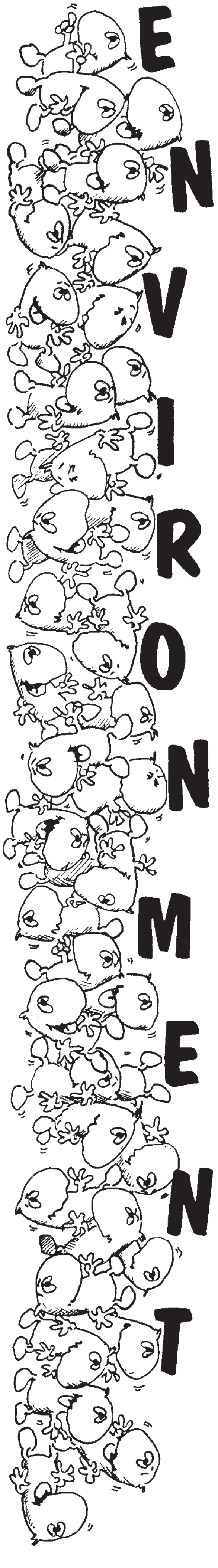


PAPER RECYCLING

Paper is one of the most common commodities, used in education, offices, business, retail, industry, commerce and the home.

In New Zealand, paper is one product that does not consume a non renewable resource because our trees are purpose grown in large forests. As the trees are logged they are replaced by new ones.

Why Recycle?

Used or waste paper forms an integral and unavoidable part of everyones lives and creates a mountain of waste that

1 costs to dispose

2 creates bulk in our landfills

Making paper from waste instead of virgin pulp -

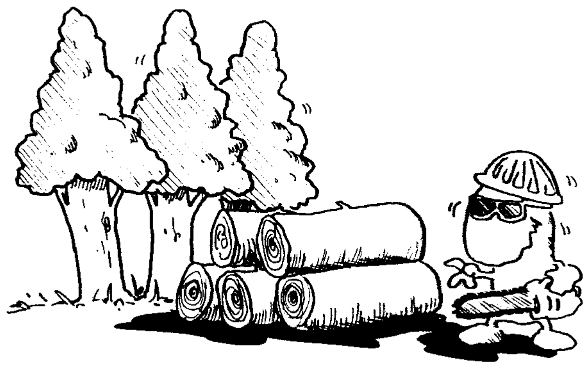
reduces energy consumption by	40%
reduces water use by	64%
reduces air pollution by	74%
reduces water pollution by	35%

It is estimated that it takes between 10 and 17 trees to produce 1 tonne of paper, enough for around 7000 copies of a national newspaper.

Softwoods, such as New Zealand's main plantation species, Radiata, produce long cellulose fibres excellent for producing strong papers.

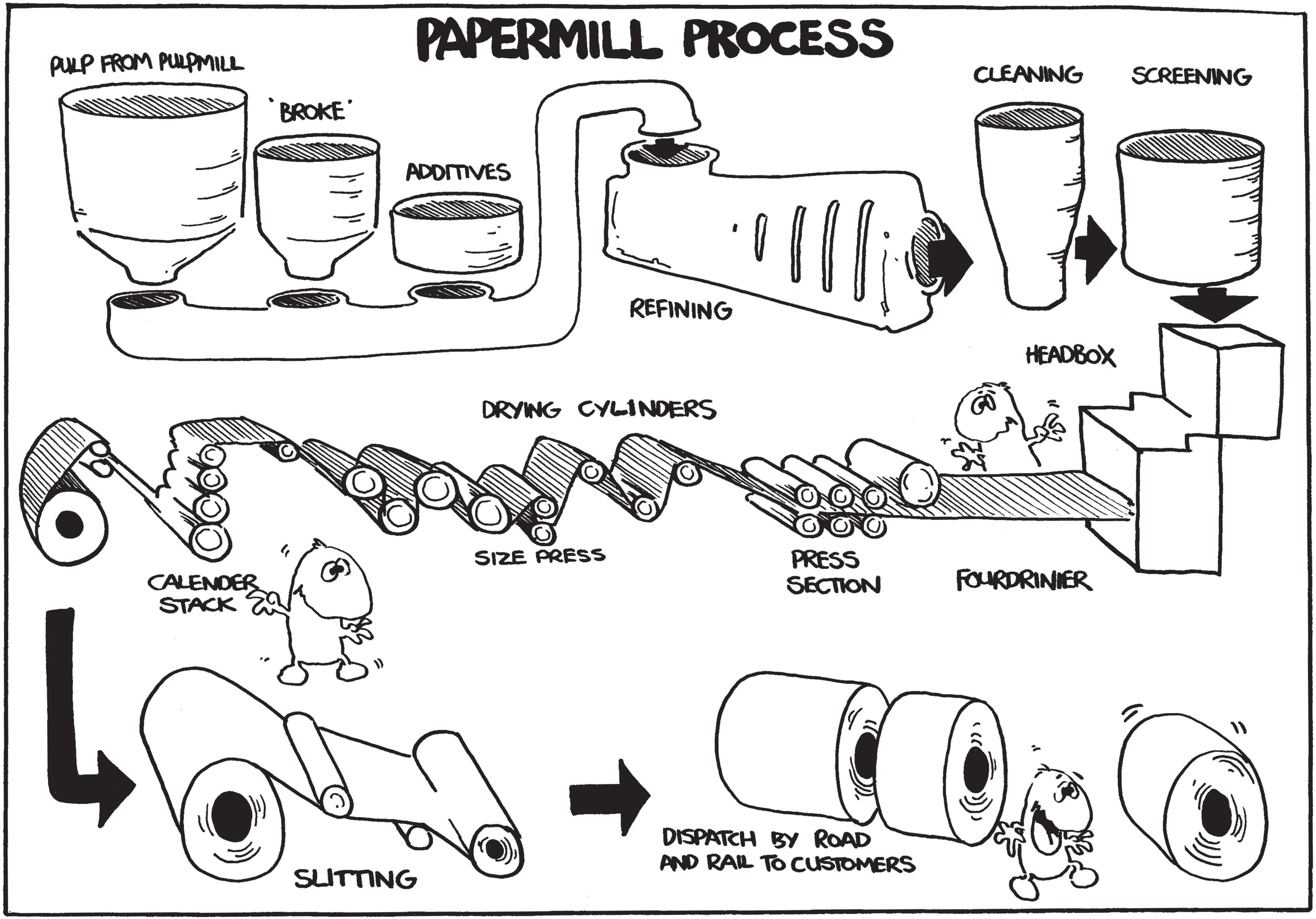
The strongest papers come from the kraft process which uses chemicals to separate the fibres from the other wood materials such as lignin. Because the fibres are not broken during the chemical process they retain their long length to form strong papers.

Newsprint is also made from Radiata, but in this case the fibres are separated by a mechanical grinding process which tears the fibres from the log. The tearing produces many short broken fibres which reduce the strength of the paper that is produced.



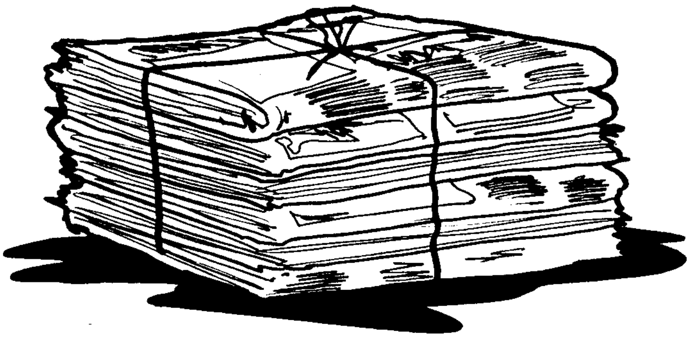
Information
sheet 5

Auckland **Regional** Council


PAPERMILL PROCESS
PULP FROM PULPMILL
'BROKE'
ADDITIVES
REFINING
CLEANING
SCREENING
HEADBOX
FOURDRINIER
PRESS SECTION
DRYING CYLINDERS
SIZE PRESS
CALENDER STACK
SLITTING
DISPATCH BY ROAD AND RAIL TO CUSTOMERS

PAPER RECYCLING IN NEW ZEALAND

In the twelve months ending June 1998, more than 170,000 tonnes of paper was collected in New Zealand for recycling. More than two thirds of this was recycled locally into packaging papers and paperboards and moulded pulp products. The remainder was exported for recycling elsewhere.



Paper and paperboard recovered in NZ for recycling:

Mixed	**50,400**	**tonnes**
Kraft (packaging)	**86,100**	**tonnes**
Newsprint	**38,850**	**tonnes**
Premium	**3,150**	**tonnes (white)**
Total:	**178,500**	

Recycled in New Zealand:

Mixed	**31,500**	**tonnes**
Kraft	**78,750**	**tonnes**
Newsprint	**37,800**	**tonnes**
Premium	**2,100**	**tonnes**
Total:	**150,150**	

Recycled Overseas:

Mixed	**18,900**	**tonnes**
Kraft	**7,350**	**tonnes**
Newsprint	**1,050**	**tonnes**
Premium	**1,050**	**tonnes**
Total:	**28,350**	

About 80% of mixed waste is packaging materials and the balance is mainly printed matter from colour magazines to office papers.

THE PRODUCTION PROCESS

The basic paper making process has not changed for 2000 years.

Paper collected for recycling comes from a wide variety of sources and is usually sorted and baled before it is sent to be recycled.

1. Papers come in different qualities and types and sorting ensures the correct fibres are available for recycling.

2. Baling improves handling and transport efficiency.

3. Once at the factory the paper and water are mixed together at high speed in a hydrapulper to break up the paper into separate fibres.

4. Contaminants such as wire, plastic and string are removed before the pulp is passed through cleaning and screening equipment to remove smaller items such as paper clips, staples and grit.

5. The pulp is then further heated to remove any sticky substances such as glue.

6. The cleaned pulp is diluted with water and mixed with small amounts of paper making additives. Ready to be recycled off-cuts are returned to the process, ahead of the paper machine. The paper, if it has recycled content, may be de-inked. If it is not, the old ink is dispersed throughout the new paper giving a greyish effect.

At this stage recycled paper may go to a moulded pulp factory to be made into packaging or be made into cardboard boxes etc.

Further paper production:

7. Paper is formed by pouring the stock onto an endless moving belt of fine mesh fabric. Excess water filters through the mesh leaving an even mat of the stock (fibre) and additives.

8 The mat passes through a press section which removes more water.

9 The stock passes into a drier which evaporates further water. When the paper emerges from the drying cylinders it has a moisture content of 6-7%.

10 Paper is sometimes passed through calendars to give it a smooth polished finish.

11 The finished paper is tested to ensure it meets the correct quality standards.

12 The paper is wound onto reels or cut into sheets before being packed to customers' specifications.

Most waste paper is used to make paperboard. Small quantities are used in making printing and writing paper, tissues, toilet paper and other minor applications such as plasterboard backing. Corrugated card, paper bags, envelopes and building papers also have recycled paper content.
Moulded pulp packaging such as egg cartons, produce trays and hospital equipment are also manufactured from recycled paper.

THE CHLORINE ISSUE

CHLORINE:

Historically, chlorine, which is harmful to the environment, has been used in the paper making process for bleaching. Because the chlorine is a very corrosive substance it cannot be reused in other stages of the paper making process. It therefore must be discharged as used effluent into the waste water system. The organochlorines and dioxins that are formed from the bleaching during the paper making process can be highly toxic and are readily detectable in the waste effluent. This can have an adverse effect on river and marine wildlife.

Owing to public concern, a number of European companies have developed chlorine free paper making processes which meet high environmental standards.

Oxygen and Ozone Bleaching:

TFC or Totally Free Chlorine pulp utilises oxygen and ozone (a form of oxygen) to bleach the paper pulp.

Advantages of Ozone Bleaching

Water Reuse:

The residues that are produced during this process are not corrosive, enabling the water to be recycled, and chemicals that are pulled out of the pulp can be recovered.

Decreased energy usage:

Oxygen production requires 1/8th the energy of producing chlorine dioxide.

Purchasing chlorine free papers is an important step towards minimising the environmental impact from paper manufacturing.

Consumer demand will be a likely impetus to force industry to examining current bleaching and pulping practices.

PAPER HISTORY

- Paper is derived from the word Papyrus, which preceded it as a writing material used by the **Egyptians**.
- Paper was invented in China in AD 105

by Tasai Lun, Minister of Agriculture under the Chinese Emperor, Ho Ti.

- The oldest paper is dated around AD 405, is Chinese in origin and is held in the British Museum.

- A 'watermark' is one of the earliest forms of trade marking and probably originated in Italy.

  Linen was one of the earliest materials to be used for paper making.

  Today cotton and linen rags make the highest quality paper for special purposes ie banknotes. (This is changing as in some countries plastic is becoming more widely used).

Paper Facts

- Wood consists of 50% cellulose, 30% lignin and 20% other material. It is the cellulose that is needed for paper. These components are separated either chemically or mechanically.

- Paper is made from the pulped, pressed and dried out cellulose fibres. In New Zealand pulp trees are a renewable resource - from planting to maturity our pulp trees take 20 years to grow.

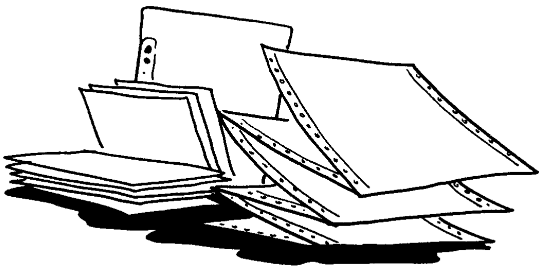
- Recycling reverses the process of paper manufacturing making the cellulose very wet and agitating it so that the fibres are separated and can be reconstituted.

- Recycled paper labelled "100% recycled" is not necessarily true. Such paper often contains scrap from paper mills or misprints and has not gone through a true consumer.

- **To make 1kg of paper -**
  It takes 2.7 kg of wood
  130g of calcium carbonate
  85g of sulphur
  40g of chlorine
  300 litres of water

- In New Zealand we can now purchase both recycled content and 100% recycled post consumer paper.

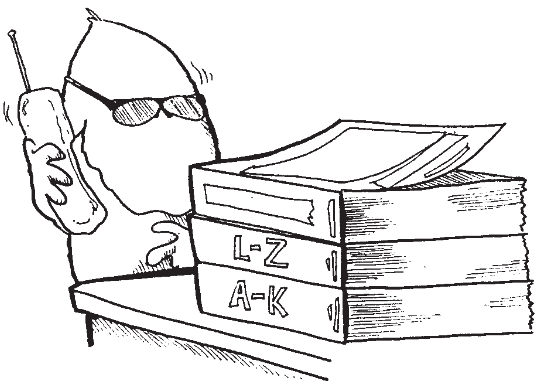
Recyclable paper includes:-



- photocopier paper
- bond stock (all forms)
- writing paper
- note paper and envelopes
- binder dividers
- manilla folders
- computer cards
- computer print out
- reports and forms
- cardboard cartons eg *Weetbix* and *Milo*
- cartons, packaging etc.
- magazines, newspapers

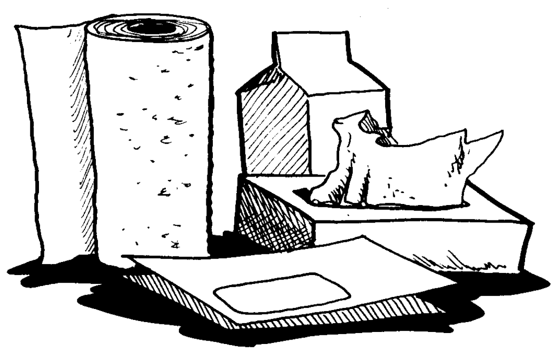
Telephone books are now accepted throughout Auckland for recycling.

Note:
Staples and paper clips need not be removed. A small number are acceptable.



Non Recycle items include:

carbon paper
typewriter ribbons
gummed labels
chocolate and foil wrappers
facial tissues
waxed paper
cigarette packets
cups and plates
paper towels
lunch bags
window envelopes
milk and drink cartons



MAKE YOUR OWN RECYCLED PAPER

Paper making kits are available from newsagents and bookstores.

There are many new and attractive papers both recycled and chlorine free, available in New Zealand. The more people that purchase these the more affordable they will become.

Do your part to help preserve our environment and conserve our resources.

BUY RECYCLED
BUY CHLORINE FREE

Auckland **Regional** Council

For further information
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Auckland

ARC Wasteline (09) 366-2070
February 1999

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