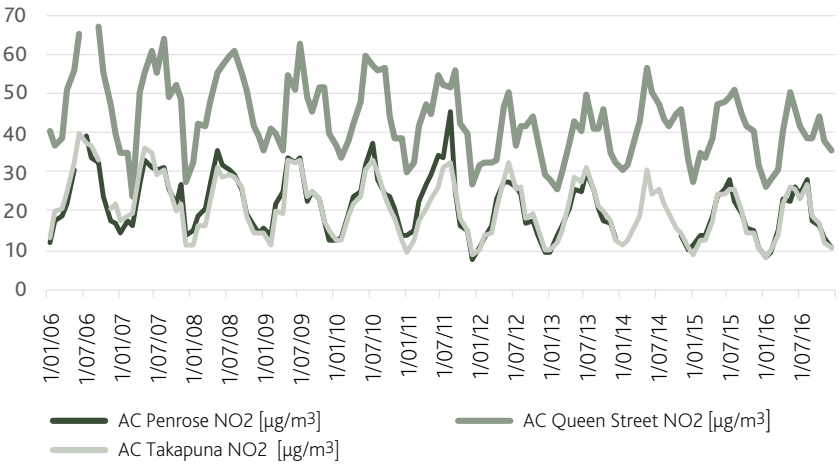
Outcome

Environment and Cultural Heritage

Measure 3
Air Quality & Greenhouse Gas Emissions

Measure 3a.
Concentration of air pollutants



Data
Concentrations of following pollutants:
- Particulate matter (PM2.5 and PM10).
- Gaseous pollutants (oxides of nitrogen, carbon monoxide, sulphur dioxide, ozone).

Source
Auckland Council ambient air quality monitoring programme.

Frequency
Continuous data are collected every minute and averaged over 10 minutes, 1-hour and 24-hour periods. Most national and regional standards and targets are based on 1-hour and 24-hour periods. Diffusion tube and volatile organic compounds measurements can be obtained over weekly or monthly time periods.

Availability
Real-time and historical data are available from Auckland Council on request. Various technical and summary reports describing Auckland's air quality are available at Knowledge Auckland.

Notes
The following data are collected and used for air quality monitoring.
- PM_{10} particulate data are currently collected at eight sites across the network. This size of particulate is emitted from natural sources such as oceanic sea salt and pollen. Anthropogenic sources include dust, transport emission and home heating.
- $PM_{2.5}$ is currently monitored at four sites. $PM_{2.5}$ measures the smallest size fraction of particulates that are most commonly anthropogenic in origin, including combustion sources, home heating, and secondary particulates emanating from gas emissions.
- Emissions from vehicles (especially diesel) also contribute nitrogen oxides (NOx), mainly nitric oxide (NO). Nitric oxide reacts with oxygen in the atmosphere to form NO_2, which can cause the brown haze that affects our health.
- Shipping traffic also has an impact, contributing mainly PM, NOx and Sulphur dioxide (SO_2) to the air.
- Ozone (O_3) is produced because of vehicle exhaust emissions interacting with sunlight in the presence of volatile organic compounds.

Relevance
There is a statistically significant increase in the number of admissions to hospital for respiratory disorders follow brown haze events over Auckland. This is because the brown haze is a stagnant pool of polluted air sitting over a large area of Auckland's airshed. These events tend to occur on clear calm mornings in winter when people tend to go out and exercise, unaware of the risks of exacerbating existing bronchial and respiratory disorders. This model will act as a warning for the public, advisory for the ADHBs, and as a mitigation tool for key polluters such as Auckland Transport

Baseline (2016)

The current baseline is set against 2016 data:
AC Penrose NO2 [µg/m³] - 10.5
AC Queen Street NO2 [µg/m³] - 35.5
AC Takapuna NO2 [µg/m³] - 10.7

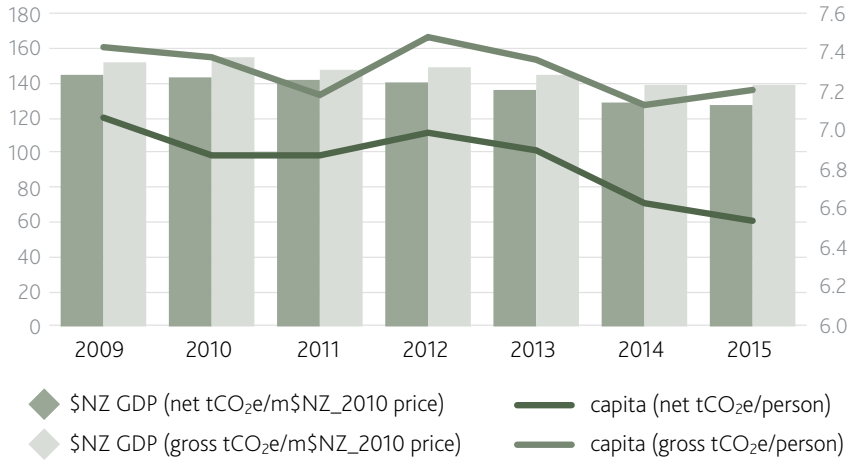
Analysis

The graphed NO_2 data is collected from 3 air quality monitoring stations across Auckland, Penrose, Takapuna and Queen Street. The dashed lines show the long-term trend in the data for each of the sites.
Key air quality information can be determined from this simple graph.
A long-term downward trend in measured NO_2 is evident. NO_2 is largely emitted from on-road vehicles. As vehicle numbers are known to be increasing, the data may seem surprising. However, improvements in engine efficiency and cleaner fuel have proved more influential on pollution emissions than the increasing traffic volume. This is more evident before 2012. Since then, traffic volume has started to mitigate gains in vehicle efficiency with trends levelling off, and in some locations, now increasing.
Penrose and Takapuna display almost identical concentrations, despite being almost 10km apart. This is due to similarities in their relative proximity to the S1 motorway. The similarity in data demonstrates that they are measuring the same emission source with similar emission rates.
Queen Street shows a marked drop in 2011. This was due to the reconfiguration of Queen-street, effectively reducing traffic, Interestingly, since 2012, the trend in NO_2 has been slowly increasing at this location due to an increasing number of vehicles, and buses. This demonstrates the importance and influence of policy and planning on Auckland's air quality.

(✓) **Trend**

From 2011 to 2016 decreasing positive trend.

Measure 3b.
Greenhouse gas emissions (tonne of CO_2e accounting for CO_2e removed by forests)



Data

Multiple indicators and data sources used.

Source

Auckland Greenhouse Gas Inventory, Projections of Auckland Greenhouse Gas Emissions.

Frequency

Annual greenhouse gas emissions are reported for 1990 and from 2009 to 2015, so a pre-Auckland Plan 2050 baseline is available. Projected greenhouse gas emissions are reported every 3 to 5 years.

Availability

Emissions data from all the sectors and sources are available.

Notes

There are multiple indicators and data sets that can be used to report on greenhouse gas emissions and projections across various environmental domains.

Relevance

Climate change mitigation contributes to all Focus Areas and Directions of the Environment and Cultural Heritage Outcome, as well as Auckland's Climate Action Plan. The measure of greenhouse gas emissions enables us:

- To be in line with national and international best practice
- To better measure progress

Baseline (2015)

The current baseline is set against 2015 data - 6.5 net tCO_2e per person.

Analysis

In 2015, Auckland's gross greenhouse gas emissions were 11,309 kilo-tonnes of carbon dioxide equivalent (kt CO_2e) (10,267 kt with forestry sequestration included). Transport emissions made up 39.7% of total emissions (Figure 1), with 35.7% of this made up of road transport emissions. 2015 saw an increase of 1.5% on net 2014 emissions, and 2.1% on 2009 emissions.

Auckland's greenhouse gas emissions are increasing. However, as Auckland's population and Gross Domestic Product (GDP) have increased, there has not been a proportional increase in greenhouse gas emissions, and thus emissions per capita and per unit GDP have declined.

(^) **Trend**

From 2009 to 2015 increasing negative trend.