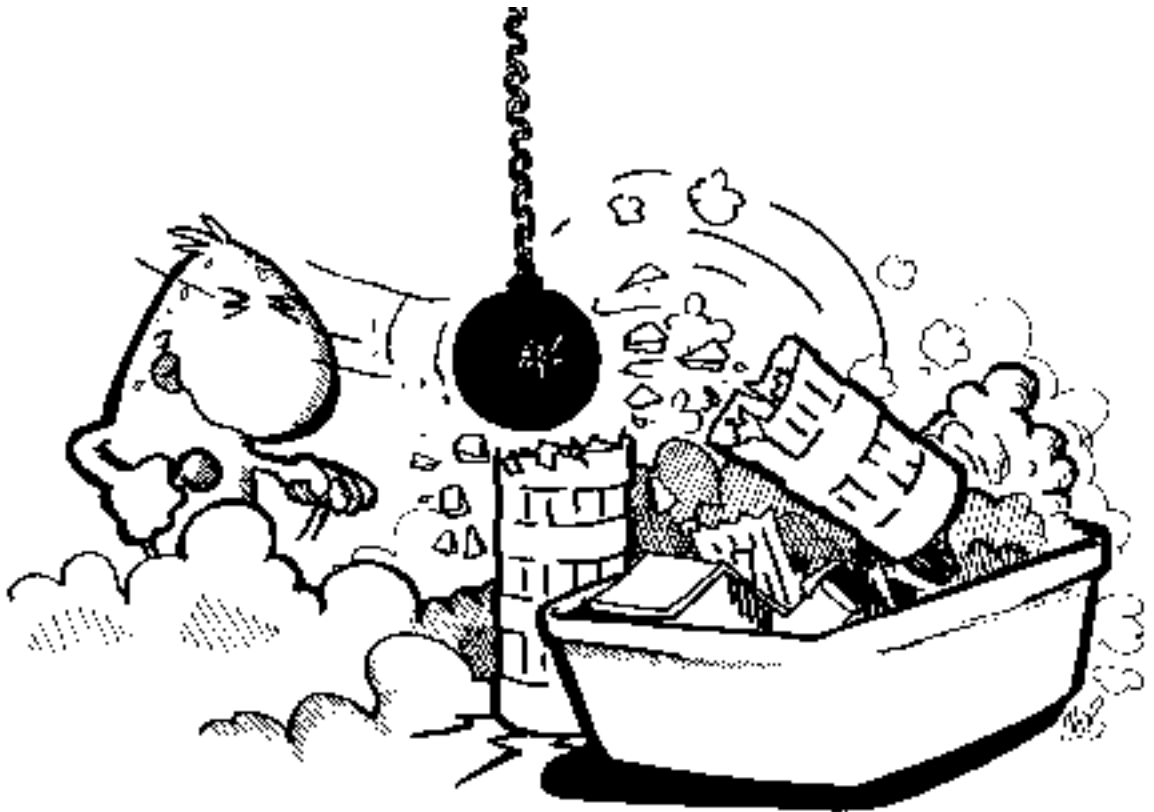




BOOK 4

OF TREADING LIGHTLY ON THE EARTH

DEMOLITION DERBY!



PROJECT C&D: REAL LIFE WASTE MINIMISATION IN THE CONSTRUCTION AND DEMOLITION INDUSTRY

Copyright 1999 © Auckland Regional Council. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the publisher. This material may be used for educational purposes, provided the source is acknowledged in the following way. "This material is from the Auckland Regional Council's 1999 Technology and Science Curriculum Education Resource "Treading Lightly on the Earth"."



TREADING LIGHTLY ON THE EARTH

Printed on 100% post consumer recycled paper

 Auckland
Regional
Council



Treading lightly on the earth

A technology and science curriculum resource for secondary schools on solid waste

AUCKLAND REGIONAL COUNCIL 1999

IN THIS EDUCATION RESOURCE KIT

Products and materials samples

Eight booklets covering the following topics:

Level of difficulty:

- | | | | |
|--|-------|----|----------|
| 1. Introduction: How to use this resource
Assessing awareness: BEFORE and AFTER this unit of study
Ideas for revision exercises
Relief Teacher Lesson
Topic 1: An overview of solid waste: 'What a waste!' | ♻️ | to | ♻️ ♻️ ♻️ |
| 2. Topic 2: Composting: 'Green waste to black magic' | ♻️ | to | ♻️ ♻️ ♻️ |
| 3. Topic 3: Recycling: 'The endless loop' | ♻️ | to | ♻️ ♻️ ♻️ |
| 4. Topic 4: Re-using construction waste: 'Demolition derby' | ♻️ ♻️ | to | ♻️ ♻️ ♻️ |
| 5. Topic 5: Hazardous waste: 'Handle with care!' | ♻️ | to | ♻️ ♻️ ♻️ |
| 6. Topic 6: Environmental audit: 'Your school's ecological footprint' | ♻️ | to | ♻️ ♻️ ♻️ |
| 7. Topic 7: Cleaner production:
'Less waste = more profit for environmentally friendly business' | ♻️ ♻️ | to | ♻️ ♻️ ♻️ |
| 8. Topic 8: Waste disposal: 'The last resort' | ♻️ | to | ♻️ ♻️ ♻️ |

A general guide to the Level of each activity

Difficulty	Suitable for	Level
♻️	Years 7-8	4 and 5
♻️ ♻️	Years 9-10	6 and 7
♻️ ♻️ ♻️	Years 11-13 or very able students	8

Most topics contain a range of activities at a mix of levels ♻️ to ♻️ ♻️ ♻️, so that you will generally be able to find something in each topic for a class working at any level.

If you only want to do one or two self-contained activities from each topic, you will find the ♻️ activities best suited for this.

This means your class can re-visit the same topics in successive years, avoiding repetition by doing more advanced activities.

To find out more, call the Auckland Regional Council on 09-366 2070.





TOPIC 4

DEMOLITION DERBY! PROJECT C&D: REAL LIFE WASTE MINIMISATION IN THE CONSTRUCTION AND DEMOLITION INDUSTRY

CONTEXT

Introduction

Project C&D (short for construction and demolition) is a joint project of the Auckland Regional Council and the Building Research Association. It aims to reduce construction and demolition waste, which in Auckland comprises 20.1% of all landfilled waste and 26.7% of all commercial landfilled waste. The construction companies involved have requested a name change to REBRI — Resource Efficiency in the Building and Related Industries.

Activities in this topic range in suitability from years 7 to 13. Activities can be selected according to level and the availability of speakers, sites to visit and time.

Contents

<i>Technological process</i>	<i>Difficulty</i>
Setting the scene - motivational activities:	
1. Analysis: What are buildings made of?	
2. Project analysis: How Project C&D can reduce wastes and costs to firms	
Identifying needs and opportunities; speculating, clarifying, finding solutions:	
3. Cleanfill or landfill site visit: Where does C&D waste go?	to
4. Project promotion: Why we should do waste minimisation on your site	
5. Design brief: Reducing, re-using or recycling C&D waste	
6. Project C&D - from technology to behaviour	
7. Vocabulary quiz	





Technological information for teachers

Model answers	page 14
Waste minimisation in the construction and demolition industry (Background Information for Teachers)	page 15
References	page 20
Glossary	page 20
Curriculum guidance	page 21
Resource materials	page 25

A general guide to the level of each activity

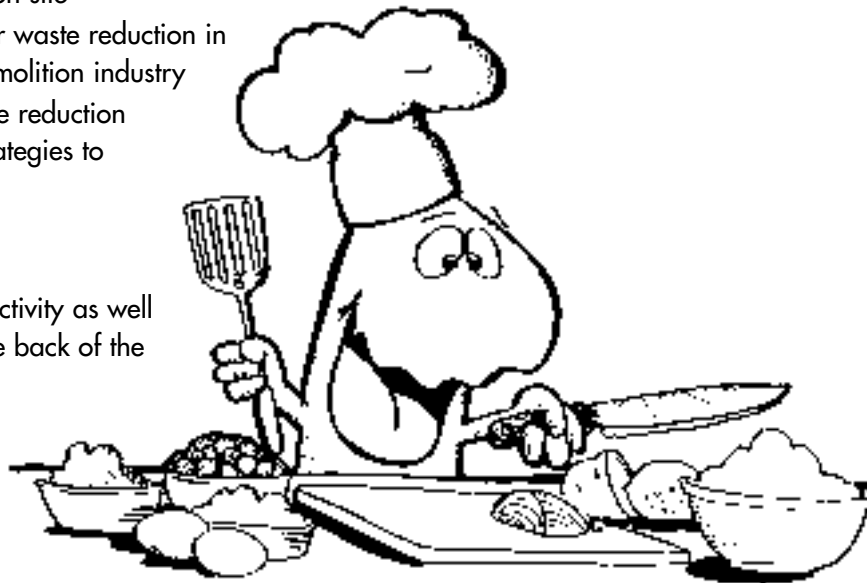
Difficulty	Suitable for	Level
	Years 7-8	4 and 5
	Years 9-10	6 and 7
	Years 11-13 or very able students	8

Specific learning objectives

- understand the construction and demolition industry
- appreciate its significance as a generator of waste
- understand how waste minimisation works on a construction or demolition site
- identify opportunities for waste reduction in the construction and demolition industry
- identify barriers to waste reduction practices and create strategies to overcome these

Preparation

- see the notes for each activity as well as the information at the back of the booklet





SETTING THE SCENE

Select one or both of motivational activities 1 and 2



ACTIVITY 1 Analysis:
What are buildings made of? ♻️

PREPARATION

- produce overheads of pie graphs from the resource information on page 18



Introduce this activity by asking: 'What is the largest single component of Auckland's commercial landfill waste stream, and the second largest of all landfilled waste?' (construction and demolition waste, as in the pie graph on page 18).

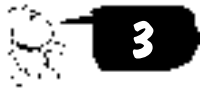


The information below summarises what construction and demolition waste usually contains:

- concrete
- steel
- wood
- carpets and other floorings
- bricks
- gib board
- wood fibre products (softboard, hardboard, particle board)
- clay, sand and rock

Ask the class questions about what construction and demolition waste would be likely to contain, and if they think any of it could be re-used or recycled.





Ask the class as a whole or each student to develop a form for:

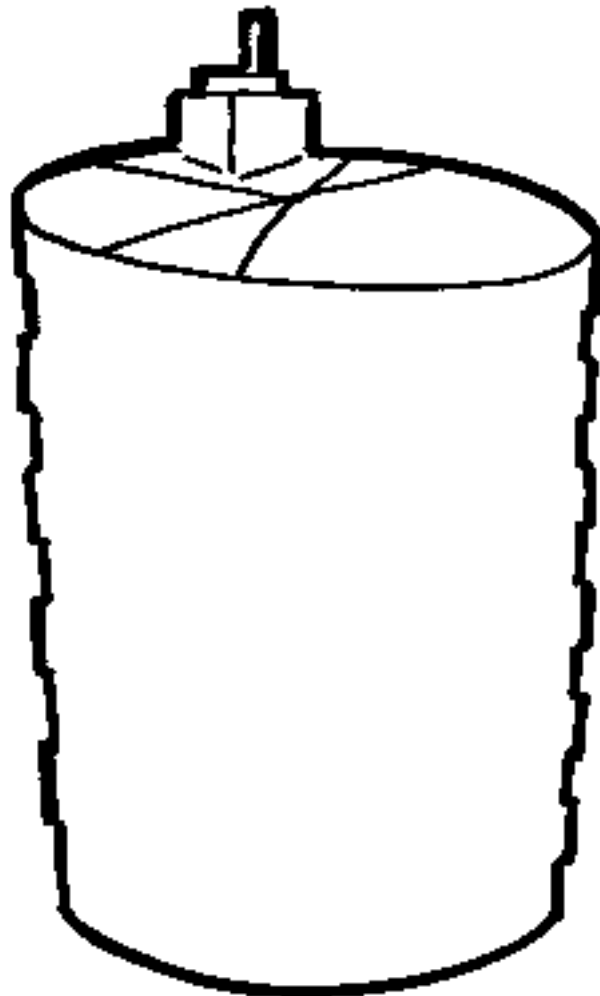
- making a list of the materials their classroom or block is made of, and
- assessing opportunities for waste minimisation of materials which would be generated if the building were renovated or demolished

The form should have at least four columns, for example:

Material:	Can be re-used for:	Can be recycled into:	Other comments:

Include all elements of the building, such as:

- roof
- chimney (if any)
- exterior walls
- basement/foundations
- interior walls
- windows
- fittings such as carpets, curtains
- other (specify)



Complete the form for reporting back to the class or small groups the next day and encourage a general discussion.





ACTIVITY 2

Project analysis: How project C&D can reduce wastes and costs to firms ♻️ ♻️

PREPARATION

- make an overhead of relevant material in the Technological notes for teachers on page 15
- photocopy the sections of the REBRI resource guide in the resource materials at the back of this booklet to hand out to groups

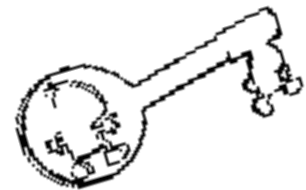
AND/OR

invite a guest speaker to come and talk to the class about some specific Project C&D programmes:

- ask representatives of the firms listed in the REBRI case studies
- ask the Auckland Regional Council on 09-366 2070
- look in the Yellow Pages under Architects, Quantity surveyors, Recyclers, Waste disposal

Teachers: Key Messages

Waste minimisation on construction and demolition sites can make significant cost savings to firms, improving business profit margins. It also has significant flow-on environmental benefits in reducing demand on landfill and cleanfill space.



Introduce the class to the scale of the problem using the overheads and any other material in the Technological notes for teachers on page 15.



Divide the class into the nine groups listed over the page and ask them to:

- review the material they are given
- list at least three methods used to reduce waste
- find out the cost savings made from waste minimisation
- think of some of the flow-on environmental benefits
- prepare a brief presentation to the rest of the class on their findings





The groups can use the following material from the back of this booklet:

1. Chapter 1: Introduction and the first page of chapter 2: What can you do?
2. Chapter 2: Section 1: Design
3. Chapter 2: Section 2: Construction
4. Chapter 2: Section 3: Demolition
5. Chapter 2: Case studies
6. Chapter 3: Eight steps to resource efficiency: Steps 1-3
7. Chapter 3: Eight steps to resource efficiency: Steps 4 and 5
8. Chapter 3: Eight steps to resource efficiency: Steps 6-8
9. Project C&D newsletters



Arrange for the groups to make presentations to the class.



Ask the class to overview and summarise all the presentations and encourage a class discussion on Project C&D and its effectiveness for waste minimisation.





IDENTIFYING NEEDS AND OPPORTUNITIES

Speculating, clarifying, finding solutions: Select any one or more of activities 3-7



ACTIVITY 3

Cleanfill or landfill site visit

- where the waste goes ♻️ to ♻️ ♻️ ♻️

PREPARATION

- contact your regional, city or district council to locate a cleanfill site where construction and demolition material is dumped
- ask the site manager if your class can visit
- photocopy five sets of the tip sheets in the resource materials at the back of this booklet
- photocopy or ask the students to draw up another copy of the materials listing form prepared for activity 1



1. SITE VISIT

- divide the class into five groups and make sure each one has a set of tip sheets and a copy of the form from activity 1
- ask the students to view the day's cleanfill collection, analyse the composition of any construction and demolition waste they observe (the staff may provide records), and with the aid of their forms, make a list of the recycling possibilities for the material in the cleanfill using the suggestions in the tip sheets



2. REVIEW

- back in the classroom, encourage a class discussion on what they saw

AND/OR

- ask each group to present their findings to the rest of the class





Teachers: Key Messages

In 1997, 146,000 tonnes of construction and demolition waste was landfilled - 19% of the Auckland region's waste - enough to fill the Town Hall every six weeks!



Of this amount, 103,000 tonnes was transported in bins. If all these bins were lined up end to end, they would stretch from Auckland to Whangarei!

Quotable Quotes

'Instead of digging up new rock, we are recycling what has previously been used, which is much better for the environment and a lot cheaper, too. We have a lot of customers satisfied with the product and we're having trouble keeping up with the demand.'


John Adsett, Bedrock Industries, Auckland





ACTIVITY 4

Project promotion:

Why our class should do a waste minimisation project on your site 

PREPARATION

- look at activity 5 to see if you want, or are able, to use a real site
- students or teacher: contact a construction or demolition company (see 'Builders and Building Contractors' and 'Demolition - Buildings etc' in your Yellow Pages) to organise a visit to a construction or demolition site so your class can carry out a design brief on reducing, re-using or recycling waste. A major site is best, but if one cannot be found, a home building site will be adequate provided the builder has the time to talk with your class



DESIGN BRIEF: PUTTING TOGETHER A CONVINCING CASE FOR THE BENEFITS TO A LOCAL FIRM OF REDUCING, RE-USING OR RECYCLING CONSTRUCTION AND DEMOLITION WASTE

The situation

- you want to do a project brief on waste minimisation for a nearby construction or demolition site (activity 5)
- you need to get the support of the site manager and site supervisor to do this, as it will involve some of their staff time
- to get their support, you need to prepare a brief presentation which will persuade them that waste minimisation offers real potential benefits to construction and demolition projects and that you can help them with your next design brief
- role play the presentation in class if a meeting is not possible

Some considerations

- your presentation should be suitable for making an approach by telephone, with a follow-up by letter and/or presentation
- what information can you provide from other projects about the financial benefits of reducing waste?
- what benefits to the environment can you think of?



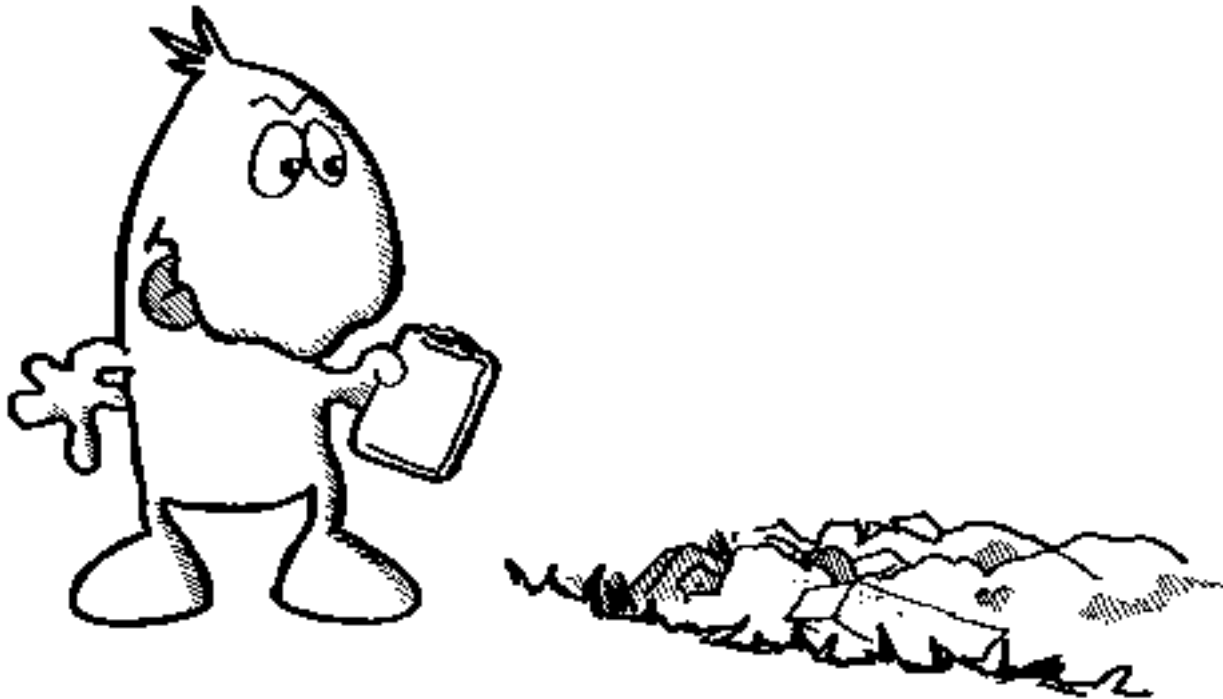


Resources available

- information about Project C&D/REBRI
- information you have obtained from activity 2
- web site addresses
- demolition records from site manager of construction/demolition company

Assessment examples

- peer evaluation of the likely effectiveness of the completed strategies
- evaluation by the 'client' - the manager or supervisor of the site which your class analysed (or the class as a whole if you role-played the presentation)
- group evaluation of successes and difficulties encountered in this brief



Quotable Quotes

An ounce of prevention is worth a pound of cure.

Benjamin Franklin





ACTIVITY 5

Design brief: Reducing, re-using or recycling construction and demolition waste and presenting your findings ♻️ ♻️ ♻️

The situation

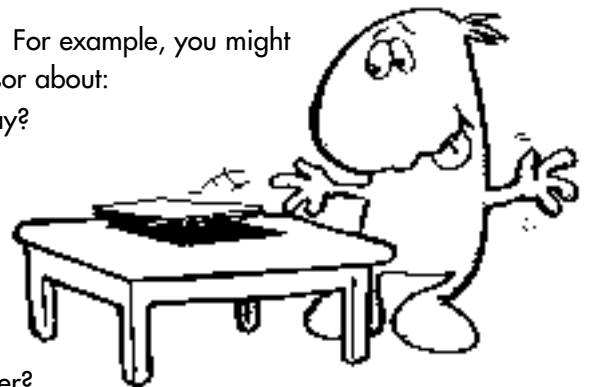
The site supervisor of a nearby construction or demolition site has asked you to help reduce the costs of the project by reducing waste as much as possible.

Your task is to look at opportunities for waste minimisation and cost savings, and to make a presentation to the site supervisor about your findings.

Some considerations

What information will you need from the company? For example, you might need to prepare a questionnaire for the site supervisor about:

- how much waste does the firm generate every day?
- what sort of waste does it generate?
- how is it disposed of?
- how much does disposal cost?
- what is the total cost of the project?
- is any re-use or recycling going on at present?
- how can you best present your findings and suggestions to the site supervisor and site manager?



Some suggestions

- what are the main areas of materials wastage that could be avoided to reduce waste?
- what materials could be re-used or recycled?
- if the company reduced its waste by the average volumes achieved by other companies, calculate how much money the company would save in total, and how much it could save as a percentage of the total project cost - or the contractor's profit!

Resources available

- existing site records of demolition material

Assessment examples

- peer evaluation of the likely effectiveness of the completed strategies
- evaluation by the 'client' - the manager or supervisor of the site
- group evaluation of successes and difficulties encountered in this brief



Want to enter the best strategy in the Auckland Regional Council's annual competition?

See the competition details in book 1 ... ***Good luck!***





ACTIVITY 6

Project C&D - from technology to behaviour ♻️ ♻️

As a follow-up to activity 5 - presentation, students could outline:

- some of the barriers to innovation and change
- how they can be overcome
- some of the long-term implications of Project C&D for waste minimisation and business costs

The Project C&D newsletters and the REBRI resource guide will help identify some of these.

For example, using the waste figures in book 1 or for your area and assuming all projects are the same size, if 10% of construction and demolition projects reduced their waste by half, how much would this reduce the local solid waste stream?





ACTIVITY 7

Vocabulary quiz ♻️ ♻️

Place the letter of the word or words from the list below which best matches the numbered statement in the space next to the number.

A. Resource efficiency

B. Demolition

C. Construction

D. Waste stream

E. Reduction

F. Renovation

Your answers:

	1. Building new houses, offices, schools, bridges and so on.
	2. Redecorating or altering an existing building.
	3. Waste produced from a particular source. Can mean the total volume of all wastes from that source, or the total volume can also be split into component streams of different wastes (separate waste streams).
	4. Only using as much material as you need which at its source has environmental benefits (forests, quarries) and at its disposal site. It also saves companies a lot of money.
	5. Destroying or dismantling buildings or structures.





ANSWERS

MODEL ANSWERS for Activity 7: Vocabulary quiz

Place the letter of the word or words from the list below which best matches the numbered statement in the space next to the number.

- | | |
|-------------------------------|------------------------|
| A. Resource efficiency | B. Demolition |
| C. Construction | D. Waste stream |
| E. Reduction | F. Renovation |

Your answers:

C.	1. Building new houses, offices, schools, bridges and so on.
F.	2. Redecorating or altering an existing building.
D.	3. Waste produced from a particular source. Can mean the total volume of all wastes from that source, or the total volume can also be split into component streams of different wastes (separate waste streams).
A.	4. Only using as much material as you need which at its source has environmental benefits (forests, quarries) and at its disposal site. It also saves companies a lot of money.
B.	5. Destroying or dismantling buildings or structures.

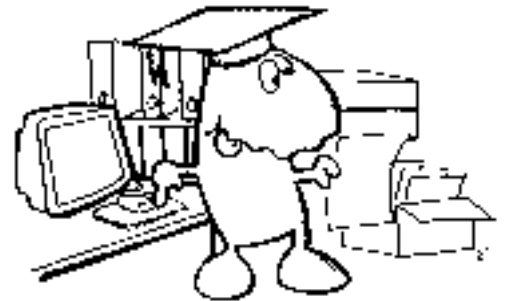




WASTE MINIMISATION IN THE CONSTRUCTION AND DEMOLITION INDUSTRY

This is background information for teachers which some students may be capable of using.

Why is construction and demolition waste a problem?



Nearly one and a half million tonnes of demolition and excavation material is dumped every year in cleanfill sites throughout the Auckland region.

Cleanfill is inert waste material which causes minimal damage to the environment or living things. For example, clay, soil or bricks do not have strong chemical or biological interactions. Because it is less likely to generate leachate (the polluting liquid produced by the breakdown of materials in solid waste), this material can be disposed of more easily than landfill material. Some cleanfill sites are extensive and their proliferation throughout the region is undesirable.

Because many cleanfill materials are bulky - blocks of concrete, girders and so on, they rapidly fill up our expensive landfills - a quarter of Auckland's landfilled waste is construction and demolition materials.

Auckland generates enough construction and demolition waste to:

- fill the Town Hall every 6 weeks
- it would take only 70% of the waste bins placed end to end to reach from Auckland to Whangarei



Construction and demolition waste from Auckland councils in 1996-7

Source: AGFIRST, 1997

Council	C&D waste as a percentage of total solid waste
Auckland City Council	41
Manukau City Council	26
North Shore City Council	17
Waitakere City Council	12
Papakura District Council	0
Rodney District Council	3
Franklin District Council	1





In the light of this finding, Project C&D was jointly launched by the Auckland Regional Council, Auckland City Council and BRANZ (the Building Research Association of New Zealand) with funding from Ministry for the Environment, to reduce the amount of construction and demolition waste generated in New Zealand. The construction companies which have since also become involved have requested a name change to REBRI - Resource Efficiency in the Building and Related Industries.

What's in construction and demolition waste?

Construction and demolition waste comes from:

- constructing new buildings
- renovating existing buildings
- demolishing old buildings

A survey carried out for Project C&D found:

- up to 25% of waste disposed of to landfills is construction and demolition material
- 51% is from new building and renovation of old buildings in the business sector
- 59% is from new building and renovation of residential homes
- nearly half the waste on construction sites is material offcuts
- nearly half the construction waste is generated during the lining and finishing stages of the project
- 79 out of 102 waste bins investigated were more than 40% full of just one material

How can the amount of construction and demolition waste be reduced?

As with any waste minimisation project, the first thing to find out is what sort of waste is typical from the type of construction or demolition proposed. The graphs on page 18 show some of the main materials found.

Knowing what the main wastes are makes it easier to:

- focus on areas for waste reduction
- find markets to re-use or recycle wastes

Savings can be made before building starts by using efficient building design and good quantity estimation (for example, ordering the right lengths of materials to reduce offcuts).

On-site practices such as good storage to prevent material loss from weather or handling damage and separation at source to keep waste materials separate for re-use or recycling are important.

Staff education and training is essential too, and the REBRI booklet which is part of this resource outlines a systematic approach suitable for any firm or site.





Which people need to know about Project C&D?

Successful waste minimisation starts with eliminating waste — preventing it from being generated in the first place. So everyone associated with a building needs to know about waste minimisation, including:

- architects
- quantity surveyors
- construction managers
- demolition managers
- builders
- recycling contractors
- waste collection and disposal contractors

How effective can Project C&D be?

Even basic sorting of wastes into materials categories (wood, metal, plasterboard etc) can reduce the volume of waste from a site by 50-55%. More sophisticated methods can save 65-70%.

One company saved its client \$80,000 in waste disposal costs by reducing, re-using and recycling wastes.

The benefits are clear - for companies and the environment!

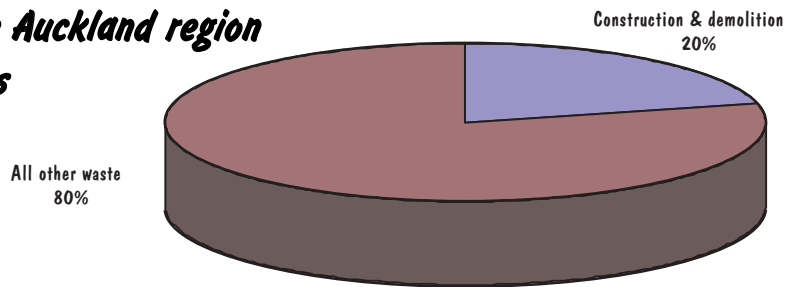




PROJECT C&D: SOME FACTS

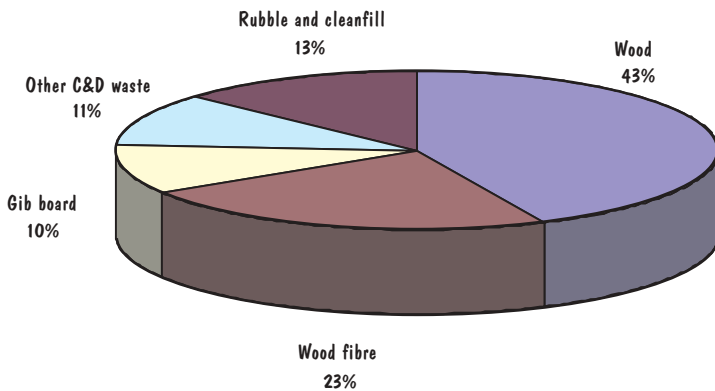
Landfilled waste in the Auckland region in 1996-7 - all sources

(from AGFIRST, 1997)



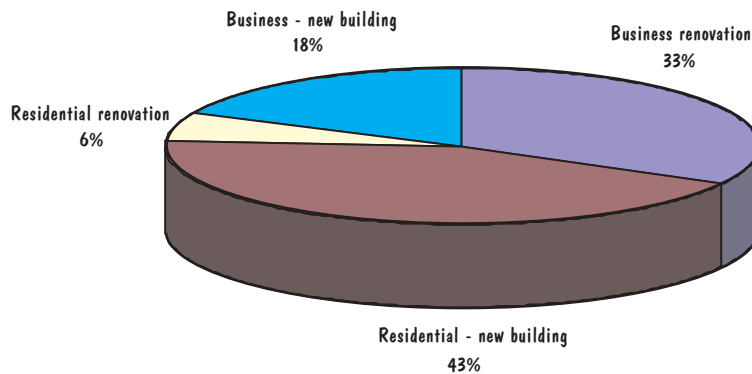
Construction and demolition waste - what's in it?

(from Auckland Regional Council, 1996)



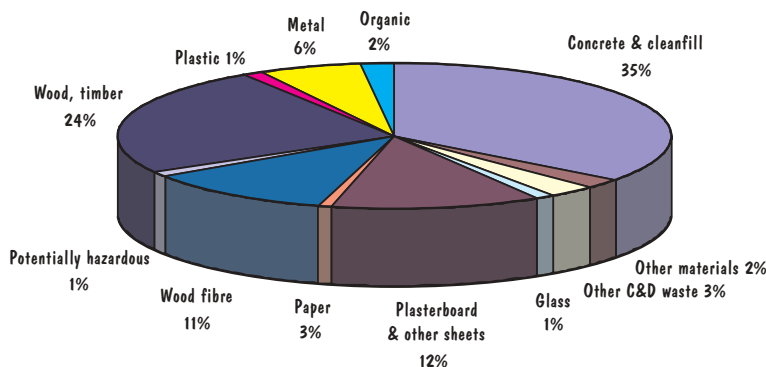
Where does construction and demolition waste come from?

(from Project C&D News, Issue 1, July 1996)



Construction and demolition waste - what's in it?

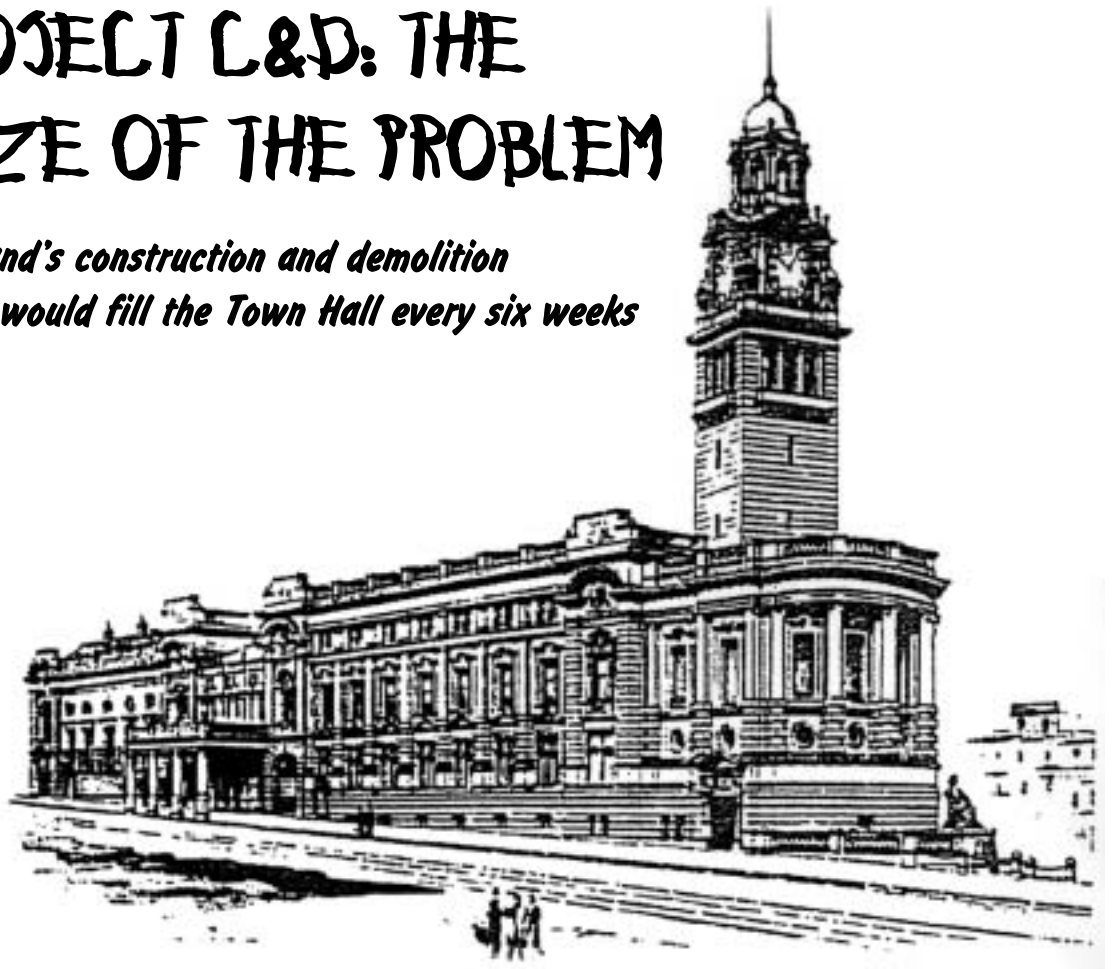
(from Project C&D Factsheet, September 1997)



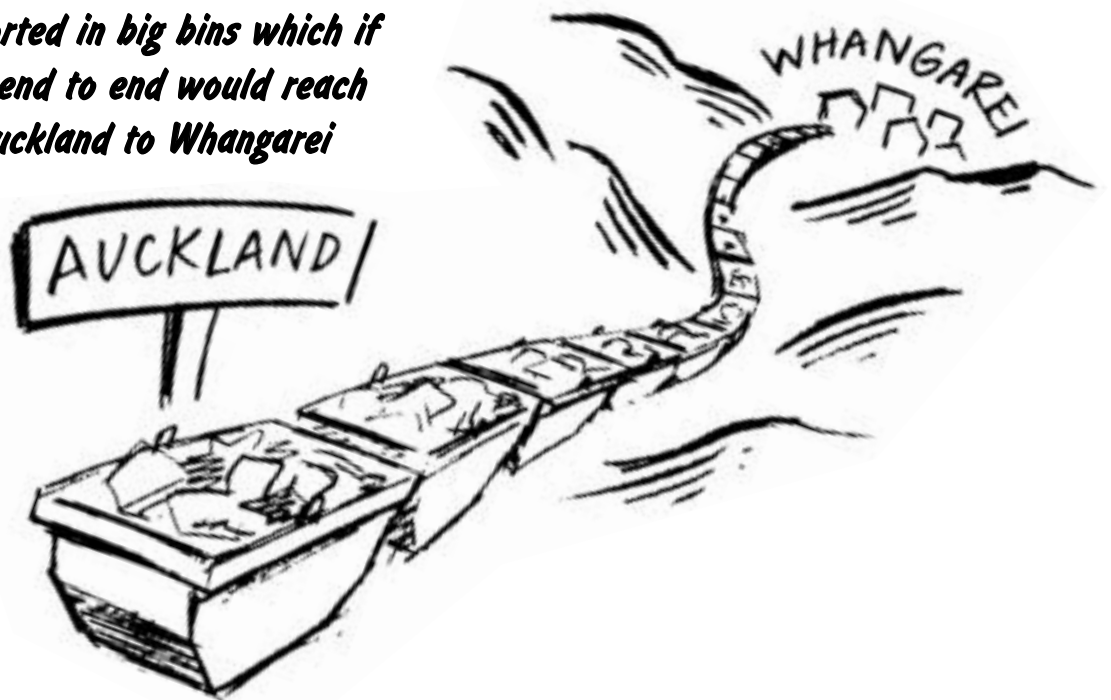


PROJECT C&D: THE SIZE OF THE PROBLEM

Auckland's construction and demolition waste would fill the Town Hall every six weeks



About 70% of this waste is transported in big bins which if placed end to end would reach from Auckland to Whangarei





REFERENCES

A complete list of references can be found at the end of Book 1.

AGFIRST Consultants Environmental Ltd, 1997. Composition of Waste, Auckland Region July 1996 - June 1997. Prepared for the Auckland Regional Council and the Ministry for the Environment.

Auckland Regional Council, April 1996. Auckland Regional Waste Stream Report 1995. Technical Publication No. 72.

_____, July 1996. Project C&D News. Issue 1.

_____, February 1997. Project C&D News. Issue 2.

_____, September 1997. Project C&D Fact Sheet.

_____, 1998. Resource Efficiency in the Building and Related Industries Resource Guide.

_____, no date. Final Report on Stage II of Project C&D for the Sustainable Management Fund.

GLOSSARY

A complete list of terms can be found at the end of Book 1.

C&D (construction and demolition) waste: wastes from building or demolishing houses and commercial properties, including wood, plasterboard, concrete, glass, plastic, metal, wood fibre.

Cleaner production: the efficient use of energy and resources to eliminate or reduce waste or to produce less harmful wastes, in order to produce environmentally sound products and services at the same time as reducing costs and increasing profits.

Cleanfill: inert waste material which causes minimal damage to the environment or living things. For example, clay, soil or bricks do not have strong chemical or biological interactions.

Construction: building new houses, offices, schools, bridges and so on.

Construction waste: waste materials from construction of homes, office buildings, industrial plants, schools, etc. usually including wood scraps, metal, brick and block, wires and industrial packaging materials.

Demolition: destroying or dismantling buildings or structures.

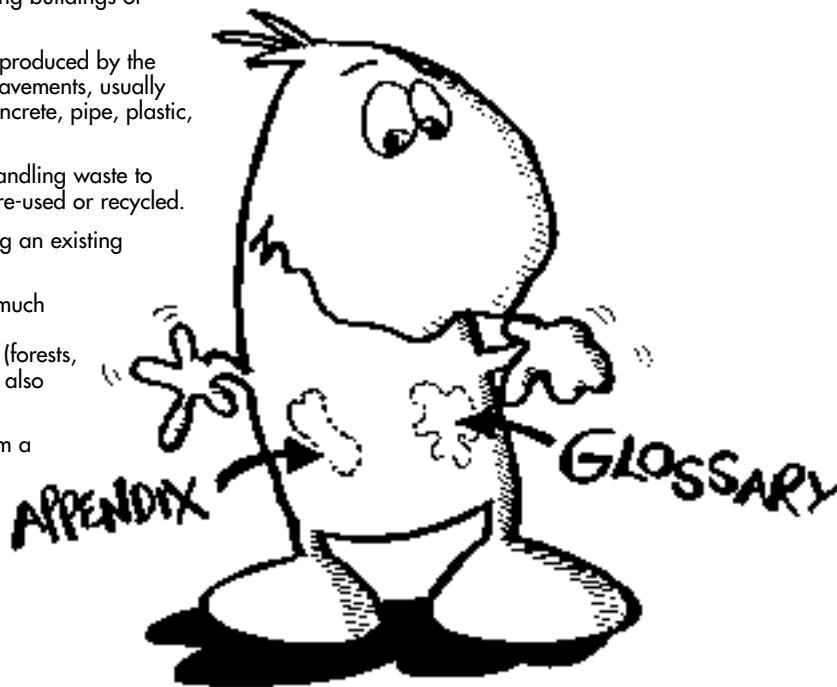
Demolition waste: waste materials produced by the destruction of buildings, roads or pavements, usually including large pieces of broken concrete, pipe, plastic, wood, bricks and glass.

Materials recovery: a process of handling waste to separate out materials that can be re-used or recycled.

Renovation: redecorating or altering an existing building.

Resource efficiency: only using as much material as you need which has environmental benefits at its source (forests, quarries) and at its disposal site. It also saves companies a lot of money.

Waste stream: waste produced from a particular source. Can mean the total volume of all wastes from that source, or the total volume can also be split into component streams of different wastes (separate waste streams).





CURRICULUM GUIDANCE

Additional resources

- page 78 of the technology curriculum
- Auckland Regional Council RENEW programme 09-366 2070
- Building Research Association of New Zealand: 09-526 4880; 04-235 7600
- http://www.ebuild.com/Archives/Fe.../Steel_vs_Wood/Steel_vs_Wood.html
- telephone contact list at the back of book 1

Technological outcomes

By the end of this topic your class could have:

- summarised the savings made by construction and demolition firms practising waste minimisation
- summarised reasons why the class should do a waste minimisation project on a particular site
- visited a cleanfill site or substitute activity
- investigated reducing, re-using or recycling construction and demolition waste on a site
- presented the class's findings and recommendations for waste minimisation on that site to a 'client'
- carried out a design brief on some of the barriers to innovation and change and how they can be overcome, plus some of the long-term implications of Project C&D



TECHNOLOGY Curriculum implementation **Topic 4: Demolition derby! Project C&D**

Technological areas:Information/Communication, Materials, Production/Process, Structure/Mechanisms
 Learning contexts:Home, School, Community, Environmental, Business, Industrial
 Technological outcomes:Product, Modified environment, System
 Essential skills:Communication, Numeracy, Information, Problem-solving, Self-management, Social/Cooperative,
Physical, Work/Study
 Community links:Landfills, Business, Industry
 Level: (Teachers: record the level or levels you are working with here):.....

Achievement objectives	Learning experiences	Possible assessment (teacher to complete)
Strand A: Technological knowledge and understanding		
Within a range of technological areas & contexts, students should develop understanding of:		
1. use and operation of technologies		
2. technological principles and systems		
3. nature of technological practice		
4. strategies for communicating, promoting and evaluating technological ideas and outcomes		
Strand B: Technological capability		
Within a range of technological areas & contexts, produce technological solutions:		
5. identify needs and opportunities to provide information for possible technological practice		
6. with reference to identified needs and opportunities:		
a. generate possible options & strategies; select, develop & adapt appropriate solutions		
b. produce technological outcomes to agreed quality standards, managing time and using human resources skilfully, safely and effectively		
c. present and promote ideas, strategies and outcomes throughout technological practice		
d. evaluate designs, strategies & outcomes in relation to their own and others' activities		
Strand C: Technology and society		
Within a range of technological areas and contexts, students should:		
7. develop awareness of, & understand how, beliefs, values & ethics of individuals & groups:		
- promote or constrain technological development		
- influence attitudes towards technological development		
8. develop awareness & understanding of impacts of technology on society & environment:		
- in the past, present and future		
- in local, national & international settings		





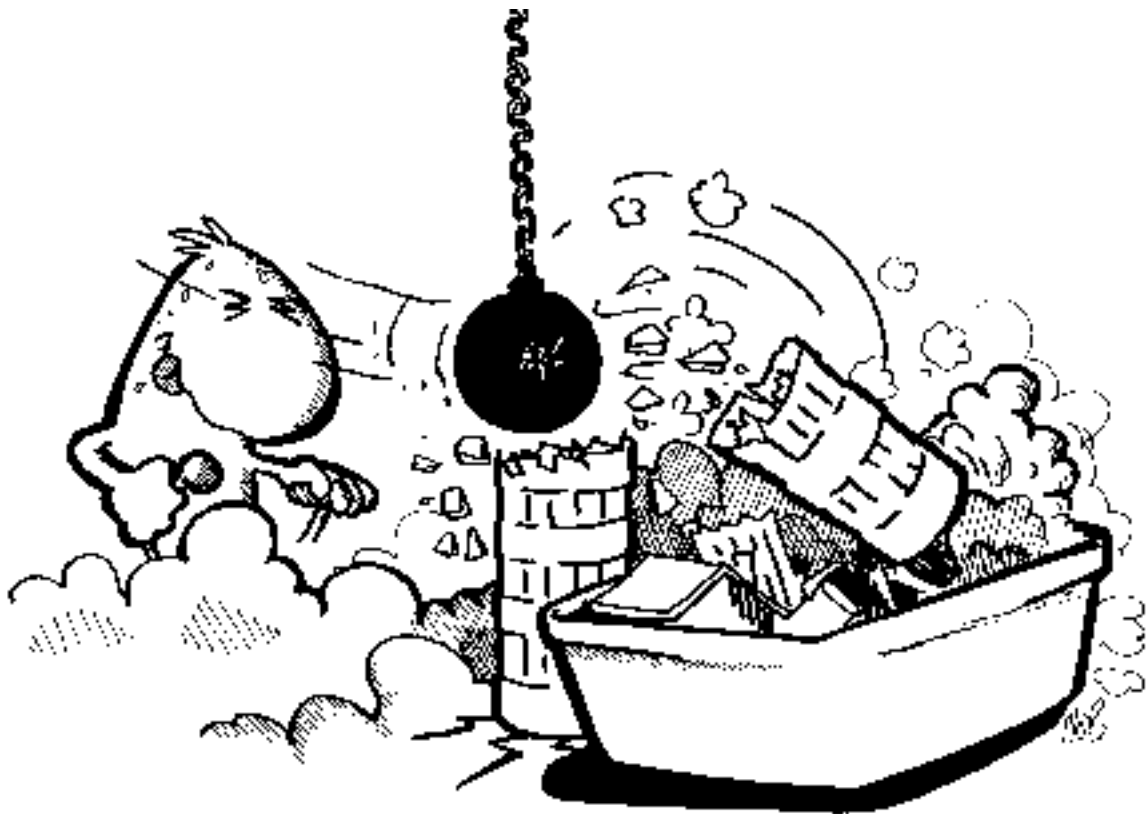
Teachers - please photocopy this form for your own use and records

CLASS/ES:

SCIENCE Curriculum implementation *Topic 4: Demolition derby! Project C&D*

Learning contexts:.....School grounds, Urban waste disposal, Construction, Industry, Rubbish dumps, Refuse centres, Pollution,
.....Building materials, Environmental organisations
Essential skills:.....Communication, Numeracy, Information, Problem-solving, Self-management, Competitive,
.....Social/Cooperative, Work/Study, Physical
Community links:.....Landfills, Business, Industry
Level: (Teachers: record the level or levels you are working with here):.....

Achievement objectives	Learning experiences	Possible assessment (teacher to complete)
Making sense of the nature of science and its relationship to technology		
2. explore the relationship between science and technology by investigating the application of science to technology and the impact of technology in science		
3. gain an understanding of personal, community and global implications of the application of science and technology		
Developing scientific skills and attitudes		
In their study of science, students will use their developing scientific knowledge, skills and attitudes to further develop their investigative skills and attitudes (see pages 44-51 of the curriculum)		
Making sense of the living world		
4. investigate local ecosystems and understand the interdependence of living organisms, including humans, and their relationship with their physical environment		
Making Sense of the Physical World		
4. explain how physical phenomena are used in everyday technology and how such technology affects people and their environment		
Making Sense of the Material World		
2. apply their knowledge of the properties of substances to the safe and appropriate use of these in the home, industry and the environment		
4. make informed decisions about the interrelationships of chemical substances and processes with technology, people and the environment		
Making Sense of Planet Earth and Beyond		
4. investigate how people's decisions and activities change planet Earth's physical environment; develop responsibility for guardianship of the Earth and its resources		





RESOURCE MATERIALS FOR TOPIC 4

DEMOLITION DERBY!

CLEANER PRODUCTION IN THE CONSTRUCTION AND DEMOLITION INDUSTRY

Topic 4: Demolition derby: Re-using construction and demolition waste

Project C&D (short for construction and demolition), a project of councils in the Auckland region and the Building Research Association, aims to reduce construction and demolition waste, which for some Auckland councils can be as much as 46% of landfilled waste.

Specific learning objectives are to:

- ✓ understand the construction and demolition industry
- ✓ appreciate its significance as a generator of waste
- ✓ understand how waste minimisation works on a construction or demolition site
- ✓ identify opportunities for waste reduction in the construction and demolition industry
- ✓ identify barriers to waste reduction practices and create strategies to overcome these



