

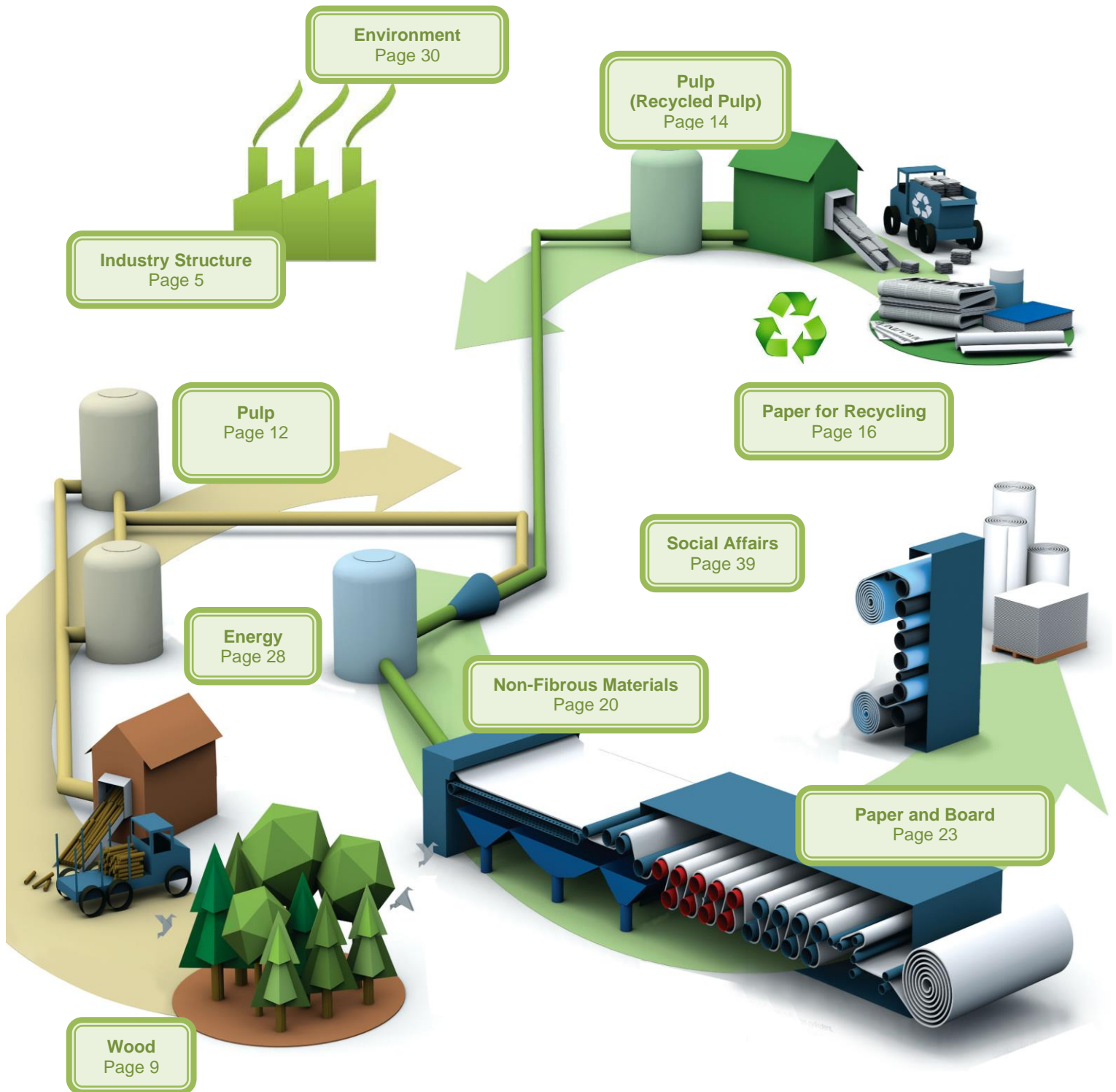
# Pulp and Paper Industry

## *Definitions and Concepts*



January 2025

# The Pulp and Paper Making Process



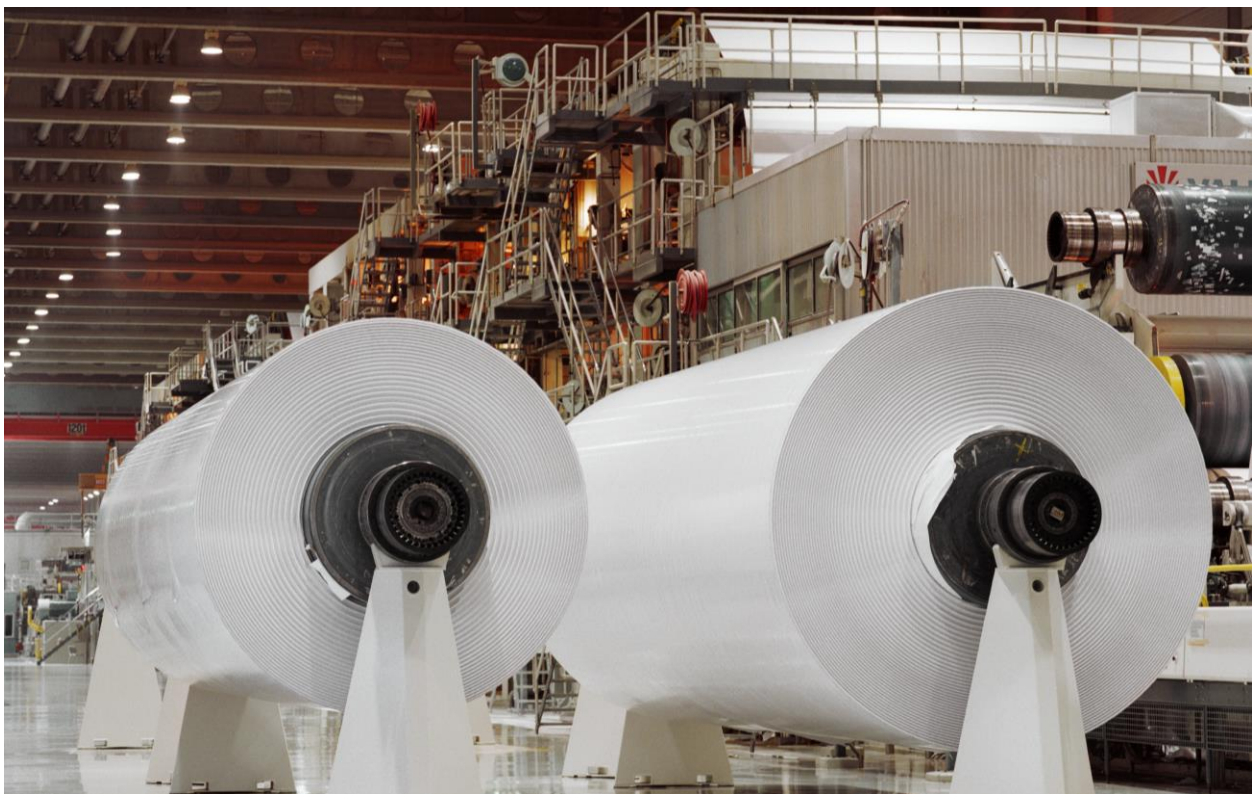
## Introduction

This document provides definitions and descriptions of terms and categories used in the European Paper Industry.

It is intended to be used by both providers and users of European paper industry statistics and aims to provide a clear indication of the meaning of all expressions used in Cepi statistical reports.

The document is divided into nine sections covering all aspects of the industry from its structure through the raw materials used and grades of paper produced and also covering terms used for environmental, energy and social statistics.

In general, the terms and expressions covered are those used in Cepi statistical reports, in particular the Cepi Annual Statistics and Key Statistics.



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## Table of Content

<b>1 Industry Structure</b>	<b>5</b>	<b>7 Paper and Board</b>	<b>23</b>
1.1 Country Details	5	7.1 General Definitions on Paper and Board	23
1.2 Companies and Mills	5	7.2 Paper and Board Grades	23
1.3 Capacities	6	7.2.1 Graphic Papers	24
1.4 Financial Data	7	7.2.2 Packaging Paper and Board	25
<b>2 Raw Materials</b>	<b>8</b>	7.2.3 Tissue Paper	25
<b>3 Wood</b>	<b>9</b>	7.2.4 Other Paper and Board	26
3.1 General Definitions on Wood	9	7.2.5 Speciality Paper and Board	26
3.2 Wood Species	10	7.3 Paper and Board Flows	27
3.3 Wood Assortments	10	7.4 Alignment with CN Codes and Cepi Harmonised Codes	29
3.4 Wood Flows	11	<b>8 Energy and Environment</b>	<b>30</b>
3.5 Alignment with CN codes and Cepi Harmonised codes	11	8.1 Energy	30
<b>4 Pulp</b>	<b>12</b>	8.1.1 Primary Energy	30
4.1 General Definitions on Pulp	12	8.1.2 Electricity	31
4.2 Pulp Grades	12	8.1.3 Heat	31
4.2.1 Wood Pulp	12	8.2 Water	32
4.2.2 Non-Wood Pulp and Other Pulps	14	8.2.1 Water Intake	32
4.2.3 Recycled Pulp	14	8.2.2 Water in Manufacturing	32
4.3 Pulp Flows	14	8.2.3 Wastewater Outflow	33
4.4 Alignment with CN Codes and Cepi Harmonised Codes	15	8.2.4 Water Consumption	33
<b>5 Paper for Recycling</b>	<b>16</b>	8.2.5 Wastewater Treatment	33
5.1 General Definitions on Paper for Recycling and Recycling	16	8.3 Emissions	34
5.2 Paper for Recycling Classes	16	8.3.1 Air Emissions	34
5.3 Paper for Recycling Flows	16	8.3.2 Water Emissions	35
5.4 Paper for Recycling Rates	18	8.4 Residues and Sludges	36
5.5 Alignment with CN Codes and Cepi Harmonised Codes	18	8.5 Environmental Management System	36
5.6 Alignment with EN 643	18	8.6 Bioeconomy	37
5.7 Paper for Recycling Prices	18	8.6.1 General Definitions on Bioeconomy	37
<b>6 Non-Fibrous Materials</b>	<b>20</b>	8.6.2 Woody Biomass Usages	38
6.1 General Definitions on Non-Fibrous Materials	20	<b>9 Social Affairs</b>	<b>39</b>
6.2 Chemicals	20	9.1 Employment	39
6.2.1 Mineral Chemicals	20	9.2 Accidents	39
6.2.2 Non-Mineral Chemicals	22	9.3 Health and Safety	39
		<b>I List of Terms</b>	<b>40</b>
		<b>II References</b>	<b>44</b>
		<b>III Acronyms and Abbreviations</b>	<b>48</b>

## Chapter 1 – Industry Structure

### 1.1 Country Details

#### **Population**

The source used for population data in Cepi reports is Eurostat. Population on 1<sup>st</sup> January of the year reported.

#### **Gross Domestic Product - GDP**

A measure of economic activity, namely the value of an economy's total output of goods and services, less intermediate consumption, plus net taxes on products and imports, in a specified period. GDP can be broken down by output, expenditure or income components. The main expenditure aggregates that make up GDP are household final consumption, government final consumption, gross fixed capital formation, changes in inventories, and imports and exports of goods and services (including intra-eu trade). GDP at market prices is the sum of the gross values added of all resident producers at market prices, plus taxes less subsidies on imports.

#### **Industrial Production**

As specified in the Regulation on short-term statistics (STS-R), and in line with traditional practice in business statistics, the production index should show the evolution of value added at factor cost, at constant prices. Value added at factor cost can be calculated from turnover (excluding VAT), plus capitalised production, plus other operating income, plus or minus the changes in stocks, minus the purchases of goods and services, minus other taxes on products and taxes linked to production.

#### **Private Final Consumption Expenditure**

Final consumption expenditure consists of expenditure incurred by resident institutional units on goods or services that are used for the direct satisfaction of individual needs or wants or the collective needs of members of the community. The final consumption expenditure may take place on the domestic territory or abroad (ESA 1995, 3.75). Private final consumption expenditure includes households' and Non Profit Institutions Serving Households (NPISH's) final consumption expenditure. Data are calculated as chain-linked volumes (i.e. data at previous year's prices, linked over the years via appropriate growth rates). Growth rates with respect to the previous quarter (Q/Q-1) are calculated from calendar and seasonally adjusted figures while growth rates with respect to the same quarter of the previous year (Q/Q-4) are calculated from raw data.

#### **Retail Trade Turnover**

The Retail Trade Index is a business cycle indicator which shows the monthly activity of the retail sector in value and volume. It is a short-term indicator for final domestic demand. It should be noted that the volume of sales is different from the volume of (retail) trade services. The latter takes account of changes in the quality of the trade service supplied. As such the volume of sales is conceptually different from the index of production which takes account of quality changes. Data are compiled according to the Statistical classification of economic activities in the European Community, (NACE Rev.2, Eurostat). Turnover for retail trade are compiled as a "fixed base year Laspeyres type volume-index". The current base year is 2005 (Index 2005=100). The index is presented in calendar and seasonally adjusted form. Growth rates with respect to the previous month (M/M-1) are calculated from calendar and seasonally adjusted figures while growth rates with respect to the same month of the previous year (M/M-12) are calculated from calendar adjusted figures.

### 1.2 Companies and Mills

#### **Group or Corporation**

Association of companies located in one or several EU countries and bound together by legal and/or financial links. A group of companies can have more than one decision-making centre, especially for policy on production, sales and profit. It may centralise certain aspects of financial management and taxation. It constitutes an economic entity which is empowered to make choices, particularly concerning the units which it comprises.

**Company**

Combination of pulp, paper or board mills that carry out one or more producing activities at one or more locations within the same country, and formed in accordance with the law of the country. Company means a separate legal unit (limited, GmbH, S.A., AB, A/S, etc.) even if it is part of a bigger group, holding, etc. In some cases, companies carry out raw material supply and converting activities. The figure for the number of pulp and papermaking companies in all Cepi countries is an aggregate of all the companies from each individual country. The companies with operations in more than one country are considered as groups or corporations (see above definition).

**Mill**

The building or buildings and area where the pulp and papermaking operations are carried out. Sometimes called a plant when referring to one area of the whole operation. It can also refer to rotating steel rolls used in mixing materials.

**Paper Mill**

A paper mill is a factory or plant location where various pulps in slurry form are mechanically treated, mixed with the proper dyes, additives, and chemicals, and converted into a sheet of paper by the processes of drainage, formation, and drying on a paper machine. Some paper mills also finish the paper in various ways.

**Integrated Paper Mill**

A pulp and paper mill manufacturing complex in which all pulp and papermaking operations are conducted at one site. Sometimes converting operations, such as bag and tissue manufacturing, are also included. Integrated production means that pulp and paper is produced in the same plant. The pulp is not dried before paper manufacture. Integrated mills can however also use some dried pulp acquired elsewhere.

When two or more companies (legal units not belonging to the same group/corporation) work at the same location, this is not considered as an integrated mill.

See also definition of Integrated Pulp on page 14.

**Pulp Mill**

Mill which processes pulpwood, wood chips or other such cellulosic material into pulp by using mechanical, cooking, screening and bleaching methods.

**Non-Integrated Pulp and Paper Mills**

Non-integrated pulp mills (market pulp) are only manufacturing pulp that is then sold on the open market. Non-integrated paper mills are using purchased pulp for their paper production.

**Paper Machine**

The primary machine in a paper mill on which slurries containing fibres and other constituents are formed into a sheet by the drainage of water, pressing, drying, winding into rolls, and sometimes coating. Sections of the paper making, which are at the same mill but operation offline (e.g. coaters or cutters), are counted as parts of the actual paper machine.

**1.3 Capacities**

**Production Capacity**

Practical maximum capacity is the tonnage of paper, paperboard or pulp of normal commercial quality that could be produced per year with full use of equipment and adequate supplies of raw materials and labour, and assuming full demand. No allowance is made for losses due to unscheduled shut downs, strikes, temporary lack of power, etc., which cause decreases in actual production, but not in production capacity.

Capacity of paper machines that produce more than one grade is apportioned in accordance with actual production patterns or plans for future operation.

Capacity is reported in metric tons of net finished paper and paperboard, and air-dry (10 percent moisture content) pulp.

### **Changes in Capacity**

Changes in capacity should be included only for the portion of the year which they are actually effective.

(a) Additions to capacity: for new mills and machines, data should reflect the fact that full capacity is only reached after a certain period of operation. For the first 12 months of operation, assume 70 percent of capacity, the next 12 months 90 percent and 100 percent thereafter.

(b) Reductions in capacity: capacity of machinery which has been closed down mainly for economic reasons, with no intention of resuming production, should be excluded.

Note: for specific subsectors such as graphic or packaging paper and board, some specific rules can be applied to calculate the production capacities. More information can be obtained directly from the industry sectors organisations.

### **Average Size of Mills (Pulp or Paper)**

Total capacity divided by the total number of mills.

### **Operating Rate (%) (Capacity Utilisation Rate)**

The amount of pulp or paper produced annually compared to the amount of capacity available to produce pulp or paper.

## **1.4 Financial Data**

### **Turnover**

Turnover comprises the totals invoiced by the observation unit during the reference period, and this corresponds to market sales of goods or services supplied to third parties. Turnover includes all duties and taxes on the goods or services invoiced by the unit with the exception of the VAT invoiced by the unit vis-à-vis its customer and other similar deductible taxes directly linked to turnover. It also includes all other charges (transport, packaging, etc.) passed on to the customer, even if these charges are listed separately in the invoice. Reduction in prices, rebates and discounts as well as the value of returned packing must be deducted. Income classified as other operating income, financial income and extra-ordinary income in company accounts is excluded from turnover. Operating subsidies received from public authorities or the institutions of the European Union are also excluded.

### **Investments**

Investments made during the reference period in all tangible goods. Included are new and existing tangible capital goods, whether bought from third parties or produced for own use (i.e. Capitalised production of tangible capital goods), having a useful life of more than one year including non-produced tangible goods such as land. The threshold for the useful life of a good that can be capitalised may be increased according to company accounting practices where these practices require a greater expected useful life than the 1 year threshold indicated above. All investments are valued prior to (i.e. gross of) value adjustments, and before the deduction of income from disposals. Purchased goods are valued at purchase price, i.e. transport and installation charges, fees, taxes and other costs of ownership transfer are included. Own produced tangible goods are valued at production cost. Goods acquired through restructuration (such as mergers, take-overs, break-ups, split-off) are excluded. Purchases of small tools which are not capitalised are included under current expenditure. Also included are all additions, alterations, improvements and renovations which prolong the service life or increase the productive capacity of capital goods.

### **Added Value**

Added value at factor cost is the gross income from operating activities after adjusting for operating subsidies and indirect taxes. It can be calculated from turnover, plus capitalised production, plus other operating income, plus or minus the changes in stocks, minus the purchases of goods and services, minus other taxes on products which are linked to turnover but not deductible, minus the duties and taxes linked to production. Alternatively, it can be calculated from gross operating surplus by adding personnel costs. Income and expenditure classified as financial or extra-ordinary in company accounts is excluded from value added. Value added at factor costs is calculated "gross" as value adjustments (such as depreciation) are not subtracted.

## Chapter 2 – Raw Materials

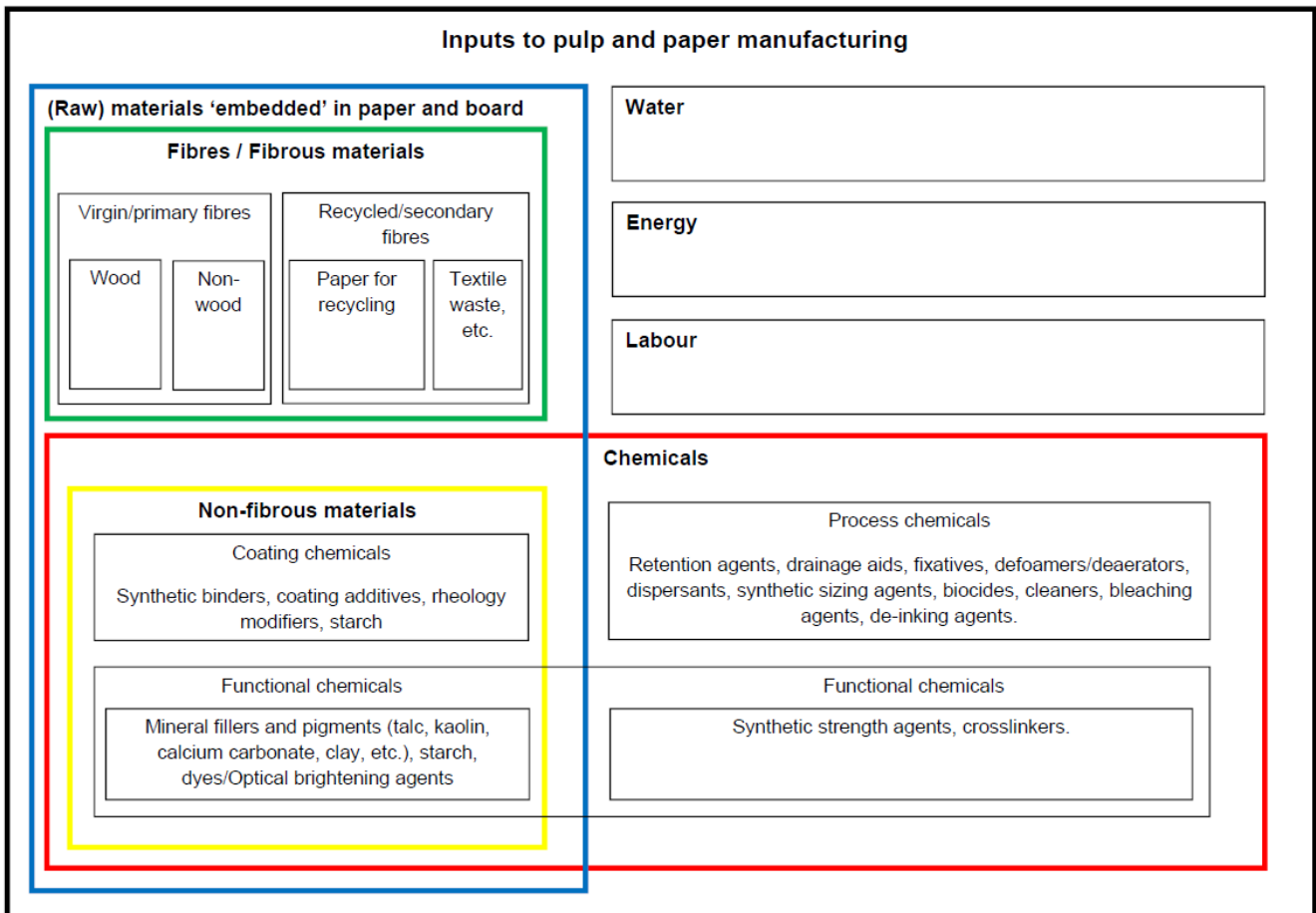
### Raw Materials

Input to pulp and paper manufacturing include (raw) materials and chemicals as well as water, energy and labour.

The basic (raw) materials to produce pulp and paper can be split into two parts: fibres - or fibrous materials - and non-fibrous materials. In the case of non-integrated paper and board mills, i.e. mills not producing their pulp, pulp can be considered as a raw material too.

### Fibres – or Lignocellulosic Fibrous Materials

Derived from wood, non-wood fibre sources such as fibre crops (straw, bamboo, bagasse, etc.) or alternatively paper for recycling, through a recycling process. Today, wood and paper for recycling are the main fibre sources used in Europe.



**Black box:** Total input to pulp and paper manufacturing.  
**Blue box:** (Raw) Materials 'embedded' in paper and board.  
**Red box:** Chemicals, embedded or not in the final product.

**Green box:** Fibres / Fibrous materials.  
**Yellow box:** Non-fibrous materials.



## Chapter 3 – Wood

### 3.1 General Definitions on Wood

#### **Forest**

Land within a contiguous area with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use.

- Forest is determined both by the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 meters in situ without measures to increase production. Areas under reforestation that have not yet reached but are expected to reach a canopy cover of 10 percent and a tree height of 5 m are included, as are temporarily unstocked areas, resulting from human intervention or natural causes, which are expected to regenerate.
- Includes areas with bamboo and palms provided that height and canopy cover criteria are met.
- Includes forest roads, firebreaks and other small open areas; forest in national parks, nature reserves and other protected areas such as those of specific scientific, historical, cultural or spiritual interest.
- Includes windbreaks, shelterbelts and corridors of trees with an area of more than 0.5 ha and width of more than 20 m.
- Includes plantations primarily used for forestry or protection purposes, such as rubber wood plantations and cork oak stands.
- Excludes tree stands in agricultural production systems, for example in fruit plantations and agroforestry systems. The term also excludes trees in urban parks and gardens.

#### **Forest Available for Wood Supply**

Forest where any legal, economic, or specific environmental restrictions do not have a significant impact on the supply of wood. Includes: areas where, although there are no such restrictions, harvesting is not taking place, for example areas included in long-term utilisation plans or intentions.

#### **Growing Stock**

The living tree component of the standing volume. Volume over bark of all living trees that have reached breast height. Includes the stem from ground level or stump height.

#### **Net Annual Increment**

Average annual volume over the given reference period of gross increment less that of natural losses on all trees to a minimum diameter of 0 cm (d.b.h.)

#### **Logging**

A method by which the growing stock (or part of it) of a stand is removed. Includes the procedure from fellings to long-distance transport. Annual fellings refers to the average annual standing volume of all trees, living or dead, that are felled during the given reference period.

#### **Forest Certification**

A system for verifying that a forest is being managed sustainably according to the requirements of a forest management standard.

In Europe there exist two certification schemes: FSC – the Forest Stewardship Council – and PEFC - the Programme for the Endorsement of Forest Certification.

#### **Wood**

All roundwood felled or otherwise harvested and removed. It comprises all wood obtained from removals, i.e. the quantities removed from forests and from trees outside the forest, including wood recovered from natural, felling and logging losses during the period, calendar year or forest year. It includes all wood removed with or without bark, including wood removed in its round form, or split, roughly squared or in other form (e.g. branches, roots, stumps and burls (where these are harvested) and wood that is roughly shaped or pointed. It is an aggregate comprising wood fuel (including wood for charcoal) and industrial roundwood (wood in the rough).

**Wood Industrial Residues**

The volume of roundwood that is left over after the production of forest products in the forest processing industry (i.e. forest processing residues) and that has not been reduced to chips or particles. It includes sawmill rejects, slabs, edgings and trimmings, veneer log cores, veneer rejects, sawdust (fine particles created when sawing wood), residues from carpentry and joinery production and agglomerated products such as logs, briquettes, pellets or similar forms. It excludes wood chips made either directly in the forest from roundwood or made from residues (i.e. already counted as pulpwood, round and split or wood chips and particles).

**Wood Logging Residues**

Residues that result from harvesting and extracting logs from the forest, and generally considered of no economic use for further processing. These are left in the forest after felling and are not salvaged.

**Solid under Bark** - The volume of wood excluding the bark.

**3.2 Wood Species**

**Hardwood - Non-Coniferous**

The wood from non-coniferous (broadleaved) trees (trees that do not have needles or cones). Include birch, eucalyptus, aspen, beech, hornbeam, ash, maple, acacia, quercus-cerris, oak, alder, poplar, willow, chestnut. The wood of these trees is composed of short fibres.

All woods derived from trees classified botanically as Angiospermae, e.g. Acer spp., Dipterocarpus spp., Entandrophragma spp., Eucalyptus spp., Fagus spp., Populus spp., Quercus spp., Shorea spp., Swietenia spp., Tectona spp., etc.

**Softwood - Coniferous**

The wood from coniferous trees. Include pine, spruce, Fir, Hemlock, Larch, Cedar. The wood of these trees is composed of long fibres.

All woods derived from trees classified botanically as Gymnospermae, e.g. Abies spp., Araucaria spp., Cedrus spp., Chamaecyparis spp., Cupressus spp., Larix spp., Picea spp., Pinus spp., Thuja spp., Tsuga spp., etc.

**3.3 Wood Assortments**

**Roundwood**

All roundwood felled or otherwise harvested and removed. It comprises all wood obtained from removals, i.e. the quantities removed from forests and from trees outside the forest, including wood recovered from natural, felling and logging losses during the period, calendar year or forest year. It includes all wood removed with or without bark, including wood removed in its round form, or split, roughly squared or in other form (e.g. branches, roots, stumps and burls (where these are harvested) and wood that is roughly shaped or pointed. It is an aggregate comprising wood fuel (including wood for charcoal) and industrial roundwood (wood in the rough). It is reported in cubic metres solid volume underbark (i.e. excluding bark)

**Pulpwood**

Roundwood that will be used for the production of pulp, particleboard or fibreboard. It includes: roundwood (with or without bark) that will be used for these purposes in its round form or as splitwood or wood chips made directly (i.e. in the forest) from roundwood.

**Sawlogs and Veneer Logs**

Roundwood that will be sawn (or chipped) lengthways for the manufacture of sawnwood or railway sleepers (ties) or used for the production of veneer (mainly by peeling or slicing). It includes roundwood (whether or not it is roughly squared) that will be used for these purposes; shingle bolts and stave bolts; match billets and other special types of roundwood (e.g. burls and roots, etc.) used for veneer production. It is reported in cubic metres solid volume underbark.

**Fuel Wood**

Roundwood that will be used as fuel for purposes such as cooking, heating or power production. It includes wood harvested from main stems, branches and other parts of trees (where these are harvested for fuel).

**Chips**

Particles of wood originating from logs and branches. Chipped woody biomass in the form of pieces with a defined particle size produced by mechanical treatment with sharp tools such as knives. Wood chips have a subrectangular shape with a typical length 5 to 50 mm and a low thickness compared to other dimensions.

**Sawdust**

Small particles of wood formed during slashing and chipping of pulpwood logs. It is screened from the chips and disposed of or burned in power furnaces. Some mills will also bring in this material from sawmills to use as a source of fuel for power furnaces. Also, it is sometimes cooked in specially designed digester vessels for use in certain paperboard furnishes. Sawdust is not included in Cepi wood consumption data.

**Pellets**

Agglomerates produced either directly by compression or by the addition of a binder in a proportion not exceeding 3% by weight. Such pellets are cylindrical, with a diameter not exceeding 25 mm and a length not exceeding 100 mm. Pellets are not included in Cepi wood consumption data.

**3.4 Wood Flows**

**Wood Consumption**

The wood used for pulp and paper manufacturing is mainly constituted of the following assortments: pulpwood (roundwood other than sawlogs, from silvicultural measures such as thinning or final felling), chips and residues from sawmills. The utilisation of sawlogs is very limited and sawdust volumes consumed are negligible. The relative shares of softwood and hardwood used depend on the country considered and the pulp and paper grades produced. The main softwood species used are pine and spruce. The main hardwood species used are birch, eucalyptus, beech and aspen. Oak is hardly used.

The wood consumption figures reported by the pulp and paper companies and included in the Cepi statistics are the volumes of wood (solid volumes under bark) at the mill gates and come from domestic supply or imports.

**3.5 Alignment with CN Codes and Cepi Harmonised Codes**

References:

- Cepi Harmonised Structure for Raw Material and Products*
- Cepi Harmonised List for Raw Material and Products*
- Alignment of Combined Nomenclature Products Headings with Cepi Grades*
- Combined Nomenclature Chapter 44*

**Alignment with CN Codes**

See Alignment of Combined Nomenclature Products Headings with Cepi Grades

**Alignment with Cepi Harmonised Codes**

- Softwood Pulpwood - 910 110 000
- Hardwood Pulpwood - 910 120 000
- Softwood Chips - 910 310 000
- Hardwood Chips - 910 320 000

## Chapter 4 – Pulp

### 4.1 General Definitions on Pulp

#### **Pulp**

Fibrous material in papermaking produced in a pulp mill, either mechanically or chemically from fibrous cellulose raw material (wood most common).

#### **Pulping**

The act of processing wood (or other plant) to obtain the primary raw material for making paper, usually cellulose fibre. Wood is the most widely used source of fibres for the paper making process. The fibres are separated from one another into a mass of individual fibres. The separation can be undertaken by a mechanical process, where the fibres are teased apart, or by chemical means, where the lignin binding the fibres together is dissolved away by cooking the woodchips in suitable chemicals. After separation, the fibres are washed and screened to remove any remaining fibre bundles.

#### **Stock Pulp**

Aqueous suspension of one or more paper-making pulps and other material, from the stage of disintegration of the pulp to the formation of the web or sheet of paper and board.

### 4.2 Pulp Grades

#### References:

*Cepi Harmonised Structure for Raw Material and Products*

*Cepi Harmonised List for Raw Material and Products*

#### 4.2.1 Wood Pulp

##### **Wood Pulp**

Fibrous material prepared from pulpwood, wood chips or residues by mechanical and/or chemical process for further manufacture into paper, paperboard, fibreboard or other cellulose products. It is an aggregate comprising mechanical wood pulp; semi-chemical wood pulp; chemical wood pulp; and dissolving wood pulp.

##### **Virgin Pulp / Primary Pulp**

Pulp consisting of unused fibres. It contains no secondary or recycled fibres.

##### **Mechanical Pulp**

Woodpulp, including reject pulp, obtained by grinding or milling into their relatively short fibres, coniferous or non-coniferous rounds, quarters, billets, etc., or through refining coniferous or non-coniferous chips. Called stone groundwood pulp and refiner groundwood pulp can include pre-treatment with chemical as in chemi-mechanical pulp. It can be bleached or unbleached. This pulp is used mainly in newsprint and wood-containing papers, like LWC (light-weight coated) and SC papers.

##### **Thermo-Mechanical Pulp (TMP)**

Pulp produced by a mechanical process in which wood chips are softened by pre-heating under pressure prior to a pressurized refining stage.

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.

##### **Chemi-Thermomechanical (CTMP)**

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. 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-thermomechanical pulps are grouped with mechanical pulp.



**Semi-Chemical Pulp**

Woodpulp, including reject pulp, obtained by subjecting coniferous or non-coniferous wood to a series of mechanical chemical treatments and cooking in a pressure vessel, none of which alone is sufficient to make the fibres separate readily, followed by mechanical treatment. The ratio of the weight of the pulp produced to the weight of wood used is often very high. It can be bleached or unbleached. This pulp is mainly used in the production of fluting medium for corrugated board.

**Chemical Pulp**

Wood pulp obtained by subjecting pulpwood, wood chips or residues to a series of chemical treatments. It includes sulphate (kraft) wood pulp; soda wood pulp and sulphite wood pulp. It may be bleached, semi-bleached or unbleached. It excludes dissolving grades of wood pulp.

**Bleaching**

Removal or modification, to a greater or lesser extent, of coloured components of pulp with a view to increasing its brightness.

**Unbleached Pulp**

Pulp that has not been subjected to any treatment which is intended primarily to increase its brightness.

**Sulphite Pulp**

Woodpulp, including rejects, obtained by mechanically reducing coniferous or non-coniferous wood to chips which are subsequently cooked in a pressure vessel in the presence of a bisulphite cooking liquor. Bisulphites such as ammonium, calcium magnesium and sodium, are commonly used. It can be unbleached or bleached. End-uses range from newsprint, printing and writing papers, tissue paper. Sulphite can be either bleached or unbleached.

Exclude: Dissolving grades having very high alpha cellulose content (usually 90 percent or more). These should be included in dissolving pulps.

**Unbleached Sulphite Pulp**

Sulphite pulp which has not been bleached.

**Bleached Sulphite Pulp**

Sulphite pulp which has been bleached or partly bleached.

**Sulphate (or kraft) Pulp**

Woodpulp, including rejects, obtained by mechanically reducing coniferous or non-coniferous wood to chips which are subsequently cooked in pressure vessel in presence of sodium hydroxide cooking liquor (soda pulp) or mixture of sodium hydroxide and sodium sulphide cooking liquor (sulphate pulp). It can 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.

Exclude: Dissolving grades having very high alpha cellulose content (usually 90 percent or more). These should be included in dissolving pulps.

In the strict technical sense, the term "kraft pulp" is more restrictive than "sulphate pulp", and, in some countries, this distinction is also maintained commercially. In many countries, however, the two terms are regarded as synonyms commercially, the term "kraft pulp" being preferred in order to avoid confusion with "sulphite pulp".

**Unbleached Sulphate Pulp**

Sulphate and soda pulp which has not been unbleached.

**Bleached Sulphate + Soda Pulp**

Sulphate and soda pulp which has been bleached or partly bleached.

#### 4.2.2 Non-Wood Pulp and Other Pulps

##### **Other Fibre Pulps**

- Straw: Pulp obtained from straw by any method. It may be bleached
- Bamboo: Pulp obtained from bamboo by any method. It may be bleached.
- Bagasse: Pulp obtained from residue from processing sugar cane by any method. It may be bleached.
- Others (reeds, esparto, rags, etc.): Includes pulp obtained by any method from such materials as esparto and other reeds and grass, cotton linters, flax, hemp, rags, other textile wastes. It may be bleached. Exclude: Dissolving grades.

##### **Dissolving Pulp (wood and other fibrous raw materials)**

Highly bleached chemical pulp (sulphate, soda or sulphite) from coniferous or non-coniferous wood, rags, cotton linters, etc., of special quality, with very high alpha cellulose content (usually 90 percent and over) readily adaptable for uses other than papermaking. They are used principally as a source of cellulose in the manufacture of products such as man-made fibres (textiles), cellulosic plastic materials, lacquers, explosives, etc. Dissolving pulp is not included in Cepi statistics reports.

##### **Fluff Pulp**

Pulp characterized by high water absorbency and bulk intended for absorbent and hygiene products. Fluff pulp is not included in Cepi statistics reports.

#### 4.2.3 Recycled Pulp

##### **Recycled Pulp**

Pulp manufactured from paper for recycling and used for the manufacture of paper, paperboard and fibreboard. It excludes pulp made from straw; bamboo; bagasse; esparto; other reeds or grasses; cotton fibres; flax; hemp; rags; and other textile wastes.

##### **Deinked Pulps**

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

##### **Deinking**

Removal of ink and/or toner from a printed product to a high extent by means of a deinking process. This shall restore as good as possible the optical properties of the unprinted product.

#### 4.3 Pulp Flows

##### **Integrated Pulp**

Integrated pulp is produced for use as raw material in the production of paper at the same mill, or for shipment by a producing mill to other mills, which it owns, controls or with which it is affiliated within the same country and therefore not sold on the open market. See also definition of Integrated Mill on page 6.

##### **Market Pulp**

Pulp for sale in the open market and does not include pulp used in own plant or shipped to wholly owned or associated companies within the country. All pulp moving outside the producing country is considered to be market pulp.

##### **Internal Deliveries of Pulp**

The internal deliveries of pulp reported in Cepi publications are calculated as follow:  
 Integrated production + domestic deliveries + internal trade within Cepi countries

##### **Total Deliveries of Pulp**

The total deliveries of pulp reported in Cepi publications are calculated as follow  
 Integrated production + domestic deliveries + total exports

**Pulp Consumption**

The pulp consumption by country reported in Cepi publications is calculated as follow:

Production + imports from other Cepi Countries + imports from outside Cepi – exports to other Cepi Countries – exports to outside Cepi

**4.4 Alignment with CN Codes and Cepi Harmonised Codes**

*References:*

*Cepi Harmonised Structure for Raw Material and Products*

*Cepi Harmonised List for Raw Material and Products*

*Alignment of Combined Nomenclature Products Headings with Cepi Grades*

*Combined Nomenclature Chapter 47*

**Alignment with CN Codes**

See Alignment of Combined Nomenclature Products Headings with Cepi Grades

**Alignment with Cepi Harmonised Codes**

- Mechanical Pulp - 923 000 000
- Semi-Chemical Pulp - 921 000 000
- Sulphite Chemical Pulp - 922 200 000
- Sulphate Chemical Pulp - 922 100 000

## Chapter 5 – Paper for Recycling

### 5.1 General Definitions on Paper for Recycling and Recycling

To clarify the intended use of collected paper for recycling in paper mills, it has been decided to substitute the term “recovered paper” by “paper for recycling”.

#### **Paper for Recycling**

Natural fibre-based paper and board suitable for recycling and consisting of

- Paper and board in any shape
- Products made predominately from paper and board, which may include other constituents that cannot be removed by dry sorting, such as coatings and laminates, spiral bindings, etc.

#### **Recycling**

Reprocessing of used paper in a production process into new paper and board.

See also the Waste Directive 2008/98/EC

#### **Waste**

Any substance or object which holder discards or intends or is required to discard.

#### **Recyclability**

Ability of a product to be recycled into a new paper and board.

Design, manufacturing and converting of paper-based products in such a way as to enable a high quality recycling of fibres and other materials in a manufacturing process in compliance – where appropriate – with current standards in the Community: as a minimum, recyclability requires that sufficient information is exchanged for appropriate risk management and safe re-use of fibres.

#### **Recovered Paper**

Outdated term used for paper for recycling.

### 5.2 Paper for Recycling Classes

#### **Class I - Mixed Grades**

Waste and scrap of paper or paperboard, including unsorted waste and scrap.

#### **Class II - Corrugated and Kraft**

Unbleached kraft paper or paperboard or corrugated paper or paperboard.

#### **Class III - Newspapers and Magazines**

Paper or paperboard made mainly of mechanical pulp (for example, newspapers, journals and similar printed matter). Including old and unsold newspapers and magazines, telephone directories, brochures and printed advertising material.

#### **Class IV - Other Grades**

Other paper or paperboard made mainly of bleached chemical pulp, not coloured in the mass.

### 5.3 Paper for Recycling Flows

#### **Paper for Recycling Utilisation**

Use of paper for recycling as raw material. Volumes entering the mill gates.

Mill broke are not included.

#### **Mill Broke**

Materials that are discarded by a manufacture process but that has properties allowing it to be reused on site by being incorporated back into the same manufacturing process that generated it.



**Utilisation by Sector (%)**

Total utilisation of paper for recycling in a paper & board production sector as percentage of the overall paper for recycling utilisation. The paper & board production sectors are newsprint, printing and writing papers, containerboard, cartonboard, wrappings, other paper and board for packaging, tissue paper and other paper and board. See definitions of paper and board production sectors in chapter 7.

**Recovery**

Principle of waste management policy including reuse, material recycling, composting and energy recovery as well as exports for similar purposes.

**Collector**

One who separately collects used paper and board; he may also have pre-processing (sorting, handling) transport or trade activities.

**Collection**

Separate collection of paper and paper products from industrial and commercial outlets, from households and offices for recovery. (Collection includes transport to the sorting or recycling plant/paper mill.)

Collection = utilisation plus exports minus imports of paper for recycling.

The difference between collection and utilisation of paper for recycling can be explained by trade, stock variations and some volumes destined to other material recycling options.

**Paper for Recycling Stocks**

Stock figures reported in Cepi reports are closing stocks present in the paper & board mills, at the end of the period reported. It doesn't include stocks present in depots of paper for recycling owned by the companies.

The day of the end of the month also affects the volumes of paper for recycling stocks at mills (often higher on Mondays than on Fridays).

**Non-Paper Usages**

Include products such as absorbent and hygienic personal products made of fluff pulp and insulation products.

**Process Losses from Paper Recycling**

Recycling residues consisting of non-paper components (metal, plastic, glass, textiles, wood and sand) separated from the material flow during pulping, cleaning, screening, fine screening and deinking.

**Non-Collectable**

Paper products which are technical not accessible to collection system, neither mixed nor separate collection: resulting from purpose, e.g. toilet paper, cigarette paper... Paper products that are used in coal-fired domestic heating systems are not taken into account because they are collectable, at least technically.

**Composting**

Composting is the natural process of 'rotting' or decomposition of organic matter by microorganisms under controlled conditions. Raw organic materials such as crop residues, animal wastes, food garbage, some municipal wastes and suitable industrial wastes, enhance their suitability for application to the soil as a fertilizing resource, after having undergone composting.

**Final Disposal**

Definitive disposal of waste to landfill or incineration without energy recovery.

#### **5.4 Paper for Recycling Rates**

##### ***Utilisation Rate / Recycled Content***

Percentage of paper for recycling utilisation compared to the total paper production.

Important Note: Paper for recycling is composed of fibrous material but also unwanted material – non-paper components as well as paper and board detrimental to production. The share of unwanted material depends on the actual collection and sorting of used paper. It varies according to the grades of paper for recycling, but its maximum limit is 3% for most post-consumer grades and 1% for most pre-consumer grades according to the EN 643. The volume of recycled fibrous material actually in the new paper is therefore lower than the volume of paper for recycling utilised. The utilisation rate compares paper for recycling utilisation to paper production.

##### ***Recycling Rate***

The ratio between recycling of used paper, including net trade of paper for recycling, and paper and board consumption. It is calculated as “paper for recycling utilisation + net trade” divided by “paper and board consumption”, on base paper level.

See definition of paper & board consumption on page 28.

#### **5.5 Alignment with CN Codes and Cepi Harmonised Codes**

##### ***References:***

*Cepi Harmonised Structure for Raw Material and Products*

*Cepi Harmonised List for Raw Material and Products*

*Combined Nomenclature Chapter 4707*

##### **Alignment with CN Codes**

See Alignment of Combined Nomenclature Products Headings with Cepi Grades

##### **Alignment with Cepi Harmonised Codes**

- Mixed Grades - 941 000 000
- Corrugated and Kraft - 942 000 000
- Newspapers and Magazines - 943 000 000
- High Grades - 944 000 000

#### **5.6 Alignment with EN 643**

##### ***References:***

*EN 643 European List of Standard Grades of Paper and Board for Recycling.*

*Guidance on the revised EN 643*

*Alignment of Paper for Recycling Classes with EN 643 List of Grades*

EN643 - European List of Standard Grades of Paper and Board for Recycling.

The European List of Standard Grades of Paper and Board for Recycling give a general description of the standard grades by defining what they do and do not contain. The list has been revised in 2013, a guidance on the revised version is available.

##### **Alignment with EN 643 List of Grades**

See Alignment of Paper for Recycling Classes with EN 643 List of Grades

#### **5.7 Paper for Recycling Prices**

##### ***Paper for Recycling Prices***

Prices of paper for recycling reported in Cepi statistics are the buying prices reported by the mills.

Depending on the country, prices are reported according to two different definitions: “free-delivered” or “ex-mill”/“ex-works”. When comparing prices between two countries, one should secure that the same definition is used. Transport cost has to be added to “ex-mill” prices before comparison to “free-delivered” prices. Transport cost has to be deducted from “free-delivered” prices before comparison to “ex-mill” prices.

***Ex-Mill Prices / Ex-Works (EXW)***

Means that the seller delivers when he places the goods at the disposal of the buyer at the seller's premises or another named place (i.e. works, factory, warehouse, etc.) not cleared for export and not loaded on any collecting vehicle.

***Free-Delivered Prices / Carriage Paid To (CPT)***

Means that the seller delivers the goods to the carrier or another person nominated by the seller at an agreed place, and that the seller must contract for and pay the costs of carriage necessary to bring the goods to the named place of destination (i.e. the paper mill, for example).

## Chapter 6 – Non-Fibrous Materials

### 6.1 General Definition on Non-Fibrous Materials

#### **Non-Fibrous Materials**

Non-cellulose items added to paper stock during the papermaking process in order to impart special characteristics to the final product. There are materials for sizing, loading and filling, colouring and other additives. Non-fibrous materials are therefore constituted by coating chemicals and some functional chemicals. Other functional chemicals and process chemicals have to be considered as well to have the full picture.

Data on fibrous materials in Cepi reports is collected and reported in dry tonnes (tonnes converted to 100% dry weight).

The main types of non-fibrous materials used can be mainly grouped by purpose:

#### **Materials for Sizing (both internal and surface sizing)**

These are used in papermaking to control the absorbency of paper with regards to liquids such as water or ink. Rosin, alum, starch and gelatine are the most commonly used materials for this purpose.

#### **Sizing**

Addition of materials either to the stock pulp (internal sizing) or to the surface of paper or board (surface sizing), in order to increase its resistance to the penetration and spreading of aqueous liquids, for example writing ink. Surface sizing may also be used to increase the surface strength of paper and board.

#### **Materials for Loading and Filling**

These are used to improve the optical and physical properties of the final product such as opacity, brightness, smoothness, and ink receptivity.

#### **Materials for Colouring**

Pigments and dyestuffs used to impart colour to the paper and usually added to the pulp whilst in the beater.

#### **Additives used to impart special paper characteristics**

In particular the use of starch as a binder to increase the strength of the final paper.

### 6.2 Chemicals

#### **Chemicals**

Chemicals are used in the paper industry in different parts of the pulp and paper making process. They can be divided into three main areas: process chemicals, functional chemicals and coating chemicals. These chemicals have different functions and different influence on the sustainability of the paper product.

#### **Process Chemicals**

Process chemicals to optimize costs and increase machine efficiency

#### **Functional Chemicals**

Functional chemicals to attribute specific properties to paper.

#### **Coating Chemicals**

Finishing chemicals to improve appearance and performance of printed paper and board.

#### 6.2.1 Mineral Chemicals

The paper industry, particularly printing and writing paper, is by far the largest volume user of industrial minerals. Minerals are either used as fillers or as a coating on paper. The principal minerals used in paper making are kaolin, talc, ground calcium carbonate, precipitated calcium carbonate, titanium dioxide and bentonite.



Minerals are suspended in water before being incorporated into the process. The minerals are often supplied directly to the paper manufacturers in a slurry form or even produced as an integrated part of the paper process (precipitated calcium carbonate).

The use of minerals in paper production increases the speed of the machine performance and fluidity. The final characteristics of the paper (strength, whiteness, gloss, ink retention, etc.) are largely determined by the blend of minerals used. High quality, glossy paper is obtained by applying a thin layer of minerals on the surface of the paper.

#### **Filler**

Fine pigments, generally white and usually of mineral origin, incorporated in the stock pulp during the manufacture of paper or board. Filler materials include china clay (kaolin - used by papermakers to obtain finish and consistency and also for coating art and chromo paper), calcium carbonate, barium sulphate (barites), talc, and titanium dioxide.

#### **Kaolin**

Kaolin or "China Clay" is a white, soft, plastic clay mainly composed of fine-grained plate-like particles. It is chemically inert, non-abrasive and has low heat and electricity conductivity.

The largest applications for kaolin are the filling and coating of paper as well as the production of fine ceramics. It is used as filler in the bulk of paper and to coat its surface. Kaolin use reduces the amount of wood pulp needed, enhances the optical properties of the paper and improves its printing characteristics.

#### **Clay**

A naturally occurring, earthy, fine-grain material comprised of a group of crystalline clay minerals with a natural basic structure of aluminosilicate whose hydrous chemical form is  $2H_2O$

It is commonly used in the paper industry to make up paper filling and coating materials. Clays are sometimes altered by further refining, heat treatment, etc., to enhance or extend their end uses, e.g., calcined clay and delaminated clay.

#### **Coating Clay**

The types of finer size clays with higher whiteness, used to make up coating materials for paper and paperboard surfaces.

#### **Filler Clay**

A white, aluminum silicate, natural mineral added to pulp stock to enhance opacity, brightness, and printing surface smoothness of the paper made from it.

#### **Calcium Carbonate (CaCO<sub>3</sub>)**

White pigment commonly used in the paper industry as a paper coating material and filler that helps produce papers with high whiteness and gloss and good printing properties. It is a compound that can be chemically prepared but also occurs in a natural form.

A naturally occurring mineral called limestone, usually combined with magnesium carbonate (MgCO<sub>3</sub>), and used primarily in the pulping industry to produce lime (CaO). It is used as ground calcium carbonate (GCC) and precipitated calcium carbonate (PCC) in the paper industry.

#### **Ground Calcium Carbonate (GCC)**

Minerals mechanically refined from limestone and marble and used as a filler pigment, paper coating ingredient, etc. Sometimes referred to as natural ground calcium carbonate (NGCC).

#### **Precipitated Calcium Carbonate (PCC)**

Wet end filler used in alkaline papermaking and also in some coating formulations. It generally has good opacity and bulking characteristics, and can be produced in several particle morphologies and sizes. Most PCC being used in the paper industry is made in onsite satellite plants that utilize available mill carbon dioxide streams as well as mill power and water resources.

#### **Bentonite**

This mineral is used in pitch control, i.e. absorption of wood resins that tend to obstruct the machines and to improve the efficiency of the conversion of pulp into paper as well as to improve the quality of paper. Bentonite also offers useful de-inking properties for paper recycling.

**Talc**

It is used in both uncoated and coated rotogravure papers where it enhances printability and reduce surface friction, improving productivity at the paper mill and print house. It also improve mattness and reduce ink scuff in offset papers. Used as pitch control agents, talc “clean” the papermaking process by adsorbing any sticky resinous particles in the pulp.

**6.2.2 Non-mineral Chemicals****Starch**

Starch is a carbohydrate extracted from agricultural raw materials which is widely present in literally thousands of everyday food and non-food applications. The starch molecule consists of a large number of glucose units joined by glycosides bonds. It is produced by all vegetables as an energy store. Starch is a type of papermaking adhesive and size material. In Europe, starch is extracted almost exclusively from potatoes, wheat and maize, but it can be also extracted from tapioca and other sources. It is used to produce a higher degree of rigidity in a sheet and to improve the finish by causing the fibres to lie flat.

**Native Starch**

Once extracted, pure starch (native starch) is a white tasteless and odourless powder that is insoluble in cold water or alcohol, which is used widely in the food and paper industry primarily for binding and thickening purposes.

**Modified Starch**

Native starch that has been modified by a chemical, physical or enzymatic process to create ‘modified starches’, each offering differing characteristics and used widely in the food, paper, textile, oil, adhesives, fermentation and pharmaceutical industries.

## Chapter 7 – Paper and Board

### 7.1 General Definitions on Paper and Board

#### **Paper and Board**

The paper and paperboard category is an aggregate category. In the production and trade statistics, it represents the sum of graphic papers, tissue paper, packaging paper and board and other paper and board. It excludes manufactured paper products such as boxes, cartons, books and magazines, etc.

#### **Paper**

Generic term for a range of materials in the form of a coherent sheet or web, excluding sheets or laps of pulp as commonly understood for paper making or dissolving purposes and non-woven products, made by deposition of vegetable, mineral, animal or synthetic fibres, or their mixtures, from a fluid suspension onto a suitable forming device, with or without the addition of other substances.

Papers may be coated, impregnated or otherwise converted, during or after their manufacture, without necessarily losing their identity as paper. In conventional papermaking process, the fluid is water; new developments, however, include the use of air and other fluids.

#### **Board / Paperboard**

Generic term applied to certain types of paper frequently characterized by their relative high rigidity.

The primary distinction between paper and board is normally based upon thickness or grammage, though in some instances the distinction will be based on the characteristics and/or end-use. For example, some materials of lower grammage, such as certain grades of folding boxboard and corrugated raw materials, are generally referred to as “board”, while other materials of higher grammage, such as certain grades of blotting paper, felt paper and drawing paper, are generally referred to as “paper”.

#### **Coating**

Process of applying, to the surface of a paper or board, one or more layers of coating slip or other materials in fluid form.

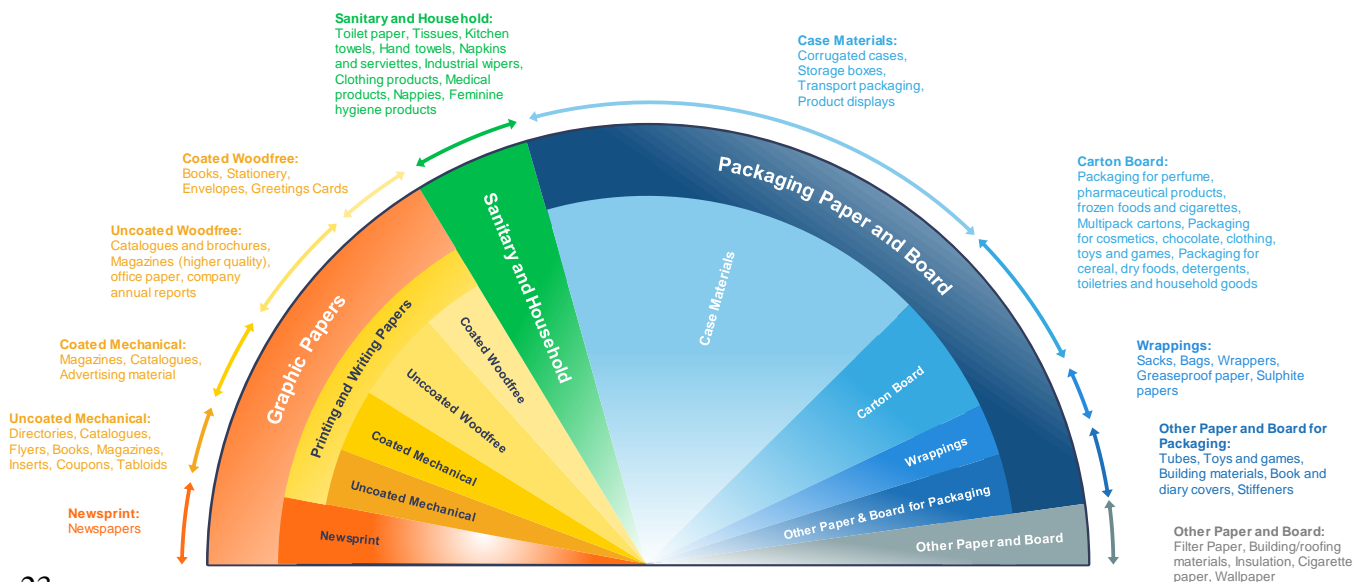
#### **Mechanical Paper or Board**

Paper or board having mechanical woodpulp as an essential constituent of its fibre composition.

#### **Woodfree Paper or Board**

Paper or board having, in principle, only chemical pulp in its fibre composition. In practice, it may contain a small amount of other pulps.

### 7.2 Paper and Board Grades



### 7.2.1 Graphic Papers

#### **Graphic Papers**

The graphic papers category is an aggregate category. In the production and trade statistics, it represents the sum of newsprint; uncoated mechanical; uncoated woodfree and coated papers. Products in this category are generally manufactured in strips or rolls of a width exceeding 15 cm or in rectangular sheets with one side exceeding 36 cm and the other exceeding 15 cm in the unfolded state. It excludes manufactured paper products such as books and magazines, etc..

#### **Newsprint**

Paper mainly used for printing newspapers. It is made largely from mechanical pulp and/or paper for recycling, with or without a small amount of filler. Products in this category are generally manufactured in strips or rolls of a width exceeding 36 cm. Weights usually range from 40 to 52 g/m<sup>2</sup> but can be as high as 65 g/m<sup>2</sup>. Newsprint is machine finished or slightly calendered, white or slightly coloured and is used in reels for letterpress, offset or flexo printing.

#### **Printing and Writing Papers (also known as Other Graphic Papers)**

*Graphic Papers excluding newsprint.*

#### **Uncoated Printing and Writing Papers**

Printing and writing papers, which have been subjected to sizing, calendering, supercalendering, glazing, water-marking or similar simple finishing processes, but not to coating.

#### **Uncoated Mechanical**

Paper suitable for printing or other graphic purposes where less than 90% of the fibre furnish consists of chemical pulp fibres. This grade is also known as groundwood or wood-containing paper.

The sub-grades of uncoated mechanical are uncoated mechanical improved (high-bright and super-bright), supercalendered paper (SC-A+, SC-A, SC-B) and other uncoated mechanical (directory paper, thin printing grades and book paper).

Uncoated mechanical is largely used for magazines and catalogues printed by the rotogravure and offset methods, and book paper. It excludes wallpaper base.

#### **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 or furnishes, with variable levels of mineral filler and a range of finishing processes such as sizing, calendering, machine glazing and watermarking.

The sub-grades of uncoated woodfree are cut-sizes (A3 or smaller, including A4), folio sheets (larger than A3) and reels (rolls).

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 5 g per side) are covered by this heading. It excludes wallpaper base.

#### **Coated Printing and Writing Papers**

Printing and writing papers, which have been coated on one or both sides with coating materials such as clay (beneficiated kaolin), calcium carbonate, barium sulphate, gypsum or zinc oxide, often supplemented with supercalendering, etc. It includes coated paper produced at the paper mill from base paper manufactured for own use or purchased, together with all paper made and coated in a single operation on the papermaking machine. It includes raw carbon and self-copy paper in rolls or sheets. It excludes other copying and transfer papers.

#### **Coated Mechanical**

Made of fibres produced mainly (90%) by a mechanical pulping process and are also known as coated groundwood.

The sub-grades of coated mechanical are coated mechanical reels (lightweight coated LWC and medium weight coated MWC) and coated mechanical sheets.

These papers are used mostly for catalogues, magazines and advertising material.

**Coated Woodfree**

Made of fibres produced mainly (90%) by a chemical pulping process and are also known as coated freesheet.

The sub-grades of coated woodfree are sheets and reels.

These papers are used mostly for magazines and commercial printing material.

7.2.2 Packaging Paper and Board**Packaging Paper and Board**

Paper or board mainly used for wrapping and packaging purposes. Products in this category are generally manufactured in strips or rolls of a width exceeding 36 cm or in rectangular sheets with one side exceeding 36 cm and the other exceeding 15 cm in the unfolded state.

**Containerboard** (also known as Case Materials)

Papers and boards mainly used in the manufacture of corrugated board. They are made from any combination of virgin and recovered fibres and can be bleached, unbleached or mottled. Fluting is the middle ply with outer layers called the liners.

The sub-grades of containerboard are liners (kraftliners and testliners), flutings (semi-chemical fluting and recovered paper- / paper for recycling- based fluting (Wellenstoff)) and dual papers.

Main uses are corrugated boxes, transport packaging, storage and product display.

**Cartonboard** (can also be written as Carton Board)

Board single or multiply, coated or uncoated. It is made from virgin and/or recovered fibres, and has good folding properties, stiffness and scoring ability. It is mainly used in cartons for consumer products such as frozen food, cosmetics and pharma. The sub-grades of cartonboard are solid board (bleached and unbleached), folding boxboard, white lined chipboard, boxboard or carrier board.

**Wrappings**

Papers whose main use is wrapping or packaging made from any combination of virgin or recovered fibres, bleached or unbleached. They may be subject to various finishing and/or marking processes. The sub-grades of wrappings are sack kraft, other wrapping krafts, sulphite and grease-proof papers.

**Other Paper and Board for Packaging**

This category embraces all paper and board mainly for packaging purposes other than those listed above. Most are produced from recovered fibres, e.g. greyboards, and go for conversion, which in some cases may be for end-uses other than packaging including book covers and games. The sub-grades are greyboard, moulded products and unlined chip.

**Moulded Products**

Moulded articles made from paper-making pulp.

7.2.3 Tissue Paper**Tissue Paper** (also known as Sanitary and Household, Hygiene Paper)

Base paper made from lightweight, dry or wet creped paper and some non-creped paper, predominantly made from natural fibres. These fibres can be issued from virgin pulp or recycled pulp, a mixture of both, or in some cases non-wood fibres.

The base paper material is taken from the tissue machine as a single-ply web wound up on a roll/reel. The base paper is intended to manufacture single-ply or multi-ply tissue products. A typical grammage of single ply tissue base paper ranges from 10 g/m<sup>2</sup> to 50 g/m<sup>2</sup>.

The sub-grades of tissue paper are cellulose wadding, tissue <25g, tissue >25g and other tissue paper.

#### 7.2.4 Other Paper and Board

##### **Other Paper and Board**

Other papers and boards for industrial and special purposes. It includes cigarette papers and stock of filter papers, as well as gypsum liners and special papers for insulating, roofing, waxing, asphaltting and other specific applications or treatments; wallpaper base; unbleached kraft paper and paperboard that are not sack kraft paper or kraftliner and weighing more than 150 g/m<sup>2</sup> but less than 225 g/m<sup>2</sup>; felt paper and paperboard; tracing papers; not further processed uncoated paper weighing 225 g/m<sup>2</sup> or more; and raw copying and transfer papers, in rolls or sheets except carbon or self-copy paper.

It excludes all composite, not coated, paper and paper board of flat layers stuck together; coated paper and paperboard not uniformly bleached throughout the mass; and paper and paperboard covered or coated with plastics (excluding adhesives).

#### 7.2.5 Speciality Paper and Board

Paper or board with enhanced properties (physical, optical, electrical, chemical and/or other special considerations) that are required for either the performance of the paper in a special application or to convey a visual or tactile perception of a brand.

They all exhibit special performance characteristics, including:

- physical properties: such as strength, dimensional stability, density, porosity, permeability, smoothness, wet strength, absorptivity, texture, barrier properties (f.i. against water, grease, water-vapour, oxygen a.s.o.) and others;
- optical properties: such as very high brightness, deep colours, especially low or high opacity and gloss, transparency;
- electrical properties: such as increased conductivity or increased resistivity (insulation);
- chemical properties: such as purity, anti-corrosion, anti-microbial or pH; and/or
- other special considerations: such as specific compliance schemes, special insertions (such as security features), special moisture levels, very narrow rolls, etc..

##### End-uses

Specialty paper and board may be produced directly on a paper machine, by the insertion of security features, for example.

Alternatively, properties may be created by a conversion process such as lamination, metallizing, silicone coating, extrusion coating, etc.

Such papers then serve a wide range of end-uses, which can be classified under various categories, including (with some examples in brackets): packaging & labelling (flexible packaging, bag and liquid packaging board), building & construction (gypsum board and wallpaper), food service (drinking straw wrap and tea bag), business and communication (thermal paper and banner), industrial (abrasive base and stick paper), printing & publishing (cover and poster, luxury packaging), consumer (fine art paper, drawing paper, hand kraft, tobacco paper and gift wrap), filter (water filter and face mask), security (banknote and stamp), medical (medical disposables and bandage wrap) and electrical (battery component and cable wrap and filler).

Speciality paper and board can be found under several Cepi grades: wrappings, cartonboard, graphic papers, tissue paper and other paper and board. Europe is currently the leading specialty paper and board producing and exporting region.

##### **Cigarette Paper**

Lightweight paper, unsized, which may contain fillers and/or additives in order that its combustibility may be adapted to that of tobacco; it is resistant to tearing and rubbing, and suitable for the manufacture of cigarettes, and capable of being reeled in small widths.

##### **Envelope Paper**

Paper of suitable strength for the manufacture of correspondence envelopes and pockets, capable of receiving handwriting, printing and the application of an appropriate adhesive.



**Felt Board**

Board containing textile fibres specially processed to give a loose soft texture.

**Filter Paper**

Paper intended to provide selective retention of particles from a fluid suspension or from a gas.

**Insulating Paper or Board**

Paper or board which is intended to impede the transmission of certain forms of energy, for example heat, sound, electricity.

**Wallpaper Base**

Paper intended to receive on one side either a coating or a print, or both, the other side being intended for the application of paste or another adhesive. This base paper has to be suitable for conversion to wallpaper, and for hanging.

**Label Papers**

One-side coated wet glue label papers, wet-strength or non-wet-strength, all substances.

Excluding flexible packaging grades, poster papers, grades for self-adhesive labels and cast-coated papers.

**Release Liner Base Paper 1- and 2-sides Clay Coated**

Backing for pressure-sensitive laminate which acts as a carrier of the pressure-sensitive laminate. Prior to application, it protects the adhesive and then readily separates from (i.e.) a label before the label is applied.

**Flexible Packaging one side coated paper**

Flexible packaging one side coated paper, substance range <110 gsm

Including several coatings (but always one side), one side coated paper with grease resistant properties, tobacco.

Excluding label (and label wet strength), self-adhesive and silicone base paper, wallpaper, envelopes, book jackets, paper in sheets, for gift wrapping: flexible packaging and others.

**Flexible packaging kraft base / uncoated paper**

Flexible packaging uncoated paper - 100% Virgin-fibre bleached & unbleached uncoated kraft paper ≤120gsm, with and without special fibre/chemical treatment (e.g. grease barrier, corrosion barrier, wet strength). Delivered in reels.

Including consumer bags / food wrap (sugar, flour, rice, bread, pet food, etc.): standard and OGR (oil & grease resistant) grades, shopping carrier bags, tea bags – secondary packaging, consumer goods (processed food, dehydrated food, confectionary, butter, cheese, yoghurt lids, etc.), tobacco wrap / inner liner, industrial packaging (soap, reel / ream wrapping,...), interleaving, gift wrapping papers, medical packaging, cushion pads, MG/kraft papers for envelopes, MG paper for siliconised food and baking applications, MG paper for release liner applications (base papers for siliconising).

Excluding sack kraft papers for industrial bags, labels, self-adhesive and release / silicone base paper (glassine, Super Calendered Kraft), wall paper, envelopes, book jackets, pharmaceutical & cosmetic leaflets, tipping papers, electrical insulation papers, thin papers (religious literature, general literature, mailing, ...), solid board liner, masking tape, filter papers, abrasive base papers.

**7.3 Paper and Board Flows**

**Production**

Quantity of all paper and paperboard of commercial quality (fibre building boards not included) produced within a country. Net production represents the saleable output of the production line.

**Net Production (Roll)**

Net production is the unpacked saleable production as weighed on the scale after the slitter winder. As rolls are wound up with cores and plugged afterwards, the measured weight has to be reduced by the (theoretical) weight of cores and plugs.

***Net Production (Sheet)***

Net production is the unpacked saleable production as weighed on the scale reduced by the weight of pallets, ream wrapper and pallet packaging, if this is included in the weighted mass.

***Deliveries***

All material delivered from the mill for sale or conversion. Include deliveries to another mill within the same group.

***Domestic Deliveries***

All material delivered from the mill for sale or conversion, within the same country. Include deliveries to another mill within the same group.

***Exports***

All material leaving the country for another country, after being placed under the customs procedure for export (final export, re-export following inward processing, etc.) in the originating country, or following transfer to another country where customs procedures are carried out.

***Imports***

All material entering the country from another country, and which are placed under the customs procedure for release into free circulation, either immediately or after a period in a customs warehouse, either in country of entry or after transfer to another country.

***Internal Deliveries***

The paper and board internal deliveries reported in Cepi publications are calculated as follow: domestic deliveries + internal trade within Cepi countries.

***Apparent Consumption***

Quantity of paper and paperboard consumed within a country without taking into account the changes in stocks. It is thus paper and paperboard production (on base paper level) within the country plus imports minus exports.

The word "apparent" signifies that the more a country exports paper as manufactures (ie: in converted or printed form, such as books), the more paper it will appear to "consume". This results from such paper not being included in that country's paper exports. To this extent, national consumption actually by the country's own population is exaggerated. The converse applies to imported paper manufactures.

***Note:***

The paper and board apparent consumption by country reported in Cepi publications is calculated as follow: production + imports from other Cepi countries + imports from outside Cepi – exports to other Cepi countries – exports to outside Cepi

***Per Capita Consumption***

Per capita consumption of paper and board here is a calculation taking the amount of paper and board consumed in each country (the amount of paper and board produced domestically by paper manufacturers plus imports minus exports) divided by the number of the population in that country. It cannot be assumed to be the average amount of finished paper and board or articles of paper and board used by an individual. Consumption by companies, and more broadly the whole economy, is included.

***Converting***

Manufacture of products by processes or operations applied after the normal paper or board manufacturing process. The operation of treating, modifying, or otherwise manipulating the finished paper and paperboard so that it can be made into end-user products, such as special coating, waxing, printing, and gumming, and envelope, bag, and container manufacturing.

***Converter***

Processor of paper or board as a raw material (such as packaging, printing).

#### **7.4 Alignment with CN Codes and Cepi Harmonised Codes**

References:

*Cepi Harmonised Structure for Paper & Board Grades*

*Cepi Harmonised List for Paper & Board Grades*

*Alignment of Combined Nomenclature Products Headings with Cepi Grades*

*Combined Nomenclature Chapter 48*

#### **Alignment with CN Codes**

See Alignment of Combined Nomenclature Products Headings with Cepi Grades

#### **Alignment with Cepi Harmonised Codes**

- Newsprint - 100 000 000
- Uncoated Mechanical -211 000 000
- Uncoated Woodfree - 231 000 000
- Coated Mechanical - 212 000 000
- Coated Woodfree - 232 000 000
- Tissue Paper - 700 000 000
- Containerboard - 300 000 000
- Carton Boards - 400 000 000
- Wrappings - 500 000 000
- Other Paper and Boards for Packaging - 600 000 000
- Other Paper and Board - 800 000 000

## Chapter 8 – Energy and Environment

### 8.1 Energy

#### **Energy**

All energy products, consisting of hard coal and derivatives, lignite and derivatives, peat and derivatives, crude oil and petroleum products (such as LPG, refinery gas, motor spirit, kerosene, gas/diesel oil, residual fuel oil, refuse-derived-fuels, solid-recovered-fuel), natural gas, manufactured gases, derived heat, renewable energies (such as hydro power, wind energy, biomass, wastes, geothermal energy), electrical energy and nuclear energy.

#### 8.1.1 Primary Energy

##### **Primary Energy Use**

Primary energy use refers to the direct use at the source, or supply to users without transformation, of crude energy, that is, energy that has not been subjected to any conversion or transformation process.

##### **Specific Primary Energy Use**

Primary energy use calculated per quantity of the final output (paper & board + market pulp).

##### **Fossil Fuels**

Coal, natural gas, peat and petroleum products (such as oil) formed from the decayed bodies of animals and plants that died millions of years ago.

##### **Coal**

Coal refers to a variety of solid, combustible, sedimentary, organic rocks that are composed mainly of carbon and varying amounts of other components such as hydrogen, oxygen, sulphur and moisture. Coal is formed from vegetation that has been consolidated between other rock strata and altered by the combined effects of pressure and heat over millions of years. Many different classifications of coal are used around the world, reflecting a broad range of ages, compositions and properties.

##### **Gas – Natural and Derived**

Natural gas comprises gases occurring in underground deposits, whether liquefied or gaseous, consisting mainly of methane. Natural gas includes "non-associated" gas originating from fields producing hydrocarbons only in gaseous form, and "associated" gas produced in association with crude oil, as well as methane recovered from coal mines (colliery gas) and shale gas from fracking. Derived gases are manufactured gases, comprising coke-oven gas, blast furnace gas, and gasworks gas.

##### **Peat**

Peat is a combustible soft, porous or compressed, fossil sedimentary deposit of plant origin with high water content (up to 90 percent in the raw state), easily cut, and of light to dark brown colour.

##### **Petroleum Products (Fuel Oil and Other Petroleum Products)**

*Fuel oil* covers all residual (heavy) fuel oils (including those obtained by blending). Kinematic viscosity is above 10 cSt at 80°C. The flash point is always above 50°C and density is always more than 0.90 kg/l. Low sulphur content: heavy fuel oil with sulphur content lower than 1%, high sulphur content: heavy fuel oil with sulphur content of 1% or higher.

*Other petroleum products* include refinery gas & ethane, liquefied petroleum gas, motor spirit, kerosene & jet fuels, naphtha, gasoil, diesel oil.

##### **Biomass**

Biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste. Includes bio-based products and lignin. See chapter 8.6 for more definitions on biomass.

**Energy from Renewable Sources**

Energy from renewable non-fossil sources, namely wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases.

**Other Energy – Waste of Waste**

Rejects from recycling operations (not from pulping) used as fuel (bought or produced on the site).

**Waste**

Any substance or object which the holder discards or intends or is required to discard.

8.1.2 Electricity**Gross Electricity Generation**

Total gross electricity generation covers gross electricity generation in all types of power plants. The gross electricity generation at the plant level is defined as the electricity measured at the outlet of the main transformers, i.e. the consumption of electricity in the plant auxiliaries and in transformers is included.

**Net Electricity Generation**

Total net electricity generation covers net electricity generation in all types of power plants. Net electricity generation is defined as the total gross electricity generation (Code 107000) less the consumption of the auxiliary services of the power stations. The generation in pumped storage plants is included.

**Electricity Produced on Site**

Electrical energy produced on the mill site from different primary sources such as: hydro power, steam boilers, CHPs, recovery boilers, etc.

**Purchased Electricity**

Electrical energy bought from outside the mill to be used on site.

**Sold Electricity**

Net electrical energy produced on site and sent (sold) to the public grid network or other electricity consumers.

**Co-Generation (Combined Heat and Power - CHP)**

The definition of combined heat and power (CHP) or "cogeneration" implies that heat and electricity are produced simultaneously in one process. The overall efficiency of a CHP unit is used as a measure to determine whether the electricity generation is fully CHP or not. If the overall efficiency is above a threshold set at 75% (85% for steam condensing extraction turbines and combined cycle units), all the electricity generated is considered as CHP electricity.

**Net Bought Electricity**

Difference between "Purchased Electricity from the Grid" and "Sold Electricity".

8.1.3 Heat**Heat Energy**

Heat is obtained from fuels combustion, nuclear reactors, geothermal reservoirs, capture of sunlight, exothermic chemical processes and heat pumps which can extract it from ambient air and liquids. It may be used for heating or cooling or converted into mechanical energy for transport vehicles or electricity generation. Commercial heat sold is reported under total final consumption with the fuel inputs allocated under power generation.

**Heat Produced on Site**

Total heat production in heating plants and in combined heat and power plants. It includes the heat used by the auxiliaries of the installation which use hot fluid (space heating, liquid fuel heating, etc.) and losses in the installation/network heat exchanges. For auto producing entities (= entities

generating electricity and/or heat wholly or partially for their own use as an activity which supports their primary activity) the heat used by the undertaking for its own processes is not included.

***Purchased Heat***

Purchased heat not included in the primary energy use.

***Sold Steam***

Steam delivered to outside the industry. It does mean outside the mill.

***Sold Other Heat***

Any other heat delivered to outside the industry (warm water, thermal fluids...).

**8.2 Water**

**8.2.1 Water Intake**

***Water Intake***

The amount of freshwater abstracted by source and any other water received at the mill and the amount of water content in purchased materials and products for the purpose of pulp and paper production.

***Freshwater Abstracted***

Freshwater abstracted by source and any other water received at the mill for the purpose of pulp and paper production.

***Surface Water***

All waters on the surface of the Earth found in rivers, streams, ponds, lakes, marshes, wetlands, as well as ice and snow, and transitional, coastal and marine waters.

***Groundwater***

All water from below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.

***Municipal Supply Water***

All public or private water services that are providing drinking water for the society, its citizens, activities and services.

***Other Water Received***

For example desalinated sea water and reclaimed wastewater treated externally of the mill.

***Water Content in Purchased Materials and Products***

Water content in purchased materials and products for the purpose of pulp and paper production.

***Water Content in Fibrous Materials***

From forest (timberland), i.e. water content in wood chips etc, market pulp and recycled fibre.

***Water Content in Non-Fibrous Materials***

Water content in process chemicals, coating pigments, fillers, etc.

***Other purchased materials or products***

For example steam, hot water, etc.

**8.2.2 Water in Manufacturing**

***Cooling Water***

Water used for cooling purposes (used to absorb and remove heat). Depending upon the mill, (non-contact) cooling water may be used for process needs. It includes the fresh water which feeds the cooling water circuit (e.g. water towers) and then it is either discharged or re-circulated after re-cooling or is used as warm water in the pulping process.



**Process Water**

Water used in a manufacturing or treatment process or in the actual product manufactured. Examples would include water used for washing, rinsing, direct contact, cooling, solution make-up, chemical reactions, and gas scrubbing in industrial and food processing applications. In many cases, water is specifically treated to produce the quality of water needed for the process.

8.2.3 Wastewater Outflow

**Wastewater Outflow**

The amount of wastewater discharged from mill site to final destination.

**Reservoir**

Artificial and heavily modified surface bodies (surface water).

**Transitional Water**

Discharge to brackish water i.e. mixture of freshwater and sea water or to an estuary with a free connection to the open sea.

**Municipal Wastewater Treatment Plant**

Wastewater from the mill site discharged/piped and treated at external wastewater treatment plant.

8.2.4 Water Consumption

**Water Consumption**

Equals water lost during manufacturing plus water in sold products and water in waste – i.e. “the portion of the water that is removed from a water source that is not immediately returned to the water source.”

**Evaporation**

Conversion from a liquid or solid state to a vapour.

**Water Lost during Manufacturing**

Water evaporated to the atmosphere during manufacturing, from on-site wastewater treatment facilities and any other water evaporated to air or lost to soil.

**Water in Products Sold**

Water content in manufactured products sold (at gate) to the market, in pulp, paper and any other products. Water contained in finished products sold is calculated based on factors – supporting calculation table for optional use is provided by Cepi.

**Water in Waste**

Water content in waste that is permanently stored on site or removed from site for treatment off site or for deposit on landfill. Includes water in rejects – e.g. contrary bale content –, water in sludge – from paper production, de-inking, wastewater – and water in any other solid residual.

Water contained in waste is calculated based on factors – supporting calculation table for optional use is provided by Cepi.

8.2.5 Wastewater Treatment

**Wastewater Treatment**

Waste water treatment techniques are end-of-pipe (secondary techniques or abatement techniques). Because it is not always possible to prevent pollution at the source, end-of-pipe techniques are those that treat the waste stream arising from a process or storage unit, or an area, or part thereof, to reduce its pollutant content. Waste water treatment techniques aim to reduce waste water and the pollutants it carries. They encompass pre-treatment at the source or in combined streams as well as final treatment of collected waste water before discharge into a receiving water body.

**Primary Treatment**

Physico-chemical treatment, such as equalisation, neutralisation or sedimentation. Equalisation (e.g. in equalising basins) is used to prevent large variations in flow rate, temperature and contaminant concentrations and thus to avoid overloading the waste water treatment system.

**Secondary Treatment**

For the treatment of waste water by means of microorganisms, the available processes are aerobic and anaerobic treatment. In a secondary clarification step, solids and biomass are separated from effluents by sedimentation, sometimes combined with flocculation.

**Tertiary Treatment**

Advanced treatment comprises techniques, such as filtration for further solids removal, nitrification and denitrification for nitrogen removal or flocculation/precipitation followed by filtration for phosphorus removal. Tertiary treatment is normally used in cases where primary and biological treatment are not sufficient to achieve low levels of TSS, nitrogen or phosphorus, which may be required e.g. due to local conditions.

**8.3 Emissions****Emissions**

Means the direct or indirect release of substances, vibrations, heat or noise from individual or diffuse sources [...] into air, water or land.

**Specific Emissions**

Emissions calculated per quantity of the final output (paper & board + market pulp).

**8.3.1 Air Emissions****Carbon Dioxide (CO<sub>2</sub>)**

A naturally occurring gas, also a by-product of burning fossil fuels from fossil carbon deposits, such as oil, gas and coal, of burning biomass, of land use changes and of industrial processes (e.g., cement production). It is the most important anthropogenic Greenhouse Gas (see definition below). CO<sub>2</sub> emissions are fossil emissions – from stationary combustion of fossil fuels – or biogenic emissions – emissions directly resulting from the combustion, decomposition, or processing of biologically based materials other than fossil fuels, peat, and mineral sources of carbon.

The CO<sub>2</sub> emissions reported in Cepi statistics includes emissions of combustion installations in pulp and paper mills.

**Indirect CO<sub>2</sub> Emissions**

CO<sub>2</sub> emissions from net bought electricity, calculated as “net bought electricity” multiplied by the “electricity emissions factor” applied in each country.

**Electricity Emissions Factors**

CO<sub>2</sub> emissions per kWh from electricity generation: CO<sub>2</sub> emissions from fossil fuels consumed for electricity generation, in both electricity-only and combined heat and power plants, divided by output of electricity generated from fossil fuels, nuclear, hydro (excl. pumped storage), geothermal, solar, wind, tide, wave, ocean and biofuels. Both main activity producers and autoproducers have been included in the calculation.

**Greenhouse Gas (GHG)**

Those gaseous constituents of the Earth's atmosphere, both natural and anthropogenic, with properties that cause the greenhouse effect. Water vapour (H<sub>2</sub>O), carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>) and ozone (O<sub>3</sub>) are the primary greenhouse gases in the atmosphere. The Kyoto Protocol deals with these greenhouse gases, except for water vapour, as well as sulphur hexafluoride (SF<sub>6</sub>), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs). Other entirely human-made greenhouse gases in the atmosphere, such as the halocarbons and other chlorine- and bromine-containing substances, are dealt with under the Montreal Protocol.

**Methane (CH<sub>4</sub>)**

Methane is a colourless gas, odourless at low concentrations, but with sweetish chloroform-like odour at high concentration. It is one of the six greenhouse gases to be mitigated under the Kyoto Protocol. Methane is the major component of natural gas and associated with hydrocarbon fuels (animal husbandry and agriculture). The gas is highly combustible, and mixtures of about 5 to 15 per cent in air are explosive. Upon release into the atmosphere, methane is destroyed by reactions with other chemicals in the atmosphere, giving a lifetime of about 10 years.

**Sulphur Emissions (SO<sub>x</sub>)**

Sulphur emissions come from fossil fuel combustion by power plants, large industries, and mobile sources, and from some industrial processes. It is harmful to vegetation and contributes to adverse health effects and to the formation of ground-level ozone and fine particle pollution. Sulphur dioxide and other sulphur compounds are listed as polluting substances e.g. in the Industrial Emissions Directive (IED).

Total sulphur (S) emissions to air are the sum of sulphur dioxide, TRS and all other gases containing sulphur compounds.

- Sulphur dioxide (SO<sub>2</sub>) is major air pollutant of sulphuric emissions. When expressed as sulphur emissions (S) in tonnes, 2 tonnes of SO<sub>2</sub> equals 1 tonne of S.
- Total reduced sulphur (TRS). The sum of the following reduced malodorous sulphur compounds generated in the pulping process: hydrogen sulphide, methyl mercaptan, dimethylsulphide and dimethyldisulphide, expressed as sulphur. (Source BAT conclusions, PP). Hydrogen sulphide (H<sub>2</sub>S) is the main contributor.
- Other gases containing sulphur compounds include is e.g. SO<sub>3</sub>.

**Nitrogen Oxides (NO<sub>x</sub>)**

Nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>) are together referred to as nitrogen oxides (NO<sub>x</sub>). The sum of nitrogen oxide (NO) and nitrogen dioxide (NO<sub>2</sub>), expressed as NO<sub>2</sub>.

**Particulate Matter (Dust)**

Particulate matter (synonymous dust) is a collective name for all solid particles (of any shape, structure or density) or liquid materials (droplets and aerosols) suspended in air, including dust, smoke, soot, pollen and soil particles. These complex mixtures include both organic and inorganic particles and vary greatly in size, composition and origin. Based on size, particulate matter is often divided into two main groups. The coarse fraction contains the larger particles with a size ranging from 2.5 to 10 µm (PM<sub>10</sub>– PM<sub>2.5</sub>). The fine fraction contains the smaller ones with a size up to 2.5 µm (PM<sub>2.5</sub>). The particles in the fine fraction which are smaller than 0.1 µm are called ultrafine particles. Particles present in the flue-gas are determined from waste gases as 'mass concentration of dust' according to an appropriate standard method, e.g. gravimetric method EN 13284-1.

**8.3.2 Water Emissions (Discharge of Pollutants)**

Discharge of pollutants at point source after internal or external treatment to final destination for pollutants specified following legal requirements.

**Biochemical Oxygen Demand (BOD)**

BOD is the quantity of dissolved oxygen required by microorganisms to decompose organic matter in waste water. BOD is related to the content of substances that can be biochemically oxidised. BOD can be seen as the easily degradable part of COD. The unit of measurement is mg O<sub>2</sub>/l.

**Chemical Oxygen Demand (COD)**

COD is the amount of chemically oxidisable organic matter in waste water (normally referring to analysis with dichromate oxidation).

**Total Suspended Solids (TSS)**

Total suspended solids (in waste water). Suspended solids consist of small fibre fragments, fillers, fines, non-settled biomass (agglomeration of microorganisms) and other small particles.

**Total Nitrogen**

Total nitrogen (Tot-N) expressed as N, includes organic nitrogen, free ammonia and ammonium (NH<sub>4</sub><sup>+</sup>-N), nitrites (NO<sub>2</sub><sup>-</sup>-N), nitrates (NO<sub>3</sub><sup>-</sup>-N) and organic nitrogen compounds. Nitrogen is released to water from mills due to the content in wood, use in biological treatment plant and use of chemicals.

**Total Phosphorus**

Total phosphorous (Tot-P) expressed as P, includes dissolved phosphorus plus any insoluble phosphorus carried over into the effluent in the form of precipitates or within microbes.

**Adsorbable Organic Halides (AO<sub>x</sub>)**

Adsorbable organic halides measured according to the EN ISO: 9562 standard method for waste waters and expressed as chloride in mg Cl/l. It includes adsorbable organically bound chlorine, bromine and iodine.

**8.4 Residues and Sludges**

**Residues and Sludges**

All residues from the pulp and paper production and waste water treatment processes are included: bark, ashes, green liquor sludges, other sludges, paper rejects, etc.

**Sludge**

A semifluid mass of sediment resulting from treatment of water, sewage and/or other wastes. A soft, soupy, or muddy bottom deposit, such as found on tideland or at the bottom of a water body.

**Landfill**

A waste disposal site for the deposit of the waste onto or into land (i.e. underground).

**Use on Land**

Residues are used as soil improvers in road construction and on land reconstruction applications. For example, a large fraction of deinking sludge consists of carbonates and clay and can act as liming agents, acidity controllers, and structure improvers in agricultural land. Ash can be used in land construction and also as a fertiliser.

**Incineration with Energy Recovery**

Since these residues are, to a large extent, based on wood they are ideal for co-combustion in heat or power generating plants. Since wood is a renewable resource, combustion of pulp and paper production residues with energy recovery contributes to the battle against global warming.

**8.5 Environmental Management System**

**Eco-Management and Audit Scheme (EMAS)**

The EU Eco-Management and Audit Scheme (EMAS) is a voluntary management instrument developed by the European Commission for companies and other organisations (all economic and service sectors, applicable world-wide) to evaluate, report, and improve their environmental performance. EMAS is open to every type of organisation eager to improve its environmental performance. Its objective is to improve the environmental performance of organisations by having them commit to both evaluating and reducing their environmental impact, and continuously improving their environmental performance. External and independent nature of the EMAS registration process ensures credibility and reliability of the scheme. This includes both the actions taken by an organisation to continuously improve its environmental performance, and the organisation's disclosure of information to the public through the environmental statement.

**Environment Management System (ISO 14001)**

The ISO 14000 family addresses various aspects of environmental management developed by ISO (International Organization for Standardization). ISO 14001:2004 sets out the criteria for an environmental management system. It maps out a framework that a company or organization can follow to set up an effective environmental management system. It can be used by any organization regardless of its activity or sector and can be certified to. Using ISO 14001 can provide assurance to

company management and employees as well as external stakeholders that environmental impact is being measured and improved; however the standard does not state requirements for environmental performance. ISO 14004:2004 provides guidance on the establishment, implementation, maintenance and improvement of an environmental management system and its coordination with other management systems.

#### **Energy Management System (ISO 50001)**

ISO 50001:2011 sets requirements with guidance for establishing, implementing, maintaining and improving an energy management system with the purpose to support organizations in all sectors to enable an organization to follow a systematic approach in achieving continual improvement of energy performance, including energy efficiency, energy use and consumption, through the development of an energy management system.

### **8.6 Bioeconomy**

#### **8.6.1 General definitions on Bioeconomy**

##### **Bioeconomy**

The bioeconomy encompasses the production and use of renewable biological resources and their conversion into food, feed, bio-based products and bioenergy.

##### **Biomass**

Biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste. Includes bio-based products and lignin.

##### **Bio-Based Products**

Material of biological origin excluding material embedded in geological formations and/or fossilized. Examples are (whole or parts of) plants, trees, algae, marine organisms, micro-organisms, animals, etc.

##### **Bioliquids - Biofuels**

Bioliquids are liquid fuels for energy purposes other than for transport, including electricity and heating and cooling, produced from biomass. Biofuels means liquid or gaseous fuels for transport produced from biomass.

##### **Black Liquor**

Black liquor is generated in the chemical pulping process (kraft, sulphite) and recovered in the recovery boiler. Black liquor contains organic substances (essentially the separated lignin residue but also minor dissolved components of wood: extractives, hemicelluloses) and inorganic chemicals that resulted from the pulping process reactions. After washing and evaporation, the concentrated black liquor is led to the recovery system where cooking chemicals are recovered using energy made available from the combustion of organic substances. Additional energy from the flue-gases is recovered to produce heat, process steam and generate electrical power. Also known as spent cooking liquor.

##### **Lignin**

Wood substance, an aromatic polymer in the cell wall of plants. The binding substance in natural fibres. Lignin is dissolved out along with the carbohydrates in the pulping process.

##### **Biorefinery**

A biorefinery is an overall concept of a processing plant where forest-based feedstock (virgin and/or recycled fibres) is converted and extracted into a spectrum of added value products.

Biorefineries can be classified in four sub-categories:

- 1- Biorefineries based on chemical pulping operations to produce various existing or evolving bio-based products;
- 2- Biorefineries using virgin pulp and/or recycled fibres to produce evolving bio-based products;

- 3- Other biorefineries using lignocellulose as raw material to produce various existing or evolving bio-based products.
- 4- Categories 1-3 Refineries that implement Carbon Capture and Utilisation (CCU) technologies to capture and utilise biogenic carbon to produce bio-based products.

8.6.2 Woody Biomass usages

Traditional products

Fibres		Main sector of use	Main products
Roundwood	Saw log	Sawn wood	Wood Construction, Furniture & Packaging, etc.
		Plywood	Plywood, particle board, Fibreboard, Veneer Sheets
	Pulpwood, Paper for Recycling	Pulp	Paper pulp, Dissolving pulp
		Paper and Board	Graphic paper, Packaging paper & board, Tissue paper, Speciality paper, other paper and board

Energy

	Main sectors of use	Main products
Residues from forestry, pulp & paper mills, sawmills	Heat	Heat
	Power	Power
	Wood pellet	Wood pellet

New bio-based products

	Main sectors of use	Main products
Biomass	Fuel	Bio-cellulosic ethanol, bio oils, bio-gas, biodiesel, heating oil, etc.
	Chemicals	Adhesives, disinfectants and detergents, drilling fluids, paint and dyes, etc.
	Food and feed	Flavourings, preservatives, texturizers and emulsifiers, anti-caking agents and stabilizers, etc.
	Materials	Natural fabric dyes, pig iron, asphalt roofing sheets, carbon fibre, thermoplastics, synthetic viscose fibre, alternative to metallic materials, bio-plastics, cellulose foams, flexible and LCD screens, etc.
	Cosmetics, personal hygiene, medical and pharmaceutical	Essential oils, medication, cosmetics, personal hygiene products, etc.



## **Chapter 9 – Social Affairs**

### **9.1 Employment**

#### ***Employment***

The number of employees concerned with the manufacture of pulp and/or paper as recorded by Cepi member associations at a specific point during the year concerned. Includes all full-time and part-time employees in what might be classed as blue-collar and white-collar occupations.

Employment figures reported in Cepi annual statistics don't include employees in converting operations. However, employees of integrated converting operations (within the producing mill) and those of headquarters are included.

#### ***Number of "Man-years"***

All employees who are on the payroll of the mill calculated as full-time employees during the year (full year equivalent)

#### ***Total Number of Worked Hours***

Refers to the total worked hours for the mill (planned hours plus overtime of all employees worked minus absenteeism due to sickness, holidays, sabbaticals...)

### **9.2 Accidents**

#### ***Number of Accidents***

Fatality: accident at work leading to the death of the victim within a year after the date of the accident

1 to 3 days lost time accidents: number of accidents resulting 1 to 3 days of absence after the accident day

More than 3 days lost time accidents: number of accidents resulting 4 and more days of absence after the accident day (counting starts on the 4th day)

#### ***Accident Rate***

Number of all lost-time-accidents at work (fatal and non-fatal) divided by the number of employed persons times 1000

#### ***Lost Time Accidents Frequency Rate***

Number of lost-time-accidents/worked hours \* 1,000,000

#### ***Accidents Travelling to and from Work***

These accidents refer to commuting accidents from and to work. If a person has e.g. a traffic accident outside the mill in the course of a business trip, that accident should be recorded under "number of accidents at work".

#### ***Lost Workdays***

Total number of days lost due to accidents at work

### **9.3 Health and Safety**

#### ***OHSAS 18000***

International occupational health and safety management system specification. It comprises of OHSAS 18001, which is an Occupation Health and Safety Assessment Series for health and safety management systems. OHSAS 18001 is intended to help an organizations to control occupational health and safety risks. It was developed in response to widespread demand for a recognized standard against which to be certified and assessed.

## I - List of Terms

Abstracted (Water)	32	Classes (Paper for Recycling)	16
Accident Rate	39	Clay	21
Accidents	39	Coal	30
Added Value	7	Coated Printing and Writing Papers	24
Additives	20	Coated Mechanical	24
Adsorbable Organic Halides	36	Coated Woodfree	25
Air Emissions	34	Coating	23
AOX	36	Coating Chemicals	20
Apparent Consumption	28	Coating Clay	21
Audit Scheme	36	COD	35
Average Size of Mills	7	Co-generation (CHP)	31
Bagasse	14	Collection	17
Bamboo	14	Collector	17
Bentonite	21	Colouring (Materials for)	20
Bio-based Products	30	Company	6
Biochemical Oxygen Demand	35	Composting	17
Bioeconomy	37	Coniferous	10
Biofuels	37	Consumption (Paper and Board)	28
Bioliquids	37	Consumption (Paper for Recycling)	16
Biomass	30	Consumption (Pulp )	14
Biomass	37	Consumption (Water)	33
Biorefinery	37	Consumption (Wood )	11
Black Liquor	37	Containerboard / Case Materials	25
Bleached Sulphate	13	Converter	28
Bleached Sulphite Pulp	13	Converting	28
Bleaching	13	Cooling Water	32
Board	23	Corporation	5
BOD	35	Corrugated and Kraft	16
Broke (Mill)	16	Deinked Pulps	14
Calcium Carbonate	21	Deinking	14
Capacity	6	Deliveries (Pulp)	14
Carbon Dioxide	34	Derived Gas	30
Carriage Paid To	19	Disposal	17
Cartonboard	25	Dissolving Pulp	14
Case Material / Containerboard	25	Dust	35
Certification	9	Eco-Management and Audit Scheme	36
Changes in capacity	7	Electricity	31
Chemical Oxygen Demand	35	Electricity Emissions Factors	34
Chemical Pulp	13	Electricity Generation	31
Chemicals	20	Electricity Produced on Site	31
Chemi-thermomechanical Pulp	12	EMAS	36
Chips	11	Emissions	34
Cigarette Paper	26	Emissions Factors (Electricity)	34

Employment	39	High Grades / Other Grades	16
EN643	18	Imports	28
Energy	30	Incineration	36
Energy Management System	37	Indirect CO <sub>2</sub> Emissions	34
Envelope Paper	26	Industrial Production	5
Environmental Management System	36	Industrial Residues (Wood)	10
Evaporation	33	Insulating Paper or Board	27
Ex-mill Prices	19	Intake (Water)	32
Ex-works Prices	19	Integrated Paper Mill	6
Exports	28	Integrated Pulp	14
Felt Board	27	Internal Deliveries (P&B)	28
Fibres	8	Internal Deliveries (Pulp)	14
Fibrous Materials	8	Investments	7
Filler	21	ISO 14001	36
Filler Clay	21	ISO 50001	37
Filling (Materials for)	20	Kaolin	21
Filter Paper	27	Kraft Pulp	13
Final Disposal	17	Label Papers	27
Flexible Packaging	27	Landfill	36
Forest	9	Lignin	37
Forest Available for Wood Supply	9	Loading (Materials for)	20
Forest Certification	9	Logging	9
Fossil Fuel	30	Logging Residues (Wood)	10
Free-delivered Prices	19	Losses	17
Freshwater Abstracted	32	Lost Workdays	39
Fuel Oil	30	Machine	6
Fuel Wood	11	Man-years	39
Functional Chemicals	20	Market pulp	14
Gas	30	Mechanical Paper or Board	23
Generation (Electricity)	31	Mechanical Pulp	12
Grades (Paper and Board)	23	Methane	35
Grades (Pulp)	12	Mill	6
Graphic Papers	24	Mill Broke	16
Greenhouse Gas	34	Mineral Chemicals	20
Gross Domestic Product	5	Mixed Grades	16
Ground Calcium Carbonate	21	Modified Starches	22
Groundwater	32	Moulded Products	25
Group	5	Municipal Supply Water	32
Growing Stock	9	Native Starch	22
Hardwood	10	Natural Gas	30
Heat Energy	31	Net Annual Increment	9
Heat Produced on Site	31	Net Bought Electricity	31

Net Production	27	Pulping	12
Newspapers and Magazines	16	Pulpwood	10
Newsprint	24	Purchased Electricity	31
Nitrogen	36	Purchased Heat	32
Nitrogen Oxides	35	Raw materials	8
Non-Collectable	17	Recovered Paper	16
Non-Coniferous	10	Recovery	17
Non-Fibrous Materials	20	Recyclability	16
Non-Integrated Pulp and Paper Mills	6	Recycled Pulp	14
Non-Wood Pulp	14	Recycling	16
OHSAS 18000	39	Recycling Rate	18
Operating Rate	7	Release Liner Base Paper	27
Other Grades / High Grades	16	Renewable Sources	31
Other Paper and Board	26	Reservoir	33
Other Paper and Board for Packaging	25	Residues	36
Other Pulps	14	Retail Trade Turnover	5
Outflow (Water)	33	Roll	27
Packaging Paper and Board	25	Roundwood	10
Paper and Board	23	Sawdust	11
Paper for Recycling	16	Sawlogs	10
Paper Mill	6	Secondary Treatment	34
Paperboard	23	Semi-Chemical Pulp	13
Particulate Matter	35	Sheet	28
Pellets	11	Size of Mills	7
Phosphorus	36	Sizing (Materials for)	20
Pollutants	35	Sludges	36
Population	5	Social Affairs	39
Precipitated Calcium Carbonate	21	Soda Pulp	13
Prices (Paper for Recycling)	18	Softwood	10
Primary Energy	30	Sold Electricity	31
Primary Pulp	12	Sold Steam	32
Primary Treatment	34	Solid under Bark	10
Printing and Writing Papers	24	Speciality Paper and Board	26
Private Final Consumption Expenditure	5	Specific Emissions	34
Process Chemicals	20	Specific Primary Energy	30
Process Losses	17	Starch	22
Process Water	33	Stock Pulp	12
Production (Paper and Board)	27	Stocks (Paper for Recycling)	17
Production Capacity	6	Straw	14
Pulp	12	Sulphate Pulp	13
Pulp Mill	6	Sulphite Pulp	13

Sulphur Emissions	35	Wood	9
Surface Water	32	Wood Consumption	11
Suspended Solids	35	Wood Pulp	12
Talc	22	Woody Biomass	38
Tertiary Treatment	34	Woodfree Paper or Board	23
Thermo-Mechanical Pulp	12	Worked Hours	36
Tissue Paper	25	Wrappings	26
Total Deliveries (Pulp)	14		
Transitional water	33		
Treatment (Wastewater)	33		
Turnover	7		
Unbleached Pulp	13		
Unbleached Sulphate Pulp	13		
Unbleached Sulphite Pulp	13		
Uncoated Printing & Writing Papers	24		
Uncoated Mechanical	24		
Uncoated Woodfree	24		
Use on Land	36		
Utilisation (Paper for Recycling)	16		
Utilisation by Sector (Paper for Rec.)	17		
Utilisation Rate (Paper for Recycling)	18		
Value Added	7		
Veneer Logs	10		
Virgin Pulp	12		
Wallpaper Base	27		
Waste	16-31		
Waste of Waste	31		
Wastewater	33		
Wastewater Treatment	33		
Water	32		
Water Consumption	33		
Water Content	32		
Water Emissions	35		
Water in Products Sold	33		
Water in Waste	33		
Water Lost	33		

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### **III - Acronyms – Abbreviations**

AOX	Absorbable Organic Halides
BAT	Best Available Technology
BOD	Biological Oxygen Demand
BREF	Best Available Technology Reference Documents
BREF-CCW	BAT Reference Document for Common Waste water and Waste Gas Treatment
BREF-PP	BAT Reference Document for the Production of Pulp, Paper and Board
CEN	European Committee for Standardization
CEPI	Confederation of European Paper Industries
CHP	Combined Heat and Power (Generation)
CH <sub>4</sub>	Methane
CMP	Chemi-mechanical Pulp
CN	Combined Nomenclature
CO <sub>2</sub>	Carbon Dioxide
COD	Chemical Oxygen Demand
CPT	Free-delivered Prices / Carriage Paid To
CTMP	Chemi-Thermomechanical Pulp
DIP	De-inked Pulp
EC	European Commission
ECB	European Central Bank
EEA	European Environment Agency
EFI	European Forest Institute
EN	European Normalization
EPIS	European Pulp Industry Sector
ERPA	European Recovered Paper Association
ERPC	European Recovered Paper Council
ESTAT	Eurostat - Statistical office of the European Union
ETS	Emissions Trading Scheme
EU	European Union
EXW	Ex-mill Prices / Ex-works
FAO	Food and Agriculture Organization of the United Nations
FRA	Forest Resource Assessment
FSC	Forest Stewardship Council
FTP	Forest-based Sector Technology Platform
GCC	Ground Calcium Carbonate
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GTIS	Global Trade Information System
GVA	Gross Value Added
HS	Harmonized Commodity Description and Coding System
HW	Hardwood
ICFPA	International Council of Forest and Paper Associations
IEA	International Energy Agency
IED	Industrial Emissions Directive
IMA	Industrial Minerals Association

IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organisation for Standardisation
ITTO	International Tropical Timber Organization
JPC	Jaakko Poyry Consulting
JRC	Joint Research Centre
LHV	Lower Heating value
LWC	Light-weight Coated
MCPFE	Ministerial Conference on the Protection of Forests in Europe
NACE	Statistical Classification of Economic Activities in the European Community
NCASI	National Council for Air and Stream Improvement
NGO	Non-governmental Organization
NOx	Nitrogen Oxides
NPISH	Non Profit Institutions Serving Households
OECD	Organisation for Economic Co-operation and Development
OHSAS	Occupation Health and Safety Assessment Series
P	Phosphorus
PCC	Precipitated Calcium Carbonate
PEFC	Programme for the Endorsement of Forest Certification
PM	Particulate Matter
PPI	Pulp and Paper Industry
PRODCOM	European Community Industry Production (statistics of industrial production)
PTS	Papiertechnische Stiftung
R&D	Research and Development
RES	Renewable Energy Sources
RISI	Fastmarkets RISI - Resource Information System Inc
S	Sulphur
SC	Super Calendered
SFM	Sustainable Forest Management
SME	Small and Medium-sized Enterprises
SO <sub>2</sub>	Sulphur Dioxide
STS-R	Regulation on Short-Term Statistics
SW	Softwood
TBFRA	Temperate and Boreal Forest Resources Assessment
TMP	Thermo-Mechanical Pulp
TOR	Terms of Reference
TRS	Total Reduced Sulphur
TSS	Total Suspended Solids
UN	United Nations
UNECE	Economic Commission for Europe of the United Nation
VAT	Value Added Tax
WBCSD	World Business Council for Sustainable Development
WTO	World Trade Organization



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