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2014 Air domain report

DATA TO 2012

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New Zealand's air quality at a glance

This section provides a summary of New Zealand's air quality, using data to 2012.

Good outdoor air quality is fundamental to our well-being. On average, a person inhales about 14,000 litres of air every day, and the presence of contaminants in this air can adversely affect people's health. People with pre-existing respiratory and heart conditions, diabetes, the young, and older people are particularly vulnerable to these effects. Poor air quality can also cause damage to the natural and built environment.

Air pollution occurs through the introduction of gases, chemicals, particulate matter (airborne particles), and natural materials into the atmosphere from both human-made and natural sources (such as sea salt, pollen, wildfires, and volcanic activity).

This report includes data to 2012. Data for 2013 was not available for all our national indicators and case studies, or could not be collected, validated, and analysed in time to meet our publication schedule.

Summary

From 2006 to 2012, our national air quality indicators showed some improvement to the pressures on air quality, state of air quality, and impacts of air quality in New Zealand. However, national indicators are not available for all aspects of air pollution. At the local level, exceedances of the national and international guidelines for some air pollutants occur.

Figure 1 summarises the results for the three national air quality indicators for 2006–12.

Figure 1: National indicators of air quality, 2006–12

The state of New Zealand's air

By reporting on the state of New Zealand's air, we provide information (where available) on the quality of our air and how it is changing over time. Air quality is measured by the concentrations of pollutants within the air.

We compared the state of our air with guidelines or standards that provide a maximum concentration a pollutant should not exceed to ensure an appropriate level of protection is provided for human and environmental health.

The adverse effects from pollutants can result from exposure over long-term periods (annual) and/or short-term periods (hourly or daily). When reporting on the state of New Zealand's air we report first on the period over which the greatest health risk from the pollutant occurs, and then the alternative time period where appropriate. For many pollutants the greatest health risks are associated with long-term exposure, though for some pollutants these occur over the short-term. Reporting against long-term guidelines also gives a good indication of general air quality conditions and best represents the typical exposure of most New Zealanders, while reporting on the short-term has more of a focus on peak events.

For long-term exposure to pollutants we report against these guidelines:

- World Health Organization (WHO) long-term guidelines
- Ministry for the Environment's Ambient Air Quality Guidelines (where they differ from the WHO guideline).

For short-term exposure to pollutants we report against these guidelines:

- National Environmental Standards for Air Quality (NESAQ)
- WHO short-term exposure guidelines (where they differ from NESAQ).

To put New Zealand's air pollution into context, we also provide a comparison with other Organisation for Economic Co-operation and Development (OECD) countries.

PM_{10} is a collective term for very small airborne particles, 10 micrometres or less in diameter, that are associated with health problems, ranging from respiratory irritation to cancer.

- From 2006 to 2012, the national annual average PM_{10} concentration fell 8 percent.
- New Zealand's average national PM10 concentration was the seventh lowest of 32 OECD countries in 2011.
- In 2012, 87 percent (48 out of 55) of PM_{10} monitoring sites met the WHO long-term guideline. Of the seven exceeding locations:
  - PM_{10} levels at two sites exceeded the annual guideline by 1–10 percent
  - PM_{10} levels at three sites exceeded it by 11–20 percent
  - PM_{10} levels at two sites exceeded it by 21–40 percent.
- In 2012, 50 percent (19 out of 38) of airsheds experienced concentrations that exceeded the national short-term standard, down from a peak of 26 airsheds in 2008. Of these 19 airsheds:

- eight exceeded the daily PM_{10} standard on 2–10 days
- seven exceeded it on 11–20 days
- four exceeded it on 21–50 days.

$PM_{2.5}$ is a collective term for the finer airborne particles, 2.5 micrometres or less in diameter, that are a component of PM_{10} and are therefore associated with similar health problems.

- In 2012, six out of seven $PM_{2.5}$ monitoring sites met the WHO long-term guideline. The one site exceeding the guideline did so by 17 percent.
- In 2012, four out of seven $PM_{2.5}$ monitoring sites exceeded the WHO short-term guideline. Two of these sites exceeded the guideline on between one and five days, and the other two sites exceeded the guideline on between 30 and 40 days.

Nitrogen dioxide is a gas that at elevated concentrations can aggravate asthma symptoms and reduce lung development in children.

- In 2012, monitoring of nitrogen dioxide indicated that the WHO long-term guideline was met at 98 percent of monitoring sites (121 out of 124). Those where the guideline was likely exceeded are close to state highways and busy local roads.
- In 2012, all 15 regional council and unitary authority monitoring sites that can be compared directly to guidelines met both the WHO long-term guideline and national short-term standard for nitrogen dioxide. Many of these sites are where high concentrations are expected.

Carbon monoxide is a gas that can aggravate heart conditions. A long-term guideline does not exist as most of the negative health problems are associated with high short-term concentrations.

- In 2012, all 20 monitoring sites for carbon monoxide met the national short-term guideline. Many of these sites are where high concentrations are expected.

Ground-level ozone is associated with increased respiratory and cardiovascular diseases. Only a short-term guideline exists as most of the negative health problems are associated with high short-term concentrations.

- From 2002 to 2012, the WHO short-term guideline and national short-term standard for ground-level ozone was met at all three monitored sites. These sites are where high concentrations are expected.

Sulphur dioxide is associated with, and can aggravate, respiratory conditions. The WHO only provides a short-term guideline for sulphur dioxide.

- In 2012, sulphur dioxide concentrations exceeded the WHO short-term guideline at three out of nine sites. At these three sites, the standard was exceeded on 13, 54, and 69 days over the year. These three sites were expected to have high concentrations due to nearby industry and shipping activities. Other sites close to industry did not exceed the guideline. All nine sites met the national short-term standard.

Arsenic, **benzene**, and **benzo(a)pyrene** are pollutants that are associated with health problems ranging from respiratory irritation to cancer.

- Limited monitoring of arsenic, benzene, and benzo(a)pyrene allows for very few comparisons to be made with New Zealand's long-term health guidelines, but monitoring does indicate that annual concentrations are elevated in some locations.

The pressures on New Zealand's air

By reporting on pressures on New Zealand's air, we provide information (where available) on the significant activities (human and natural) that may be causing, or have the potential to cause, changes in air quality.

On-road vehicle emissions are a source of gases, particulate matter, metals, and volatile organic compounds.

- From 2001 to 2012, estimated emissions (using modelling) from on-road transport fell between 25 and 49 percent for the range of pollutants, mainly due to technological advances in vehicles and fuel. This decrease may have contributed to the overall reduction in PM_{10} concentrations from 2006 to 2012.
- The decrease in estimated emissions occurred despite an 11 percent increase in vehicle kilometres travelled (or vehicle use).
- Pollutants from on-road transport continue to be an issue, with high levels of nitrogen dioxide and benzene in some peak traffic locations.

Home-heating emissions are a source of gases, particulate matter, metals, and volatile organic compounds. In New Zealand home heating is considered the main source of human-made PM_{10} emissions.

- From 1996 to 2013, the number of households that burnt wood or coal for home heating decreased 25 percent. This decrease is likely to have contributed to the overall reduction in PM_{10} concentrations from 2006 to 2012.
- Burning wood and coal for home heating continues to be associated with air quality issues, including high levels of $PM_{2.5}$, arsenic (from burning treated timber), and benzo(a)pyrene at some locations.