the impact of better sewage treatment in Auckland:

> Between 1960 and the 1990s, the population of Auckland doubled and so did its sewage. The city responded by adding secondary and tertiary treatment (bioreactor systems and an ultraviolet light disinfection step) to the Mangere sewage treatment plant. The discharge now contains less nutrients and fewer viruses than before the upgrade. As a result, shellfish in the Manukau estuary are once again edible. (p. 50)

The New Zealand Planning Institute noted that tighter controls of discharges and the resulting better performance of wastewater and stormwater systems "had led to measurable declines in enterrococci and other signs of human sewage in – for example – Waitemata Harbour" (sub.27, p. 11). The OECD (2007) also concluded that the introduction and implementation of coastal management plans had "helped reduce pollutant loading to coastal waters and thus improved coastal bathing water quality" (p. 18). Rosier (2006) argued that the NZCPS had "been effective changing current practice concerning direct discharges of sewage effluent in the coastal marine area" (p. 498).

6.3 Greenhouse gas emissions, and rising sea levels from climate change

Land-use changes and land-based activities, such as more intensive agriculture and road transport, contribute to greenhouse gas emissions. All persons exercising powers under the RMA are required to have "particular regard to…the effects of climate change", and the MfE has described the Act as "the key piece of legislation for adapting to climate change and associated natural hazards" (2014b, p. 2). Many RMA plans include objectives and policies aimed at mitigating climate change, often by discouraging the expansion of cities and car use and promoting more intensive development within established areas.

New Zealand's net greenhouse gas emissions in 2014 were 53.6% higher than those in 1990, but were lower than their peak in 2006. Total greenhouse gas emissions in 2014 were 23.2% higher than in 1990. However, the emissions intensity of the economy (that is, gross emissions of greenhouse gases per unit of Gross Domestic Product (GDP) fell by 34% over the same period (MfE, 2016c).

Agriculture is the largest contributor to New Zealand's greenhouse gas emissions, although almost half the increase in New Zealand's total emissions from 1990 came from the energy sector (Table 6.5). The transport sector represents over 40% of the energy sector's emissions (MoT, 2017). Absorption of carbon dioxide by forests has reduced in recent years, due to increased harvesting of plantation forests (MfE, 2016c).

Table 6.5 New Zealand's emissions by sector in 1990 and 2014

Sector	1990 (kt CO^2 equivalent)	2014 (kt CO^2 equivalent)	Change from 1990 (kt CO^2 equivalent)	Change from 1990 (%)
Agriculture	34 351.1	39 585.3	+5 234.2	+15.2
Energy	23 793.2	32 240.2	+8 447.0	+35.5
Industrial processes and product use	3 578.9	5 193.6	+1 614.7	+45.1
Waste	4 105.2	4 085.4	-19.9	-0.5

Sector	1990 (kt CO^2 equivalent)	2014 (kt CO^2 equivalent)	Change from 1990 (kt CO^2 equivalent)	Change from 1990 (%)
Total (excluding LULUCF)	65 828.4	81 104.4	+15 276.0	+23.2
Land use, land-use change and forestry (LULUCF)	-28 927.7	-24 414.8	+4 512.8	-15.6
Net total (including LULUCF)	36 900.7	56 689.6	+19 788.9	+53.6

Source: MfE, 2016c.

Note: Total emissions' include emissions from the four main sectors (agriculture, energy, industrial processes and product use, and waste). 'Net emissions' are made up of emissions from those four sectors and also include emissions and removals from the LULUCF sector. The abbreviation kt refers to kilotonne.

F6.4 Net and total greenhouse gas emissions increased from 1990 to 2014 by 54% and 23% respectively. Most of the increases were due to road transport activities, agriculture and reduced carbon dioxide absorption from forests.

Council efforts to plan for the effects of climate change – eg, rising sea levels, increasing coastal erosion, more frequent flooding and storm surges – have varied, reflecting the different pressures that communities face. In Dunedin, the City Council is considering options for the low-lying Harbourside and South City suburbs, including measures to either defend them from rising sea levels or retreat (ie move settlements away from affected areas). In some cases, council action has been controversial. Following the release of a report on coastal erosion in 2012, the Kapiti Coast District Council:

- sent letters to 1 800 coastal residents informing them that the Land Information Memorandum (LIM) reports for their properties would now note that they were within 'erosion hazard zones'; and
- notified a new proposed District Plan, placing restrictions on building and subdivision within the 50-year 'erosion hazard zone'.

The District Council subsequently abandoned the inclusion of the erosion zones in its new District Plan, following a critical independent review of the 2012 report. It also decided not to include the coastal erosion zones on LIM reports, after the High Court criticised its behaviour.

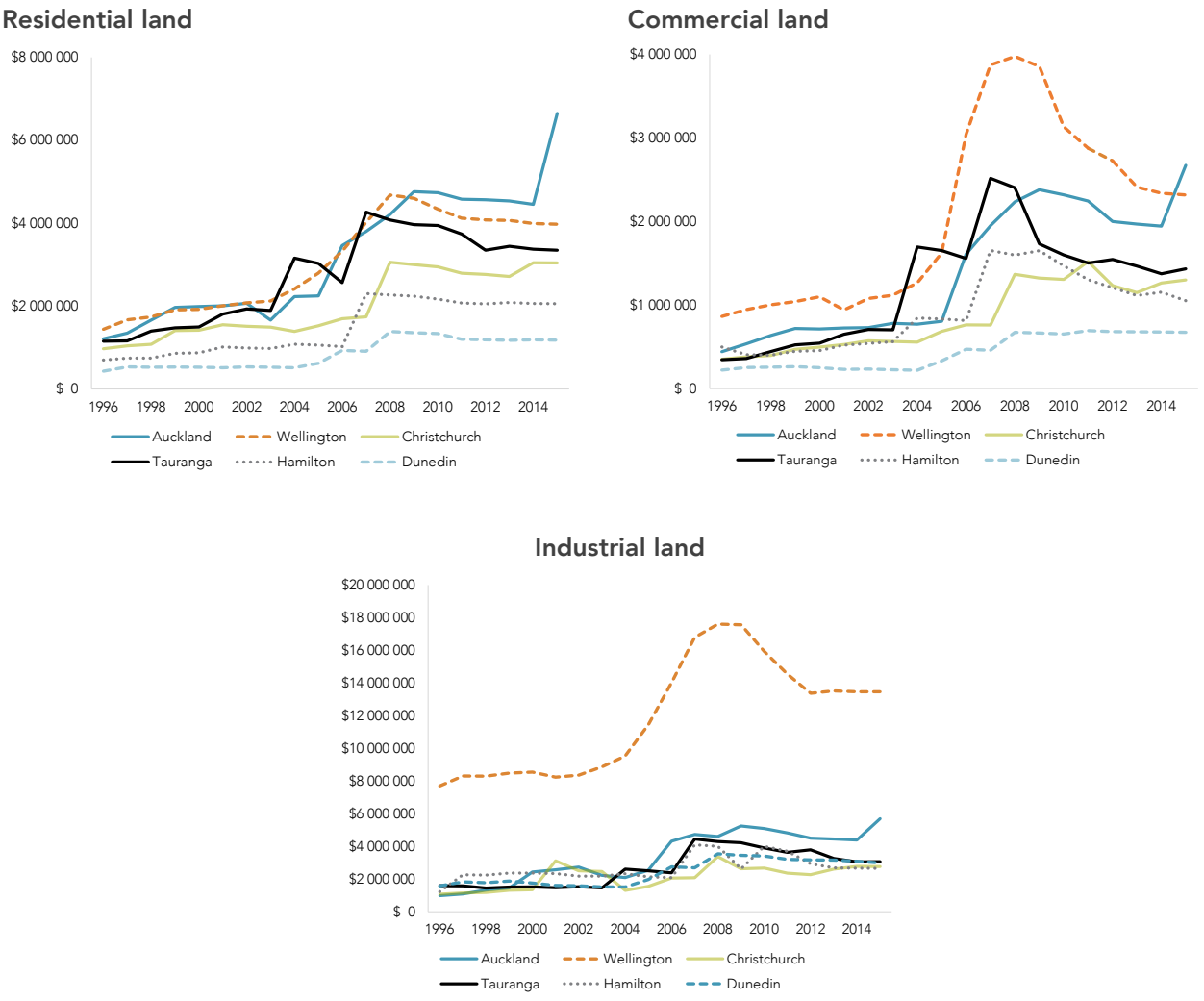
The Parliamentary Commissioner for the Environment has recommended that, in planning for climate change, councils need to "engage with coastal communities in a measured and empathetic way. The focus should be on preparing well rather than rushing" (PCE, 2015, p. 71). The Commissioner also recommended that central government provide better national direction, guidance and support for councils carrying out such planning (PCE, 2015).

6.4 Urban development capacity

Development capacity refers to land that is "shovel ready" for building (ie, appropriately zoned and serviced with infrastructure), and that can be developed to meet a range of market demands. This includes both greenfield land and brownfield land that can be redeveloped for other and more intensive uses (NZPC, 2015a). The term 'development capacity' is not currently defined consistently within New Zealand's planning system.[53]

The best available indicator of the adequacy of supply is the price of urban land. All else being equal, rising prices would indicate a shortfall of development capacity relative to demand. Land price data from major New Zealand cities indicates that development capacity – especially for residential and commercial development – has failed to keep pace with demand (Figure 6.7).

Figure 6.7 Nominal per-hectare land prices in major New Zealand cities by type, 1996–2014



Source: Productivity Commission analysis of Quotable Value data.

[53] However, the Resource Legislation Amendment Bill 2015, which was before Parliament at the time of publication, includes the following definition: "development capacity, in relation to residential and business land, means the capacity of the land for development, taking into account the following factors:

(a) the zoning of the land; and

(b) the provision of adequate infrastructure, existing or likely to exist, to support the development of the land, having regard to—

(i) the relevant proposed and operative policy statements and plans for the region; and

(ii) the relevant proposed and operative plans for the district; and

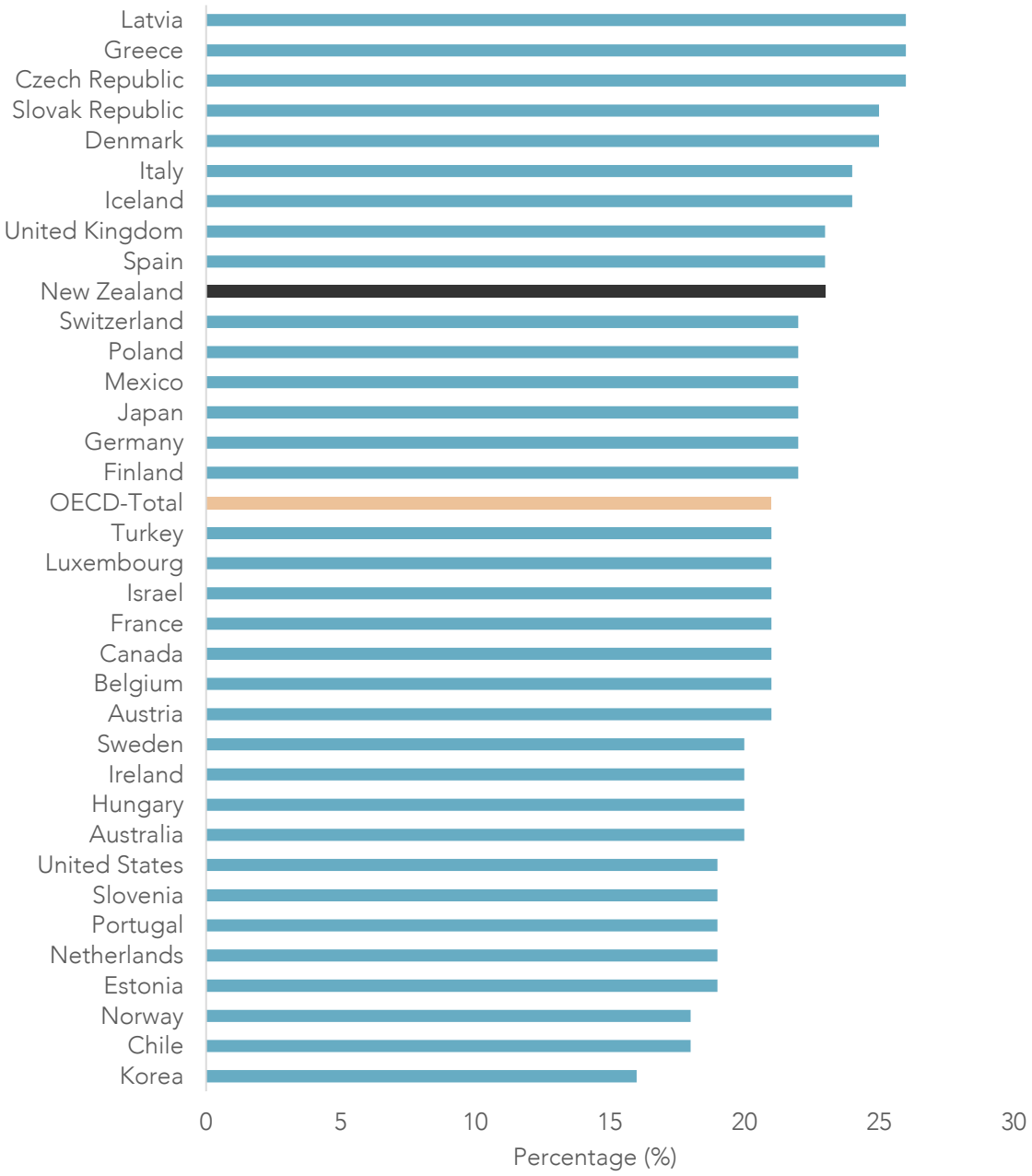
(iii) any relevant management plans and strategies prepared under other Acts; and

(c) the rules and methods in the operative plans that govern the capacity of the land for development; and

(d) other constraints on the development of the land, including natural and physical constraints."

One result of the shortfall of residential development capacity has been rising house prices and declining affordability. One frequently used measure of housing affordability is the proportion of household income devoted to housing costs. By this measure, New Zealand performs poorly compared with other OECD countries (Figure 6.8), and affordability has been deteriorating over time (Figure 6.9).

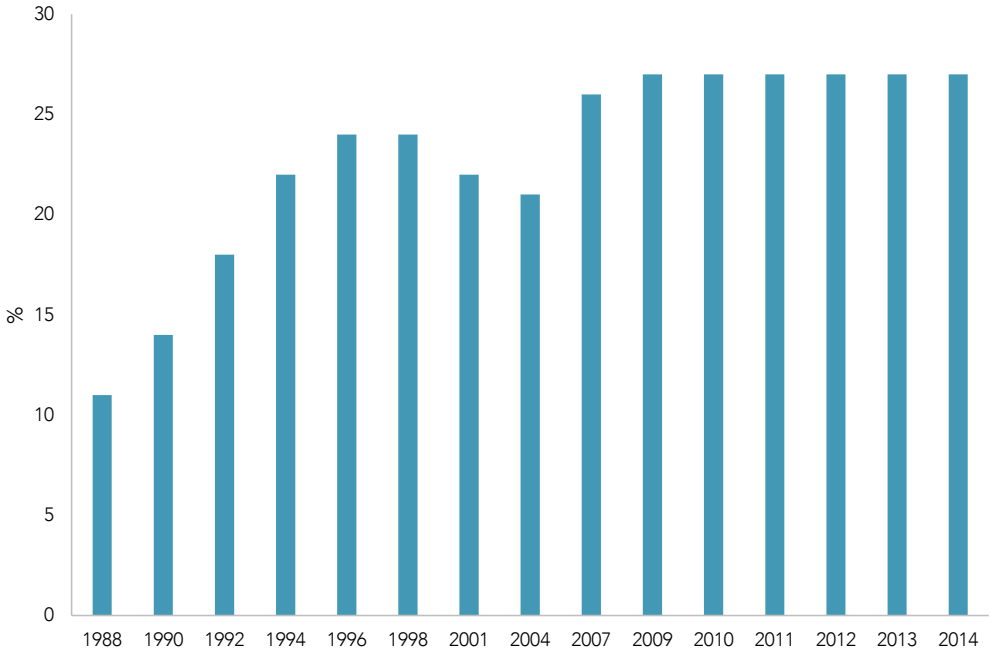
Figure 6.8 Percentage of gross adjusted disposable income spent on housing, by OECD country, 2016



Source: OECD

Note: Results for Iceland, Israel, Luxembourg, and Turkey are estimated values.

Figure 6.9 Share of New Zealand households that spend more than 30% of their disposable income on housing, various years between 1998 and 2014



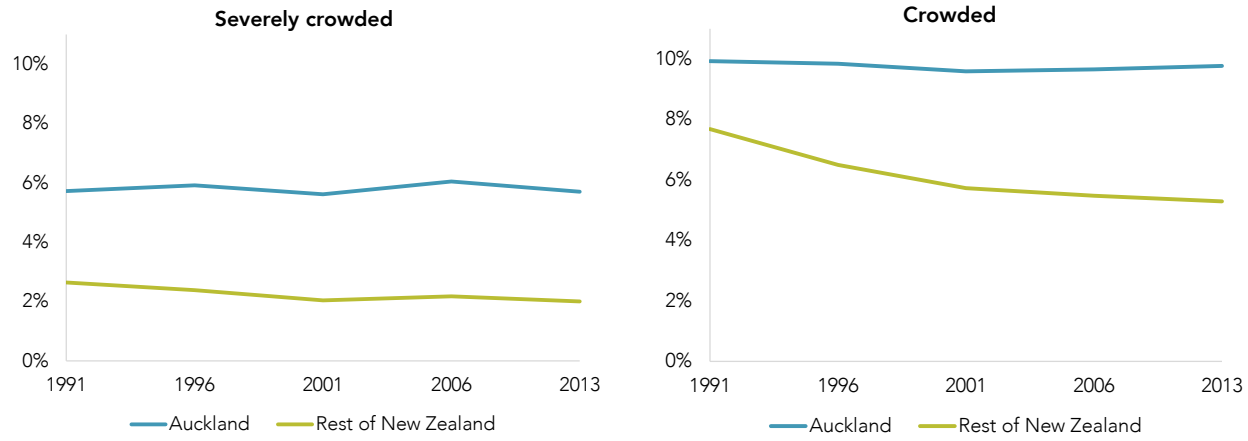
Sources: Statistics New Zealand.

Rising housing prices in New Zealand have had a number of negative social and economic impacts, including:

- stubbornly high crowding rates in Auckland (Figure 6.10);
- infectious diseases associated with crowding;
- upward pressure on central government housing assistance budgets;
- barriers to wealth accumulation;
- risks to macroeconomic stability; and
- constraints on the performance of the labour market and higher productivity (NZPC, 2015a).

Rising housing costs also bear more heavily on people who earn lower incomes. In 2014, 41% of households in the lowest income quintile were paying more than 30% of their disposable income on housing costs, compared with just one-tenth of households in the top income quintile (Statistics New Zealand, 2015c).

Figure 6.10 Share of New Zealand's population living in crowded housing, 1991–2013



Source: Productivity Commission analysis of Statistics New Zealand data.

Note: Crowding is defined using the Canadian National Occupancy Standard (CNOS). CNOS defines a household as crowded if it fails to meet all of the following characteristics: (1) Children aged under 5 may share a bedroom, but children aged 5 to 18 should only share a room if they are of the same sex. (2) Couples and people aged over 18 should each have their own bedroom. (3) No more than 2 people should share a room. "Crowded" means that one extra bedroom is needed to meet the CNO standard. "Severely crowded" means that two or more extra bedrooms are required to meet CNOS.

F6.5 Housing affordability, expressed as the portion of the community paying more than 30% of disposable income on housing, has deteriorated significantly over the past 25 years. People on lower incomes feel the burdens of this deterioration most heavily.

6.5 Congestion and road safety

The speed and safety of people and goods moving around a city matter for economic performance and wellbeing. While road safety has improved over time, congestion appears less improved.

Congestion levels in major cities have been largely stable for about the past 10 years, with some improvements in Auckland compared to 2003 (Figure 6.11 and Figure 6.12). A report prepared for the New Zealand Transport Agency (NZTA) estimated that the yearly costs of congestion in Auckland alone were between $250 million and $1.25 billion, depending on the measure used (Wallis & Lupton, 2013).[54]

[54] The amount of $250 million a year measured the difference between the observed cost of travel and the cost of travel when the network is at capacity. The amount of $1.25 billion a year measured the difference between the observed cost and travel and zero traffic ("free flow"). Both measures include the costs of travel time delay, schedule costs (ie, those who stagger or delay their trip times), crash costs, vehicle operating costs and environmental costs.

Figure 6.11 Morning peak traffic congestion in selected New Zealand cities, 2003–2015

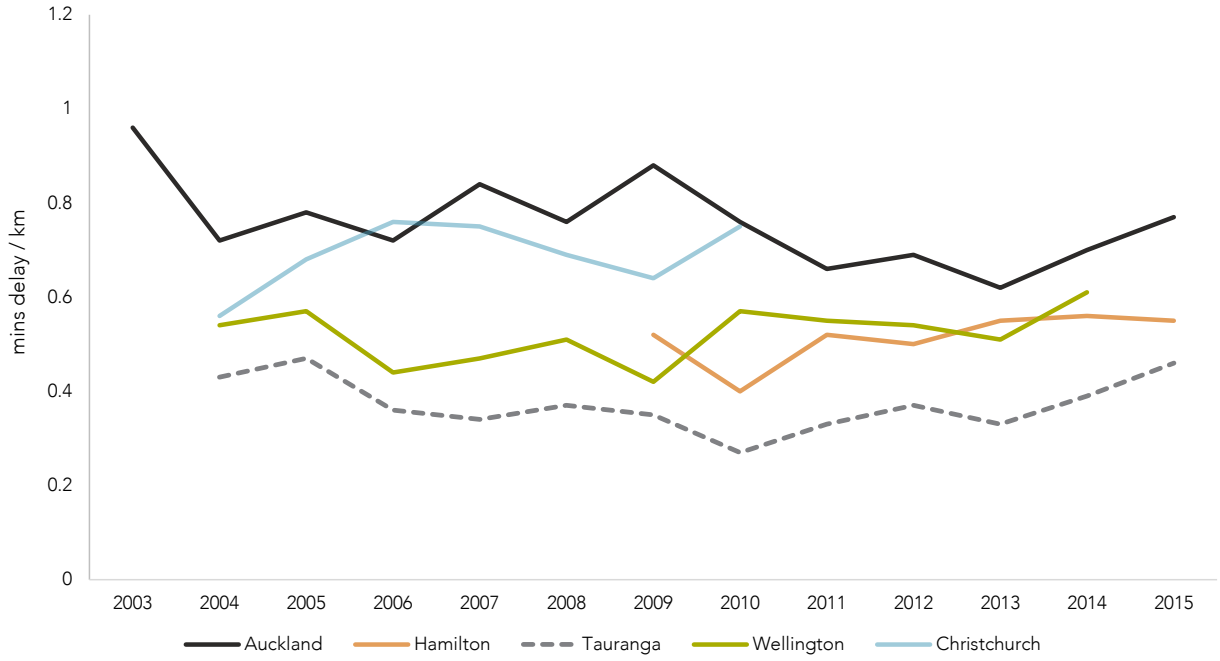
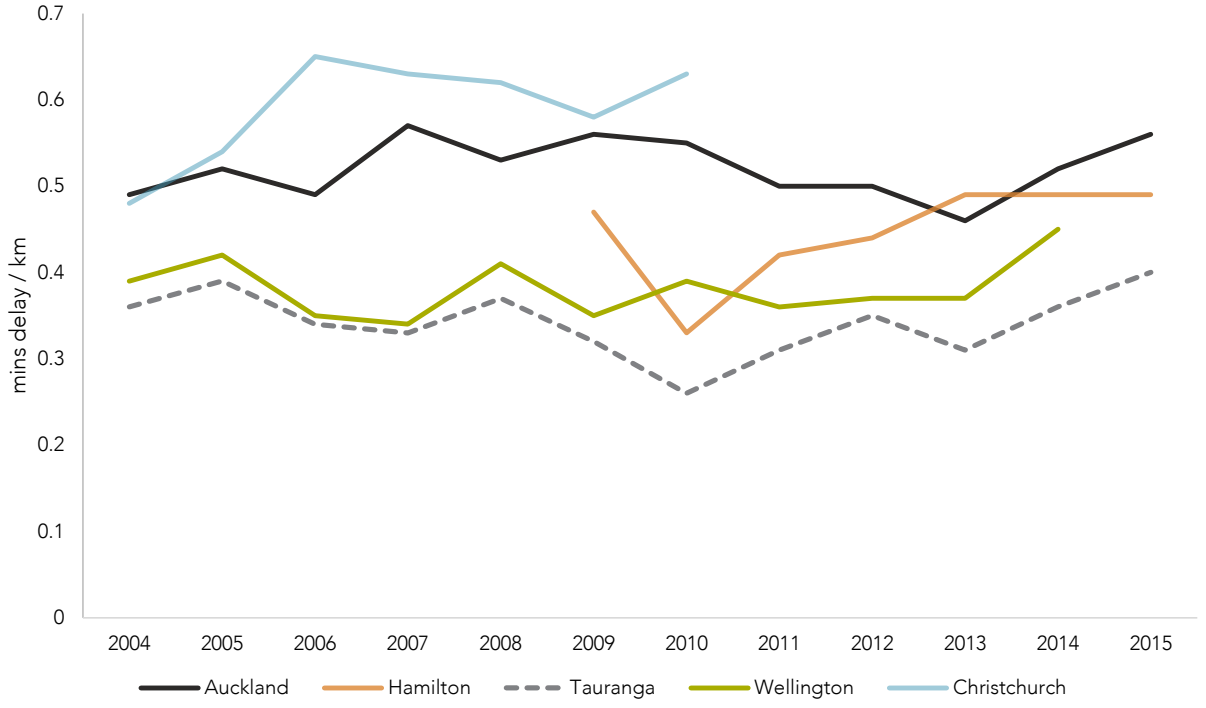


Figure 6.12 All-day traffic congestion in selected New Zealand cities, 2003–2015



Source: Productivity Commission analysis of Ministry of Transport data.

Note: indicators are for March years, and measure minutes delay per kilometre, compared to travel at the speed limit in the surveyed area. 2015 results only available for some cities. No reliable data is available on Christchurch since 2011 due to disruption caused by earthquakes.

The incidences of fatal and injury crashes on New Zealand roads have decreased since the 1970s, on both a per capita and per-vehicle basis (Figure 6.13 and Figure 6.14). Most crashes occur on rural roads, with only 28% of accidents taking place on urban roads.

Figure 6.13 Fatal crashes, on a per-capita and per-vehicle basis, 1950–2014

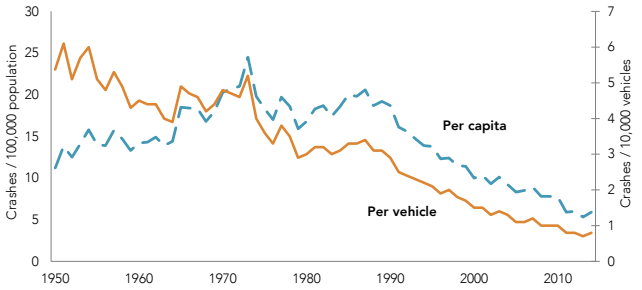
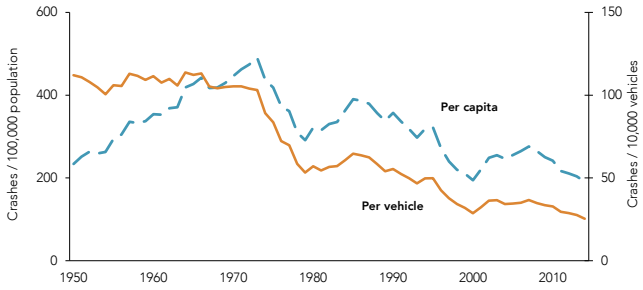


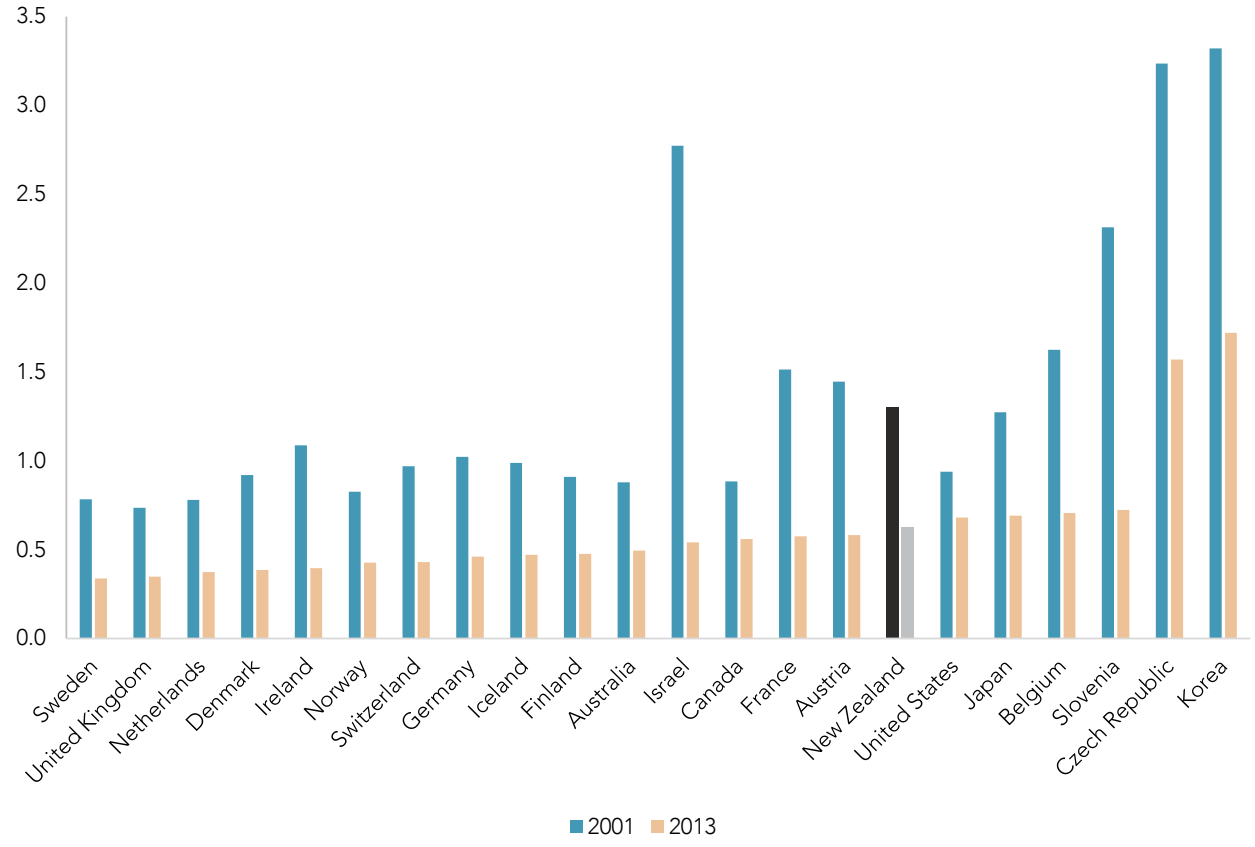
Figure 6.14 Injury crashes, on a per-capita and per-vehicle basis, 1950–2014



Source: Ministry of Transport.

Despite these improvements in accident and fatality rates, New Zealand still has relatively high rates of traffic death by the standards of other developed countries (Figure 6.15).

Figure 6.15 Yearly road deaths per 100 million kilometres travelled, 2001 and 2013



Source: Bureau of Infrastructure Transport and Regional Economics, 2015.

F6.6 Congestion levels in major New Zealand cities have been broadly steady for the past 10 years, and traffic-related accident and fatality rates have been falling since the 1970s. Despite recent improvements, New Zealand still has relatively high rates of traffic deaths by the standards of other developed countries.

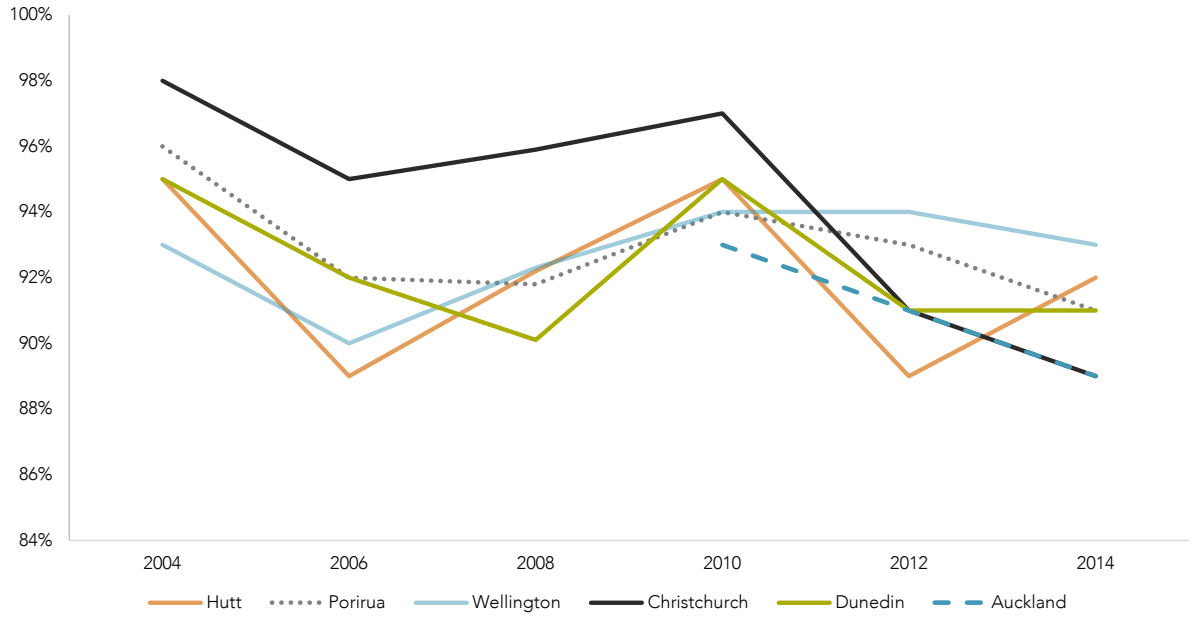
6.6 Core infrastructure and services

In their 2015–16 annual reports, local authorities will report against non-financial performance indicators covering the delivery of specified core services.[55] In the absence of this information, the Commission has gathered available data to assess the state of urban infrastructure and services and, where possible, trends in their performance.

Access to green space

Urban New Zealanders have good access to green space. Witten et al. (2008) estimated that residents in three out of four New Zealand neighbourhoods can travel by car to a local, regional or national park in less than two and a half minutes, and to a beach in just over half an hour. The Quality of Life surveys of residents in six major New Zealand cities similarly report high levels of access to green space (Figure 6.16).

Figure 6.16 Proportion of residents reporting they have "easy" or "very easy" access to green spaces



Source: Quality of Life Project, 2005, 2007, 2009, 2011, 2013, 2014.

Note: Data for Auckland before 2010 was collected at the level of the legacy councils. Other cities were involved in the Quality of Life surveys, but have dropped out over time. Most of those other cities also reported high levels of access to green space.

F6.7 Urban New Zealanders currently have good access to green space.

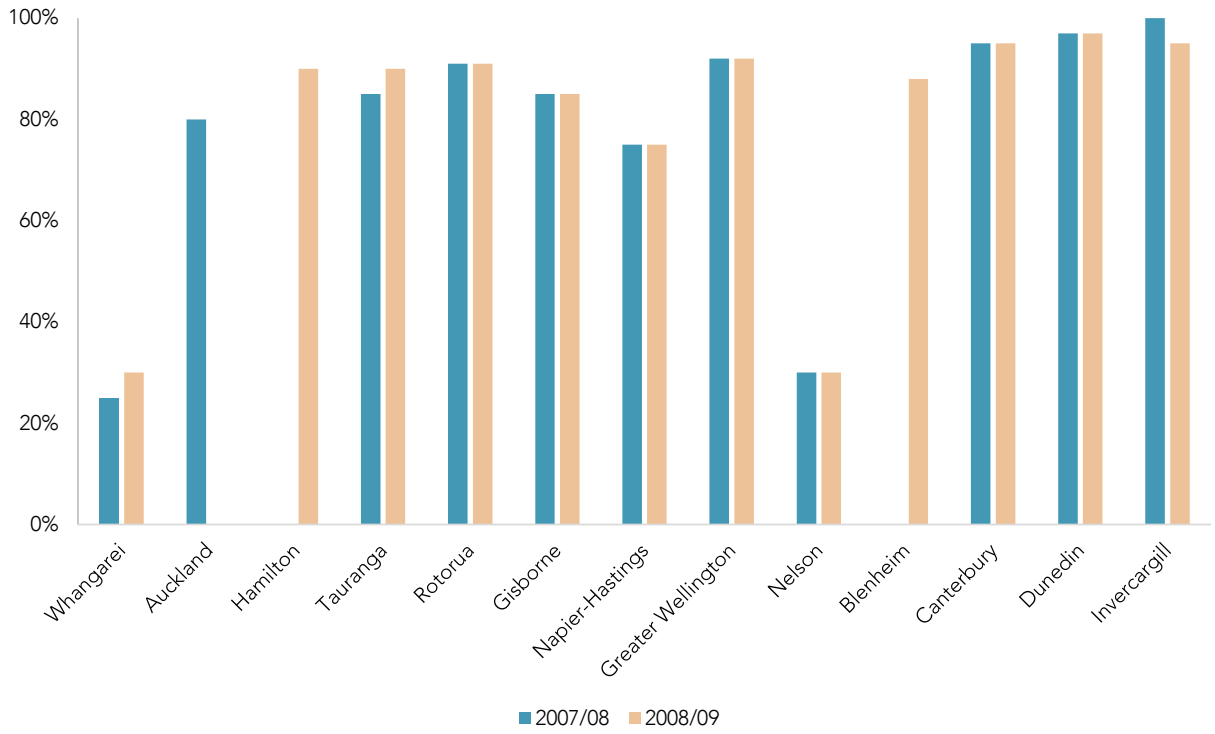
Using public transport to ease road congestion

Most urban local authorities provide or subsidise public transport services and infrastructure, to ease road congestion (ie, encouraging people to move out of private vehicles onto buses and trains) and to improve access to jobs and services by people who do not own cars (GWRC, 2015; Auckland Transport, 2015).

Consistent data about access to, and the performance of, public transport is limited. Surveys conducted for the NZTA and its predecessor agencies suggest reasonable access to bus stops in most New Zealand cities (Figure 6.17), although this says little about the reach or adequacy of the public transport networks.

[55] The specified core services are water supply, sewerage and the treatment and disposal of sewage, stormwater drainage, flood protection and control works, and the provision of roads and footpaths.

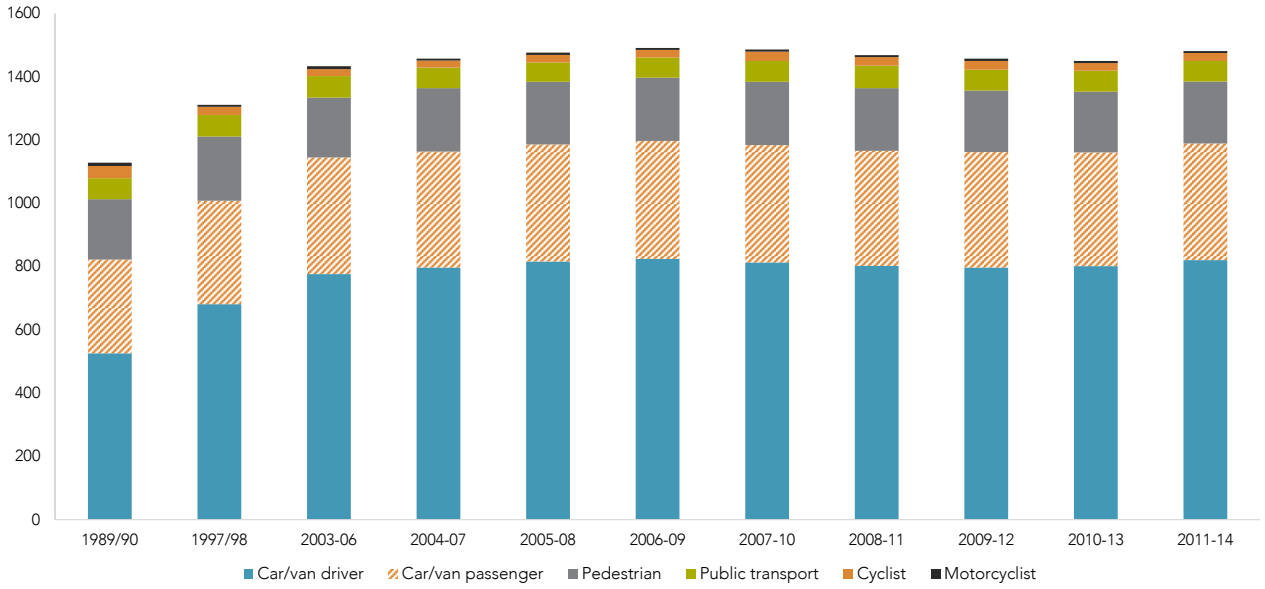
Figure 6.17 Proportion of population living within 500m of a bus stop, 2007/08 and 2008/9



Source: Productivity Commission analysis of MoT data.

At a national level, public transport makes up a relatively small proportion of travel by any measure (duration, distance, trip leg) and its share has not significantly increased since the early 1990s (Figure 6.18). Data from the Household Travel Survey suggests that the total volume of trip legs taken on public transport by people aged 5 and over has hovered around 160 million since the early 2000s (Figure 6.19).

Figure 6.18 Million hours spent travelling each year, by mode, for various years since 1989



Source: Productivity Commission analysis of MoT data.

Figure 6.19 Million public transport trip legs each year by people over 5, various years since 1989

Source: Productivity Commission analysis of MoT data.

Few current international comparisons of public transport use include many New Zealand cities. The most comprehensive analysis is by Bachels, Newman & Kenworthy. (1999), which looked at transport, land use and economic indicators across selected New Zealand, Australian, United States, Canadian, European and Asian cities. They found that New Zealand had the lowest average public transport kilometres travelled per person, the lowest number of public transport trips per person, and the lowest share of overall trips by public transport. These results were attributed, in part, to low levels of urban density and very high provision of carparks in New Zealand cities. A later Auckland Regional Transport Authority study (2005) comparing public transport use in selected Australian, Canadian, New Zealand and US cities found that Auckland and Christchurch had the lowest rates of all, and a 2014 Ministry of Transport-commissioned study concluded that Auckland had a low use of public transport compared with major Australian cities (Sydney, Melbourne, Brisbane and Perth) (Richard Paling Consulting, 2014).

F6.8 New Zealand has low levels of public transport use by developed world standards, and rates of public transport use have been broadly stable since the early 2000s.

The adequacy of public transport networks has implications for the ability of people to access the labour market. Leung and Adli's (2016) comparison of job accessibility in Auckland, Brisbane, Perth and Sydney suggests that public transport in Auckland compared poorly with the Australian cities:

> In absolute terms, this means only 100 000 Aucklanders are living within a 45-minute public transport commute of 100 000 or more jobs compared to about 300 000 people in Perth or over a million people in Sydney. (p. 4)

Leung and Aldi also found that "Auckland's road infrastructure generates a lower quantity of job accessibility compared to Perth, Brisbane and Sydney" (p. 4). The Auckland Transport Alignment Project compared Auckland with Vancouver and five major Australian cities and noted that

> access to employment in Auckland varies significantly by location and declines comparatively rapidly beyond the central area. For example, the proportion of Aucklanders who can access more than 20% of the city's jobs within a 45-minute public transport commute is lower than any of the other cities analysed. (2016, p. 22)

Length and quality of the national road network

Roads allow people and goods to move to, and within, cities, and support the operation of labour and product markets. By length, most roads in New Zealand are rural (76,037 km in 2015, compared to 18,785 km

of urban roads). However, the expansion of the road network over the past decade or so has been concentrated in urban areas. Between 2006 and 2015 the length of urban roads increased by 9%, while the length of the rural road network fell by 0.4%.

The quality of urban roads is generally slightly lower than rural roads (see Box 6.1 for the road quality measures used in New Zealand), although the rural–urban gap has reduced for some measures (Figure 6.20 to Figure 6.22).

Box 6.1 **Road quality measures in New Zealand**

Condition Index (CI) is a combined index, a "weighted sum", of the surface faults in sealed road surfaces. CI combines alligator cracking, scabbing, potholes, pothole patches and flushing. The higher the CI number, the better the condition.

Pavement Integrity Index (PII) is a combined index of the pavement faults in sealed road surfaces. It is a "weighted sum" of the pavement defects divided by total lane length. PII combines surface faults (CI) with rutting and shoving.[56] The higher the PII number, the greater the pavement integrity.

Smooth Travel Exposure (STE) measures the proportion (percentage) of vehicle kilometres travelled in a year that occurs on "smooth" sealed roads and indicates the ride quality that motorists experience. A "smooth" road is a smoother road than a predetermined threshold set down by National Association of Australian State Road Authorities. The thresholds used vary with traffic density and road location. Heavily trafficked roads have a lower (smoother) threshold. High-volume urban roads have lower roughness thresholds than low-volume rural roads.

Source: Land Transport New Zealand, 2007.

Figure 6.20 Condition Index performance, by type of road, 2006–2015

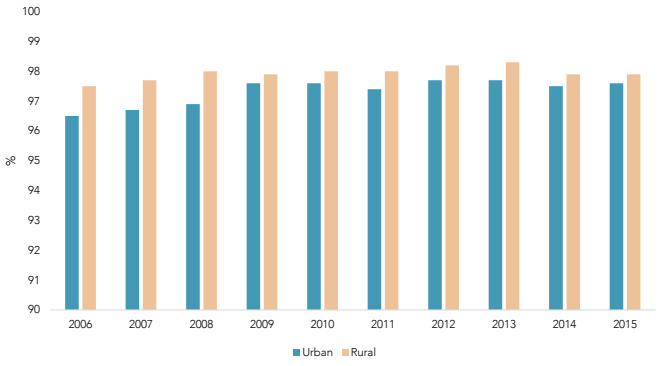
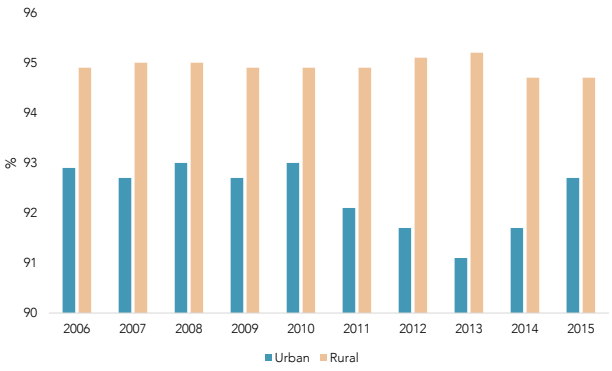
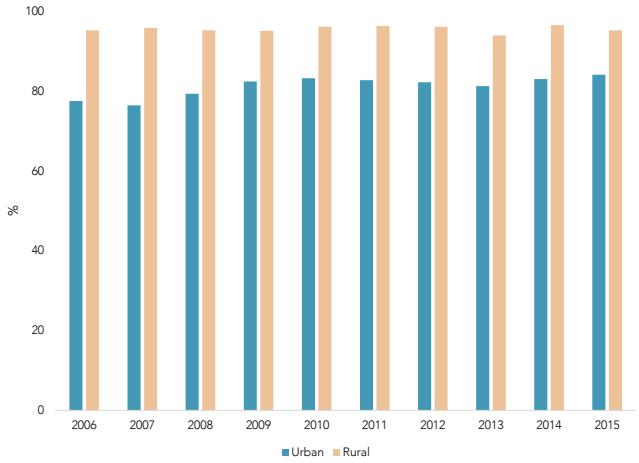


Figure 6.21 Pavement Integrity Index performance, by type of road, 2006–2015



[56] "Shoving occurs when material is displaced to form a bulge or heave alongside a depressed area" (Transfund New Zealand, 1997, p. 41).

Figure 6.22 Smooth Travel Exposure performance, by type of road, 2006–2016



Source: New Zealand Transport Agency.

Managing wastewater and stormwater

A slightly higher proportion of New Zealanders are connected to a sewage treatment plant than the OECD average, although the growth in connections since 1990 has been much slower in New Zealand compared with other developed countries (Figure 6.23).

Figure 6.23 Percentage of population connected to wastewater treatment plants, early 1990s to 2013

Source: OECD, 2015c.

Connection levels are higher in cities than in provincial or rural areas. According to Water New Zealand's 2013–14 National Performance Review (NPR) survey of local authorities,

> [a]verage water services coverage was 56% for rural sector participants and 96% for metropolitan. Average service coverage for wastewater was 45% across rural sector participants and 96% for metropolitan. (Water New Zealand, 2015, p. 21)

The absence of long-term comparable data makes it difficult to judge trends in the quality and performance of waste and stormwater systems in New Zealand. The 2013–14 NPR findings suggest that New Zealand systems currently compare unfavourably against international benchmarks for customer complaints, unplanned interruptions and daily residential water consumption (Water New Zealand, 2015). The 2014–15 NPR report notes issues with the treatment and discharge of wastewater:

> Resource consents for effluent discharge have expired for 26 of the 190 wastewater plans covered by the review…Additionally, of the 18% of treated wastewater that is discharged into freshwater bodies, nearly 10% received only primary treatment. (Water New Zealand, 2016, p. 4)

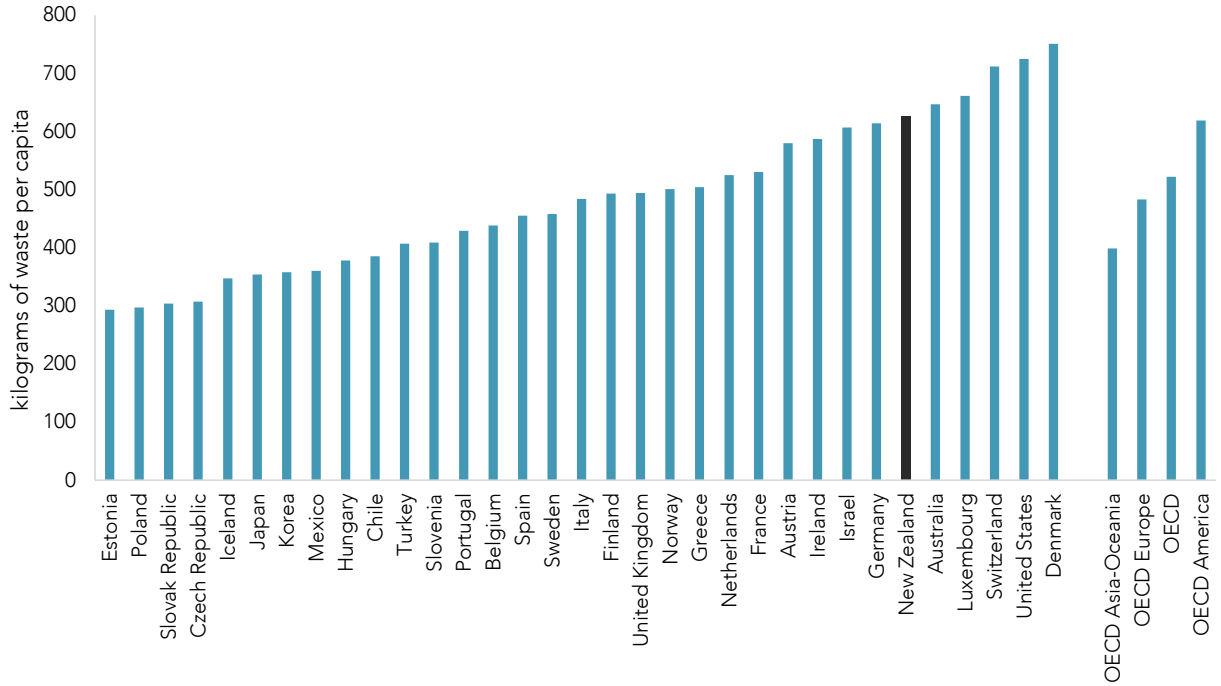
Repeated references in regional council monitoring reports to stormwater and wastewater outflows and leaks contributing to poor river and coastal water quality further indicate room for improvement.

F6.9 A slightly higher proportion of New Zealanders live in dwellings connected to sewage treatment systems than OECD averages. Available comparative information suggests that New Zealand sewerage systems compare unfavourably against a number of international performance benchmarks.

Managing waste

On a per capita basis, New Zealanders produce large amounts of municipal waste (Figure 6.24). New Zealand seems to have no reliable long-term data on its per-capita waste generation. Approximately 43% of municipal waste in New Zealand is recycled (which is higher than OECD averages), with the rest going to landfill (Frykberg, 2015).

Figure 6.24 Municipal waste generated per capita, 2013



Source: OECD, 2015c.

An MfE analysis (2014c) of territorial authority waste infrastructure and services found that two-thirds of surveyed councils in 2013 offered both refuse and recycling collection, while 8% provided no services.

The same survey found an increase in the proportion of councils offering both refuse and recycling collection between 2011 and 2013.[57]

More stringent regulation and enforcement has seen a reduction in the number of landfills in New Zealand, and more prevalent use of measures to prevent water and soil pollution from waste management facilities. As MfE (2009d) note,

> [t]he proportion of landfills with liners designed to prevent groundwater contamination rose from 4 per cent in 1998, to 52 per cent in 2006, and the proportion of landfills with leachate collection systems rose from 35 per cent in 1998 to 77 per cent in 2006. (p. 6)

A recent MfE report attributed a 0.5% reduction (from 1990 levels) in greenhouse gas emissions from the waste sector to "improved landfill management practices, particularly methane recovery. These improvements offset an increase in the amount of solid waste disposed on land and increases in emissions from industrial and domestic wastewater handling" (2016c, p. 3).

6.7 Affordability of infrastructure and services over time

To support access, wellbeing and productivity on an ongoing basis, cities need to be able to maintain their infrastructure and services and replace assets at the end of their lives. Doubts exist about whether some urban infrastructure and services are being maintained to the desired levels, and about the ability of councils to maintain some service or asset levels over the longer-term.

One key area where questions have been asked about affordability is three waters (drinking, wastewater and stormwater) infrastructure. In a 2014 report, the Office of the Auditor-General (OAG) raised concerns about planned council capital expenditure:

> During the period we reviewed (2007 to 2013), local authorities consistently spent less than they intended on capital works, including on asset renewals. There are often explanations and good reasons for under-spending, such as project delays.
>
> However, the ratio of forecast renewals expenditure to depreciation in local authorities' 2012-22 long-term plans also shows a downward trend in asset reinvestment. If actual spending trends continue to match those forecast, we estimate that, by 2022, the gap between asset renewals expenditure and depreciation for the local government sector could be between $6 billion and $7 billion. (p. 4)

These concerns are not universally shared. For example, the Institution of Professional Engineers New Zealand (IPENZ) and Local Government New Zealand (LGNZ) have argued that judgements about depreciation/renewals gaps should be treated with care, given the difficulties predicting the useful lives of long-lived assets and the lumpy nature of infrastructure expenditure (NZPC, 2015a, pp. 180–181).

The OAG also highlighted variable asset management systems and practices among councils. Councils had better and more reliable information about assets located above ground (especially roads) than those below ground, were more likely to know more about newer assets than older ones, and were more likely to renew their roading assets than three waters infrastructure (Table 6.6). The OAG (2014) attributed the better performance around roading infrastructure to the requirements attached to NZTA funding, and the fact that expenditure on roads was less reliant on rates revenue. The Commission made similar findings in its *Using Land for Housing* report (NZPC, 2015a).

[57] As only 53 of the 67 (79%) territorial authorities responded to the survey, its results must be treated with some caution.

Table 6.6 Average renewals expenditure to depreciation, by asset class: 2012–2022

Asset class	Average renewals expenditure to depreciation
Roading	91%
Water supply	72%
Wastewater	58%
Stormwater	32%

Source: OAG, 2014.

The OAG's most recent summary of matters arising from Long-Term Plans (LTPs) was somewhat more positive in its assessment of council spending plans, but continued to sound a note of caution:

> When we compare the spending on capital as forecast in the previous LTPs with that forecast in the latest LTPs, it is clear that an increasing proportion of total spending is being directed towards renewal of infrastructure assets. However…although there is an increase in the level of renewal and replacement spending compared to depreciation in 2015, from 2019 onwards the level returns to almost mirror the level forecast in the previous LTPs. We note that a large amount of the increase relates to Christchurch City Council rebuild work…Individual local authorities need to consider whether the renewal and replacement spending they have forecast for 2019 onwards is adequate or will need to be increased when the next LTPs are produced in 2018. (2015, pp. 10–11)

A report prepared for LGNZ on the state of council three waters assets pointed to inadequate depreciation allowances and planning:

> [D]epreciation allowances appear to be lower than the level needed to replace existing assets at the same cost. This is particularly evident for wastewater and stormwater assets in metro councils, although the reason for this difference is unclear…. some councils appear to have a high proportion of either their water or wastewater assets depreciated, but do not have a fully funded renewals profile to deliver the investment programme. The fact that not all councils have renewals profiles in place is concerning. (Castalia Strategic Advisors, 2014, p. 14)

Water New Zealand's National Performance Reviews of local authority water services has raised similar issues about the quality of asset information and the adequacy of expenditure. The 2013–14 survey found that confidence in asset condition grading data – which "provides an indication of pipes' overall condition and underpins decisions on pipe renewals and expenditure" – was low (2015, p. 22). Over half of the data "was categorised between 'less reliable' and 'no data confidence'" (2015, p. 21). The survey also found that capital expenditure was lagging budget expectations, and that revenue was "not covering cost for most participants" (2015, p. 32).

Questions have also been raised about the ability to sustain current central government expenditure levels on land transport services and infrastructure. In its Briefing to the Incoming Minister, the Ministry of Transport (MoT, 2014) notes that

> New Zealand's current level of investment in roading is the highest it has been since the 1960s. New Zealand is now spending a higher percentage (1.3 percent) of its GDP on roading compared to other developed countries. Over the next 10 years, expenditure on transport is expected to increase at 3.3 percent per year, well above the forecasted 2 percent annual increase in inflation for the economy as a whole over the same period. (p. 19)

The Ministry goes on to identify a number of pressures on the current funding model, including

- the rising cost of finding solutions to urban congestion;
- smaller regional centres facing growing difficulties maintaining their existing services and infrastructure, with growing costs and fewer ratepayers; and
- more fuel-efficient vehicles, which will "will slowly erode the effectiveness and fairness of FED [Fuel Excise Duty] as a means of collecting revenue from transport users" (p. 18).

6.8 To what extent has the planning system contributed to these outcomes?

The planning system has had some impacts, both positive and negative…

The inherent dynamism of cities means that it is impossible to definitively attribute urban and environmental outcomes to the planning system. A range of other contributing and confounding factors have, or may have, led to the outcomes described above. However, the planning system has likely played a role in affecting these results, particularly air quality, the supply of development capacity, and housing affordability.

The introduction of tougher national standards through the planning system has been cited as contributing to improvements in air quality. Heitzmann (2007) notes that, by "barring local authorities from authorising new polluting activities without pollution offsets", the National Environmental Standards for Air Quality introduced "an implicit cap on cumulative emission in areas in non-compliance" (p. 167). The introduction of the NES also led a number of regional and district councils to set local emissions standards and rules that were more stringent than the national standards, to enable compliance with the NES. In some cases, local authorities used Local Government Act powers to tackle air quality problems. For example, Rotorua District Council introduced a bylaw in 2010:

- requiring that only approved woodburners and pelletburners could be installed in homes within the Rotorua airshed;
- prohibiting from 1 May 2012 the sale of houses with a working open fire or non-compliant burner; and
- prohibiting from 1 May 2015 the use of indoor open fires.

Several councils also brought in non-regulatory programmes to promote compliance with the new rules and standards. For example, Environment Canterbury and Nelson City Council provided financial assistance to help homeowners upgrade their heating systems to lower-emitting or non-polluting appliances. In the case of Christchurch, regional council interventions appear to have helped to reduce emissions. A section 32 report prepared for the proposed Canterbury Air Regional Plan noted:

> Christchurch has seen the most significant effort (including the investment of $42 million, over 10 years, in a clean heat scheme that reduced the number of solid fuel burning devices in use in the City by approximately half. Improvement over that time was achieved but multiple exceedances of the standard still occur each year. Timaru has had very little regulatory intervention and has seen no significant improvement over the past decade. (Environment Canterbury, 2015, p. 3-1)

Local government is the dominant actor for the supply of development capacity. With a few exceptions, new development capacity cannot be brought on stream without the express permission of councils.[58] Similarly, most local roading and water infrastructure is either laid by the council or council-controlled organisations, or with the agreement of councils, to their standards (eg, through development agreements). The planning system is therefore highly likely to have contributed to a shortfall in, and the rising cost of, development capacity and housing over the past 20 years. Infrastructure-serviced land is a key input to new housing. Land prices now account for 40% to 60% of the total cost of dwellings in New Zealand. As a result, the Commission found in its *Housing affordability* inquiry that "appreciating land prices have been a key driver of house price inflation in New Zealand over recent years" (2012, p. 35).

Key factors that have led to the shortfall in development capacity are the political economy of planning, and inadequate governance of infrastructure providers:

- Growth in cities imposes additional costs on councils and existing ratepayers who consequently resist it. As discussed by the Commission in its *Using land for housing* report (2015), the shortfalls in development capacity reflect a "democratic deficit", by which incumbent homeowners and ratepayers use the

[58] Examples of exceptions include where the Environment Court overturns a council decision not to rezone land, or where central government uses extraordinary powers to require the release of land. One example of use of extraordinary powers is where the Minister for Canterbury Earthquake Recovery used powers (under the CER Act) to make changes to the Canterbury Regional Policy Statement obliging territorial authorities to ensure that sufficient land will be available to meet the region's residential and commercial needs to 2041.

planning system to contain the growth in local rate and debt levels, at the expense of new or aspiring households and firms.

- The statutory and legal frameworks for water supply, wastewater and stormwater in New Zealand are unclear, leaving the provision and pricing of water services susceptible to political interference. In Auckland, fees to connect to the council's water network provider only recover two-thirds of growth and do not reflect the true costs of supply, which vary by location. This inhibits the efficient and responsive provision of water infrastructure to support urban growth, and contributes to problems funding the maintenance of existing networks. (NZPC, 2015a)

…and the planning system has failed to deliver some desired goals

Increasing evidence and concern about the poor state of freshwater bodies in New Zealand has raised questions about the performance of the RMA in protecting this natural resource. Many agree that point-source water pollution has been better controlled as a result of the RMA. Even so, many believe that the planning system has struggled to manage pollution from diffuse sources and deal with cumulative effects (EDS, 2016; OECD, 2007; Heitzmann, 2007; Peart, 2007). Indeed, some argue that the failure to manage diffuse-source and cumulative pollution has negated the benefits of better managing point-source water pollution (Brown et al., 2015). The New Zealand Planning Institute notes urban streams as an example of how poor management of cumulative effects has led to environmental deterioration:

> This is particularly evident in recent Auckland urban development on what was previously rural land, where relatively pristine streams have been silted up to the point they don't support natural ecosystems, due to clay and runoff accumulation from a sequence of permitted subdivision site works enabling development. (sub. 27, p. 11)

The failure to achieve better water quality through the planning system has been linked to the lack (until recently) of national standards, and local or political resistance to tighter environmental regulation. For instance, in its report evaluating environmental outcomes of the RMA, EDS (2016) noted that

> [t]he case study of point source pollution management compared with diffuse pollution demonstrates many of the key themes found in analysis of RMA outcomes.... Weak national direction, poor agency performance, the influence of political pressure towards enabling development with weak regard environmental bottomlines and an absence of flexible tools that could smoot the way for better outcomes have all forced water quality decline (p. 32)

Without the pressure from national policies or standards, councils face few incentives to establish hard environmental standards or limits. This is particularly where their imposition would create costs or losses for residents and ratepayers. In 2010, the Land and Water Forum (LAWF) reported that only four regional councils had

> a complete set of operative or proposed water quality limits for surface and groundwater, allocation regimes for surface and groundwater, and flow regimes for surface water across their regions, and there is debate about whether these limits are appropriate or effective. (2010, p. 12)

And, as the LAWF commented, without limits

> it is hard to manage diffuse discharges – nutrients, microbes, sediment and other contaminants that wash into water from the land – and impossible to deal with the cumulative effects on water bodies of water takes on the one hand and diffuse and direct discharges to water on the other. (2010, p. viii)

Local or political resistance has manifested itself in an unwillingness to impose tighter controls on land-use activities (EDS, 2016). Less stringent controls have contributed to water pollution, a reliance on arguably less effective non-regulatory approaches, and patchy monitoring and enforcement. Some councils have been reluctant to impose more stringent controls because of concerns about their impact on the economic wellbeing of constituents. A 2006 report on freshwater management practices commented:

> While in theory the RMA and Freshwater Plans can provide for the management of both freshwater resources and nutrients loads, Councils are concerned that this unprecedented pressure for growth is placing unsustainable demands on natural resources in some localities. They are also concerned that there is a looming conflict between economic growth and development of the farming sector and the

> state of freshwater resources….If Councils seek to apply greater controls on landuse activities, economic growth may be severely constrained. (Hill Young Cooper, p. 14)

The influence of agricultural interests may have limited the range and stringency of tools that councils applied in managing pollution. Memon (2000) noted that, while run-off from fertiliser applications and animal effluent could be controlled through greater use of resource-consent conditions and further regulation of farm activities,

> this level of regulation does not, however, appear politically acceptable at present to the farming industry. Regional councils are therefore being forced to rely on advocacy and education to improve land-use practices as a means to manage non-point sources of pollution in anticipation of more stringent regulatory approaches. (p. 241)

McNeill's (2008) analysis of the role of regional councils found that some councils (especially those in rural and provincial areas) were "not representative of the regions' populations, with many councils consisting predominantly of farmers":

> Some 51 (38%) of the 134 regional councillors excluding the unitary authorities, in 2007 are farmers. This is nearly double the 20% of all local government elected members….Agricultural and fisheries workers made up only 7.9% of the national workforce (2001 census) by comparison. As a consequence farmers make up at least half the total number of elected representatives on five of the twelve regional councils. (p. 143)

McNeill posited that this overrepresentation by farmers "may serve to explain the slow response by councils to dairying impacts" (p. 250).

The decentralised nature of monitoring and enforcement under the RMA potentially limits its effectiveness. The OECD observed in 2007 that the devolved structure "engenders a risk of development interests overriding environmental considerations, particularly where responsibility for the issuance of resource consents and the inspection and enforcement of compliance lies with a single authority" (p. 126). Frieder (1997), Memon (2000) and Day et al. (2003) have argued that the ability of councils to effectively monitor environmental trends has been limited by their dependence on local rates and charges and the reluctance of residents, especially farming and business groups, to bear these costs. However, political factors have also constrained the robustness of monitoring and compliance efforts. Brown et al. (2015) argue that "agency capture and the political power of private landowners" has led to low levels of monitoring and compliance with environmental plan rules or resource consent conditions.

In some cases, compliance and enforcement activities have been subject to inappropriate interference or oversight by elected representatives. In their 2011 review of how four regional councils managed fresh water, the OAG expressed concern that

> councillors in all the regional councils we audited had some involvement either in deciding whether the council should prosecute or investigating cases after the decision to prosecute had been made. (2011a, p. 60)

F6.10 The absence of national standards in combination with local and political resistance has limited the planning system's ability to manage pollution of fresh water or cumulative pollution.

Poor environmental outcomes, including the declining quality of water bodies, particularly affect Māori communities due to their unique kaitiaki relationship with the natural environment (Chapter 7 & Chapter 9). Ngā Aho & Papa Pounamu said that

> These findings reinforce our concerns that the current planning system is not fully delivering the outcomes that Māori communities expect and aspire to (for example, water quality standards that sustain mahinga kai). We believe that the Commission's findings substantiate support for greater involvement from central government in any new planning system through developing and implementing national policy statements and environmental standards under Part 5 of the RMA (p. 39).

Ngā Aho & Papa Pounamu went on to recommend:

> A future planning system should improve requirements to measure and monitor environmental outcomes against a framework which includes indicators based in mātauranga Māori (p. 39).

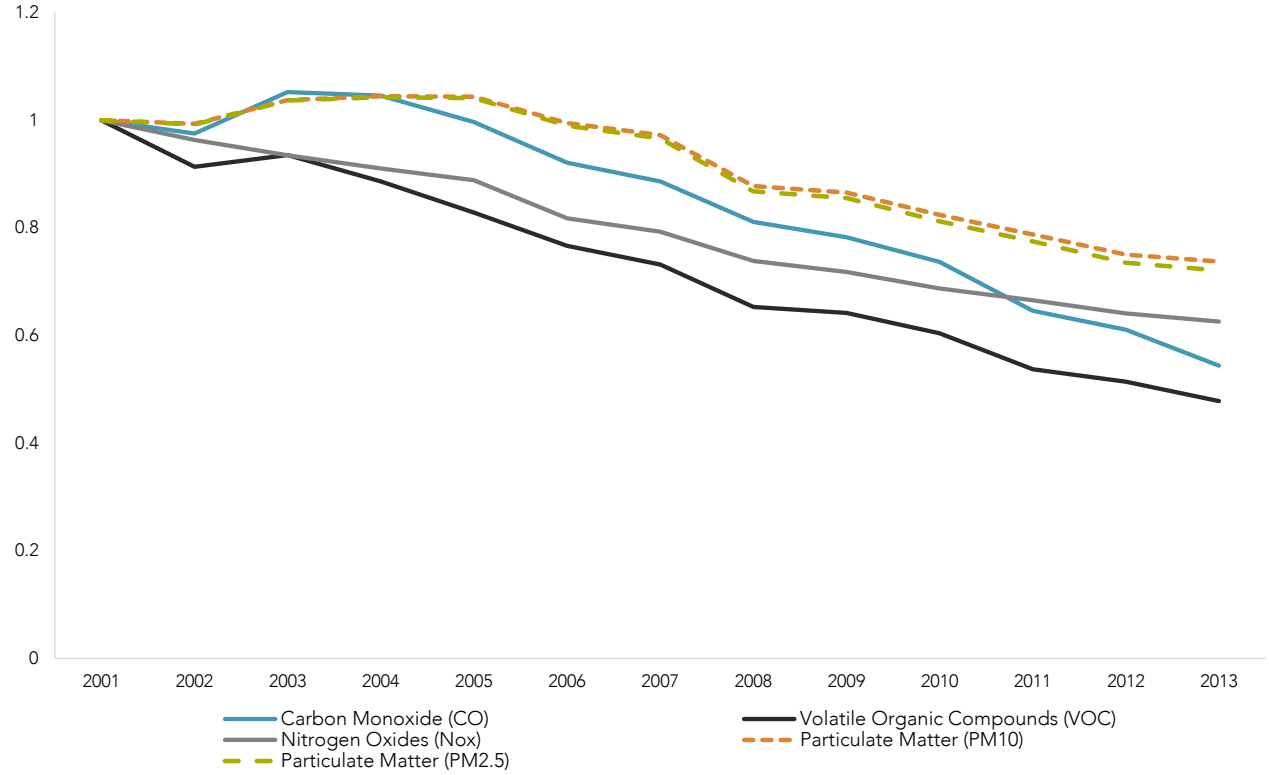
In Chapter 13, the Commission recommends that a future planning system should give greater recognition to tikanga Māori and mātauranga Māori in monitoring environmental outcomes.

But the planning system is only one factor among many

The planning system is just one factor among many affecting the development of cities and the natural environment. Other factors include wider central government policy, technological change and changing consumer preferences. Decisions made under earlier regimes have also constrained the ability of the current planning system to significantly change some outcomes.

The influence of other factors on outcomes is seen in air quality. While more stringent planning rules and policies played a part in reducing the flow of pollutants into the air, two key factors that also contributed to better air quality are reduced emissions from transport and household heating. For example, emissions from road motor vehicles are estimated to have fallen by 26% to 52% between 2001 and 2013, despite a 12% increase in road vehicle use (Figure 6.25).[59]

Figure 6.25 Estimated yearly emission index of key pollutants from road transport, 2001–2013



Source: Ministry for the Environment / Statistics New Zealand.

Note: Data adjusted to reflect changes from a 2001 base year.

These estimated reductions in vehicle emissions have been attributed to improvements in fleet and fuel quality (Ministry for the Environment / Statistics New Zealand, 2015). Central government regulations unrelated to the planning system have contributed to most of these improvements. Permissible levels of sulphur in petrol were lowered from 500 parts per million in 2002 to 50 parts per million from 1 January 2008, leaded petrol was phased out in 1996, and petrol additives containing lead were removed from sale in 2002.

[59] As measured by vehicle kilometres travelled.

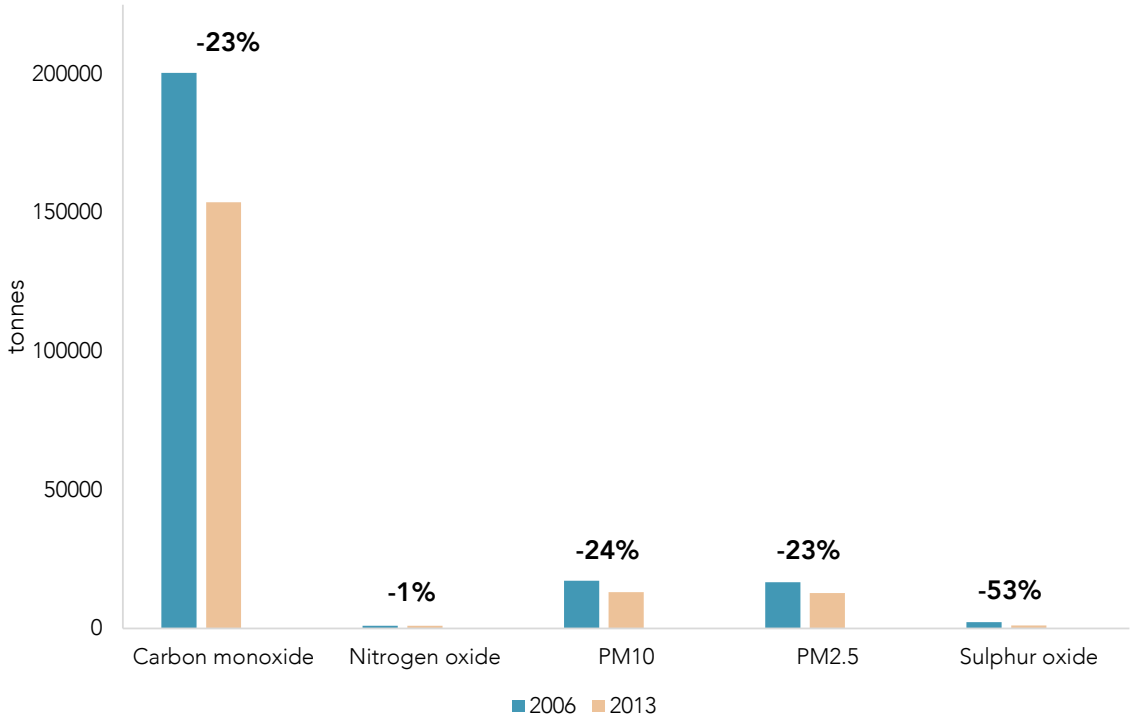
An emissions rule was introduced in 2003, setting minimum standards for vehicles entering New Zealand. Emission standards were tightened in:

- 2006 (to add a visible smoke check to the Warrant of Fitness and Certificate of Fitness tests for all vehicles, including those already in the fleet),
- 2007 (to update the emissions standards to reflect international practice, tighten standards for used vehicles, and require testing of used vehicles entering the fleet), and
- 2012 (to introduce more stringent minimum standards for new vehicles, and align them with Australian practice).

Reviews of vehicle emissions in Auckland conducted for the NZTA (Bluett et al., 2011) and Auckland Council (Kuschel, Bluett & Unwin, 2012) concluded that the "introduction and improvement of emissions standards have significantly reduced mean emissions of CO [carbon monoxide], HC [hydrocarbons], NO [nitrogen oxide] and uvSmoke for petrol vehicles" (2011, p. v). However, they also noted that an ageing fleet and congestion were eroding the benefits of higher standards, with mean emission levels plateauing from 2009 after earlier improvements.

Similarly, emissions of pollutants from home heating fell between 2006 and 2013 (Figure 6.26), as fewer households used coal or wood for heating. The number of private households using coal for heating fell by 50% between the 2001 and 2013 Censuses. Some of this reflects efforts by local authorities to encourage shifts in household behaviour. However, central government policies are likely to have contributed to this shift in household heating and reductions in emissions. Particular policies are the nationwide Warm Up New Zealand insulation and clean heating retrofit programme, and the EQC-funded scheme of replacing home heating sources damaged during the Canterbury earthquakes with cleaner units.[60]

Figure 6.26 Yearly emissions from burning wood or coal for home heating, 2006 and 2013



Source: Ministry for the Environment / Statistics New Zealand, 2015.

In the case of deteriorating housing affordability, while councils have had a significant impact on the supply of key inputs (ie, development capacity), they have no control over demand. In its housing affordability

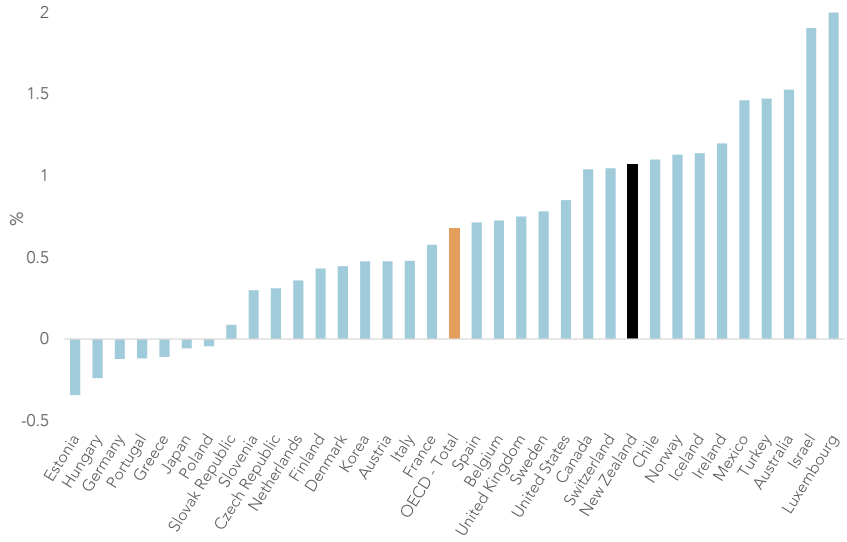
[60] The Warm Up New Zealand: Heat Smart programme (which ran between 2009/10 and September 2013) led to the installation of 39 578 low-emission heating units. EQC funded the installation of approximately 20 000 clean household heating units in Canterbury.

report the Commission noted the two forms of demand, both of which have played a part in rising house prices in recent years.

- *Underlying* housing demand is driven by household formation, which reflects population growth and changes in household size. In turn, population growth is a function of natural increases (births minus deaths) and net migration. Household size is essentially determined by demographic and social factors, although new household formation is also determined by economic factors, as higher incomes and access to finance enables new households to form.
- *Effective* housing demand reflects the combined effect of consumer and investor aspirations to rent or buy a dwelling and their financial ability to do so. As such, it is influenced by the prevailing set of economic factors, including incomes, availability of finance, the prospect of capital gains, and the economic situation more generally. (NZPC, 2012a)

Population and demographic influences have been particularly important drivers of household formation, with implications for the quantity and type of dwelling required in the New Zealand market. New Zealand population growth has been strong when compared to the OECD average, with main population growth and migration focused on Auckland (Figure 6.27 and Chapter 4).

Figure 6.27 Yearly average population growth for OECD countries, 2004-2015



Source: Productivity Commission analysis of United Nations data.

Changes in effective demand have also been significant. Although income growth has been relatively weak, it has still led to housing demand pressures as households "trade up" to higher-quality living environments. Increased access to credit, low interest rates and innovations in financial instruments have increased the "borrowing capacity" of households and have been a key source of increased effective demand for housing (NZPC, 2012a).

In other areas, non-planning factors are likely to have played a larger role in achieving outcomes. For example, the urban planning system is likely to have contributed to improvements in road safety, but only in a limited way. Econometric analysis of the downward trend in road fatalities since 1990 commissioned by the Ministry of Transport concluded that 19% of the decline in deaths could be attributed to improvements in roading (as measured by real net investment in roading per unit of travel) (Infometrics, 2013). Most of the reductions in fatalities were due to improvements in the ability of vehicles to withstand crashes, fewer motorcycles on the roads (45%) and better driver behaviour (36%).

The current planning system is similarly likely to have made an insignificant contribution to greenhouse gas reduction, for a couple of reasons. First, the drafting of amendments to the RMA and subsequent court cases have restricted the ability of councils to consider the effects of greenhouse gases on climate change when making rules to control discharges into the air and when considering applications for discharge

permits (Baillie, 2012; Palmer, 2015b). Second, the main climate change response policy in New Zealand is the Emissions Trading Scheme (ETS). A current government review of the ETS has noted that a fall in the price of carbon units and the effective carbon price since 2011 has "reduced the price incentive for businesses to invest to reduce their emissions in New Zealand" (MfE, 2015c, p. 8).

Finally, some current outcomes reflect land-use decisions taken under previous regimes. The high levels of access to green space in New Zealand cities reflect a series of planning decisions by successive councils taken over many years. And the relatively low use of public transport by international standards has been attributed to distributed housing and employment patterns in many New Zealand cities (especially Auckland), and decisions taken back in the 1950s by Auckland's regional planning body to abandon the rail network and invest instead in highways (Mees & Dodson, 2007; Coleman, 2010; MoT, 2014).

6.9 Conclusion

In dynamic environments like cities, the ability of councils to change behaviour and outcomes through the planning system will necessarily be constrained, and will depend to a large degree on whether local government is the primary actor. The experience with urban and environmental outcomes over the past 20 years tends to bear this out. Where councils have veto rights over the supply of a good or service (eg, development capacity), they can have a significant effect on outcomes. But where they are merely one actor among many, the effects are more muted. The performance of New Zealand cities in terms of green space availability and the uptake of public transport also point to the impact of path dependence (ie previous decisions affecting and limiting current choices) on city development and on council strategies and decisions. There are inherent limits to what can be expected from planning systems.

However, muted effects on urban and environmental outcomes also point to weaknesses in the design and operation of the planning system. In both urban and environmental outcomes, underlying political dynamics have constrained the effectiveness of the planning system. For environmental outcomes, these dynamics include pressure from some commercial interests not to regulate pollution stringently. In the urban environment, they include pressure from incumbents not to raise rates or debt to pay for the infrastructure required to enable new development. Any new planning system needs to consider, and manage, these dynamics.