



Teacher Supporting Resources

Reduce, Recycle, Reuse

Paper and Cardboard

Natural Resource: Trees

Interesting Fact

Global paper use increased more than six-fold over the second half of the 20th century, and has doubled since the mid-1970s.

Paper is made from pulped, pressed and dried out fibres of wood. Once a tree is cut down for paper making, the bark is removed and then it is put through a machine that turns the tree into wood chips. These chips are then turned into wood pulp, either by adding chemicals to the chips or by grinding them, then the wood pulp is either bleached (to make white paper) or non-bleached (to make brown paper).



The bleaching process can use either pure chlorine, chlorine dioxide, hydrogen peroxide, or oxygen pre-bleaching. The most environmentally unfriendly of these methods is bleaching with chlorine. Chlorine combines with chemicals in the wood pulp to form hazardous substances, such as dioxin. For this reason, it is best to buy paper that has not been chlorine bleached.



Recycling Paper

Paper can be recycled up to five times. After that, the wood fibres become too weak to reuse. However, paper can be recycled forever if some virgin (new) pulp is added to the recycled pulp.

Carter Holt Harvey is New Zealand's main recycler of paper and cardboard. At their Penrose plant in Auckland, they use 100% recycled paper to produce corrugating medium (used to make cardboard boxes) and paperboard for cartons.



In New Zealand, most of the paper that is collected for recycling is baled up and then transported to the North Island where it is recycled into paper and cardboard products. Some paper is also sold to overseas buyers, who recycle the paper in their own country.

In order to produce recycled paper, old paper is shredded into small pieces and mixed with lots of water. This turns the paper back into pulp. The pulp is then spread out very



thinly on conveyor belts and put through driers. The “new” paper is then rolled into big rolls and taken to a machine which measures and cuts it to the right size. This recycled paper is not pure white, and can have dark flecks in it, caused by the ink which was on the original paper.

Did you know?

Egg cartons can be made from recycled newspaper. They are grey in colour because of all the ink that is in newspapers.

Paper Facts

- It takes about 17 trees to make one tonne of paper.
- It takes one pine tree to make about 700 paper bags.
- Paper production is responsible for about 1/5th of the total wood harvest world-wide.
- A sheet of writing paper might contain fibres from hundreds of different trees that have collectively travelled thousands of kilometres from forest to consumer.
- Making paper from recycled content rather than virgin fibre creates 74 percent less air pollution and 35 percent less water pollution.
- In the past, paper has been made from non-wood sources, such as hemp, papyrus, kenaf (a leafy member of the hibiscus family), agricultural residues (cereal straws, cotton linters, banana peels, coconut shells), and can even be made from denim scraps.

What you can do?

- Reuse paper by writing on both sides
- Use scrap paper for art sessions
- Put a ‘No Junk Mail’ sticker on your mailbox
- Recycle all your paper, cardboard boxes and cartons



Plastic

Natural Resource: Crude oil, or possibly natural gas.

Interesting fact

Plastic was first created from the plant-based material cellulose in the mid-1800s, as a replacement for ivory. Since 1976 plastic has been the most widely used material in the United States.

Refining of crude oil leads through to approximately 4% ethylene, which provides the basis for the different types of plastics. Although world production of plastic resin is approximately 100 million tonnes a year, the driving force for crude oil consumption is the world's energy demand. Plastics are a by-product of this.

Plastic is strong, light and durable and a wide range of products can be made from the various types of plastic, such as nylon, acrylic, cellophane, polyester, polystyrene and polyethylene.

The recycling code used by New Zealand plastics manufacturers was introduced in 1989 as part of an international coding system to allow identification of the plastic types. Currently there is no requirement for imported plastic products to show the recycling code, thus a number of items in the market place remain un-coded.

Because this coding system uses the recycling triangle to identify the plastic code, the general public often think this means the plastic is recyclable in New Zealand. However, this is not the case. Types 1 and 2 are currently recyclable in most places, with some areas expanding into other plastic codes where practicable. However, recycling of many of these resins is very complex, and therefore it is not always viable.

Recycling Plastic

In Southland, we can currently recycle plastic **bottles**, marked 1 and 2. These plastics are collected from every household in Invercargill through a kerbside collection once a week. Stewart Island also has a kerbside recycling collection. In other areas of Southland, people can take their recyclable plastics to a



recycling centre, where they are collected and then transported to Invercargill.

The recycling collectors need to be very careful that they only pick up the right types of plastic, because the wrong type could contaminate a whole batch of plastic or even cause an explosion. The plastic also needs to be clean so it doesn't create any health hazards for the people handling the materials.



After collection, the plastics are taken to the sorting plant in Bond St, Invercargill, where they are sorted into specific categories and compressed into bales, ready for transport. The plastic is not melted down and recycled in Invercargill, instead, it is sold to buyers who will make it into new plastic products, such as recycling crates.



A large consideration for recyclers is whether they can sell their plastics once they have collected and baled them. By correctly sorting and cleaning the plastics, householders can help to make their job a lot easier.

Did you know?

Some countries have been exploring a new technology called Thermalysis. This technology converts unwashed and unsorted plastics into a clean burning, low sulphur diesel fuel, suitable for use in any standard diesel engine.

In the United States, there is a rapidly growing market for "plastic lumber", which can last significantly longer than wood, is waterproof, maintenance free and doesn't splinter. In New Zealand, the Toner Recycling Company (TRC – www.trconline.co.nz) make the plastic from non-recyclable toner cartridges into plastic products such as benches and picnic tables.

Plastic Facts

- Plastic amounts to 20% by volume of all domestic packaging.
- Approximately 9% of waste in wheelie bins is plastic
- In 2004, Invercargill recycled 127 tonnes of plastic bottles

What you can do?

- Try to buy things in recyclable plastic
- Reuse non-recyclable containers, like ice cream containers and margarine pottles
- Recycle all your plastic bottles marked 1 and 2



Aluminium

Natural resource: Bauxite ore

Interesting fact

Recycling one aluminium can saves enough energy to run a TV set for about three hours.

Bauxite is considered a non-renewable but abundant resource. It is processed to produce alumina, or aluminium oxide, which is then used to produce aluminium using an electrolytic process.

The alumina is dissolved into a bath of material called cryolite, contained in large carbon lined steel tubs, commonly known as pots. In the smelting process, a huge electric current is passed from large carbon anodes through the cryolite and alumina solution to the carbon lining of the pot. In the process the oxygen component of the alumina combines with carbon from the anodes to produce carbon dioxide gas, leaving the aluminium to settle into the bottom of the pot. The aluminium produced is then siphoned off daily and cast into ingots (large bars), extrusion billet and other forms which are then turned into the products we see every day.

The production of aluminium requires large amounts of energy and produces large amounts of carbon dioxide gas but, statistically, the payback in terms of reduced emissions and energy savings from using aluminium as a weight saving material in transport and packaging is very good.

Aluminium packaging products, such as the aluminium can, have several advantages over other packaging. These include longer shelf life for contents, light-weight, ease of handling and a better surface quality on which to print labels.

Recycling Aluminium

Since aluminium does not degrade in quality with repeated recycling, there is no limit to the proportion of recycled aluminium which can be used in a batch of raw material. The recycling of aluminium reduces air



pollution by 95%, water pollution by 97% and energy consumption by 95%, as compared to the manufacture of the raw material. Recycling of aluminium also helps to ensure that we will not run short of bauxite ore, which is a non-renewable natural resource.

In Southland, cans can be dropped off at recycling centres, schools, outside some supermarkets, or in the kerbside recycling collection. If a school or business produces a lot of aluminium cans, they may be able to contact a scrap metal dealer or recycler to arrange a collection.

Did you know?

Most aluminium is not recycled in New Zealand, so all your cans go overseas to be melted down and recycled into new products, such as aluminium window frames, mechanical parts or new aluminium cans.

Aluminium Facts

- Aluminium was first mass produced as a packaging material in the early 1900's.
- Aluminium makes up about 3% of all domestic packaging, including drink cans and the foil we use to wrap food in.
- An aluminium can takes about 500 years to break down in a landfill.
- In 2002, it is estimated that about 70% of aluminium cans were recycled.

What you can do?

- Try to buy drinks in aluminium cans, because they are very efficient to recycle
- Set up a can collection at school
- Collect aluminium cans at sports events to raise money



Other Metals

Natural Resource: All metal started out as a type of ore, the most abundant being iron ore.

Interesting fact

The cans we commonly refer to as 'tin cans' are actually made of steel, with a thin coating of tin that prevents the steel from corroding.

Ores are natural deposits of minerals within the earth that are non-renewable. Iron ore can be processed into raw iron, which can then be converted to steel. Steel is used for many different purposes, from food cans to buildings supports. If it is unprotected, steel can decay when it is exposed to oxygen for a long period of time. This is called rust. One way to protect steel from rusting is to galvanize it. This means that a coating of zinc is placed over the steel. Fencing wire and roofing iron are two examples of galvanized iron.

Other ores which are a part of our everyday life are copper ore (used for electrical wiring), nickel ore (used in making coins), tin ore (combined with copper makes bronze), zinc ore (combined with copper makes brass). Some of these ores can also rust. For example, when copper is exposed to oxygen for a long period of time, it will turn green (as compared to steel turning red when it rusts). In the past, copper was frequently used as a roof for some buildings. If you look at these buildings nowadays, you'll find the copper areas have become a light green.

Some ores, such as gold and silver, are not very abundant and have a great value placed upon them. These ores are used mainly for decorative purposes (such as jewellery) as they are neither strong enough nor abundant enough to use for building or other purposes.

Recycling Metals

Scrap metal recycling is an economically viable activity, and a number of scrap metal recyclers operate in Southland. Metals for recycling are placed in two categories:

- Ferrous, meaning that it is made from iron, and



- Non-Ferrous, meaning that there is no iron in it.

Most ferrous metal items, such as old pipes, railway tracks, stainless steel and fencing wire can be easily recycled. Non-ferrous metals such as copper, bronze and aluminium are also readily recycled. Steel cans, such as clean food cans and empty aerosol cans, can be recycled through the kerbside collection or at recycling drop-off centres.

Did you know?

Not all metal types can be recycled. If you have metal for recycling it pays to call the recycler first to make sure that it will be accepted.

Metal Facts:

- Each tonne of recycled steel can save up to 1.5 tonnes of ore.
- Recycling one steel can saves 60-74% of the energy used to produce it from raw materials.
- A tin can takes about 100 years to break down in a landfill.

What you can do?

- Clean and recycle all your empty food cans
- Find out if old appliances, like ovens and refrigerators, can be reused by a second hand dealer or in the reuse area at your local transfer station



Organic Material

Natural resource: Anything that was once alive.

Interesting fact

Organic material can be composted to create a nutrient-rich garden fertiliser.

Organic waste is made up of materials such as garden waste (grass clippings, leaves, prunings) and kitchen scraps (peelings, food scraps, tea bags etc.). An estimated 25-30% of what we send to landfill in wheelie bins is organic material.

In nature, most living tissue is recycled through the ecosystem. Carbon is fixed by plants, used for growth, consumed by animals and released through respiration or decay. Other elements are similarly cycled within the ecosystem, returning valuable nutrients to the land for further production.

When organic waste is landfilled however, the materials produce gases as they rot, including large quantities of methane, a greenhouse gas. A toxic liquid called leachate is also produced, and this can drain into the soil and groundwater, causing pollution. For this reason, organic waste is often considered to be one of the most harmful types of waste in the domestic wastestream.

Because organic waste is so heavy, it adds significantly to the cost that ratepayers must pay for domestic rubbish disposal, which is partly calculated on the weight of the rubbish dumped. Most councils strongly discourage people from putting garden waste in with their household rubbish. In Invercargill, garden waste is actually banned from wheelie bins.

Recycling Organic Materials

An alternative to putting organic waste in the rubbish bin (or down the kitchen waste disposal unit), is to recycle it by composting or worm farming at home.

Compost is simply decayed organic material which can be used as fertiliser. Composting is also nature's way of recycling. In the forest, or a paddock, dead plant



material breaks down naturally, providing the living plants with rich nutrients. Composting creates the same kind of environment in your own backyard and will create a nutrient rich fertiliser that gardens will love.

Worm farming is also a way of imitating nature. Worm farming uses special composting worms that eat organic waste from our kitchens and turn it into a nutrient rich fertiliser through the digestion process. Composting worms are usually tiger worms, or red worms, and can often be found in areas where organic matter is gathered, such as compost or manure heaps, or under piles of leaves.

Bulky garden waste, such as prunings and branches, can be taken separately to most transfer stations, where they will be chipped and composted.

Did you know?

Plant material takes up more volume in our landfills than any other single waste material.

Organic facts:

- When organic waste is landfilled (or put down the kitchen waste disposal unit), important nutrients are removed from the land and soil function is eventually depleted.
- Organic waste in a landfill can produce up to 100kg of methane per tonne of waste.
- Composting can be done in a variety of containers, or even just into a trench in your garden.

What you can do?

- Learn about compost bins, or worm farms, and set one up at home.
- Collect your kitchen scraps in a plastic container and recycle them into your compost.
- Set up an organic waste recycling system at school, or take your food scraps home to compost.



Glass

Natural resource: Silica sand, along with soda ash and limestone

Interesting fact

The use of glass for packaging dates back at least 6,000 years, to Phoenician and Egyptian times.

In order to make glass, a mixture of silica sand, soda ash, limestone and recycled glass (cullet) is heated in natural gas-fired furnaces to between 1200-1500°C. This melted mixture is then formed into bottles and jars ready for use.

Both silica sand and limestone are mined in New Zealand, but the soda ash must be imported from overseas. ACI Glass Packaging, in Auckland, produce glass bottles and jars. Since 1922, the plant has gone from producing 50,000 bottles per week, to 50,000 bottles an hour.



Recycling Glass

Glass is 100% recyclable and approximately 40% of all glass manufactured in New Zealand is recycled. In the North Island, many recycling centres can sell their glass to ACI Glass who will recycle it back into glass containers.

However, in Southland, it is not economically viable (or environmentally friendly) to transport the glass to Auckland for recycling, so recycling our glass is more of a problem. Our glass is therefore crushed and used locally for secondary purposes, such as roading material. This activity prevents the glass from being landfilled, but it doesn't help to reduce the pressure on our natural resources from mining sand and limestone for glass manufacturing. Recycling glass in this way also adds to the overall cost of recycling due to the cost of storing and crushing.

Window glass, mirror glass, crystal glass and lightbulbs are not recyclable, due to their high lead content.



Did you know?

Because glass packaging is inert, it does not react with the contents and will not affect the taste, odour or quality of a product.

Glass Facts

- Recycled glass uses 20% less energy in manufacturing, as compared to virgin glass.
- ACI Glass has the capacity to recycle 70,000-80,000 tonnes of glass a year.
- The energy saved from recycling one glass bottle will light a 100-watt light bulb for four hours.
- Crushed glass can be used as a filter medium, sand blasting material, for decorative purposes or to produce 'crystal sand'.

What you can do?

- Wash and reuse your glass containers if possible
- Try to buy alternative containers to glass that are easier to recycle i.e. aluminium, type 1 and 2 plastic
- When you recycle glass, make sure the tops are off to reduce contamination





Natural resource: Crude oil

Interesting fact

The total world consumption of crude oil in 1996 was 71.7 million barrels per day (there are 159 litres in a barrel).

Crude oil is one of our non-renewable resources. In order for crude oil to be used, it must first be refined. The refining process heats the crude oil in a tall, silo-like tank until the oil vaporizes and becomes steam. The different petroleum products condense at different temperatures and are drawn off at various levels in the tank. These include petrol, diesel, oil and grease.

Refined oil is used as a lubricant in a variety of machines, such as motor vehicle engines. It is also used in hydraulic systems as the means of transferring power. Oil does not lose its lubricating properties when used, however, the additives which have been mixed with the oil can wear out. Oil can also become contaminated with water, carbon, dirt and engine metals. When this happens the oil is no longer usable and needs to be re-refined.

During the processing of crude oil, a significant proportion (40%) is turned into gases such as ethylene (ethene). Originally, these gases were simply burned off, which released considerable amounts of carbon dioxide into the atmosphere. However, in the 1930's, scientists found a way to use these gases to make synthetic plastics. This has significantly reduced the air pollution problem caused by these gases.

Recycling Oil

Used oil is recycled by a process called fractional distillation. In this process, the oil is heated to around 350°C, which causes the oil to separate from most of its contaminants. The oil is then further refined by a polishing process. Additives are added to the oil to make it suitable for a variety of uses, and the oil is then ready to be reused. Since oil never loses its lubricating properties, it can be re-refined and recycled over and over again, thus reducing the need for new crude oil.

In New Zealand, the major oil companies operate nationwide collection networks and supply used oil to the Milburn cement kiln in Westport, where it is burned at high temperatures. The burning of used oil in high temperature kilns is good practice environmentally because it deals effectively with contaminants. In some areas, local operators collect oil for low temperature burners (which often do not require resource consents), burning in asphalt plants and road oiling. In Southland, used oil can be dropped off at most service stations or transfer stations for recycling in these ways.

The dumping or spilling of used oil into the environment is a major pollution hazard. By using re-refined oils for any lubricating needs, we can all further the recycling efforts which help to reduce this problem.

Did you know?

The global plastics industry uses an estimated 4% of all oil consumed.

Oil Facts

- The top oil user in the world is the USA (17 million barrels per day).
- The amount of petroleum products ending up in the ocean is estimated at 0.25% of world oil production - about 6 million tons per year.
- Oil spills account for only about 5% of the oil entering our oceans. The U.S. Coast Guard estimates that sewage treatment plants discharge twice as much oil each year as tanker spills.
- Approximately 60 million litres of lubricating oil are sold in NZ each year. About 50% of this is leaked, burned or otherwise lost during use.

What can you do?

- Drop off used oil at your local transfer station, or service station, for recycling.
- Make sure that motor vehicles are maintained and repaired, so that oil is not wasted or leaking.
- Ensure that oil does not spill into the storm water drains - these drains are situated in the gutter on streets and roads. Any substance that enters them will run directly to the sea.



The 3R's and Our Community

Here are a few places that are doing a great job of implementing Reduce, Reuse and Recycle principles.

Councils

Our local councils are out there promoting waste minimisation and encouraging people to get into using the 3R's. They are also using the 3R's themselves in their office buildings.

Environment Southland has a really cool waste reduction programme, and everyone can recycle using the recycle box in their office. All the staff are encouraged to do things that reduce and reuse, like printing out on both sides of paper and having reusable cups at the water cooler. In their canteen they have a worm farm for food scraps, and a scrap bucket that gets collected by a local worm farmer each week.



Invercargill City Council and Southland District Council also have office recycling programmes for things like paper, cardboard, plastic bottles and cans. They have these big containers that get collected by a recycler every week, and they recycle cartridges from their photocopiers and printers too. They also have reusable envelopes for their internal mail and do their reports on double-sided printers whenever they can.

Businesses

The Warehouse are right into the 3R's. They have recycling stations in their staff cafes and they recycle all the cardboard and plastic film from all those boxes that come in everyday. They encourage people to reduce waste by using cloth bags, and only taking a plastic big if they really need it, and they report every year on their progress with the 3R's in their annual report.

Another business that's doing great things is the Tiwai Aluminium Smelter. Out there, they all have recycling bins in their offices and they recycle all their paper, cardboard and toner cartridges. They also try to recycle everything they can from the smelting process, things like wood, steel, oil and batteries and items that could be reused by someone else.

Community organisations

The Invercargill Fire Service has a system to reduce their waste and their impact on the environment. They have recycling containers in their offices and their kitchen, and these are emptied by cleaners into big drums that are picked up by a local recycler.

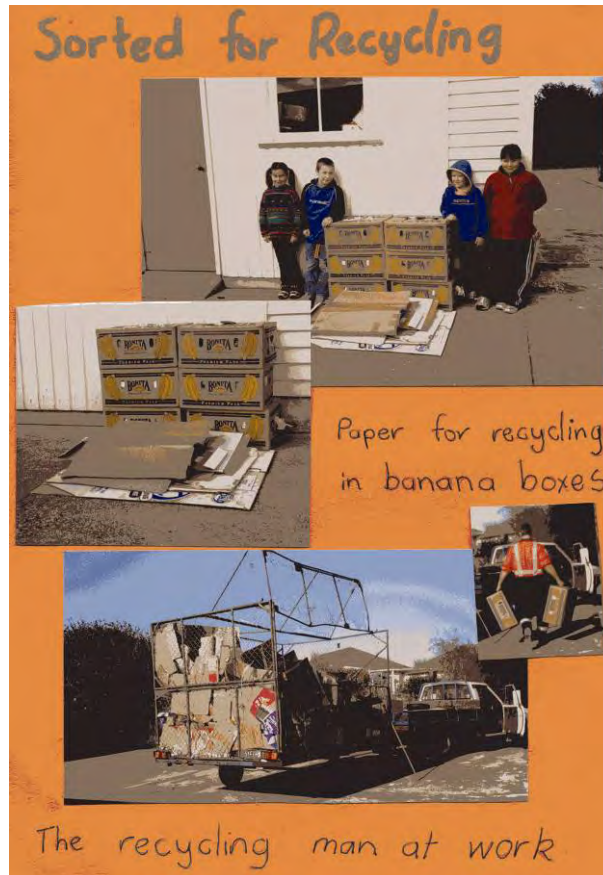


The Invercargill Environment Centre reduce, reuse and recycle all sorts of things, like hearing aid batteries, stamps and envelopes. They even have a working worm farm to gobble up their food scraps and turn them into plant food. They also promote the 3R's to everyone they see.

Schools

Limehills School do heaps of stuff to minimise waste, like reusing all sorts of containers for art, reusing paper for scrap paper and running a worm farm to recycle food scraps.

Waverley Park School in Invercargill have an awesome recycling system that's run by the caretaker. He picks up all their recyclables from the classroom and takes them away for sorting before they get recycled.



Individuals and Families

Lots and lots of everyday people, just like you and me, are getting involved and using the 3R's. Even quite famous people use the 3R's, like Robyn Broughton (the Southern Sting coach) and Gerry Forde (he promotes Southland). They use their green recycle crates to recycle their paper, cardboard, plastic bottles, cans and glass. And they do things like composing and cutting down on plastic shopping bags to reduce waste.



Beat the Rubbish Blues DVD

WasteNet & eVIDEO- present



Beat the Rubbish Blues



Beat the Rubbish Blues

Journey through the world of waste as Peti tries desperately to retrieve his favourite hat that mistakenly went out with the rubbish.

Along the way, Peti is shocked to find out what really happens to rubbish and he begins to ask questions -

Why is there so much rubbish?
Where does it all come from?
What else could we do with it?

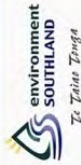
Fortunately, some special guests (Mayor Tim Shadbolt, Bruce C Gull and Mayor Frana Cardno) come to

Peti's rescue and teach him to reduce waste by using the power of the 3R's - **Reduce, Reuse, Recycle!**

Beat the Rubbish Blues is an educational resource that people of all ages can learn from and enjoy.

For more information check out our website at www.wastenet.org.nz or contact your local council.

Running time 15 mins



Beat the Rubbish Blues Quiz

1. After Peti finished his breakfast, where did he put all the leftovers and empty containers?
2. How was the wheelie bin emptied?
3. Why does Peti chase after the rubbish truck?
4. Where does the rubbish truck go first, to drop off its rubbish?
5. Where does all the rubbish in Southland end up?
6. Where is the Regional Landfill?
7. How do you think Peti felt when he saw how much rubbish was being dumped?
8. According to Mayor Tim, whose responsibility is household waste?
9. What does Mayor Tim say is the alternative to making rubbish?
10. What are the 3R's (in correct order)?
11. Give 2 examples of Reduce:
12. Give 2 examples of Reuse:
13. Where would you find a 'Reuse Shed'?
14. What is the third R?
15. Name all the items you can recycle in Invercargill and Southland?
16. What type of plastic bottles can you recycle (what is their recycling number)?
17. Who would you contact for advice on recycling in your local area?
18. Where does all the recycling in Southland go?
19. How is the recycling at the depot sorted – by people or machines?
20. How did you feel when you saw how much paper used to be landfilled, but is now recycled?

Answers

1. In the wheelie bin
2. By a truck / with a mechanical arm
3. Because he lost his favourite red hat in the rubbish
4. The Waste Transfer Station
5. The Regional Landfill / out near Winton
6. Near Winton / Kings Bend / Central Southland
7. Angry, sad, dismayed, annoyed, shocked, disappointed, outraged.
8. Everyone's responsibility
9. Using the three R's
10. Reduce, Reuse, Recycle
11. Buy less packaging, buy concentrates, use green bags, buy in bulk and use reusable containers.
12. Reuse containers for various uses, take your household items to a reuse shed, reuse paper for scrap paper or art.
13. At a Transfer Station
14. Recycle
15. Paper & cardboard, plastic bottles numbered 1 or 2, cans, glass bottles/jars
16. Types 1 and 2.
17. Your local council
18. On a truck / to the recycling depot on Bond St / Invercargill
19. People
20. Happy, proud, relieved, ecstatic, overjoyed

Trashtalk DVD

The Directors Cut

Trashtalk

Independently produced in Invercargill

“A thoroughly entertaining rubbish story”



Trashtalk - The Recycling Animation

From the award winning creator of *A Perfect Circle* comes a new kind of adventure.

Join Fizz (The Can) and an interesting Apple on their adventure into intrigue and discovery.

Fizz the soft-drink can is thrown from a car window and left all alone in the middle of nowhere. With no other option, Fizz sets off on a journey to discover its place in a world where rubbish doesn't get the respect it deserves.

“It's rubbish, and its on the top of the pile”
Govinda Lascelles

“Reeks of quality”
Mark Wambold

Contents:

- The full eight and half minute version of Trash talk.
- Scene selection
- Recycling Information

Produced 2005

A Rhyce Barker Animation



This DVD will only play on DVD-R compatible players.



This DVD was produced with support from the ICC



Copies are available from the Invercargill City Council.