



# An environmental report on sources of fibre for tissue making

prepared by  
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# Introduction

Kimberly-Clark is a major Australian producer of tissue paper from wood fibre. In this Environmental Report, which they commissioned, I have attempted to be objective and to give an independent analysis of the way that the company sources its fibre and its consequential impact on the environment.

Unfortunately no environmental practice, not even recycling, is without some cost to the environment – every option has positives and negatives. Even breathing consumes oxygen and produces carbon dioxide as a waste product! Consequently one must choose the least damaging and most sustainable option, all things being considered.

Therefore this report highlights the pros and cons of Kimberly-Clark's practices, as well as those of alternatives it does not pursue.

It is divided into two sections: Long Fibre (from Pinewood, that adds strength to paper) and Short Fibre (from Eucalyptus, that adds softness).

Uncommon terms are asterisked, and are listed in a Glossary at the end of the report.



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# A: OPTIONS FOR SOURCING LONG FIBRE

## OPTION A1: fibre source is chemically pulped plantation pine<sup>1</sup>.

### Environmental Positives for this option

- Plantations absorb atmospheric carbon dioxide and, during photosynthesis, release oxygen
- Plantations are a renewable and sustainable resource, and are carbon dioxide neutral (trees only release to the atmosphere the CO<sup>2</sup> that was once there in the first place)
- Uses thinnings\* from a sustainable resource that is grown for other purposes (e.g. timber for housing, etc.)
- Less energy is needed to process plantation timber into fibres than for processing wood from older forests (the cellulose of younger trees is not as tightly bound)
- Plantations are close to mills, which reduces fuel used to cart timber and subsequent vehicle emissions and greenhouse gases
- The wood is pulped efficiently with recycled chemicals (mainly magnesium oxide\* and sulphur dioxide\* – make-up chemicals are less than 5%)
- The overall process consumes less water (compared to using recycled paper) because incoming wood has a high water content (about 50%)
- Much of the solar energy in the wood is captured by burning the removed lignin\* and tree bark to further fuel the pulping process

### Environmental negatives for this option

- Plantations have, by definition, less biodiversity than native forest (however in this respect it is no different from monoculture farming such as wheat or grazing)
- There is a small amount of mill emissions in the processing of the wood (but these are controlled by EPA (Environmental Protection Authority) licences and controls)

1. (Pulping method is Kraft or bisulfite\* pulping with non-chlorine bleaching\*)

- Knots and bark disposal could be a problem but these are composted or burnt as fuel
- When transporting wood a lot of water is also being transported (wood is 50% water) – this can be minimised with mills close to plantations
- Carbon dioxide is emitted in the burning of lignin, but this is only the carbon dioxide captured in the growing of the trees

## OPTION A2: fibre source is deinked recycled paper.

### Environmental Positives for this option

- The fibres will be used at least once, lessening the wood cut required.
- There is less energy needed to separate and prepare recycled fibres
- There will be less energy expended in forests
- There will be a reduction in paper that goes to landfill (where it eventually produces greenhouse gases)

### Environmental negatives for this option

- Disposal of wet de-inking sludge
  - for the classes of waste paper, which can be used, approximately 0.5 tonne of sludge (40% solids) is produced for every tonne of recycled paper
  - sludge biodegrades in landfill, giving off methane (a major greenhouse gas)
- The overall process requires more water because moisture-rich wood is replaced by “dry” (8% moisture) waste paper.
- The classes of waste paper that can be used to provide long fibres, all have their own potential negatives
  1. Newsprint contains a significant amount of fibres that have not been chemically pulped, so further chemicals (such as sodium hydroxide) are needed to soften and brighten the fibres
  2. Old milk cartons are laminated with plastics and extra energy is required for removing the plastic, and also for washing the containers
  3. Office waste contains a significant quantity

of fillers (such as Calcium Carbonate) that are lost in recycling, creating an even higher sludge burden.

- The location of the de-inking process is problematical
  1. If the de-inking takes place at the paper production site then waste paper transport includes not only the useful fibre, but also all the material that will be lost during the recycling/deinking process
  2. If the de-inking takes place in an urban centre, away from the production site, then the transport of the de-inked pulp will include a lot of water (the pulp will be at least 40% water)
- There is no recovery of de-inking chemicals, resulting in increased load, particularly on water treatment
- There are increased greenhouse gas emissions from wastepaper collection trucks, and the waste paper is far from the production site.

## RANKING OF OPTIONS FOR SOURCING LONG FIBRE:

A1 > A2

### Kimberly-Clark's Practice: Option A1 (fibre source is chemically pulped plantation pine).

Long fibre represents 75% of Kimberly-Clark's fibre needs.

The company uses only 100% plantation-grown trees.

KCA takes pine thinnings from the nearest plantation, (average transport distance to the mill is 60 km).

KCA uses bisulfite pulp and non-chlorine bleaching.

## B: OPTIONS FOR SOURCING SHORT FIBRE

### OPTION B1: fibre source is chemically pulped plantation eucalypt<sup>1</sup>.

#### Environmental Positives for this option

- Plantations absorb atmospheric carbon dioxide and, during photosynthesis, release oxygen
- Plantations are a renewable and sustainable resource, and are carbon dioxide neutral (trees only release to the atmosphere the CO<sup>2</sup> that was once there in the first place)
- Less energy is needed to process plantation timber into fibres than for processing wood from older forests (the cellulose of younger trees is not as tightly bound)
- Plantations have been developed close to mills, which reduces fuel used to cart timber and subsequent vehicle emissions and greenhouse gases
- The wood is pulped efficiently with recycled chemicals (mainly magnesium oxide\* and sulphur dioxide\* – make-up chemicals are less than 5%)
- The overall process consumes less water (compared to using recycle paper) because incoming wood has a high water content (about 50%)
- Much of the solar energy in the wood is captured by burning the removed lignin\* and tree bark to further fuel the pulping process

#### Environmental negatives for this option

- Plantations have, by definition, less biodiversity than native forest (however in this respect they are no different from monoculture farming such as wheat or grazing)
- There is a small amount of mill emissions in the processing of the wood (but these are controlled by EPA (Environmental Protection Authority) licences and controls)

1. (Pulping method is Kraft or bisulfite\* pulping with non-chlorine bleaching\*)

- Knots disposal could be a problem but these are composted or burnt as fuel
- When transporting wood a lot of water is also being transported (wood is 50% water) – this can be minimised with mills close to plantations
- Carbon dioxide is emitted in the burning of lignin, but this is only the carbon dioxide captured in the growing of the trees

## OPTION B2: fibre source is chemically pulped native eucalypt<sup>1</sup>.

### Environmental Positives for this option

- Sustainably managed native eucalypt forests can be a renewable and sustainable resource, and are carbon dioxide neutral (trees only release to the atmosphere the CO<sub>2</sub> that was once there in the first place)
- RFAs (Regional Forest Agreements) are designed to maintain high biodiversity in state forest areas
- The saw log rejects and waste from the native eucalypt timber processing industry are used
- The wood is pulped efficiently with recycled chemicals (mainly magnesium oxide\* and sulphur dioxide\* – make-up chemicals are less than 5%)
- The overall process consumes less water (compared to using recycle paper) because incoming wood has a high water content (about 50%)
- Much of the solar energy in the wood is captured by burning the removed lignin\* and tree bark to further fuel the pulping process

### Environmental negatives for this option

- More energy is needed to process native timber into fibres than for processing wood from plantations (the cellulose of older trees is more tightly bound)

- There is undoubtedly a large demand on these forests and even though KCA would take residues, this option would increase the demand.
- There is a small amount of mill emissions in the processing of the wood (but these are controlled by EPA (Environmental Protection Authority) licences and controls)
- Knots disposal could be a problem but these are composted or burnt as fuel
- When transporting wood a lot of water is also being transported (wood is 50% water) – this can be minimised with mills close to plantations
- Available native timber is relatively distant from the mill, increasing the fuel used to cart timber and subsequent vehicle emissions and greenhouse gases
- Carbon dioxide is emitted in the burning of lignin, but this is only the carbon dioxide captured in the growing of the trees

## OPTION B3: fibre source is deinked recycled paper.

### Environmental Positives for this option

- The fibres will already be used at least once, lessening the wood cut required.
- There is less energy needed to separate and prepare recycled fibres
- There will be less energy expended in forests
- There will be a reduction in paper that goes to landfill (where it eventually produces greenhouse gases)

### Environmental negatives for this option

- Disposal of wet de-inking sludge
  - for the class of waste paper that can be used, approximately one tonne of sludge (40% solids) is produced for every tonne of recycled paper
  - sludge biodegrades in landfill, giving off methane (a major greenhouse gas)
- There is no recovery of de-inking chemicals, resulting in increased load, particularly on water treatment

1. (Pulping method is Kraft or bisulfite\* pulping with non-chlorine bleaching\*)

- There is increased greenhouse gas emissions from wastepaper collection trucks, and the wastepaper is far from the production site
- The location of the de-inking process is problematical
  1. If the de-inking takes place at the paper production site then waste paper transport includes not only the useful fibre, but also all the material that will be lost during the recycling/deinking process
  2. If the de-inking takes place in an urban centre, away from the production site, then the transport of the de-inked pulp will include a lot of water (the pulp will be at least 40% water)
- The overall process requires more water because moisture-rich wood is replaced by “dry” (8% moisture) waste paper.
- Office waste is the only source of paper that can supply short fibre. This paper contains a significant quantity of fillers (usually more than 20% of Calcium Carbonate) that are lost on recycling, creating a high sludge burden.

## RANKING OF OPTIONS FOR SOURCING SHORT FIBRE:

**B1 > B2 > B3**

### Kimberly-Clark’s Practice: Option B1 (develop eucalypt plantations close to their mill).

Short fibre represents 25% of Kimberly-Clark’s fibre use.

The company uses only 100% plantation-grown trees.

The average transport distance to the mill is 100 km.

KCA uses bisulfite pulp and non-chlorine bleaching.

## CONCLUSION

This report shows that the commonly held belief that recycled paper products are clearly better for the environment is not necessarily true. The methods of collecting, de-inking and separating paper fibres for re-use have some adverse environmental impacts of their own.

Using virgin pulp from sustainably managed plantations can have low environmental impact, particularly if mills are close to those plantations, as are Kimberly-Clark’s.

On balance, I believe Kimberly-Clark Australia’s approach to sourcing fibre for their products is at world’s Best Practice levels in their low environmental impact, given current knowledge and technology.

(The glossary and fact sheet which follow have been prepared by KCA staff. Their purpose is to put Professor Johnston’s report into the broader context and to answer additional questions outside the scope of Professor Johnston’s report.)

## Glossary

**Bisulfite pulping:** Sulfur dioxide is reacted with magnesium oxide to make magnesium bisulfite. This forms the digestion liquor for bisulfite (or magnefite) pulping of wood.

**Chemical pulp:** Chemical pulping liquor is mixed with wood chips which are heated under pressure to react with and dissolve lignin. This liberates the cellulose fibres, which are called 'chemical pulp'. Kraft is the dominant chemical pulp. KCA uses bisulfite pulp.

**Deinking and fibre cleaning:** Process to make recycled pulp – chemicals (eg, sodium hydroxide and silicate) are used to soften and separate fibres. Old newsprint, office paper and milk/juice cartons are key feedstocks for these processes

**Lignin:** Wood consists mainly of cellulose fibres, and lignin, which is the 'glue' that binds the fibres together

**Magnesium oxide:** A major ingredient in bisulfite pulping liquor, along with sulfur dioxide (see below). This tasteless, white substance is also used in medicine as an antacid and laxative.

**Mechanical pulp:** Mechanical action (e.g. grinding) of wood separates the fibres from each other. Newsprint is made from this pulp – both virgin mechanical pulp and deinked pulp from old newspapers.

**Pulp & Pulping:** Pulp is the cellulose fibre extracted from wood. There are chemical\* and mechanical\* pulping processes.

**Sulfur dioxide:** see Bisulfite pulping

**Thinnings:** Prunings of lower grade trees are taken from pine plantations to help the majority grow straighter and stronger. Previously this wood was burnt or left to rot on the forest floor.

## Fact Sheet

Kimberly-Clark...

...uses about 400,000 tonnes of pinewood (Pinus Radiata) per annum on a wet wood basis to extract long fibre – about 21% of Australia's paper industry usage overall

...uses about 100,000 tonnes of eucalyptus wood per annum on a wet wood basis to extract short fibre – about 10% of Australia's paper industry usage overall

...makes about 97,000 tonnes of paper per annum (about 3.3% of the Australian paper industry's production)

...situates its mills close to its pinewood plantations to minimise greenhouse gas emissions from timber transport vehicles

...continually reviews its policy on fibre supply, especially regarding alternative wastepaper options

...has an extensive recycling programme in place at all its mills, including the goal of zero manufacturing wastes to landfill

Each Kimberly-Clark mill has committed to achieve a 10% reduction in energy-per-production-unit by 2005 (compared with 2000)

Kimberly-Clark's three mills achieved a 15.3% reduction in greenhouse gas emissions per production unit between 1994 and 2000

Kimberly-Clark has an Environmental Management System based on the ISO 14000 standards for environmental management

Environmental audits show a high level of compliance with ISO 14001 (Environmental Management System)

Since signing the Commonwealth and state governments' National Packaging Covenant in 1999 more than 200 tonnes of packaging has been saved

#### FURTHER INFORMATION

Kimberly-Clark's Environmental Policy and other information is available on this website;

[www.kca.com.au](http://www.kca.com.au)

click on "Caring for our Environment"

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