

Annex 1
Of DT_ECO-07/2008

STUDY FOR THE COPYING AND GRAPHIC PAPER CRITERIA REVISION



WORK PACKAGE 1
FINAL REPORT

VERSION 19th December 2008

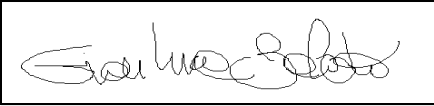
“Revision of EU Ecolabel criteria for the copying and graphic paper product group”

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SUMMARY

1	INTRODUCTION	5
1.1	PROJECT FRAMEWORK	5
1.2	PAPER PRODUCTION PROCESS	8
1.3	COPYING AND GRAPHIC PAPER - CLASSES DEFINITIONS	11
1.4	PULPS - DEFINITIONS.....	12
	<i>Chemical pulp</i>	12
	<i>Mechanical pulp</i>	12
	<i>Semi-chemical pulp</i>	13
	<i>Other pulp</i>	13
	<i>Deinked pulp</i>	13
1.5	PAPER MILLS CLASSIFICATION	13
2	THE EU PAPER MARKET	14
2.1	PAPER INDUSTRY	15
	<i>WORLD PAPER INDUSTRY OVERVIEW</i>	15
	<i>EUROPEAN PAPER INDUSTRY</i>	16
	European Production	17
	Main European Total Paper Producers.....	18
	European imports	18
	European exports.....	20
	Economic aspects of the European paper industry.....	21
	Raw materials used in Papermaking	22
	Recovered Paper.....	22
2.2	PULP INDUSTRY	24
	<i>World Pulp Industry Overview</i>	24
	<i>European Pulp Industry</i>	25
	<i>Main European Pulp Producers</i>	26
	<i>Pulp Grades</i>	26
	<i>Chemical pulp</i>	28
	<i>Semi-chemical pulp</i>	30
	<i>Mechanical pulp</i>	31
2.3	GRAPHIC AND COPYING PAPER	32
	<i>Uncoated mechanical</i>	32
	<i>Uncoated wood-free</i>	33
	<i>Coated papers</i>	33
2.4	SUMMARY OF THE MARKET ANALYSIS FOR THE PAPER PRODUCT GROUP	35
2.5	MARKET INFORMATION ABOUT ECOLABELLED MANUFACTURES	36
2.6	BENCHMARKING WITH OTHER EUROPEAN NATIONAL LABELS.....	38
3	EU NORMATIVE ANALYSIS: REGULATORY IMPROVEMENTS FOR THE PAPER SECTOR	40
3.1	CHEMICAL SUBSTANCES NORMATIVE UPDATE.....	40
3.2	TEST METHODS REFERENCES UPDATE.....	41

4	TECHNICAL ANALYSIS OF EXISTING CRITERIA	44
4.1	MAIN ENVIRONMENTAL ASPECTS LINKED TO THE PAPER PRODUCTION	44
4.2	CURRENT ECOLABEL CRITERIA	45
4.3	THE IPPC DIRECTIVE	45
4.4	BEST AVAILABLE TECHNIQUES (BAT) ANALYSIS	46
	<i>Emissions to air and water</i>	46
	<i>Energy Use</i>	48
	<i>Notes on the technical analysis</i>	50
4.5	SUSTAINABLE FOREST MANAGEMENT	50
4.6	GREEN PUBLIC PROCUREMENT FOR COPYING AND GRAPHIC PAPER	55
	<i>The European GPP criteria</i>	55
	<i>Focus on the EU National GPP criteria</i>	58
4.7	LCA COMPARATIVE ANALYSIS ON VIRGIN - RECYCLED PAPER PRODUCTION	61
	<i>Introduction</i>	61
	<i>System boundaries</i>	61
	<i>Data sources and hypotheses</i>	62
	<i>Results comparison</i>	63
	<i>Considerations</i>	66
4.8	CARBON FOOTPRINT FOR THE PAPER MANUFACTURE	68
5	COMMENTS AND PROPOSALS ON EXISTING CRITERIA OVERVIEW COMING FROM THE STAKEHOLDERS.....	69
	<i>Definition of the product group (Commission decision, Article 2)</i>	69
	<i>Criterion 1. – Emission to air and water</i>	70
	<i>Criterion 2. – Energy use</i>	73
	<i>Criterion 3. – Fibres - Certified Forest Management</i>	74
	<i>Criterion 4. – Hazardous chemical substances</i>	76
	<i>Criterion 5. – Waste management</i>	77
	<i>Criterion 6. – Fitness for use</i>	78
	<i>Criterion 7. – Information on the packaging</i>	79
	<i>Criterion 8. – Information appearing on the eco-label</i>	80
5.1	NEW CRITERIA PROPOSAL	80
6	APPENDIX	81
6.1	CONTACTS.....	81
6.2	REFERENCES.....	82

1 Introduction

ISPRA, the Italian Agency for Environmental Protection and Technical Services, the technical support for the Italian C.B., has been entrusted by the European Commission for the development of the project entitled “**EU Ecolabel Criteria Revision for Copying and Graphic Paper**”.

ISPRA, subsequently, appointed Life Cycle Engineering (LCE) to act as technical support during the project development.

The overall aim of the project is to assess the need for updating/developing new criteria for the Copying and Graphic paper product group (PG).

The project is composed by 2 Work Packages (WPs).

WP1 focuses on the development of a Preliminary Report for the revision of the existing Copying and Graphic paper criteria.

Based on the WP1 results, the **WP2** would be implemented if a revision of the existing criteria is needed.

The **Work Package 1 Preliminary Report** constitutes an informative platform for the whole project. This Preliminary Report aims at:

- Updating some basic market data, to highlight the share of the products belonging to this PG in the European market and the feasibility of Ecolabelled papers.
- Defining the available technologies and production methods, to assess if the existing criteria have been overcome by technological improvements, and if some new requirements need to be tightened.
- Analysing the existing EU and some specific national legislations as well as BAT documents influencing the Copying and Graphic paper sector, to assess if new mandatory requirements have been introduced, and if the criteria are, at least, as strict as the current legislation is.

WP2: revision of the existing criteria for the award of the Ecolabel flower for the copying and graphic paper product group.

1.1 PROJECT FRAMEWORK

A general framework of the whole project is schematically presented in Figure 1.1.

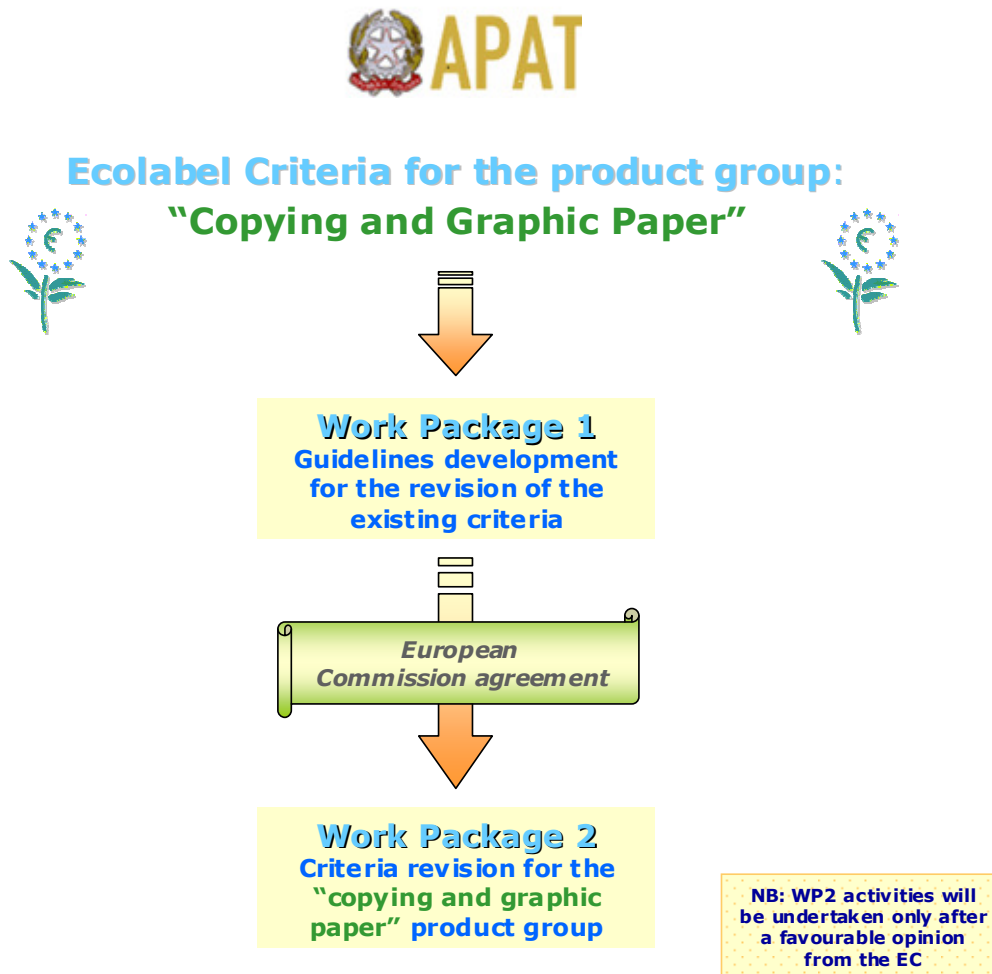


Figure 1.1 - The project framework.

Then, Table 1.1 highlights the main actions grouped in the Work Package 1, as well as the corresponding deadlines and responsibilities.

Table 1.1 - Work Package 1 actions and timetable

TASK	ACTION	WHO	DEADLINE	Deliverables	Status
Task 1	Kick-off meeting	LCE/ISPRA	29/01/2008	Minutes	OK
	Mailing list stakeholders	LCE	15/02/2008	Mailing list	OK
	Work Plan	LCE	15/02/2008	Work Plan	OK
	Preliminary Questionnaire delivery	LCE/ISPRA	20/02/2008	Preliminary Questionnaire	OK
	Preliminary Questionnaire feedbacks	CBs + Stakeholders	21/03/2008	-	OK
	Preliminary Results Task 1 (legislation analysis; BAT; market analysis; Environmental impacts analysis (LCA); Results interpretation)	LCE/ISPRA	21/03/2008	Preliminary Report - 1° draft	OK
	Intermediate Results Task 1 (First results + Analysis of the potential benefits, benchmarking whit other products and labels)	LCE/ISPRA	21/04/2008	Preliminary Report -2° draft	OK
	Final Results Task 1	LCE/ISPRA	30/06/2008	Preliminary Report	OK
	Comments from EC	CE	07/07/2008	-	OK
Task 2	Preliminary Report Distribution and AHWG constitution	ISPRA	08/07/2008	Preliminary Report (Final draft) + invitation meeting agenda	OK
	First AHWG meeting	LCE/ISPRA	09/09/2008 (Rome)	<ul style="list-style-type: none"> Preliminary Report (Final draft) Presentation (ppt) 	OK
	Minutes of the 1 st AHWG	LCE	28/10/2008	Minutes of the 1 st AHWG	OK
	Management of the AHWG comments	LCE	28/10/2008	-	OK
Task 3	Hypothesis of extension of the validity without review. Possible extension to new paper products.	LCE	28/10/2008	Report - Feasibility Study	OK
	LCA analysis to define the revision and improvement of the criteria for paper copy and graphics.	LCE	28/11/2008	-	OK
	Revision and updating of the preliminary report with comments arising from 1 st AHWG	LCE	28/11/2008	-	OK
	Documents for the EUEB meeting	LCE	28/11/2008	WP1 Final Draft Report	OK
	Revision and updating of the final draft report with comments arising from the EUEB meeting	LCE	19/12/2008	WP1 Final Report	OK

1.2 PAPER PRODUCTION PROCESS

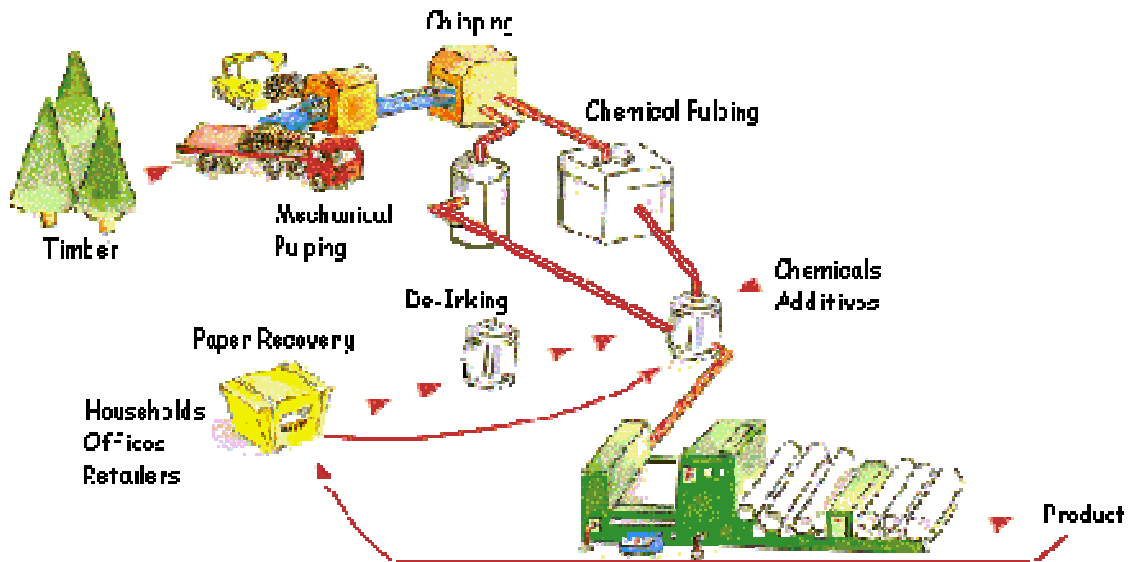


Figure 1.2 – Paper production process (Source: CEPI¹)

As it can be seen in Figure 1.2, there are two main fibrous raw materials used in papermaking: the wood pulp (chemical and mechanical) and the recovered paper. In addition, a quantity of additives (mainly natural mineral fillers) and dyestuffs are used together with traces of auxiliary chemicals. Another important raw material is water, which is used in large quantities during the papermaking process, but then recovered and reused, or returned to the watercourse from which it is extracted after cleaning processes.

Paper mills can be fully-integrated mills or non-integrated mills: some differences in the production processes must be highlighted for the two cases. Integrated mills are factories producing pulp and a paper on the same site: such mills receive logs or wood chips and produce paper; mechanical pulps are almost always used in fully-integrated mills.

Non-integrated mills purchase more commonly chemical pulps, usually as dried baled, known as market pulp.

Wood pulp normally arrives at the paper mill in the form of very thick sheets, while recovered paper usually arrives in the form of large, compressed bales. Both these materials have to be broken down so that the individual fibres they contain are completely separated from each other. This process is performed in large vessels known as pulpers where the raw materials are diluted with up to 100 times their weight of water and then subjected to violent mechanical action using steel rotor blades. The resulting slurry (known as papermaking stock) is then passed to holding tanks.

¹ Confederation of European Paper Industries - www.paperonline.org

During this preliminary stage, auxiliary chemicals and additives may be added. The auxiliary chemicals are usually combined with the fibrous raw materials at levels from below 1% to 2% and can be sizing agents, which reduce ink and water penetration, and process anti-foaming agents. Common additives consist of clay or chalk (titanium dioxide is no longer used because of its high cost) that are added to modify the optical properties of the paper and board or as a fibre substitute. The stock is then pumped through various types of mechanical cleaning equipment to the paper machine.

On the paper machine, yet further water is added to produce a fibre suspension of as little as 1 to 10 parts fibre to 1000 parts water and the resulting mixture is passed into a head-box which squirts it through a thin, horizontal slit across the full machine width (typically 2 - 6 m) on to a moving, endless wire mesh.

The water is then removed on this wire section by a mixture of gravity and suction in a process known as sheet formation where the fibres start to spread and consolidate into a thin mat, which is almost recognisable as a layer of paper on top of the wire mesh.

This web of wet paper is lifted from the wire mesh and squeezed between a series of presses where its water content is lowered to about 50%. It passes around a series of cast-iron cylinders, heated to temperatures in excess of 100°C, where drying takes place. Here the water content is lowered to between 5% and 8%, its final level. Throughout its passage from the wire mesh to the drying operation, the paper web is supported on various types of endless fabric belts moving at the same speed. After drying, some papers may also undergo surface treatments e.g. **sizing** and **calendering**. The latter process consists of smoothing the surface of the paper by passing it between a series of rotating, polished, metal rollers. It is then wound into a reel.

The reels from the paper machine are passed into a separate area where they are subjected to further operations. These may be either simple processes where the reel is slit into a number of more narrow reels or cut into sheets. In some cases, more complicated processes may be performed such as coating (often consisting of the application of clay-based materials for special printing finishes) or more calendaring may be performed. The final reels or sheets are normally wrapped and despatched to other companies which carry out converting and printing operations.

The production process does not vary so much for different types of paper: the main difference concerns the coating processes, most of all in the case of the so called “coated paper”. The use of different raw materials in input, instead, involves the employment of several kinds of additives and chemicals for the pulp preparation in the pre-treatment phases.

The following figure (Figure 1.3) shows a generic flowchart of the manufacturing process for the different kinds of paper.

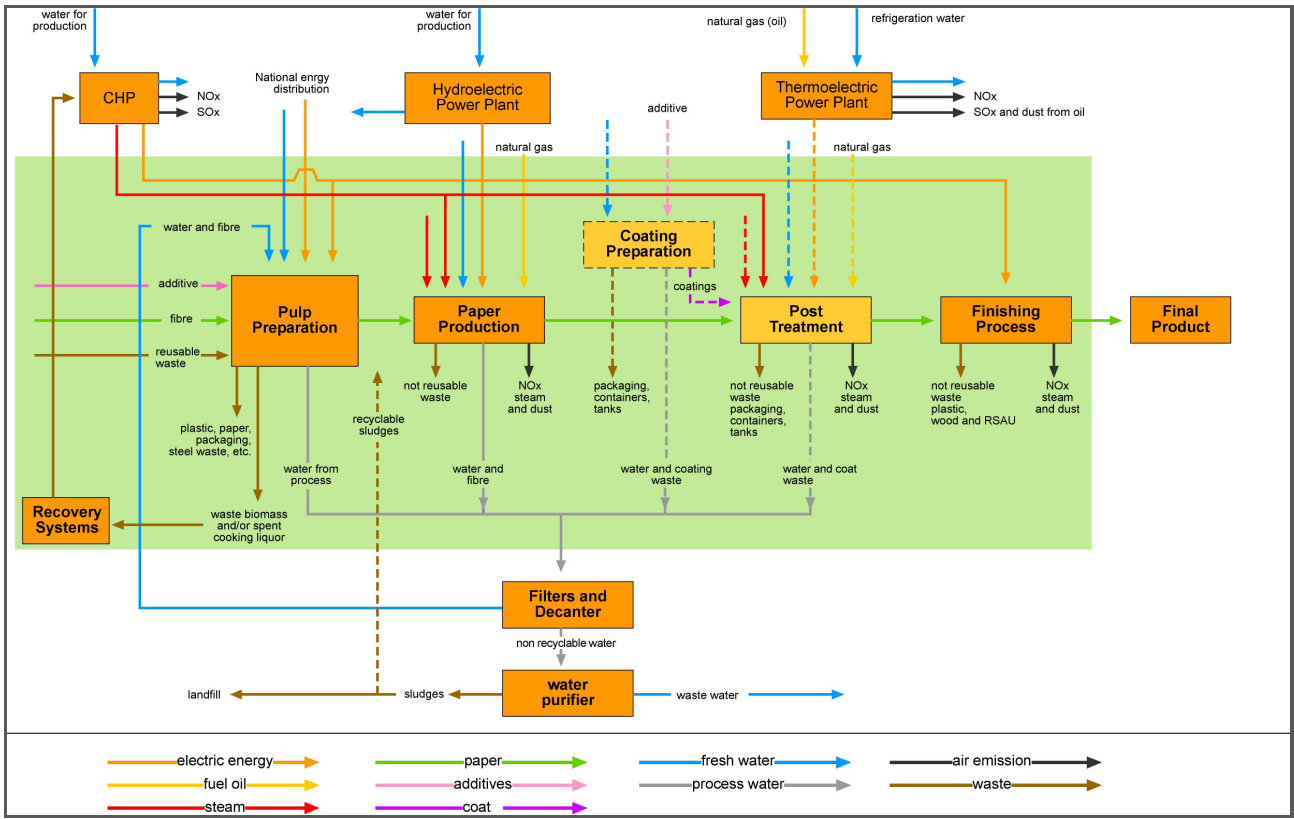


Figure 1.3 – A flowchart that summarises the paper production process.

1.3 COPYING AND GRAPHIC PAPER - CLASSES DEFINITIONS

For the aim of the study, the CEPI - Confederation of European Paper Industries – proposal for graphic paper definition is adopted, as the following scheme shows (Table 1.2).

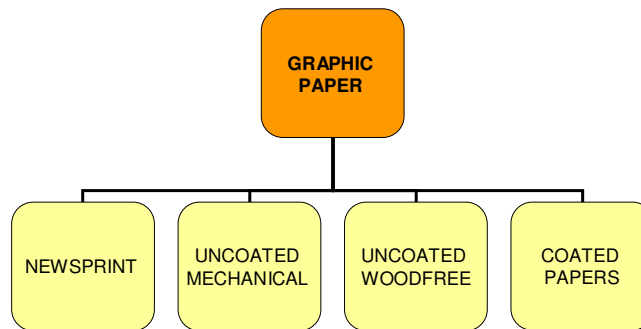


Table 1.2– “Graphic Paper “classes definitions by CEPI (Source: CEPI)

NEWSPRINT	Paper mainly used for printing newspapers. It is made largely from mechanical pulp and/or recovered paper, with or without a small amount of filler. Weights usually range from 40 to 52g/m ² but can be as high as 65g/m ² . Newsprint is machine finished or slightly calendered, white or slightly coloured and is used in reels for letterpress, offset or flexo-printing.
UNCOATED MECHANICAL	Paper suitable for printing or other graphic purposes where less than 90% of the fibre furnish consists of chemical pulp fibres ² . This grade is also known as groundwood or wood-containing paper and magazine paper, such as heavily filled super-calendered paper for consumer magazines printed by the rotogravure and offset methods.
UNCOATED WOODFREE	Paper suitable for printing or other graphic purposes, where at least 90% of the fibre furnish consists of chemical pulp fibres. Uncoated woodfree paper can be made from a variety of furnishes, with variable levels of mineral filler and a range of finishing processes such as sizing, calendering, machine-glazing and watermarking. This grade includes most office papers, such as business forms, copier, computer, stationery and book papers. Pigmented and size press “coated” papers (coating less than 5g per side) are covered by this heading.
COATED PAPERS	All paper suitable for printing or other graphic purposes and coated on one or both sides with minerals such as china clay (kaolin), calcium carbonate, etc. Coating may be by a variety of methods, both on-machine and off-machine, and may be supplemented by super-calendering.

Current criteria for “copying and graphic paper” (Commission Decision 2002/741/EC) exclude “newsprint paper” explicitly from the product group. The inclusion of the *newsprint paper* in the EU Ecolabel criteria for “printed paper products” (criteria currently *in interservice consultation within the European Commission*) has been evaluated and excluded also from the scope of this new product group. Therefore, at the moment, newsprint paper couldn’t be awarded with the EU Ecolabel.

²

For more details see the following paragraph (“Pulp- Definitions”).

1.4 PULPS - DEFINITIONS

In order to explain the different pulp grade definitions set by CEPI the following schemes are reported (Figure 1.4, Figure 1.5, Figure 1.6, Figure 1.7, Figure 1.8)

Chemical pulp

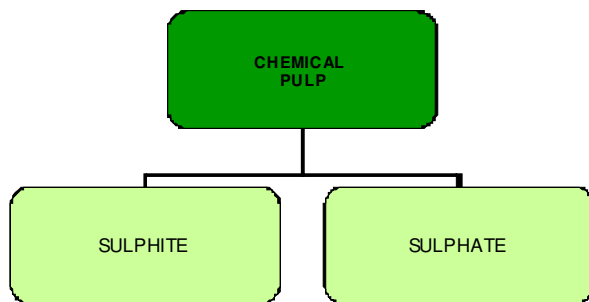


Figure 1.4 – Chemical pulp grades (Source: CEPI, 2006)

SULPHITE

Pulp produced by cooking wood chips in a pressure vessel in the presence of bisulphite liquor. End-uses range from newsprint, printing and writing papers, tissue and sanitary papers. Sulphite can be either bleached or unbleached.

SULPHATE

Pulp produced by cooking wood chips in pressure vessels in the presence of a sodium hydroxide (soda) liquor. The pulp may be unbleached or bleached. End-uses are widespread, with bleached pulp particularly used for graphic papers, tissue and carton boards. Unbleached pulp is commonly used in liner for corrugated board, wrappings, sack and bag papers, envelopes and other unbleached speciality papers.

Mechanical pulp

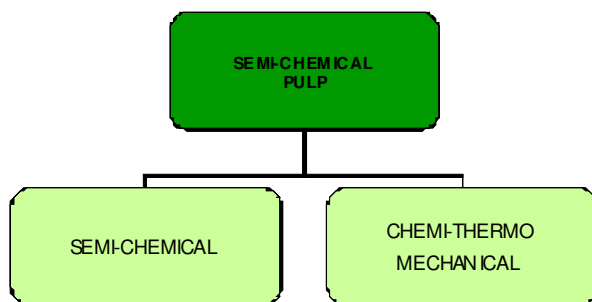


Figure 1.5 - Mechanical pulp grades (Source: CEPI, 2006)

STONE GROUNDWOOD

Pulp produced by grinding wood into relatively short fibres. This pulp is used mainly in newsprint and wood containing papers, like LWC (light-weight coated) and SC papers.

THERMO-MECHANICAL

Pulp produced in a thermo-mechanical process where wood particles are softened by steam before entering a pressurised refiner. TMP has mainly the same end-uses as stone groundwood. Variants of the above two processes produce pressurised stone groundwood pulp and refiner mechanical pulp.

Semi-chemical pulp

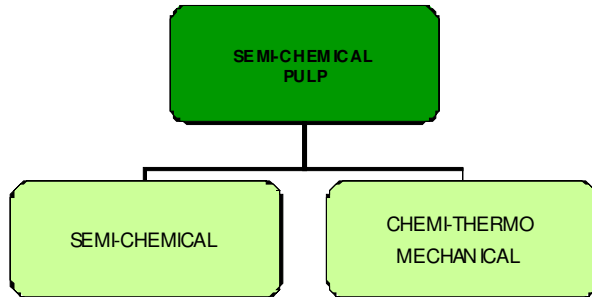


Figure 1.6 - Semi-chemical pulp grades
(Source: CEPI, 2006)

SEMI-CHEMICAL

Pulp produced in a two-stage process, which involves partial digestion with chemicals, followed by mechanical treatment in a disc refiner. This pulp is mainly used in the production of fluting medium for corrugated board.

CHEM-THERMO MECHANICAL

Pulp produced in a similar way to TMP, but the wood particles are chemically treated before entering the refiner. This pulp has properties suited to tissue manufacture. Some CTMP is used in printing and writing grades. CTMP is classified under semi-chemical pulps in the Harmonised System of the Customs Co-operation Council. In the FAO, as well as in other industry statistics, such chemi-thermo mechanical pulps are grouped with mechanical pulp.

Other pulp

Pulp produced from fibres other than wood, such as sugar cane bagasse, wheat straw, kenaf, cotton rags and hemp.

Deinked pulp

Pulp made from recovered paper from which inks and other contaminants have been removed.

1.5 PAPER MILLS CLASSIFICATION

The paper mills classification depends on the papermaking processes which take place in the plant, as suggested by the BREF document:

- **Integrated paper mills**
Plants in which the pulp and the paper are both produced in the same productive site.
- **Non-integrated paper mills**
Plants that produce just the paper and that get the pulp from external supplier.

2 The EU Paper Market

This section highlights the main features of the European paper market to assess the up to date situation and to confirm/evaluate the Ecolabel feasibility according to the EC Regulation 1980/2000. The analysis takes into consideration all the paper grades (and pulp grades) used for the manufacturing of paper products³:

- Newsprint and magazine paper;
- Printing and writing paper (i.e. office papers);
- Sanitary and household (i.e. tissue and other hygienic papers, etc);
- Paper based packaging materials and products (i.e. case materials, wrappings, etc);
- Other specialised paper (i.e. cigarette papers and filter papers) ;

Referring to the EU Member States data, it is analyzed the EU market relevance also compared with global trends⁴.

In addition, the analysis displays the results obtained for the Copying and Graphic Paper product group, defined in the Article 2 of the Commission Decision 2002/741/EC, as:

“sheets or reels of unprinted paper which are used for printing or copying or writing or drawing; Newsprint, thermally sensitive paper and carbonless paper are not included in the product group”.

CEPI - Confederation of European Paper Industries – is the main reference to define the European paper market. Through its member the association represents most of the European paper and pulp industry⁵.

³ www.paperonline.org

⁴ Main sources: UN/ECE “Forest Products Statistics” 2006 and CEPI “Statistics 2006- European pulp and paper industry”.

⁵ Members of CEPI (2006): Austria, Belgium, Czech Republic, Finland, France, Germany, Hungary, Italy, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, The Netherlands, United Kingdom.

2.1 PAPER INDUSTRY

WORLD PAPER INDUSTRY OVERVIEW

The last three years period represented a context of economic growth: around 3% for the European Union (EU25 +3,3% in the 2006 after +2,1% in 2005).

Asia is however confirmed as the main engine of the sector economy in the 2006, returning to a growth of 8,6% after 8,2% in 2005. The most relevant results have been obtained by China (+10.7%) and India (+9.1%).

The United States confirmed a development similar to that achieved in 2005 (+3.3%).

In Latin America, GDP growth is back in all major economies, in the recording complex acceleration compared to 2005 (+5%) thanks mainly to the strengthening of activity in Brazil (+2.3% in 2005 to 2.9% in 2006) and Mexico (from 3% to over 4%). Very high even the expected growth for Argentina (+8.5%, after 9.2% in 2005).⁶

Concerning the World paper industry, the following figures report the main paper producers. The percentages in Figure 2.1 refer to the total World paper production in 2005 (367 million tonnes) and show the main producers: Asia, North America and Europe.

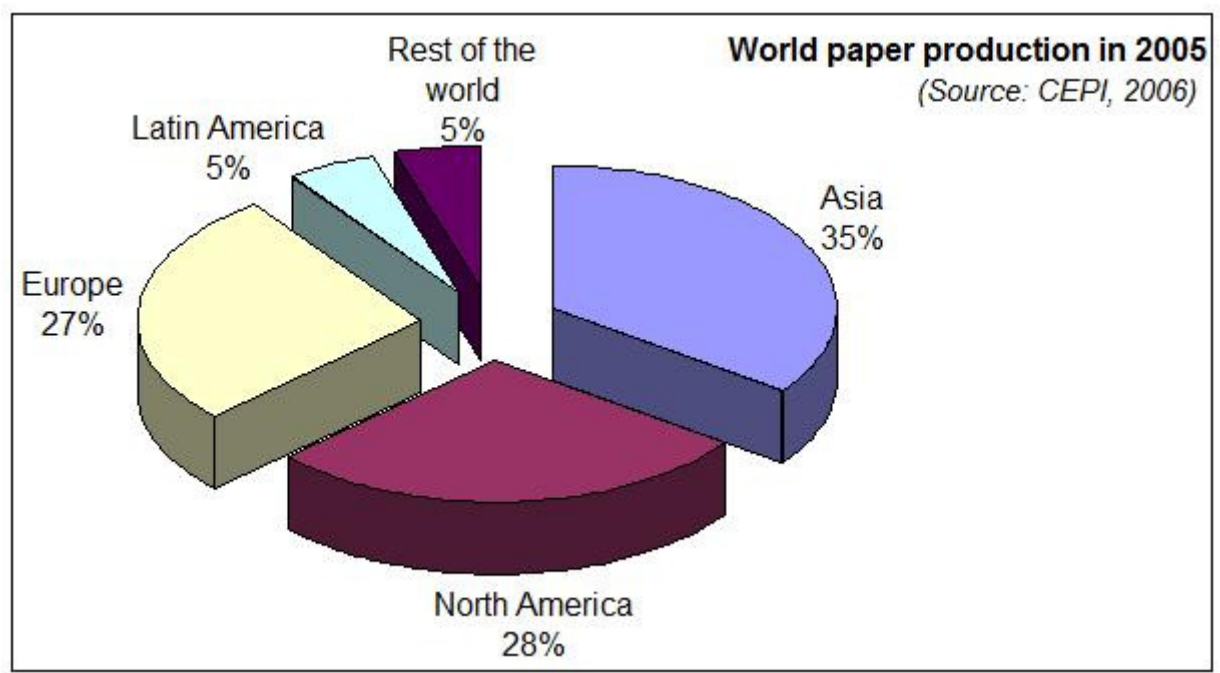


Figure 2.1 – World paper production by country in 2005. (Source: CEPI, 2006)

⁶

Source: Assocarta, 2006

EUROPEAN PAPER INDUSTRY

Taking into account the period between 2004 and 2006, Table 2.1 shows the market features of the European paper industry. The data are expressed per 1000 tonnes (air-dried weight) of total paper products. In the last column of the table, the percentage of change in the last years has been measured.

Table 2.2.1 – European total paper production, consumption and external trade.

(Source: CEPI, 2006)

1000 t	2004	2005	2006	Var. % 2005-2006
Production	98.637	98.946	102.231	+3,3
Consumption	85.584	86.902	89.131	+2,6
Imports	4.399	4.907	4.412	-10,1
Exports	17.079	16.540	17.666	+6,8

The European paper production, consumption and exports show an increasing trend. Just the imports decreased of about 10% between 2005 and 2006.

Figure 2.2 highlights the trends of the major economic markers from 2004 to 2006. The production values are quite constant reaching 100 million tonnes of paper in 2006. The exports also had a little increasing during the considered period: they are 18 million tonnes in 2006 and imports are 4,5 million tonnes in the same year.

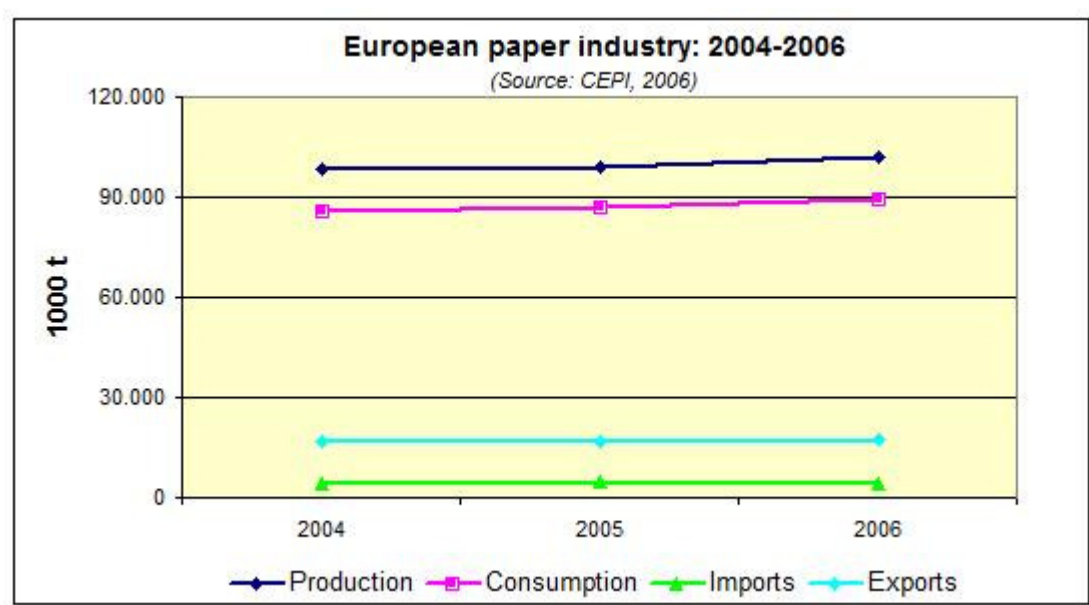


Figure 2.2 – European paper production, consumption and external trade trends 2004-2006
(Source: CEPI, 2006)

European Production

As emerged from the previous paragraph, total paper production marked a slight increasing trend up to 2006. A deep analysis has been made about paper production: the data expressed in 1000 tonnes (air-dried weight) and they concerned the period from 1991 to 2006.

The conducted analysis shows that “Total packaging” and “Other graphic paper” get the main share (Figure 2.3).

The “Other Graphic paper” excludes the Newsprint thus referring to the paper products under consideration in this study, as defined by the Ecolabel criteria (“papers used for printing or copying or writing or drawing and excluded newsprint” - (Art.2 Commission Decision 2002/741/EC)”).

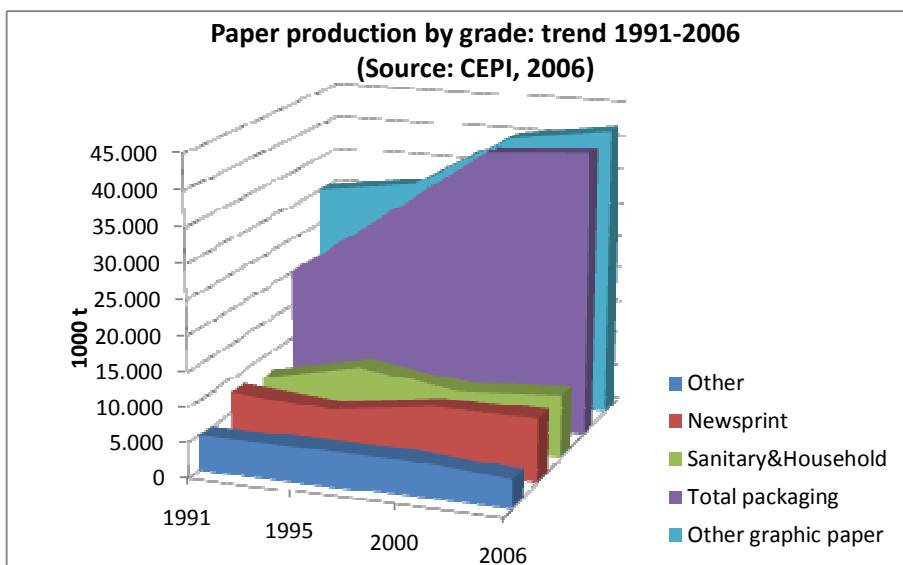


Figure 2.3 – Paper production by grade (Source: CEPI, 2006)

Main European Total Paper Producers

Germany (21%) is the largest paper producer, followed by Finland (14%), Sweden (12%), France and Italy (10%) (Figure 2.4).

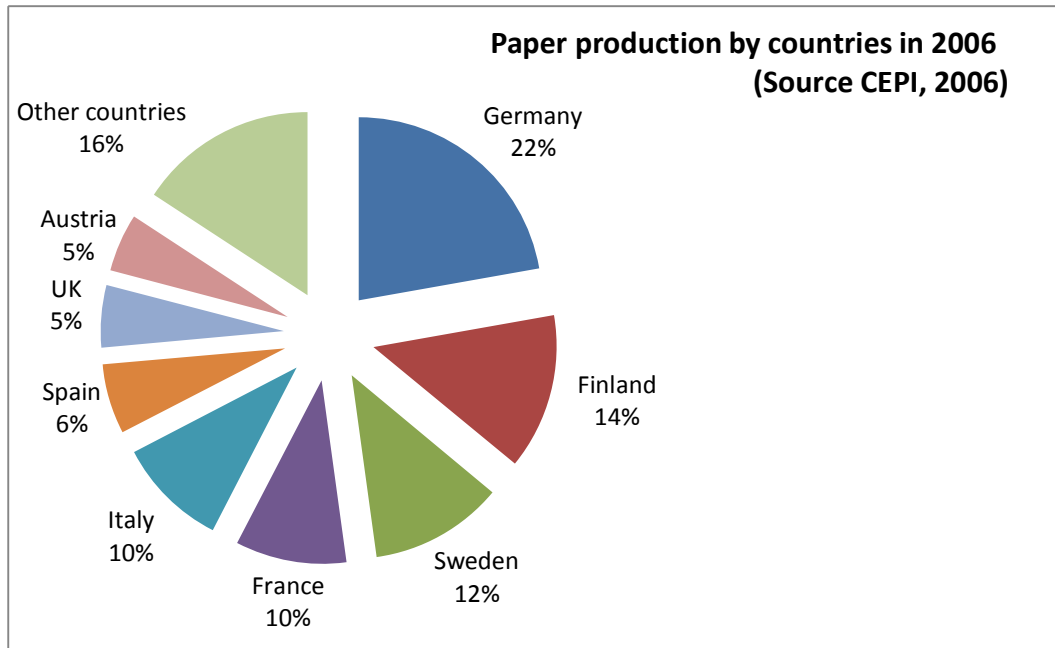


Figure 2.4 – Main European paper producers in 2006 (Source: CEPI, 2006)

European imports

The analysis of European paper imports has considered the main paper suppliers from 2002 to 2006 (referring to Asia, North America, Latin America, Other European countries and the Rest of the world).

Figure 2.5 highlights that the main suppliers are both the so called “other European countries”⁷ and North America. Besides the European countries (27%), North America represents the major paper producer area in the world (after Asia), with share of 28% in 2005 (CEPI Statistics, 2006): it supplied the European market in 2006 with 1,5 million tonnes of paper.

In 2005-2006 the total European imports came down (10%), also from North America (17%).

⁷ European countries not members of CEPI in 2006 (see note 7).

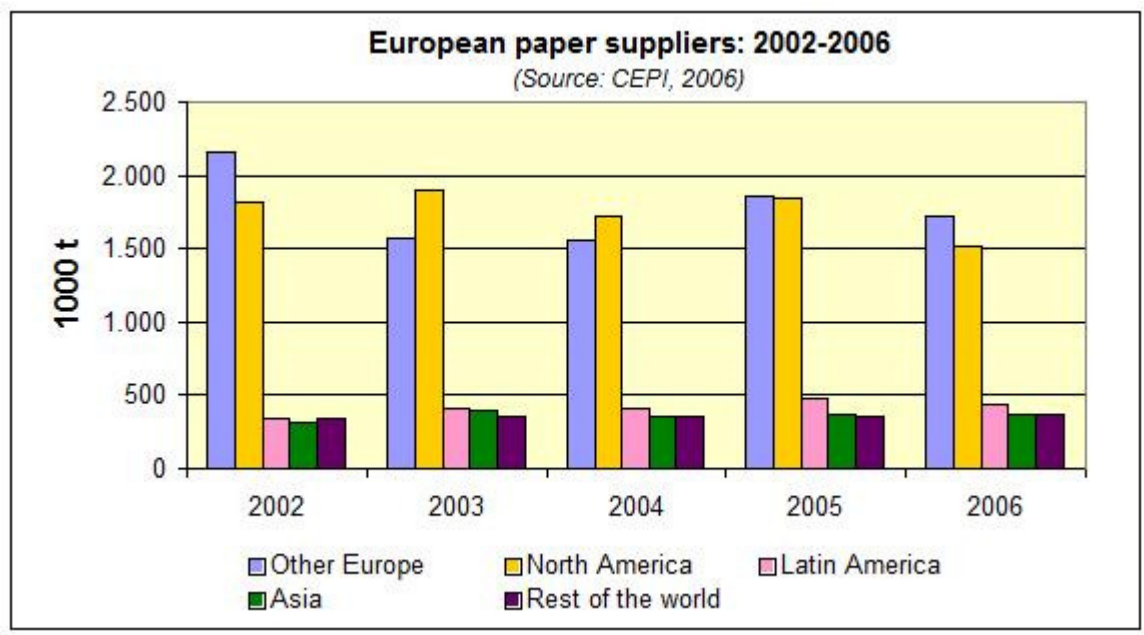


Figure 2.5 – Main European paper suppliers (Source: CEPI, 2006)

Data referring to import values are expressed in million USD.

The trend shows an increasing since 2004 until about 50 billion USD in 2006 (Figure 2.6).

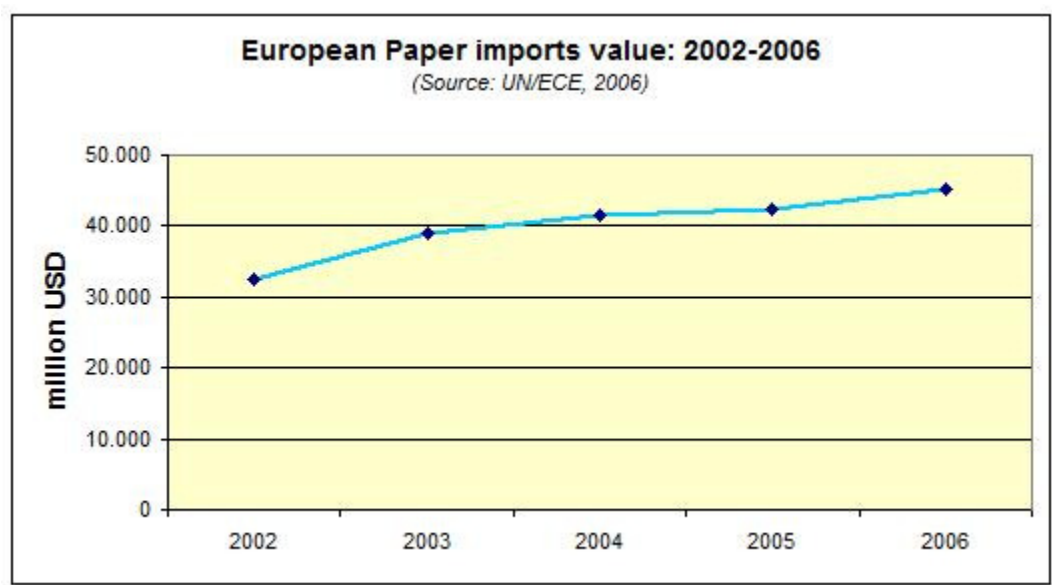


Figure 2.6 – European Paper imports value: 2002-2006 (source: UN/ECE, 2006)

European exports

The main markets of European paper products are the other European countries⁸. Figure 2.7 shows that the main market extra Europe is Asia, with 4,6 million tonnes in 2006, constantly followed by North America.

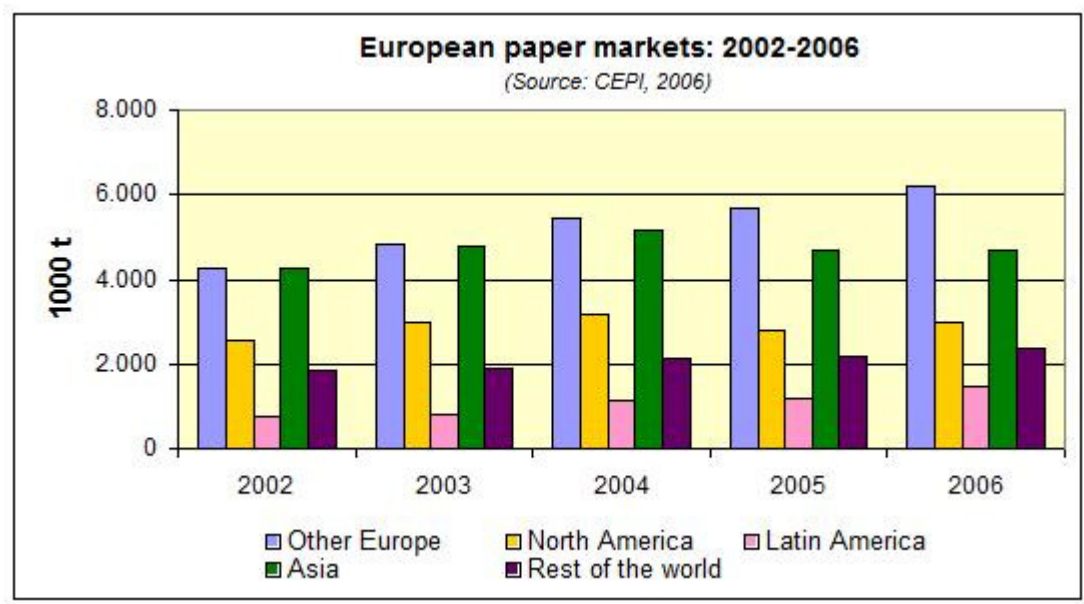


Figure 2.7 – Main European paper markets (Source: CEPI, 2006)

The economic value of exports reached 55 billion USD in 2006. The trend since 2002 to 2006 is reported in Figure 2.8.

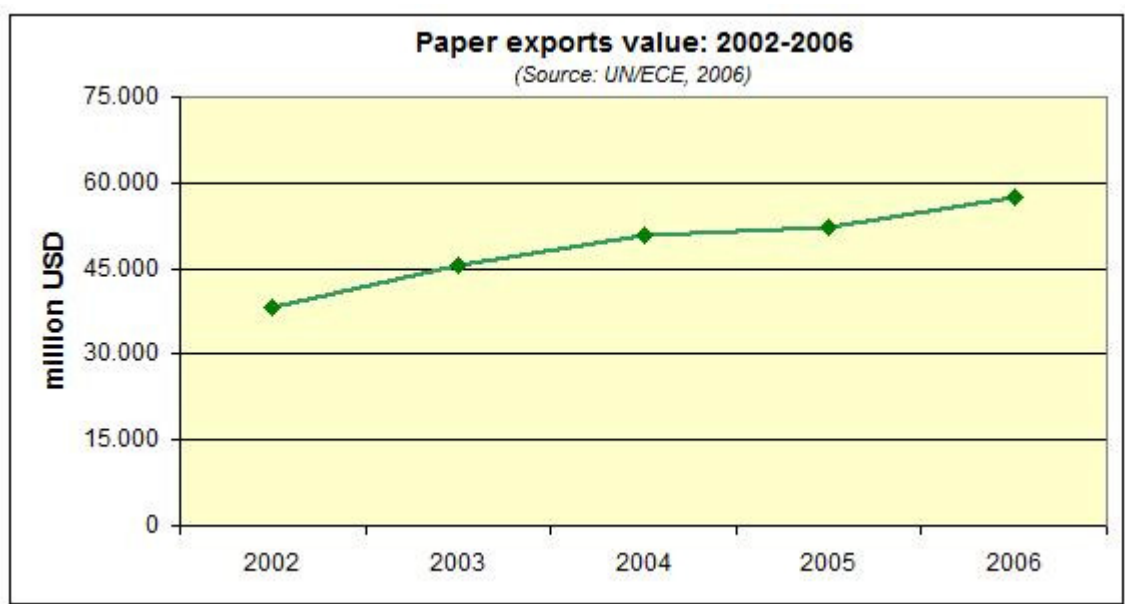


Figure 2.8- European paper exports value: 2002-2006 (Source: UN/ECE, 2006)

⁸ European countries not members of CEPI in 2006.

Economic aspects of the European paper industry

Figure 2.9 shows a brief summary of some economic features of paper industry in the last three years and in 1991.

Table 2.9 – Economic features of paper industry (Source: CEPI, 2006)

	1991	2004	2005	2006	Var. % 1991- 2006
Companies	1.023	839	824	801	-21.7
Mills	1.555	1.222	1.215	1.186	-23.7
Employment	389.300	269.900	257.100	259.100	-33.4

Although the number of companies and employment around the European paper industry decreased both of 21.7% and of 33.4% from 1991 to 2006, its turnover has increased since 2004 and it was about 78.5 billion euro in 2006 (Figure 2.10).

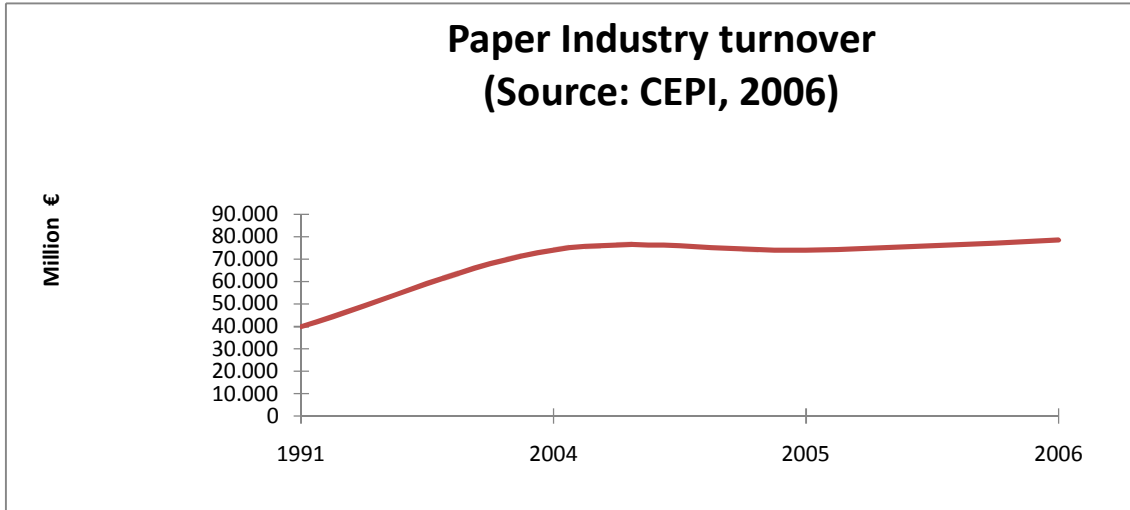


Figure 2.10– Paper industry turnover 1991- 2006 in million Euro (Source: CEPI, 2006)

Raw materials used in Papermaking

Following the description of the raw materials used in papermaking made in the previous chapter, Figure 2.11 shows the raw materials used in the paper manufacturing and their use share in 2006 is reported⁹:

- **Recovered Paper:** materials made out of waste paper and paperboard.
- **Wood pulp:** dry fibrous material (cellulose) coming from softwood *trees* (such as spruce, pine, fir, larch and hemlock) and hardwoods (such as eucalyptus, aspen and birch).
- **Non-fibrous materials:** materials made of chemical and mineral components.
- **Pulp other than wood:** pulp produced from fibres other than wood, such as sugar cane bagasse, wheat straw, kenaf, cotton rags and hemp.

Figure 2.11 highlights that **wood pulp** and **recovered paper** are the main materials used in papermaking.

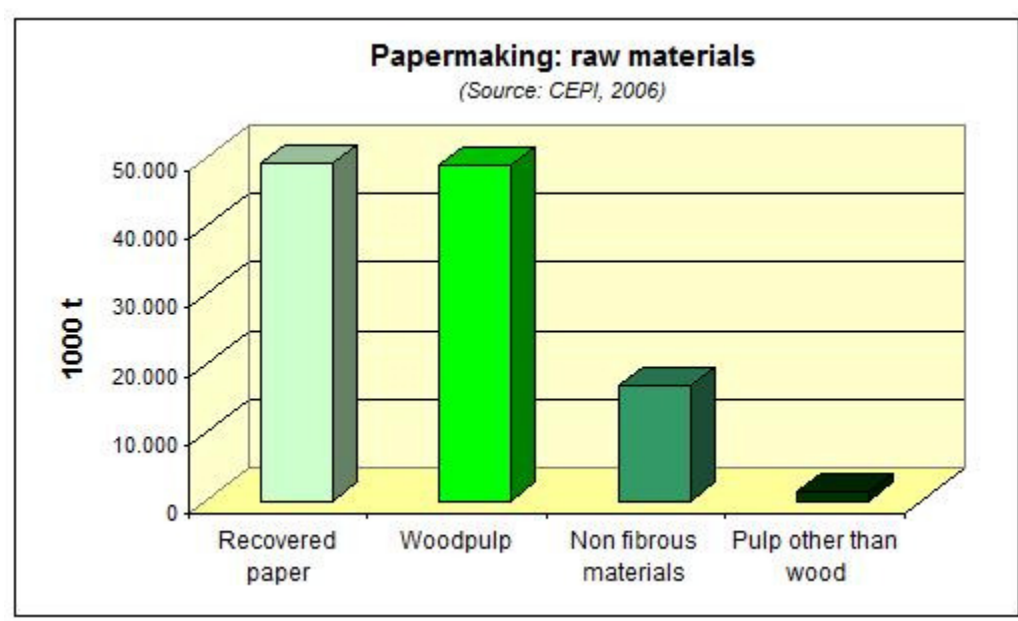


Figure 2.11 – 2006- Raw materials used in papermaking (Source: CEPI, 2006)

Recovered Paper

About recovered paper, the analysis of paper use rate shows that its use is mainly for newsprint and packaging products (case material). For *Other graphic paper*, the recovered paper use has low value (10%) as Figure 2.12 underlines.

⁹

CEPI, Statistics 2006

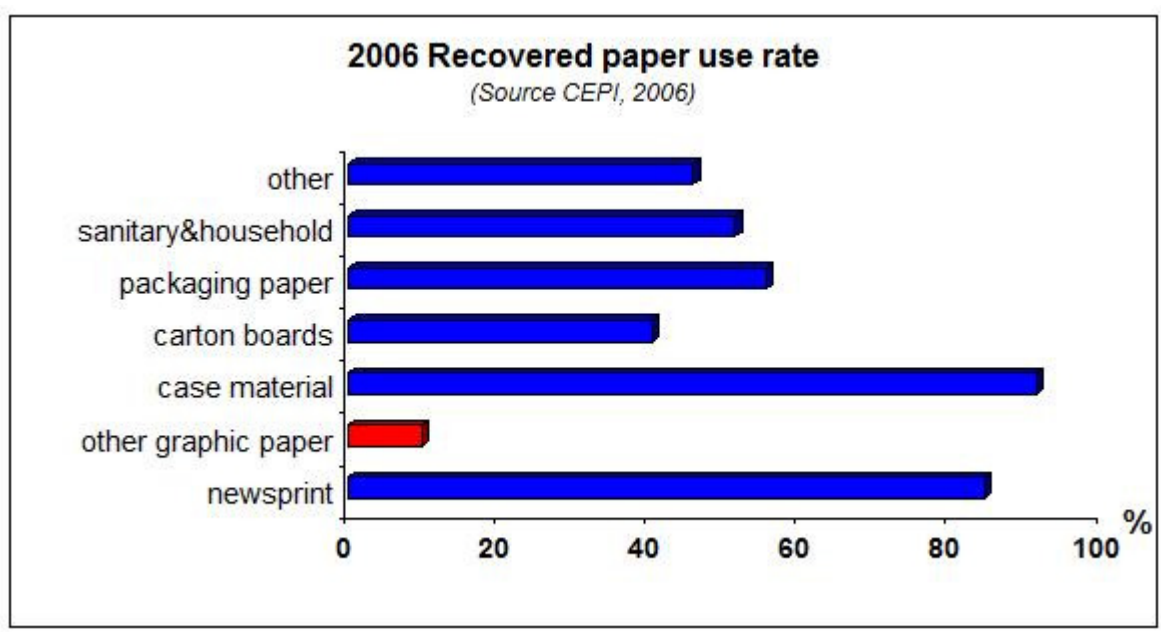


Figure 2.12- Recovered paper use in 2006 (Source: CEPI, 2006)

It has to be considered that this results could be influenced by the fact that not all the different qualities of recovered paper are always usable for all the scopes. It should be noted that unbleached paper (e.g. board) cannot be used for the production of printing papers. For copying and graphic paper only graphic paper waste can be used, i.e. the commonly called "household recovered paper" (e.g.: newsprint, magazines, catalogues, supplements, etc...). The recycling of paper is used for those graphic paper qualities where it is most easy to use (e.g. newsprint). For higher paper qualities the processing of recovered paper needs, e.g., bleaching or more energy due to additional flotation. The alternative use of high quality recovered paper (wood free) is limited due to its availability and price, and it is mainly used for white tissue papers where fiber properties aren't that critical, but whiteness is required¹⁰.

Figure 2.13 takes into account the main economic markers to define recovered paper market. Referring to the period 2002-2006, the consumption trend has progressively increased, reaching 45 million tonnes in 2006. About external trade, European exports are higher than the imports among years considered, but much lower than the production values.

¹⁰ UPM comments to the WP1 report.

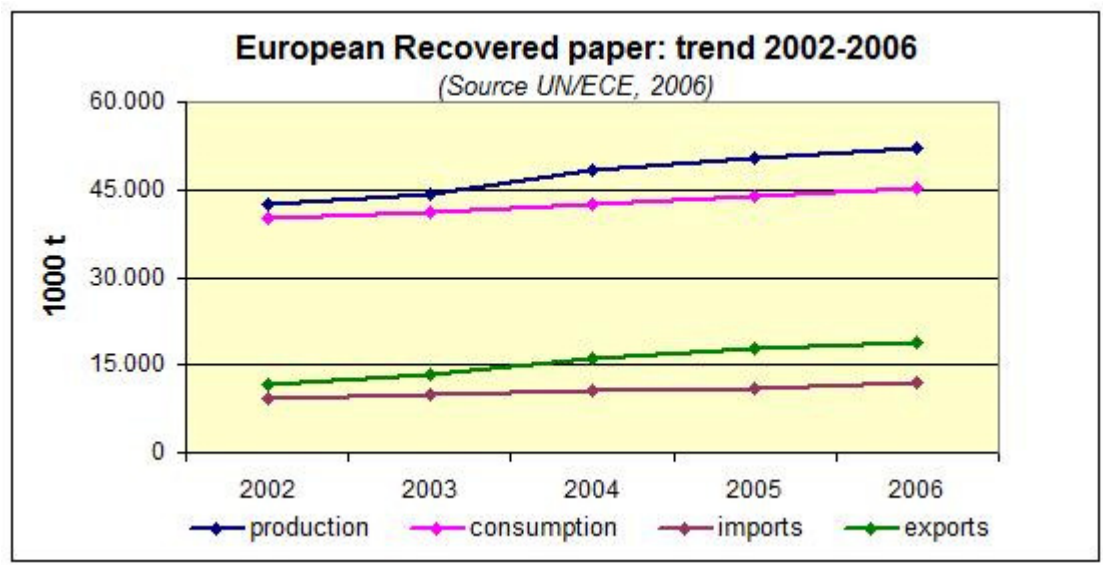


Figure 2.13 – Trend of European recovered paper between 2002-2006
(Source: UN/ECE, 2006)

2.2 PULP INDUSTRY

World Pulp Industry Overview

In 2005, the world pulp production was of about 189 million tonnes. Figure 2.14 puts in evidence that North America and Europe represent the main pulp producers with 44% and 23%. Also Asia, with the 22%, has a high share.

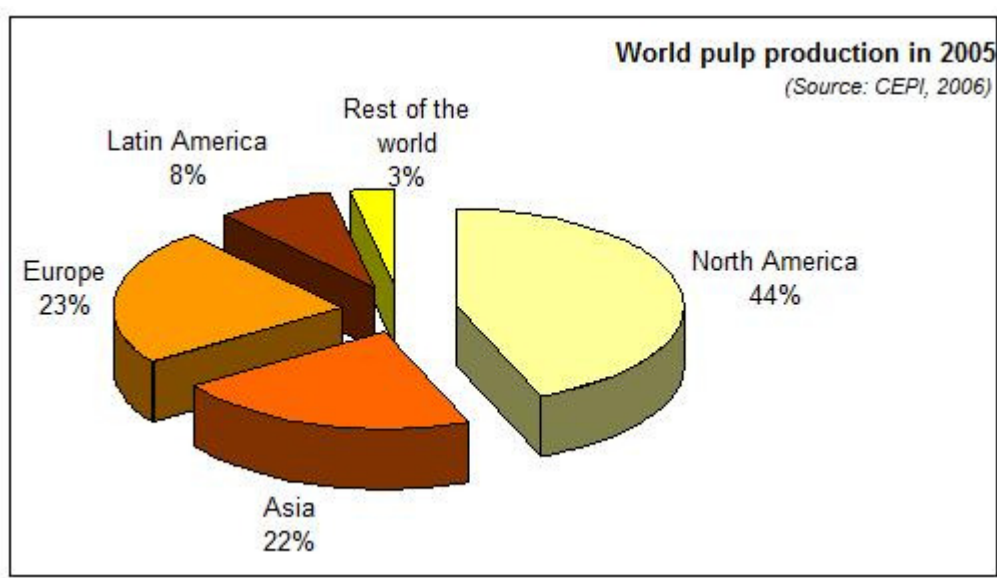


Figure 2.14 – World pulp production by country in 2005 (Source: CEPI, 2006)

European Pulp Industry

Referring to the period 2004-2006, Table 2.2 shows the market features of European pulp market. The data are expressed in 1000 tonnes of pulp used in papermaking.

In the yellow column of the table, the percentage of variation in the period 2005-2006 is reported.

Table 2.2 – European pulp production, consumption and external trade
(Source: CEPI, 2006)

1000 t	2004	2005	2006	Var. % 2005/2006
Production	42.602	41.551	43.495	+4,7
Consumption	49.088	48.869	49.884	+2,1
Imports	7.820	7.937	7.557	-4,8
Exports	1826	1904	2.209	+16,0

Figure 2.15 highlights the economic markers trends from 2004 to 2006 that are quite constant in the period. The consumption is higher than other markers and reached 50 million tonnes in 2006.

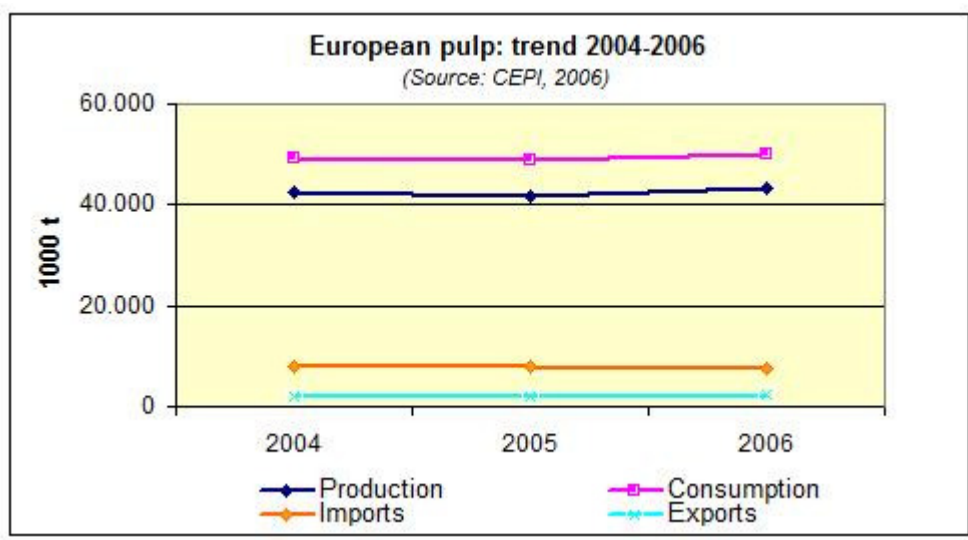


Figure 2.15 – European pulp trend 2004-2006 (Source: CEPI, 2006)

Main European Pulp Producers

Finland and Sweden are the main European pulp producers. In Figure 2.16, the percentage of share is reported. These percentages are probably due to their wide forestry areas and so to the abundance of the basic raw material for pulp production: the wood.

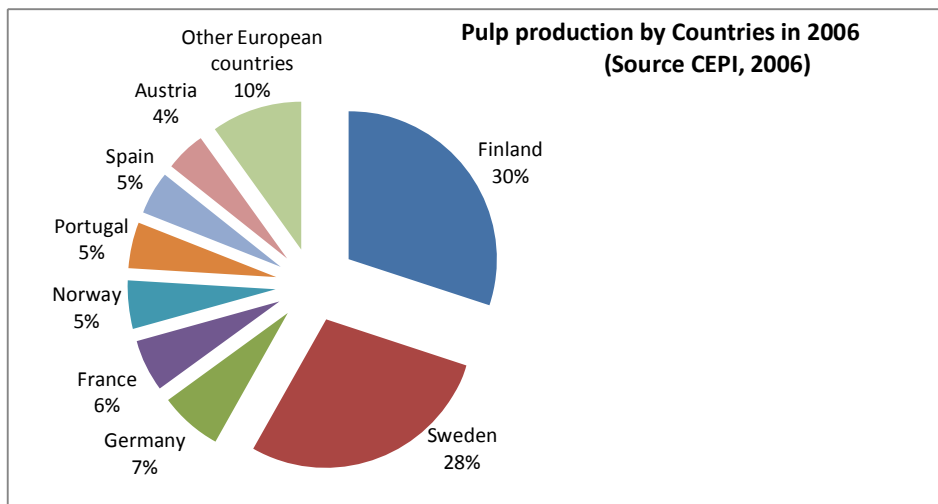


Figure 2.16 – Pulp production by countries in 2006 (Source: CEPI, 2006)

Pulp Grades

Wood pulp for papermaking refers to three grades concerning to the wood pulp processing used (for details see Figures 1.4,1.5,1.6):

- *Chemical Pulp*
- *Semi-chemical Pulp*
- *Mechanical Pulp*

Figure 2.17, concerning trend in the period 1991- 2006, shows the main share of chemical pulp. The European pulp production in 2006 has been based for the 68% on chemical pulp (CEPI, 2006).

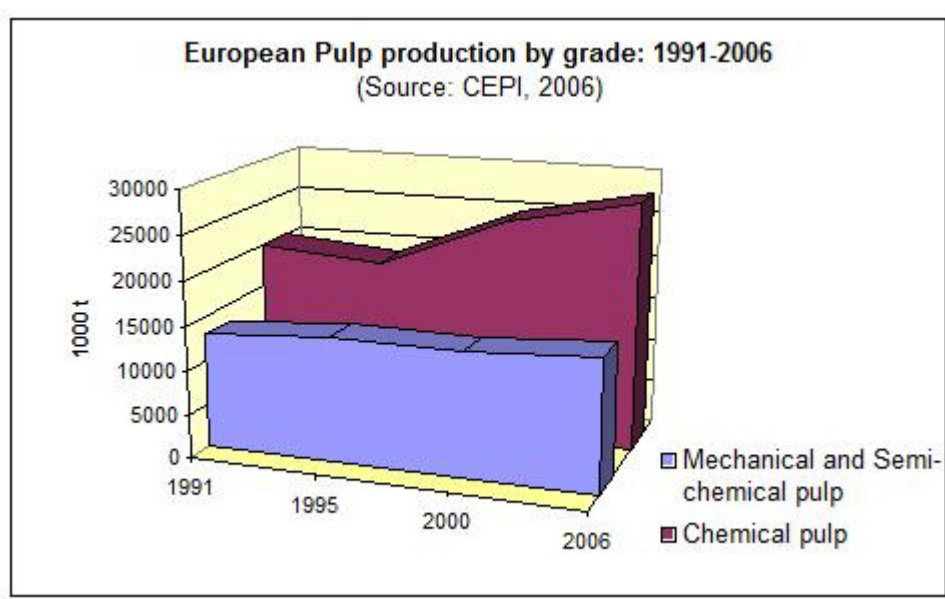


Figure 2.17 – 1991-2006, European Pulp production by grade (Source: CEPI, 2006)

Using chemical pulp to produce paper is more expensive (for production costs) than using mechanical pulp, but it results in better strength and brightness properties. Chemical pulp is used to provide the required strength when producing fine papers (for example copying papers, writing papers etc.)¹¹.

However, the main use of *chemical pulp* is linked to the need of more raw material (wood) for tonne of chemical pulp than for tonne of mechanical pulp. In chemical pulping, lignin and part of the hemicelluloses dissolves in the cooking chemical solution (white liquor) and the result is the black liquor (spent cooking liquor): black liquor can be led to the chemical recovery system, where cooking chemicals and energy are recovered. Most modern chemical pulp mills are energy self-sufficient due to this biomass burning as about half of the wood is dissolved in the cooking, but they need more wood for tonne of pulp. Softwood chemical pulp brings strength due to long fibre and hardwood chemical pulp brings good optical properties. It shall be noted that only chemical pulp based paper, e.g. wood free paper (+ recovered paper produced based on collection of wood free papers) is eligible to be filed permanently¹².

For each pulp grade, the main economic markers have been reported considering the period 1991-2006 in order to define their weight on European pulp market features.

The data source used for the following analysis is UN/ECE (United Nations Economic Commission for Europe) referred to the EU 25 Member States.

¹¹ www.paperonline.org- provided by CEPI

¹² UPM comments to the WP1 report

Chemical pulp

Referring to 2002-2006, Figure 2.18 highlights the high constant consumption of chemical pulp (35 million tonnes) and high amount of the imports (they are 15 million tonnes since 2002) in Europe.

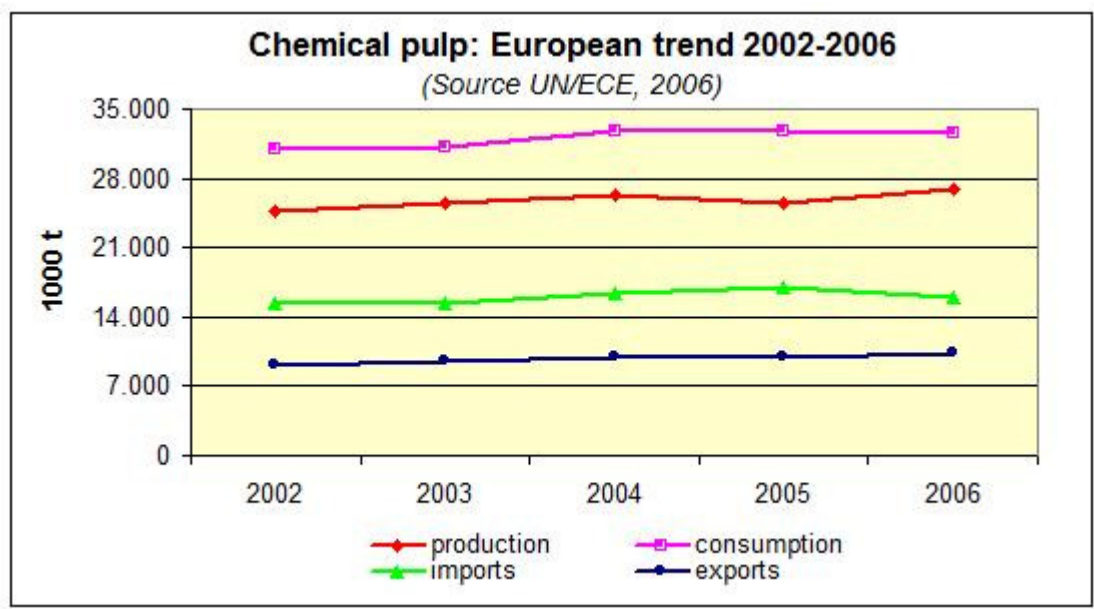


Figure 2.18 – Chemical pulp production, consumption and external trade in Europe (Source: UN/ECE, 2006).

Chemical pulp is grouped in Sulphite (bleached and unbleached) and Sulphate-Kraft (bleached and unbleached) (for details see Figure 1.4). Following Figure 2.19 shows chemical pulp production according to this grouping. As shown, chemical pulp sulphate is the most produced and in particular, Sulphate-Kraft bleached (see Figure 2.20). In addition, Figure 2.21 highlights the Sulphite grades, reporting the bleached and unbleached percentages.

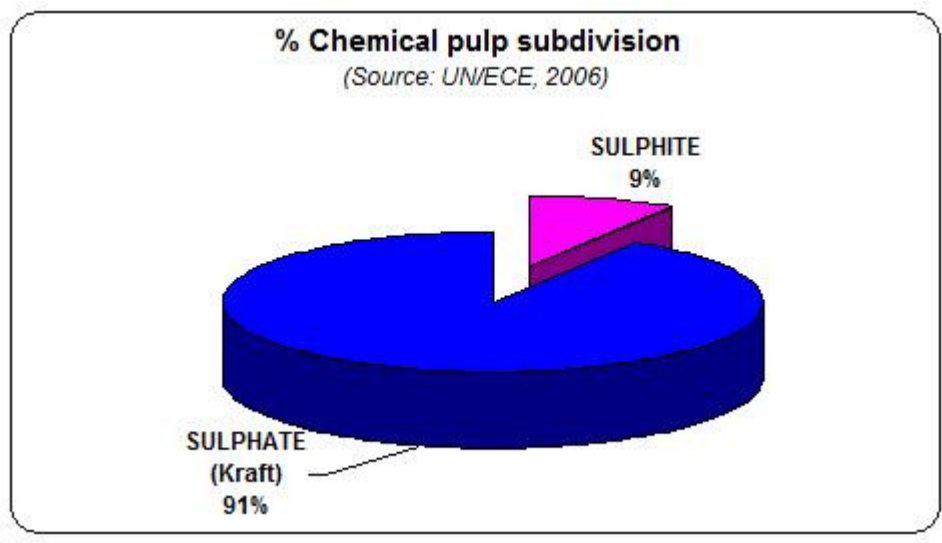


Figure 2.19 –Chemical pulp sulphite and sulphate produced in 2006
(Source: UN/ECE, 2006)

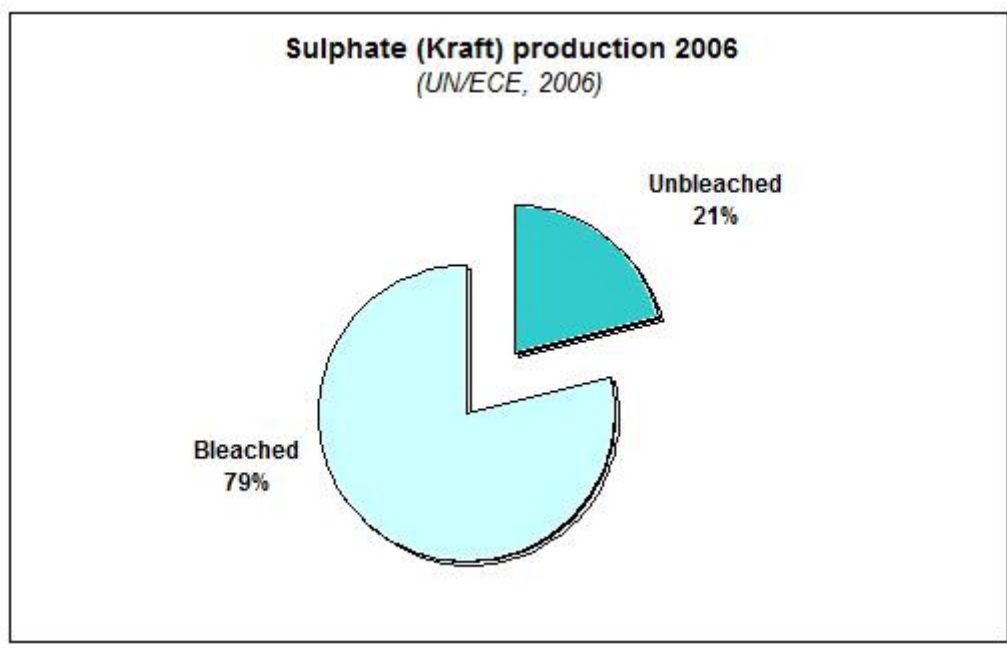


Figure 2.20 – Sulphate production breakdown by bleached and unbleached share in 2006 (Source: UN/ECE, 2006)

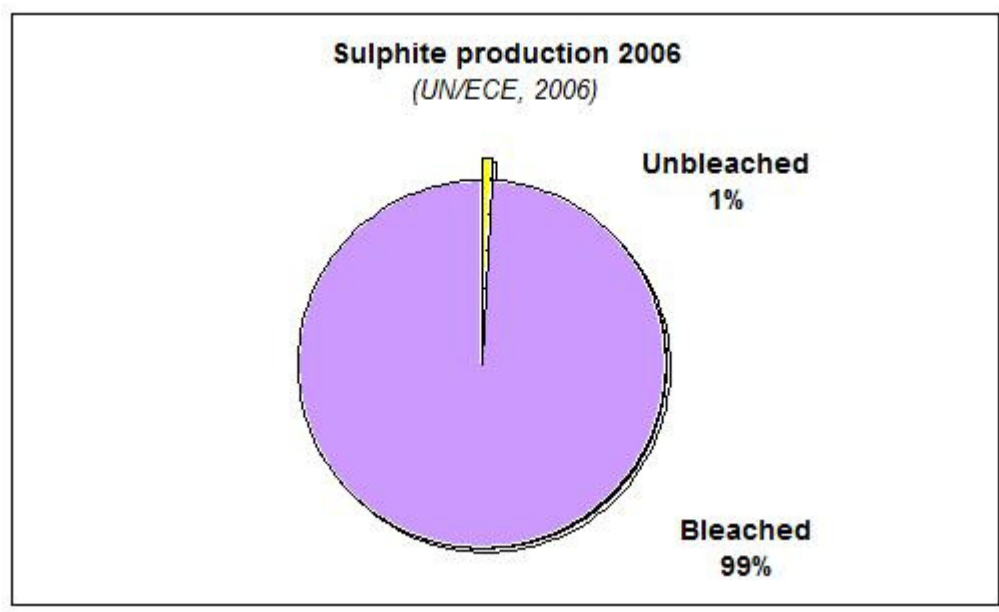


Figure 2.21 - Sulphite production breakdown by bleached and unbleached share in 2006 (Source: UN/ECE, 2006)

Semi-chemical pulp

Figure 2.22 shows the Semi-chemical pulp market features in the period 2002-2006 in Europe. The production is constant with 1,3 million tonnes, also the consumption is constant except a little decreasing since 2005. In that year the exports of this pulp grade increased, reaching the 500 thousand tonnes.

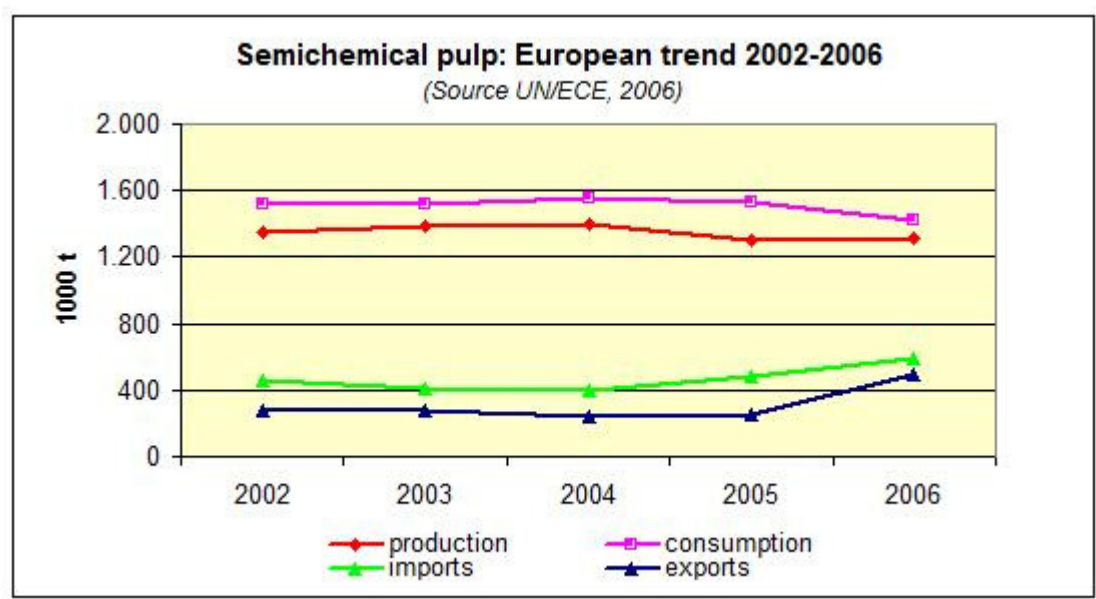


Figure 2.22 – Semi-chemical pulp production, consumption, external trade in Europe (Source: UN/ECE, 2006)

Mechanical pulp

Figure 2.23 describes mechanical pulp production, consumption, imports and exports since 2002 to 2006 in Europe. The production and consumption have constant trend since 2002 about 12 million tonnes. The external trade is not meaningful. Probably these facts are due to the great availability of wood in Europe.

Mechanical pulp is cheaper due to less wood needed for tonne of pulp, and can't thus bear transportation costs similarly than more expensive chemical pulp. Another reason is that, as already explained, it's sensible to integrate mechanical pulping with paper making due to improved efficiency with heat recovery and use of fresh water.

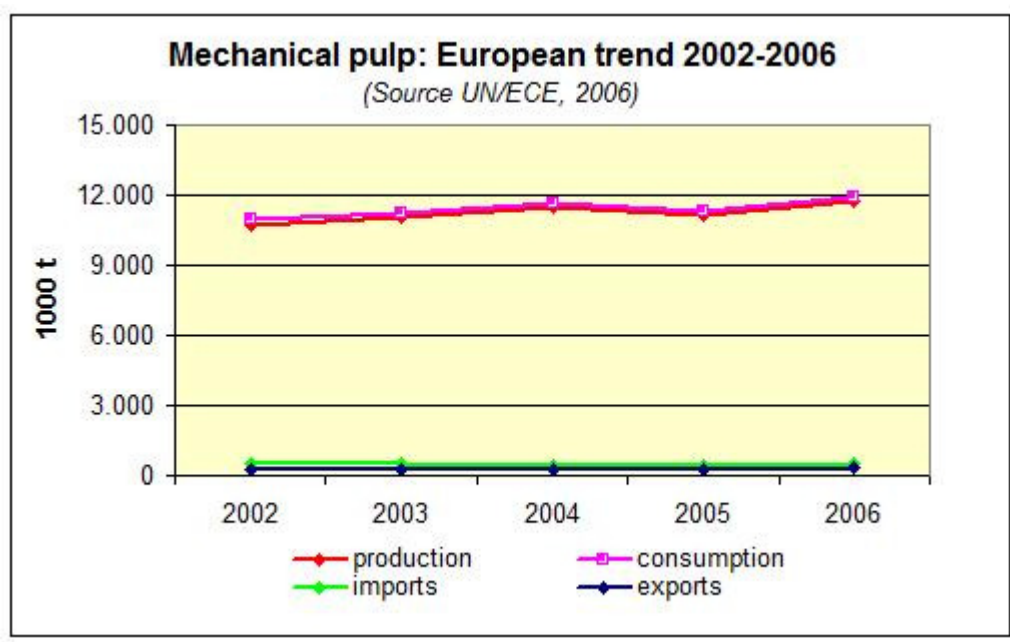


Figure 2.23 – Mechanical pulp production, consumption, external trade in Europe
(Source: UN/ECE, 2006)

2.3 GRAPHIC AND COPYING PAPER

Graphic and Copying paper has been included under CEPI definition of “Graphic Paper” (for descriptions see Table 1.2). This grade comprises the following subdivisions:

- *Newsprint* (not considered in this study)
- *Uncoated mechanical*
- *Uncoated wood free*
- *Coated papers*

Referring to Article 2 of the Commission Decision 2002/741/EC, all the subdivisions, with the exclusion of Newsprint paper, have to be analysed.

Figure 2.24 shows the percentage of share for Copying and Graphic paper subdivision in 2006: coated papers represent the main product (53%). Newsprint paper data were however reported for informative and comparative purposes and because of some stakeholders suggested the possibility to include also this and other paper grades in the criteria scope.

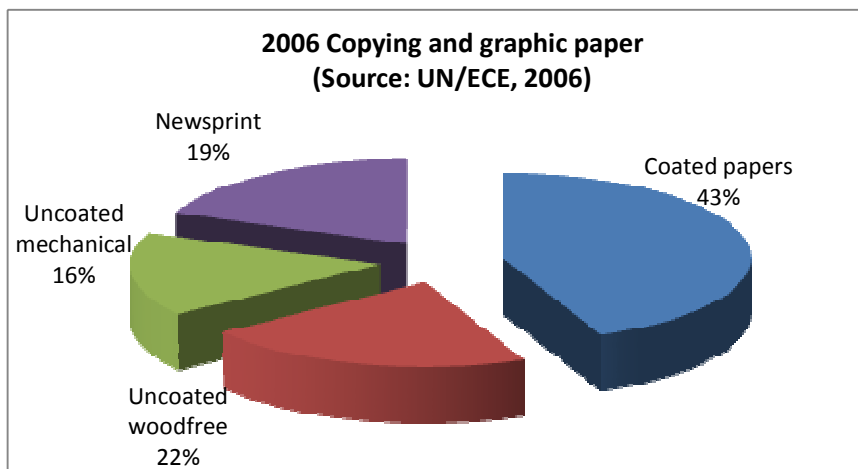


Figure 2.24 – Copying and Graphic paper production breakdown by subdivision in Europe (Source: UN/ECE, 2006)

Uncoated mechanical

Figure 2.25 takes in consideration the period between 2002-2006 to analyse the economic trend of this graphic paper grade. The production of uncoated mechanical reached the 7,5 million tonnes in 2006.

Since 2005, the external trade (imports and exports) of this paper products showed an increase. In particular the exports in 2006 amounted to 6,2 million tonnes.

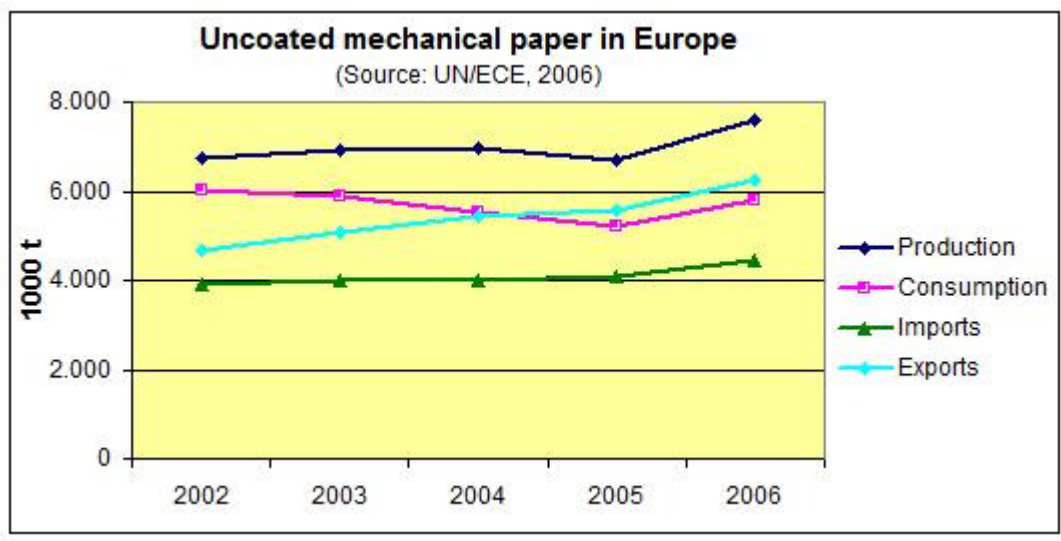


Figure 2.25 – Uncoated mechanical production, consumption, imports, exports in Europe
(Source: UN/ECE, 2006)

Uncoated wood-free

The uncoated wood-free production in Europe is about 11 million tonnes in 2006 (Figure 2.26). All economic markers show a quite constant trend except the exports, that since 2002 have a little increasing and reached the 7,8 million tonnes in 2006.

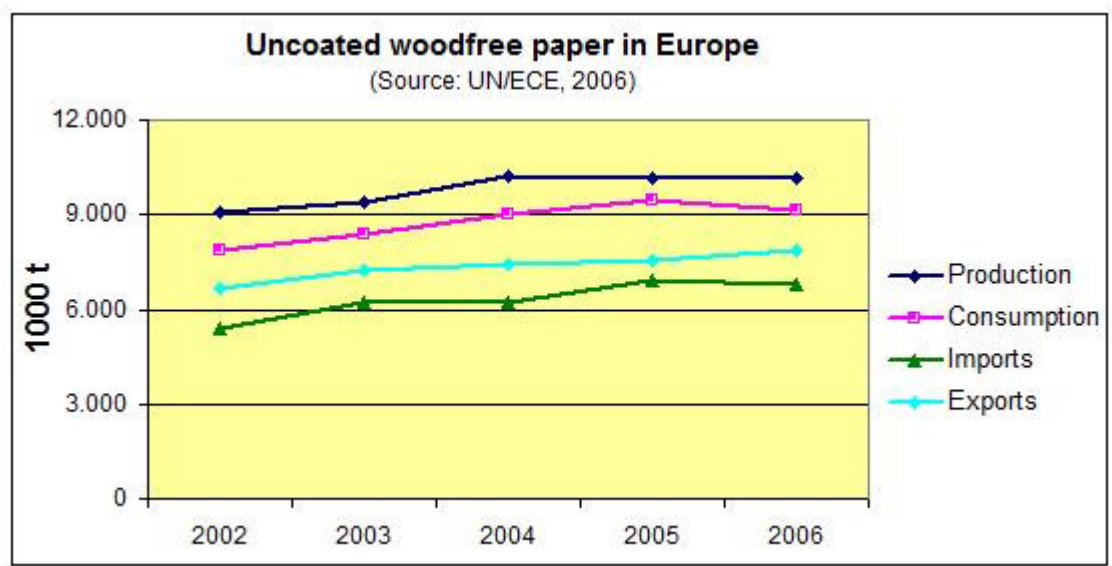


Figure 2.26 – Uncoated wood-free production, consumption, imports, exports in Europe
(Source: UN/ECE, 2006)

Coated papers

Figure 2.27 refers to coated papers that represent the main graphic paper category in Europe.

The production values are higher than the other paper products and they have progressively increased.

Almost the whole production has been exported: 18 million tonnes exported of 20 million tonnes of total production in 2006.

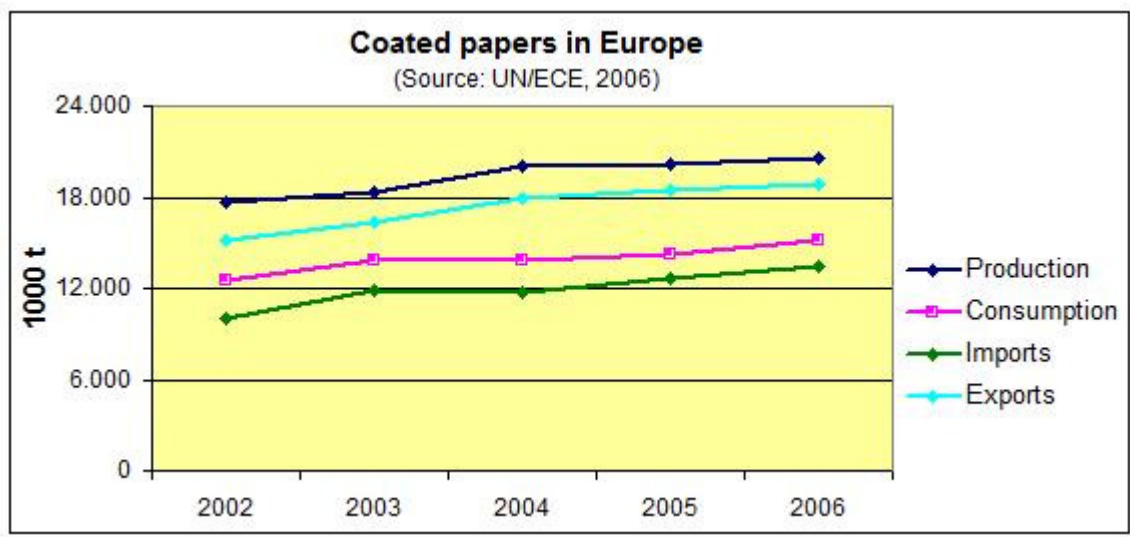


Figure 2.27 – Coated papers production, consumption, imports, exports in Europe (source: UN/ECE, 2006)

2.4 SUMMARY OF THE MARKET ANALYSIS FOR THE PAPER PRODUCT GROUP

Following Table 2.3 in order to summarize the European paper market pointing out the weight of Copying and Graphic paper group on paper market in 2006.

Table 2.3 – Brief summary of European Paper Industry market in 2006 (elaborated by LCE)

2006 European Paper Industry market	
Turnover: 78.5 billion €	
PAPER (data expressed in 1000 t)	
Total production	102.231
Copying and Graphic paper	
<i>Uncoated mechanical</i>	
<i>Uncoated wood free</i>	
<i>Coated papers</i>	
<i>Others</i>	
Main producer	GERMANY
PULP (data expressed in 1000 t)	
Total production	43.495
<i>Chemical pulp</i>	
<i>Semi-chemical pulp</i>	
<i>Mechanical pulp</i>	
Main producer	FINLAND
Recovered paper: 48.000 for paper production	

2.5 MARKET INFORMATION ABOUT ECOLABELLED MANUFACTURES

The following figures highlight the weight of the EU flower for copying and graphic paper and the main licensed producers.

Figure 2.28 shows the spread of EU Ecolabel licensees in Europe updated to October 30th, 2008. With reference to copying and graphic paper, 9 European producers were possessing the European Eco-label having totally labelled 250 products and articles.

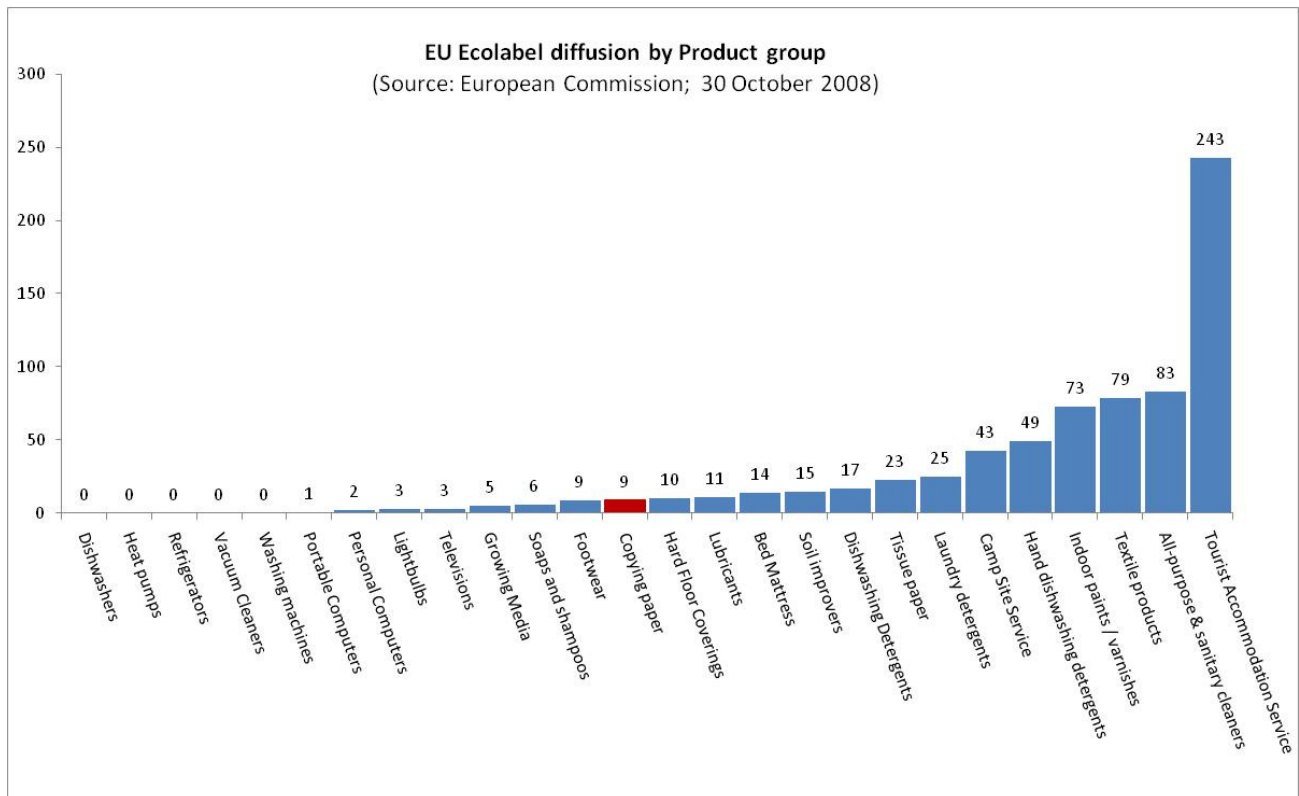


Figure 2.28 – 2008 European Ecolabel licensees diffusion by product group (Source: European Ecolabel Commission)

Italy reaches 3 Ecolabel producers for a total of 28 products, while Sweden and Denmark, with only one producer, get respectively 40 and 32 products awarded; Finland labels two manufacturers, with 145 products (Figure 2.29). It has to be noticed that the only non European Company certified, the Indonesian “Pindo Deli Pulp and Paper Mill”, has been accredited by the French Competent Body, as it emerges from the comparison between Figure 2.29 and Figure 2.30.

N° of licensees by certifying Competent Body (30/10/2008)
(Source: European Ecolabel Commission)

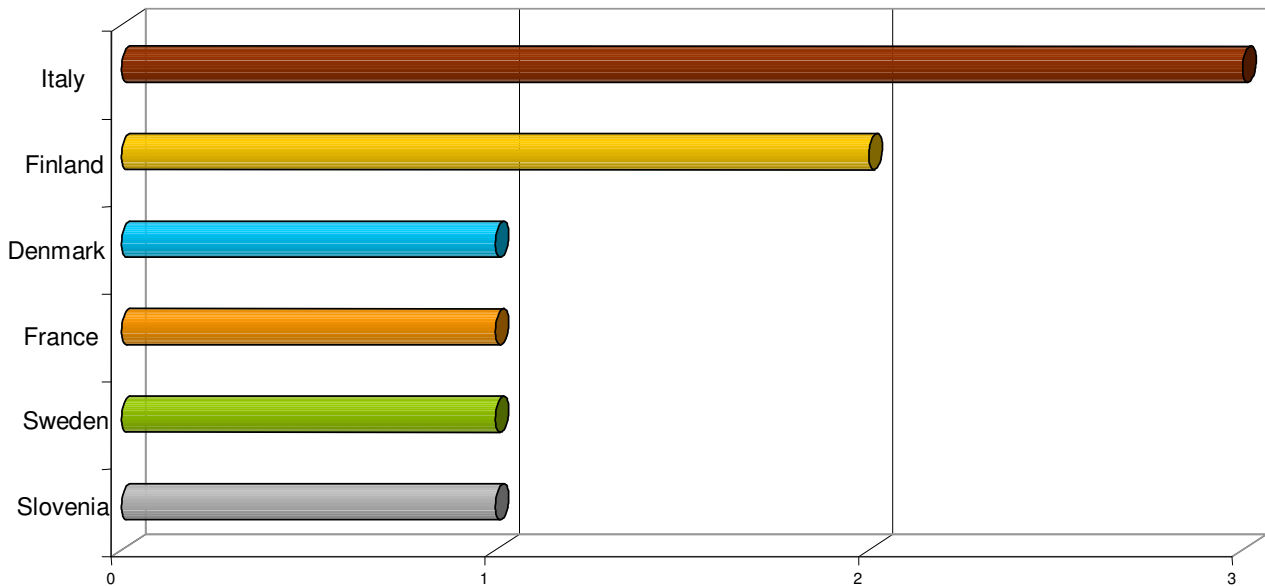


Figure 2.29 – Number of licensees by certifying country in 2008 (Source: European Ecolabel Commission)

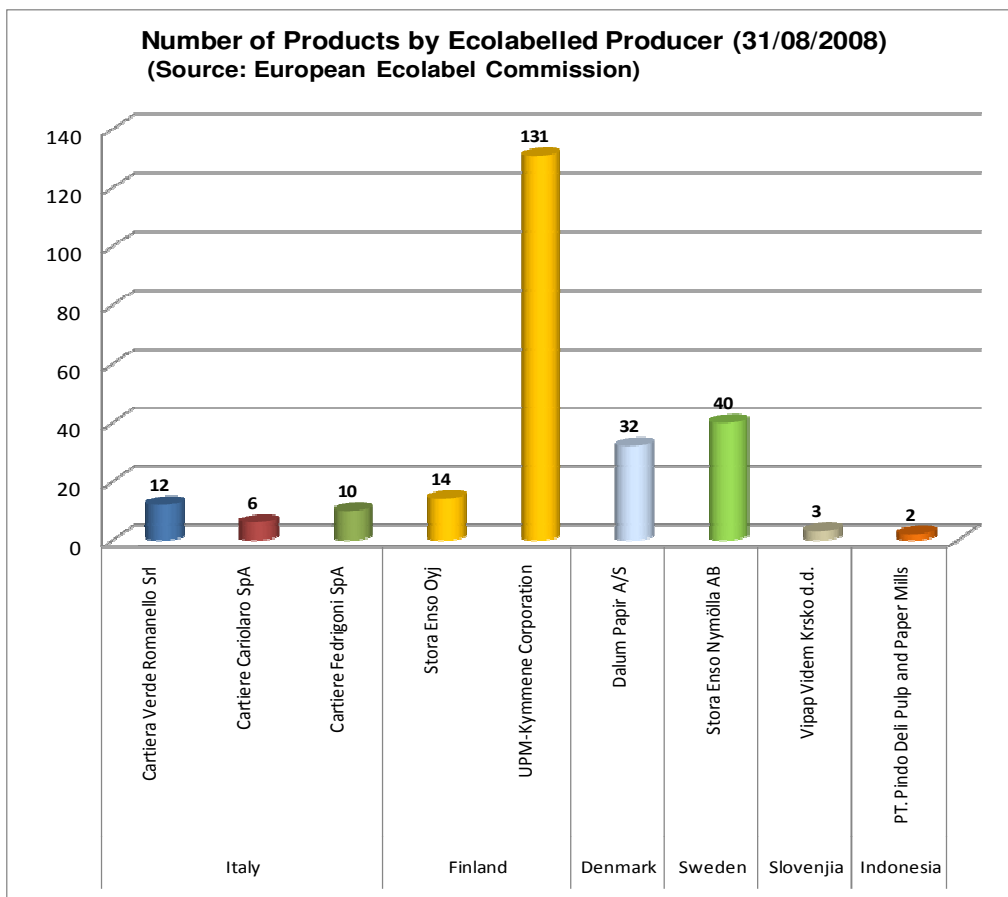


Figure 2.30– Number of Products by Ecolabelled Producer in 2008

(Source: European Ecolabel Commission)

2.6 BENCHMARKING WITH OTHER EUROPEAN NATIONAL LABELS

The following Table 2.4, elaborated in order to have an overview of other European Labels, approaches with regard to management of criteria for Copying and Graphic paper. It points out different existing criteria at the moment from Nordic Swan, Blauer Engel and DGQA:

- **Blauer Engel:** is the first environmental label, born in 1978 in Germany. The criteria to obtain the label refer to the life cycle of products, with attention to environmental performance and safety aspects.
- **Nordic Swan:** is the Nordic environmental label. The Nordic Swan criteria pays particular attention to the amount of hazardous substances in the product and to the total environmental and health impacts.
- **DGQA (Direcció General de Qualitat Ambiental):** the Government of Catalonia's Emblem of Guarantee of Environmental Quality concerns the products manufactured or marketed in Catalonia and the services provided in Catalonia. The logo should specify the properties or features of the product or service that satisfy environmental requirements and that are defined in the relevant criteria.

Figure 2.30 shows the number of copying and graphic paper products referred to the other label schemes considered, in 2008. The Blauer Engel is the most diffused scheme, with 170 copying and graphic paper products labelled.

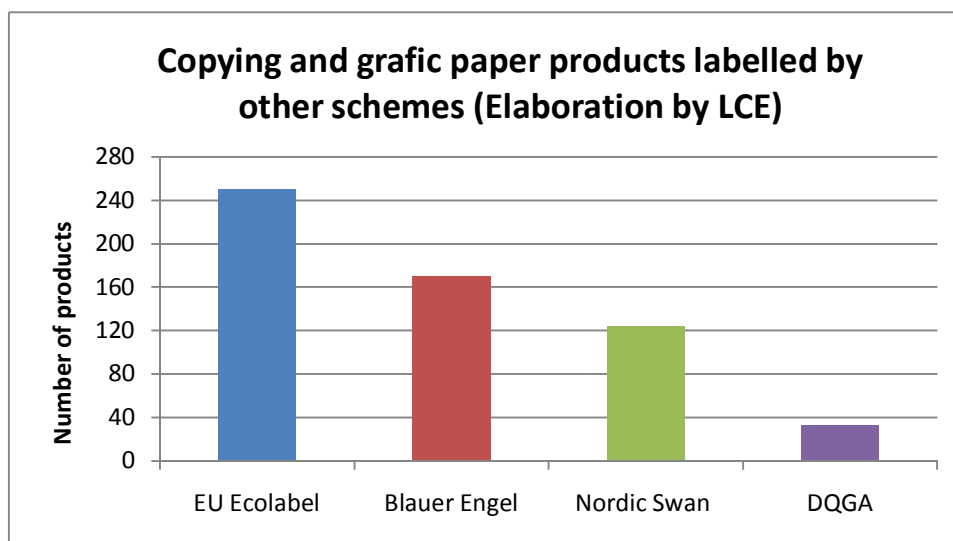






Figure 2.30- Number of products labelled by EU Ecolabel, Blauer Engel, Nordic Swan and DGQA (Elaborated by LCE, 2008)

Table 2.4- Criteria for copying and graphic paper for the main European ecological labels.
 (Source: elaborated by ISPRA and LCE)

CRITERIA FOR COPYING AND GRAPHIC PAPER	EUROPEAN NATIONAL LABELS			
	Eco-label ¹³ 	Nordic Swan 	Blauer Engel 	DGQA 
1. Emission to water and air	a) COD : Pcod < 1.5 S : Ps < 1.5 NOx: Pnox < 1.5 Ptot < 3 b) AOX < 0.25 kg/t c) CO ₂ < 1100-1000 kg/t (CO ₂ from fuel and electricity)	a) COD: Pcod < 1.5 S : Ps < 1.5 NOx: Pnox < 1.5 P : Pp < 1.5 Ptot < 4 b) AOX < 0.4 kg/t c) CO ₂ < 300-1000 kg/t (CO ₂ just from fuel)	n.a.	a) COD: No more than 95% of legislation limits for water residuals. b) AOX: bleaching with chlorant compounds are banned.
2. Energy use	a) electricity: Pe < 1.5 b) fuel : Pf < 1.5	a) electricity: Pe < 1.75 c) Ptot = (Pel + Pfuel) / 2 < 1.5	n.a.	n.a.
3. Fibres	10% from certified forests	20% from certified forests or 75% recycled (not mandatory) or combination of both.	100% recycled fibres	90% recycled fibres (not mandatory)
4. Hazardous chemical substances	a) chlorine: no bleaching gas; b) APEOs: banned c) Residual monomers < 100ppm d) Surfactans in de-inking formulation: biodegrad. e) Biocides : no bio-accumulative f) Azo-dyes: no aromatic amines in 2002/61/CE g) Dyes: no environmental risk phrases h) Pigments : no Pb, Cu, Ni, Cr, Al i) Ionic impurities: limits	a) chlorine: no bleaching gas b) APEOs: banned c) Residual monomers < 100ppm d) Surfactans in de-inking formulation: biodegrad e) Biocides: no bio-accumulative f) Azo-dyes: no aromatic amines in 2002/61/CE g) Dyes: no environmental risk phrases EDTA : to supervise	a) Chlorine: banned b) APEOs: banned e) Biocides: banned for Annex II EC 2032/2003 f) Azo-dyes: banned aromatic amines in 2002/61/CE g) Dyes: no risk phrases for human safety h) Pigments: no Pb, Cu, Ni, Cr, Al Others: Formaldehyde < 0.5 mg/dm ² PCP < 0.15 mg/kg Glyoxal: NO Bleaching optics: NO EDTA: NO COV): to supervise	a) Bleaching optics: banned b) EDTA: banned c) APEOs: banned d) Heavy metals: banned Cd, Cr, Hg, Pb, Ni, Zn.
5. Waste management	Yes	Yes	n.a.	n.a.
6. Fitness for use	Yes	n.a.	n.a.	n.a.
7. User information	Yes	n.a.	n.a.	n.a.

¹³ Note: the *emissions to air and water* and the *energy consumption* are expressed in terms of “points” (“P”) by the specific calculation method indicated in the criteria of the Commission Decision 2002/741/EC.

3 EU normative analysis: regulatory improvements for the paper sector

The first version of the criteria for the award of Ecolabel for Copying and Graphic paper was issued on July 19th, 1999, with the COMMISSION DECISION 1999/554/EC.

These criteria have undergone a first review (DECISION OF COMMISSION 2002/741/EC) valid until August 31, 2007, by which the product group, limited in the first version of the criteria only to copying paper, was amended and expanded to include also the graphic paper. With the Decision 2007/457/EC of 21st June 2007 the European Commission has extended the effective date of the previous criteria of 18 months, bringing the expiring date to February 28th, 2009.

From a first analysis the main EU legislation referred to the paper sector has not significantly changed in these years, so a readjustment of the criteria to assure the consistency with the legislation should not be based on the law upgrading but should focus mainly on the IPPC directive (see the Technical analysis, chapter 4). Additionally the significant coming of the new Regulation on the chemical substances (REACH) has been highlighted: an examination is provided in the following chapter.

3.1 CHEMICAL SUBSTANCES NORMATIVE UPDATE

From 2007 is in force the REACH Regulation (CE) n. 1907/2006 (Registration, Evaluation and Authorization of Chemicals). This new discipline will have an important impact from different points of view on the paper sector. The paper mills, in fact, will be allowed to use only chemicals registered for use in the paper industry in their production processes. Among the main raw materials, it has to be pointed out that the fibre (cellulose) is expressly excluded from the scope of REACH, while the mechanical pulp are excluded because these are natural substances subjected only to physical treatments.

The recycled fibre pulp, as secondary raw material, is already subjected to the rules on wastes and wastes are excluded from the scope of the REACH. It follows that the recycled fibre pulp should be excluded from the application of the REACH.

Finally, it has to be noted that the paper mills will be subjected to some fulfilments of the REACH also as producer of “articles”, such as paper and cardboard. For example, the registration must be provided for those substances contained in the paper that have an intentional emission release (e.g.: the ink in carbon paper).

The following table (table 3.1) shows a general prospect of the possible REACH Regulation fulfillment for the paper industry:

Table 3.1 - REACH fulfilments for the paper industry

Production / Material	Reach fulfilments
Primary materials (fibres)	excluded
Mechanical pulp	excluded
Chemical pulp	excluded
Secondary materials (recycled fibre pulp)	excluded
Chemical substances (Production)	use allowed only if registered
Substances (final product)	need of registration if potentially dangerous for health and environment

Some REACH outcomes should be however taken into consideration. For example, it must be specified that, where “chemical products” or “substances” are referred to in the criteria, this include substances and preparations. The reference for the definitions of ‘substances’ and ‘preparations’ shall be indicated in the REACH Regulation (Regulation (EC) No 1907/2006).

Furthermore, where a material safety data sheet (MSDS) is required to demonstrate compliance with the requirements, it should be indicated that this has to meet the requirements of Annex II of REACH (Regulation EC No. 1907/2006).

Anyway, the legislation references cited in the current criteria for copying and graphic paper, i.e. the *Council Directive 67/548/EEC*¹⁴ and the *Directive 1999/45/EC*¹⁵ have not yet been substituted or amended by the REACH Regulation, so the references to the abovementioned directives are still valid.

Any modification or new requirement related to the Regulation 1907/2006 will be however supervised and considered for the revision process of the criteria.

3.2 TEST METHODS REFERENCES UPDATE

Table 3.2 sums up the current test methods adopted in Decision 2002/741/EC. They refer to the parameters for emissions to air and water (criterion 1) and hazardous chemical substances (criterion 4).

¹⁴ Directive 67/548/EEC of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances

¹⁵ Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations,

The specific *Assessment and Verification* requirements are reported below:

Criterion 1. Emissions to air and water - Assessment and Verification (GUCE L 237/9)

Parameters	Assessment and Verification references
COD, S, NO_x	<i>"The applicant shall provide detailed calculations showing compliance with this criterion, together with related supporting documentation which shall include test reports using the following test methods: COD: ISO 6060; NO_x: ISO 11564; S(oxid.): EPA no.8; S(red.): EPA no 16A; S content in oil: ISO 8754:1995; S content in coal: ISO 351."</i>
AOX	<i>"The applicant shall provide test reports using the following test method: AOX ISO 9562 (1989) [...] AOX shall only be measured in processes where chlorine compounds are used for the bleaching of the pulp [...]"</i>

Criterion 4. Hazardous chemical substances - Assessment and verification (GUCE L 237/12)

Parameters	Assessment and Verification references
Surfactants	<i>"The applicant shall provide a declaration of compliance with this criterion together with the relevant material safety data sheets or test reports for each surfactant which shall indicate the test method, threshold and conclusion stated, using one of the following test methods and pass levels: for ready biodegradability OECD 301 A-F (or equivalent ISO standards), with a percentage degradation within 28 days of at least 70 % for 301 A and E, and of at least 60 % for 301 B, C, D and F; for ultimate biodegradability OECD 302 A-C (or equivalent ISO standards), with a percentage degradation (including adsorption) within 28 days of at least 70 % for 302 A and B, and of at least 60 % for 302 C."</i>
Biocides	<i>"The applicant shall provide a declaration of compliance with this criterion together with the relevant material safety data sheet or test report which shall indicate the test method, threshold and conclusion stated, using the following test methods: OECD 107, 117 or 305 A-E."</i>

The following table contains the update of test methods for criteria proposal.

Table 3.2 - The updated set of test methods for criteria proposal.

Criterion	Parameter	Current Test Method Dec. 2002/741/EC	Updated Test Method proposal (CEN/ISO)			
			Code	Norm	year	
1	Emissions to air and water	COD	<ul style="list-style-type: none"> ISO 6060 	<ul style="list-style-type: none"> ISO 6060 	Water quality: Determination of the chemical oxygen demand	1989
		NO _x	<ul style="list-style-type: none"> ISO 11564 	<ul style="list-style-type: none"> ISO 11564 	Stationary source emissions: Determination of the mass concentration of nitrogen oxides; Naphthylethylenediamine photometric method.	1998
		S	<ul style="list-style-type: none"> EPA n.8 	<ul style="list-style-type: none"> EPA n.8 	<ul style="list-style-type: none"> Determination of sulphuric acid and sulphur dioxide emissions from stationary sources. Determination of the reduced sulphur emissions from stationary sources (Impinger Technique). Petroleum products: Determination of sulphur content; Energy dispersive X-ray fluorescence spectrometry. Solid mineral fuels; Determination of total sulphur - High temperature combustion method. 	2003
			<ul style="list-style-type: none"> EPA n.16A 	<ul style="list-style-type: none"> EPA n.16A 		
			<ul style="list-style-type: none"> ISO 8754 	<ul style="list-style-type: none"> ISO 8754 		
<ul style="list-style-type: none"> ISO 351 	<ul style="list-style-type: none"> ISO 351 	1996				
AOX	<ul style="list-style-type: none"> ISO 9562 	<ul style="list-style-type: none"> ISO 9562 	Water quality: Determination of absorbable organically bound halogens (AOX).	1998		
4	Hazardous chemical substances	Surfactants	<ul style="list-style-type: none"> OCSE 301 A-F OCSE 302 A-C 	<ul style="list-style-type: none"> OCSE 301 A-F OCSE 302 A-C 	<ul style="list-style-type: none"> Ready biodegradability of organic chemicals; Inherent biodegradability of organic chemicals 	
		Biocides	<ul style="list-style-type: none"> OCSE 107,117 or 305 A-E 	<ul style="list-style-type: none"> OCSE 107,117 or 305 A-E 		

4 Technical analysis of existing criteria

This Chapter focuses on Pulp and Paper production processes to highlight how the existing criteria have been developed and to open the discussion about their revision.

In particular the section summarizes the analysis of the main technical reference existing for the management of environmental aspects related to the European pulp and paper industries.

4.1 MAIN ENVIRONMENTAL ASPECTS LINKED TO THE PAPER PRODUCTION

The paper industry requires natural and chemical raw materials use: cellulose, water and additives (e.g. for the graphic paper, the production process needs adhesive agents as resins, etc...).

Production processes need energy for paper dehydration, paper drying and fibres processing. The different processes cause emissions to air and water, mainly SO_x, NO_x, AOX and organic compounds.

The residual de-inking, the sludge depuration and the residuals chemical agents are the main production waste to manage.

No significant technical changes occurred in the production process since the last criteria revision, as also CEPI¹⁶ and ASSOCARTA¹⁷ consulted documentation has demonstrated.

The following table (Table 4.1) shows the main environmental aspects involved in the pulp and paper manufacture. The main impact sources are specified.

Table 4.1 - Environmental aspects of paper and pulp production
 (Source: Italian guidelines for the BAT for paper industry, 2004)

Environmental aspects		Sources
Energy / Resources consumption	Raw Materials	Natural and chemical substances use
	Energy	Production process
	Water	Production process
Emissions	Air	Production process and energy use
	Water	Production process
Waste production		Production process

¹⁶ CEPI, 2006 and website www.cepi.org

¹⁷ ASSOCARTA, 2007 and website www.assocarta.it

4.2 CURRENT ECOLABEL CRITERIA

The current scheme of the criteria for copying and graphic paper is structured in 8 main criteria dealing with the following life cycle phases: raw materials, production process and use phase (Figure 4.1).

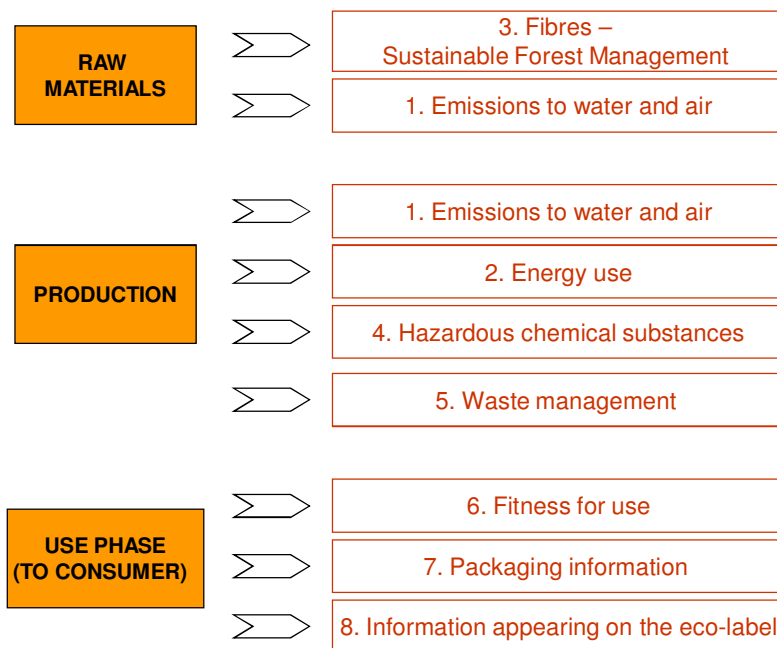


Figure 4.4.1 – Structure of the current Ecolabel criteria.

4.3 THE IPPC DIRECTIVE

The purpose of the IPPC (Directive 96/61/CE) is to achieve integrated prevention and control of pollution arising from the activities listed in its Annex I. The IPPC establishes a common set of rules for the release of the permits to industrial installations in Europe with the aim to promote the integrated pollution prevention and control.

Industrial plants for the production of:

(a) *pulp from timber or other fibrous materials;*

(b) *paper and board with a production capacity exceeding 20 tonnes per day,*

are included, as specified at the point 6.1 of the Annex I of the Directive.

Therefore, the European paper and pulp producers are subjected to the IPPC directive rules and, in particular, they have to refer to the BREF, the Reference Document on Best Available Techniques (BAT), in order to reduce the environmental impacts associated to their productive processes.

4.4 BEST AVAILABLE TECHNIQUES (BAT) ANALYSIS

The term “best available techniques” is defined in Article 2(11) of the Directive as “*the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing in principle the basis for emission limit values designed to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environment as a whole.*”

The BREF document sets which range of emissions levels is expected from the use of best available techniques, and shall not be considered as limits.

The most recent Reference Document on Best Available Techniques in the Pulp and Paper Industry is dated 2001 and it is the same used in the development of the former criteria for this product group¹⁸.

The analysis highlights a close relationship between the resources/energy consumption and emission values reported in the BAT document and the Ecolabel criteria, as shown in the following chapter.

Emissions to air and water

The following tables (Table 4.2 and 4.3) refer to the emissions levels associated to the pulp and paper production process.

Table 4.2 shows the range of values for air and water emissions established by the BAT compared with the reference values imposed by the current Ecolabel criteria, expressed in Kg/ADT¹⁹.

When a correspondence between the BAT and the Ecolabel values exists, the Ecolabel always respects the range established by the Best Available Techniques.

The table takes into consideration also the BAT limits for the Phosphorus (Total P) emission to water, also if in the current Ecolabel criteria it is not still considered.

The phosphorus is an indicator of the potential eutrophication for the water ecosystems. The environmental relevance of the phosphorus could be considered for the criteria revision, as already done for the “Tissue paper” Ecolabel Criteria Revision under development. In accordance with the limits imposed for the other above-mentioned parameters, the reference values for the phosphorus should be included in the BAT ranges shown in the table below.

¹⁸ Note: the BREF and BAT document revision has been undertaken in early 2007 and it will soon be coming to an end.

¹⁹ “ADT”: Air Dried Tonnes

Since the reference document has not changed from the last revision of the Ecolabel Criteria for Copying and Graphic paper, the process and the existing limits still respect the BAT ranges. About this issue, it could be taken into account also the technical analysis results (treated in previous paragraph) about the technological developments occurred to assess the possibility of either a further lowering of the reference values or leaving them unchanged.

Moreover new emission reference values for copying and graphic paper could also take in account the final drafts of the Ecolabel Criteria for other Paper Products (Printed Paper and Tissue Paper), still in Interservice Consultation, trying to harmonize, for instance, the emission data for copying and graphic paper to those reported for the “Substrate” in the Printed Paper products draft.

Table 4.2 - Air and water emissions levels related to pulp and paper production (Source: BREF, 2001)

EMISSIONS (kg/ADT)			Water		Air				Water (New Proposal)
			COD		S		NO _x		Total P
			BAT	Criteria	BAT	Criteria	BAT	Criteria	BAT
P U L P	CHEMICAL (kraft-sulphate)	Bleached	8,0 -23	18,0	0,2-0,4	0,6	1,0-1,5	1,6	0,01-0,03
		Unbleached	5,0 - 10						0,01-0,02
	CHEMICAL (sulphite)	Bleached and unbleached	20 - 30	25,0	0,5-1,0	0,6	1,0-2,0	1,6	0,02-0,05
	MECHANICAL (CTMP)	n.a.	10,0 - 20	15,0	n.d.	0,2	n.d.	0,3	0,005-0,01
	RECYCLED FIBRES	n.a.	2,0 - 4,0	2,0	n.d.	0,2	n.d.	0,3	0,005-0,01
P A P E R 20	NOT INTEGRATED PAPER MILLS	Uncoated fine paper	0,5 - 2	1,0	n.d.	0,3	n.d.	0,8	0,003- 0,01
		Coated fine paper	0,5 - 1,5						
	OTHER PAPER MILLS	n.d.	1,0	n.d.	0,3	n.d.	0,7	n.d.	

Table 4.3 shows the AOX emission levels: in the current criteria, the hurdle values for AOX just refer to pulp production while, in the BREF document, the AOX emissions levels refers also to the paper production.

In the existing criteria the hurdle is 0,25 Kg/ADT for each pulp used, while in the BAT the value depends on the kind of pulp (sulphate bleached or recycled).

Table 4.3- AOX emission levels related to pulp production (Source: BREF, 2001)

EMISSIONS (kg/ADT)		AOX Kg/ADT		
		BAT	Criteria	
P U L P	CHEMICAL (sulphate bleachead)	< 0,25	0,25	
	RECYCLED FIBRES	< 0,005		
P A P E R 21	NOT INTEGRATED PAPER MILLS	< 0,005	<i>n.d.</i>	
	INTEGRATED PAPER MILLS	from mechanical pulp		< 0,001
		from recycled fibres		< 0,005

Energy Use

About the energy consumption, the BAT set range limits for fuel and electricity use. Table 4.4 refers to the **pulp** production and Table 4.5 to the **paper** production.

As Table 4.4 shows, the Ecolabel criteria reference values always comply with the ranges imposed by the BAT. Furthermore, the recycled fibres reference value for the electricity use (yellow box) is lower than the BAT minimum hurdle.

Referring to the fuel limits for the chemical pulp, in the BAT there are different ranges for sulphate and sulphite grades, while in the current criteria there is just a medium value for both of them (4000 kWh/ADT).

Table 4.4- Energy consumption levels for pulp production (Source: BREF, 2001)

ENERGY USE			FUEL (kWh/ADT)		ELECTRICITY (kWh/ADT)			
			BAT	Criteria	BAT		Criteria	
PULP	CHEMICAL	sulphate	2.770	3.878	4.000	700	800	800
		sulphite	4.432	4.986		700	800	
	MECHANICAL	n.a.	277	1.662	900	1.900	2.600	2500
	RECYCLED FIBRES	n.a.	1.108	1.801	1.800	1.000	1.500	800

About the paper production, the BAT limits concern both the integrated and not integrated paper mills, while the current Ecolabel criteria impose reference values to not integrated paper mills only, as the Table 4.5 highlights.

Therefore, for the calculation of their energy consumption, the integrated paper mills have to refer to both “pulp” and “not integrated paper mills” BAT values (Table 4.4 and Table 4.5).

The current Ecolabel reference values are in accordance with the BAT ranges and for the not integrated paper mills the fuel use values are even lower than the BAT minimum hurdles, as the Table 4.5 shows (yellow box).

Table 4.5– Energy consumption levels for paper production (Source: BREF, 2001)

ENERGY USE				FUEL kWh/ADT			ELECTRICITY kWh/ADT		
				BAT	Criteria	BAT	Criteria		
PAPER	INTEGRATED PAPER MILLS	CHEMICAL sulphate	bleached	3878	5.540	<i>n.a.</i>	1.200	1.500	<i>n.a.</i>
			unbleached	3.878	4.848	<i>n.a.</i>	1.000	1.300	<i>n.a.</i>
		CHEMICAL sulphite	bleached	4.986	6.648	<i>n.a.</i>	1.200	1.500	<i>n.a.</i>
			MECHANICAL pulp	coated	831	3.324	<i>n.a.</i>	1.700	2.600
			printing	277	1.662	<i>n.a.</i>	1.700	2.600	<i>n.a.</i>
		RECYCLED FIBRES		1.108	1.801	<i>n.a.</i>	1.000	1.500	<i>n.a.</i>
	NOT INTEGRATED PAPER MILLS	uncoated	1.939	2.078	1.800	600	700	600	
		coated	1.939	2.216	1.800	700	900	800	

Notes on the technical analysis

The argumentation made in the previous paragraph demonstrates that, at the moment, it seems necessary to consider also the technical analysis results on the current technological developments in order to evaluate the necessity of changing the reference values for the “emission to air and water” and for the “energy use” in the new Criteria for Copying and Graphic Paper. The reference document on which the current criteria are based on, in fact, has not been changed since the last criteria revision process.

On the other hand it has to be considered that an updated version of the BREF for the Pulp and Paper Industry might be soon available, (the BREF revision is starting in January 2009), so if this new document is published before the end of the current criteria review, a new update of the abovementioned values will be necessary.

It has to be highlighted also that, as shown in the analysis, the Ecolabel reference values represent a “simplification” of those reported in the BAT: for this, in some cases, some modification could be made to the existing criteria, and the introduction of a limit to the Phosphorus emissions to water (not considered for now) could also be included.

4.5 SUSTAINABLE FOREST MANAGEMENT

Hereafter are reported some hotspots available in the *UN/ECE Forest Products Annual Market Review, 2007-2008*:

- From 2007 to 2008, the world’s certified forest area grew by 8.8%, reaching 320 million hectares, which is **8.3%** of the global forest area, and **13.4%** of the managed forest area.
- While the rate of increase in forest area certification has been slowing since 2006, chain of custody (**CoC**) **grew by 50%** in 2007, attaining 12,600 certificates worldwide in 2008.
- **Western European** countries have certified more than **50%** of their total forest area, North America more than one third, but Africa and Asia only 0.1%.
- Approximately 80-90% of the world’s certified forest is located in the northern hemisphere, where two thirds of the world’s round wood is produced; more than half (57%) of the certified forest is in North America.
- Canada and the US continue leading the UNECE region in hectares of forest area certified, while Australia and Brazil have the most certified area outside the UNECE region.
- In the tropical region, 40% of the certified forest remains under certification schemes that are not certified by independent third parties.
- Globally the United Kingdom, the US and Germany have the most CoC certificates, while outside the UNECE region, Japan, China and Brazil are top ranked.
- Green purchasing policies and public procurement policies remain key drivers for certified forest products (CFPs) and forest certification.
- Double certification by multiple schemes is increasing as the wood and paper industries achieve better market access.
- The most prominent market benefits for CFPs are market access and brand image; price premiums for CFPs are an exception in Europe and North America.

Table 4.6 shows the worldwide certified areas by scheme and regions. For this analysis the “FSC” (Forest Stewardship Council), the “PEFC” (Programme for the Endorsement of Forest Certification) and “Other schemes” (that refer to specific regional schemes ,as reported in the note below the Table) have been considered. In Europe, the certified forest areas cover over that 84 million hectares, representing 54% of the total EU forest areas and about the 26% of the worldwide total certified forests (319,9 million hectares).

It has to be noted that the global percentage of the industrial roundwood coming from certified forests on worldwide roundwood production is slightly over the 26%. Only North America and Europe reach an appreciable amount of production from certificated areas (14,6 ad 11%).

Figure 4.2 gives a picture of the worldwide managed and certificated areas.

Table 4.6 – Global supply of roundwood from certified resources (Source: UNECE, 2008)

	Total Certified forest Area (million ha)	Total Certified forest Area (%)	Estimated industrial roundwood from certified forests, from global roundwood production (%)
North America	181,7	38,6	14,6
South & Central America	15	1,6	0,2
Western Europe	84,2	54,1	10,9
Asia	2	0,4	0,1
Oceania	9,4	4,8	0,1
Africa	3	0,5	0
Russia	24,6	2,7	0,3
World	319,9	8,3	26,2

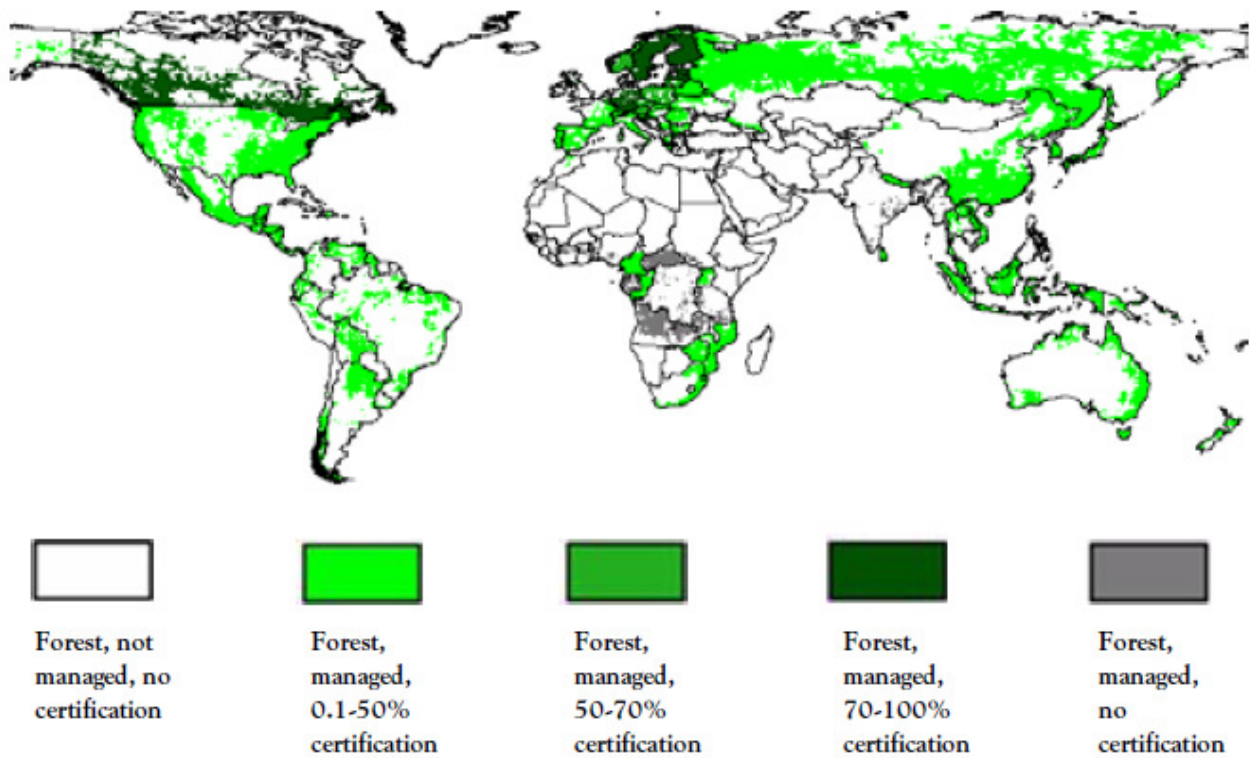


Figure 4.2 – Forest area certified relative to the forest area under management by countries. It is assumed that managed forest is at least 55% influenced by human activity. (source: UNECE, 2008)

The following table (Table 4.7) shows a picture of the situation of the Certified forest areas in the EU 25 updated to February 2007. It can be noticed that in the EU, the 46,6% on the average of forests are certified.

Table 4.7 - Certified Forest areas in EU (ISPRA elaboration, 2007)

Country	Forest area ²² (ha)	Certified area (ha) ²³	% of forest certified
Austria	3.862.000	3.378.966	87,5
Belgium	667.000	258.425	38,7
Bulgaria	3.625.000	21.609	0,6
Czech Republic	2.648.000	1.987.765	75,1
Denmark	500.000	27.975	5,6
Estonia	2.284.000	1.063.913	46,6
Finland	22.577.834	22.577.834	100,0
France	15.554.000	4.272.065	27,5
Germany	11.076.000	7.768.111	70,1
Greece	3.752.000	31.526	0,8
Hungary	1.976.000	193.166	9,8
Ireland	669.000	438.360	65,5
Italy	9.979.000	657.180	6,6
Latvia	2.941.000	97.335	3,3
Lithuania	2.099.000	1.108.281	52,8
Luxembourg	87.000	21.630	24,9
Netherlands	365.000	140.324	38,4
Poland	9.192.000	6.579.417	71,6
Portugal	3.783.000	123.624	3,3
Romania	6.370.000	1.124.412	17,7
Slovakia	1.929.000	539.273	28,0
Slovenia	1.264.000	270.840	21,4
Spain	17.915.000	697.887	3,9
Sweden	27.528.000	17.387.744	63,2
United Kingdom	2.845.000	1.692.709	59,5
TOTAL	155.487.834	72.460.371	46,6

Considering, instead, the 30 EU 27 and EFTA 24 countries, the percentage of the Certified Forest areas grows up to around 50%.

In figure 4.3 is shown the share of the certified forest area and the growing trend since the 1998 concerning the three major schemes: i.e. FSC, PEFC and ATFS.

²² Global Forest Resources Assessment 2005 - F.A.O. <http://www.fao.org/forestry/site/fra2005/en/>

²³ FSC database and PEFC database (update 22/02/2007)

²⁴ European Free Trade Association

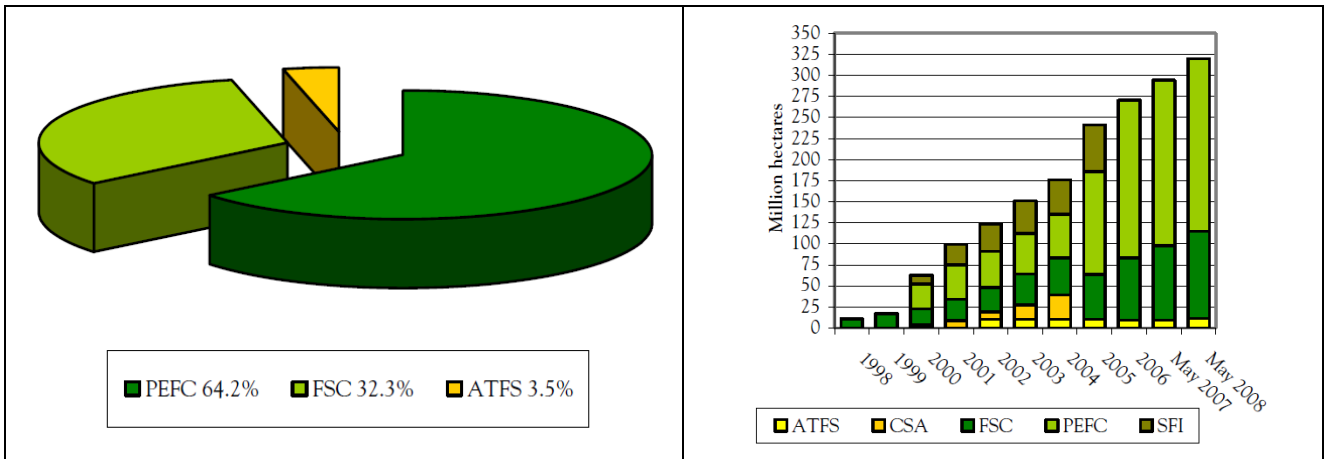


Figure 4.3 - Share and trend of the certified forest area concerning the three major schemes.

The requirement to provide CoC certificates is often required, within the main European Ecological Label criteria, for the percentage of fibres for which the forestry certification is not compulsory.

Figure 4.4, instead, shows the Chain of Custody (CoC) certificates issued in December 2008 in main European and extra European countries. The schemes considered in the figure are PEFC, FSC.

Germany, France and United Kingdom reached more than 1000 certificates in the considered period. It has to be highlighted how this typical business-to-business certification had a more rapid grown in the last decade than the CFPs.

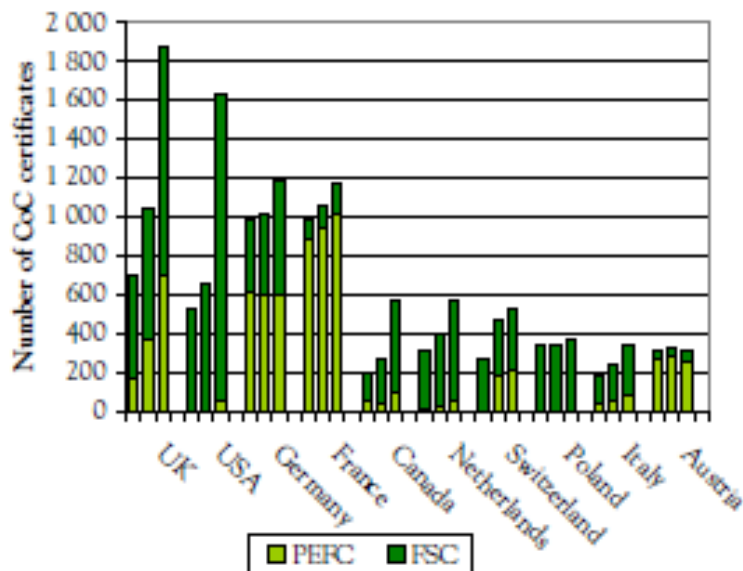


Figure 4.4 - Chain of custody certificate distribution within the UNECE region between 2006-2008²⁵.

²⁵ UNECE, 2008

4.6 GREEN PUBLIC PROCUREMENT FOR COPYING AND GRAPHIC PAPER

The European GPP criteria²⁶

European GPPs criteria for *copying and graphic paper* have been developed by the European Commission in 2008 for the GPP Training Toolkit²⁷. They are included in Module 3 - *Purchasing recommendations*.

These recommendations cover the purchase of the products that encompass **unprinted paper for writing, printing and copying purposes (up to 170g/m²) sold in sheets or reels**.

Finished paper products, such as writing pads, drawing books, calendars, manuals, etc. have not been included.

Different sets of criteria are provided for, as shown in Figure 4.6:

- **Paper based on recovered paper fibres, recycled paper;**
- **Paper based on virgin fibres.**

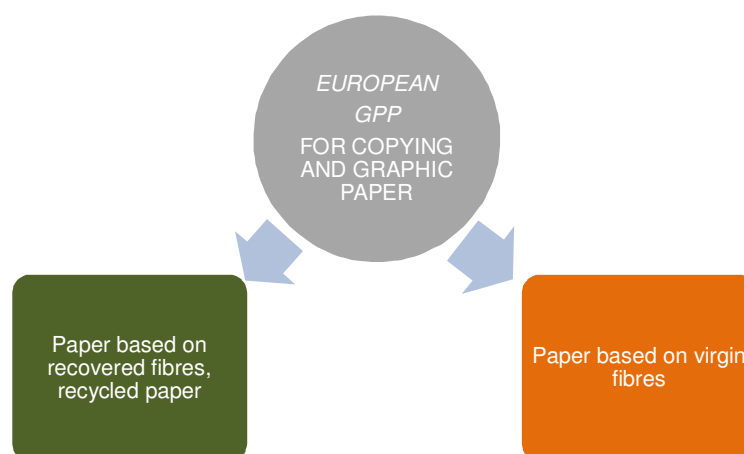


Figure 4.6- Two sets of criteria are available in the EU GPP for copying and graphic paper (Source: EU GPP, 2008)

Both of them are divided into two sets of requirements:

- a. **Core criteria:** the designed to be used by any European contracting authority.

²⁶ EU GPP, 2008

²⁷ http://ec.europa.eu/environment/gpp/toolkit_en.htm

They address the most significant environmental impacts and are designed to be used with minimum additional verification effort or cost increases.

- b. **Comprehensive criteria:** intended for use by authorities who wish to purchase the best environmental products available on the market, and may require additional administrative effort or imply a slight cost increase as compared to the purchase of other products fulfilling the same function.

The European GPP criteria often refer to the available Environmental label of Type 1, i.e.: the European Ecolabel, the Nordic Swan and the Blue Angel. In particular, the criteria concerning the *paper based on post-consumer recovered paper fibres* are related to the **Blue Angel** label, while the criteria for *paper based on virgin fibres* make reference to the **European Ecolabel** and the **Nordic Swan** label.

Table 4.6 shows the requirements for each of the abovementioned label about the fiber used in the paper production.

Table 4.6 – Fibres requirements for EU Ecolabel, Nordic Swan and Blue Angel criteria.

	European ecolabel criteria (Current criteria)	Nordic Swan criteria	Blue Angel criteria
Fibres	<p>10% virgin fibres should be proven to come from sustainably managed certified forest</p> <p>The remaining virgin wood fibres shall come from forests that are managed so as to implement the principles and measures aimed at ensuring sustainable forest management.</p> <p>The origin of all virgin fibres used shall be indicated.</p>	<p>20% of the fibre raw material in the paper must come from certified forestry operation;</p> <p>OR</p> <p>At least 75% of the fibre raw material in the paper must be recycled fibre, wood shawing or sawdust</p> <p>OR</p> <p>A combination of a) and b) is permitted</p>	<p>100% post consumer recovered paper</p>

For paper based on recovered paper fibres, the specifications refers to *copying and graphic paper for normal office use and professional purposes*. Table 4.7 show the requirements European GPP requirements:

Table 4.7 – European GPP criteria for paper based on recovered paper fibres (Source: EC Green Public Procurement Training Toolkit Module 3, 2008)

PAPER USED ON RECOVERED PAPER FIBRES (RECYCLED PAPER)	
Core criteria	100% recycled fibres (for professional purposes: 75%)
	Elementary chlorine free (EFC). Totally chlorine free (TCF) also accepted. ²⁸
	Need of Paper quality tests for the office machines suitability
Comprehensive criteria	100% recycled fibres with minimum 75% post consumer (for professional use: 75% with minimum of 80% post consumer)
	Meet the ecological criteria of Ecolabel, Nordic Swan, Blue Angel related to the paper production.
	Need of Paper quality tests for the office machines suitability

In the core criteria it is specified that the total amount of fibers must be recycled, while the comprehensive criteria specifies the amount of minimum post-consumer recycled fibres as well. All the products carrying the Blue Angel label will be deemed to comply.

The GPPs recommend the limitation or the non use of any chlorine based substance (ECF or TCF); all the products carrying European Ecolabel, Nordic Swan or Blue Angel will be deemed to comply.

About virgin fibres, the criteria deal with the purchase of *office paper* based on virgin fibre stemming from legally and/or sustainably harvested sources (also fibres), as shown in Table 4.8. The core criteria state that the virgin fibres shall come from legal sources: certificates of chain of custody (FSC, PEFC and any other internationally recognized scheme is accepted) as proof of compliance.

²⁸ In order to avoid the emissions to aquatic environment of AOX (organic chlorine compounds) related to the bleaching process.

Table 4.8 – European GPP criteria for paper based on recovered paper fibres (Source: EC Green Public Procurement Training Toolkit Module 3- 2008)

PAPER BASED ON SUSTAINABLE AND/OR LEGAL VIRGIN FIBRES	
Core criteria	Virgin fibres from legal sources (certified by FSC, PEFC and other forest management system)
	Elementary chlorine free (EFC).
Comprehensive criteria	Virgin fibres from legal sources (certified by FSC, PEFC and other forest management system)
	Elementary chlorine free (EFC). Totally Chlorine Free(TCF) also accepted.

Focus on the EU National GPP criteria

Some European countries developed national environmental criteria and guidance for the green procurement of paper products. They establish a set of *minimum standards* (compulsory requirements or recommendations) that the product has to comply with, especially to the use of recycled and/or virgin fibres, as shown in Table 4.9.

As already happens in the European GPP, also main national GPP criteria are based on the existing ecological labels for paper products.

Table 4.9 – Major National GPP requirements for copying and graphic paper.

Country	Type	Recycled paper criteria	Virgin fibres criteria	Reference/Legislation
Germany	Recommendations	<i>Copying paper</i> 100% recycled paper (based on Blue Angel)	n.a.	Papierprodukte-Ausschreibungsempfehlung -2007 (at www.beschaffung-info.de)
Italy	Mandatory (Under development ²⁹)	<i>Copying paper</i> No minimum limit (assumed a technological maximum of 85% recycled)	n.a.	Decree of Ministry of Environment (DM 23/2003) "obliges all public bodies to purchase at least 30% of all purchased goods of recycled materials".
Sweden	Mandatory	<i>For paper products:</i> 75% recycled paper OR 20% virgin fibres from certified forestry OR combination of both of them. (based on Nordic Swan criteria)	From legal sources (based on Nordic Swan)	SEMC, "Environmental Management Council's procurement criteria for paper products"-2007 (at http://www.msr.se/en/green_procurement/criteria)
France	Raccomandations	<i>Office paper</i> values depending on the market availability	From legal sources (based on European Ecolabel)	GPEM/DDEN "Guide de l'achat public éco-responsable- Achat de papier à copier et de papier graphique"-2005 (at http://www.ecologie.gouv.fr/IMG/pdf/05-064.pdf)
UK	Mandatory	<i>For copying paper:</i> 100% recycled paper	From sustainable sources	Quick Wins 2007 (at http://www.defra.gov.uk/) See also CEPT of UK Government (www.proforest.net/cpet)

In the "Copying and Graphic Paper" GPP Background Report, the most important environmental impacts relating to pulp and paper production are listed, and for each of them the way to reduce these impacts are suggested.

It states, for instance, that it is possible to recycle high quality paper, such as graphic paper, several times for either the same, or lower quality uses, reducing the need for virgin fibres.

²⁹ D.M. 11 aprile 2008

Concerning the water and energy consumption, the document refers to the BAT for the Pulp and Paper industry and to other studies³⁰, declaring that the production processes for paper based (totally or mainly) on post-consumer recovered paper fibres (recycled paper) use much less energy and water than those for paper based (totally or mainly) on virgin fibre but may cause higher fossil CO₂ emissions.

Regarding chemicals used in the bleaching process, the document indicates how to develop and carry on the process in order to control of AOX levels, COD emission and other substances³¹.

³⁰ UBA, 2000- IFEU,2006

³¹ See pag. 66 of the EU GPP Training Toolkit Background Product Report for Copying and Graphic Paper (2008).

4.7 LCA COMPARATIVE ANALYSIS ON VIRGIN - RECYCLED PAPER PRODUCTION

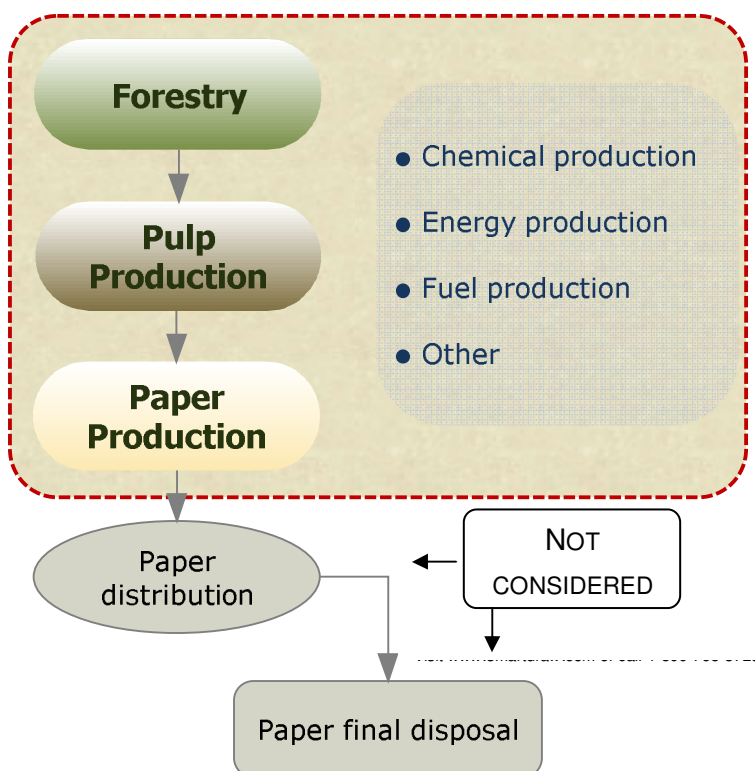
Introduction

This chapter aims to compare the results of several LCA studies and data available in literature, for the manufacture of paper produced by using virgin wood (mechanical and chemical pulp) or recycled paper (bleached and unbleached chemical wood-free pulp).

Data refer to the production of non coated printing or graphic paper (see “data sources and hypotheses adopted”).

System boundaries

The production and maintenance of capital goods (buildings, machinery, etc.) were excluded from all the studies and the models used, as well as the environmental burdens associated with the production of ink, toner, and other materials used during the utilisation of printing and writing paper.



The life cycle stages considered for paper production process were grouped into the following categories:

- **FORESTRY** (includes the production of wood);
- **PULP PRODUCTION**;
- **PAPER PRODUCTION** (includes printing and writing paper production);

Phases not considered are:

- **PAPER DISTRIBUTION** (refers to the transport of printing and writing paper from the paper mill to the place of consumption);
- **PAPER FINAL DISPOSAL** (it consists mainly of landfilling, incineration and recycling).

Figure 4.2- Share and trend of the certified forest area concerning the three major schemes.

The distribution, the use and the disposal stages were not considered because of the strong differences in the possible, strictly regional dependent scenarios.

Besides these main sequential processes, each stage also includes additional processes, such as chemical production, energy production (electricity and heat), fuel production and others.

Transportation was not considered.

Data sources and hypotheses

Data and results used for this comparative analysis come both from publication, such as LCA studies, and databases, such as Ecoinvent³² and Boustead model³³.

Following a list of the sources employed for this comparative analysis:

A. Ecoinvent data v2.0 from Swiss Centre of Life Cycle Inventories.

Main hypotheses adopted:

- a. Product: Bleached and Unbleached Graphic paper.
- b. System boundaries: from forestry to manufacturing stage. Biogenic CO₂ and CO emissions and biogenic CO₂ resource extraction are excluded from the impact assessment.
- c. Functional unit: kg of paper.
- d. Location: European data.

B. Boustead model v 5.0:

Main hypotheses adopted:

- a. Product: unglazed printing and graphic paper.
- b. System boundaries: from forestry to manufacturing stage. Biogenic emissions have not been considered.
- c. Functional unit: kg of paper.
- d. Location: Global

C. Ana Cláudia Dias, Luis Arroja and Isabel Capela - **Life Cycle Assessment of Printing and Writing Paper Produced in Portugal** - Int J LCA 12 (7) 521 – 528 (2007).

Main hypotheses adopted:

- a. Product: writing paper (chemical pulp)
- e. System boundaries: from forestry to manufacturing stage. Biogenic emissions have not been considered.
- b. Functional unit: kg of paper (pulp from Eucalyptus globulus).
- c. Location: Germany and Portugal.

³² The Swiss Centre for life cycle inventory (LCI) data – Ecoinvent data v1.1

³³ Boustead Consulting Ltd v.05.

The following study was also taken into account, but since the data used were the same of the Ecoinvent database, it has been decided not to use its outcomes, also because they were not complete and exhaustive for our purposes:

Roland Hischier, Hans-Jörg Althaus and Frank Werner - Developments in Wood and Packaging Materials Life Cycle Inventories in ecoinvent - Int J LCA 10 (1) 50 – 58 (2005) – OnlinePublication: November 10th, 2004.

Results comparison

A summarizing table is provided in order to show the results of the abovementioned sources and to compare the different values obtained for the main environmental impact indicators: GER (Gross Energy requirement), GWP₁₀₀ (Global Warming Potential), Acidification and Eutrophication potentials.

For each source the paper grade and the data origin considered in the study are expressed.

The data have been separately collected for *virgin paper* and *recycled paper*, according to different sources:

- Source 1 – Ecoinvent v2.0 “*Newsprint Graphic paper*”
- Source 2 – Boustead Model v5.0
- Source 3 – Int. J. of LCA: Life Cycle Assessment of Printing and Writing Paper
- Source 4 – Ecoinvent v2.0 “*Unbleached recycled paper*”
- Source 5 – Ecoinvent v2.0 “*Bleached recycled paper*”

The functional unit considered is 1 kg of finished paper.

Table 4.10 – Comparative table of the main environmental impact indicators for virgin paper and recycled paper production.

Environmental Impact Indicators	VIRGIN			RECYCLED		FU
	Source 1	Source 2	Source 3	Source 4	Source 5	
GER	41,70	40,00	31,00	13,70	30,80	MJ/kg
GWP₁₀₀	1,3	1,035	1,215	0,832	1,564	kg CO ₂ /kg
ACIDIFICATION	0,0068	0,014	0,015	0,0016	0,0061	kg SO ₂ /kg
EUTROPHICATION	0,00076	0,00074	0,0018	0,0004	0,001	kg PO ₄ ³⁻ /kg
Paper	Graphic paper	Unglazed printing and graphic paper	Writing paper	Unbleached recycled paper	Bleached recycled paper	
Data origin	European	European	Germany and Portugal	European		

The following figures show the results obtained for each environmental indicator.

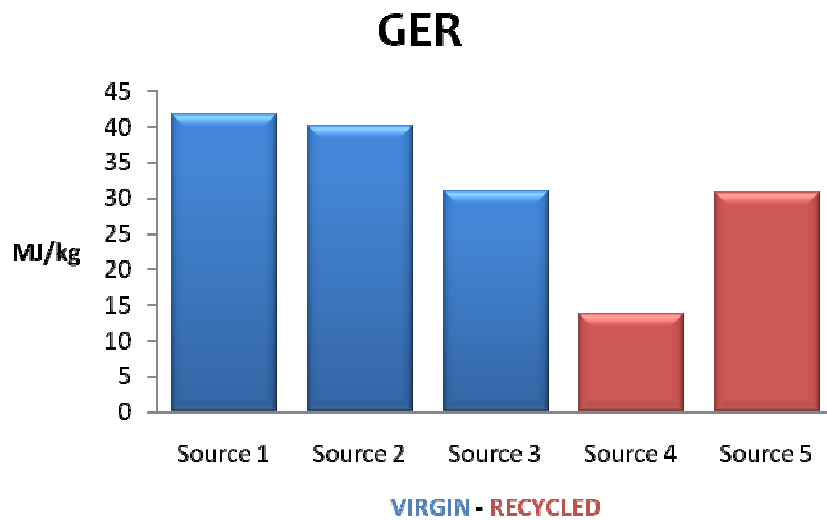


Figure 4.3 – Gross Energy Requirements in virgin and recycled paper production processes.

The values do not differ really much, except for the unbleached recycled paper, which value are considerably lower.

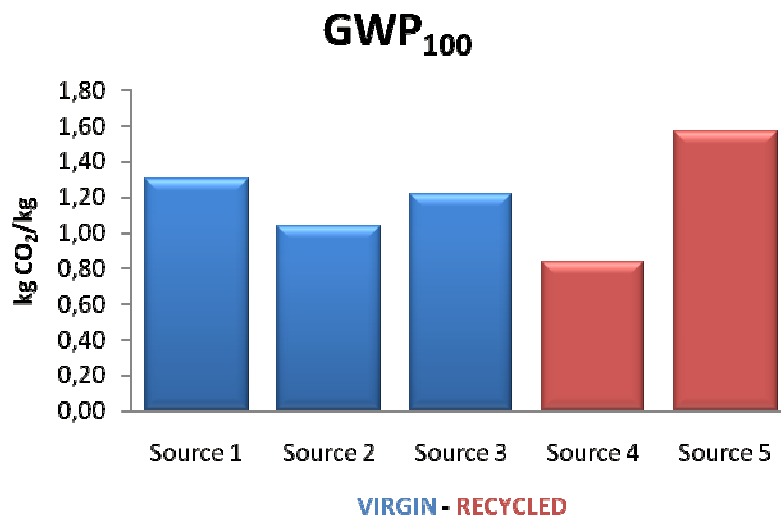


Figure 4.4 – Global Warming Potential in virgin and recycled paper production processes.

The emissions of GHG from the life cycle of the products for the unbleached recycled paper is the lowest, also if the variation is not very high.

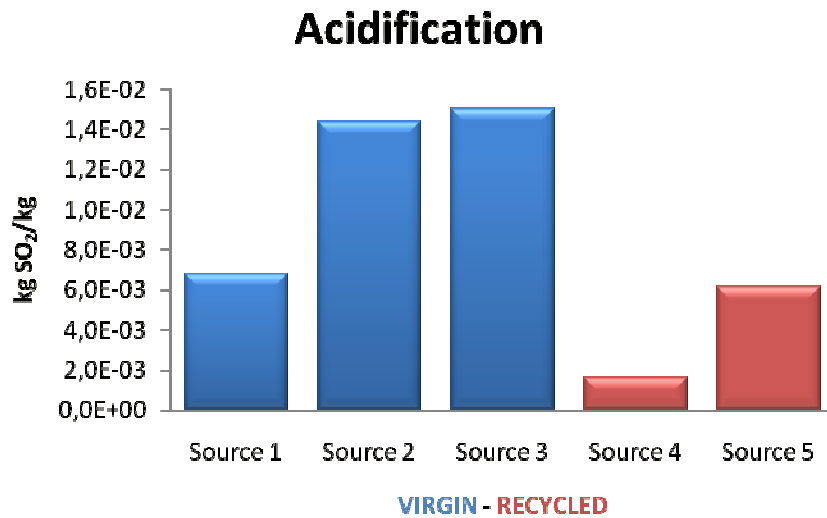


Figure 4.5 – Acidification potential in virgin and recycled paper production processes.

The Acidification potential from the life cycle of the recycled bleached and unbleached paper has the lowest values.

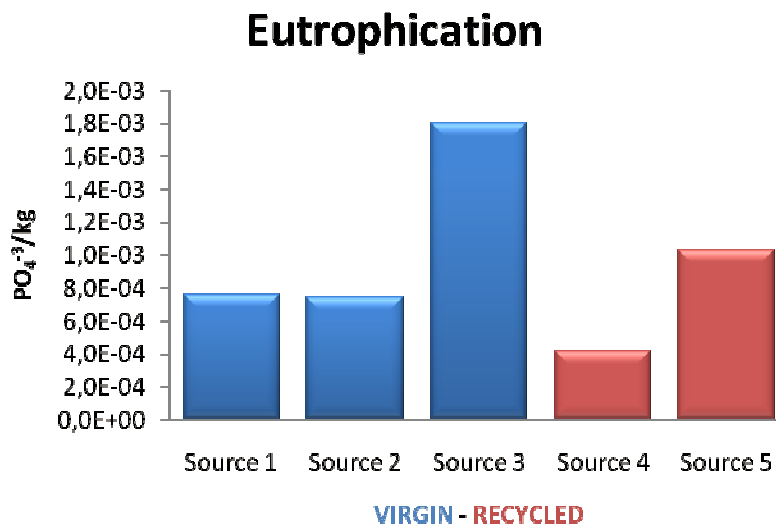


Figure 4.6 – Eutrophication in virgin and recycled paper production processes.

Analysed data show that the greatest contribution to the eutrophication potential comes from the pulp production stage.

The highest value of the Int. J. of LCA (Source 3) is due to the fact that the raw material used to produce the pulp comes from *Eucalyptus* wood, which has a natural high content of phosphate, strictly contributing to the eutrophication potential.

Considerations

Comparing the results, the different system boundaries and hypothesis have to be taken into consideration, because, clearly, LCAs from different sources should not be compared as exact data. Despite this, from the above analysis it can be deduced that the product with the lowest environmental impacts is the recycled unbleached paper. The collected data show that paper production involving bleaching treatments, although recycled paper is used as raw material, has higher impacts, often in line with the virgin paper production.

The comparison gives a clear picture that recycling is only one aspect of paper's life cycle and can result higher emissions in some emission parameters compared to papers made of virgin fibres.

As EEB and BEUC suggested, the LCA made by UBA “*Life Cycle Assessments for Graphic Papers Environmental comparison of recycling disposal processes for used graphic paper and of paper products for newspaper and magazine publishing and for photocopying*”³⁴ has been considered.

The assessment of 100 different processes of pulp and paper production in a life cycle on press paper is considered.

The key results of the project are listed below:

- As a whole, fibre/pulp and paper production produces the most significant environmental stress and consume the most resources;
- The environmental preferable option for waste graphic paper is increasing the material recycling of waste paper, then burning waste paper in low emissions CHP and the less preferable scenario is disposal to landfill;
- The environmental advantage of using waste paper as a raw material for producing newspaper and photocopy paper compared to exclusive use of wood concludes that 100% recycling newspaper and photocopy papers are considerably preferable in environmental terms. As well as using partial use of waste paper as a raw material for producing coated and super calendar glossy paper is considerably preferable in environmental terms to the exclusive use of wood;
- It is proved that fibres can be recycled up to six times when producing press paper;
- Reduction of the environmental burden from paper products is possible using technical measures and also potential low emissions could be achieved.

³⁴ UBA, 2000

Table 4.11 - Possible reduction of the environmental burden in paper production (source: UBA, 2000)

Environmental burden	Possible improvements
Production of newspaper, SC paper, LWC paper, photocopy paper	Newspaper, photocopy paper can be produced from 100% recycled paper Glossy (SC and LWC) paper can be produced with 30% recycled fibre
Water pollution from Kraft pulp works / eutrophication potential : COD currently at 90 kg/t	COD could be reduced to: <ul style="list-style-type: none"> • 4 kg/t (Metsä-Rauma, Finland) • 6.9 kg/t (Alberta pacific, Canada) • 12 kg/t (Enocell, Finland) • 13 kg/t (Soedra Cell, Sweden)
Greenhouse effect, scarcity of fossil fuels, atmospheric pollutants	Examine energy production and consumption for optimization in order to reduce their contribution to the impacts
Transport related environmental stress	Pulp purchased locally
Intensity of land use	Continuing development of sustainable forestry, particularly in view of the vast quantities of wood consumed.

Table 4.12 - Possible reduction of the environmental burden in paper production (EU GPP, 2008)

Environmental burden	Possible improvements
Water consumption : Water consumption for the production of non-recycled paper is about: 25- 70 m³/t	The water consumption for the production of recycled graphic paper is about 10-15 m ³ /t in plants working with best available techniques according to the BREF (including the preparation of recovered paper pulp).
Energy consumption for the production of paper based (totally or mainly) on virgin fibre is 5,000-10,700 kWh/t	Energy consumption for the production of recycled paper of 1,700-5,500 kWh/t.

From the last table emerges that, as the EU GPP Training Toolkit Background product report for Copying and Graphic Paper developed by ICLEI for the European Commission (2008) concluded, basing on the UBA 2000 study above mentioned, on the IFEU 2006³⁵, and on and on the last

³⁵ IFEU 2006, "Ökologischer Vergleich von Büropapieren in Abhängigkeit vom Faserrohstoff"

BREF document (2001) : “production processes for paper based (totally or mainly) on post-consumer recovered paper fibres (recycled paper) use much less energy and water than those for paper based (totally or mainly) on virgin fibre”...“however the production process of paper based (totally or mainly) on virgin fibre is still characterised [...] in many cases by a lower fossil CO₂ emission.”

“Both types of paper need to be purchased, as the amount of recycled paper cannot cover the total paper demand in Europe, and as there would be not recycled paper without having paper made from virgin fibres [...] The key issue is recyclability, not the recycled origin of fibres”.

4.8 CARBON FOOTPRINT FOR THE PAPER MANUFACTURE

The possibility to add, as additional information, the indication of the CO₂ emissions per functional unit (the so-called carbon footprint³⁶), is recommended in order to make the consumer informed and to stimulate green procurements.

It has to be specified that this hypothetical information will be, by now, not a mandatory requirement. The reasons that can force the inclusion of such a criterion can be summarized in the following considerations.

The demand for factual-based and quality-assured environmental information has increased during recent years. This is especially important in the currently heated debate about climate change, where a number of reports have been issued recently conveying quite different messages about the magnitude of our emissions of green-house gases and their future consequences for mankind. Managing to reduce emissions of CO₂ has become a highly prioritised and strategic issue for many organisations wanting to be regarded as front-runners in combating climate change. This trend has lead to the introduction of a large number of ideas for new attempts of methods for reducing and compensation for CO₂ emissions, i.e. climate labelling of food and of “climate-neutral” products and services.

The EU Ecolabel has developed a pilot toolkit functional to the inclusion of the carbon footprint issue during the criteria development and revision processes³⁷.

The ways in which to apply the tool and the hypotheses adopted should be discussed during the next steps and shared by the member countries and the different stakeholders.

Anyhow we should consider that the existing criterion on CO₂ refers to production of paper and pulp (be it internally or externally produced), including emissions of purchased power. Thus, the major sources of CO₂ emissions should be covered.

³⁶ In this context, carbon footprint is the overall amount of carbon dioxide (CO₂) and other greenhouse gas (GHG) emissions (e.g. methane, laughing gas, etc.) associated with a product, along its supply-chain and sometimes including the use phase and the end-of-life recovery and disposal. In other words, hence, a carbon footprint is a life cycle assessment with the analysis limited to emissions that have an effect on climate change.

³⁷ For more information please, visit the web site www.msrl.se

5 Comments and proposals on existing criteria overview coming from the stakeholders

The following modification proposals of the current criteria for the copying and graphic paper product group are the feedbacks coming from the preliminary questionnaires collected among the stakeholders between February 20th and March 21st 2008³⁸ and from the comments received after the 1st AHWG meeting of held in Rome in September 9th.

It has to be pointed out that no modification or censorship has been applied to the suggestions described below, in order to maintain a neutral position against all the stakeholders and to give everybody the possibility to evaluate the general orientation on the various critical points.

Reporting these comments doesn't mean, at this stage, that ISPRA specifically supports any of the following suggestions.

Definition of the product group (Commission decision, Article 2)

The **product group is defined** as follows:

“Sheets or reels of unprinted paper which are used for printing or copying or writing or drawing. Newspaper, thermally sensitive paper and carbonless paper are not included in the product group”.

Some comments suggested widening these criteria to newsprint and to all paper grades.

As for newsprint, It would have seemed more appropriate to include it in the scope of “printed paper products criteria” (at the moment in interservice consultation) but since this possibility has lately been removed, paper used to produce newsprint at the moment could not be awarded.

The extension to the **monoglazed** paper grade has also been requested, as well as a clarification on the possible inclusion of the **photographic paper** in the product group definition.

From the 1st AHWG meeting has emerged the necessity to better specify the “scope” of the product group. In particular it has to be clarified if certain kind of paper can access or not to the labelling, e.g.: speciality coated paper, paper used for sacks and bags, newsprint (not printed) paper, etc...

Some stakeholders (i.e.: UPM) propose a new definition for the product group, based on the manufacturing process used to produce the paper, and not on the final use of the product itself, as it currently happens.

³⁸ Comments to Questionnaires, 2008

They suggest a wider scope, e.g. "Graphic paper including all end-uses", for example: fine paper for various printing, packaging and office applications like copying and Magazine & Newsprint Paper with its various transition grades used for printing and other end uses for graphic paper.

Furthermore many stakeholders don't agree on a possible inclusion of a limit on the grammage, as defined in the European GPP on copying and graphic paper.

Criterion 1. – Emission to air and water

The criterion can be divided into three sections concerning the parameters that have to be managed for the paper and pulp production. The producers have to assess their emissions expressed in term of points (P_i) by a specific calculation method and they have to refer to a specific table containing the reference values for the emissions.

Section (a): COD, S, NO_x

For each of these parameters, the emissions to air and water from the pulp and the paper production are expressed in terms of points (P_{COD} , P_S , P_{NO_x}) as detailed in the section.

Some comments highlight that the current calculation method is quite complicated and they ask for a **simplified method**.

Some paper producers have highlighted a problem about the NO_x and S calculation. In the assessment and verification of the criterion in fact they pointed out that *"the calculation of the points for COD, S and NO_x [...] shall include all emissions of S and NO_x which occur during the production of pulp and paper, including steam generated outside the production site, **except those emissions related to the production of electricity**".*

The manufacturers, however, are rarely able to distinguish the emission values for S and NO_x when they apply the cogeneration system. The result could be an overestimation of the values that often can exclude them from the range of acceptable values for the Ecolabel accreditation.

In these cases, the opportunity of using a calculation formula that provides a simplified allocation for the split of the contribution due to the generation of steam and to the production of electricity should be given to the applicant.

A possible approach to this issue could be the one proposed in the Final Draft Criteria for the Tissue Paper, now in interservice consultation, but this technical aspect will be discussed further, during the second part of the revision project (WP2) .

A proposal made by some producers is to exclude the mills that use Natural gas as fuel from the calculation of the **sulphur (S)** load point: P_S score. The combustion of Methane, in fact, does not produce any sulphur emission. In such a case, they suggested, the value of P_S could be set to zero.

Although this reasoning is true for the paper mill using methane, nevertheless it has to be considered that a contribution to sulphur can always occur from the production of the purchased pulps. Therefore the figure P_s can't be automatically set to zero.

For some stakeholders it seems necessary to include also the **phosphorus (P)** to the list of the current parameters for the water emissions, with different values for **P total** and **P inorganic** (phosphorus comes both from the production process and the water biologic treatment).

From comments received during and after the 1st AHGW meeting it emerged that some matters should be considered about P:

- a. P can be measured in several ways which should be noted so that additional measurements from the applicant aren't required just due to criteria. Most commonly used are Total P, inorganic P and PO_4 .
- b. P can originate from different sources: it depends on the used wood and/or it can be added to mill's biological waste water treatment plant as nutrient to keep biological sludge active.

If a limit for P will be added, the possibility that mills having biological treatment plants must diminish their dosage too much, leading to weaker purification of waste water in general, has to be considered. It has to be noted that P is an expensive nutrient and mills try to optimise the dosage anyhow. In general, P discharged by the paper industry is minimal compared to discharge by communal waste water treatment plants or agricultural activities.

Some stakeholders affirm that producers have no control on this parameter, because it is often strictly dependent on the wood species (e.g. *Eucalyptus spp.* have an high natural concentration of P). The problems with phosphorus are confined to the pulp production, because it is not intentionally added to the following paper production process. So, in their opinion this criterion would add a complication without any added value.

Anyway the Consumers and Environmental associations would agree with the introduction of this new parameter.

Section (b): AOX

The AOX current limit is **0,25 Kg/ADT** for each pulp.

The applicant provides test reports using the following test method: AOX ISO 9562.

A revision and update of the reference norms for the assessment and verification is required: **more general test methods** to facilitate the applicant.

Considering that someone suggests to set **lower limits** for AOX emissions and in order to narrow the gap with the other Ecolabel paper products criteria, for the AOX limits the same values chosen for the Tissue Paper (currently on interservice consultation) could be considered:

“The weighted average value of AOX released from the productions of the pulps used in the eco-labelled tissue product must not exceed 0.12 kg/ADT paper. AOX emissions from each individual pulp used in the paper must not exceed 0.25 kg/ADT pulp”.

Many participants to the 1st AHWG expressed concern with the proposal of a setting lower limits on AOX and with the introduction of a limit for the paper, as currently happens in the tissue paper criteria proposal.

They highlighted that the latest scientific literature shows that there's no environmental difference between modern ECF (Elementally chlorine free) and TCF (Totally chlorine free) bleached chemical pulps when biological waste water systems are used and that no environmental impacts are found when pulp's AOX is less than 0.5 kg/ADt.

TCF bleaching doesn't cause AOX emissions, but uses more energy and wood for tonne of pulp than ECF.

AOX per tonne of final paper would be only relevant for wood free papers as quality requirement sets the use of chemical pulp only. It was already shown (Figure 2.12) that the availability of suitable recovered fibre is very limited for wood free papers. All other grades have only a certain amount of chemical pulp and their AOX value would therefore be far below 0.12 kg/ADt. By taking the proposed 0.12 kg/ADt paper limit from Tissue papers into use would mean that 100 % BAT based chemical pulp won't be good enough as a raw material for wood free graphic paper grades.

Criteria supporting only TCF bleached pulps would be against Life Cycle approach as it would impact negatively to wood use and energy efficiency.

Section (c): CO₂

The current values for CO₂ emissions are:

- **1000 Kg/t** for integrated paper mills
- **1100 Kg/t** for not integrated paper mills.

In order to better comply with the emission values for the printed-paper, it was suggested to lower the gap between the emission levels for copying and graphic paper and printed-paper products.

The final draft criteria for printed-paper³⁹ establishes the following hurdles for CO₂ emissions: 1150 kg/t for integrated and 1250 kg for not integrated paper mills.

Someone suggest even to make lower the current CO₂ hurdles, because they are easy to reach.

³⁹ The final draft Ecoalbel criteria for printed-paper is dated October 2005. The suitability of these criteria are currently being discussed within the Commission services.

Table 5.1 - Review table for criterion 1

Criterion	Theme	Existing requirements	New requirements proposal	Motivation
Emission to air and water	COD, S, NO _x	$P_{\text{COD}} < 1,5$ $P_{\text{S}} < 1,5$ $P_{\text{NOX}} < 1,5$ $P_{\text{TOT}} < 3$	To simplify the calculation method	To facilitate the applicant
			To put at 0 the Ps parameter value if the plant uses natural gas as fuel.	To avoid the providing of a useless data.
			To include the parameter phosphorus (P)	To supervise water pollution
	AOX	0,25 kg/ADT for each pulp	More general test methods; 0,12 kg/ADT?	To facilitate the applicant
	CO ₂	1000 kg/t for integrated paper mills and 1100 kg/t for not integrated paper mills	To reduce the gap of values between this group and printed paper	Compliance with the limits for printed paper
			To lower the hurdles	Current limits are easy to reach

Criterion 2. – Energy use

The current criterion can be divided in two sections concerning the electricity and the fuel consumption related to the pulp and paper production.

The producers have to assess their energy use **expressed in term of points (P)** by a specific calculation method and they have to refer to the table with a list of reference values.

Section (a): Electricity

Some comments highlight that the current calculation method is quite complicated and ask for a **simplified method**.

The limits seem already rather strict and, therefore, no changes seem necessary.

Section (b): Fuel

As for the electricity, no changes in the fuel consumption limits seem necessary.

The calculation method is quite complicated. A **simplification** has to be considered.

It was suggested to lower the hurdles for both the electricity and fuel use, because the current limits are too easy to reach.

Table 5.2 - Review table for criterion 2

Criterion	Theme	Existing requirements	New requirements proposal	Motivation
Energy use	Electricity	Pe < 1,5	To simplify the calculation method	To facilitate the applicant
			To lower the hurdles	Current limits are too easy to reach
	Fuel (heat)	Pf < 1,5	To simplify the calculation method	To facilitate the applicant
			To lower the hurdles	Current limits are too easy to reach

All the participants agreed in keeping the criterion as it is now. Only a formula simplification could be considered.

Criterion 3. – Fibres - Certified Forest Management

In the current criteria, *at least 10 % of virgin wood fibres from forests shall come from forests that are certified as being managed so as to implement the principles and measures aimed at ensuring sustainable forest management.*

For those virgin wood fibers from forests that are not certified as being from sustainably managed forests, the applicant shall provide the appropriate declarations, charter, code of conduct or statement, verifying that the above requirements are met.

Due to some comments, the percentage of the certified wood could be increased to 30-50%, but some stakeholders think that this increase sounds like a big jump from current 10% and that 25 % could be more acceptable like in current Nordic Swan criteria.

It was also suggested that the figures could be based on a certified “chain of custody” for a better traceability chain of the wood.

About the uncertified wood, it seems necessary to make a clarification about the current declaration requested and also to prohibit the use of wood from controversial sources (as done for the “wooden

furniture”). The system of “chain of custody” could also act as a proof that requirements for non-certified wood are met.

Table 5.3 - Review table for criterion 3

Criterion	Theme	Existing requirements	New requirements proposal	Motivation
Fibres- Forest Certified Management	Wood fibres from certified forests	10% of virgin wood from certified forest	To rise the hurdle to: 30-50%	To widen the percentage of raw materials certified
	Fibres from uncertified forest	A declaration is requested	More clarifications about the declaration to be provided and to introduce a certified system to manage the requirements for uncertified wood	To standardize the requirements

The following hot spots have to be considered for the technical revision that will be developed during the Work Package 2:

- The criterion on certified fibres should not be separated from the one on recovered fibres.

Some proposals are for the setting of a minimum amount of recycled fibres “AND” certified fibres for the remaining percentage of materials used.

Other asked to leave to producers the possibility to either choose to use certified fibres “OR” recycled fibres.

- In order to have recycled fibres available, there must be also a production of paper from virgin fibres since fibres cannot be recycled indefinitely.

Some stakeholders underlined that Ecolabel should promote balanced use of fibres, not to discriminate use of renewable and recyclable fresh fibre. Setting recycled content targets for all paper grades would mean that less recovered paper is available for newsprint papers which would only lead to more competition in the already narrow recovered paper market and would not have any environmental benefit.

In some cases, the effect would be negative for the environment as more bleaching and flotation would be needed for higher paper qualities (see LCA comparison; chapter 4.7).

On the other hand it should be also considered that:

- Copying paper is one of the fastest growing products in paper use and waste of copying paper in offices is huge (40% of office paper end in the bin at the end of the day: research Xerox: The Guardian, 14/10/2007. “Britain’s trillion page mountain stacks up”. – “Behavioural research for the printer manufacturer Xerox found office workers throw away 45 % of everything they print within a day”, equivalent to more than a trillion pages every year.) ;
- Additionally the potential for recycled fibres is still huge in Europe with a strong increase of the amount of recovered paper on the European market;
- Recent news on collapsing recycling markets (because of less demand from abroad) are another strong argument that should push the European recycling market and to achieve further promotion of recycled fibres through the Ecolabel.

Regarding certification schemes it has to be noted that in the last years the major improvement has occurred in the amount of certified “Chain of Custody” systems more than in the “Forestry Certification” ones. A Chain of Custody system verifies the amount of certified fibre and ensures the legality of the remaining non-certified fibres.

On the basis of these considerations it seems to be necessary to find a solution requiring a minimal percentage of fibers that can be “certified” or “recycled”, remaining the oblige for the 100% chain of custody certification for the virgin fibres.

Criterion 4. – Hazardous chemical substances

The criterion states that:

The applicant shall supply a list of the chemical products used in the pulp and paper production, together with appropriate documentation (such as MSDSs). This list shall include the quantity, function and suppliers of all process chemicals used.

The criterion has nine sections:

Section (a) Chlorine

The chlorine gas used as bleaching agent is banned.

Section (b) APEOs

APEOs can’t be added to cleaning chemicals, de-inking chemicals, foam inhibitors, dispersants or coatings.

Section (c) Residual monomers

The quantity of residual monomers can’t exceed 100 ppm; for acrylamide the maximum value is 1000 ppm.

Section (d) Surfactants in de-inking formulations for return fibres

100g/ADT is the hurdle for biodegradable surfactants.

Section (e) Biocides

The use of biocides with bio-accumulative components is prohibited.

Section (f) Azo-dyes

Azo-dyes cannot be used. For the specific list of aromatic amines see the Commission Decision 2002/741/CE.

Section (g) Dye stuffs

Commercial dye formulation with specific risk phrases don't have to be used (please see the Commission Decision 2002/741/CE).

Section (h) Metal complex dye stuffs or pigments

Dyes or pigments (that are based on lead, copper, chromium, nickel or aluminium) can't be used.

Section (i) Ionic impurities in dye stuffs

For the specific limits please see the Commission Decision 2002/741/CE.

It was suggested to specify what is meant for “**process chemicals**”, in order to make clear which chemicals substances have to be included in the list (i.e.: all cleaning agents?).

A revision of the *assessment and verification* is required. In particular, it is suggested to **delete the request of declarations of compliance** with the requirements.

Also the necessity to revise all the requirements on chemicals to comply with the more recent normative (e.g: REACh, etc...) has emerged.

During the 1st AHWG it has been demanded that only totally chlorine free (TCF) paper can be awarded with the EU Ecolabel and the introduction of an additional requirement for EDTA and for optical brightener limitation. But others remarked that even if TCF bleaching doesn't cause AOX emissions it nevertheless uses more energy and wood for tonne of pulp than ECF

Some stakeholders also required the restriction to the use of chemicals that may fulfil the criteria for Substances of Very High Concern in REACH (CMR, PBT, vPvB, endocrine disruptors).

Criterion 5. – Waste management

The criterion states that:

“The waste management system shall be documented or explained in the application and include information on at least the following points:

- *procedures for separating and using recyclable materials from the waste stream,*

- procedures for recovering materials for other uses, such as incineration for raising process steam or heating, or agricultural use,
- procedures for handling hazardous waste (as defined by the relevant regulatory authorities of the pulp and paper production sites in question).

It was suggested to facilitate the applicant **providing ISO 14001 or EMAS** certification instead of the current declaration of compliance with the criterion.

In order to simplify the Ecolabel system it was also suggested to delete this criterion because not so relevant.

Table 5.4 - Review table for criterion 5.

Criterion	Theme	Existing requirements	New requirements proposal	Motivation
Waste management	Waste management	To provide a declaration with the description of the waste management	To provide any declaration	To facilitate the applicant
			In place of current declaration, to provide ISO 14001 /EMAS certification as proof of compliance with the criterion	To facilitate the applicant and the assessors
			Make references to DIN EN 12281: 2003 for use in copying machines, DIN 6738: 1999 for archiving	More information to consumer

Criterion 6. – Fitness for use

The criterion states that the product shall be fit for use and “*the applicant shall provide appropriate documentation and/or test results*”

It was suggested to modify this criterion because it has **no specific relevance for the paper products**.

However, from other comments it doesn't seem necessary to modify the criterion, because of its relevance.

BEUC wants to keep the criterion and suggests to use DIN standards as the Blue Angel (DIN EN 12281: 2003 for use in copying machines, DIN 6738: 1999 for archiving).

Criterion 7. – Information on the packaging

The criterion states that the following text must appear on the Ecolabel product:

- *This product qualifies for the Flower because it meets requirements that, amongst others, limit emissions to water (COD, AO_x), to air (S, NO_x, CO₂), and limits the use of energy, fossil fuels and hazardous substances."*
- *"For more information on the Flower, please visit the web-site: <http://europa.eu.int/ecolabel>"*
- *"Please collect used paper for recycling".*
- *In addition, the manufacturer may also provide a statement indicating the minimum percentage of recycled fibres.*

Some comments received are in favour of a simplification of the communication message on the product packaging: they suggest to put just the Ecolabel logo and license number on the packaging without the current additional text.

Anyway the logo and the general rules for its creation are defined by the Ecolabel Regulation 1980/2000 – Annex 3 and they can't be changed just in single product groups Criteria.

The requirement to put on the packaging the % of virgin or recycled fibers, if a mandatory criterion on this issue were included in the revised criteria, was made, together with the proposal to add an information on the country of origin for fibres in the criterion.

Table 5.5 - Review table for criterion 7

Criterion	Theme	Existing requirements	New requirements proposal	Motivation
Information on the packaging	Information on the packaging	To put the logo, license number and Ecolabel phrases on the packaging	To put jut Logo and license number without additional text on packaging	Not to confuse the consumers
			To add the % of recycled fibers	More information to consumers
			To add the origin of recycled fibers	information to consumers

Criterion 8. – Information appearing on the eco-label

The criterion establishes that:

Box 2 of the eco-label shall contain the following text:

- "low air and water pollution
- low energy use
- harmful substances restricted".

As for the criterion 7, a simplification of the communication on the packaging is advocated, because, as suggested by some stakeholders, the consumers could be confused by too many written information.

5.1 NEW CRITERIA PROPOSAL

The new criteria proposal concerns the inclusion of **Phosphorus (P)** as further parameter to measure emissions to water, with the consequent modification of the scoring point system used for the Criterion 1.

A new criterion could be introduced concerning the **use of nano-particles in the paper production**. New requirements about the raw materials are also suggested: in particular, the possible inclusion of **GMO trees as raw material**.

The discussion on the GMO wood use is currently under evaluation by the Interservice Commission Service: a decision about this issue will be defined after the Commission resolution.

About nanoparticles normally the graphic paper producers don't add directly substances in this form. More often they use pigment that have been modified using nanoparticles. For instance: natural pigments are covered or modified by the use of nanoparticles, so what arrives in paper mills is not the single nanoparticle, but an article that could have been modified by nanoparticles. This topic has however to be more deeply investigated.

Also the inclusion of a mandatory hurdle limit on the minimum presence of **recycled fiber** in the copying and graphic paper could be considered. As reported in chapter 2 (Figure 2.12) the recovered paper use in the "copying and graphic paper" medium European manufacture is on the 10%. The other environmental ecological labels for the same product group already impose some limits, as already explained in the chapter 4.6.

A similar approach should be undertaken by the Ecolabel Criteria, which currently do not consider this issue.

6 Appendix

6.1 CONTACTS

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