

About Nordic Ecolabelled

Paper products – basic and chemical module



Version 2.5

Background to ecolabelling
12 November 2019

Nordic Ecolabelling



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Appendix 1 Background to requirements in regard to fibres

Appendix 2 Background to the requirements in the chemical module

AI001 Paper products - Paper products – basic and chemical module, version 2.5, 12 November 2019

This document is a translation of an original in Swedish. In case of dispute, the original document should be taken as authoritative.

Addresses

In 1989, the Nordic Council of Ministers decided to introduce a voluntary official ecolabel, the Nordic Ecolabel. These organisations/companies operate the Nordic ecolabelling system on behalf of their own country's government. For more information, see the websites:

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1 Summary

This background document presents an account of the general requirements given in “Nordic Ecolabelling of paper products – basic module version 2” and in “Nordic Ecolabelling of paper products – chemical module version 2”.

Nordic Ecolabelling has been designing ecolabelling requirements in regard to paper products for nearly twenty years. A life cycle analysis perspective provides the basis for Nordic Ecolabelling requirements, which means that requirements are devised, for each phase in the life cycle of a paper product, in terms of their effects on the product’s environmental impact and their potential for facilitating environmental improvements as well as in regard to whether the fulfilment of the requirement is technically feasible. Ecolabelling can make a difference. Requirements in regard to paper products are currently arranged in a so-called modular system, in which the general requirements placed on pulp and paper production, including forestry management, are to be found in the basic module and the chemical module.

The criteria presented in the basic module and the chemical module for the paper industry, version 1 (2003), have been reviewed and revised. The revision process took place between 2008 and 2011. An evaluation of the criteria, completed prior to the start of the revision process, has both guided and informed the work of the revision. The revision compares parameters to actual results attained by producers, as well as to BAT (Best Available Technology) values according to the appropriate BREF (BAT Reference) documents, as well as the new EU Eco-label criteria for paper. Nordic Ecolabelling has additionally made use of available drafts of a new BREF document, which, however, do not, as yet, contain any new BAT values.

The most important changes made to the new proposal for version 2 of the basic module are:

- Requirements in regard to energy and CO₂ emissions have been made more stringent.
- Requirements in relation to CO₂ emissions during transportation from forest to the paper mill have been introduced.
- The requirements on AOX levels have been tightened.
- The effects of filler material have been removed from the calculation matrix. This means that the emissions requirement has been tightened for paper that contains filler, such as printing paper.
- Requirements in regard to certification of sustainable raw products have been tightened.

The most important changes made to the new proposal for version 2 of the chemical module are:

- A general prohibition of classified chemicals, including trivial limit, has been introduced.
- The requirement regarding classified residual monomers has been extended.
- A new requirement stipulating that Bisphenol A may not be used in Nordic Ecolabelled paper.
- A GMO ban has been introduced for starches.

The standards required by Nordic Ecolabelling are set at a considerably more demanding level than previously; and, furthermore, are judged to be more stringent than those required according to the EU Ecolabel criteria for printing paper. This difference is especially apparent in regard to passages concerning energy, CO₂ emissions, uses of GMO and the requirements placed on forestry management practices.

2 Basic facts about the criteria

This section contains basic information regarding the criteria for Nordic Ecolabelling of various kinds of paper product. Background information on the modular system for paper products is given, along with a presentation of arguments for the Nordic Ecolabel. A summary of the market situation in regard to the paper industry is also provided in this section, along with a series of brief remarks on environmental management systems, environmental declarations and other forms of labelling.

2.1 The Nordic Ecolabelling modular system for paper products

The criteria for Nordic Ecolabelling of paper products encompass a wide range of requirements, most of which relate to pulp and paper production. Since the raw materials, chemicals and manufacturing processes in pulp and paper production are similar, Nordic Ecolabelling introduced a so-called modular system for paper products in 2003.

This background document for the basic and chemical modules presents the reasoning behind the standards required by Nordic Ecolabelling in regard to forestry management, pulp and paper production and uses of chemicals. More detailed descriptions of motives for Nordic Ecolabelling as regards various finished products are given in the background documents belonging to their respective supplementary modules, for example the supplementary module regarding copy and printing paper.

The Basic module contains general requirements concerning forestry management, emissions, energy efficiency, waste disposal in pulp and paper production, as well as environmental and quality assurance.

The chemical module contains general requirements in regard to the uses of chemicals in the manufacture of pulp and paper.

Supplementary modules specify those requirements, in addition to those laid out in the Basic and Chemical modules, for different types of paper in order that must be met in order that a licence to carry the Nordic Ecolabel may be granted. The requirements levels of supplementary modules may vary in relation to the basic or chemical module. If the standards required in the modules differ, the requirement levels specified in the applicable supplementary module are to be applied. For a product to be granted a licence to carry the Nordic Ecolabel, the relevant requirements in the basic module and chemical module, in addition to the requirements in the applicable supplementary module, must be fulfilled.

Version 1 of the modular system includes the following documents regarding paper products:

General criteria

- Basic Module (Nordic Ecolabelling of paper products – basic module)
- Chemical Module (Nordic Ecolabelling of paper products – chemical module)

and the following **supplementary modules**

- Nordic Ecolabelling of copy and printing paper – supplementary module
- Nordic Ecolabelling of tissue paper – supplementary module
- Nordic Ecolabelling of greaseproof paper – supplementary module
- Nordic Ecolabelling of coffee filters – supplementary module
- Nordic Ecolabelling of paper envelopes – supplementary module

Version 2 of the modular system includes the following documents:

- Basic Module (Nordic Ecolabelling of paper products – basic module)
- Chemical Module (Nordic Ecolabelling of paper products – chemical module)

Other Nordic Ecolabel criteria may refer to the modular system, such as the revised criteria for copying and printing paper (version 4), the revised criteria for tissue paper (version 5) and the criteria for hygiene products.

2.2 Justification for Nordic Ecolabelling

An account of the reasons for the decision by Nordic Ecolabelling to make provision for eco-labelling of paper products is presented in this section.

Raw materials

Cellulose fibre is the predominant raw material for paper manufacture. The material content of paper is nearly 98% natural in origin. The fibrous raw material may be sourced from trees, other plants or recycled paper. The environmental impact of felling may, inter alia, involve reduced biodiversity in the affected area as well as having a negative effect on climate change. It may also have other effects – for instance, infringements upon the rights and lands of indigenous peoples.

As is shown by Figure 1, 89% of raw materials in global paper production are derived from chemical or mechanical pulp or recycled paper. Approximately 8% consists in filler material and coating chemicals. The remaining 3% is made up of various forms of chemical additive, approximately half of which consists in starch. Values are calculated on the basis of the dry-matter content of products in relation to the 2005 world paper production total of 375 million tonnes.

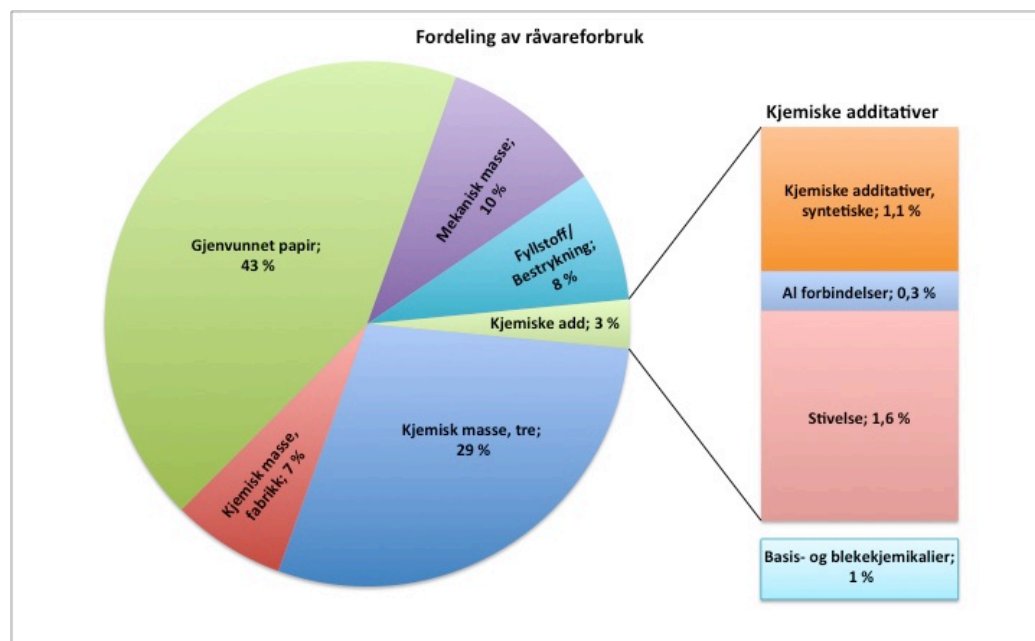


Figure 1. Breakdown of types of raw materials used in total world paper production; shown in percentage by weight for 2005. As cited in "Department of Chemical Additives, Zellcheming, Germany, 2008. Printed in MS/EIPPCB/PP_Draft_1 April 2010". The illustration is taken from the BREF document¹. ("Kjemisk masse, fabrikk" = Chemical pulp, annual plants. "Kjemisk masse, tre" = Chemical pulp, wood).

Recycled paper is a valuable source of raw materials. Recycled paper is sorted before being sold on as raw material for paper manufacture; the various grades of paper quality provide raw materials, or input factors, for the production of, for example, paper for newspapers and magazines, paper packaging, paper towels as well as copy and printing paper. Nordic Ecolabelling places emphasis on sustainable forestry management and the traceability of fibre from forest to producer. In addition, Nordic Ecolabelling promotes the use of recycled fibre, which is a valuable resource.

Uses and handling of chemicals

Many chemical substances are used in the manufacture of pulp and paper products. According to KEMI, the Swedish Chemicals Agency, 3100 different chemical products from 200 suppliers were delivered to the Swedish pulp and paper industry during 2004. These may be categorised into process chemicals for pulp production as well as chemical additives and auxiliary chemicals for paper production. Chemical additives are used to give the paper various characteristics or qualities and the purpose of auxiliary chemicals is to increase efficiency and simplify production processes. These substances are collectively referred to as "production chemicals".

¹ Draft 1 BREF document for Pulp and Paper Industry, 2010. Reference documents from the European IPPC Bureau. <http://eippcb.jrc.ec.europa.eu/reference/>

Figure 2 shows the market shares of chemicals according to function.

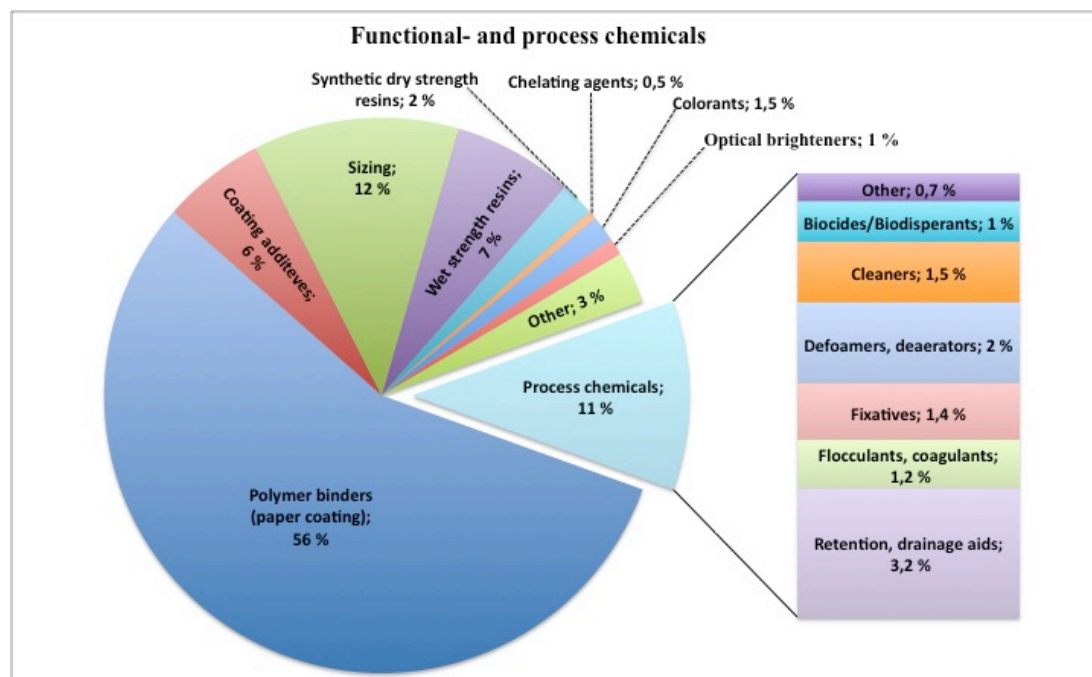


Figure 2. Market share of functional and process chemicals used by the pulp and paper industry. Information from Department of Chemical Additives, Zellcheming, Germany, 2008. Printed in MS/EIPPCB/PP_Draft_1 April 2010. The illustration is taken from the BREF document².

The chemicals are grouped in segments corresponding to the distinction between chemical additives and auxiliary chemicals described above. Chemical additives have a market share of 89% and auxiliary chemicals 11%. Of the market share taken by chemical additives, 56% is made up of coating chemicals used in paper production. Coatings consist in the main of a wet mixture of fillers (pigment) and binders. Filler consisting of clay and calcium carbonate account for 80% of the total dry-matter content of coatings. Other performance enhancing functional chemicals (3% of the total) are used in purification processes and water treatment.

Some of the chemicals are not easily biodegradable and may accumulate in plants and animals. Other chemical substances may be carcinogenic or are suspected endocrine disrupters. Biodegradability is, from an ecological point of view, one of the most important characteristics of an organic substance. In general, the easier a substance biodegrades, the fewer the ecological risks involved. Toxic substances that do not degrade are extremely hazardous for the environment. They pass undisturbed through sewage works and are deposited in the recipient, where decomposition occurs slowly and the toxic effects are long-term. Substances that bioaccumulate, and do not biodegrade, can easily reach harmful concentrations in a range of organisms. Nordic Ecolabelling sets general requirements governing the use of environmentally classified chemicals in paper production.

² Draft 1 BREF-document for Pulp and Paper Industry, 2010. Reference documents from the European IPPC Bureau. <http://eippcb.jrc.ec.europa.eu/reference/>

The **fillers and coating chemicals** category represents a majority of production chemicals. The reference group working on this project has, for both the present and previous criteria revisions, examined the environmental impact of the manufacture of filler materials. The conclusion has been drawn that the negative environmental impact of fillers and/or coating chemicals is low in comparison to the detrimental effects of paper production as a whole. The potential for securing environmental improvements in this area is, therefore, also low. The transportation of fillers may, however, present an area in which there is potential for significant environmental improvements. The production of starch based on genetically modified potato presents a further issue for future consideration. Nordic Ecolabelling has, for the current revision, chosen to prohibit such products.

New uses for chemicals are continually appearing, for instance fluoride and chromium are used in the coating of food paper and baking paper and hamburger paper in the United States. Chromium compounds and fluorinated organic compounds are both problematic for the environment. Chromium compounds are persistent and can, to varying degrees, bioaccumulate. Fluorinated organic compounds may be toxic, persistent, potentially bioaccumulative and can disperse across the globe. As result they can pose a long-term threat to both animal and human life. Nordic Ecolabelling regulates the use of chemicals with a set of stringent requirements; and both fluoride and chromium are prohibited for use in Nordic Ecolabelled food paper and baking paper.

No new Nordic Ecolabelling requirements are specified in regard to the various processes involved in extracting and producing chemicals, with the exception of the new requirement in respect of GMO starches. An evaluation of associated environmental effects may be undertaken for the next revision.

The production process

The manufacture of cellulose pulp and paper has a negative effect on the environment in a number of ways. Overall, the environmental impact of the production of cellulose pulp is greater than that of paper manufacture. Different manufacturing processes have different effects on the environment. The production of chemical pulp results in high levels of emissions, while mechanical pulp manufacturing consumes large amounts of energy in the form of electricity.

The production of paper from recycled fibres also places a burden on the environment, for example through the use of de-inking chemicals. For certain paper types, for example tissue paper, problems may be caused by remnants of substances, hazardous to both health and the environment, originating in recycled fibres.

All production of cellulose pulp and paper is energy intensive, but plants for the production of chemical pulp can achieve energy self-sufficiency. It is often the case that over 90% of energy consumed in the production process is generated from biofuels. Biofuels may be obtained as a by-product of wood handling or from the pulping process itself, in which cellulose fibres are released during boiling. The cooking liquor contains large amounts of organic substances (wood) that release energy when combusted in the recovery boiler. If pulp manufacture were to be made more energy efficient the resulting surplus of biofuel generated electricity and/or heat could be sold on the open market.

When the fibres are instead released by mechanical processes the wood fragments remain trapped in the pulp. As a result, the by-products of mechanical pulp manufacture do not contribute to the production of biofuels to the same degree as the by-products of chemical pulping. On the contrary, the mechanical pulping process consumes a great deal of electricity.

The characteristics and qualities of a paper product are determined by the use of various pulp raw materials and chemicals. The characteristics and qualities of pulp are determined by the various types of fibre and production processes used. There are three main types of pulp manufacturing processes: chemical, mechanical and the production of pulp from recycled paper. These three methods have very different effects on the environments, which makes comparison between the three difficult.

- Mechanical pulp production may consume large amounts of electricity, but emissions to water and air are low and little use is made of chemicals. Almost 100% of wood fibres are extracted and used.
- Chemical pulping processes give rise to large emissions, but energy consumption is lower and chemical pulp mills are almost self-sufficient in energy, using bio-fuels for heat and electricity generation. The use of chemicals is high. The process extracts only 50% of wood fibres from the raw material.
- The use of recycled paper has a limiting effect on the exploitation of forestry resources. However, the de-inking of recycled paper creates large amounts of sludge, for which an acceptable method of disposal must be found. The collection of used paper results in an increase in the number of journeys undertaken.

Energy consumption and effects on climate change

The production and consumption of energy place a number of burdens on the environment. Besides climatic impact and air pollution produced by the combustion of fuel, the production of primary energy sources and disposal of waste products impact on the environment.

Energy savings have an important role to play in reducing burdens placed on the environment. As regards the issues of global warming and climate change, the pulp and paper industry is in the unique position since its main raw material (wood) is renewable. As a result, waste products and surplus energy may be used to good effect in the production of renewable energy with a low climate impact. Energy use in the industry has been made more efficient. An increasing use of paper qualities that require less electricity in production goes in some way to explain this, but the main cause of improvements lies in the systematic efforts that have been made to make production processes more energy efficient.

Nordic Ecolabelling has previously instituted requirements limiting quantities of fuel consumed in heat generation, as well as levels of electricity consumption, during the manufacturing of pulp and paper. Furthermore, Nordic Ecolabelling has placed requirements on the production phase of paper and pulp manufacture in regard of carbon dioxide emissions. This new version of the basic module requires that applicants calculate and notify of the total CO₂ emissions produced by transportation from the forest to the paper mill.

Emissions to water and air

Life cycle assessments have shown that **environmental impact on the air** is primarily caused by the energy production required by the energy-intensive pulp and paper industry.

The industry is responsible for polluting the air with acidifying substances, such as sulphur, substances that lead to eutrophication, such as NO_x, and substances that contribute to the greenhouse effect.

Emissions to water resulting from the production of cellulose pulp and paper consists in, among others, substances that lead to eutrophication, such as nitrogen (N) and phosphorous (P), or that upset the balance between N and P. In sensitive environments, incidences of algal bloom and oxygen depletion may occur. The same effect occurs during a COD (Chemical Oxygen Demand) test, i.e. organic compounds consume oxygen as they degrade in water.

Better bleaching chemicals, more effective methods of water purification and the optimisation of the manufacturing process have led to major reductions in adsorbable organic halogen (AOX) emissions to water over the last few years. AOX categorised compounds of chlorine have been replaced by less toxic compounds, as chlorine gas is no longer used in bleaching. The issue of AOX pollutants is taken into consideration by Nordic Ecolabelling in the setting of requirements in regard to emissions to water from pulp and paper production and of requirements in regard to wet strength agents, which may contain chloro-organic compounds, as well as in the prohibition of the chlorine bleaching of pulp.

Waste and residual products and recycling

Waste products are formed during the production process. Waste products include bark, fibre residues and sludge arising from water treatment. These residue products are currently mainly used as sources of fuel. Combustion of these residues results in the accumulation of quantities of ash. The production of pulp from recycled paper results in larger quantities of sludge due to the presence of fillers and printing ink in the recycled material. Energy may also be recovered from these waste products by incineration; although ash forms a higher of combustion products than for the incineration of pure biomass.

The paper becomes waste after use by the consumer. Toilet paper is disposed of via the sewer system. Household paper products, such as kitchen towel or serviettes, are disposed of in household waste and are subsequently burnt, composted or deposited at a landfill site. The majority of used office paper, newspapers and other printed matter are collected as recycled paper. Several of the Nordic countries are approaching the theoretical limit for the possible collection of paper for recycling, which is set at 90%. It is not considered possible to recycle the approximately 19% of used paper that consists of paper hygiene articles, archived paper or that is used in products such as wallpaper. Sweden already currently imports a high proportion of recycled fibre from continental Europe.

Recycling paper is energy and resource efficient since the production of paper from virgin fibre requires greater resources than production from recycled fibre.

Nordic Ecolabelling places requirements on waste treatment and disposal associated with production. The Nordic Ecolabel also promotes the use of recycled fibre by allowing for

the use of a high proportion of recycled fibre in the production of Nordic Ecolabelled paper as an alternative to the use of certified virgin fibre. The criteria for paper envelopes contain requirements that are designed to ensure that it is possible to recycle the end product.

Objectives for the future

It is theoretically possible to envisage pulping plants that achieve a zero level of emissions to water. Despite the fact that improvements are continually being made in regard to the environmental impact of pulp and paper production, much remains to be done to optimise processes, for example through the uses of internal water recirculation in production plants and membrane filtration methods of purification. Remaining waste products can then be incinerated or decomposed with the assistance of various methods of oxidation. The pulp and paper industry has also enormous potential for the future in the development of biorefineries, which make possible the efficient generation of energy from sources with a low climate impact.

However, attention must be drawn to the risk that improvements in regard to the industry's various negative effects on the environment, such as an increased use of recirculation and improved treatment processes, may lead to an increase in energy consumption and, consequently, increased levels of emissions to air and a greater impact on climate change. By adopting a comprehensive scoring system for the calculation of emissions, Nordic Ecolabelling strives to avoid moving around environmental problems in this manner.

2.3 The Nordic market

Our society consumes very large quantities of paper products. It is, therefore, appropriate to enable these products to be licensed to carry the Nordic Ecolabel – as an effective means of securing environmental improvements. Sweden and Finland in particular are major producers and exporters of pulp and paper products. The table below shows production volumes for various types of paper in the Nordic countries.

Table 1 The pulp and paper product market in the Nordic countries. The figures are, in the main, taken from 2007.

	Total paper^a	Total pulp^a
Production in Norway	2 010 000	2 200 000
Consumption in Norway	874 000	N/A
Production in Finland	14 334 000	12 900 000
Consumption in Finland	1 933 000	N/A
Production in Sweden	11 860 000	12 400 000
Consumption in Sweden	2 314 000	N/A
Production in Denmark	367 000 ^b	N/A
Consumption in Denmark	1 256 000	N/A

^a BREF document, draft 2010

^b Nordic Ecolabelling 2003, Background document. Modules for Nordic Ecolabelled paper products
n. a. The information is not available

2.4 Other labels

The industry's own efforts in regard to environmental issues are in part directed by legislation and in part a result of voluntary measures. The most important voluntary measures stem from environmental management systems, environmental declarations and environmental labelling. Requirements in regard to environmental considerations increasingly form part of invitations to tender. A number of environmental labelling schemes, in addition to Nordic Ecolabelling, are in operation.

Environmental Management

Environmental management systems are a means of creating order in corporate operations and facilitate continual improvement on the basis of the company's own environmental objectives. Environmental management systems do not, however, stipulate requirements for specific limits (threshold values) in regard to the products or production processes. EMAS, the Eco-Management and Audit Scheme developed by the EU, and international standard ISO 14001 are important in the field of environmental management systems.

Environmental declarations

Environmental product declarations provide detailed information without placing any specific requirements on the products in question. Hence no specified limits are required. The usefulness of the declaration is dependent on the purchaser's prior knowledge of environmental concerns surrounding the product. There is at present no internationally recognised system for environmental product declarations, but this is an issue under preparation by ISO. Product category rules (PCR) are required in order to be able to make an environmental declaration.

Paper Profile is one such self-declaration system designed for the paper industry, covering several environmental parameters, for example: certification of timber, emissions, purchased electricity and quantity of deposited waste. This system, too, does not place any prohibitions on any products or operations that may be less desirable from an environmental point of view.

Raw materials labelling, FSC and PEFC

A paper product may bear the FSC (Forest Stewardship Council) label if it contains a certain quantity of certified fibres. This label is also used for printed matter and has grown in popularity over the last few years. The Harry Potter series of books is the best known examples of publications carrying the FSC label. Similarly, products may also be marked with the PEFC, Programme for the Endorsement of Forest Certification, label. These labels are, however, solely concerned with the origins of timber based raw material and say nothing about the later phases of a labelled product's life cycle. As regards printed matter, for example, FSC/PEFC labelling does not take energy consumption, emissions or use of chemicals into account – neither when the pulp or paper is produced, nor at the printing stage.

Public sector tendering

Public organisations have, in many countries, developed environmental criteria for public sector purchasing. The Swedish Environmental Management Council, and SKI³, the

³ National Procurement Ltd. – Denmark (SKI, Statens og Kommunernes Indkøbs Service)

national Danish public procurement company, are examples of organisations that issue purchasing criteria concerned with environmental sustainability. The EU Commission also publishes manuals containing guidelines for public sector purchasers seeking to apply environmental standards in their purchasing.

Environmental labelling

Environmental labelling, or ecolabelling, is the most effective way of making it easier for the consumer to choose products with the least negative impact on the environment. The products are granted approval in accordance with specific environmental requirements and the licensing organisation alone makes the necessary complex judgements in respect of the product's effects on the environment. The system excludes products that do not meet the requirements and independent third parties perform checks on the products.

In addition to the Nordic Ecolabel, there are a number of other environmental labelling schemes operating in the field of paper products: The best well-known in Europe are:

- The EU Ecolabel covers both copy paper/ printing paper and tissue paper products within the EU.
- The Swedish Society for Nature Conservation's ecolabel, Good Environmental Choice, specifies criteria for paper.
- The German Blue Angel ecolabel has requirements for recycled paper.

Many ecolabelling schemes that are members of GEN, the Global Ecolabelling Network, publish criteria in respect of paper products. This is true of ecolabels in America, Australia and New Zealand, and Asia. Several countries have elected to implement Nordic Ecolabelling criteria when designing their own ecolabelling schemes. New Zealand and the Netherlands offer examples of this.

Nordic Ecolabelling's efforts in the field of paper products have, so far, met with great success; probably since a large proportion of the cellulose pulp and paper used in Europe is manufactured in the Nordic countries. The Nordic Ecolabel is well known in the field of paper products even outside the Nordic region. A number of overseas licence holders make use of the Nordic Ecolabel in their home markets.

Nordic Ecolabelling follows the ISO 14 024 type I standard for a voluntary, lifecycle analysis based style of ecolabelling.

2.5 Nordic Ecolabelling criteria for paper products

Nordic Ecolabelling has maintained criteria in respect of various paper products for almost twenty years. The first criteria document for paper products concerned tissue paper, and the very first Nordic Ecolabelling license was issued in respect of copy and printing paper.

The modular system for paper products

As Nordic Ecolabel criteria were developed for different types of paper products and in regard to the product's entire life cycle, from forest to waste disposal, criteria documents became ever more complex as they grew in size. Previously a comprehensive criteria document was produced containing requirements for each product group (such as printing paper, tissue paper, coffee filter paper and envelopes) in regard to forestry management and pulp and paper production. These criteria were revised at different

points in time and by different working groups. As a result requirements regarding the same types of chemicals or pulp were formulated in different ways, even when production processes and environmental effects were identical.

In order to solve this problem a new way of structuring criteria documents was developed, with the modular criteria being finalised in the autumn of 2003. The modular system was introduced for the first time when applied to criteria for copying and printing paper, coffee filter paper, greaseproof paper and paper envelopes. This common structure has since been introduced, as criteria have undergone the process of revision, for all paper product groups.

The modular system of presenting criteria is based on the idea that all requirements common to the various paper product groups, for example in regard to pulp and chemicals, are located in common criteria modules, the so-called basic and chemical modules. Product specific requirements that are stipulated in so-called supplementary modules. Such supplementary modules are specific to a particular product group. The requirements levels of supplementary modules may vary in relation to the basic or chemical module. If the standards required in the modules differ, the requirement levels specified in the applicable supplementary module are to be applied.

Basic and chemical module versions and validity periods

Version 1 of the Basic and chemical modules gained approval on the 9th October 2003. No expiry date has been set for the validity of the document, but the objective is that the modules should be regularly revised every few years. For example, a correction was made to the background document in September 2004 noting that it is monomers of acrylamide, and not polymers, that are classified.

Following the current revision, the basic and chemical modules will be given version number 2.

All supplementary modules revised subsequent to the completion of the present criteria revision will make reference to the new version 2 of the basic and chemical modules. This will apply, for example, to the forthcoming fourth version of the supplementary module for copy and printing paper, which is being revised at the same time as the basic and chemical modules, as well as to the fifth version of the tissue paper supplementary module, which is due to undergo revision from the autumn of 2010.

2.6 Nordic Ecolabel licences for paper products

The numbers of valid Nordic Ecolabel licences for various product groups are presented below. Please note that, at the time of writing, in addition to licensed paper products there exists a large number of graphical printing paper products approved for use in Nordic Ecolabelled printing plants that fulfil the requirements for licensed printing paper.

Table 2 Nordic Ecolabel licences for paper products, June 2010.

Product group	Number of licences				
	DK	FIN	NO	SE	Total
Copy and printing paper	0	6	3	7	16
Tissue paper	4	10	0	26	40
Coffee filter paper	0	2	0	4	6
Grease-proof paper	2	2	1	2	7
Envelopes	0	4	2	3	9
Total	6	24	6	42	78

3 About this revision

The criteria in the basic and chemical modules underwent evaluation at the same as the supplementary module for copy and printing paper during 2006 and 2007. Following this evaluation the conclusion was reached that the modular system should be retained and the criteria revised.

The evaluation report presented a summary of how climate changes in the last few years have resulted in a greater focus on issues of energy use and emissions of greenhouse gases, which has led to the development of different types of energy-saving measures and the use of biofuels at many energy generation plants. These developments have proceeded at greater speed than could have been anticipated at the previous criteria revision. Consequently, there is great need to strengthen requirements in regard to energy use and generation. The evaluation of the criteria also indicated that there is potential for strengthening standards required in regard to carbon dioxide emissions.

The criteria working-party has, therefore, placed the greatest emphasis on revising requirements in regard to energy and carbon dioxide emissions. These parameters will for the most part, therefore, be decisive when considering approval for a paper product to carry the Nordic Ecolabel. In addition to requirements in regard to energy and carbon dioxide emissions, all other requirements have been considered and updated. Requirements in regard to chemicals, timber based raw materials and emissions to air and water have, in particular, been made more stringent. Additionally, requirement texts and requirements in regard to documentation have been clarified.

Work on this revision has taken place in the period 2008 to 2011. Various interested parties, e.g. representatives from the industry, have been consulted through personal contacts.

The following people have participated in the working-party:

Ulla Sahlberg (Project leader) (2008-2009)/Maria Göransson (2010), Sweden
Elisabeth Magnus (2008-2009)/Kristian Kruse (2010), Norway
Suvi Sormunen (2008-2009)/ Niina Tanskanen (2010), Finland
Thomas Christensen (Project manager), Denmark (2010-2011)

Karin Bergbom (2010-2011) and Elisabeth Magnus (2010) have led the project and acted as Nordic area co-coordinators.

Mette Sjölin has assisted in certain parts of the revision as a technical expert.

4 Justification of the requirements

This chapter presents the background to the proposed changes to the requirements stipulated in the basic and chemical modules. Many of the arguments for the proposed changes are also pertinent to issues arising from the revision of the supplementary module for copy and printing paper, which is under revision at the same time.

This background description may also be useful for future revisions of criteria for tissue paper and other paper products. This applies in particular to the basic requirements placed on timber based raw products, manufacture of pulp and use of chemicals, since these basic, generic requirements are defined for this revision. However, these requirements may be re-examined in the context of a specific product group for future revisions of supplementary modules for paper products, and in those cases in which it is motivated departures may be made from the generic requirements made in the basic and chemical modules, version 2.

4.1 What can carry the Nordic Ecolabel?

Product group definitions for the basic module

No definitions of product groups are made in the basic module since the requirements stipulated in this document are only those basic requirements that apply generally to pulp and paper production, i.e. the requirements contained in the basic module do not take into consideration differences in production methods that derive from the differing qualities of various end products. Such differences in production methods are dealt with in the supplementary modules for each product type. Each supplementary module therefore contains a clear and authoritative definition of the products permitted to carry the Nordic Ecolabel according to the criteria set out in that document.

The basic and chemical modules may be used as a source for requirements for product groups that use raw materials from the paper industry. Hygiene products, for which fluff pulp is an important raw material, offer one example of such a product group. Nordic Ecolabelling is engaged in a project for the development of criteria in respect of disposable articles used in serving and preparing food. Since such disposable items contain cardboard, the requirements stipulated in the basic module may be used for the future product group. References to which of the versions of the basic module functions as a source for requirements in each particular case are made in the specific criteria document for the relevant end product.

4.2 Revised criteria

Since the structure of the revised Basic module version 2 differs, in some respects, from the structure of the previous version 1, the numbering of requirements and references has been altered. The number for each requirement is given below (for example R1, R2 etcetera) and the previous number is indicated in a footnote.

The scope and limit values of most requirements are unchanged compared to version 1 of the basic module. In many cases, however, the requirements have been both reformulated and re-numbered since version 2 combines requirements that were previously directed towards pulp and paper producers separately. The aim has been to simplify and abbreviate the criteria.

4.2.1 General comments on documentation

Requirement R1⁴ of the basic module

This requirement is unchanged. However, it is now made clear that Nordic Ecolabelling's worksheet must be used.

This requirement describes the procedure for licence application. The requirement is relevant to both pulp and paper production. It is an amalgamation of several different requirements in the previous version of the basic module. The aim of reformulating the requirement is to present a single, clear description of what is required by the application procedure.

Among other things, the requirement presents a description of the documentation acceptable as part of a licence application. For example, it is explained that if Nordic Ecolabelling has previously evaluated a pulp available on the market according to the currently applicable basic module, then this evaluation may be re-used in the documentation submitted in support of a licence application. This measure simplifies the application process, and the documentation involved, for all parties.

It has been clarified that applicants must use Nordic Ecolabelling's Excel worksheet for calculations.

4.2.2 Type of pulp, type of paper and methods of production

Requirements R2⁵ and R3⁶ of the basic module

The requirement is unchanged.

The requirement sets out how the producer should provide information on the pulp and paper types that are used in the production of ecolabelled products. This is a significant requirement, in that it is important to be informed of the methods of production employed in the manufacture of the product, since the environmental impact and energy consumption of different production techniques may differ considerably.

4.2.3 Regulatory requirements

Requirement R4⁷ of the basic module.

The requirement is unchanged. Equivalent requirements are included in all product criteria.

⁴ R1 = equivalent requirements in previous version 1 are R1-R4

⁵ R2 = equivalent requirements in v. 1 of the Basic Module are R5, R29

⁶ R3 = equivalent requirements in v. 1 of the basic module are R6, R30

⁷ R4 = equivalent requirements in v. 1 of the basic module are R7, R31

4.2.4 Environmental assurance, quality assurance and quality manual

Requirements R5⁸ and R6⁹ of the basic module.

The requirement is unchanged. Equivalent requirements are included in all product criteria.

4.2.5 Fibre raw material

Requirement R7¹⁰ of the basic module.

This requirement has been made more stringent. The most important changes are those made to the requirement on traceability of the forest-sourced raw materials. Nordic Ecolabelling now requires that pulp and paper mills are certified for traceability, i.e. that an independent third-party monitors traceability. Simultaneously, the required proportion of certified fibre in paper has been increased from 20% to 30%.

Recent developments in the pulp and paper industry have led to an increased use of fibres from other types of plant than trees. Consequently, the scope of requirements in regard to fibre has been extended so that they no longer apply exclusively to wood fibres but also to bamboo, cotton linters, hemp and flax. Nordic Ecolabelling has chosen to introduce a general prohibition of genetically modified wood and fibre. This decision is, among other considerations, based on the precautionary principle.

An array of non-governmental organisations (NGOs), including FSC, have placed a prohibition on the use of genetically modified wood. The PEFC has yet to declare itself, in favour of or against, GMO, but imposes a general ban on the use of GMO¹¹. GMO are a topic of much discussion, raising issues of food safety and land use and so on – but concerns regarding lack of knowledge in regard to the effects of GMO crops on local cultivation conditions or the state of local forests, or in respect of the risks of negative health or environmental outcomes¹² are also widely discussed. The discussion largely concerns issues of food production, but many of the problems associated with GMO and food also apply to forestry management. GMO in wood is primarily relevant to the cultivation of fast-growing species of tree. The use of GMO trees is still in experimental stages.

Standards of traceability have been increased in that a Chain of Custody certificate (CoC) is required of pulp and paper producers. Such certification provides increased reliability in regard to wood fibre origins; and is particularly important in checking sourcing of timber from tropical areas and regions with weak forestry legislation. The CoC system is, today, a common feature of the paper industry.

The increase in the required proportion of certified fibre is modest, rising from 20% to 30%. This may be compared with the revised and adopted EU Eco-label criteria for copy

⁸ R5 = equivalent requirements in v. 1 of the basic module are R8, R32

⁹ R6 = equivalent requirements in v. 1 of the basic module are R9, R33

¹⁰ R7 = equivalent requirements in v. 1 of the basic module are R10, R34-R36

¹¹ PEFC (Programme for the Endorsement of Forest Certification) Denmark. Personal communication with Tanja B. Olsen.

¹² FAO, M. Hosny El-Lakany: Are genetically modified trees a threat to forests?, 2005

and printing paper that stipulate a level of 50%. However, the Nordic Ecolabel differs significantly from the EU Eco-label in that Nordic Ecolabelling places stringent requirements on standards of forestry management, which are approved on a case-by-case basis following careful examination. Local adaptation of applicable standards is one of the conditions placed by Nordic Ecolabelling on timber raw materials, so that, for example, a forestry certified according to international FSC standards does not receive automatic approval, but must be seen to comply with national standards. Nor are national standards, such as PEFC or FSC standards, accepted without careful evaluation. The Nordic Ecolabel requirement on forestry standards are general and can be used for all fibre raw materials, irrespective of their country of origin.

Previously, the fibre raw material in Nordic Ecolabelled products was primarily derived from traditional forestry in Europe. In recent years, there has been a steep rise in the use of fibre from plantations in paper production. Nordic Ecolabelling has evaluated several plantation standards but has found that they do not fulfil Nordic Ecolabel requirements. The primary reasons are the national scope of these standards and weak requirements regarding biodiversity. This also reflects the requirement stipulating a minimum proportion of 30% certified fibre raw materials.

A more detailed account of the background to this requirement is provided in Appendix 1.

4.2.6 Chemicals

Requirement R8¹³ in the basic module, with reference to the chemical module.

Requirement R8 stipulates that chemicals used in pulp and paper production must comply with the requirements delineated in the chemical module version 2, which is under revision at the same time as the basic module.

Following revision, a number of requirements in the chemical module have been made more stringent. The most important change is the introduction of a general prohibition of chemicals that are hazardous to the environment and health. An entirely new requirement has been introduced prohibiting GMO starches. A more detailed account of the background to requirements in regard to chemical is provided in Appendix 2.

4.2.7 Energy and CO₂

All requirements in regard to energy have been made more stringent; and requirements concerning CO₂ emissions arising from transport have been introduced. The requirements have been restructured and description of calculation methods relocated to an appendix. A calculation sheet in respect of energy requirements has been developed during the revision in order to simplify documentation and the processing of applications. Formulas, calculation instructions and conversion tables have been moved from the requirement text to Appendix 2 of the basic module. This calculation sheet is up-to-date and was made available during the period of consultation.

¹³R8 = equivalent requirements in v. 1 of the basic module are R11, R37

Justification for requirements contained in the supplementary module for copy and printing paper, which has been under revision during the same period, are also related in the following background analysis.

Justification for requirements in regard to energy and carbon dioxide emissions

An intensive legislative effort is underway within the European Union promoting energy efficiency and aiming for reductions in emissions of greenhouse gases from a range of different activities. Several new directives contain indirect regulation of pulp and paper production.

Nordic Ecolabelling schemes act as a complement to legislation. In stipulating requirements in regard to energy, Nordic Ecolabelling aims to identify pulp and paper products that are manufactured using energy efficient production methods and that emit low levels of greenhouse gasses.

Requirements are stipulated in regard to electricity generation and the use of fuel for heating. Carbon dioxide emissions are regulated in a separate requirement in respect of fossil fuels used in heating, in-house generated electricity and purchased electricity. Nordic Ecolabelling, when formulating requirements in regard to energy consumption and carbon dioxide emissions, takes into consideration the fact that the use of different pulps and production techniques has an effect on the quality of the final product. The field of paper production covers a wide range of different products, such as copy paper, newsprint, offset paper, tissue paper, greaseproof paper, coffee filters, paper envelopes, all of which possess different characteristics depending on their areas of use.

Reference values for energy

Consequently, the different paper qualities have different sets of advantages and disadvantages. This fact has been taken into consideration when formulating the energy requirement in the following way: instead of placing an absolute requirement on the amount of energy that may be consumed in production, each pulp and paper manufacturing process has been assigned a particular reference value. In this way the best pulps produced from each method of manufacturing may be included in the category of Nordic Ecolabelled products. At the same time, a wide range of ecolabelled paper types can be made available to meet market demands.

The currently applicable reference values given in basic module version 1 are based on the BAT values laid out in the so-called BREF document written within the framework set up by the 1996 European Union IPPC directive. The BREF document was itself issued in 2000. Reference values for the Nordic Ecolabelling criteria were developed in 1999 with the assistance of a draft version of the BREF. The BAT values contained in the published BREF document were somewhat more stringent than the values given in the version 1 of the basic module.

The currently applicable requirement in regard to energy, as laid out in version 1 of the basic module, places an obligation on producers of pulp and paper to calculate specific reference values, as regards their different types of pulp and paper product, for both electricity consumption and quantities of fuel used in heating. This is done by calculating the sum of the reference values for each sub-process. In order to calculate points scores for fuel and electricity consumption respectively, the actual, specific values for electricity

and fuel consumption are divided by the reference values. This principle has been applied in the proposed new Basic module.

Restriction on points levels in regard to energy

In addition to comparison with reference values, energy consumption is regulated by a points limit.

This limit defines how much of the paper product's total energy consumption may be permitted to exceed the level of consumption recorded under optimal conditions. A points limit of 1.25 indicates that the average value of the paper product's total energy consumption may not rise above a level that is 25 % higher than the rate of energy use set by the relevant reference value. The points model permits a higher level of energy consumption in order to allow the paper manufacturer an increased degree of flexibility.

This flexibility is necessary since the criteria stipulate many requirements; and each must be met. The various environmental parameters, such as energy consumption and treatment of emissions, are, to a certain degree, to be considered as a whole. Investment in treatment of water and air emissions can result in a higher rate of energy consumption than set by the reference value. The low emissions compensate for the somewhat higher energy consumption.

Evaluation of the basic module (2006/2007)

Analysis of licenses issued in compliance with the first version of the basic module has shown that producers have been able to meet energy requirements with relative ease. It was concluded that energy requirements place on paper manufacturers remained environmentally pertinent but that a tightening of these requirements would be beneficial. Levels in respect of both reference values and points scores needed to be made more stringent. It has also become clear, during the revision process, that the method of calculation should also be revised.

Revised criteria: Energy use

Energy requirement R9¹⁴ in the basic module.

The following revisions have been made:

- a) Reference values have been tightened.
- b) Reference values have been simplified and the calculation of specific reference values is no longer required.
- c) The effects of filler material have been removed from the calculation matrix.
- d) The points scores are awarded according to the requirement in respect of energy use in two distinct categories, electricity points and fuel points. The previous requirement for a total energy points score no longer applies.

a) More stringent reference values

Table 3 shows a comparison of the old and new Nordic Ecolabelling reference values. The table includes data gathered from the newly adopted EU Ecolabel criteria for copy

¹⁴ R9 = equivalent requirements in version 1 of the basic modules are R12-R18, R38-R40

and printing paper (18th October 2010), as well as actual data collected from the Swedish forestry industry in 2007¹⁵.

At present, a revision of the BREF document with accompanying BAT values is underway. At the time of writing (May 2011) a draft of the BREF document has been made available, but new BAT values have yet to be released. As a result no new BAT values have been available to form the basis of the current revision of reference values for Nordic Ecolabelling.

The new reference values are primarily based on data gathered from Nordic Ecolabelling licence holders. Values recorded in Nordic Ecolabelled paper and paper used in Nordic Ecolabelled printed matter have been examined while work on the development of the reference values has been conducted. The objectives of the new reference values are to exclude products manufactured using the most environmentally detrimental production processes from participation in the Nordic Ecolabelling scheme and to set limits that lie below the average values for the paper industry in Europe (based on EU Eco-label requirements on printing paper and data from the Swedish Forest Industries Federation, as well as an evaluation of CEPI statistics). The proposed Nordic Ecolabel reference values are well below the equivalent values for the EU Ecolabel.

Reference values have been evaluated and revised for each type of process in turn, which has led to variation in the magnitude of the changes made for each type of process. The extent of the changes has varied depending on the extent of revision required in respect of each individual process or, in other words, the degree of ease or difficulty with which the specific processes have been able to comply with the revised standards.

Some aspects have been amended based on responses following the referral period. Some reference values have been relaxed slightly while the reference value for DIP has been tightened. The DIP reference value has been tightened since prior to referral it was hoped that the same value should be used for both printing paper and tissue paper. Responses from the referral period demonstrated that DIP for tissue paper requires much more energy. Accordingly, a separate reference value will be included in the supplementary module for tissue paper. Further, the reference DIP value could be tightened for printing paper so that only the best pulps from an energy perspective meet the requirement.

The range of tightening required for each of the reference values has varied from 0% to 50%. The average tightening is 23% compared to version 1.

¹⁵ The environmental and energy committee of the Swedish Forest Industries Federation has for a seventh time performed a study of the energy consumption of pulp and paper industries. The current report presents the energy consumption of the industry in 2007. The survey is a repeat of studies performed in 1973, 1979, 1984, 1988, 1994 and 2000. The report can be found at www.skogsindustrierna.org

Table 3. Comparison of energy reference values in respect of the Nordic Ecolabel, the EU Ecolabel (adopted 18 October 2010) and BAT, and data collected from the Swedish Forest Industries Federation in 2007. Note that the comparison of reference values is for guidance only since the methods of calculation can vary.

Fuel (kWh/tonne)	Nordic Ecolabel	Nordic Ecolabel	EU Ecolabel	BAT	Sweden 2007
Type of paper/pulp	Present figure	Version 2	Ver. 3	BREF 2001	Swedish Forest Industries Federation
Bleached chemical pulp	4108	3750	4000		3542
Unbleached chemical pulp	3935	3200	4000	2770-4986	2276
Dried bleached chemical pulp	5097	4750	5000		4960
Dried unbleached chemical pulp	4924	4500	5000		5195
Groundwood pulp	None	None			108
Dried groundwood pulp	1500	1000			1156
CTMP and TMP	None	None			140
Dried CTMP / TMP	1550/1500	1000	1000/900		1070
DIP / recycled fibre	832	350	1800		173
Dried DIP / recycled fibre	2776	1350	2250		
News	1700	1700			1318
SC/LWC	1700/1700	1700 / 1700	1800 / 1800		1674
SBS / SBB, SUB and WLC	2300	1700			1825
Uncoated / coated fine paper	2300/2300	1700		1939-2216	1555
FBB	2300	1700			1340
Electricity (kWh/tonne)	Nordic Ecolabel	Nordic Ecolabel	EU Ecolabel	BAT	Sweden 2007
Type of paper/pulp	Present figure	Version 2	Ver. 3	BREF 2001	Swedish Forest Industries Federation
Bleached chemical pulp	736	750	800		698
Unbleached chemical pulp	606	550	800		529
Dried bleached chemical pulp	841	750	800	600-800	800
Dried unbleached chemical pulp	711	550	800		738
Groundwood pulp	2161	2000			1991
Dried groundwood pulp	2036	2000			2160
CTMP / TMP	326100/3311	2000/ 2200			2292
Dried CTMP / TMP	3411/3461	2000/2200	2000/1900	2000-3000	1461
DIP / recycled fibre	721	500	800		318
Dried DIP / recycled fibre	841	600	800		
News	886	750			596
SC/LWC	1286/936	750 / 800	600/800		804
SBS / SBB, SUB and WLC	1186	800			658
Uncoated / coated fine paper	986/1286	750/ 800		600-900	638
FBB	1186	800			522

b) Simplified reference values

Reference values in respect of types of pulp were previously calculated as the sum of the values of the sub-processes involved in the production of the pulp. Analysis of currently held licences showed, however, that different manufacturers presented only marginal differences. Consequently, the working-party has prioritised simplicity over optimality in calculation. Instead of calculating reference values from the sum of values for sub-processes, a reference value for each pulp and paper type has been set.

Differences in reference values are determined by various factors, such as whether the pulp has been produced by chemical or mechanical processes, are bleached, unbleached or dried. For paper production energy consumption is increased by factors such as the machine's speed, the weight of the paper, coating and fineness. Recycled fibres are not ground before being fed into the paper machine as are virgin fibres, which results in lowered energy consumption and, therefore, a lower reference value.

c) Effects of filler material have been removed from the calculation matrix.

Points in the Nordic Ecolabel points calculation matrix in regard to energy use in pulp and paper production are weighted with the assistance of reference values, which are equivalent to the values recorded using the Best Available Techniques (BAT).

It has been observed that the method of calculation used in the matrix is advantageous for printing paper products containing much filler material. The proportion of filler in printing paper can vary between none at all to 50% of its content. In order to eliminate the effects of filler, Nordic Ecolabelling has proposed a modified method of calculation in the revised criteria in which filler is excluded from calculations. In other words, it is no longer possible to dilute a paper product with filler in order to more easily meet the requirements. All calculations in the basic module must now be performed on the basis of fibre content only. Removing filler from calculations constitutes a more stringent interpretation of active content (Pulp share, m_i , indicated in tonne ADP (90 %) per tonne ADT (95 %)). Where m_i represents the specific pulp's share of the total pulp mix used to produce a tonne of paper. Because of wastage and differences in water content, the total of m_i may be greater than 1. This, in turn, has an effect on the share of certified fibre/ recycled fibre, and on emissions and energy consumption in pulp and paper production. Printing paper with a high level of filler content represents the product category that is most affected by this change. The requirement will not have an effect on tissue paper as this type of product does not contain filler.

The BREF report (2001 and draft April 2010) contains BAT values for both pulp and paper manufacturing. The BAT values for paper manufacturing can be compared to the reference values we have established for paper manufacturing. The effects of filler are also taken into account in these figures. The reference values that we have established for pulp can also be compared to the BAT values for pulp in the BREF report. There are no conflicts between the Nordic Ecolabel values and those of the BREF report. By changing the method of calculation from that in previous versions and the draft, the requirement is now considerably more stringent for special printing paper with high quantities of filler. According to calculations based on Nordic Ecolabelled paper or approved printing paper, paper can contain as much as 50% filler while the average value is 300 kg/tonne paper. This means that requirement for printing paper is roughly 30% more stringent since filler is not included in the calculation.

d) Separate electricity and fuel points

The present criteria place a limit on average values for the combined energy points total for both electricity and fuel expended in heat generation. This was done in order to allow for flexibility between energy sources. It has, however, come to light that these two sources of energy (electricity and fuel for heat) are often not compatible other than in generating heat. Separate points scores have been instituted in order to bring greater clarity to the requirement.

A points limit for fuel and electricity respectively of 1.23 is proposed in the basic module. This is a considerable tightening of requirements in regard to the points score when compared to version 1, in which the limit was set at 1.75. The requirement is designed to ensure optimal use of energy.

The reason for the new points limit of 1.25 for fuel and electricity is formed by a desire to ensure that the energy requirement for paper approved according to the criteria of the basic module is tough and demanding. This limit can then be applied to, for example, paper for use by printing plants or in hygiene products, depending on the formulation of the relevant requirements in the appropriate criteria documents.

The new points limit, in the cases of both electricity and fuel, is, according to the proposal, to be set at 1.15 for Nordic Ecolabelled copy and printing paper. This is more stringent than the limit of 1.25 set out in the current criteria document, version 3 for copy and printing paper. The new points level is, first and foremost, based on data provided by licence holders and gathered from paper used in Nordic Ecolabelled printing matter. A points limit of 1.15 indicates that the average value of the paper product's total energy consumption may not rise above a level that is 15% higher than the reference value. The points model permits a higher level of energy consumption in order to allow the paper manufacturer an increased degree of flexibility.

Consequences of the more stringent energy requirement

The new draft energy requirement has simplified reference values that have been tightened between 0% and 58% compared to version 1. Nordic Ecolabelling's new reference values are lower or equal to the equivalent EU Ecolabel values. Since the point score requirement is considerably more stringent than the equivalent EU Ecolabel requirement, Nordic Ecolabel requirements on energy are significantly more stringent than EU Ecolabel requirements for printing paper.

Requirements in regard to energy have been further tightened with the removal of the effects of filler from the calculation matrix. This tightening of the requirement has greatest effect on those paper qualities with a high filler content.

It is proposed to set the new points score limit for copy and printing paper, in regard to both electricity and fuel, at 1.15. This new limit involves a considerable tightening of the requirement since the points scores are now calculated separately (see above). In previous criteria the limit for average values for electricity and fuel combined as set at 1.25 and the limit for electricity at 1.75. There was no regulation of limits for fuel only.

A review of current Nordic Ecolabel licenses and paper grades approved for Nordic Ecolabelling reveals that the proposed new limits exclude several paper mills due to the energy requirement alone. It should also be remembered that the energy requirement is

not the only requirement to have been tightened. Apart from stricter energy standards, requirements in regard to the certified fibre contents of paper and as regards emissions to water and air have been tightened. It should also be noted that the paper products shown in the tables are generally among the best available from an environmental point of view, as they comply with the current Nordic Ecolabelling requirements.

A somewhat larger number of paper products meet the requirements of the lower points score level for energy as set out in the basic module. Justification here lies in the fact that such paper is approved as raw material for other product groups. For these product groups greater weight, from a life cycle assessment point of view, is placed on other aspects of their environmental impact than the energy consumed in the manufacture of their pulp or paper based raw materials.

Revised criteria: Emissions of carbon dioxide

Requirements in regard to emissions of carbon dioxide R10-R11¹⁶ in the basic module.

The requirement in regard to carbon dioxide emissions has been made more stringent and restructured. Declarations of CO₂ emissions are now to be made in regard to all fuels expended in heat generation, purchased electricity and in-house electricity generated from fossil fuels. A new requirement in regard to CO₂ emissions from transport has been introduced.

System definition for CO₂

As climate change has become ever more apparent, requirements designed to secure reductions in CO₂ emissions have become increasingly important. The paper industry is very energy intensive. Even though over 50% of all energy consumed by the European paper industry comes from renewable sources, a great deal of electricity and fossil based fuels are used in paper manufacture.

The processes highlighted in grey in Figure 3 represent the stages in the life-cycle of paper included in the calculation of CO₂ emissions according to the criteria in the basic module:



Figure 3. A schematic diagram illustrating the life cycle of a paper product.

The following factors are either included or excluded when delineating the life cycle of a product for calculations arising from Nordic Ecolabelling requirements in respect of CO₂ emissions:

- forestry – not included
- transport from forest area to pulp mill – included
- pulp mill – included
- transport from pulp mill to paper mill – included
- further stages of production, for example printing – not included

¹⁶ R10 = equivalent requirements in v. 1 of the basic module are R24, R48 R11 is a new requirement.

Requirements in regard to CO₂ emissions are divided into two parts:

- a) Requirements in regard to CO₂ emissions from pulp and paper production
- b) Reporting requirements in regard to CO₂ emissions from transportation

a) Requirements in regard to CO₂ emissions from pulp and paper production (R10)

Nordic Ecolabelling has previously stipulated requirements concerning CO₂ emissions in respect of fossil fuels expended in the generation of heat during production. It is now proposed that the scope of the requirements be extended to cover, for both pulp and paper production, externally purchased heating, electricity generated in-house from fossil fuels and electricity sourced from an external supplier. Electricity obtained from external suppliers is assigned a factor of 385 g CO₂/kWh, which is an average for European electricity generation. Equivalent factors assigned to fossil fuels expended in heat production and to in-house generated electricity are reproduced in Table 2.5 of Appendix 2 of the basic module. This means that no deductions may be made for green electricity. Consequently, it remains the case that carbon dioxide emissions from in-house production of energy are included in emissions calculations only when the energy in question has been generated from fossil fuels (and not from renewable sources). The definition of renewable energy used is that given in the guidelines associated with the RES directive, the EU directive concerning electricity production from renewable energy sources¹⁷.

The requirement has been restructured in such a way that the combined total of CO₂ emissions arising from paper production is calculated upon the basis of the sum of the weighted averages for CO₂ emissions from production of the various types of constituent pulp and from the paper manufacturing processes.

The requirement limits are differentiated. The upper limits are:

- 100% DIP/recycled fibre – 1000 kg CO₂/tonne paper.
- 100% chemical pulp – 900 kg CO₂/tonne paper.
- 100% mechanical pulp – 1,600 kg CO₂/tonne paper.

The requirement has been tightened compared to version 1, when the upper limits for paper manufacturing were:

- 100% chemical pulp or recycled fibre – 1,300 kg CO₂/tonne paper.
- 100% mechanical pulp – 1400 kg CO₂/tonne paper (TMP/CTMP) or 1800 kg CO₂/tonne paper (groundwood pulp).

A weighted threshold value for blends of different types of pulp is calculated upon the basis of the threshold values for chemical pulp, recycled fibre and mechanical pulp. The threshold value of paper made from 50% chemical pulp and 50% mechanical pulp is, for instance, calculated according to the formula $0.5 \cdot 900 + 0.5 \cdot 1600$. The requirement is differentiated since a larger proportion of chemical pulp is used in the making of fine paper than in the manufacture of other grades of paper. A smaller share of fossil fuel is expended in the production of chemical pulp than in the manufacture of mechanical

¹⁷ Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

pulp, which is the most common constituent of other paper grades, as mechanical pulp production uses large quantities of electricity. Applying a single threshold value to all types of paper would pose the risk of all paper made from mechanical pulp failing to meet the requirement, while paper manufactured from chemical pulp would have little difficulty in complying with its strictures. The basis for the new levels for CO₂ limits is provided, first and foremost, by the data collected from Nordic Ecolabel licence holders.

The limits set by the requirement are formulated in terms of CO₂ kg/tonne paper. Expressing the limit in this way prevents the difference in threshold values for the different pulp types from having a more than marginal effect on the CO₂ emissions values calculated for the finished product, since the weight of lightweight coated (LWC) paper, supercalendered (SC) paper and newsprint, which all have a high content of mechanical pulp, is always much lower (35-80 g/m²) than printing paper made from chemical pulp. The weight of an item printed on LWC paper can be almost half of that of an item printed on printing paper made from chemical pulp (90-170 g/m² for coated fine paper). Subsequently, the CO₂ impact can even be lower than that of paper made from chemical pulp. It should be added that twice as much timber is used in producing a finished product made from mechanical pulp than in the manufacture of a similar product from chemical pulp.

The requirement is structured in a manner similar to the equivalent requirements contained in the proposed EU criteria for the ecolabelling of copy and graphic paper and of tissue paper. No specific limits are set as regards types of pulp since the CO₂ impact of pulp is included in calculations by adding the weighted average value for constituent pulps to the total value of CO₂ emissions for the paper product. The EU Eco-label requirement on CO₂ is not differentiated. Instead it stipulates the limit values 1000 kg/tonne paper for integrated mills and 1100 kg/tonne paper for unintegrated mills. These limits are unchanged for the current EU Eco-label criteria. Newsprint is not included within the scope of the criteria. The limits imposed in the EU Ecolabel criteria are, in the light of current practice, too lax in respect of fine paper and too stringent as regards LWC.

The pulp/paper manufacturer shall submit calculations in accordance with Appendix 2 to demonstrate fulfilment of the requirement. Nordic Ecolabelling also provides a worksheet that is to be used for these calculations.

b) Requirements in regard to CO₂ emissions from transportation (R11)

This is a new requirement.

The issue of whether goods transportation should be considered in the ecolabelling of paper products is, in many respects, a complex matter. Paper producers, for instance, are rarely able to control goods transportation. Moreover, three different forms of transport are involved: lorries, trains and boats, either alone or in combination. As a result of discussions, within the Nordic Ecolabelling organisation and with representatives from the industry, the focus of the requirement in regard to transportation has been placed on the issue of carbon dioxide emissions.

The environmental relevance of CO₂ emissions from transportation

In considering the feasibility of imposing a requirement in regard to carbon dioxide emissions from goods transportation, it has been important to form an idea of the extent of

CO₂ emissions relative to the emissions created during other phases of the life-cycle of a paper product.

A review of sustainability reports published by the major forest management companies based in the Nordic countries shows that significant CO₂ emissions arise from the transportation of goods. However, only SCA and Stora Enso have, as yet, included information on emissions from transportation in their published statistics. Calculations provided by SCA indicate that roughly 25% of the company's total CO₂ emissions arise from the transport of goods. The equivalent figure for Stora Enso is 40%¹⁸. The equivalent figure for Stora Enso lies at around 40%. The differences may result from discrepancies in methods of calculation as the reports do not provide any explanation of this matter.

In 2008 the Swedish Environmental Research Institute (IVL) performed a study¹⁹ of emissions versus uptake of greenhouse gases arising from the activities of the Swedish forestry industry. The annualised average for total fossil carbon dioxide emissions for the pulp and paper industry between the years 2001 and 2003 totalled 205,000 tonnes and the equivalent figure for emissions from transport for the forestry management industry totalled 590,000 tonnes. These figures include, however, emissions from all transport associated with the forest industry including saw mills and suchlike. These figures suggest that roughly 20% of emissions of CO₂ originating from fossil fuels arising from the pulp and paper industry can be traced to transportation, but the total share may be lower as emissions from the entire forest management industry have been included in calculations. In none of the statistics available from SCA, Stora Enso or IVL is a breakdown of the shares relating to different sorts of transport, for example transport of raw materials versus transport of pulp, presented.

The website of the Finnish Forest Industries²⁰ provides a breakdown of transportation journeys undertaken in the Finnish forest industry, in which is presented the shares associated with sawn timber, cardboard, pulp and paper products. According to these figures transport of pulp accounts for 2% of total journeys, while transport of timber accounts for more than half of the total (56%). The study pertains to domestic transportation only.

In the autumn of 2009 VLT published a study²¹ comparing three different methods for calculating the carbon footprint of forestry products. According to these figures around 15% of the carbon footprint of softwood pulp (kg CO₂eq/tonne pulp) can be traced to transportation. This applies to pulp, not paper.

A study²² of the carbon footprint of the forestry industry was published by NCASI (National Council for Air and Stream Improvement) in 2007. Although it is noted several times in the report that there is an element of uncertainty associated with the figures, it is shown in this study that 16% of CO₂ emissions arising from paper production originate

¹⁸ www.skogsindustrierna.org

¹⁹ Hagberg, L. Karlsson, P-E., Stripple, H., Ek, M., Zetterberg, T & Zetterberg, L. Svenska skogsindustrins emissioner och upptag av växthusgaser, IVL rapport B1774. Available: <http://www3.ivl.se/rapporter/pdf/B1774.pdf>

²⁰ Finnish Forest Industries: www.forestindustries.fi

²¹ VTT (Technical Research Centre of Finland) symposium 262. Life Cycle Assessment of Products and Technologies, 2009. www.vtt.fi/inf/pdf/symposiums/2009/S262.pdf

²² NCASI (National Council for Air and Stream Improvement), The greenhouse gas and carbon profile of the global forest products industry, Special report no. 07-02, February 2007. www.ncasi.org/publications/Detail.aspx?id=2952

from transportation. This figure is in respect of emissions from the entire life cycle of the product, from forest to consumer to recycling. Emissions originating from the production of purchased electricity and from landfill sites are also included in these calculations.

In conclusion, based on the available information, it seems as if around 20% of the CO₂ impact of paper originates from transport. This indicates that transportation is a fairly major contributor in to the climate impact of paper from a life cycle assessment perspective, and it is thus appropriate to develop requirements in regard to transportation in the criteria for the ecolabelling of paper. Currently, there is a significant variation shown in, and a large margin of error associated with, the statistics, but these are set to improve quickly as CEPI has developed uniform guidelines for the calculation of CO₂ emissions originating from transportation.

Transport requirement: potential and controllability

As has been shown, carbon dioxide emissions arising from transportation are not insignificant. In order for a requirement to be effective it must have potential for promoting environmental improvement and the industry must be able to exercise sufficient control over the activities regulated by the requirement in order to be able to comply with the standards it sets. Good use may be made, in coming to judgement in respect of issues of potential and controllability, of the goals relating to sustainability adopted by the Swedish Forest Industries Federation. The Swedish Forest Industries Federation has set up a target of reducing emissions of CO₂ from fossil fuels by 20%, calculated per tonne of product, over the period 2007 to 2020 as regards pulp, paper and sawn timber produced in Sweden (for which EU27 marks the geographic boundary). As a means of achieving this goal, the Swedish forestry industry aims to have put together a common set of sustainability criteria in respect of tendering by 2010. Work on this is underway, but has not yet been completed.

Since the forestry industry itself is already working on developing criteria in regard to transportation it is natural for Nordic Ecolabelling to also consider setting requirements in regard to transport. It is important to consider the question of to which parameter such the requirement should apply. There are several possible options in stipulating a requirement with the aim of reducing the environmental impact of transportation. Such a reduction could be achieved by requiring measures, such as training drivers in techniques for maximising fuel economy, reducing the number of journeys with empty loads, and using “green” fuels, designed to reduce environmental impact. For Nordic Ecolabelling, however, it is important to be able to stipulate absolute requirements. An attempt is made by Nordic Ecolabelling, on this basis, to introduce a limit on CO₂ emissions arising from transportation in this consultative draft. Consistent with other parameters relating to emissions, the requirement is formulated in terms of tonne per paper product. Such a concrete requirement in regard to CO₂ emissions arising from transportation, and in regard to the reporting of emissions, will give producers an opportunity to gain a comprehensive overview of the complex problems of logistics posed by transportation. This will also give them insight into possible means of making improvements. It is easier to set concrete targets for efficiency when faced with quantified values.

Nordic Ecolabelling is of the opinion that such requirements can result in concrete, measurable environmental gains. A major motivation for achieving savings is to be found in the considerable economic gains to be made from more efficient transport activities. There are innumerable examples recorded in the scientific literature of gains achieved,

both environmental and financial, as result of the introduction of environmental requirements. These gains are often associated with technical advances.

Methods of calculation of CO₂ emissions from transportation

Filling rate is important in being able to assess the CO₂ impact of transportation. Transport of timber has, in this regard, a particular characteristic: vehicles that transport timber are often empty on the return journey, so the “empty running rate” is never lower than 50% (and the total load factor for all journeys can never be higher than 50%). Transport of tissue paper also raises particular issues regarding CO₂ emissions per tonne per km, as tissue paper weighs little per meter of occupied vehicle loading space. It is partly due issues such as these that it is considered important that a uniform method of calculation is widely adopted in respect of carbon dioxide emissions from transportation.

The European trade organisation, CEPI, issued “Transport carbon footprint assessment guidelines”²³ in December 2009. The guidelines help harmonize the way pulp and paper companies measure the share of their products’ carbon footprint related to transport. In this document, CEPI sets out system boundaries determining the transport-related emissions to be considered. Since this set of guidelines is new, there are as yet no examples of this method being employed by CEPI’s member organisations. It is, however, safe to assume that, given the sustainability objectives in respect of transportation referred to above, the CEPI model will soon be widely accepted. The Nordic forest industry has played an active part in the development of the CEPI guidelines and several industry actors have indicated an intention to follow the guidelines in the future.

There are, moreover, several alternative initiatives in the field of calculating CO₂ emissions arising from transportation underway. An ISO standard for the calculating and communicating the carbon footprint of products is under development. This standard is due to be completed during the period 2010 to 2011. As the standard will apply to all types of product, no specific method of calculation or delineation of relevant factors is to be included in the standard’s criteria. Discussions are, however, underway as regards adding these aspects to the carbon footprint guidelines contained in the industry-wide product category rules (PCR) for environmental declarations developed for tissue paper. According to CEPI, the new ISO standard will not conflict with the CEPI instructions.

The Nordic Ecolabelling working-party has examined the ways in which calculations are made in the forestry industry. One forestry company measures emissions from transportation based on the emissions factor developed by NTM (The Network for Transport and the Environment)²⁴. For transport carried out using company-owned system vessels figures for actual fuel consumption are used as the basis for calculating emissions. A Resource Management System (RMS), in which emissions from all transport journeys, in respect of both finished goods and raw materials, are counted is employed. It is possible, in these calculations, to distinguish between emissions from different sources, for example the transportation of pulp from pulp mill to paper mill.

23 CEPI (The Confederation of European Paper Industries) Transport carbon footprint assessment guidelines, 2009, <http://www.cepi.org/node/674>

24 The Network for Transport and Environment, Sweden, <http://www.ntmcalc.se/index.html>

Nordic Ecolabelling's draft proposal regarding transport requirements

Method of calculation: CEPI has developed a model for calculating emissions that takes all transportation journeys into account (including timber transport and transport of pulp to paper mills). These instructions also determine which other non-fibre raw materials are to be included in emissions calculations, for example chemicals and fillers. Since the CEPI guidelines (issued in December 2009) are likely to become the norm, and since they set out clear methods for definition and calculation, it is appropriate for Nordic Ecolabelling to adopt the use of the methods described in the guidelines. It is desirable, as this is the first time that Nordic Ecolabelling stipulates requirements in regard to emissions arising from transportation, that the views of stakeholders, concerning the stringency and scope of the requirement and specified methods of calculation and measurement, are collected. Opinions regarding documentation requirements are also welcomed, as it is important for Nordic Ecolabelling to be able to verify compliance with the requirements.

The relevant chain of transportation is defined so that the carbon dioxide impact of the paper product is included up to any form of product conversion. Transport to the customer is not included. For a de-inked paper mill, transportation of recycled paper or recycled pulp is included; CEPI guidelines refer to "Transport of Recovered Fibre to Mills". In this way, integrated pulp and paper mills are given an advantage over others.

Requirement level This is the first time that Nordic Ecolabelling sets out a requirement in regard to carbon dioxide emissions arising from transportation. It is, therefore, of particular importance that information is gathered regarding the practical application of the requirement.

There are, therefore, two alternative proposals in respect of requirements in regard to transportation:

1. The CO₂ impact of transportation may not exceed 400 kg CO₂/tonne of paper product. Calculations are performed according to the CEPI guidelines. The level is set on the basis that it represents circa 30% of the Nordic Ecolabelling threshold value for CO₂ emissions arising from paper production (1300 kg/tonne). As, according to available evidence, the share of total CO₂ emissions arising from transportation varies from 10-40%, a requirement set at a 30% level will have the effect of excluding those paper types with the highest transport emissions from participation in Nordic Ecolabelling.
2. The CEPI model for calculating emissions may be both time-consuming and difficult to follow, particularly for smaller paper manufacturers. Offering an alternative method of presenting evidence of a limited impact on climate is, therefore, justified. Paper products may be licensed to carry the Nordic Ecolabel if the CO₂ impact of the product is at least 20% below the limit imposed on the type of paper in question. Lower emissions arising from production, in such cases, compensate for any higher rate of emissions that may potentially arise from transportation in connection with the product.

Nordic Ecolabelling's final proposal regarding transport requirements following referral

Many comments were received regarding the transport requirements proposed in the draft, such as "generally good but there is no unambiguous method of calculation, i.e.

requirement lacks the basis for clear limit values”. The environmental benefit has been questioned due to limited controllability: The geographic location of the paper mills controls the methods of transport that are available and the paper mills are unable to influence this. Nonetheless, it remains that consumers are interested in the impact of transport.

A workshop during Nordic Ecolabelling's paper seminar held 31 March in Stockholm²⁵ concluded that transport is an important parameter for the paper industry. The problem, however, as described in the background document, is that the lack of an unambiguous model for calculation with clear limit values. Further, transport is regulated effectively (optimised) by the industry already. All the seminar participants supported the proposal to establish an information requirement regarding transport with defined parameters.

New requirement (Reporting requirement)

The **paper manufacturer** shall supply calculations of the total CO₂ impact of all forms of transport from the forest to the paper mill. The calculation shall contain:

Transport of raw material

- Transport of felled timber from the forest (loading area) to the pulp mill.
- Transport of felled timber to the saw/chip plant (average figures).
- Transport of wood chips to the pulp mill (average figures).
- Transport of purchased market pulp.
- Transport of the following raw materials from the supplier: filler, pigment and starch (if the quantities exceed 10 kg/tonne produced pulp/paper).
- Transport of recycled fibre from a central depot to the pulp factory.

Documentation: Calculation at the time of application of carbon dioxide emissions given in kg CO₂ per tonne paper grade or kg CO₂ per tonne of the mill's total annual production. Details of how the CO₂ values are calculated with reference to any assumption, the use of databases and suchlike.

Transport between paper mills and the conversions operations is not necessary to document..

4.2.8 Emissions of AOX, COD, P, NOx and S

Requirement R12²⁶ of the basic module.

Summary

The requirement applies to emissions to water and air. Restrictions placed on acceptable levels of emissions are defined according to a system of reference values arranged in a matrix. The limit value for the total emissions score and the reference values are unchanged from the previous criteria, besides NO_x, which has now been assigned a reference value of the same kind as for the other parameters. The method of calculation has been modified in order to eliminate the effects of filler from the calculated result, thus tightening the requirement as it applies to paper containing filler.

²⁵ Nordic Ecolabelling, 31 March 2011, paper seminar in Stockholm at which the draft paper criteria were discussed with representatives from the paper industry.

²⁶ R12 = equivalent requirements in version 1 of the basic module are R19-R21, R42, R43, R45.

An allocation for emissions to air arising from in-house generated electricity has been introduced in order to promote electricity generation.

The matrix system for calculating emission values

Nordic Ecolabelling has previously made use of a matrix system for setting limits for emissions to air and water. The most important emissions from pulp and paper mills have been collected in the environmental matrix. As previously, these parameters are chemical oxygen demand (COD) and phosphorus (P) to water, and sulphur (S) and nitrogen oxides (NO_x) to air.

Actual measurements are compared to reference values in the matrix. The reference value is based upon BAT reports supplemented by information collected by Nordic Ecolabelling in respect of the best available techniques. One point is awarded in the matrix if emissions are measured at the same level as that given in the reference value. If the emissions are recorded at a lower level than the reference value, the points score is < 1. If emissions are higher than allowed by the reference value the points awarded will be >1. No product receiving a points score above 1.5 will be permitted to carry the Nordic Ecolabel. The grand total corresponds to all emission points when added together. A total points score may not exceed 4.

A review of currently held licences, for the purposes of an evaluation of the current requirements, demonstrated that the requirements are already demanding enough to be able to distinguish the best paper products from the perspective of emissions reduction. Values for phosphorous and nitrogen oxides present the greatest difficulties in fulfilling the requirements in regard to chemical emissions. Standards for COD emissions have also, in certain cases, been considered to be difficult to meet. The reference values for COD, P, NO_x and S have, as a result, not been made more stringent for this revision. A tightening of the emissions requirement can, however, be seen in that the points scores for pulp and paper production are now calculated separately, similarly to the method of calculating energy points, in order to eliminate the effects of filler. Reference values, in respect of the energy requirement, are assigned to each process separately and energy points scores are no longer calculated in terms of a total sum of points arising from sub-processes. This means that reference values in respect of NO_x emissions, expressed in terms of kg/tonne paper or pulp, have been assigned, in the same way as for the other parameters, for each specific process.

The currently valid reference values are based on the BAT values set out in the BREF document from 2000. The BAT values are presented in intervals. The levels were, however, set at the previous revision on the basis of the actual emissions from the best, from an emission point of view, of the then active pulp and paper mills.

Arguments similar to those made in favour of stipulating different reference values for different levels of energy consumption (as presented in the chapter on energy requirements) can be made in favour of assigning different reference values in respect of emissions from different processes. An example of this can be found in the different reference values assigned to emissions arising from different types of chemical pulp, manufactured by either sulphate or sulphite based processes. The sulphite process may produce more COD emissions than the sulphate process, but the sulphite process consumes lower quantities of timber and the resulting pulp is easier to bleach, which leads to fewer bleaching chemicals being used. By assigning a specific reference value to

each process, neither technique receives undue advantage and the principles of the BREF document are followed.

Removing the effects of filler material from these calculations leads to a tightening of requirements in respect of those paper products containing a high proportion of filler (mainly printing paper).

AOX

The production of elemental chlorine-free (ECF) bleached pulp leads to emissions of absorbable organically bound halogens (AOX). The AOX value gives an indication of, among other things, the relative effectiveness of the waste treatment and purification processes, as well as the quantities of chlorine dioxide used in the bleaching process: i.e. the lower the emissions of AOX the more effective the waste treatment process and the lower the quantities of bleaching chemicals used in the pulp mill.

The AOX requirement has been tightened compared to version 1, in which the weighted average value of AOX released from the pulps used in the Nordic Ecolabelled paper product must not exceed 0.17 kg/tonne paper. AOX emissions from each individual pulp used in the paper were not permitted to exceed 0.40 kg/tonne in version 1.

The revised requirement on AOX: The **weighted average** value of AOX released from the pulps used in the Nordic Ecolabelled paper product must not exceed 0.17 kg/tonne paper. AOX emissions from each individual pulp used in the paper must not exceed 0.25 kg/tonne.

The draft of version 2 proposed that AOX should be included as a parameter in the emissions matrix. This proposal was criticised as being unclear and imprecise. It is therefore now proposed that a separate requirement on AOX emissions is included, in the same way as in previous versions of the criteria. See also the summary of comments for further information.

According to the BREF document (draft 2010)²⁷ it is possible to achieve an AOX value of <0.15 kg AOX/ADT using ECF techniques. The current BAT value in respect of AOX emissions arising from pulp bleached using ECF techniques is set at 0.25 kg/tonne pulp (BREF 2000).

The new AOX requirements are more stringent than those stipulated in the basic module and in the supplementary module for copy and printing paper. The new requirements are based upon BAT reference values as well as on a consultancy study (ÅF 2009) and other reports in respect of AOX²⁸. This consultancy study showed no noticeable effect on the environment can be shown for emissions below 0.20 kg AOX/ADT. The reports also

²⁷ Draft 1 BREF-document for Pulp and Paper Industry, 2010. Reference documents from the European IPPC Bureau. <http://eippcb.jrc.ec.europa.eu/reference/>

²⁸ ÅF reports (Jukka Tana and Caroline Grotell "Updated information on research activities in comparison of environmental effects of effluents from ECF and TCF bleaching, 2006"; "Chlorine discharges from pulp and paper industry, Recent knowledge and opinion research of different stakeholders in Nordic countries, ENVIR-510 September 2009" and "Chlorine discharges from pulp and paper industry, Complementary information to ÅF-report envi-510, November 2009").

show that no regular, systematic differences between emissions from plants using ECF bleaching and those using TCF bleaching can be identified.

The limit value for AOX of 0.17 kg AOX/ADT is based on a cautionary principle and is slightly lower than the generally accepted limit. The limit enables some flexibility in production.

The level set by the requirement is consistent with the standards currently set for tissue paper and fluff pulp in hygiene products, following modification of AOX limits in 2009. Nordic Ecolabelling intends to introduce a uniform method of calculation for, and stipulate uniform limits in respect of, AOX emissions for all paper products, i.e. this will occur for tissue paper products when the criteria are next revised.

Phosphorous emissions to water

The reference values for phosphorous (P) have been assessed with reference to requirements contained in the criteria for the EU Ecolabel.

The revised EU Ecolabel requirements in regard to copy and printing paper stipulate differentiated reference values for phosphorous as there are two sources of phosphorous in waste water; firstly, it occurs naturally in wood; and, secondly, it is often used in biological cleaning processes. The natural occurrence of phosphorous presents problems as regards stipulating a requirement in regard to phosphorous as certain types of timber, such as eucalyptus, contain much higher quantities of phosphorous than others; as a result, emissions from these sorts of timber are, in turn, higher. The reference values (in kg/ADT) stipulated in the revised EU Ecolabel criteria are given in Table 4.

Requirements in regard to phosphorous have been stipulated in earlier Nordic Ecolabelling criteria. The latest evaluation of Nordic Ecolabelling requirements showed that the requirement is considered to be difficult to meet. Consequently, no proposal for tightening the requirement has been made in the current revision. Methods of calculation have, however, been changed in order to eliminate the effects of filler in the calculations. This tightens the requirement considerably. The requirements in the proposed draft are shown in Table 4, alongside corresponding EU Ecolabel requirements.

Table 4. Reference values in Nordic Ecolabelling Basic module and EU Ecolabel requirements for copy and printing paper.

Pulp type/paper	Nordic Ecolabel P-emissions (kg/tonne pulp or paper)	EU Ecolabel P-emissions (kg/tonne pulp or paper)
Bleached chemical pulp (sulphate and other pulps except sulphite pulp)	0.03	0.045 (P an additive in biological cleaning) 0.1 (P not an additive in biological cleaning)
Bleached chemical pulp (sulphite pulp)	0.03	0.045
Unbleached chemical pulp	0.02	0.04
CTMP	0.01	0.01
TMP/Groundwood	0.01	0.01
Recycled fibre pulp	0.01	0.01
Paper, coated and uncoated	0.01	0.01
Paper, special paper	0.02	0.01

Nordic Ecolabelling requirements in respect of phosphorous differ from those set by the EU Ecolabel in that more stringent requirements are placed on chemical pulp, and in that an easier requirement is stipulated in regard to special paper.

Allocation

Energy consumption is of great relevance in respect of emissions to air, i.e. emissions of sulphur (S) and nitrogen oxides (NO_x). Emissions arising from in-house generation of electricity do not, according to the new criteria, need to be included in calculations. In cases of integrated production of both electricity and heating it can be difficult to trace those emissions arising from electricity generation alone. An allocation must be made. A method of such allocation is described in the EU Eco-label criteria for tissue paper. Called the energy principle, this method of allocation assumes that the value of electrical energy can be estimated to be double the value of heat energy. It is, therefore, proposed that the same principle of allocation is used in Nordic Ecolabelling criteria.

There are several different ways of making allocations. It is not of great importance which of these is chosen. It is simply important that all producers apply the same methods. The following method of allocation of emissions arising from electricity generation has, therefore, been added to the criteria:

In case of a co-generation of heat and electricity at the same plant the emissions of NO_x and S shall be allocated and calculated according to the following equation:

$$\text{The share of emissions to air allocated to electricity generation} = \frac{2 * (\text{MWh}(\text{electricity}))}{2 * \text{MWh}(\text{electricity}) + \text{MWh}(\text{heat})}$$

Net energy (net production of heating and net production of electricity) is referred to in the above formula. The definition of net energy used is the same as the definition contained in the proposed EU Ecolabel criteria for printing paper from December 2009: "The electricity in this calculation is the net electricity, where the part of the working electricity that is used at the power plant to generate the energy is excluded i.e. the net

electricity is the part that is delivered from the power plant to the pulp/paper production. The heat in this calculation is the net heat, where the part of the working heat is that used at the power plant”.

4.2.9 Other emissions to water and air

Requirements R13²⁹ (chlorine bleaching), K14 (emissions of chelating agents), R15 (emissions of chlorate) of the basic module.

The requirement is unchanged.

4.2.10 Waste

Requirement R16³⁰ of the basic module

The requirement has been simplified, but the level of standards set by the requirements remains the same in practice.

All licence holders have well-functioning waste treatment and disposal systems, according to an analysis of currently issued Nordic Ecolabelling licences. The majority are certified according to some sort of environmental management system. The criteria have, therefore, been modified so that no documentation is required to fulfil the requirement in regard to waste if the production site is certified according to ISO 14001 or EMAS.

4.2.11 Annual reporting

Requirement R17³¹ of the basic module.

An obligation to send a list of chemicals to Nordic Ecolabelling annually has been added; in other respects the requirement is unchanged.

4.2.12 Other areas of discussion

The following issues have been discussed, but are not included in the criteria:

New factor 2.5 for in-house generated electricity

Since pulp and paper producers make a record of total fuel consumption, even fuel used in any in-house generation of electricity is included in the accounts. In order that only fuel used in the generation of heat is included in calculations, fuel consumed in connection with the generation of electricity is subtracted from the total for fuel consumption as a whole. This is done at a factor of $1.25 \times$ the quantity of internally produced electricity, which is reflected in an efficiency rate of 0.8.

The possibility of increasing this factor to 2.5 (corresponding to an efficiency rate of 0.4) has been examined for the current revision. The motivation for this would lie in the fact

²⁹ R13 = R44 in v. 1 of the basic module; R14 = R22, R46; R15 = R23, R47

³⁰ R16 = equivalent requirements in v. 1 of the basic module are R25 and R49.

³¹ R17 = equivalent requirement in v. 1 of the basic module is R26

that, as electricity is generated from steam power, the efficiency rate of electricity generation in the pulp and paper industry is low. An increase in the electricity factor would also make it easier for electricity generating mills to comply with the points score limit. Such an easing of conditions can, however, be justified in terms of the benefits arising from promoting the generation of electricity, which makes use of surplus steam that would otherwise go to waste. Fuels consumed in electricity generation are also often renewable.

Consultation with companies involved and energy experts has, however, revealed that the original factor, set at 1.25, is more accurate and that it does not, for the most part, cause any problems pertaining to meeting Nordic Ecolabel requirements. The original factor is, therefore, retained in version 2 of the basic module.

Water consumption

The consumption of water is a matter of critical importance in many countries. The majority of pulp and paper producers that co-operate with Nordic Ecolabelling are located in the Nordic countries. It is most common in this region that surface water is used for the various manufacturing processes and there is no shortage of such water in the Nordic countries. The local or national regulatory authorities regulate the use of water in Europe. This issue has not been treated as a priority, but will be re-examined for the next revision.

Nitrogen emissions to water

Nitrogen, like phosphorous, is a major contributor to the eutrophication of water courses. No requirement is stipulated in the current Nordic Ecolabelling criteria in regard to emissions of nitrogen to water, and no such requirement has been considered for the revision. One reason for this is that the pulp and paper industry is a very small emitter of nitrogen in comparison to agriculture and other industry. Moreover, available resources for this revision have been directed at working on those parameters identified as more important in the criteria evaluation undertaken prior to work being begun on the criteria revision.

Filler

Filler can be a major ingredient in certain paper products, such as printing paper. The previous revision considered the issue of filler material; and whether it was possible or desirable to stipulate requirements in regard to filler. See the background document to version 1 of the basic module. At that stage, no requirement was introduced; and none has been added to the criteria for this revision either. Such a requirement is not considered to be relevant. It should, however, be noted that several requirements that are new to the criteria for this revision have an indirect effect on the use of filler:

- changes to the calculation of the matrices in respect of the requirements regarding energy and emissions have removed the effects of filler from the awarding of a points score. This has resulted in greater stringency in those requirements placed on paper products containing a lot of filler.
- requirements in regard to carbon dioxide emissions arising from transportation apply also to filler, as the use of filler may lead to limits set by the CEPI guidelines being breached.
- requirements in regard to chemicals generally apply to organic filler.

Emissions toxicity

EcoLogo, the Canadian ecolabel³², stipulates requirements, as regards paper products, in respect of the toxicity of emissions. As such testing is expensive and is not required by public authorities in the Nordic countries, such concerns were not taken up for consideration in the current revision of the criteria.

5 Changes compared to previous versions

5.1 New and revised criteria

New criteria are presented in section 4.2.

5.2 Omitted requirements

A number of requirements contained in the current version of the criteria have been removed from the proposed new criteria. The majority of these requirements have been omitted as a result of restructuring. In these cases no practical change has been made in comparison with earlier criteria. Methods of matrix calculation regarding energy and emissions have been moved to an appendix to the criteria, which has led to a shortening of the criteria text.

The only requirement to be omitted entirely is the former requirement “Electricity generation from fossil fuels and nuclear power”. This requirement has been removed as information regarding the proportion of fuel coming from renewable sources is no longer necessary.

6 Adjustments in version 2

The Basic Module and the Chemical Module, version 2, were adopted by the Nordic Ecolabelling Board on 22 June 2011. In this chapter, amendments done during the validity of the Modules, version 2 are introduced.

Basic Module

On 15 May 2013 the Secretariat Manager’s meeting decided to prolong the criteria document until 30 June 2016. The new version is called 2.1.

On 19 June 2013 the Secretariat Manager’s meeting decided to adopt a change in requirement R15 (Emissions of chelating agents). The pulp manufacturer must account for report (e.g. test results) regarding potential replacement of DTPA by products less hazardous to the environment (see also adjustment of DTPA in the Chemical Module). The new version is called 2.1.

On 5 November 2015 the Nordic Ecolabelling board decided to prolong the validity of the Basic Module with three years. The new version is called 2.2 and it is valid until 30 June 2019. Some editorial adjustments were also introduced in the document. The editorial updates are mainly clarifications and explanations of concepts, methods of

³² EcoLogo, the official Canadian ecolabel. <http://www.ecologo.org/en/>

calculation and allocation principles used to make the Criteria more transparent, to reduce interpretations and ease the application process in general.

On 9 November 2016 the Nordic Ecolabelling board decided to implement the Nordic Ecolabelling's new forestry requirements in the Basic Module with some adjustments. The Nordic Ecolabelling's new general forestry requirements were adopted by the Nordic Ecolabelling board in November 2015³³. The main amendments concern that Nordic Ecolabelling to acknowledge and comply with FSC/PEFC standards and regulations. In addition, a level of 70 % certified fibres in Swan labelled products was introduced. There is also a list of prohibited tree species that cannot be used in Swan labelled products. The list of banned tree species is available on the website³⁴. During the validity of the current Basic Module, version 2, the new requirements will be implemented as an alternative method in the Criteria. Pulp and paper manufacturer may choose whether to comply with and verify the requirements for fibre raw material according to the new requirements or the 'old' requirements in the Basic Module. The new and the old requirements for fibre cannot be mixed.

The main adjustments of the new forest requirement in the Basic Module concern the certification of fibre raw material that has been modified from 70 % to 50 %. The requirement for accounting has also been reformulated slightly in order to avoid complex bookkeeping when not necessary. In cases, where the inspected/Nordic Ecolabelled paper is manufactured on a production line where the share of certified fibre raw material is continuously over 50 % it is sufficient to verify the share of the certified fibres during the last 12 months on the production line. The new forest requirement was also completed by the current requirement for recycled fibre in the Basic Module (a minimum 75 %) with some modifications of the definitions used (recycled material defined according to ISO 14021). The current requirement limit for recycled material is more stringent than the proposed (75 % vs. 70 %) and covers also combination of certified and recycled material in the paper.

The new requirements are found in Appendix 1E in the Basic Module. The Nordic Ecolabelling's new forest requirement will finally be adapted to the Basic Module of Paper Products during the next revision work.

Information about pulp fees was also introduced in the document. The new version is called 2.3 and is valid until 30 June 2019.

Nordic Ecolabelling's Criteria Group decided on 14 December to prolong the criteria for Basic module with 18 months to the 31 December 2020. The new version is called 2.4.

Nordic Ecolabelling's Criteria Group decided on 12 November to prolong the criteria for Basic module with 12 months to the 31 December 2021. The new version is called 2.5.

³³ <http://www.nordic-ecolabel.org/wood>

³⁴ <http://www.nordic-ecolabel.org/wood>

Chemical Module

Following adjustments were approved by Nordic Ecolabelling 10 May 2012:

- Requirement 4 (de-inking chemicals). The pulp- and paper manufacturer must document the total amount of surfactants in the de-inking chemicals g/tonne de-inked pulp by duly completing and signing Appendix 4.
- Requirement 6 (polymers): The requirement now applies to following specific chemicals: coatings, retention agents, flocculants, foam inhibitors/defoamers and wet strength agents. New triviality limit for polymers was also introduced. Polymers which together constitute less than 1 % of the polymer blend are exempted from the requirement. Paper manufacture must affirm that the requirement to bisphenol A is met by duly completing and signing Appendix 4.

On 15 May 2013 the Secretariat Manager's meeting decided to prolong the criteria document until 30 June 2016. The new version is called 2.2.

On 19 June 2013 the Secretariat Manager's meeting decided to adopt a change in requirement R2 (Classification of production chemicals). Until 30 June 2016, can DTPA and its salts be used in production. Classification of DTPA and its salts are not harmonized and classification can vary³⁵ due to various producers. Manufacturers can classify DTPA as H361 (reproductive toxic) or H411 (hazardous to the aquatic environment , category chronic 2) , see also " CLP Inventory Database " list³⁶. As a result, DTPA does not meet the requirements for classification in R2. It is not possible to replace DTPA in all applications. Therefore, DTPA and its salts are temporarily exempted from the requirement. Some minor amendments were also included in the criteria document. The new version is called 2.2.

On 19 February 2014 the Secretariat Manager's meeting decided to adopt a change in requirement R4 (De-inking chemicals). Silicone derivatives that are destroyed in chemicals recycling are exempted from the requirement. In requirement R2, dyes classified as environmentally hazardous are exempted from the requirement providing that certain conditions for dyes are met (eg. fixing to fibres > 98%). In K8 and K9, requirements for documentation were adjusted. If exceptions are applied, the producer must affirm how the requirements for exceptions are met. Some small amendments were also included in the criteria document. The new version is called 2.3.

On 5 November 2015 the Nordic Ecolabelling Board decided to prolong the criteria document three years until 30 June 2019. The new version is called 2.4.

The derogation concerning DTPA and its salts in the requirement R2 was amended permanent in the generation 2 of the Chemical Module. It would be relevant to have focus on the newer environmentally friendly products in the Nordic Ecolabelling Criteria but it is not possible to replace EDTA/DTPA in all applications. Therefore, the derogation of DTPA was made permanent in this generation of the Criteria. The status of DTPA/ EDTA in the market and possibilities to replace DTPA/EDTA progressively

³⁵ http://echa.europa.eu/documents/10162/13562/clp_introduitory_sv.pdf

³⁶ <http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=36264&HarmOnly=no?DisclaimerAgr=Agree&Index=67-43-6&ExecuteSearch=true&fc=true&lang=en>

by less environmentally harmful products shall be studied in the next revision. Some editorial changes were also adopted in the document.

Nordic Ecolabelling's Criteria Group decided on 14 December to prolong the criteria for Chemical module with 18 months to the 31 December 2020. The new version is called 2.5.

Nordic Ecolabelling's Criteria Group decided on 12 November to prolong the criteria for Chemical module with 12 months to the 31 December 2021. The new version is called 2.6.

7 Future criteria

Future requirements in respect of the environmental labelling of paper products are likely to continue to focus on sustainable forest management, energy consumption and the problems of climate change. The use of chemicals is also likely to be an issue of concern in the future.

8 References

Background document to version 1 of Nordic Ecolabelling of paper products – Basic module and Chemical module, Nordic Ecolabelling (2003)

Other references are provided in footnotes.

Appendix 1 Background to requirements in regard to fibres

Fibre raw materials

Principally, paper products comprise a minimum of 50% wood fibre from the forestry industry. Certain types of paper may be made from other plant fibres and some types of paper may contain up to 50% fillers. The type of fibre raw materials used in the paper and the way in which forestry/agricultural acreage is managed, are essential environmental parameters when assessing the impact of the paper on the environment.

The development and use of other types of plant fibres within manufacturing based on paper and plant fibre have meant that the requirement for fibre raw materials has been extended from previously only applying to wood fibres, to now also applying to bamboo, cotton linters, hemp and flax.

No types of fibre raw material other than the aforementioned may be included in the fibre raw material. The decision as to which new types of fibre raw materials may be included within the product group is taken by Nordic Ecolabelling.

Sustainable forest management

There is no single, globally applicable standard for sustainable forest management. The perception of what is sustainable depends on basic social and cultural values and these can vary from one country to another, just as they can vary through time. However, there is a certain amount of agreement about the general principles and criteria.

The forest declaration from the 1992 UN Earth Summit on the Environment and Development in Rio stated that forests should be managed sustainably in a manner that complies with the social, economic, ecological and cultural needs of current and future generations. The forest declaration establishes a number of further principles for sustainable forest management, accentuating countries' national entitlements to utilise, manage and develop their own forests (www.un.org).

This is the reason for the establishment of numerous organisations with the intention of delivering internationally recognised principles, regulations and standards that will guarantee socially and environmentally correct forestry management. Subsequently, these schemes have expanded their goals also to encompass the certification of timber products, to provide the producers with an opportunity to prove that their product is "environmentally and socially sustainable" and to provide the consumers with easily understood tools for evaluating the consequence of their purchases.

Forest management and Chain of Custody certification

Forest management certification aims to establish rules for the way in which forests should be managed with regard to meeting social, economic, ecological and cultural needs, building on the principles of sustainability. Common to today's certification systems is the fact that they cover management aspects as well as environmental and social requirements.

The major certification schemes have developed regulations, policies and standards which further define various specific requirements.

Some of the essential requirements that appear in various forest certification schemes are listed below. They may seem almost fundamental, but in many places in the world even these fundamental requirements are not being satisfied. It is in areas like these that forest management could have the greatest positive effect:

- Ban on conversion of forest or other types of wild areas.
- Maintenance of international rights for workers.
- Ban on the use of hazardous chemicals.
- Maintenance of human rights with a special focus on indigenous peoples.
- No corruption – Maintaining all current legislation.
- Identification and appropriate management of the areas that need special protection (e.g. cultural or holy places, habitats of animals or plants under threat).

Types of certification

a) Forest management certification (FM)

This is a certification scheme reserved for forest managers or owners, who wish to prove that their forestry operations are socially beneficial and are being managed in an environmentally appropriate and economically profitable manner, in compliance with specified principles and criteria, as a recognised third party organisation. This is Business-to-Business certification.

b) Chain of Custody certification (CoC)

Chain of Custody certificates track the certified materials through the production chain. This scheme is for businesses that manufacture or trade in timber/paper or other non-timber forest products, and wish to show their customers that they use responsibly produced raw materials. A Chain of Custody certificate helps businesses to reinforce their policies on raw materials purchases and to satisfy public or private purchasing policies.

The FSC's CoC requirements³⁷ cover 5 areas

- Requirements on quality systems
- Requirements on the origins of timber/fibre materials.
- Requirements on control and documentation of production.
- Requirements on FSC products and the labelling of these.
- Requirements on documentation and specification.

³⁷www.fsc.org

The PEFC's CoC requirements³⁸ have similar specifications:

- Definition of responsibilities and rights, including:
 - Responsibility for management
 - Responsibilities and rights for traceability
- Description of procedures for the raw material within the production process, the organisational structure and the procedure for the traceability process.
- Registrations that are necessary for certification.
- Resource management, including the management of:
 - Human resources/personnel
 - Technical facilities
- Inspection and control mechanisms

c) Controlled Wood

Some organisations (e.g. the FSC) provide the opportunity to certify timber products even if the timber or the raw materials used come from "non-certified" forests. The controlled wood can also be used within the CoC certification area. Businesses which wish to sell their wood as "controlled" are subject to some requirements (standards), drawn up by the certifying organisation, with regard to maintaining some fundamental principles for sustainability.

Controlled Wood also supports the production of "Mixed Sources" by assigning certified businesses a tool for controlling "non-certified" timber in their production. This enables the company to prevent wood from being produced in a socially and environmentally harmful manner.

FSC Controlled Wood indicates the following five unacceptable origins for timber and timber products:

- Illegally felled timber.
- Timber felled in a manner that is in conflict with traditional and civil rights.
- Timber harvested from forests with High Conservation Values which are threatened because of human management and activities.
- Timber harvested from virgin/natural forest.
- Timber harvested from areas in which genetically modified trees have been planted (www.fsc.org).

To become part of a product that can be sold with the label, the controlled timber must be independently verified before being mixed with certified materials.

Other organisations (such as the PEFC) permit a mixture of Chain of Custody raw materials and other materials, as long as this other material can be guaranteed not to come from controversial sources, has not been felled illegally, or does not conflict with international and local legislation (www.pefc.org).

³⁸www.pefc.org

Developments in CoC certification

Figure A1.1 below shows developments in CoC certificates issued globally from 1997 to 2008 (FSC and PEFC)³⁹.

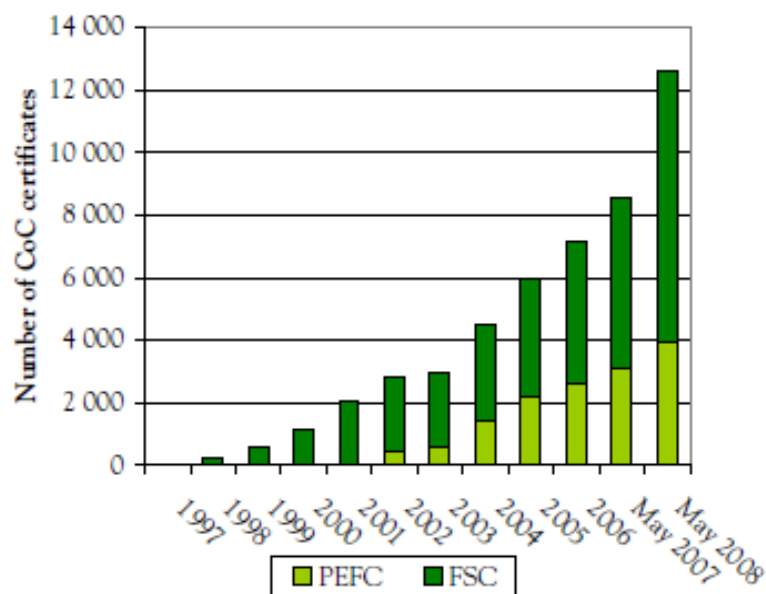


Figure A1.1 Number of CoC certificates issued worldwide between 1997 and 2008 (FSC and PEFC)

Figure A1.2 below shows CoC certificates (FSC and PEFC) issued during the period 2006 -2008 among selected European and North American countries.

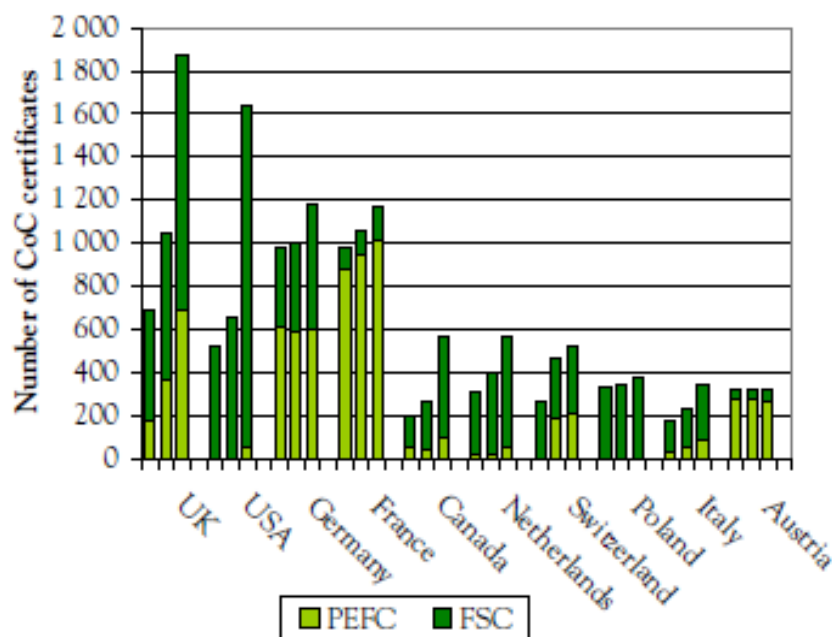


Figure A1.2 CoC certificates (FSC and PEFC) issued 2006 -2008 among selected European and North American countries.

³⁹ <http://www.unece.org/timber/docs/fpama/2008/FPAMR2008.pdf>

The EU and sustainable forestry

In spring 2009, the commission put forward proposals (a report) to the European Parliament's and Council's regulation concerning the specification of requirements for businesses selling timber and timber products (KOM(2008)0644 – C6–0373/2008 – 2008/0198(COD)). The proposal tightens the requirements for guarantees concerning legal and sustainably produced timber in/exported to Europe. The Parliament has not yet processed the proposal but Nordic Ecolabelling is keeping developments under observation.

The EU has established a licensing scheme system (FLEGT - Forest Law Enforcement, Governance and Trade). The aim of FLEGT is to identify the legality of the manufacture of imported products, FLEGT licence. To obtain a licence, voluntary partnership agreements (VPAs) must be entered into by timber producing companies and the EU. Timber products that are legally produced in VPA partner countries will be awarded a FLEGT licence. Only licensed products from these partner countries will have access to EU10. Ghana, the Republic of the Congo, Cameroon and the Central African Republic are the first countries to enter into VPA agreements with the EU⁴⁰. A further 15 countries in Africa, Asia, and Central and South America have expressed an interest in VPA.

The legal origins of timber can also be proven by means of an established tracking system. These voluntary arrangements may be certificated on a third party basis, often as part of ISO 9000 and / or ISO 14000 or EMAS management systems.

Nordic Ecolabelling's experience of requirements for fibre raw materials

Nordic Ecolabelling has, for a long time, had requirements for sustainable forestry in criteria including timber raw materials. We also have requirements for the organic production of various agricultural products. For example, the criteria for the Nordic Ecolabelling scheme for textiles require the organic cultivation of natural vegetable fibres (such as cotton, flax and hemp). With new product groups and when revising old criteria, requirements need to be specified for the cultivation of other renewable fibre raw materials, such as bamboo and cotton.

Nordic Ecolabelling has chosen to work on the basis of the following four principles in order to guarantee sustainable fibre raw materials in the production of Nordic Ecolabelled paper products:

1. To extend existing guidelines for forest certification to apply to the certification of vegetable fibre raw materials in general.
2. To introduce new requirements for fibre raw materials to be grown organically or for cultivation to be in a conversion phase towards organic production.
3. To extend the traceability requirement for fibre raw materials to apply to all areas of the natural world (instead of only forest environments as previously).
4. To introduce a new requirement to ensure pulp and paper mills possess CoC certification. Similarly, an integrated pulp and paper mill must possess CoC certification.

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http://ec.europa.eu/development/policies/9interventionareas/environment/forest/forestry_intro_en.cfm

Requirement for traceability of timber and fibre raw materials

The traceability requirement (formerly the intervention requirement) forms part of all environmental requirements for the Nordic Ecolabelling system in which timber raw materials and other vegetable raw materials represent a major proportion of the environmental impact of the ecolabelled product. Earlier formulations of the traceability requirements have been altered and are now divided into two distinct parts:

- a) Pulp and paper mills are to be traceability certified – CoC (Chain of Custody) certified – according to a scheme of forestry certification that meets requirements of the guidelines laid out in Appendix 1C. This requirement applies also to integrated pulp and paper mills.
- b) The pulp and paper manufacturer must have documented procedures for the sustainable supply of timber and fibre raw material, and a system for tracing and verifying the origins of the timber and fibre raw materials. Products shall be traceable from the forest/land to the first recipient.

The traceability requirement applies to all wood and fibre raw materials. The pulp/paper manufacture shall ensure that all wood and fibre raw materials come from legal sources. Wood and fibre raw material must not be derived from:

- Protected areas or areas subject to an official procedure in preparation for becoming earmarked for protection.
- Areas where ownership or rights of exploitation are unclear.
- Illegally harvested timber and fibre raw materials. Timber and fibre raw materials that have been felled/harvested, processed or transported in a manner that breaches current national legislation and international agreements (for example, CITES-listed species⁴¹, corruption, bribery and other relevant national legislation⁴²).
- Genetically modified trees and plants⁴³. The decision to ban GMOs in timber has its basis in the precautionary principle. *An array of non-governmental organisations (NGOs), including FSC, have placed a prohibition on the use of genetically modified wood. The PEFC⁴⁴ has as yet not drawn up a declaration for or against GMOs. In other words, they also have a general ban on the use of GMOs. The subject of GMOs is a controversial issue: Food safety, acreage used etc. - but also a shortage of knowledge about the impact of GMO yields under local agricultural/forestry conditions, the risk of negative effects on the environment and health. Although the discussion is overwhelmingly about food, many of the problems are the same when it comes to trees. GMOs in trees would primarily be connected with plantations and rapidly growing tree species. Regarding trees, GMOs are still only used on an experimental basis.*

⁴¹ www.cites.org

⁴² Subjects covered within the EU FLEGT action plan for guaranteeing legal timber:
<http://ec.europa.eu/environment/forests/flegt.htm>

⁴³ For a definition of "genetically modified" please refer to EU directive 2001/18/EC.

⁴⁴ Tanja B. Olsen, PEFC Denmark

In addition, the forest management must not harm:

Natural woodland, biodiversity, special ecosystems and important ecological functions.

- Social and cultural preservation values.

This means:

- Forest areas of globally, regionally or nationally significant:
 - concentrations of biodiversity values (e.g. endemic species, endangered species, protected areas) and/or
 - large landscape level forest that form part of a forest unit or of which the forest unit is a part, within which viable populations of most, if not all, naturally occurring species exist in natural patterns of distribution and abundance.
- Forest areas that are found within or contain rare, threatened or endangered ecosystems.
- Forest areas providing basic ecosystem services in critical situations (e.g. watershed protection, erosion control).
- Forest areas that are fundamental to meeting basic needs of local communities (e.g. subsistence, health) and/or critical to local communities' traditional cultural identity (e.g. areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).

Documentation

- Item a) Copy of pertinent certificate fulfilling the requirements in Appendix 1C on CoC certification.
- Item b) Name (in Latin and one Nordic language), quantity and geographic origin (country/state and region/district) of the wood and fibre raw material that is used. Appendix 1A may be used as documentation.

Nordic Ecolabelling may require further documentation if there is any doubt as to the origin of the fibre raw material. Nordic Ecolabelling may revoke a licence if it becomes apparent that the quality requirements cannot be upheld.

- Item b) Traceability system for all wood and fibre raw materials.
- Item b) A documented procedure from the pulp/paper manufacturer that describes how the requirement is fulfilled. The policy shall contain an up-to-date of all suppliers of fibre raw material that the ecolabelled paper contains. Appendix 1B can be used.

The traceability requirement in practice

Internationally, there is a great deal of focus on guaranteeing that all new timber and fibre raw materials come from legal, sustainable sources. Nordic Ecolabelling estimates that the extent of COC certificates in the paper industry is now so great that we have chosen to introduce a new requirement to ensure that all pulp and paper mills should possess CoC certification.

Requirements and CoC certification will be involved in ensuring full traceability of the origins of fibre raw materials. The certification scheme must specify requirements for the CoC chain, guaranteeing traceability, documentation and control throughout the production chain. The certification should be undertaken by an accredited, qualified third party. If recycled fibres, cutter shavings or sawdust are used, the pulp mill must have a verifiable system of ensuring that the recycled material comes from the following:

- Recycled fibre must be derived from used paper. Paper that has been reprocessed. This may come from consumers, offices, printing houses, bookbinders, or similar. Broke is not classified as recycled fibre.

CoC certification guarantees full traceability for that portion of the fibre raw materials covered by the specific certification scheme. If a pulp mill, for example, possesses FSC CoC certification, then there is only full traceability of the fibre raw materials that are included in the FSC products. CoC certification guarantees separation of the certified and non-certified materials within production and administration systems.

Moreover, to guarantee the full traceability and legality of all types of fibre raw materials, Nordic Ecolabelling maintains a general traceability requirement. The traceability requirement is necessary since Nordic Ecolabelling is currently not able to specify requirements to ensure that 100 per cent of all fibre raw materials in Nordic Ecolabelled products come from certified sustainable forestry/agriculture. The traceability requirement is retrospective in that a licence to use the Nordic Ecolabel can be withdrawn if it is proven that the licensee is using fibre raw materials from the areas outlined above.

The traceability requirement covers all fibre raw materials - certified and non-certified.

For example, Nordic Ecolabelling regards FSC or PEFC "controlled wood" certification and Chain of Custody (CoC) certification as examples of systems to support the traceability of fibre raw materials.

Nordic Ecolabelling puts the traceability requirement into practice by reacting to signals from sources such as environmental organisations, national and international websites if there are suspicions that the fibre raw materials might come from protected forests, for example. By remaining informed about forestry/natural fibre production at a global level, Nordic Ecolabelling obtains information about the way in which forestry/agriculture is being run in various regions of the world. However, it must be pointed out that Nordic Ecolabelling is not a global organisation that monitors forestry/agriculture. Nordic Ecolabelling is therefore dependent on information from independent and environmental organisations.

Legislation and regulatory requirements must be satisfied

In addition to requirements concerning certification of fibre raw materials and traceability requirements, the Nordic Ecolabel's ecological specifications have a general requirement that complements the fibre raw materials requirements. Nordic Ecolabelling always specifies a requirement that licensees should satisfy the current regulations and legislation. This requirement means that the licensee must not produce ecolabelled products with illegally logged/harvested fibre raw materials. The requirement is a standard formulation which is included in all environmental requirements documents for Ecolabelling.

Laws and regulations

The licensee must guarantee adherence to safety regulations, working environment legislation, environmental legislation and conditions/concessions specific to the operations at all sites where the Nordic Ecolabelled products are manufactured.

Certified raw materials Market for certified timber 2007-2008

In accordance with figures from the UN (UNECE/FAO Forest Products Annual Market Review, 2007-2008)⁴⁵ 8.3% of the global afforested areas have been certified. In other words, 320 million hectares. The area of certified forest grew at a level of 8.8% from 2007 to 2008. The figures include the American standard SFI and the Canadian standard CSA, which were both recognised by the PEFC in 2005 but, for example, not the Malaysian standard (MTCC) which is now up for consideration before the PEFC. Table A1.3 shows figures from the FSC and PEFC from 2004 and September 2008.

Table A1.3: Certified forest in December 2004 and September 2008 distributed over continents. The figures from 2004 have been taken from the assessment of forestry requirements in 2009⁴⁶. The figures from 2008 have been taken from the websites of the FSC and PEFC (www.fsc.org and www.pefc.org)

	Mil ha FSC		Mil ha PEFC	
	2004	2007	2004	2007
EUROPE	27.0	48.1	57.0	54.7
N. AMERICA	9.7	35.6	171.0	145.5
ASIA- OCEANIA	0.8	3.7	1.1	7.9
LATIN AMERICA	6.4	11.6	1.5	7.9
AFRICA	1.9	3.5	0.0	0.0
Total	45.8	102.5	230.6	216.0

In addition, according to the market report from the UN, Western Europe has certified more than 50% of its total afforested areas, North America more than one third, while Africa and Asia have only certified 0.1%. In tropical regions, 40% of forest acreage that has been certified is based on certification schemes that have not been verified by a third party.

It has also become more common to double-certify forest areas, and a total of 1.6 million ha in Europe and 1.0 million ha in North America have been double-certified. Among the reasons for this is to ensure that the paper industry should also be given an increased market share.

The areas with the greatest acreage of certified forest are the USA and Canada. Almost half of all PEFC certified forest and one third of all FSC certified forest is located in Canada. In Europe, it is Finland that has the greatest area of certified forest. However, this has undergone a minor reduction from 2007 to 2008, because some areas in which felling almost never occurs have been removed from the list. Russia has had the greatest amount of growth in certified forest areas in Europe. Sweden has also seen growth, whereas there has been a decrease in Norway.

⁴⁵ UNECE/FAO Forest Products Annual Market Review, 2007-2008, Chapter 10: "Green building drives construction market and forest certification: Certified forest products markets, 2007-2008", <http://www.unece.org/timber/docs/certification/certmktplace.htm> (22.4.2010)

⁴⁶ Evaluation of Nordic Ecolabelling Forestry Requirements, Forestry Group 21.09.2005.

The PEFC is the largest certification organ and is responsible for 64% of all certified forest. The FSC is the second largest organisation and is responsible for 32% of all certified forest. Many countries adhere to one system. Australia, Canada, Finland, France, Germany and Norway are all dominated by PEFC-approved forestry standards. In countries such as Brazil, Poland and Russia, it is the FSC that dominates. Sweden and the USA have more schemes which certify almost the same amount each. In the tropical countries, the FSC is the body with the highest proportion of certified forest, with approx. 60%; the Malaysian scheme has 28%, while the PEFC has 4%. Both the Indonesian (LEI) and Dutch Keurhout systems are responsible for 6% of certified tropical forest.

According to the UN report⁵ the greatest impetus behind the spread of products from certified forest acreage, and for the certification of the forests, is green purchasing policy and green public purchases. One factor that is also helping in the development is the ranking schemes for green buildings. For example, both LEED (Leadership in Energy and Environmental Design) in the USA and BREAM in the UK assign points for certified timber which has documentation in the form of traceability certificates (CoC). The focus on systems for green buildings varies from one country to another. Common to them all is the fact that the most important field is energy saving. In countries such as Norway and Finland, there has been a very limited focus on certified timber up until now; reasons for this include the general acceptance as self-evident that timber will have been sustainably produced.

Certification of other fibre raw materials

Nordic Ecolabelling has experienced a rising demand for permits to use fibre raw materials other than timber fibres in Nordic Ecolabelled paper products. Bamboo has been in particular demand. In its revision of the basic module for paper, Nordic Ecolabelling has charted the status of certification schemes for bamboo and has looked at the possibility of specifying requirements for certified raw materials. Nordic Ecolabelling considers complex issues linked to sustainable production of fibre raw materials, economic conditions and working conditions to be something that can best be guaranteed through external systems that have competence in these areas.

Certification of bamboo

Bamboo is found growing wild and being cultivated in plantations, but there are no particular certification schemes for bamboo or similar products. The FSC and PEFC can approve bamboo as "non-timber forest" product from FSC-certified forests or plantations⁴⁷. A search in the FSC list of registered certificates only gives one hit for bamboo in a forestry certificate from Malaysia (search carried out on 25 March 2007 and 16 August 2008⁴⁸) A search in the PEFC list of registered certificates did not give any hits⁴⁹.

Bamboo can be certified as organic, but presumably not according to the traditional standards for organic agricultural products, because it is not a traditional agricultural product. However, several certification schemes contain requirements which make it

⁴⁷ FSC Advice Note Title FSC-ADV-30-502 FSC certification of bamboo

http://www.fsc.org/fileadmin/web-data/public/document_center/international_FSC_policies/advice_notes/FSC_ADV_30_502_EN_Certification_of_bamboo_2004_05_13.pdf

⁴⁸ Golden Hope Plantations Berhad, Kuala Lumpur, Malaysia

⁴⁹ www.pefc.org

possible to label as organic various plants, berries and herbs growing in the wild. For example, this applies to the new EU regulation on organic cultivation (834/2007, valid from 1 January 2009). This regulation covers plants that grow naturally in wild areas, forests and agricultural areas. The areas will not be certified, but various requirements have been specified for them. It would probably be possible for bamboo to be included within this, but bamboo is not mentioned specifically in the regulation.

In China there is an organisation called INBAR⁵⁰ (International network for bamboo and rattan), which promotes the sustainable development of bamboo. The organisation has been set up with support from the UN. Members from 36 countries are involved and, of these, only Canada does not itself have any bamboo or rattan. One of the INBAR projects has been financed in an EU-Chinese collaborative venture and is called: "EU-China Biodiversity Conservation in Bamboo Forest Ecosystems in China"⁵¹. The project was launched in 2007.

The Canadian Eco Logo⁵² ecolabel has criteria for flooring. The following requirements are stipulated for bamboo used as a raw material:

“The bamboo flooring must:

- (f) *not be manufactured from bamboo species that appear on the Convention on International Trade in Endangered Species (CITES) list; and*
- (g) *be made from bamboo that is grown in accordance with sustainable harvesting principles such as CAN/CSA-Z809-96, A Sustainable Forest Management System, or programs run by the FSC or INBAR.”*

According to the new EU Ecolabel criteria, 50% of bamboo content of wooden floors must originate from certified sources⁵³.

Certification of cotton linters, hemp and flax

Apart from bamboo, Nordic Ecolabelling in particular has experienced a demand for the ability to use cotton linters, hemp and flax in Nordic Ecolabelled paper products. Cotton, hemp and flax can all be certified as organic, similar to the requirements for organic bamboo.

Requirement for certified timber and fibre raw materials

R7 On an annual basis:

- 1) at least 30% of fibre raw material in the paper shall be source from areas certified to one of the standards or certification systems specified in Appendix 1C. Alternatively, cultivation of the fibre raw material must be certified organic or converting to organic production,
- or
- 2) at least 75% of the fibre raw material in the paper must be recycled fibre, wood shavings or sawdust,

⁵⁰ INBAR (International network for bamboo and rattan) an intergovernmental organization established by treaty deposited with the United Nations, <http://www.inbar.int/>

⁵¹ INBAR Project on "EU-China Biodiversity Conservation in Bamboo Forest Ecosystems in China" Launched, <http://www.inbar.int/show.asp?BoardID=98&NewsID=228>

⁵² The Canadian ecolabel, Eco Logo, <http://www.ecologo.org/>, Internet page visited on 6 June 2009

⁵³ EU Ecolabel Coverings, November 2009.

or

- 3) the fibre shall comprise a combination of 1 and 2. If the paper contains less than 75% recycled fibre, the content of fibre from certified sources shall be calculated using the following formula.

Requirement as to the proportion of certified fibre raw material in the paper (Y)

$$Y (\%) \geq 30 - 0.4x$$

where x = the proportion of recycled fibre, wood shavings or sawdust.

Documentation

- ☒ The **pulp manufacturer** must document the proportion of fibre raw material from certified forestry and cultivation and the proportion of recycled fibre, wood shavings and sawdust in each constituent pulp as specified in Appendix 1D.
- ☒ **The producer of the paper product** must attach calculations demonstrating that the fibre requirement has been fulfilled. The paper product producer must also, for the duration of the licence period, supply calculations demonstrating that the fibre requirement has been fulfilled for the previous year. This report must be sent to Nordic Ecolabelling before the 1st April of each year.
- ☒ Copy of forestry management certificate that meets the requirements of the guidelines for forestry management certification and organic cultivation found in Appendix 1C.

Nordic Ecolabelling may request further documents to examine whether the requirements of the forestry standard and certification system in question can be approved. Such documentation can, for example, comprise copies of the certification body's final report, a copy of the forestry standard (including the name, address and phone number of the organisation that established the standard) as well as references to individuals representing parties and interest groups who have been involved in the standard.

Background to the certification requirement

The purpose of certification is to ensure that the requirements regarding forestry standards are fulfilled. Nordic Ecolabelling does not have the expertise or the resources to monitor forest management or to verify a forestry standard. For that reason, independent third party certification is required.

The certification system is designed to verify fulfilment of the requirements within the standard. It must be possible to repeat the method used for certification. It should also be possible to use the method within forestry and agriculture, with certification being carried out in accordance with a specific forestry and agriculture standard. The standard must be inspected on the cultivated area before the certificate can be issued.

In the revised version 2 of the basic module, Nordic Ecolabelling sets requirements for 30% of the fibre raw material to be certified in compliance with the methods described above. This is a 10% increase in the requirement in relation to the 20% in the current regulation. The supply of certified forestry is increasing constantly, but the supply in certain regions is constantly low. To a certain extent, paper manufacturers can compensate for this by purchasing market pulp.

Nordic Ecolabelling has previously received standards for sustainable forestry that deal with traditional forestry in Europe. In recent years, there has been a steep rise in the use of fibre from plantations in paper production. The eucalyptus tree species in particular is being cultivated on a large scale as a "hardwood" while the conifer species *Pinus Radiator* is being cultivated as a "soft wood". Plantation cultivation of forests is taking place with a very varied impact on the environment. By definition, it is a monoculture and that has a negative impact on biodiversity.

Similarly, plantation forestry is surrounded by problems concerning the conversion of territory (from original forest and wild areas into plantation use) as well as problems connected with the repression of local populations. The FSC has been developing requirements for plantation forestry in its criteria for sustainable forestry. However, these do not take into account many of the problems surrounding plantation forestry. For that reason, the FSC is currently working on a revision of the standard for plantation forestry. The standard is expected to be completed in 2010⁵⁴.

Nordic Ecolabelling has not approved any non-Europe standards for plantation forest since the standards that have been reviewed are weak with regard to biodiversity. In many cases there has been no national standard. Nordic Ecolabelling hopes that FSC's revised criteria will improve the quality of standards for plantation forest. Nordic Ecolabelling's restrictions regarding fibre raw material are reflected in the minimum requirement of 30% certified raw material.

As a new requirement in the revision of the basic model for paper products, Nordic Ecolabelling has specified that 30 % of the fibre raw materials may be certified as organically grown or that the cultivation is in a transition phase towards organic production in accordance with IFOAM, EEC 2092/91 or similar systems. The global proportion of organically grown agricultural products remains very low and, furthermore, the majority of organic production is used for food. However, Nordic Ecolabelling wishes to stimulate development within organically grown fibre raw materials - in this case, bamboo, cotton linters, hemp and flax. Today, bamboo may either be certified according to a sustainable forestry standard or organic production.

If the requirement for the proportion of fibre raw materials from certified forest/agricultural areas cannot be fulfilled, at least 75% of the fibre raw materials must be recycled paper. This requirement is identical to the current requirement. This proportion can include cutter shavings or sawdust.

Nordic Ecolabelling will follow developments in the use of fibre raw materials from certified forestry/agriculture plus recycled fibre in order to have the best possible foundation on which to make an assessment during later revisions. This is the reason for our wanting an annual update from pulp and paper manufacturers.

⁵⁴ <http://www.fsc.org/19.html>

Requirement for certification standards

Nordic Ecolabelling sets requirements on the standards to which forestry is certified. These requirements are described below. When Nordic Ecolabelling receives an application in which raw materials are certified according to a given standard, this is reviewed and checked in accordance with the requirements specified for standards. When standards are revised they are checked once more.

Requirements on standards

- The standard must balance economic, ecological and social interests; comply with the Rio Declaration's forestry principles, Agenda 21 and the Forest Principles; and respect international conventions and agreements.
- The standard must contain absolute requirements and promote and contribute towards sustainable forestry. Nordic Ecolabelling places special emphasis on the standard including effective requirements to protect the forest from illegal felling and that the requirements protect the biodiversity of the forest.
- The standard must be generally available. The standard must have been developed in an open process in which stakeholders with economic, ecological and social interests have been invited to participate.

The standard must set absolute requirements that must be fulfilled for the certification of the forest/agricultural area. This guarantees that forestry and agriculture are satisfying acceptable levels of environmental work. When Nordic Ecolabelling stipulates that the standard must promote and work to bring about the sustainable production of fibre raw materials, it requires the standard to be evaluated and reviewed regularly to ensure that the process is forward-looking and that the environmental impact is reduced gradually.

Requirements on certification and certification bodies are described below:

Requirements on the certification system

- The certification system must be open, have wide-spread national or international credibility and be able to verify that the requirements in the standard are fulfilled.

Requirements on the certification body

- The certification body must be independent and recognised. It must be able to verify that the requirements in the standard are met, able to communicate the results and be suitable for the efficient application of the standard.

Requirements for organic cultivation are described below.

Requirement on organic production

- Fibre raw materials certified as having been grown organically or in a cultivation system that is in a transition phase towards organic cultivation, must be grown in accordance with EU regulation 2092/91 or 834/2007, or in an equivalent manner in an equivalent control system to KRAV, SKAL, IMO, OCIA etc.

Requirements on CoC certification are described below.

Requirements on Chain of Custody (CoC) certification

- Chain of Custody certification must be issued by an accredited, qualified third party (as for forest certification).
- The scheme must specify requirements for the CoC chain, guaranteeing traceability, documentation and control throughout the production chain.
- If recycled fibres, cutter shavings or sawdust are used, the pulp mill must have a verifiable system of ensuring that the recycled material comes from the following:
 - Recycled fibre must be derived from used paper.
 - Paper that has been reprocessed. This may come from consumers, offices, printing houses, bookbinders, or similar.
 - Broke is not classified as recycled fibre.

Future criteria and requirements for background knowledge about forestry

Nordic Ecolabelling will follow developments within forest and fibre raw materials certification and assess the possibilities of tightening the requirement when the base module is next revised and when the criteria within the various supplementary modules for paper are revised.

There will be particular focus on the FSC's imminent revised criteria for plantation forestry. If Nordic Ecolabelling accepts the new revised FSC criteria for plantation forestry, this will involve an evaluation of the requirement concerning the proportion of certified fibre raw materials in paper, which must be expected to rise significantly.

Nordic Ecolabelling will similarly be following developments within the use of new types of fibre raw materials in the production of paper products.

There will also be a focus on work within the EU concerning guarantees for legally and sustainably produced timber.

Appendix 2 Background to the requirements in the chemical module

What are production chemicals?

Many chemical substances are used in the manufacture of pulp and paper products. These may be categorised into process chemicals for pulp production as well as chemical additives and auxiliary chemicals for paper production. Chemical additives are used to give the paper various characteristics or qualities and the purpose of auxiliary chemicals is to increase efficiency and simplify production processes. Chemical additives are easily retained by cellulose fibres, while auxiliary chemicals are not so easily retained and are often released into waste water.

Intrinsic properties of chemicals may change when they react with each other. Since it is very difficult to predict what happens to a single chemical in a manufacturing process, chemical requirements are placed on the intrinsic properties of each chemical at the moment when it is first used in the manufacturing process.

The term “production chemicals” is used in this document, and in the proposed criteria (Nordic Ecolabelling of paper products, Chemical module version 2), as a collective name for chemical additives, auxiliary chemicals and process chemicals. The term is further used to refer to starch, filler material and so on.

Environmental effects

The chemical requirement is formulated with the primary objective of limiting and reducing damage to the environment, but consideration is also taken to the health hazards involved in handling chemicals.

Information on the biodegradability of a substance, its toxicity and whether it is suspected of having bioaccumulative properties is needed in order to assess the extent of any danger to the environment it may pose.

Biodegradability is, from an ecological point of view, one of the most important characteristics of an organic substance. In general, the easier a substance biodegrades, the fewer the ecological risks involved. Substances that decompose at a very slow rate may accumulate in the environment and, as a result, may pose a risk in the future even if they do not exhibit any acute toxicity. The substances may remain present in the environment over a long period of time and become widely dispersed.

Toxic substances that do not degrade are extremely hazardous for the environment. They pass undisturbed through sewage works and are deposited in the recipient, where decomposition occurs slowly and the toxic effects are long-term, or end up in the sludge and eventually onto agricultural land when the sludge is used as soil fertilizer.

The tendency exhibited by a substance to accumulate in an aquatic organism, such as fish, is measured in terms of a bioconcentration factor (BCF), which is the ratio between the concentration of the substance in the tissue of the organism and the concentration of the substance in the surrounding water at equilibrium. Substances exhibiting a marked tendency to bioaccumulate, especially if they are not easily biodegradable, may quickly become concentrated to harmful levels.

RPC (Relevance, Potential, Controllability) of chemical requirements

Quantities of production chemicals often appear to be relatively small relative to the total amount of pulp or paper produced. However, each year, millions of tonnes of pulp and paper products are manufactured, which means that a considerable quantity of chemicals is used worldwide. The properties of these chemicals, in relation to their effects on the environment, are, therefore, of major significance. The latest revision of the stipulates criteria in regard of chemical groups known to be associated with detrimental effects on the environment or health, and which are used in large quantities.

Efforts are being made across the EU to phase out the use of harmful chemicals. Ecolabelling has proven itself to be a quick and effective means of reducing the use of harmful chemicals; and, is, therefore, a valuable complement to legislation. The market demand for more environmentally sensitive chemical products increases as pulp and paper mills replace their production chemicals with less harmful alternatives as a result of participation in the Nordic Ecolabelling process. Producers of chemicals are, in this way, given an incentive to adapt production to chemicals that are environmentally more suitable.

Evaluating the environmental hazards associated with different chemicals can be a difficult task for those with responsibility for production. In such cases, Nordic Ecolabel requirements can help those charged with responsibility for environmental issues to select production chemicals with a lower negative impact on the environment. EU directives apply only to goods sold or produced within the EU, but Nordic Ecolabelling accepts applications for licences to carry the Nordic Ecolabel from across the world; and, thus, the reach of Nordic Ecolabelling requirements extends to pulp and paper production beyond the boundaries of the EU.

Pulp and paper manufacturers purchase products from a wide range of suppliers of chemicals. These suppliers are often able to offer, or develop, alternative products if there is a demand for them. Experience from the ecolabelling products such as tissue paper and printing paper has shown that it is relatively simple to substitute chemicals that are harmful to health and the environment with less hazardous alternatives. Nordic Ecolabelling, in this way, steers production towards the use of chemical products that are less harmful to health and the environment.

General remarks

Which chemicals are subject to the requirements?

The chemical requirements apply to production chemicals used in the production of pulp and paper and to chemicals used in the conversion of the paper. The requirements are stipulated in respect of recycled fibre, mechanical pulp, CTMP and chemical pulp. These requirements do not depend on the manufacturing combination; i.e. whether the pulp is manufactured at a non-integrated or at an integrated paper mill.

The requirements do not apply to chemicals used in the treatment of freshwater, in the generation of energy or in maintenance work that is not defined as maintenance of pulp and paper production equipment. Chemicals used in external treatment of water lying outside the control of the pulp or paper manufacturer (e.g. municipal treatment plants), are exempt from the requirements below. It is most common for manufacturers of pulp

to maintain their own systems of external water treatment; these systems are not exempted from the requirement. It is, however, common practice on the continent for waste water from smaller paper mills to be treated in municipal treatment plants, over which the paper manufacturer exercises no control. Exemptions from the chemical requirements are allowed for this type of external water treatment plant.

For example, the cleaning of wires, or of cooking and bleaching equipment, is regarded as constituting maintenance of pulp and paper production equipment, whereas felt washing agents used continuously in production are regarded as production chemicals.

It is not necessary to report or document the use of chemicals in trials, of no longer than 10 days during a period of, at most, two months, to Nordic Ecolabelling, in respect of pulp and paper manufacturing.

How are the requirements documented?

Fulfilment of the requirements is documented primarily with the aid of declaration or test results from chemical manufacturers/suppliers. Nevertheless, Nordic Ecolabelling will be entitled to seek information from chemical manufacturers/suppliers in respect of the complete chemical composition of a product in order to be able to analyse the contents of that product, whenever it is judged to be necessary to do so.

The chemical supplier shall inform Nordic Ecolabelling regarding modifications to the composition of the product or any substitutions of raw materials that might occur before the next revision of the chemical module.

Requirements applying to all production chemicals and chemical products

The requirements are presented below, together with specification of required documentation and relevant background analysis. The status of the specific requirements, as new or revised, is also stated.

R1 Production chemicals

The requirement has been amended.

The pulp/paper manufacturer must report all production chemicals per product, providing documentation in respect of the product's complete name, product safety data sheets, function, classification, area of use in the mill, supplier and quantities used in kg/tonnes pulp/paper. All chemical products used in the production of pulp and paper and in conversion must be fully documented. The requirement further applies to any water treatment over which the producer exercises control.

- ☒ Declaration of the production chemicals used, see Appendix 1, and full product safety data sheets for all chemical products. Safety data sheet/product specification must comply with the standards set out in Appendix II of REACH (Regulation 1907/2006/EC).

Background:

The requirement provides an overview of the quantities and types of chemicals used in pulp and / or paper production, making it possible for Nordic Ecolabelling to check that sufficient and correct information has been submitted regarding the chemicals subject to the requirements. A description of the chemicals subject to the requirement is supplied in the above section. Changed since version 1 is that chemicals used in external treatment of water lying outside the control of the pulp or paper manufacturer (e.g. municipal treatment plants), are no longer included in the requirements.

R2 Classification of production chemicals

This is a new requirement.

Organic production chemicals classified according to the risk phrases indicated in the Table 1 may not be used in pulp and paper manufacture.

Table 1. Classification of production chemicals

Classification	Hazard symbol and risk phrase / Hazard class, category and statement	
	EU Dangerous Substances Directive 67/548/EEC	CLP Regulation 1272/2008
Hazardous to the environment	N with R50, R50/53 or R51/53 and/or R59	Hazardous to the aquatic environment: Category Acute 1 H400 Category Chronic 1 H410, Category Chronic 2 H411 EUH 059
Very toxic	Tx (T+ in Norway) with R26, R27, R28	Acute toxicity: Category 1 or 2 with H330, H310 and/or H300 and/or Specific target organ toxicity – single exposure: Category 1 with H370
Carcinogenic	T with R45 and/or R49, (Category 1 or 2)or Xn with R40 (Cat 3)	Carc 1A/1B/2 with H350, H350i and/or H351
Mutagenic	T with R46 (Category 1 or 2) or Xn with R68 (Cat 3)	Mut 1B/2 with H340 and/or H341
Reproductive toxic	T with R60 and/or R61 (Category 1 or 2). Or Xn with R62 and/or R63 (Cat 3)	Repr 1A/1B/2 with H360, H361

Classification is performed according to EU Dangerous Substance Directive 67/548/EEC with later amendments and adjustments and/or CLP Regulation 1272/2008 with later amendments. Classification according to the EU Dangerous Substance Directive or the CLP Regulation may be used during the transition period, i.e. until 1 June 2015. Following the transition period, classification according to the CLP Regulation is to apply exclusively (see Table 1 above). Further information on the risk phrases is supplied in Appendix 2.

Note that the producer of the raw material/product is responsible for classification.

Note that this requirement applies to organic production chemicals and not constituent substances. Only chemicals that are 100% inorganic are exempted from the requirement (e.g. NaOH).

Exceptions to the requirement:

- Biocides
- Peracetic acid (bleaching agent)
- Cationic polymers, if charge is the reason for classification.
- If consumption of the chemical is less than 0.05 kg/tonne produced pulp (0.005%) at the pulp mill or per produced paper at the paper mill.

- ☒ The pulp/paper manufacturer shall check the classification of the production chemicals as specified by the enclosed material safety data sheets and ensure that the information is correctly included in Appendix 1.

Background:

KCL Science and Consulting in Finland were engaged to evaluate the requirements regarding chemicals.

They recommended introducing a general prohibition of production chemicals classified according to CMR (Carcinogenic, Mutagenic, toxic for Reproduction) criteria, categories 1 and 2, or classified as environmentally hazardous with N R50-R53. They further recommended that the use of CMR chemicals with a T classification, assigned with risk phrases R45, R46, R60, R61, or that are classed as toxic/very toxic, with risk phrases R23, R24 or R25 or R48 and R26, R27, R28 or R39, be banned from use in Nordic Ecolabelled paper products. Based on the consultants' recommendations, Nordic Ecolabelling sent a questionnaire to 48 suppliers of chemicals to the pulp and paper industry. Nordic Ecolabelling received 16 responses in which the suppliers have based their answers on the products that they themselves market. In general, the respondents affected by the requirement were both positive and negative. Those not affected welcomed the requirement. Only two suppliers rejected the proposal outright: the first argued for risk-based criteria, and the second for allowing the use small amounts of the chemicals. Several suppliers have also expressed a wish to exempt biocides from the requirement.

The suppliers were also asked to give their assessment of whether T or T+ classified chemicals remain present in the finished paper product. The responses indicated that since there are no comprehensive lists of classified substances it is currently not possible to comply effectively with such a requirement. Several suppliers opposed the idea of Nordic Ecolabelling composing its own list of hazardous substances. The majority of suppliers replied that the question was not relevant to their activities.

Nonetheless, the relevance of a requirement in regard to classification is demonstrated by the results of a recent internal review of all 1700 chemical products listed in Nordic Ecolabelling's database of chemicals used in the paper industry. The review shows that the majority of production chemicals are not affected by the classification limits as they are used in quantities below limits specified for the product in question. The requirement will however influence the use of the most problematic and undesirable chemicals, as well as new problematic chemicals, such as coating chemicals, softeners or fixatives that could be classified as carcinogenic or hazardous to the environment and which are not limited by the present criteria.

Exceptions have also been introduced for biocides in those cases in which specific requirements are stipulated in regard to classification. Cationic polymers are exempt from the requirement on classification as environmentally hazardous if charge is the reason for

classification. Peracetic acid (bleaching agent) is exempt from the requirement. Inorganic production chemicals are also exempt from the requirement. Biocides are often hazardous to the environment and CMR classified since they are used to inhibit the growth of microorganisms in the production process. Specific requirements in respect of biocides are given in R5.

The exemption regarding cationic polymers has been introduced since these are indispensable in paper production. They are used as retention agents in paper production and for water purification to bind substances and thus prevent them entering the receiving body of water. Used as a retention agent, they reduce emissions and increase productivity. Retention agents are themselves primarily (97-99%) contained by the paper. The small quantities that are released into process water bind to the biomass, thus losing their charge and also their toxicity⁵⁵.

The exemption regarding peracetic acid (bleaching agent, CAS 79-21-0) has been introduced since these are indispensable in paper production. Peracetic acid is classified as R50. According to the Finnish Forest Industries, peracetic acid decomposes during the bleaching process and biological purification.

An exemption for non-organic products has been introduced as these may be present in large quantities, and play a vital role in paper production, while not posing the most significant risks to the environment. Non-organic chemicals may be classified as environmentally hazardous or very toxic at high concentrations, *inter alia* due to high alkalinity. A review of chemicals used in products endowed with a Norwegian license, showed that no non-organic chemicals are CMR classified. Two chemicals are classified as environmentally hazardous: Ammonia (Ammonium hydroxide) R50 and Sodium chlorate crystals (N: 51/52). A requirement in respect of classification (R2) of non-organic chemicals is not judged to be of benefit to the environment. Non-organic chemicals may, of course, constitute a hazard in the workplace if handled without due care and attention, but requirements placed on workplaces by the authorities are considered by Nordic Ecolabelling to constitute sufficient regulation.

Definitions of organic and non-organic chemicals follow IUPAC (International Union of Pure and Applied Chemistry) nomenclature.

Exceptions: The limit value of 0.05 kg/tonne is set based on a review of the chemical lists submitted by licence holders. The trade's BAT representative has also been consulted as to the viability of the limit value. Some dyes in particular are very close to the trivial limit.

⁵⁵ Draft 1 BREF-document for Pulp and Paper Industry, 2010. Reference documents from the European IPPC Bureau. <http://eippcb.jrc.ec.europa.eu/reference/>

Requirements applying to specific chemicals

Requirements applying to specific chemicals are stipulated in respect of the following chemicals. Declarations that may be used for documentation are indicated in parentheses:

- Cleaning agents and dispersants, (Appendix 3, Declaration 1)
- De-inking chemicals (Appendix 3, Declaration 2)
- Biocides/slimicides (Appendix 3, Declaration 3)
- Coatings*, retention agents and other polymer containing chemicals (Appendix 3, Declaration 4)
- Wet strength agents (Appendix 3, Declaration 5)
- Foam inhibitors/defoamers (Appendix 3, Declaration 6)
- Dyes, environmental hazard of constituent substances (Appendix 3, Declaration 7)
- Dyes, heavy metals (Appendix 3, Declaration 7)
- Dyes, amines (Appendix 3, Declaration 7)
- Dyes, phthalates (Appendix 3, Declaration 7)
- Adhesives (Appendix 3, Declaration 8)
- Starch products, GMO (Appendix 3, Declaration 9)

**Coatings: The term "coatings" encompasses products applied to the base paper after the press section of a paper machine.*

R3 Cleaning agents and dispersants (previously R2)

The requirement has not been amended.

Alkylphenol ethoxylates or other alkylphenol derivatives must not be deliberately added to cleaning agents or dispersants.

Documentation

- The producer or supplier shall demonstrate compliance with the requirement by duly completing and signing Declaration 1, Appendix 3.

Background:

The use of alkylphenol ethoxylates is prohibited as these decompose to produce alkylphenols. Nonylphenols do not easily degrade and are suspected endocrine disrupters. According to the precautionary principle, a prohibition is imposed on the addition of all alkylphenol ethoxylates, which degrade to alkylphenols, to chemical products used in pulp and paper production.

The primary use of alkylphenols is as raw material for the production of alkylphenol ethoxylates. The latter substances are surfactants and are used in detergents, dispersers and emulsifiers. Uses for nonylphenol ethoxylates are found as a catalyst in the plastic, paper and pulp industries, in textiles, in paint, cleaning agents, adhesives and lubricants. Alkylphenol ethoxylates may be present in cleaning agents, felt-washing agents, de-inking chemicals, foam inhibitors, dispersants and coatings. Documentation requirements are placed, in this revision of the criteria, on the most common types of preparations

containing alkylphenol ethoxylate additives; see also R4, R6 and R8. The requirement in version 1 was formulated in order to encompass all production and auxiliary chemicals. This has now been changed.

R4 De-inking chemicals (previously R2 and R3)

The requirement has been clarified.

If more than 100 g of surfactant per tonne fibre is used in de-inking (the total of all surfactants used in the various de-inking products in use), each surfactant must be readily degradable (OECD test method no. 301 A-F). If the sum of all surfactants used is lower than 100g of surfactant per tonne fibre, each surfactant must be either readily degradable (OECD test method no. 301 A-F) or potentially degradable (OECD test method no. 302 A-F).

Alkylphenol ethoxylates or other alkylphenol derivatives must not be deliberately added to de-inking chemicals.

Documentation

- ☒ The chemical manufacturer/supplier must report the composition of the product regarding surfactants, stating complete names, CAS no. and amounts in accordance with Declaration 2 in Appendix 3. The result of testing for biodegradation properties must be reported in the form of e.g. a product safety data sheet.

Background:

Surfactants are used in large amounts for the production of pulp and paper. Environmental concerns are raised by the toxicity of these substances in combination with poor biodegradability and risk for bioaccumulation. Testing the toxicity or bioaccumulative tendencies of surfactants is, however, difficult, as standard testing methods do not work due to the chemical structure and function of these substances. It is for these reasons that requirements continue to be stipulated in respect of the biodegradability of surfactants. The development of the industry has led to the use of more effective substances that can be added in much smaller quantities than is the case for traditional de-inking chemicals. These substances, however, often exhibit the disadvantage of not always being readily biodegradable (non-ionic surfactants). Since it is not necessary to add large amounts of these substances, they are considered acceptable in small quantities (100 g surfactants per tonne fibre) as long as the surfactants in question are completely biodegradable.

The formulation of the requirement has been clarified. See R3 for requirements in respect of alkylphenol ethoxylates or other alkylphenol derivatives.

R5 Biocides/slimicides (previously R4)

The requirement has been amended.

Active organic substances in biocides used for countering slime-forming organisms in pulp and paper production must not bioaccumulate or be potentially bioaccumulative.

Documentation

- ☒ Chemical manufacturers/suppliers must report on the biocide content of the product stating complete name and CAS no. in accordance with Declaration 3 in Appendix 3 of the Chemical module. Test results on the bioaccumulation potential of the active substances must be reported in the form of e.g. product safety data sheets.

Background:

Closed systems for the circulation of water used in pulp and paper mills that are intended to lower environmental impact also increases the risk of growth of micro-organisms. Uncontrolled growth can lead to slime formation, inorganic and organic deposits, production of gas and corrosion. These may, in turn, affect the capacity of the paper machine and lead to a decline in the quality of the paper product. Consequently, biocides occasionally have to be used in the production of pulp or paper. The micro-organisms are composed of different species of bacteria or fungi.

There are a number of different types of biocides on the market. Certain products kill the micro-organisms and biodegrade immediately, whereas others have a long-term effect. It is, consequently, in the nature of biocides to be toxic. Moreover, rapid biodegradability may not necessarily be desirable if the product is to perform a preventive function. It is, however, considered appropriate to stipulate requirements in respect of bioaccumulation. Requirements in regard to biodegradability should be considered for the next revision of the criteria.

All biocides used in pulp and paper production are required to be non-bioaccumulative. For example, biocides added to preparations of coating slurry must be non-bioaccumulative. (Biocides used in the treatment of crude water, in energy generation and in maintenance work that is not defined as maintenance of pulp and paper production equipment are exempted from the requirement.) Non-organic biocides do not bioaccumulate in non-organic form and fall therefore outside the scope of the requirement.

R6 Coatings, retention agents and other polymer containing chemicals (previously R2 and R5)

The requirement has been amended.

Alkylphenol ethoxylates or other alkylphenol derivatives must not be deliberately added to coatings, retention agents and other polymer products.

The total content of residual monomers, classified according to Table 1 in requirement R2 (N with R50 exempt) and/or as environmentally hazardous with R52/53 (without N), may in newly produced polymers not exceed:

- 700 ppm for acrylamide
- 100 ppm for other residual monomers

Quantities are calculated based on the dry matter content of the commercial product.

In wet strength agents epichlorohydrin (ECH) is (in this specific requirement) regarded as a residual monomer, whereas DPC (dichloroisopropanol) and CPD (chloropropanediol) are not.

Bisphenol A may not be used in Nordic Ecolabelled paper.

Documentation

- ☒ The manufacturer or supplier of the chemical product shall, with full name and CAS number, provide a statement listing the residual monomers in the product classified according to the requirement above, and certify that the requirement is fulfilled by duly completing and signing Declaration 4 in Appendix 3 or Declaration 5 (wet strength agents) in Appendix 3.

Background:

Amendments have been made in respect of prohibited risk phrases, according to which residual monomers may not be classified. The relevant risk phrases are those listed in Table 1 in R2 (N excluding R50) and/or R52/53 (without N), indicating classification as environmentally hazardous. The change made, in relation to version 1, consists in an extension of the prohibition to cover residual monomers classified as environmentally hazardous with N classifications R50 and R59, highly toxic with Tx classifications R26, R27, R28 and/or R39, carcinogenic with T classifications R45 and/or R49 (Category 1 or 2) or with Xn classification R40 (Category 3), mutagenic with Xn classification R68 (Category 1 or 2) or harmful to reproduction with T classifications R62 and/or R63.

Several of the chemical products used in pulp and paper production are composed of polymers. In itself a polymer product is safe, but it may often contain residual monomers that are classified as hazardous to health and the environment. A limit has been set for the content of classified residual monomers in the commercial product at 100 ppm, calculated on the basis of the dry matter content of the commercial product. Polyacrylamide is a common chemical. The monomer acrylamide is classed as hazardous with the risk phrases R45 and R46 (“May cause cancer” and “May cause heritable genetic damage”). For practical reasons to do with production techniques, the requirement of 100 ppm in respect of residual monomers generally is too strict a requirement in regard to acrylamide. Within the EU the limit for residual acrylamide in a product is set at 1000 ppm, whereas the classification limit in Norway is set at 100 ppm. Nordic Ecolabelling hopes to promote the development of production processes and techniques that lead to lower quantities of harmful residual monomers. Nonetheless, the requirement must be framed in such a way that it is possible to meet the standards it sets. The previous limit for the permitted amount of acrylamide in the dry matter content of polyacrylamide was set at 700 ppm. Respondents to earlier consultation rounds proposed a considerably more stringent requirement, at a level as low as 100 ppm. Following the previous consultation round a number of suppliers of chemicals were contacted. Opinions were divided as to the lowest limit with which it would be possible to comply; the very best (and most expensive) processes make it possible to come down to a level of 500 ppm or below. A recent review of the chemical database mentioned above reveals that many chemical products are able to comply with the new limit of 500 ppm. It is unclear how many of the products are not able to comply as many of the residual monomer values are reported as <700 ppm. One can assume that many of these would be able to claim values below the limit of 500 ppm.

As the industry has developed since the limit for acrylamide was last changed in 2001, and a review of the existing data indicates that there is room for tightening the requirement, a new limit in respect of acrylamide monomers is proposed in the draft at the level of 500 ppm. The requirement was strongly criticised and the limit value for acrylamide monomers remains unchanged at 700 ppm.

The requirement on classification has been tightened. The change made, in relation to version 1, consists in an extension of the prohibition to cover residual monomers classified as environmentally hazardous with N R50, R59, highly toxic with Tx classifications R26, R27, R28 and/or R39, carcinogenic with T classifications R45 and/or R49 (Category 1 or 2) or with Xn classification R40 (Category 3), mutagenic with Xn classification R68 (Category 1 or 2) or harmful to reproduction with T classifications R62 and/or R63. Respondents indicate that several essential residual monomers are classified as N R50 and thus exempt from the requirement.

See R3 for requirements in respect of alkylphenol ethoxylates or other alkylphenol derivatives.

Bisphenol A may not be used in Nordic Ecolabelled paper since the substance is a suspected endocrine disrupter. Bisphenol A is often used in thermal paper such as recipes. The chemical industry is aware of this problem and is developing alternatives to Bisphenol A¹.

R7 Wet strength agents (previously R7)

The requirement has been amended.

Wet strength agents may contain a total of no more than 100 ppm (0.01%) low-molecular chloro-organic compounds epichlorohydrin (ECH), dichloroisopropanol (DCP) and chloropropanediol (CPD) – calculated on the basis of the dry matter content.

Documentation

- ☒ The manufacturer or supplier of chloro-organic wet strength agents shall certify that the requirement is fulfilled by duly completing and signing Declaration 5 in Appendix 3.

Background:

Wet strength agents are necessary in order to increase the strength of products when they come into contact with liquids. As such, they are relevant to the function of the product.⁵⁶ Wet strength agents are often used in kitchen towling, napkins and wipes, but also in lesser quantities in copy and printing paper. The wet strength agents used in paper are, in the main, polyamide-epichlorohydrin resins, which lend the paper durable wet strength. It is indicated in the draft version of the new Best Available Techniques (BAT) report (April 2010)⁵⁷ that urea-formaldehyde and melamine-formaldehyde resins are also used. Braga et al (2009)⁵⁸ Over 90% of wet strength agents on the market are based on epichlorohydrin. Kitchen towel typically contains 2-8% while the quantities typically added to copy and printing paper are <0.05% (Braga et al, 2009).

The complete development of wet strength (polymerisation) in a paper product takes about a week. Subsequently, a small amount of residual monomers, such as ECH and its products DCP and CPD, may be left in the paper product. DCP and CPD are usually formed during synthesis and storage of epichlorohydrin (Braga et al, 2009). Both ECH

⁵⁶ Reference document on Best available techniques in the Pulp and Paper industry, Integrated Pollution Prevention and Control (IPPC), December 2001

⁵⁷ Draft reference document on Best Available Techniques in the Pulp and Paper industry, Integrated Pollution Prevention and Control (IPPC), april 2010

⁵⁸ Braga D., Kramer G., Pelzer R., Halko M., Recent developments in wet strength chemistry targeting high performance and ambitious environmental goals, Professional Papermaking 3-4/2009

and DCP are classified as carcinogenic. CPD is volatile and can be shed from paper to air during drying. It is also classed as genotoxic by the EU Scientific Committee on Food (SCF, May 2001). Both of these reaction products are skin-penetrating. Epichlorohydrin resins are also toxic to aquatic organisms and do not readily biodegrade. 90% of all wet strength agents used remains in the paper, and less than 10% is released into the waste water system. Use of epichlorohydrin resins may, therefore, contribute to emissions of AOX.

Wet strength agents have been developed to contain lower levels of DCP and CPD, due in part to more stringent requirements on the chemical purity of packaging paper, in particular paper in contact with foodstuffs. According to Braga et al (2009), levels of DCP of wet strength agents based on epichlorohydrin have dropped from <10,000 ppm from the first generation to <5 ppm in the third generation of wet strength agents. The equivalent reduction in CPD went from < 3500 to < 100 ppm.

The requirement is that wet strength agents may contain a total of no more than 100 ppm (0.01%) low-molecular chloro-organic compounds epichlorohydrin (ECH), dichloroisopropanol (DCP) and chloropropanediol (CPD) – calculated on the basis of the dry matter content.

R8 Foam inhibitors/defoamers (previously R2 and R6)

The requirement has been amended.

Alkylphenol ethoxylates or other alkylphenol derivatives must not be deliberately added to foam inhibitors.

None of the constituent substances that have a foam inhibiting or foam retarding effect in foam inhibitors/defoamers shall be classified as environmentally hazardous in accordance with the risk phrases stipulated in Table 1 in R2 and/or as environmentally hazardous with risk phrases R52/53 (without N).

As an alternative, foam inhibitors/defoamers for which 95% by weight of the constituent substances with a foam inhibiting or foam retarding effect are either readily or ultimately biodegradable, may be used.

Foam inhibitors/defoamers that are destroyed in chemicals recycling are exempted from this requirement.

Documentation

- The chemical manufacturer or supplier of a foam inhibitor/defoamer shall certify:
- that the product does not contain components that are classified as environmentally hazardous in accordance with the requirement, Declaration 6 in Appendix 3. Or:
 - where foam inhibitors/defoamers consist of a mixture of various substances, each substance shall be stated with its full name, CAS no. and concentration. The result of testing for biodegradability of the individual substances shall be reported for example in product safety data sheets and completed and signed Declaration 6 in Appendix 3.

Background:

Increased use of recycled fibre and closed systems in production plants, for reasons of environmental protection, has led to a greater need for foam inhibitors/defoamers in, for example, paper manufacture. Several types of foam inhibitor are currently in use in pulp production, of which oil and silicon based foam inhibitors constitute the greater part. Silicon based foam inhibitors are especially effective and are added in smaller quantities than mineral oil based inhibitors. They are not toxic; and biodegradability is difficult to test as silicon does not dissolve in water and is chemically inert.

Mineral oil based foam inhibitors are not readily biodegradable but may be assumed to be potentially biodegradable and possibly prone to bioaccumulate. They may also contain small amounts of aromatic substances and dioxins, even if their toxicity in respect of aquatic organisms is low.

Foam inhibitors are often in the form of preparations and, considering the new classification rules for preparations, a discussion took place, during the process of revision, concerning a possible reformulation of requirements to apply to preparations rather than their constituent parts. The view was taken, however, that such a change would involve a lowering of standards since it would then be permissible for up to 25% of the content of preparations to be made up of harmful substances with R52-53 classifications,

Stipulation of risk phrases, according to which constituent substances with foam inhibiting functions may not be classified, has been changed and makes reference to classification as environmentally hazardous according to Table 1 in R2 and/or as environmentally hazardous with N classifications R50 and R59.

See R3 for requirements in respect of alkylphenol ethoxylates or other alkylphenol derivatives.

Bleaching chemicals (previously R8)

The requirement has not been changed, but has been moved from the chemical module to the basic module.

Chlorine gas bleaching is not permitted as a method of pulp bleaching.

Documentation

Documented by the pulp producer, see R13 in the Basic module.

R9 Dyes, environmental hazard in constituent substances (previously R10 and R11)

The requirement has been amended.

Dyes for use in printing and colouring shall contain a maximum total of 2% by weight of constituent substances classified as environmentally hazardous in accordance with Table 1 in Requirement 2 and/or as environmentally hazardous with R52/53 (without N).

The above requirements do not include dyestuffs that are fixed to fibres > 98% where the constituent substances are not found in Restricted Substances Database (Sweden), List of undesirable substances,

*Environmental Review*⁵⁹ (Denmark) or *The Observation List, (State of the Environment, Norway)*.
The degree of fixation is calculated as the total retention of dyestuffs on the fibres during the process.

Documentation

- The producer or supplier shall specify the content of the product by duly completing and signing Declaration 7, Appendix 3.

Background:

KCL Science and Consulting in Finland were engaged to evaluate the requirements regarding chemicals.

They recommended introducing a general prohibition of production chemicals classified as environmentally hazardous with N R50, N R50+R53, N R51-53, N R52-R53, N R50-53 and R59. Nordic Ecolabelled wished to transfer this requirement to apply to preparations also. This is a tightening of the requirement in version 1 which applied to constituent substances classified as environmentally hazardous with risk phrases R50+R53, R51+R53 or R52+R53.

The exemption to the requirement (made in respect of dyes fixed to fibres to 98%) concerns cationic dyes that only exhibit environmentally harmful characteristics as a result of a cationic charge. The exemption is explained by the fact that such dyes are almost completely fixed to the fibres or other organic material in the system. This means that the cationic charge is rendered harmless before any release to the recipient.

R10 Dyes, heavy metals and aluminium (previously R10 and R12)

The requirement has been amended.

Heavy metals, aluminium and copper (e.g. aluminium in silver colouring, copper in gold colouring), or compounds of heavy metals, may not be present in dyestuffs or pigments in dyes. This applies to dyeing of both pulp and printing inks.

Copper in phthalocyanine pigment is exempt from this requirement.

Impurities of Pb, Hg, Cr and Cd in dyes must not exceed a total content of 100 ppm. This applies to dyeing of both pulp and printing inks.

The following limit values apply in the case of individual substances in direct dyes:
Pb 100 ppm, Hg 4 ppm, Cd 20 ppm and Cr 100 ppm.

The following limit values apply in the case of individual substances in pigment dyes:
Pb 100 ppm, Hg 25 ppm, Cd 50 ppm and Cr 100 ppm.

Documentation

- The producer or supplier shall demonstrate compliance with the requirement by duly completing and signing Declaration 7, Appendix 3.

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http://www.mst.dk/Virksomhed_og_myndighed/Kemikalier/Stoflister+og+databaser/listen_over_uoens_kede_stoffer/

Background:

The requirement in respect of impurities in dyes is intended to reduce the presence of the listed heavy metals to those levels of impurity that are considered to be the lowest attainable. The limits are set to make it impossible to add these metals actively to dyes. The threshold values are the same as those set by ETAD (Ecological and Toxicological Association of Dyes and Organic Pigments Manufactures). However, ETAD have placed several more metals on their list of restricted substances. Since Nordic Ecolabelling has chosen to place focus on the phasing out of those metals that are the most harmful to health and the environment, only these most harmful metals have been included in the scope of the requirement and not all of the metals placed on the list provided by ETAD. Dye manufacturers belonging to ETAD are expected to follow the ETAD recommendations in respect of all of these impurities. It is, however, worthwhile noting that the threshold values set by the requirement are identical to the equivalent threshold values contained in the EU Eco-label criteria for textile products and the EU Eco-label criteria for copy and printing paper. The requirements presented in both documents are based on the threshold values stipulated by ETAD. Both sets of EU Eco-label criteria, however, stipulate requirements in respect of all metals placed on the ETAD list. Sufficient documentation of compliance with the requirement may, therefore, be provided in the form of e.g. a product data safety sheet, in accordance with Directive 2001/58/EC, in which it is guaranteed that the dye does not contain quantities of heavy metals in excess of the threshold values as set out by ETAD. Analysis must be performed according to directives provided by ETAD. A producer's own measurements of heavy metal content in respect of the product in question may also be submitted as documentation of compliance with the requirement.

The term "direct dye" refers to dyes containing water soluble dyestuffs that can be e.g. anionic or cationic. Pigments are not soluble in water.

R11 Dyes, amines (previously R14)

The requirement has not been amended.

Direct and pigment dye shall not contain dye substances that may liberate the amines specified in Table 2.

Table 2 Amines that must not be liberated from dyestuffs.

Amine	CAS-number
4-amino-biphenyl	92-67-1
Benzidine	92-87-5
4-chloro-toluidine	95-69-2
2-naphtylamine	91-59-8
o-aminoazo-toluene	97-56-3
2-amino-4-nitro-toluene	99-55-8
p-chloroaniline	106-47-8
2,4-diamino-anisol	615-05-4
2,4'-diamino-diphenylmethane	101-77-9
3,3'-dichlorobenzidine	91-94-1
3,3'-dimethoxybenzidine	119-90-4
3,3'-dimethylbenzidine	119-93-7

3,3'-dimethyl-4,4'-diamino-diphenylmethane	838-88-0
p-Cresidine	120-71-8
4,4'-methylenebis(2-chloroaniline)	101-14-4
4,4'-oxydianiline	101-80-4
4,4'-thiodianiline	139-65-1
o-Toluidine	95-53-4
2,4-toluilenediamine	95-80-7
2,4,5-trimethylaniline	137-17-7
0-anisidinedimethoxyaniline	90-04-0
2,4-xylylidine	95-68-1
4,6-xylylidine	87-62-7
4-aminoazobenzene	60-09-3

Documentation

- The producer or supplier shall demonstrate compliance with the requirement by duly completing and signing Declaration 7, Appendix 3.

Background:

Azo dyestuffs that liberate the carcinogenic amines listed in Table 2 are no longer offered by serious dye manufacturers in western Europe, but continue to be manufactured in eastern Europe. Furthermore, both PCB and formaldehyde can be found outside western Europe. Although the majority of coloured paper carrying the Nordic Ecolabel is manufactured in western Europe, there remains a risk that azo dyes would be used in Nordic Ecolabelled products if they were not prohibited. This is because Nordic Ecolabelling accepts applications for licences worldwide.

R12 Dyes, phthalates (previously R13)

The requirement has not been amended.

Phthalates shall not be present in the dyes used.

Documentation

- The chemical manufacturer or supplier must give an account of the composition of the product according to Declaration 7 in Appendix 3.

Background:

Phthalates are prohibited because they are suspected endocrine disrupters.

R13 Adhesives (previously R2 and R15)

The requirement has been amended.

Adhesives used in the production, conversion or packaging of the product shall not contain alkylphenol ethoxylates or other alkylphenol derivatives, phthalates, halogenated volatile organic compounds or ethylene glycol ethers.

Adhesives carrying the Nordic Ecolabel are approved, provided that the trade name and licence number are specified.

Documentation

- ☒ The chemical manufacturer or supplier shall give an account of the composition and classification of the product by duly completing and signing Declaration 8 in Appendix 3 or provide documentation demonstrating that the adhesive is Nordic Ecolabelled.

Background:

The presence of phthalates in adhesives used in Nordic Ecolabelled paper is prohibited as phthalates are suspected of being endocrine disrupters. Halogenated solvents pose major problems for both the environment and in terms of issues of health and safety at work. Many chlorinated solvents have an ozone depleting effect; and some of them have been classed as carcinogenic. Halogenated solvents may also be toxic for aquatic organisms and do not easily degrade.

See R3 for requirements in respect of alkylphenol ethoxylates or other alkylphenol derivatives.

R14 GMO in starch products

This is a new requirement.

The use of starch products that derive from genetically modified material, e.g. certain potato and maize starches, is prohibited. The requirement specifies that this only applies to starches used in paper production.

Documentation

- ☒ The producer or supplier shall demonstrate compliance with the requirement by duly completing and signing Declaration 9, Appendix 3.

Background:

In addition to discussion of the traditional environmental issues arising from paper production, a debate concerning GMO has flared up in recent years. The currency of this debate has increased as the genetically modified potato Amflora, intended for use in the production of starch for, primarily, the paper industry, gained the approval of the EU at the beginning of February 2010. BASF Plant Science expect commercial cultivation to begin during 2010. (BASF)

The term "genetically modified organism" (GMO) refers to a living organism that has had its characteristics altered using techniques of gene manipulation, i.e. using other methods than those used in traditional plant breeding. A plant may have been given characteristics from another plant or organism by means of the transplantation of genetic material. This also occurs in traditional plant breeding, but the new method is undertaken under laboratory conditions. The method is quicker and more exact, as well as enabling more "crossings over" than the old method. The new characteristics may include an altered nutrient content or an ability to withstand cold, insect infestations or dry periods. Within the field of agriculture GMO may occur in two main sorts of products: GMO used in industry (for example, starch from GMO potatoes); and GMOs used in animal feed or food for human consumption.

Genetically modified organisms, GMO, are regulated within the EU by common legislation that all member states must follow. The purpose of the legislation is to protect the health of people and animals as well as the environment. Legislation requires that an analysis is performed of potential risks to health and the environment and that the consequences of any potentially harmful effects are evaluated before approval may be granted.

All activities connected with GMO require the permission of regulators. It is obligatory to provide information in an application or approval regarding the organisms origin, details of the gene added to the organism's genetic material, the characteristics of the organism and possible effects on health and the environment. (Ministry of Agriculture)

The risks involved in genetic technology are a matter of contention. According to the WHO the relevant issues arising from the use of techniques of genetic modification are: the risk that genetically modified organisms spread their genes to wild populations; the continued presence of GMO following harvest; the sensitivity of non-targeted organisms to GMO; threats to genetic stability; a decline in biodiversity; and an increase in the use of chemicals in agriculture.

Regulation 1831/2003 of the European Parliament and of the Council (Concerning the traceability and labelling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms and amending) stipulates requirements placed on the labelling and traceability of food products composed of GMO, or that contain, or are produced with the help of, GMO. All products composed of, or containing, or manufactured using, GMO must be labelled as such. The progress of GMO throughout the process of manufacturing must be traceable.

For products consisting of or containing GMOs, operators shall ensure that:

- a) for pre-packaged products consisting of, or containing GMOs, the words "This product contains genetically modified organisms" or "This product contains genetically modified [name of organism(s)]" appear on a label;
- b) for non-pre-packaged products offered to the final consumer the words "This product contains genetically modified organisms" or "This product contains genetically modified [name of organism(s)]" shall appear on, or in connection with, the display of the product.

Definitions of genetically modified products differ between the EU and the rest of the world. The EU defines a product as genetically modified whenever techniques of genetic modification have been used in the manufacturing of a product, even if the product itself is identical to a product produced using traditional methods only. Such products must be labelled as GMO when imported to the EU, according to the prevailing legislation. However, this regulation is often neglected as no such labelling is required in the country of origin, e.g. the USA. (Cogem). Consequently, it is difficult, as things stand, to know if an imported starch is genetically modified or not.

Three major starch suppliers in the Nordic countries were contacted for the purposes of the consultation round. No requests for GMO starch had been received from Nordic paper manufacturers and the importation of GMO starch from the United States had not been a matter of current interest. The market situation has changed as a result of the EU

decision to allow the cultivation of GMO potatoes for, among other things, the production of starch.

Nordic Ecolabelling has chosen to follow the precautionary principle in this case, by introducing a prohibition of GMO starch, i.e. starch made from genetically modified potato. Although there are some economic gains of using GMO starches, it is not possible to draw a general conclusion that there is a long term environmental benefit in the use of GMO starch. Nordic Ecolabelling has chosen not to take into account any possible advantages of such starch but instead focus on the uncertain scope of the risks involved.

There are many unanswered questions surrounding GMOs. Nordic Ecolabelling bases its overall evaluation in part on a consultant report regarding GMO. It is also highly problematic for example that the GMO potato Amflora is not allowed to be grown in Norway and several EU countries (Austria, Luxemburg, Hungary) due to containing an antibiotic resistance marker gene.

Nordic Ecolabelling's initial environmental requirements are more stringent than the environmental legislation in the Nordic countries. This means that if a product/raw material is prohibited in one Nordic country, Nordic Ecolabelling in general sets requirement limits that are in line with that countries regulatory requirements.

Nordic Ecolabelling also bases its requirements on a precautionary principle. Regarding GMOs, Nordic Ecolabelling wishes for a collected evaluation of the GMO crops in question. It should be demonstrated that in the long term and in general the GMO crop promotes sustainable development and provides ecological, economic and social benefits. Such information is not available for GMO-based starches today.

Prohibiting the use of GMO starches means that the consumer is able to choose paper that is guaranteed to be GMO free. At present, there is no way for consumers to identify and choose a paper that is GMO-free.

References in respect of GMO

Conversations with starch suppliers Cerestar/Cargill, VH-group/Chemec (Roquette) and Lyckeby Starch.

BASF, European Commission approves Amflora starch potato,
<http://www.basf.com/group/pressrelease/P-10-179>.

Ministry of Agriculture, definition of, and legislation governing, GMO,
www.regeringen.se.

WHO, the risks of GMO, www.who.int.

Cogem, various definitions of GMO, www.cogem.net.

ⁱ <http://www.basf.com/group/pressrelease/P-11-324>