



Greenhouse Gas Emissions Analysis and Forecast

Milestone One Report

Communities for Climate Protection™ - New Zealand Programme

Executive Summary

In July 2004, Environment Canterbury joined the Communities for Climate Protection™ - New Zealand (CCP™-NZ) Programme, a campaign to reduce greenhouse gas emissions. CCP™-NZ is a New Zealand Government initiative delivered by the International Council for Local Environmental Initiatives – Australia / New Zealand (ICLEI-A/NZ). This programme is part of ICLEI's International Cities for Climate Protection™ Campaign.

Milestone 1 of the CCP™-NZ Programme requires participating councils to conduct an analysis and forecast of greenhouse gas emissions from the community and from council activities. The New Zealand Climate Change Office of the Ministry for the Environment provided \$4,000 for Council to employ an intern to assist with this task.

The analysis and forecast of greenhouse gas emissions been completed for Environment Canterbury and this report details the results.

The CCP™-NZ Programme divides local authorities' greenhouse gas emissions into two areas: Corporate (referring to council activities), and Community (the residential, commercial and industrial sectors of the council area).

Key findings identified from the inventory process are:

- Corporate Base Year (2001) greenhouse gas emissions were 1,217 tonnes of carbon dioxide equivalents (CO₂e). In a business as usual scenario, where no action is taken, these emissions are expected to rise by 30% by 2010.
- Community Base Year (2001) greenhouse gas emissions were 4,758,372 tonnes CO₂e. In a business as usual scenario, where no action is taken, these emissions are expected to rise by 19% by 2010.
- The two main sources of greenhouse gas emissions from council's operations are the vehicle fleet and employee commute to work.
- Key sources of greenhouse gas emissions from the Community analysis include the Transport and Industrial sectors.

Communities for Climate Protection™ - New Zealand: A New Zealand Government initiative delivered by ICLEI-A/NZ.
This programme is part of ICLEI's international Cities for Climate Protection™ Programme.

Background

CCP™-NZ is a New Zealand Government initiative delivered by the International Council for Local Environmental Initiatives – Australia/ New Zealand (ICLEI-A/NZ). This programme is part of ICLEI's International Cities for Climate Protection™ Campaign.

CCP™-NZ encourages and supports councils to reduce their greenhouse gas emissions and develop actions to foster climate change action at a local level. There are almost 700 Councils participating in the CCP™ Programme around the world, including 15 New Zealand councils.

Environment Canterbury joined the CCP™-NZ Programme in July 2004 and committed to completing the five milestones of the Programme. These are:

- *Milestone 1:* Conduct an inventory and forecast for Community and Corporate (council) greenhouse gas emissions
- *Milestone 2:* Establish greenhouse gas emissions reduction goals
- *Milestone 3:* Develop and adopt a local action plan
- *Milestone 4:* Implement the local action plan and quantify the benefits of implementing actions
- *Milestone 5:* Monitor and report on implementation of the local action plan and progress towards achieving the reduction goal.

The milestone framework enables council to strategically identify sources and levels of greenhouse gas emissions produced from within council's operations ('Corporate') and the community. Council has completed Milestone 1 and can now use the results to establish reduction goals and prioritise actions to reduce greenhouse gas emissions that are locally relevant.

To assist with Milestone 1, Council used \$4,000 funding from the New Zealand Climate Change Office of the Ministry for the Environment to employ an intern in May 2005.

Milestone 1: Analysis and Forecast of Greenhouse Gas Emissions Results

Note: All greenhouse gas emissions are equated into a common measure of carbon dioxide equivalents (CO₂e) in tonnes (T). CO₂e is a measure of *equivalent* carbon dioxide produced from each emissions source. For example, methane is 21 times more potent than carbon dioxide in terms of global warming potential. Therefore, 1 tonne of methane is calculated to be the equivalent of 21 tonnes of CO₂, and is expressed as 21 T-CO₂e.

THE CORPORATE EMISSIONS ANALYSIS

The base year selected by Environment Canterbury for the Corporate emissions inventory was the financial year 2000-2001. This base year was selected due to the availability of data necessary to complete the inventory.

The forecast year is 2010. This is recommended by ICLEI-A/NZ and is the mid-point of the First Commitment Period of the Kyoto Protocol. The forecast calculations are based on a 'business as usual' scenario for council's operations. This includes any new developments expected between the base year

and the forecast year. Examples include an expected increase in the number of staff leading to increased size and use of the vehicle fleet and greater overall electricity consumption.

The Corporate emissions analysis is broken down into four main sectors:

- Buildings – emissions resulting from the energy use (electricity and gas) of council-owned and/or operated buildings
- Vehicle Fleet – emissions resulting from the energy use (petrol, diesel and LPG) of council-operated vehicles and machinery
- Employee Commute – a non-compulsory sector which examines emissions resulting from the energy use (petrol, diesel and LPG) of Council employees travelling to and from the workplace in personal vehicles.
- Waste – emissions resulting from the breakdown of organic waste originating from corporate activities and operations (organic waste breaks down to produce methane).

Figure 1 below shows the percentage of Corporate emissions generated from each of these sectors during the inventory year of 1 July 2000 to 30 June 2001.

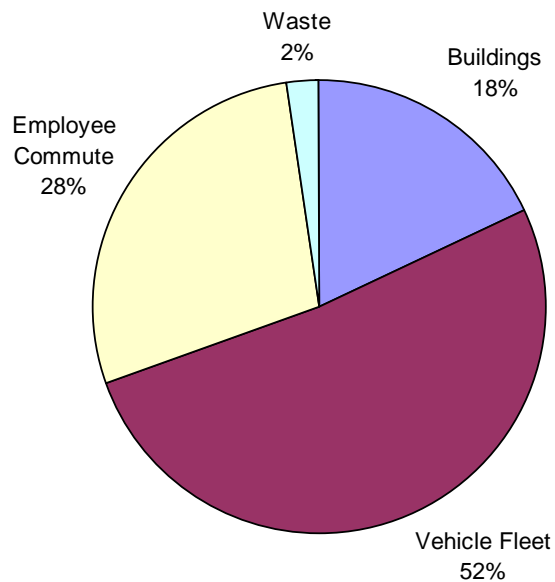


Figure 1. Environment Canterbury – Corporate emissions by sector

Figure 1 illustrates that the major sources of corporate emissions are the vehicle fleet and employee commute to work. For the purpose of this analysis, leased vehicles, such as those leased to Target Pest were not included in the vehicle fleet sector. In 2001 Environment Canterbury spent \$92,776 on energy for buildings (\$75,529 for the Christchurch office) and \$215,161 on fuel for the vehicle fleet.

Vehicle Fleet

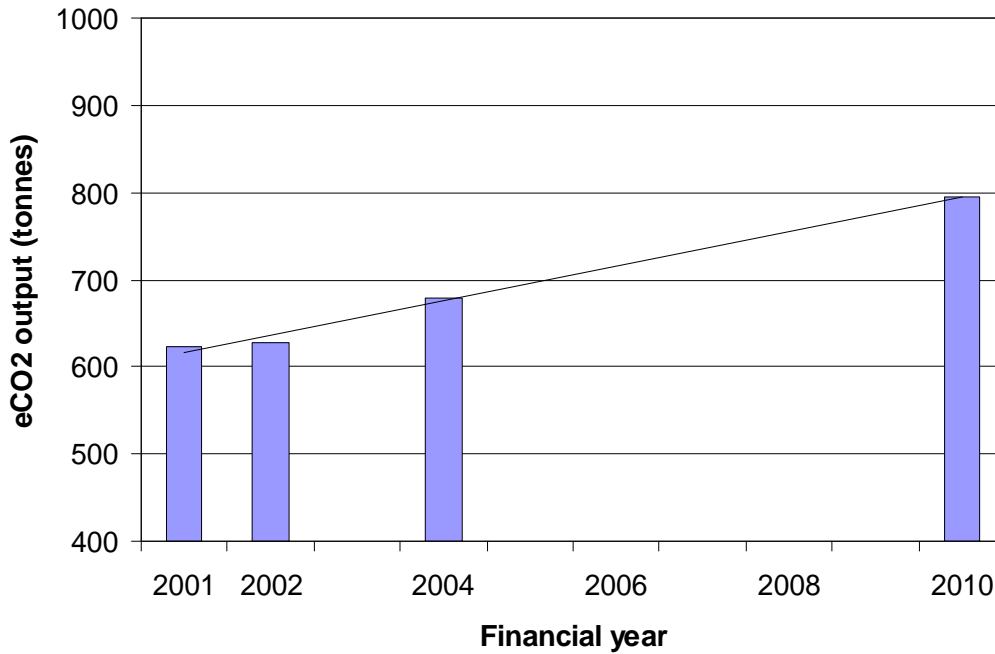


Figure 2. Vehicle fleet eCO₂ emissions. Data for years 2001, 2002 and 2004 were calculated from actual fuel usage data.

The ECan vehicle fleet accounts for over 50% of corporate emissions in 2001 and as Figure 2 shows is increasing steadily. Environment Canterbury already considers fuel efficiency as an important factor when buying new vehicles and efforts have been made to reduce the use of the fleet such as holding meetings with staff from different offices using video links and the provision of bicycle for staff to use when travelling short distances to meetings. There is a forecasted increase in emissions from the vehicle fleet of 27% from 2001 to 2010. However, taking into account the increase in staff over this period this is actually a decrease per staff member from 1.81 t/person in 2001 to 1.68 t/person in 2010.

Buildings Sector

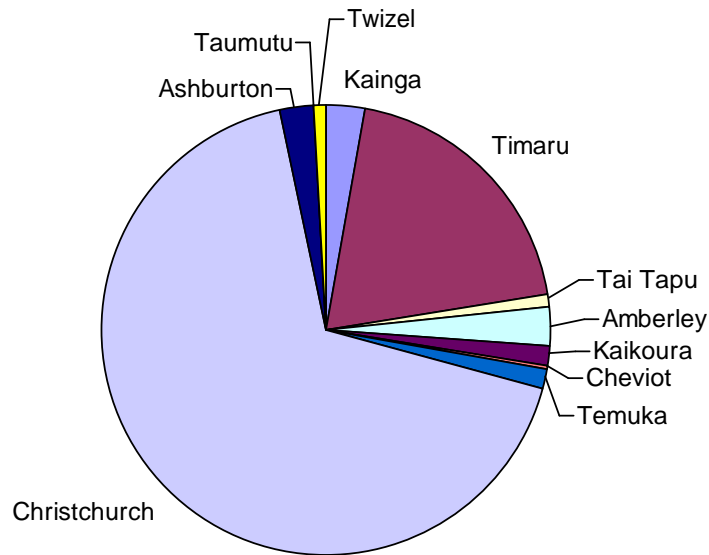


Figure 3. Proportion of eCO₂ emissions from each of Environment Canterbury offices in 2001.

Total emissions in the buildings sector were 220 T-eCO₂. The majority (67%) of these emissions resulted from the Christchurch office although this is not surprising as it is the largest of Environment Canterbury's places of employment. Notably, while 72% of staff are based in Christchurch this office is the source of only 67% of emissions, suggesting improvements to energy efficiency can be made in the other Environment Canterbury buildings. The majority of building sector emissions resulted from electricity use but diesel generators were used for heating in parts of the Christchurch and Timaru offices.

Waste

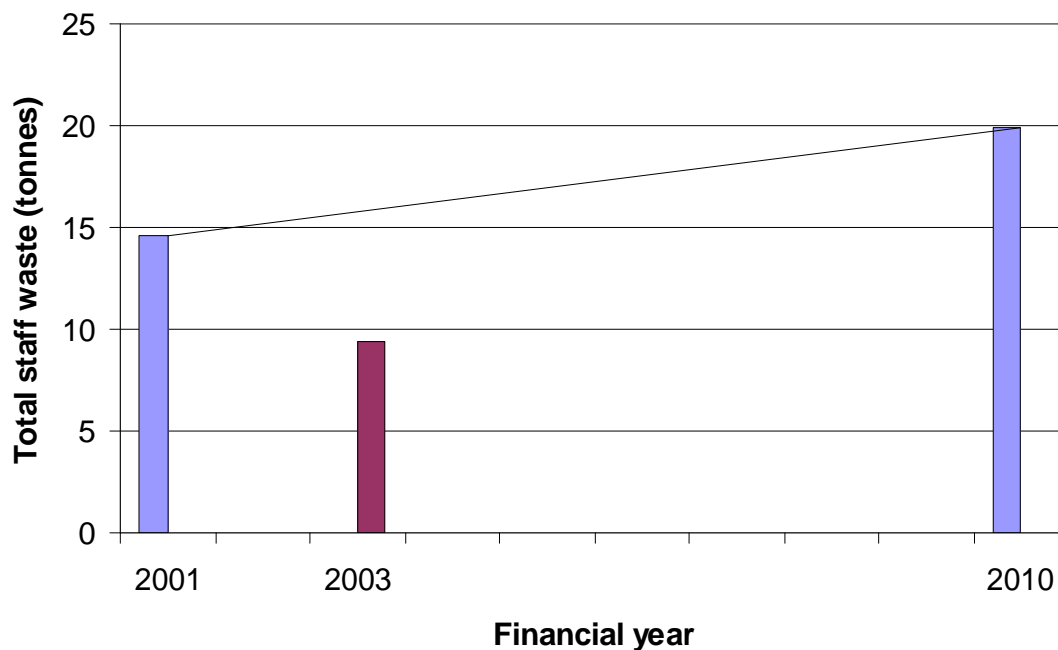


Figure 4. Total staff generated by ECan employees in 2001, 2003 and the forecasted waste for 2010 under a 'business as usual' scenario from 2001.

In early 2002 a waste minimisation initiative, the WECan project, was launched. The project involves diverting all compostable waste from landfill by providing staff with small containers for their food scraps and tissues. This waste is then composted in worm farms set up in office car-park gardens. In addition, rubbish bins were removed from all offices, and replaced with paper recycling bins and centralised recycling drop-off points for non-paper recyclables. As shown in Figure 4, The WECan project has dramatically reduced the amount of waste sent to landfill.

Employee commute

The employee commute emissions values were extrapolated from a 2002 survey of 106 staff members assuming that these staff members were representative of the whole staff and that commuter travel modes did not change significantly between 2001 and 2002.

Table 1. Transport mode used by Environment Canterbury staff for travel to work.

Transport mode	Percentage of employees
Driving alone	34.0
Carpool	16.5
Bus	14.0
Bike	26.5
Walk	8.0
Other	1.0

In 2002 nearly half (48.5%) of ECan staff walked, cycled or caught the bus to work. Most of those who travelled to work by car (50.5%) cited convenience, comfort and ease of use as the main reason why they used a car to commute. Other reasons included using the car to pick up or drop off children, having to be somewhere else after work or having the freedom to use their car during the day for non-work purposes.

Figure 2 shows the breakdown of Corporate emissions by source.

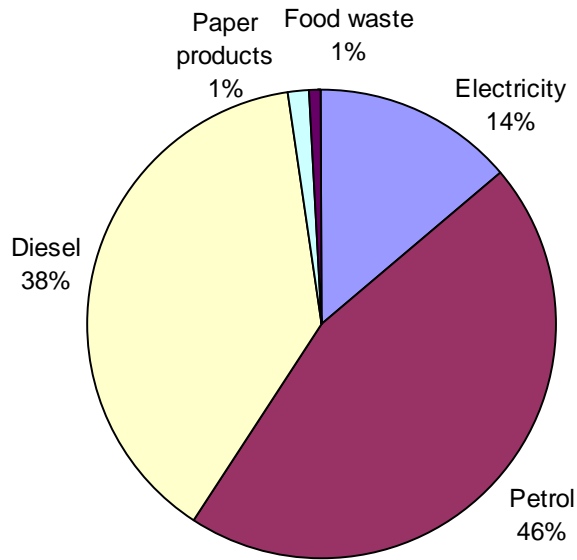


Figure 2. Environment Canterbury – Corporate Emissions by Source

Figure 2 shows that the overwhelming majority of corporate emissions (86%) come from the use of petrol and diesel. In 2001 Environment Canterbury spent \$113,946 on petrol, \$114,584 on diesel and \$79,407 on electricity.

Corporate Emissions Forecast

As Figure 3 and Table 1 illustrate, Corporate emissions are expected to increase under a 'business as usual' scenario by 30%. Main areas of increasing greenhouse gas emissions are the vehicle fleet, employee commute and buildings sectors. The overall increase can be attributed to the population growth in the region creating growth within the Council staff and associated services.

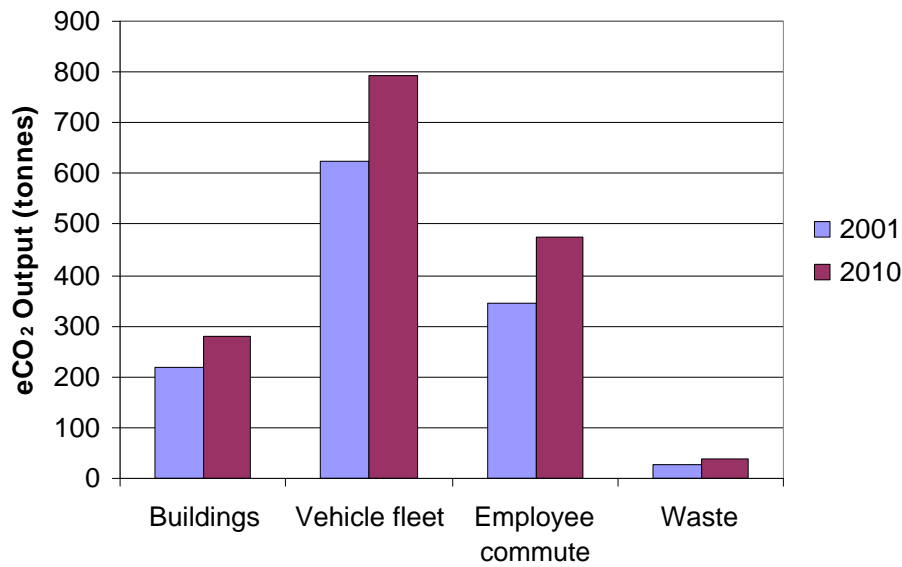


Figure 3. Environment Canterbury – Corporate base and forecast year greenhouse gas emissions by sector.

Table 1. Base Year and Forecast Year Corporate greenhouse gas emissions by sector.

Sector	Year 2001 (Equivalent CO2 Tonnes)	Year 2010 (Equivalent CO2 Tonnes)
Buildings	220	280
Vehicle Fleet	624	794
Employee Commute	346	474
Waste	27	37
TOTAL	1,217	1,585

THE COMMUNITY EMISSIONS ANALYSIS

The base year selected by Environment Canterbury for the Community emissions inventory was 2001. The primary reason for selecting 2001 is attributable to most of the data being supplied for the Community inventory by ICLEI-A/NZ. ICLEI-A/NZ obtain the data primarily from sources such as Statistics New Zealand and the Ministry for Economic Development who in turn base most of their research on information provided in the last census of 2001. The forecast year is again 2010. Forecast calculations are based on a 'business as usual' scenario allowing for population growth within the Canterbury region and its associated effects.

The Community analysis is divided into five sectors:

- Residential – emissions resulting from household energy use across the council region
- Commercial – emissions resulting from commercial operations including government and institutional activity (schools, hospitals, etc. as well as commercial and personal services (retail, finance, etc.)
- Industrial – emissions resulting from energy in local industry operations (manufacturing, mining, construction, etc.)
- Transport – emissions resulting from energy use associated the movement of people and goods within the council region
- Waste – emissions resulting from the breakdown of waste originating from the community.

It is anticipated that agriculture will become another sector in the Community emissions analysis, including emissions resulting from stock, cropping and other agricultural activities. However, this has not yet been finalised by ICLEI-A/NZ as a CCP™-NZ sector but may be taken into account in future inventories.

Figure 4 shows the percentage breakdown of Community greenhouse gas emissions from each sector. The greatest emissions result from the Transportation sector, followed by Industrial. 45% of the Community emissions were generated from transport fuel consumption, which translates to 2.9 million T-CO₂e per annum.

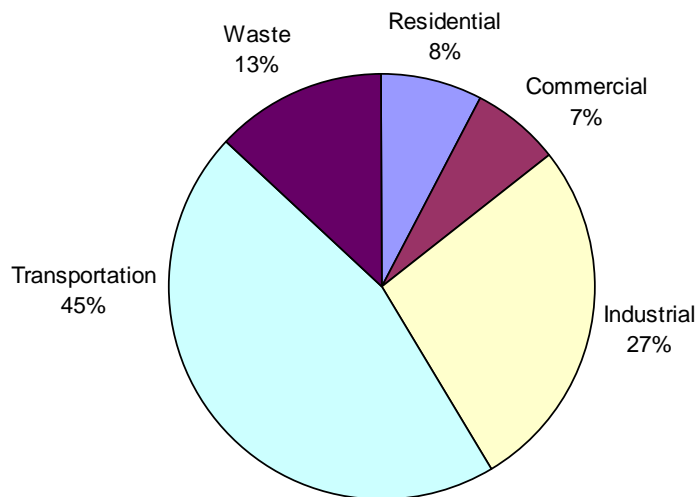


Figure 4. Environment Canterbury - Community emissions by sector.

Community Emissions Forecast

As Figure 5 and Table 2 illustrate, overall community emissions are expected to increase under a 'business as usual' scenario by 19%. The overall increase can be attributed to population growth in the region. The main area of increasing greenhouse gas emissions is the transportation sector. Increases specific to the transportation sector can be attributed to a combination of population growth, increases in the number of households and the number of cars per household. In the long term changes in land use can also affect transportation demand. As people move further away from the city centre they need to travel further to get to work and are less likely to be able to walk, cycle or use public transport.

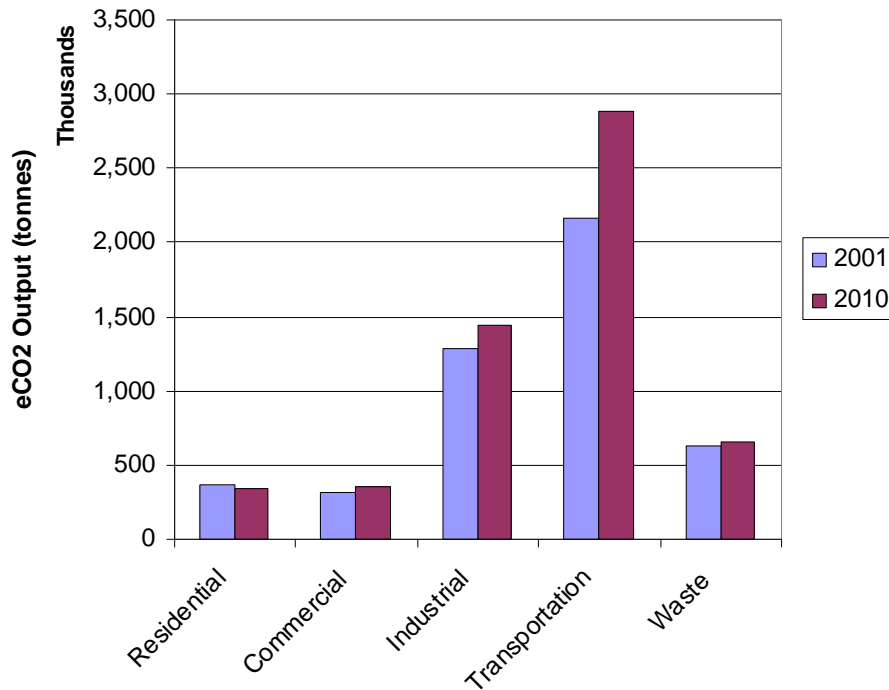


Figure 5. Canterbury Region greenhouse gas emissions, base and forecast year.

Table 2. Base Year and Forecast Year Community greenhouse gas emissions by sector.

Sector	Year 2001 (Equivalent CO2 Tonnes)	Year 2010 (Equivalent CO2 Tonnes)
Residential	370,756	340,526
Commercial	314,536	349,322
Industrial	1,289,689	1,446,505
Transport	2,160,056	2,888,312
Waste	623,335	661,139
TOTAL	4,758,372	5,685,805

Next Steps

Council has now completed the requirements of Milestone 1 of the CCP™-NZ Programme and will begin work on Milestone 2 which is developing goals for reducing greenhouse gas emissions. Work on Milestone 2 is currently underway. Milestone 3 then requires council to produce a local action plan for how it will work towards those goals.

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