

# Canterbury

An  
environmental  
resource for  
schools

## From the EDITORS

Air ... every minute of every day, each of us uses about 10 litres of it, depending on what we are doing. It's all around us. We all depend on air. Its quality affects people's health and the rest of the environment. Clean air is essential, and yet we often take it for granted!

During a typical Canterbury winter the quality of the air in many of our towns can be poor at times. Many aspects of modern life in our cities and towns affect air quality: discharges of smoke and gases from industries; vehicles on our roads; and above all, burning solid fuel such as wood and coal for home heating.

We are all affected by air pollution, and we can all help fix it. We need clean air and warm homes. If we make some changes, we could have both.

As always, your thoughts and comments are welcome. Please contact us for further information. Our contact details are below:

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## A breath of fresh air

Ask people, "What's the best thing about living in Canterbury?" and you'll get dozens of answers: the rivers, the sea, the mountains, the wide open spaces, the people, the fresh air...!

However, our fresh air isn't always so great. "SMOG!" is a common complaint, especially during the winter months. During winter, a lot of Canterbury towns have a serious air pollution problem. During cold weather, poor air quality affects many people's health, and spoils the look – and the smell! – of where we live.

Not only does smog look and smell bad, but the tiny airborne particles contained in smoke are bad for our health. Because of these health effects, the Government has introduced National Environmental Standards for Air Quality. These standards set health-based limits for different kinds of air pollution. As a regional council, Environment Canterbury, alongside district and city councils, is responsible for meeting the National Environmental Standards in Canterbury towns and cities.

To achieve this, Environment Canterbury has introduced clean air rules in a number of towns and cities, particularly around home heating, the biggest cause of winter air pollution. They aim to ensure we have clean air to breathe during winter.

This issue of Your environment, Canterbury breathes fresh air into the issue of wintertime smog – what actually is air pollution, what causes it, why it is so bad in many towns and cities across the world, and in New Zealand and Canterbury, and what you, your family and friends can do about it!



### in this issue...

- |           |  |           |   |
|-----------|--|-----------|---|
| <b>2</b>  | Air pollution - what are the issues?           | <b>12</b> | What's up with the air - different types of pollution |
| <b>4</b>  | Where does our winter air pollution come from? | <b>14</b> | Local solutions for a big problem                     |
| <b>6</b>  | The harmful stuff – PM <sub>10</sub>           | <b>20</b> | Debating the issue                                    |
| <b>8</b>  | Why Canterbury?                                | <b>21</b> | Heating our homes... and clearing the air             |
| <b>10</b> | A long history of air pollution in Canterbury  | <b>22</b> | Incentives and help available                         |

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Facilitating sustainable development in the Canterbury region

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## Air pollution



1.

Around 80 percent of winter air pollution is caused by smoke from domestic fires.

7.

The solutions are right here — the choices that we make can rid us of dangerous air pollution.



6.

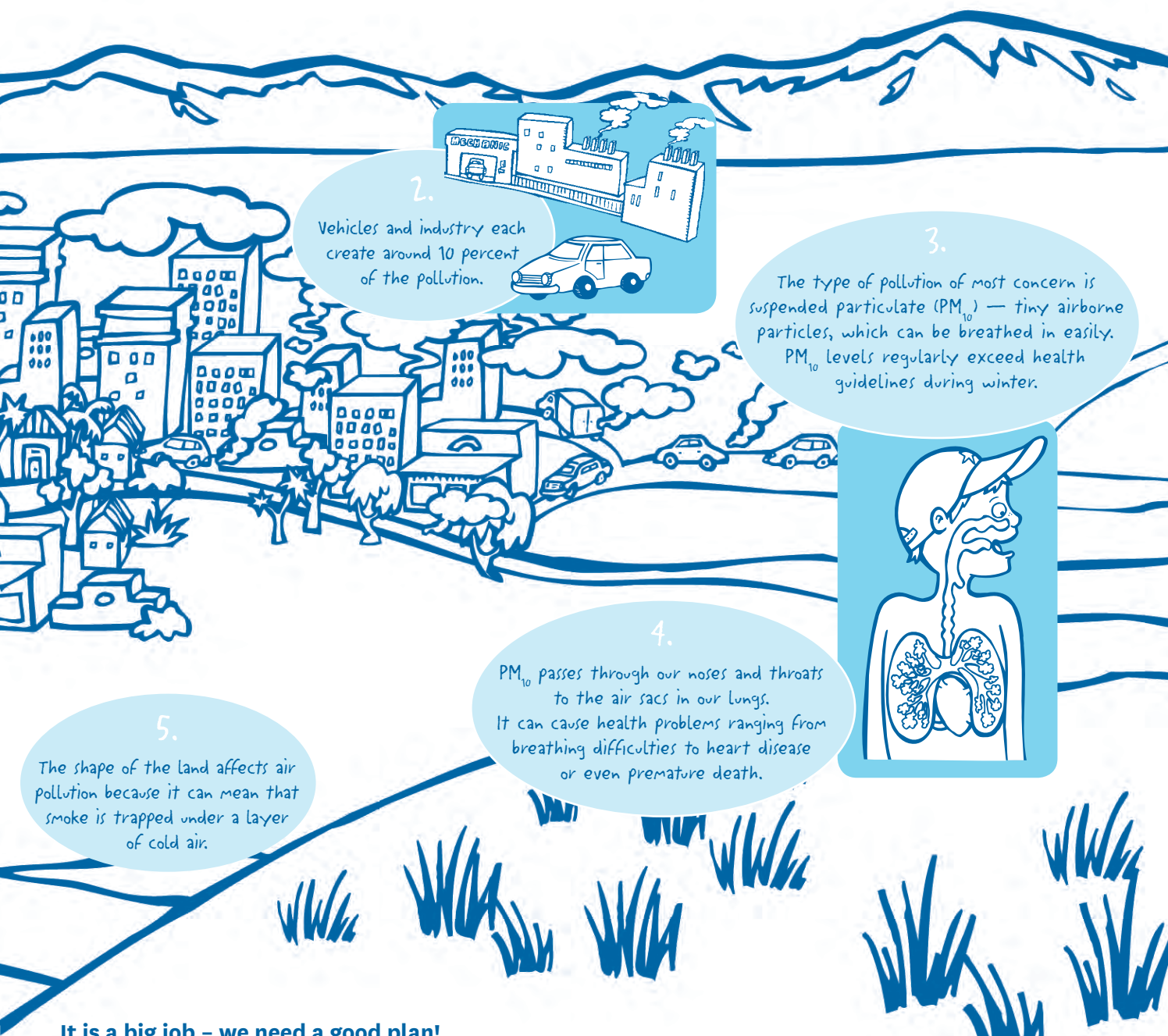
Canterbury's winter climate brings many still, frosty days when air pollution doesn't blow away.

### Did you know?

Air quality management in New Zealand is governed by the Resource Management Act 1991 (RMA) and involves a number of agencies. The Minister for the Environment is responsible for recommending national environmental standards to guarantee a set level of protection for the health of all New Zealanders. Regional councils such as Environment Canterbury and unitary authorities are, in turn, responsible for ensuring that national standards are met in their regions. (2011 Users' Guide to the revised National Environmental Standards for Air Quality – Ministry for the Environment)



# - what are the issues?



## It is a big job – we need a good plan!

Environment Canterbury has worked through all the issues, consulted the public and come up with a plan – the Air Plan<sup>1</sup>. It aims to reduce air pollution while still allowing wood burning. It addresses air quality issues by putting in place a framework whereby discharges of pollutants to air are restricted, particularly in those areas (air sheds) where air quality is often poor. It addresses activities such as:

- the use of home heating appliances (fires)
- industrial discharges to air
- discharges to air of agrichemicals such as pesticides and fertilisers.

1. "Air Plan" is the shorthand name for the Natural Resources Regional Plan (NRRP - Chapter 3: Air Quality).

# Canterbury

## Where does our winter

### Smoke + Fog = Smog

**Smog** means either a mixture of smoke and fog, or smoke pollution that is so thick that it looks like fog. In Canterbury, we don't usually get the two mixed together. Air pollution and fog happen under different weather conditions.

In Christchurch and other Canterbury towns, the tiny solid particles within smoke are the pollutants of most concern. These tiny particles are called **suspended particulate** or  $PM_{10}$  - see page 6.

### Where does our winter air pollution come from?

The biggest source of wintertime air pollution in Canterbury towns is home heating. Around 80 percent of  $PM_{10}$  is produced by home heating.

### Early evening, the worst time of day

#### Home sweet warm home...

Coming home from school, work, or play during winter, the first thing on your mind is getting the house warm for the evening. Multiply that by thousands of fires and "Houston, we have a problem!" The smog becomes concentrated, and by about 11 pm it peaks. This is bad news for people who are out and about, especially people practising and enjoying winter activities such as netball or soccer.



### In the classroom - Measuring air pollution from cars

#### EXHAUST EMISSIONS

An average car produces approximately 2 kilograms of pollution for every 35 kilometres it travels.

1. With the help of a responsible adult place the sock over the exhaust pipe of a car and ask the adult to run the car for 5 minutes, out in the open. Stand back while the engine is running.
2. Remove the sock - use gloves as the exhaust pipe will be hot! - and turn it inside out.
3. Discuss what you see. How dirty would the sock be after longer periods of time?
4. If possible, conduct the same experiment to compare different types of car, for example, diesel versus petrol, old versus new, big engine versus small.

#### CAR USE

As a class, conduct a survey about how your family commutes in the morning and create a visual human graph by putting students into categories depending on their answers. For example you could investigate:

- how many students come to school by car
- how far students travel by car
- how many trips students do by car in a week
- how students parents commute by car, for example, alone, car pool and so on
- what types of car are involved, and relate this to the exhaust emissions activity.

After completing this activity discuss as a class how significant this form of air pollution is in your community. How does it compare to other forms of air pollution e.g. home heating, industry?



#### What you will need:

- clean white socks
- vehicle(s)
- gloves



Source: The Science Learning Hub/ University of Waikato [www.sciencelearn.org.nz](http://www.sciencelearn.org.nz)

# air pollution come from?

## What about vehicles?

Motor vehicles do pollute the air (causing approximately 1 percent of PM<sub>10</sub> pollution in Waimate and around 14 percent in Christchurch). Vehicle pollution occurs during the day, when there is usually some wind to blow the pollution away. Most of it occurs around busy roads and intersections, unlike the pollution caused by domestic fires which affects all air in Canterbury towns and cities to some degree.

Motor vehicles are also sources of pollutants such as carbon monoxide, nitrogen dioxide and benzene, and are a significant source of greenhouse gas emissions. However, in the Canterbury region, relatively low vehicle numbers and a general lack of traffic congestion means that pollutants from vehicles don't reach dangerous levels.

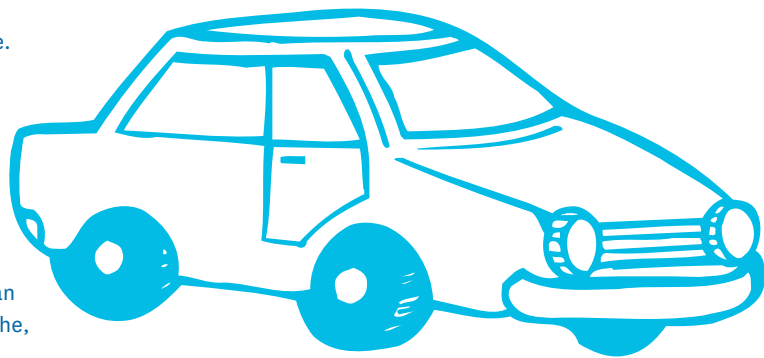
Poorly tuned vehicles can also create smoke (and sometimes odour) nuisance.



## and factories?

Yes, factories do pollute the air, but make a relatively small contribution to overall air quality. Often the white "smoke" that we see spouting out of the large chimneys is just steam! Also, some factories are required to have special equipment, e.g. cyclones and bag filters, on chimneys to reduce the amount of pollution they give out. And their tall chimneys mean any pollution left is going into the air way above the air we normally breathe, where it is often windier.

Industries can have localised impacts on air quality at times. The treatment and disposal of organic wastes from people and farming, and waste from the processing of agricultural products also affects air quality. Large-scale agrichemical spraying occurs every so often in rural areas, presenting a short-term localised source of air pollution. Similarly, stubble burning is still allowed and can produce short-term affects on air quality in rural towns.



## What does PM<sub>10</sub> really do to us?

Air pollution smells bad and sometimes we can't see through it very well, but does it really hurt us?

Sadly, yes. Studies have shown that PM<sub>10</sub> air pollution in Canterbury contributes to:

- Over 150 deaths
- About 250 extra hospital admissions per year for chest and heart problems.
- About 290,000 "restricted activity days" per year in Canterbury – days where people are sick from work, or have to restrict their activities in some way due to the effects of air pollution.

(Source: Health and Air Pollution in New Zealand study – Final Report 2007)

## The long and short of it

On a particularly smoggy winter's night you could experience itchy eyes, nose or throat or perhaps difficulties with your sinuses or breathing. Annoying, for sure, but more severe conditions caused or made worse by air pollution include asthma, bronchitis, lung disease or heart disease. Now that is getting serious!

Particles can also reduce your capacity to resist infection. Studies show that particles can increase the number of hospital admissions and emergency department visits, school absences, lost work days and restricted activity days. (Source: Ministry for the Environment)

Particles can also affect plants, although there is little information available on this. In very dusty environments, particles may affect photosynthesis in plants by settling on leaves and reducing the amount of sunlight reaching the leaf.



## Activity

Begin a glossary of words related to air pollution. Students will need to use a dictionary to find the meanings. Begin with this list and add more words as you read through this unit.

air, pollution, smoke, nuisance, smog, noxious, respiratory, soot, domestic etc.

## Did you know...?

On a bad night, there can be as much as seven tonnes of particulate hanging in the air above Christchurch. If you swept it all together to make a pile of soot it would fill up two whole rubbish trucks!

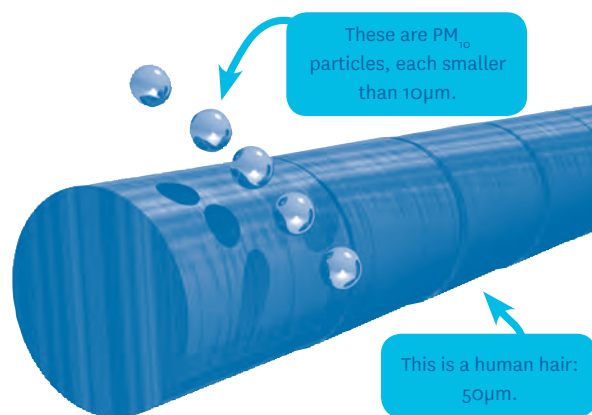


# Canterbury

## The harmful stuff – PM<sub>10</sub>

There are many different substances in the air that can be harmful to our health. The one that most frequently exceeds health and environmental standards in Canterbury urban areas is PM<sub>10</sub>.

Air pollution comes from different sources, but the one of most concern to human health is suspended particulate (PM<sub>10</sub>). These are tiny particles in smoke, smaller than 10 microns across, which is about one-fifth the diameter of a human hair. These particles are so small that they get inhaled and can travel deep into the lungs, irritating the breathing passages. They are so small that they can enter buildings that don't even have fires and cause nuisance and health problems for people living there. Large amounts of PM<sub>10</sub> are associated with many health problems such as irritation of the eyes and nose and making existing respiratory or cardiac problems worse among young children and the elderly.



### Did you know...?

A microgram (µg) is a millionth of a gram. Now that's tiny!

### How do you measure something so small?

One way is with a special machine, which sucks in a measured amount of air through a filter. The filter is dried, then weighed before and after sampling, which tells us how much PM<sub>10</sub> is in the air.

This is a concentration measured in **micrograms per cubic metre of air** (averaged over 24 hours), expressed in symbols as µg/m<sup>3</sup>. The health-based standard for PM<sub>10</sub> says the concentration should be below 50. **Once it gets over that, health problems such as respiratory difficulties can become considerably worse.** However, there is no agreed "safe level" for PM<sub>10</sub> – any amount is potentially bad for us.



### In the classroom - What's a micron?

1. Measure your height. What unit of measurement do you use to do this?
2. Measure the **length** of your index finger. What is the best unit for this measurement?
3. Now try to measure the **width** of a strand of hair. Can you do this using millimetres? Why not?

A measurement unit small enough to do this is a micrometre (or micron) – that's a thousandth of a millimetre. Your strand of hair measures about 50 microns (0.05 mm). The diagram above compares PM<sub>10</sub> particles to a strand of human hair.



High pollution  
206 µg/m<sup>3</sup>



Moderate pollution  
85 µg/m<sup>3</sup>



Clean  
6 µg/m<sup>3</sup>

### Try this!

Look at the photos of the filters through a microscope, or powerful magnifying glass.

Notice how each one is made up of thousands of tiny dots. The more dots there are, the blacker the colour.

This is similar to how the concentrations increase, the more particles there are in the air.



### Activity

Try using a "Ringelmann Smoke Chart"! Type this phrase into Google to find out how to make and use one. Use the Ringelmann cards to measure the opacity (shade of grey) of some smoke coming from a chimney. If your school has a boiler and smoke-stack, you could measure the smoke coming from it on a winter's day.

### Did you know...?

PM<sub>10</sub> are very tiny - less than 10 microns in diameter!

You could fit 50 PM<sub>10</sub> particles into this full stop. ←

## Risky business

Most at risk are people who already have trouble with breathing (suffer from respiratory problems), e.g. people with asthma may find they have more asthma episodes or more severe attacks.



- Eyes** Visible pollution irritates the eyes
- Nose** Irritates the nose and sinuses
- Tongue** Smell and taste the pollution
- Throat** Larger particles can lodge in nose and throat.  
Can cause chronic cough.  
Can cause airway obstructive diseases.  
More coughs, colds and chest problems.
- Lungs** Particles enter the lungs and irritate the breathing passages and air sacs.  
Can cause chest illnesses in children, such as bronchitis.  
Can increase incidences of asthma – has increased hospitalisation and emergency room visits for asthma.
- Heart** Existing heart problems can be worsened
- General** Carcinogenic (cancer-causing substances)  
Toxic (poisonous substances)



## Extra Extra

Do some research in your local area.

You could:

- Find out what illnesses people suffer from in winter
- Do a survey within your class or your school to see if people feel differently on or after high pollution nights
- Find out total numbers of students away sick from school each week and see whether there is any relation to high pollution nights
- Find out how many people have an existing condition (e.g. asthma) and ask them how smog affects them
- Question people whether or not they play winter sports – do they feel affected on smoggy nights?

## Did you know...?

Because PM<sub>10</sub> particles are so small, they can travel deep into the lungs and cause serious health problems. They can also get inside our homes so we breathe them while we are asleep.



## In the classroom - Make your own air pollution gauge

1. As a class, make a large map of your school; draw all the buildings, incinerator, trees, gardens, etc.
2. When the map is completed, consider where you think would be a good places to check the air quality and list them on the table below.
3. Cut up some cardboard into 10cm x 10cm squares; better still use polystyrene trays, in case of rain.
4. On the back of the cards write the name of the place you will be testing.
5. Smear the squares with a 3-4 mm coating of Vaseline.
6. With a pin, stick the card up in the place you have decided to test the air. Put the cards in a place off the ground, where they can't be disturbed. Leave the cards for three days. Make sure the weather for the three days is recorded.
7. Collect the cards, being careful not to smear the Vaseline.
8. Back in the classroom, line them up on the sill of the blackboard or in a place where everyone can see them.

### Discuss:

**Which card is from which place?**

**Is there any difference between cards?**

**Why, why not? Was the weather a factor?**

**Is the dirt on the cards all from the air?**

**Are the results what you expected?**

- Rank the cards from dirtiest to the cleanest. Write these in the results column on your table.
- Best results are likely to be seen on cold, frosty nights in June/July.

### Now try it at home.

1. Repeat the activity at home. Each student to put a card up outside their house.
2. The cards will need to be labelled with the street and other information such as, whether it is close to a road or a park and whether there were many chimneys close by.
3. Descriptions of the weather for the three days are again an important factor.
4. Discuss the results compared to what was found at school.
5. Did the results differ from street to street or from suburb to suburb?



# Canterbury

## Why Canterbury?



### In the classroom

#### Draw a map of your town or area.

Put the main geographic features around your town (e.g. hills, valleys, coast, etc.) and mark the exact spot where you live.

Now, looking at the drawing that shows how the inversion layer occurs in Canterbury, see if you can work out whether you might be in a particularly bad position for smog during winter or if you are lucky and can avoid it.

### Shape of the land + climate = smog trap

**Land** - The combination of the Canterbury Plains, Port Hills and Southern Alps creates temperature inversions. This is when cold air is trapped under layers of warmer air and smoke particles are trapped with it.

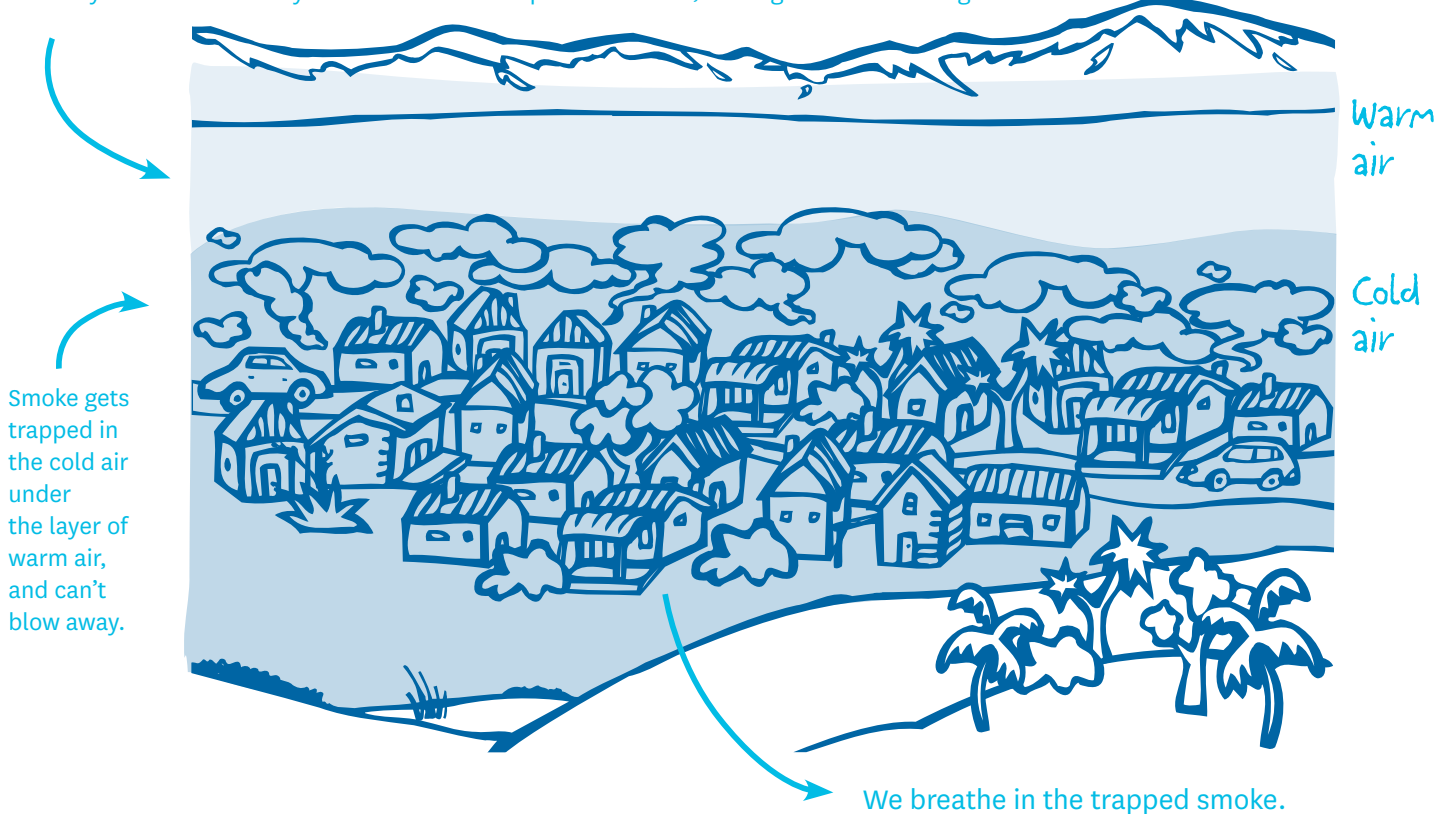
**Climate** - During the winter, Canterbury often has cold but settled weather with many frosty and still evenings. These are the nights when our pollution levels are at their highest because the smoke from our home fires is not being blown away by wind.

When there is very little wind and clear skies at night, the land cools fast. The air closest to the earth's surface also gets cooled through the night, creating a layer of cool air that sits below any warmer air further up. This is called a temperature inversion.

Normally, the air is warmer closer to the earth's surface, and because warmer air tends to rise, any smoke rises away. In a temperature inversion, the air close to the ground is cool and tends to stay where it is, especially on a clear, windless night. Smoke gets trapped in this inversion layer, which can be tens of metres thick, and we breathe in the trapped smoke. The inversion layer lasts until the sun warms up the land and/or the wind picks up speed again.

## How the inversion layer occurs

Westerly wind moves slowly from the Southern Alps to the towns, cooling the air near the ground.

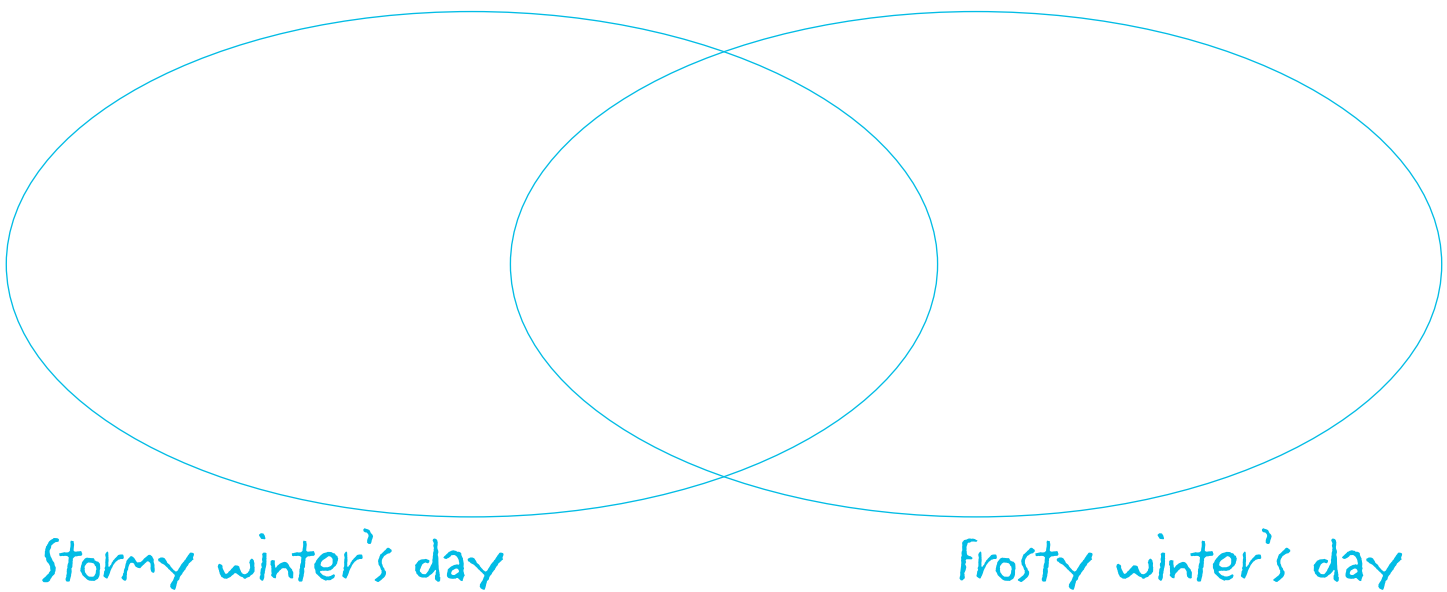






### Activity - Exploring our winter weather

Two types of weather are most common during a Canterbury winter: **southerly storms** and **crisp clear frosts**.



1. On the diagram above, describe the weather conditions on a stormy winter's day, on a frosty winter's day, and things that are common to both types of day. Use these words (and some of your own):

strong cold wind (southerly), no wind, chilly, sunny, frost, rain, cold, sleet/snow.

2. Which type of winter's day will trap air pollution the most? .....

3. Why? .....

# Canterbury

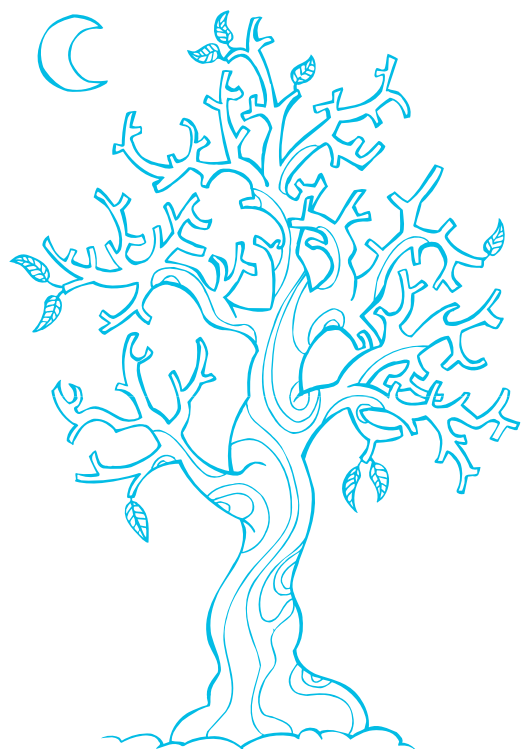


## In the classroom

1. It's the 1930s. Students pretend they are part of the Sunlight League and make up their own advertisements to go in a newspaper, telling people about the 'evils' of air pollution.
2. It's 2014. Air pollution, although improved, is still a problem in Christchurch and Canterbury towns. Form groups of three to four and design a campaign to ensure that the National Environmental Standard for Air Quality is met... and you only have one year to go!

You will need to consider:

- A name for your group.
- How you are going to let people know about the problems and what they need to do (e.g. advertise, write articles)?
- How long will the campaign run?
- How will you know if the campaign was successful?



## A long history of air pollution in Canterbury

Air pollution in Canterbury is not a new problem. In fact, the first known press report of smoke nuisance in Christchurch was on 9 August 1869. Christchurch was only established as a city in 1850!

### Enough is enough!

A group called the 'Sunlight League' was formed in the 1930s, and campaigned to inform the public on the 'evils' of air pollution. They said smoke was the cause of the "noxious fogs of winter" which caused respiratory troubles, city buildings to be "disfigured by soot" and people to pay "exorbitant laundry bills".



### Parts of a letter written by the Sunlight League in 1935

"...the soot collecting gauges in Christchurch show that soot, ash, tarry particles and dust fall at the rate of 400 tons per square mile per annum..."

"...that each one realises their responsibility to prevent their chimney from smoking that our city will become much cleaner, more beautiful and much healthier to live in..."

"... There is no reason why people should suffer such a nuisance. The Sunlight League wishes to draw attention to individual responsibility..."

### Canterbury, we have a problem!

Significant milestones since then to address Canterbury's air quality issues include

- The introduction of the Clean Air Act (1972),
- The release of the Environment Canterbury Air Plan (notified 2002, adopted in 2009). Details of the Air Plan rules for towns in Canterbury can be found on pages 14-18 in this booklet. Or you can visit [www.ecan.govt.nz/our-responsibilities/Air](http://www.ecan.govt.nz/our-responsibilities/Air)

The implementation of a **National Environmental Standard for Air Quality** (2004), requiring **regional councils to reduce pollution to acceptable levels**. There are 14 standards that include:

- seven standards banning activities that discharge significant quantities of dioxins and other toxics into the air
- five standards for ambient (outdoor) air quality
- a design standard for new wood burners installed in urban areas
- a requirement for landfills over 1 million tonnes of refuse to collect greenhouse gas emissions.

(Source: MfE website October 17th 2011)

There are a number of plans and programmes to ensure this happens in effected Canterbury towns. These include:

- **Environment Canterbury's Air Plan:** The plan includes rules and regulations for urban areas in Canterbury. Currently the only urban areas with restrictions on the kinds of home heating allowed are Ashburton, Christchurch, Rangiora and Kaiapoi. There are a number of urban areas in Canterbury other than Ashburton, Christchurch, Kaiapoi, Rangiora and Timaru where winter air quality may be poor at times. However, there are no immediate plans to introduce rules that would restrict the types of home heating that can be used, beyond these five centres.
- Energy Efficiency and Conservation Authority (EECA) ENERGYWISE: Heat Up New Zealand programme.
- Ashburton: Clean Heat Ashburton.



## Activity

# Your Air Diary

This activity is best done between June and July, when air pollution levels are highest. Photocopy the diary page so that you have enough pages for a week of monitoring. Each evening, check the weather forecast and make a pollution prediction based on the forecast. Check this with the air pollution forecast made for Christchurch, Kaiapoi, Rangiora, Ashburton and Timaru on [www.ecan.govt.nz](http://www.ecan.govt.nz). As late in the evening as you can safely go, take a short walk around your neighbourhood and record what you observe. The next morning, record what the weather actually was like, and find the air pollution readings at [www.ecan.govt.nz/todaysair](http://www.ecan.govt.nz/todaysair)

### Air diary extra – High pollution nights.

Find the air pollution graphs in The Press newspaper in Christchurch next to the weather section or at [www.ecan.govt.nz/todaysair](http://www.ecan.govt.nz/todaysair) for other towns. Compare the number of high pollution nights between your town and two others. You could monitor this over a few days, a week or a month and see what changes there are and look at how the weather during this time may have affected the results. You could put the results into a graph and discuss the differences as a class.



Day:

Weather forecast (short description): \_\_\_\_\_

Your pollution prediction:      Hardly any      Slightly smoggy      Getting nasty      Chokin'!



Evening walk: 5-10 minutes: Your observations: \_\_\_\_\_

Smell of pollution - how bad:      Didn't notice      Slight stink      Getting nasty      Can hardly breathe!



How many smoky chimneys did you see tonight? \_\_\_\_\_

Did you do any outdoor activities (apart from the walk) e.g. sports practice? \_\_\_\_\_

Date:

Next  
day

Weather report: Minimum temperature: \_\_\_\_\_ C.      Wind: \_\_\_\_\_      Frosty? Y / N

Air pollution (PM<sub>10</sub>) reading from ECan website: \_\_\_\_\_ micrograms per cubic metre of air.

Day:

Weather forecast (short description): \_\_\_\_\_

Your pollution prediction:      Hardly any      Slightly smoggy      Getting nasty      Chokin'!



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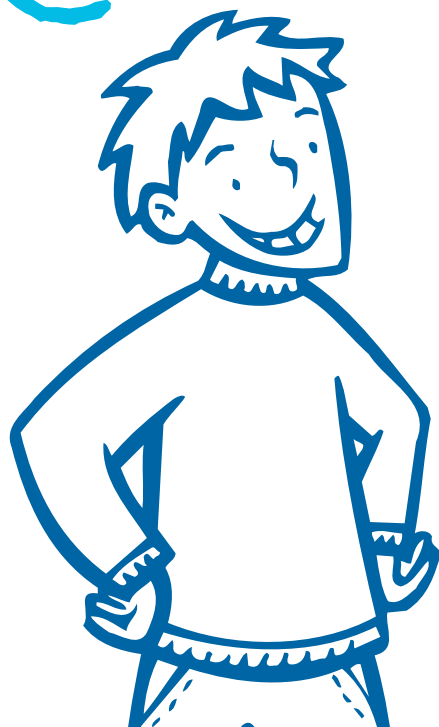
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Air pollution (PM<sub>10</sub>) reading from ECan website: \_\_\_\_\_ micrograms per cubic metre of air.



# Canterbury



## Activity What can you see?

Use the photos below and the information you have read so far to answer the following questions about the major sources of air pollution and the effects they have on people and the environment. Students could work individually or in groups.

- Write a caption/title for each photo.
- Write a brief description of what you can see.
- If you were there, what do you think you could smell?
- What would you be feeling if you were in the photo?
- What problem does this photo show?
- What could you do about this problem?
- Who could help you achieve this?
- Are there any links between this photo and the other photos?

## What's up with the air – different types of pollution

Canterbury generally has good air quality, and in many places, such as national parks, the air is virtually free of pollutants from human activities. However, where air pollution from sources such as home heating fires, industries and congested roads becomes too high, this impacts our health as well the health of our environment.

Good air quality is of great significance to Tāngata Whenua because of the interrelationship between air and other resources such as water, flora and fauna, and its life-supporting capacity. For Tāngata Whenua, air is a taonga.

### The main issues

In Canterbury, there are three levels of air quality issues:

(a) **Localised** air quality issues associated with odours, dust, smoke, agrichemical spray and other air discharges from domestic, transport, commercial, agricultural, horticultural, manufacturing and industrial sectors;

(b) **Ambient** air quality issues related to wintertime air pollution in urban areas, particularly Christchurch, Timaru and Kaiapoi.

(c) **Global** air quality issues connected to reduction in the ozone layer, greenhouse gas emissions and global warming.

Ambient air is the air that surrounds us in general and is around us all the time. Localised means the air from a nearby source, often depending on the wind coming from that direction.



### What about climate change ...?

The major “pollution” issue worldwide is the likelihood of rapid climate change, brought on by the warming of the Earth due to human activities. Canterbury’s air pollution problem is an issue in its towns and cities, as distinct from the global issue of climate change.

If you or your students want to find out more about global warming, look at the June 2008 E-Box, A Changing Climate.

### Odour

Odour is one of the most frequently raised concerns about poor air quality in Canterbury. Odour, possibly more than any other form of pollution, directly affects the “amenity values” of an area. Amenity values are those qualities and characteristics that contribute to people’s appreciation of an area.

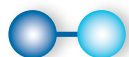


Source: The Science Learning Hub/University of Waikato [www.sciencelearn.org.nz](http://www.sciencelearn.org.nz)

# What else is in the air?

As well as particulate matter (PM<sub>10</sub>), the other major pollutants in the air we breathe are carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>) and ozone (O<sub>3</sub>).

The chemical images are from MfE site:  
[www.mfe.govt.nz/issues/air/breathe/](http://www.mfe.govt.nz/issues/air/breathe/)



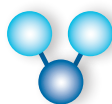
**Carbon monoxide** is produced mainly from the incomplete combustion of fuels such as petrol (from cars) and wood and coal (from home heating and industry). In cities, 75 percent of carbon monoxide comes from traffic, mostly petrol-driven cars. Natural sources of carbon monoxide include volcanoes and fires.

Carbon monoxide is readily absorbed by the lungs and interferes with the blood's ability to carry oxygen. The effects of carbon monoxide increase in severity as exposure increases.

Carbon monoxide can be both a localised problem, around congested roads, and an ambient problem (for example, when an inversion layer in winter can trap carbon monoxide from fires and vehicles).

The National Environmental Standard for carbon monoxide is 10 milligrams per cubic metre (8 hour average), not to be exceeded more than once per year. Concentrations measured in Christchurch can get close to or exceed this standard a few times each year. In Kaiapoi and Timaru the highest concentrations are around half of this standard, while in Rangiora, Ashburton, Geraldine and Waimate they are usually well under half.

Carbon monoxide (CO) is a colourless gas that affects mortality slightly, but exacerbates heart disease and causes drowsiness and learning difficulties. Raised levels of carbon monoxide are strongly correlated with raised levels of PM<sub>10</sub> in cities.



**Nitrogen dioxide** is produced directly from combustion processes and indirectly as a result of the reaction of oxides of nitrogen with other chemicals in the air.

The primary source of nitrogen dioxide in New Zealand is the combustion of fossil fuels (coal, gas and oil), especially petrol used in cars. In cities, cars contribute about 80 percent of nitrogen dioxide levels. Natural sources of nitrogen oxides include volcanoes and bacteria and viruses. Nitrogen dioxide has been linked to increases in asthma symptoms and reduced lung development and function in children. Nitrogen dioxide can

decrease the lungs' defences against bacteria, making them more susceptible to infections. Nitrogen dioxide can be both a localised problem, around congested roads, and an ambient problem.

The National Environmental Standard for nitrogen dioxide is 200 micrograms per cubic metre (1-hour average), not to be exceeded more than nine hours per year.

In Christchurch, the highest concentrations each year are less than half of this standard. As there are fewer cars in other towns of Canterbury, concentrations of nitrogen dioxide will be lower, so monitoring hasn't been carried out other than in Timaru, where the highest concentration was 60 µg/m<sup>3</sup>.

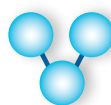


**Sulphur dioxide** is produced mainly from the combustion of fossil fuels that contain sulphur, such as coal and oil (for example, coal being burnt for home heating and oil- and coal-fired boilers used by industry). Sulphur dioxide is also produced from some industrial processes, such as petrol refining, fertiliser

manufacturing and steel manufacturing. Natural sources of sulphur dioxide include geothermal activity and volcanoes.

Sulphur dioxide can cause respiratory problems, such as bronchitis, and can aggravate symptoms of people suffering from asthma or chronic lung disease. Sulphur dioxide is typically a localised problem caused by specific industrial discharges.

The National Environmental Standard for sulphur dioxide is 350 micrograms per cubic metre (1-hour average), not to be exceeded more than nine hours per year. In some industrial areas of Christchurch (Woolston and Hornby) there have been a few hours when the concentrations were greater than 350, but not more than nine times in a year. In Timaru the highest concentrations are less than a third of the standard and in Rangiora, Kaiapoi, Ashburton, Geraldine and Waimate the highest concentrations are less than 30 µg/m<sup>3</sup>.



**Ozone at ground level** is formed by reactions of nitrogen oxides and volatile organic compounds in sunlight. Nitrogen oxides and volatile organic compounds are produced from motor vehicle emissions, industrial combustion sources, and the industrial and domestic use of solvents and coatings.



## Activity Word unscramble

Unscramble the following words and match them with their meaning

**bacorn moonidex (CO)**

This poisonous gas comes out of vehicle exhaust pipes (from petrol) and chimneys (from home heating and industry). It is readily absorbed by the lungs and interferes with the blood's ability to carry oxygen.

**prulush eddiiox**

Is produced mainly from the combustion of fossil fuels that contain sulphur, such as coal and oil (for example, coal being burnt for home heating and oil- and coal-fired boilers used by industry). Can cause respiratory problems, such as bronchitis and can aggravate symptoms of people suffering from asthma or chronic lung disease.

**tnosharub, hthscurscich, oaapiik, gaarnoir**

The urban areas in Canterbury that currently have restrictions on the kinds of home heating allowed.

**pvsnseedd raptclvatei (PM<sub>10</sub>)**

Tiny particles in smoke smaller than 10 microns across, about the diameter of a human hair.

**gomS**

Either a mix of smoke and fog or smoke pollution so thick, it looks like fog.

Answers: carbon monoxide, sulphur dioxide, Ashburton, Christchurch, Kaiapoi, Rangiora, suspended particulate, smog

Ozone at ground level affects the respiratory and cardiovascular system and can cause tissue damage in the lungs.

Because ozone at ground level forms over time, the highest concentrations are usually found downwind from major cities, where most contaminants are released.

The National Environmental Standard for ozone is 150 micrograms per cubic metre (1-hour average), not to be exceeded at any time. The highest concentration measured in Lincoln, downwind of Christchurch, was less than 100 µg/m<sup>3</sup>.

Source: Ministry for the Environment,  
[www.mfe.govt.nz](http://www.mfe.govt.nz)



## Christchurch Quake update

The earthquakes have meant that some people's homes have been damaged. Keeping warm is very important in winter, so people in these damaged homes will still be able to use their open fires or older wood burners until their homes are repaired or rebuilt.

### The issue

Christchurch experiences serious air pollution during the winter months.

### Where's it all coming from?

Home heating is the biggest culprit, in combination with the weather and topography (the shape of the land) in Christchurch which assist in trapping pollution – but the weather and the land can't be changed. The only way to improve air quality is to reduce home heating emissions. For more information see earlier sections on pages 4-5 and 8-9.

### Change is good!

Some of the benefits of reducing  $PM_{10}$  concentrations include:

- fewer people going into hospital with pollution related illness
- a reduction in the number of days missed from work
- a reduction in medication use
- reduced nuisance effects associated with smell and smoke.

### Did you know...?

By the 1920s, the smog problem in Christchurch had grown so serious that sometimes people couldn't see during the daytime without street lamps!

Christchurch (St Albans)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of high pollution nights ( $>50 \mu g/m^3$ )	31	51	28	35	36	32	27	14	18	13	12	28
Highest daily concentration of $PM_{10}$	182	220	214	136	135	147	184	120	87	85	90	112

Number of high pollution nights in Christchurch 2000-2011. Note that the higher figures for 2011 are the result of silt in the air. This has skewed the readings.

### What's being done?

Facilitating a change in the way people heat their homes to improve air quality for everyone in Canterbury is a major objective of the Air Plan. This plan looks at all of the different aspects of air quality, what the issues are and the solutions both for now and the future. For more information visit [www.ecan.govt.nz/our-responsibilities/Air](http://www.ecan.govt.nz/our-responsibilities/Air)

### Cleaning up the air in Christchurch

In 2003, Environment Canterbury launched the Clean Heat Project in Christchurch. The project gave homeowners financial incentives to change to cleaner forms of heating and improve home insulation. A Clean Heat assessor gave advice about the best way to insulate and heat your home. Alongside the availability and promotion of clean heat alternatives such as heat pumps, the Clean Heat project was influential in cleaning up winter-time air pollution in Christchurch.



# for a BIG problem

## It pays to be smart - it's in the rule book

From 1 April 2010, the winter use of open fires and old solid fuel burners (15 years and older) in Christchurch was banned. The ban extends from 1 April to 30 September each year and applies within Christchurch Clean Air Zone 1, the lighter area shown on the map (left). In Christchurch, homeowners who use a banned form of heating from April to September risk a \$300 fine for a first offence, rising to \$1050 or prosecution for repeated offences.

## Helping hands

There are lots of other things you can do to help clear the air, while keeping you and your home warm and healthy! Check out pages 22-23 for more information.

## It's not all bad!

Over the past 10 years Christchurch's number of high pollution nights has reduced significantly. In 1999 Christchurch experienced 50 high pollution nights, but the year to September 2010 had produced just 12. Just as important, the highest daily concentration now is around half what it was ten years ago.

### Did you know...?

From the start of the programme to spring 2010, more than 18,000 Christchurch homeowners had made the change with the help of the Clean Heat Project!



Energy Efficiency and Conservation Authority  
Te Tari Tiaki Pūngao

In 2009 the Energy Efficient and Conservation Authority (EECA) launched the ENERGYWISE: Warm Up New Zealand Heat Smart programme.

If your house was built before 2000 you are eligible for ENERGYWISE™ funding to install insulation and /or heating.

The Heat Smart programme replaced the Clean Heat programme in Canterbury in 2010.



### Activity - What do we know so far?

- Ask students to brainstorm (and record) all of the aspects of air pollution in Canterbury that they have looked at throughout this resource book. Some ideas are: health, environment, taking action, pollutants, and causes.
- Divide the class into groups and allocate each group one of the main areas/topics associated with air pollution in Canterbury (that you have just brainstormed as a class). Each group can then summarise their topic and report back to the rest of the class.

## Timaru

## The issue

During the wintertime, Timaru experiences serious air pollution and the problem is not improving. In 2010, Timaru experienced 49 high air pollution nights, the highest by far of all the Canterbury airsheds.

## Where's it all coming from?

The types of home heating used, in combination with settled weather and the geography of the area which assists in trapping pollution. But we can't change geography. The only way to improve Timaru's air quality is to reduce home heating emissions. For more information see earlier sections on pages 4-5 and 8-9.

## Breaking the bank

Open fires are an expensive form of heating. Most of the heat goes straight up the chimney. The approximate cost per kWh (kilowatt-hour) of useable heat energy for open fires is 26 cents for wood burning and 28 cents for coal. This is compared with 6 cents per kWh for a heat pump or enclosed wood burner and 12 cents per kWh for a plug-in heater! (See report by Greer & Bicknell – 2001:39).

## Did you know...?

In 2008 a permanent air pollution monitoring station was set up in Washdyke, just north of Timaru to assess emissions in this largely industrial area. Another monitoring unit in Anzac Park measures air pollution in the heart of residential Timaru. Both monitor particles ( $PM_{10}$ ) as well as gases (sulphur dioxide and carbon monoxide).



## Activity - Explore the web

See if you can fill in the gaps below using this resource and/or visit [www.ecan.govt.nz/air](http://www.ecan.govt.nz/air)

In general Canterbury has \_\_\_\_\_ air quality. However during the winter months, levels of \_\_\_\_\_ cause a serious \_\_\_\_\_. There are three main causes of  $PM_{10}$  pollution in Canterbury towns & they are \_\_\_\_\_, \_\_\_\_\_ & \_\_\_\_\_. The burning of \_\_\_\_\_ & \_\_\_\_\_ for home heating during winter is the major offender & will need to be considerably reduced by the year \_\_\_\_\_ to meet the National Environmental Standard set by the Ministry for the Environment.

WORD BANK: transport,  $PM_{10}$ , pollution, wood, good, industry, health risk, 2013, home heating, coal

Timaru (Anzac Park)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of high pollution nights (>50 $\mu g/m^3$ )	50	48	33	50	39	46	36	36	37	38	49	26
Highest daily concentration of $PM_{10}$	162	154	107	155	117	109	190	128	109	134	148	113

Number of high pollution nights in Timaru 2000-2011

## What's being done?

While Timaru regularly experiences serious air pollution, typically exceeding the National Environmental Standards for air quality 30-50 times each winter, there are currently no rules restricting the kinds of home heating that can be used there. Environment Canterbury is currently working with the Timaru community to find an appropriate way to tackle the issue. The development of rules similar to those of other Canterbury centres is one option being considered. For more information visit [www.ecan.govt.nz/our-responsibilities/Air](http://www.ecan.govt.nz/our-responsibilities/Air)

## Cleaning up the air in Timaru

The EECA ENERGYWISE: Warm Up New Zealand Heat Smart programme is a national programme. Therefore, those who own a house built before 2000 are eligible for funding to install insulation and/or heating.



## Helping hands

There are lots of other things you can do to help clear the air, while keeping you and your home warm and healthy! Check out pages 22-23 for more information.

# for a BIG problem

## Kaiapoi

### The issue

Kaiapoi experiences serious air pollution during the wintertime.

### Where's it all coming from?

The types of home heating used, in combination with settled weather and the geography of the area which assists in trapping pollution. For more information see earlier sections on pages 4-5 and 8-9.

Particulate pollution caused by home heating in Kaiapoi regularly exceeds the health-based National Environmental Standard for air quality. The only way to improve air quality in Kaiapoi is to reduce home heating emissions.

### Home is where the heat is

Most of the PM<sub>10</sub> in Kaiapoi (87%) comes from home heating. Along with other towns in New Zealand Kaiapoi must meet the National Environmental Standard by 2013 and the home heating rules from Environment Canterbury are aimed at helping to achieve this.

### What's being done?

Helping to change the way people heat their homes to improve air quality for everyone in Canterbury is a major objective of the Air Plan. The rules for home heating in Kaiapoi are part of that plan. The plan looks at all of the different aspects of air quality, what the issues are and the solutions both for now and the future. For more information visit [www.ecan.govt.nz/our-responsibilities/Air](http://www.ecan.govt.nz/our-responsibilities/Air)

Homeowners in Kaiapoi who use a banned form of heating in Kaiapoi at from May 2011 risk a \$300 fine for a first offence, rising to \$1050 or prosecution for repeated offences.

### Did you know...?

In 2009, Kaiapoi had the second highest number of high pollution nights (24) out of the seven Canterbury towns monitored. In August 2010 Kaiapoi had experienced 24 high pollution nights, again the second highest number (after Timaru) in Canterbury.

Kaiapoi	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of high pollution nights (>50 µg/m <sup>3</sup> )	Monitoring not carried out.	39	29	35	17	17	28	19	19	24	24	24
Highest daily concentration of PM <sub>10</sub>	153	138	63	99	152	161	104	86	86	98	110	

Number of high pollution nights in Timaru 2000-2011

### Are there any exceptions?

After May 2010, Kaiapoi residents can still use an open fire or older burner for emergency heating or cooking during an unplanned electricity network power outage lasting three hours or more. Open fire places and older solid fuel burners do not have to be sealed up or removed unless Environment Canterbury's Clean Heat Project installs a new heating system in your house.

### Cleaning up the air in Kaiapoi

In 2003, Environment Canterbury launched the Clean Heat Project. The Project provided homeowners financial incentives to change to cleaner forms of heating and improve home insulation. A Clean Heat assessor gave advice about the best way to insulate and heat your home. Alongside the availability and promotion of clean heat alternatives such as heat pumps, the Clean Heat project was influential in cleaning up winter-time air pollution in Christchurch.

In 2009 the Energy Efficient and Conservation Authority (EECA) launched the ENERGYWISE: Warm Up New Zealand Heat Smart programme. If your house was built before 2000 you are eligible for ENERGYWISE™ funding to install insulation and/or heating. The Heat Smart programme replaced the Clean Heat programme in Canterbury in 2010.



### It pays to be smart - it's in the rule book

From 1 May 2010, each dwelling house or building using an open fire or old solid fuel burner (15 years or older) in Kaiapoi Zone 1 requires resource consent with Environment Canterbury. When a home changes hands in Kaiapoi, the rules become effective immediately. For more information on the resource consent process, contact Environment Canterbury's Customer Services Team 0800 324 636. People who use a banned form of heating in Kaiapoi at any time of year from May 2011 risk a \$300 fine for a first offence, rising to \$1050 or prosecution for repeated offences.





## Rangiora

### The issue

Rangiora experiences some serious air pollution during the winter months and monitoring shows that this poor air quality generally occurs in winter under calm weather conditions when inversion layers form.

For 5-15 days each winter in Rangiora, the level of  $PM_{10}$  in the air exceeds the National Environmental Standards. While the number of high pollution nights in Rangiora has gone up and down over the past 10 years, depending on the winter weather, there has not been a major change overall. In 2006 Rangiora had 15 high pollution nights and in 2010 Rangiora experienced 12 high pollution nights. It is hoped that with cleaner and more efficient home heating this number can be reduced.

### Where's it all coming from?

The majority of  $PM_{10}$  emissions within the Rangiora airshed come from home heating, such as open fires and older wood burners. Of all the different home heating fuel burning devices, open fires produce a relatively high level of  $PM_{10}$  emissions per appliance. This is because open fires have low combustion efficiency and are inefficient at heating bigger spaces. The only way to improve Rangiora's air quality is to reduce home heating emissions. For more information see earlier sections on pages 4-5 and 8-9.

### What's being done?

Helping to change the way people heat their homes to improve air quality for everyone in Canterbury is a major objective of the Air Plan. This includes Rangiora. The plan looks at all of the different aspects of air quality, what the issues are and the solutions both for now and the future. For more information visit [www.ecan.govt.nz/our-responsibilities/Air](http://www.ecan.govt.nz/our-responsibilities/Air)

From 2012 open fires and woodburners 15 years and older cannot be used. If they are, homeowners risk a risk a \$300 fine for a first offence, rising to \$1050 or prosecution for repeated offences.

**Want to know how old the woodburner is at your house?** Check out <http://tools.ecan.govt.nz/WoodburnerAge>

### Cleaning up the air in Rangiora

In 2009 the Energy Efficient and Conservation Authority (EECA) launched the ENERGYWISE: Warm Up New Zealand Heat Smart programme. If your house was built before 2000 you are eligible for ENERGYWISE™ funding to install insulation and/or heating. The Heat Smart programme replaced the Clean Heat programme in Canterbury in 2010.



### It pays to be smart - it's in the rule book

From 1 May 2010, each dwelling house or building using an open fire or old solid fuel burner (15 years or older) in Rangiora Zone 1 will require resource consent with Environment Canterbury.

When a home changes hands in Rangiora, the rules become effective immediately. For more information on the resource consent process, contact Environment Canterbury's Customer Services Team 0800 324 636.

People who use a banned form of heating in Rangiora at any time of year from May 2011 risk a \$300 fine for a first offence, rising to \$1050 or prosecution for repeated offences.



### Helping hands

There are lots of other things you can do to help clear the air, while keeping you and your home warm and healthy! Check out pages 22-23 for more information.

Rangiora	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of high pollution nights (>50 $\mu\text{g}/\text{m}^3$ )	7	Monitoring not carried out.			6	9	15	4	6	3	12	11
Highest daily concentration of $PM_{10}$	97				78	99	138	107	61	88*	91	70

\* Dust event on September 14, 2009. Next highest daily concentration was 54.

Number of high pollution nights in Rangiora 2000-2011

# for a BIG problem

## Ashburton

### The issue

Along with all of the other airsheds in Canterbury, Ashburton experiences significant air pollution during the winter months.

### Where's it all coming from?

The types of home heating used, in combination with settled weather and the geography of the area which assists in trapping pollution. But we can't change geography. The only way to improve air quality is to reduce home heating emissions. For more information see earlier sections on pages 4-5 and 8-9.

Monitoring shows that Ashburton's poor air quality generally occurs in winter (from May to September) under calm weather conditions when inversion layers form. These very high levels of PM<sub>10</sub> are linked with many health problems including minor irritation of eyes and nose and the worsening of existing respiratory and cardiac problems among small children and the elderly.



Ashburton	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of high pollution nights (>50 µg/m³)	16	Monitoring not carried out.				18	25	13	15	9	11	15
Highest daily concentration of PM <sub>10</sub>	97					89	136	90	90	128*	79	86

\* Dust event on September 14, 2009. Next highest daily concentration was 54.

### Did you know?

In winter 2006, Ashburton recorded 25 high pollution nights, one of the highest for the region! This was linked to the very cold winter that year. While this number was greatly reduced to 9 nights in 2009 and 11 nights by September 2010, there is no clear downward trend for Ashburton at this time.

Number of high pollution nights in Ashburton 2000-2011

### What's being done?

Facilitating a change in the way people heat their homes to improve air quality for everyone in Canterbury is a major objective of the Air Plan. This includes Ashburton. The plan looks at all of the different aspects of air quality, what the issues are and the solutions both for now and the future. For more information visit [www.ecan.govt.nz/our-responsibilities/Air](http://www.ecan.govt.nz/our-responsibilities/Air)

### Cleaning up the air in Ashburton

To help homeowners change to cleaner forms of heating and improve home insulation, the Clean Heat Ashburton programme was launched in September 2011. The programme is run by Ashburton District Council in partnership with Environment Canterbury. The key focus of the partnership is the development and implementation of local solutions to the local air quality problem. [www.cleanheatashburton.org.nz](http://www.cleanheatashburton.org.nz)

The programme aims to:

- Raise awareness of the Ashburton winter air pollution problem and the effects on people's health
- Encourage people to use dry, untreated wood in their burners and ensure they are operating efficiently
- Encourage people who are living in Ashburton township to convert to cleaner heating appliances by taking advantage of the funding that is available through the Government's Warm Up New Zealand: Heat Smart programme.

### Why? Because it's in the rules

From 1 May 2011, each dwelling house or building using an open fire or old solid fuel burner (15 years and older) in Ashburton requires resource consent with Environment Canterbury. Although the rules become effective then, Ashburton people have been given an extra year until May 2012 to prepare to change. From May 2011, they are advised to use a temporary alternative while they wait for a cleaner form of heating to be installed.

When a home changes hands in Ashburton, the rules become effective immediately. For more information on the resource consent process, contact Environment Canterbury's Customer Services Team 0800 324 636.

People who use restricted forms of heating in Ashburton at any time of year from May 2012 risk a \$300 fine for a first offence, rising to \$1050 or prosecution for repeated offences.



**In the  
classroom**

## Debating the issue: *do you really want to clean up the air?*

If you asked a number of people whether or not they would like to get rid of the smog in our Canterbury towns, the chances are that most would say yes. But if you asked those same people how they heat their homes and if they're prepared to change what they do, you might get some conflicting answers.

### 1. Class debate

Choose a topic for your class to debate.

Examples:

- *Comfort and health versus health and the environment – it is more important that we burn wood to keep ourselves and our homes warm than it is to keep our air clean.*
- *The Air Plan is the best solution to our winter air pollution problem.*
- *Smog is just a part of living in Canterbury.*

### 2. Role play

Divide the class into small groups and give each group one of the roles outlined below. The groups discuss their position on air pollution and maybe do some further research. One person from each group then takes part in the class role play. You will have to decide what the scenario is, e.g. they could be at a demonstration or at a council meeting or a community gathering.

#### ROLES

**Councillors and local politicians:** You have a responsibility to answer the concerns of local citizens who are worried about air pollution. You are also aware that some people don't want to change their home heating. **Medical staff:** You are concerned about the number of people being admitted to hospital for breathing-related problems in winter and the number of deaths related to this. **Scientists:** You monitor levels of air pollution and your main job is to ensure that everyone knows what pollution is occurring and why.

**Environmentalists:** You are **completely against all use of domestic fires**. You are interested in renewable energy such as solar power and you want the council to provide assistance and advice on energy efficiency in homes.

**Concerned citizens:** You would like the city to be cleaner and safer for your children. You enjoy having a fire but understand that change is necessary.

**Sports club:** You are concerned about the health of your sports club members. You notice evening practices aren't as well attended, as they should be.

**Appliance sales staff:** You have a range of heating appliances for sale. You are concerned that some of your stock may be banned for use in the city.

**Low income representative:** You are concerned that wood and coal fires are the cheapest form of heating for some and that people on low incomes will be hit hardest by electricity prices rising.

**Note:** One way to start the debate and role play activities would be for each student in the class to place themselves (or the person they are role playing) a continuum and discuss why they have placed themselves at that point e.g.

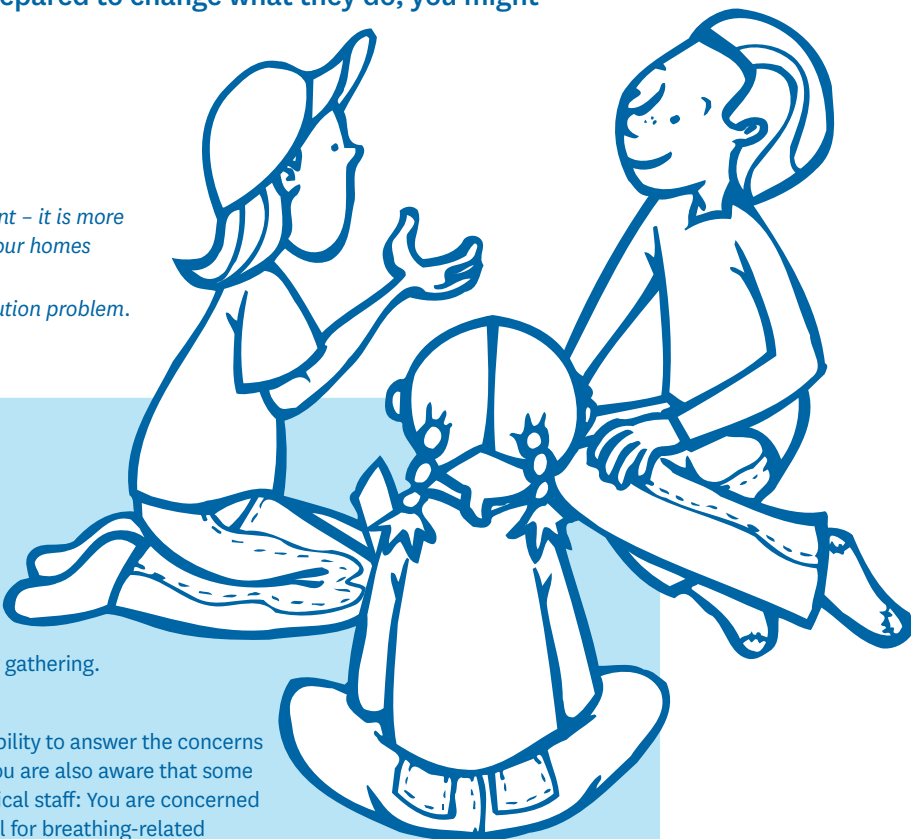
*The Air Plan is the only solution to our winter air pollution problem or smog is just a part of living in Canterbury.*

*Strongly agree*

*agree*

*disagree*

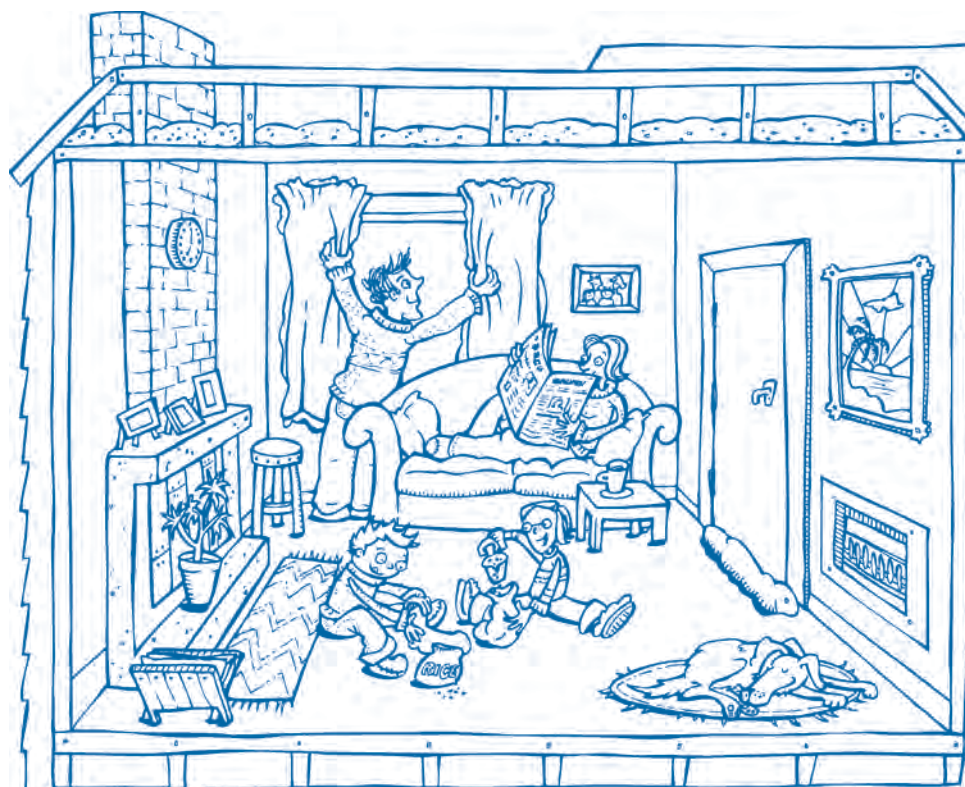
*strongly disagree*





# Heating our homes and clearing the air

Being efficient with the energy that we produce in our homes plays a big part in solving our air quality problems. There are lots of things we can do to our homes that will result in less heat being needed to make us warm, comfortable and healthy. It will also save us money in the long run.



## Activity - Clean Heat Checklist

Make a checklist based on the information on these pages and audit your home, your classroom or your school. Find out how energy-efficient you are.

### Insulation

### Heating

### Dampness

### Ventilation

## Insulation

- Ceiling insulation (a thick layer in the roof space over the entire ceiling) is a must.
- Twenty-five percent of heat loss is through the walls. If you ever need to re-line your walls, put in insulation too.
- Under-floor insulation gives warmth and stops moisture rising in the house.
- Carpets provide extra insulation.

## Heating

- Let the sun heat the house for free – remove bushes or trees that block the sun.
- Heat exchange systems that use warmer air from the roof space
- Electricity, flued-gas or diesel are cleaner ways to heat your home, as they don't pollute the air as much as wood and coal.
- Only burn dry firewood – wood that has been cut and stored allowing time for moisture and sap to evaporate.

## Keeping heat in your home

- Double-glazing is effective but also expensive – find out about alternatives like plastic window kits and make sure curtains are drawn to keep the heat in at night.
- Lined or thermal curtains help keep the heat in and the cold out.
- Concrete floors are warmer than wooden floors
- An open fire is the most expensive way to heat your home (if you are buying wood).
- Plug the gaps – draught-stopping doors and windows is inexpensive.
- An unused open fire is also a big gap – block it up with a rubbish bag filled with newspaper.

## Dampness

- Damp homes are harder to heat. Check under the house for leaky water pipes and debris or bushes blocking vents.
- Portable gas fires produce moisture, making homes damp and less energy efficient.

## Ventilation

- Ventilate your home every day for a short time to get rid of moisture caused by cooking, bathing and drying clothes – open windows at opposite ends of the house.

# Canterbury

## Incentives and help available

### What you can do?

As well as the help and financial assistance offered by the Clean Heat Project there are also other organisations that can help you decide what is the best way to heat your home, for your family and your bank balance. One key message is that when you do heat your home, try and make it as efficient as possible. For example good floor, ceiling and wall insulation and sealing any gaps in floors or walls can make all the difference.

### Home sweet home – making it warmer, drier and healthier

To really make your home warmer, drier and healthier to live in, there are three main things to think about: **insulation, heating and ventilation**. These 3 things work together as a system.

### How to heat?

Using the right kind of energy efficient heater for your home means you can keep your home warm, healthy and comfortable to live in while keeping running costs low. An energy-efficient heating system can also help our environment by reducing greenhouse gas emissions and air pollution.

#### Ventilation

- Maintains air quality
- Removes day to day moisture
- Makes your home healthier for you and your family

#### Insulation

- Makes your home easier and cheaper to heat
- Reduces the risk of mould and mildew growth
- Makes your home healthier to live in



#### Heating

- Makes your home healthier and more comfortable to live in
- Lets you remove more moisture through ventilation
- Reduces the growth of mould, mildew and dust mites.

#### Tackling dampness

- Makes your home easier to heat
- Reduces the growth of mould, mildew and dust mites
- Makes your home healthier to live in
- Reduces maintenance costs

Image courtesy of EECA, [www.energywise.govt.nz](http://www.energywise.govt.nz)

### Did you know...?

The World Health Organisation recommends the following minimum indoor temperatures, which are also supported by the Ministry of Health.

- A minimum of 18°C or a minimum of 20°C for more vulnerable groups such as children, the elderly and people who are ill.
- A minimum of 16°C in your bedroom overnight.
- These recommended temperatures apply to all rooms you are using while you are using them.

For more information about any of these ideas you can visit [www.energywise.govt.nz](http://www.energywise.govt.nz)



### COMMUNITY ENERGY ACTION

Community Energy Action (CEA) is a Christchurch-based charitable trust providing expert advice on how to make your home warmer, healthier and more energy efficient. They work with communities located north of the Rakaia.

CEA is a registered provider of the government's ENERGYWISE™ subsidies for insulation and heating. They can provide subsidies for residents both with and without a Community Services Card.

For more information visit [www.cea.co.nz](http://www.cea.co.nz)

You can also contact the Canterbury Home Energy Advice Centre on 0800 388 588 or visit [www.energyadvice.org.nz](http://www.energyadvice.org.nz). The centre offers free, unbiased advice on energy use in the home.



## Taking action: here are 3 easy things you can do at home straight away!

- Find & fill the gaps where draughts are getting through. Make a Door Snake & board up old fire places.
- Wear warm clothing so your house does not have to be heated to too high a temperature (it should still be at the minimum temperatures given above).
- Close your curtains at night to stop the heat escaping.



### Activity - Make your own door snakes!

Look around your house to find the gaps where draughts are getting through. Fill the gaps by making a door snake and board up old fire places. For the door snakes get mum or dad to help make the 'skin'. You can use scraps of crazy fabric! Fill them with sawdust, rice or plastic pellets.

## Curriculum Links (Level 4)

These suggested links are just a selection

- Principals – Foundations of curriculum decision making
- Future Focus

- Environmental Education

Key concepts: interdependence, sustainability, biodiversity, personal and social responsibility for action

### Social Sciences

- Understand how formal and informal groups make decisions that impact on communities
- Understand how people participate individually and collectively in response to community challenges

### Science

Participating and contributing:

- Use their growing science knowledge when considering issues of concern to them
- Explore various aspects of an issue and make decisions about possible actions

### Health

- Rights, responsibilities, and laws;
- People and the environment

### Technology

Nature of Technology: Characteristics of technology

### Internet resources on air pollution

There are a large number of websites with information and resources to support this unit. Air pollution around the world is caused by different things, and in some places it may be mostly from industry or motor vehicles, which is very different from the situation in Canterbury. The Ministry for the Environment links page, at: <http://www.mfe.govt.nz/issues/air/breathe/links.html> is a good place to start.

Comprehensive information about air quality, clearly set out into subheadings is at: [http://www.ace.mmu.ac.uk/ee/Air\\_Quality/air\\_quality.html](http://www.ace.mmu.ac.uk/ee/Air_Quality/air_quality.html)

A "Clean Air Primer" from California at: <http://www.sparetheair.org/Get-Involved/For-Teachers-and-Students/Educational-Tools.aspx> presents information in an easily accessible visual format.

Of course, information on Canterbury's air quality can be found on Environment Canterbury's website. Latest air monitoring results are at: [www.ecan.govt.nz/todaysair](http://www.ecan.govt.nz/todaysair)



# Canterbury

Your Environment – Canterbury is free to all schools/teachers in the Canterbury region.

canterbury mudfish

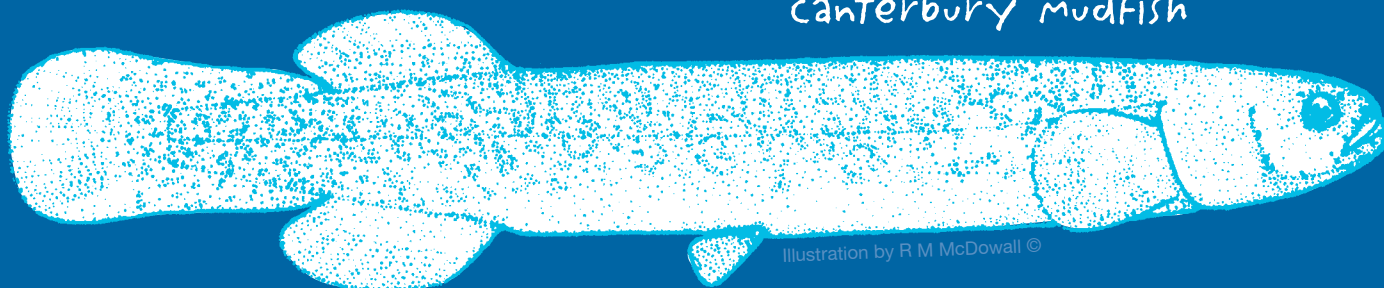
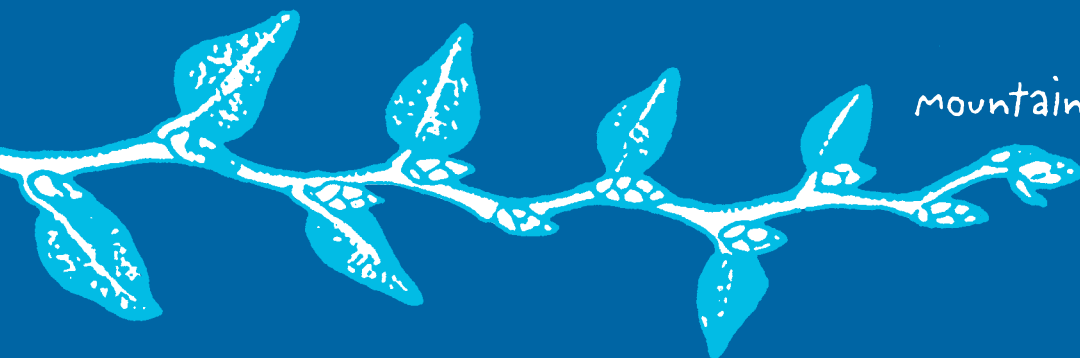


Illustration by R M McDowall ©

mountain beech



## Resources and education services

We offer a range of facilitated school programmes and environmental education resources on natural resources and their sustainable management. Environment Canterbury also produce general information and resource material, such as pamphlets, brochures and booklets, many of which are free.

## Environment Canterbury: what we do

Environment Canterbury is your regional council.

We manage 14 activities for the Canterbury region.

- Air quality
- Biodiversity & biosecurity
- Coastal environment
- Consents & compliance
- Emergency management
- Flood protection & control works
- Hazards
- Land
- Navigation safety
- Public passenger transport
- Regional land transport
- Regional leadership
- Waste, hazardous substances & contaminated sites
- Water quality, quantity & ecosystems

We welcome  
your comments or  
suggestions for what  
you would like to  
see in future  
issues.

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