Swedish Society for Nature Conservation

Environmental criteria for paper

”Good Environmental Choice is the only system in which the requirements are drawn up by an independent environmental organisation. Through the Good Environmental Choice scheme SSNC not only influences the market, but also other eco-labelling schemes.”

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Foreword

This is the fourth version environmental criteria for paper produced by the Swedish Society for Nature Conservation (SSNC) and it applies to printing paper (such as photocopier paper and newsprint), absorbent paper (such as kitchen roll and filter paper) and paper pulp.

the first criteria for paper, issued in 1988, were based on the document “paper and the environment”, published by SSNC and miljöförbundet. The criteria were revised in 1990 and 1993. The biggest change in the new version is that it now also considers how the production of forestry raw materials and energy affect the environment.

Today’s environmental criteria are based on information from many sources. The environmental reports which many manufacturers began publishing a few years ago have proved especially valuable in this respect.

These criteria were compiled by torvald jacobsson of miljöstrategi ab, who in the course of this work has been in contact with a number of experts within and outside SSNC. The criteria have also been reviewed by various trade organisations, environmental authorities and companies. They were then ratified by the general secretary of the Swedish Society for Nature Conservation, Ulrika Rasmuson.

Goals

Eco-labelling of paper is one of several tools used by SSNC, whose environmental goals are to:

- Help protect Sweden’s last remaining natural forests
- Promote the changeover to a sustainable energy system in Sweden
- Reduce the use of environmentally harmful chemicals in the pulp and paper industry

In market terms the goal of this version of criteria for paper is that one fifth of the pulp and paper that is manufactured in Sweden should meet the requirements of Good Environmental Choice.

This version takes effect from 1 march 1998.

For more information about eco-labelling, environmental criteria for paper and the application procedure, please contact:
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1. Why eco-labelling?

As consumers we are able to influence development. If enough of us consistently buy those goods and services that are best from the environmental perspective, then we will influence the market. The worst products will lose market share. When manufacturers develop new, environmentally adapted goods this will reduce the environmental burden.

Eco-labelling is a long-term process that is designed to pick out the goods or services that put least burden on the environment. It has to be easy for consumers to find the products that are best for the environment. Because the criteria for eco-labelling are regularly stiffened, it stimulates development towards increasingly better products.

Good environmental choice is one of three established and reliable eco-labelling systems in Sweden. The other two are the state-run nordic swan eco-label and krav, an eco-labelling system for food.

Through its shop and act green project SSNC aims to tell people what they can do for the environment from day-to-day. The project has been operating since 1990 and has resulted, among other things, in the shop and act green handbook, the annual Eco-friendly Market Week, and an established network of active members throughout the country.

All products affect the environment in many ways during different phases of their life cycle. To cover all these environmental problems in a single assessment template it is necessary to examine the overall environmental impact of a product. We have to look at how the raw materials are obtained, how the product is manufactured and what happens when the product is used and disposed of – in other words a life cycle analysis. In a life cycle analysis the various environmental hazards are weighed against each other in a subjective manner. Often the individual considerations are not apparent and the end result appears unequivocal, despite the fact that it is not. A life cycle analysis is only valid at the time it is done, since new environmental hazards crop up all the time and these too must be weighed in.

Good environmental choice criteria are thus based on SSNC’s understanding of environmental hazards and its ability to influence them. This makes it easier for eco-labelling to have an impact. However, the criteria must be set at the right level. They must not be so strict that no-one is able to meet them, nor must they be so mild that everyone can do so.

SSNC collaborates with the retail chains ICA and KF on an independent board, the board has three representatives and SSNC has three, of whom one is chairman and has a casting vote. SSNC develops and establishes the environmental criteria independently. The board decides which new groups of products should be given environmental criteria, and when these criteria should take effect. The majority of

Good Environmental Choice criteria have been developed as a result of this collaboration: including those for laundry and dishwasher detergents, paper, nappies and textiles. SSNC has also developed criteria for newspapers, electricity supplies, public transport and goods transport. Companies that apply to use the Good Environmental Choice eco-label must submit a complete product declaration. In this declaration the company must say which substances are used in its products and what manufacturing methods it uses. In certain cases – paper products are one example – companies must also state what source of energy is used and how the raw materials are prepared.

Instructions on how to apply for the Good Environmental Choice eco-label can be ordered from SSNC.

2. Strategy

Eco-labelling is successful. In the late eighties when consumers began to realise that emissions of organochlorine compounds from the pulp industry were damaging marine life, more people began asking for paper that was not bleached with chlorine. The Good Environmental Choice eco-label made it easy to tell which paper products were best from the environmental point of view. Within three years emissions of organochlorine compounds were halved.

The eco-labelling of goods combined with consumer demands for environmentally adapted products are equally important in improving the environment as political decisions, emission requirements and legislation. Sweden's membership of the eu has also reduced our national freedom of action in environmental matters. The thousands of consumers and buyers who make a Good Environmental Choice each day have become a forceful power in a short time.

The SSNC strategy for eco-labelling is founded on four principles:

1. Environmental benefit

The range of goods and services that qualify for the Good Environmental Choice eco-label depend on which environmental problems are considered to require the most urgent solution. Major environmental problems are given higher priority than minor ones and certain products may possibly never be eco-labelled. Because the criteria are constantly revised, SSNC is able to modify criteria at a later date. As a result eco-labelling is one of many interrelated tools used by SSNC for a better environment.

2. Leading role

Since SSNC began its eco-labelling scheme the nordic swan eco-label has also started to take effect. Similar labelling systems are in operation or are being planned in several countries, and the eu also has a system. It may seem confusing that Sweden has several eco-labelling systems, but this has also contributed to the success of eco-labelling, since the various systems have a snowball effect.

Good environmental choice is the only system in which the requirements are drawn up by an independent environmental organisation. Through the Good Environmental Choice scheme SSNC not only influences the market, but also other eco-labelling schemes.

3. Continuity
The criteria will progressively be stiffened, according to a long-term plan, so that companies can make the necessary investments. Recommendations that are made in an early version of the criteria should become requirements in the next version. The criteria for rank A in an older version should become rank B in the newer one.

4. Absolute requirement levels
Good environmental choice eco-labelling is based on absolute requirement levels in each area. SSNC does not use the swan system of matrices in which requirements in different areas are weighed together using a mathematical formula. This method can lead to unexpected improvement in one area at the cost of a reduction in requirements in another area. The formulas used in the matrix system also make it more difficult for consumers to understand the aims of eco-labelling.

3. Paper for a sustainable Sweden

To become sustainable Sweden must save natural resources and, whenever possible, use those that are renewable.. The extraction of raw materials and energy, and the manufacture of goods and services, must not burden the environment in a way that threatens biodiversity and people's health. Used materials must be returned to the natural ecocycle, re-used or recycled.

Paper products have good potential for meeting these requirements. SSNC sets out the following conditions:

- The forestry industry must be run in such a way that it does not endanger biodiversity or ecologically important forestry areas.
- The energy that is used to manufacture pulp and paper must in the long-term be based on renewable resources.
- Surplus energy from manufacture must be used to the maximum extent possible.
- The manufacture of pulp and paper must have the least possible impact on the environment. The goal is closed cycle processes.
- Chemicals used in paper products must not threaten the environment through emissions during manufacture or during waste handling. This requires measures covering additives and process chemicals.
- Sweden has a high consumption of paper containing new fibres when compared with the rest of the world, and this must be reduced. This must be done regardless of the fact that Sweden exports paper.
- The recycling of paper must increase in Sweden and in those countries that buy swedish paper products. This requires greater demand for products made from recycled paper.

In the first two version of Good Environmental Choice criteria for paper the limits for emissios were expressed per tonne of paper. Since 1993 the limits have instead applied to paper pulp. This system is easier to use since the number of types of pulp is considerably smaller than the number of paper products. This also agrees better with the emission statistics of Statens Natursvårdsverk (Swedish Environmental Agency) The limits of the Swan-criteria for paper are also expressed in terms of paper pulp.

Pulp and paper production 1995
(share of world production)

Pulp	**Paper & paperboard**
Canada 14%	Canada 7%
Usa 35%	Usa 30%
Japan 6%	Japan 11%
China 9%	China 7%
Finland 6%	Finland 4%
Sweden 6%	Sweden 3%
Others23%	Others 37%

(source: Forestry Industries 1995)

4. Background

Raw materials

Paper is made from plant fibre. The commonest raw material for this fibre is wood, but it is also possible to make good paper from other plant fibre. In the international forestry industry debate several alternatives have been proposed, including various species of grass. Certain finer grades of paper are made from rags, usually cotton fibre.

Those countries with the largest areas of forestry land account for almost all the virgin fibre that is used. The requirements for raw material production in this version of criteria for paper therefore only apply raw materials from the forest. In 1995 Sweden produced six percent of all the pulp and three percent of all the paper products in the world. Sweden is thus one of the leading pulp and paper producers in the world (fig. 1). Only finland has a higher production output per head of population. The paper and pulp industry consumes 65 percent of all virgin wood used in Sweden. Around 80 percent of production is then exported (statistics for 1995. Forestry industries 1996).

Environmental problems in Swedish forests are largely due to the forestry industry’s efforts to supply the pulp industry’s enormous demand for uniform timber. Forestry companies have exploited as large an area as possible, created “timber plantations” with just a few species of tree all of a similar age, cultivated very fast growing

seedlings, introduced new species of tree from abroad and felled the trees early because young forest grows faster than old forest.

No other major producing country achieves such a high yield of pulp wood per hectare of forest, even if one also counts protected and unexploited forestry land (“The forest resources of the ECE-region 1992” ECE/FAO Geneva, “FAO yearbook of forest products 1992”). At the same time the swedish countryside is losing species and areas of untouched or ancient forest are becoming smaller and fewer in number. (fig. 2). Other scandinavian countries and parts of eastern europe have the same problem, although to a lesser extent.

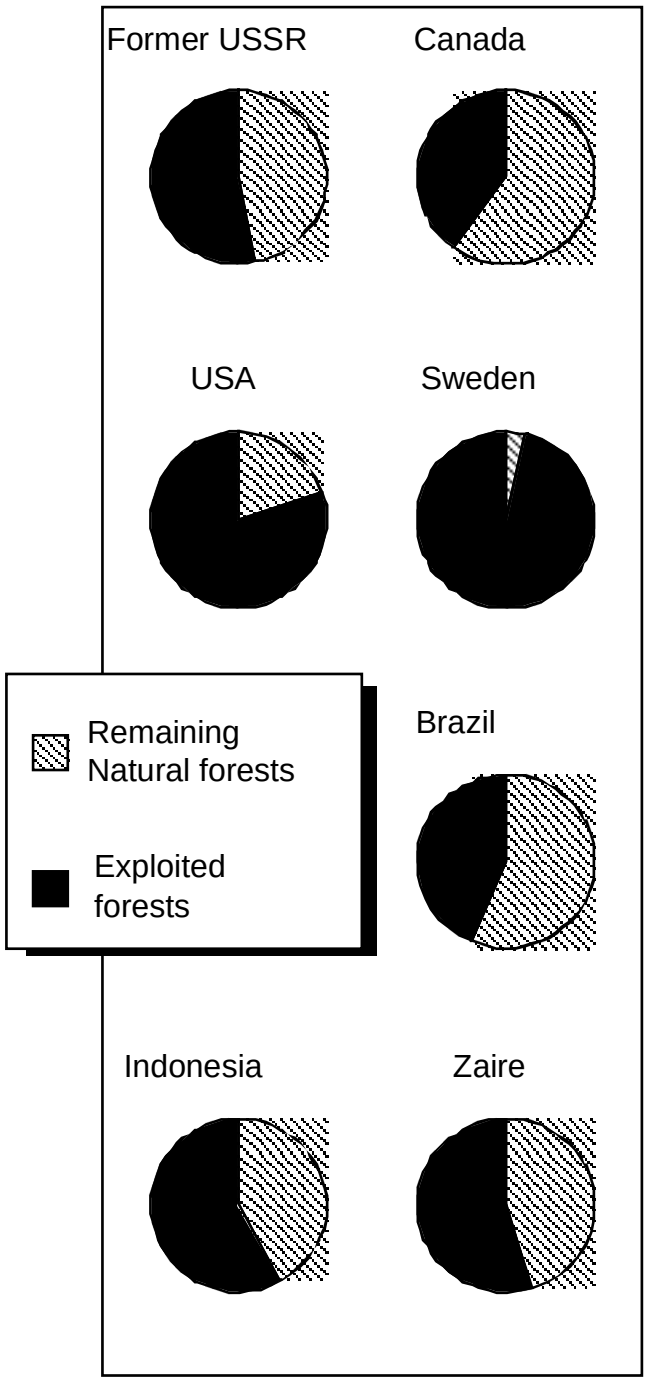
SSNC and the worldwide fund for nature (WWF) in Sweden have begun to develop environmental criteria for the swedish forestry industry, together with forestry companies, major consumers of wood and representatives of various interest groups. In 1997 these rules should be ready. Similar rules for forestry use are being drawn up in countries all over the world. All this is being done under the supervision of the international organisation forest stewardship council (FSC). The timber suppliers who follow these rules will gain the right to label their products with the FSC mark. SSNC equates FSC labelled virgin timber with recycled fibre and allows both these grades to count towards the percentage of environmentally adapted raw material that is required for Good Environmental Choice acceptance.

Pulp which consists only partly of FSC labelled virgin wood may also be counted, if the FSC organisation draws up methods for handling such “mixed products”. According to the FSC working group this will be necessary in order for FSC certification to take hold in Sweden (“FSC labelling of wood-based products from mixed resources” rainey consulting for FSC Sweden, october 1996).

However, the desire for a certain proportion of FSC labelled raw material is not sufficient. SSNC requires that all swedish virgin timber that is used in Good Environmental Choice products should come from suppliers who can confirm in writing that they have not recently felled trees in swedish forestry areas where conservation is most urgent. This requirement applies to all the operations of the timber supplier, not just individual deliveries. This is designed to guarantee that there are no fibres from, for instance, pines harvested from ancient highland forest, in any Good Environmental Choice paper.

Remaining natural forests

(percentage of the total area of production forest)



(sources: “the forest resources of the ece-region 1992” ece/fao geneva, “fao yearbook of forest products 1992” fao)

For FSC certified suppliers in Sweden, no such documentation is required since this requirement is part of the FSC standard. Future criteria should introduce similar requirements for the rest of scandinavia and other countries with a low proportion of natural forest as soon as these countries can define what constitutes ecologically important forestry areas.

Internal environmental work

In recent years many manufacturing plants have introduced systems for their internal environmental work. These systems usually include routines for the management of work and for continuously assessing how well targets are met. A company or a mill can get its environmental work certified. Certification makes it easier to impose requirements on subcontractors and provides a guarantee to customers and the public.

Most important of all these “eco-labels for environmental work” are the eu commission’s emas registration (environmental management and audit scheme) and the international standard ISO 14000.

An environmental management system can be developed by and for an individual mill, a company or a group of companies. The system can also follow templates taken from the iso 14000 series, for example. A company or a mill can obtain a certificate that proves it follows the standard.
The iso 14000 system can meet the requirements for emas registration, occasionally with certain additions (such as requirements for public reporting of certain information). Emas registration applies to manufacturing plants within the eu. Iso 14000 is valid worldwide.

SSNC welcomes these initiatives and the rapid impact they have had within manufacturing industry. A certified environmental management system adds weight to an ambitious environmental programme, since the system checks that what is said is actually done. Effective internal environmental work can reduce the need for external systems of inspection.

A mill that makes internal environmental improvements to its processes and gains certification does not eliminate the need for eco-labelling. Certification should therefore not be used in marketing a product. Certification and eco-labelling can thus complement each other well as part of a company’s environmental efforts.
SSNC has introduced requirements covering pulp and paper manufacturers’ internal environmental work in its criteria for Good Environmental Choice. Pulp factories and paper mills are large industrial plants. Trade in paper pulp particularly is international, and in order to prevent environmental requirements getting lost in the chain there is a need for a standardised system. It is therefore justifiable to set a requirement for systematic and preferably certified environmental work at each mill.
For more information about emas, contact: svenska miljöstyrningsrådet, tel. +46-8-700 62 54. For more information about iso 14000, contact: allmänna standardiseringsgruppen, tel. +46-8-13 62 50.

Energy balance 1995 for modo paper ab, domsjö plants.

Energy in 1995	**gwh**
Electricity from grid	236
Other fuels	0 (46 gwh recovered from process chemicals)
Bio-fuel	0 (974 gwh recovered from process raw materials)
Oil	85
Total energy in:	**321**
Total electricity in:	**236**

Energy out 1995	**gwh**
Electricity returned to grid	86
Hot water & steam, ö-viks region	106
Heat to football field	15
Ethanol (10000 tonnes 96%)	70
Steam to two other factories	122
Methane gas (potential)	0 (35 gwh not currently used)
Resin oil (potential)	0 (25 gwh not currently used)
Total energy out:	**399**
Total electricity out:	**86**

Energy balance:	-78
Electricity balance:	152
Production 1995:	191,000 tonnes sulphite pulp
Total energy balance/tonnes 1995:	-0.41 mwh/tonne
Electricity balance/tonne 1995:	0.80 mwh/tonne
Fossil fuel/tonne:	0.44 mwh/tonne

If methane gas is used for electricity generation in a gas turbine around 25 gwh of electricity and around 5 gwh of heat can be recovered. The electricity balance would then be 125-130 gwh, or around 0.66 mwh per tonne of pulp, and the net production of energy would increase slightly. Resin oil can be used to replace fossil fuel after making minor investments. Fossil fuel consumption would then decrease to around 0.3 mwh per tonne of pulp. (MoDo’s environment audit 1995 and conversation with Monika Mårtensson of Domsjö Fabriker)

Energy

All energy use affects the environment. When the pulp and paper industry uses oil or natural gas it contributes to the greenhouse effect and acidification. When industry uses electricity from hydroelectric and nuclear power plants it leads to other environmental effects. Hydroelectric power damages the ecosystem around exploited waterways. Nuclear waste is a threat to the environment for the foreseeable future, and poses the risk of accidents that could have disastrous environmental consequences.

the swedish parliament has therefore decided not to develop any more hydroelectric plants and to decommission its nuclear plants. This means that everyone must use energy more efficiently.

The pulp and paper industry uses large amounts of energy. Only five percent of swedish industrial jobs are in the pulp and paper industry, yet it uses 40 percent of the electricity consumed by industry and over half the fuel. The pulp and paper industry accounts for 35 percent on total industrial emissions of sulphur and nitrogen oxides. A large proportion of these emissions arise from energy consumption.

Most of the energy is used to boil the wood to break it down into fibre (chemical pulp). During the manufacture of chemical pulp it is possible to recover much of the energy from the waste products of fibre extraction. It is also possible to use surplus heat from the manufacturing process, for example generating electricity in steam turbines and returning this to the grid. Steam and hot water can also be used outside the mill. Chemical pulp mills can actually become net suppliers of energy.

The pulp mills Domsjö and Husum provide all district heating requirements for the whole community of örnsköldsvik. It is therefore possible for an environmentally aware mill management to produce large amounts of biofuel-based energy from chemical pulp mills.

The situation is different for thermomechanical pulp, since its manufacture requires large amounts of electricity. But when the wood is ground down in paper machines this electricity is converted into heat which can be used inside or outside the mill. And even though thermomechanical pulp requires a lot of energy it uses raw materials very efficiently. Twice as much pulp is obtained from a given volume of wood than for chemical pulp.

This version of Good Environmental Choice criteria for paper sets requirements for the amount of energy used in manufacturing pulp. SSNC aims to encourage pulp manufacturers who:

- Make more efficient use of surplus energy
- Reduce demand for electricity
- Reduce demand for fossil fuels
- Use a larger proportion of eco-labelled electricity supplies than other manufacturers.

Energy key figures

Example 1

Pulp manufacture at a swedish integrated paperboard mill. Annual production: 243,000 tonnes of unbleached sulphate pulp and 250,000 tonnes of paperboard.

	heat (mwh/tonne pulp)	elec. (mwh/tonne pulp)
Soda boiler, process steam	+4.03	-
Bark boiler, process steam	+0.57	-
Turbine supplying grid	-0.57	+0.57
External energy input (to mesa furnace)	+0.42	-
Used for pulp production (total including mesa furnace)	-2.95	-0.40
Treatment plants, etc.	0	-0.09
Surplus (to paperboard line)	+1.50	+0.16
Key figures, example 1		
Energy balance, total (0.42 - 0.16 - 1.50)	-1.24 mwh/tonne meets rank A requirements	
Energy balance, elec.	-0.16 mwh/tonne meets rank A requirements	
Fossil fuel consumption	0.42 mwh/tonne meets rank B requirements	

Fossil fuel can be wholly or partially replaced with internally generated methane gas, ethanol and biofuel. Pressurised gasification in a soda boiler can increase energy efficiency and electricity generation considerably.

Example 2

Pulp manufacture at a swedish non-integrated pulp mill. Annual production: 250,000 tonnes of bleached sulphate pulp for sale.

	heat (mwh/tonne pulp)	elec. (mwh/tonne pulp)
Soda boiler, process steam	+4.86	-
Bark boiler, process steam	+0.83	-
Turbine supplying grid	-0.72	+0.65
External energy input (oil)	+0.33	-
Used for pulp production (total including mesa furnace)	-4.00	-0.63
Treatment plants, etc.	0	-0.02
Surplus (sold steam and district heating)	+1.31	0
Key figures, example 2		
Energy balance, total (0.33 - 0.0 - 1.31)	-0.98 mwh/tonne meets rank A requirements	
Energy balance, elec.	0.0 mwh/tonne meets rank A requirements	
Fossil fuel consumption	0.33 mwh/tonne meets rank B requirements	

Example 3

Pulp manufacture at a swedish integrated newsprint mill. Annual production: around 480,000 tonnes of thermomechanical pulp and 500,000 tonnes of newsprint.

	heat (mwh/tonne pulp)	elec. (mwh/tonne pulp)
Recovered process steam	+0.37	-
Bark boiler, process steam	+0.37	-
Turbine supplying grid	-	+0.09
External energy input (electricity)	-	+2.00

Used for pulp production	0.04	-2.06
Treatment plants, etc.	0	-0.03
Surplus (to newsprint line)	+0.78	0
Key figures, example 3		
Energy balance, total (2.00 - 0.0 - 0.78)	-1.22 mwh/tonne meets rank B requirements	
Energy balance, elec.	-2.00 mwh/tonne meets rank B requirements	
Fossil fuel consumption	0 mwh/tonne meets rank B requirements	

New refining technology, improved speed regulation and other measures could further reduce electricity consumption, by up to 0.5 - 0.7 mwh/tonne according to jaakko pöyry.

Example 4

Pulp manufacture at a swedish integrated newsprint mill. Annual production: around 470,000 tonnes of one hundred percent de-inked pulp (dip) and 500,000 tonnes of newsprint.

	heat (mwh/tonne pulp)	elec. (mwh/tonne pulp)	
External energy input (biofuel + electricity)		+0.04	+0.27
Used for pulp production	-0.04	-0.24	
Treatment plants, etc.	-	-0.03	
Surplus (to newsprint line)	0	0	
Key figures, example 4			
Energy balance, total (0.27 - 0.0 - 0.0)	0.27 mwh/tonne meets rank A requirements		
Energy balance, elec.	0.27 mwh/tonne meets rank A requirements		
Fossil fuel consumption	0 mwh/tonne meets rank A requirements		

New chemical pulp plants, such as Metsä-Rauma's new closed cycle TCF mill in Rauma, Finland are major producers of bio-generated electricity and heat. SSNC is studying this development, which could affect future criteria. (Metsä-Rauma's new TCF pulp mill – the first step towards a "TEF mill"-paper, presented by Ismo Reilama, OY Metsä-Rauma AB, at the Envirotech Sympo '96 Vancouver, Canada 1996-04-02)

Energy requirements have been discussed in the past but not introduced, since there is a risk that they would be too complex. The requirements made in this version of criteria for paper are greatly simplified. They do not weight different grades of pulp against each other and they do not take account of the energy used in paper production, transport or forestry use. It has not been possible to impose environmental requirements for electricity supplies outside Sweden for practical reasons.
Future criteria should however set requirements in these areas too. The energy requirements in these criteria are based on four key figures which everyone must meet, as follows:

1. Total energy balance.

A pulp mill is regarded as a closed unit. The energy the mill supplies to society is subtracted from the energy that is supplied to the mill. Energy that is recovered from raw materials and process chemicals is not counted on the energy input side. The energy balance is thus the sum of the gross supply of electricity and the heat energy of fossil fuels (energy in), minus the electricity that is generated during manufacture, and

the energy and heat value of the raw materials that are disposed of externally (energy out). No conversion figures are used to equate electricity and heat.

External disposal is counted as:
- The sale of electricity to the grid
- The sale of steam, hot water and energy raw materials (such as methane gas, solid biofuel, ethanol, methanol and pine oil)
- The use of energy for paper manufacture in so-called integrated production.

Because the energy value of the wood raw materials is not counted as “energy in”, many chemical pulp plants can already show a negative balance, in other words a net supply of energy to the surrounding society.

If the mill manufactures several types of pulp then the total energy balance must be divided among the various manufacturing processes. This division is based on the rated power, the energy raw materials consumed and on operating data for the particular type of pulp.

2. Electricity balance.

The pulp mill is regarded as a closed unit. The electricity the mill supplies to the grid is subtracted from the electricity that is supplied to the mill. If the mill manufactures several types of pulp then the total electricity balance must be divided between the various processes. This division is based on the rated power, the energy raw materials consumed and on operating data for the particular type of pulp.

3. Gross supply of fossil fuels.

The heat values of the fossil fuels that are supplied to the pulp mill are added up (see appendix 1, page 20). This requirement applies to the gross supply of fossil fuels to the entire plant, even if the mill manufactures other types of pulp than that being assessed.

4. Proportion of eco-labelled electricity.

A certain proportion of the gross supply of electricity from the grid must carry the Good Environmental Choice eco-label. This requirement applies to manufacturing plants in Sweden and refers to the total gross supply of electricity, even if the mill manufactures other types of pulp than that being assessed, or supplies electricity to the grid.

The first three key figures (1-3) must be reported in mwh per tonne of pulp produced. The last one (4) must be reported as a percentage of the total electricity supplied. Calculations must be based on a full calendar year, unless the company has changed its accounting year. The key figures must also be reported in the annual environmental report for the manufacturing plant.

The examples alongside give energy key figures for some pulp mills. The examples are taken from a report produced by the consultancy company jaakko pöyry on behalf of SSNC (“Aspects on energy and environment costs in connection with production of kraft pulp, recycled fibre pulp and tmp – draft versions” Jaakko Pöyry november 1996). The report shows how energy can be used more efficiently. The performance of the mills in the example matches fairly closely the performance of swedish pulp mills in 1995.

Chemicals

When SSNC began eco-labelling paper in 1988 its initial aim was to reduce emissions of organochlorine compounds. Since then the criteria have concentrated on emissions into the air and water. This version of the criteria takes the first steps towards a more sophisticated view of the use of chemicals in the paper industry.

The paper industry uses 1,300 additives and catalysts, which are made up of 800 different substances. Chemical additives give the paper certain characteristics, such as surface finish, wet strength and colour, and remain in the finished paper. Catalysts mostly end up in the waste water. Even if one can only detect small amounts in emissions from mills they are of interest from the closed cycle perspective, since they can cause environmental damage at an earlier or later stage.

Since 1986 SSNC has kept a register of the chemicals used by the forestry industry, which is based on information from the environmental reports of mills. (“Chemicals in the Swedish forestry industry” pm by Björn Winell, Industri och kretsloppsavdelningen, Swdish Environmental Athority)

The SSNC summary presented on the next page has laid the foundation for the chemical requirements in this version of criteria for paper. SSNC has assessed chemicals on the basis of their individual environmental hazard, rather than risk assessments of the expected levels in the environment. One exception is the choice of slimicides, which was based on risk assessments.

SSNC wants to replace a number of different chemical compounds with less environmentally harmful alternatives, in accordance with the substitution rule used in chemical product legislation. These substances are not all prohibited in this version of criteria, as some lack alternatives. The requirements for rank A prohibit more substances than those for rank B. Some substances are prohibited in certain applications where there are suitable alternatives, but not where these substances occur in low concentrations and cannot be replaced with less environmentally harmful alternatives.

This is as far as the chemical requirements in this version go, since this area is still not fully researched when it comes to alternatives. In future criteria however the requirements ought to be stiffened, particularly for toxic substances which are bioaccumulating or have poor biodegradability.

Trace chemicals

Paper may not contain more than two percent by weight of organic additives with limited biodegradability. This requirement has been made because we know relatively little about which chemical substances are spread via paper. Waxes and resin acids, which make paper water-repellent, can be limited by the two percent requirement. The same applies to wet strengtheners and dyes (which are further regulated in the next section).

Dyes

The dyes the paper industry uses always have poor biodegradability, and in certain cases are toxic to aquatic organisms. The manufacture of dyes is also assumed to affect the environment. Dark coloured paper is difficult to recycle. For this reason the dye content in paper must not exceed one percent by weight. The most toxic are not permitted at all. The requirements are easily met by papers of lighter shades. There is nothing to prevent just the lighter shades in a range of coloured paper products gaining approval for eco-labelling.

Optical brighteners

All optical brighteners currently have poor biodegradability. These may not be used in the manufacture of Good Environmental Choice paper since the paper can be made sufficiently white by bleaching. If readily biodegradable optical brighteners are developed then an overall assessment must be carried out before they are approved. A comparison should show whether optical brighteners or hard bleaching is preferable from the environmental point of view.

Slimicides

The use of slimicides, which are used against micro-organisms in the paper machines, has increased in recent years. This is linked to the fact that recycled fibre, new bleaching methods and recirculation of water in the paper machines have become more widespread.

Slimicides that are used in swedish paper manufacture must be approved by the chemicals inspectorate (kemi). In spring 1997 eight approved substances were found, of which two may only be used if the paper mill has a biological treatment plant. Kemikalieinspektionen has assessed the risks of the various additives and concluded that two slimicides carry at least five times the risks of the others. (Risk Assessment of Slimicides. Ulf eriksson, Anders Johnson, Monica Törnlund. Kemikalieinspektionen rapport no. 9/95 and Supplement to pm 1994-12-22; Busan 1130, reg. No. 2114. Diary no. F-600-147-96, Kemikalieinspektionen 1996).

Only six of the eight slimicides approved by kemi are therefore approved for the manufacture of Good Environmental Choice paper.

If Kemikalieinspektionen approves new slimicides during the period of validity of these criteria then SSNC will examine whether these may be used for the manufacture of Good Environmental Choice paper products. If kemi withdraws approval for any slimicide it may no longer be used, regardless of whether paper is manufactured in Sweden or overseas.

Additives and catalysts used by forestry industry 1994

Application	Type	No. Products Tonnes/year Known hazardous components Tonnes/year
De-inking	surfactants	see below
Coating	surfactants	see below
	chromoctadecanoate (note)	
Dispersants	surfactants	see below
Anti-matting	surfactants	see below
Fillers	-	-
Dye fixing	dicyandiamide-formaldehyde	
	polyhydroxy-alkylenepolyamine	
	polydiallylmethylammonium chloride	total: 200
Dyes	triphenylmethane dyes and other basic dyes	52
Hydrophobic	resin acids and resins	
	kolofonium resin (note)	total: 6100
Builders	dtpa, edta	
Preservatives	see slimicides	
Softeners	phthalates (b list)	
	dibutylphthalate	
	diisononylphthalate	
	dhtdmac (note)	
	other quaternary ammonium compounds	
Optical brighteners	diaminostilben derivatives	
Boiler/supply water additives	aminomethylpropanol	
	hydrazine (note)	
Retention agents	polyethenimines	
	polyacrylamides	
Defoamers	mineral oils	
Slimicides	5-chloro-2-methyl-4isothiaxoline-3-on (note)	
	2-bromo-2-nitropropane-1,3-diol	
Strength improvers	-	
System cleaning	hydrocarbons	
	nonylphenolethoxylates (b list, note)	see below
Surfactants		
Present in numerous products	nonylphenolethoxylates	
	(b list, note)	
	linear alkylbenzenesulphonates	
Water treatment	defoamers	
	chlorine	

(comments: t = additives, h = catalysts, b list = substances on kemi's limitation list, note = substances on kemi's snv's and ass's list of substances which for health and environmental reasons should be replaced with less harmful substances, "-" = no information)

Bleaching

Emissions of organic chlorinated compounds (AOX) by the swedish pulp industry has fallen from 30,000 tonnes (1980) to 1,400 tonnes (1994) and 1,160 tonnes (1995). (Forestry industry emissions into air and water and waste volumes 1995. Naturvårdsverket report 4657) This is largely due to consumers choosing low chlorine or chlorine-free paper products. Despite this the pulp industry accounts for a large proportion of the swedish AOX emissions caused by man.

Nowadays chlorine-free chemical pulp is a perfectly acceptable alternative. SSNC therefore does not permit the use of chlorinated process chemicals to bleach virgin pulp for Good Environmental Choice paper. No exceptions are made for so-called closed cycle bleaching plants. Although SSNC welcomes the development of closed cycle plants, one must also consider the manufacture of chemicals and what happens to them when a paper product is burnt, recycled or composted. The use of chlorinated bleaching chemicals carries unnecessary environmental risks.

The transition to bleaching methods that are totally free from chlorine has increased the need for builders. Builders neutralise metal ions which can reduce the effectiveness of bleaching chemicals. The forestry industry's consumption of the commonest builder, edta, has grown more than fivefold since 1990. New studies of emissions from bleaching plants indicate that edta is much less readily biodegradable than the alternative builder dtpa. Builders are now being introduced that have better biodegradability than either dtpa or edta, but these criteria only set the requirement that edta may not be used ("The fate of EDTA and DTPA in aquatic environments receiving waste waters from two pulp and paper mills". Mikael Remberger and Anders Svensson, IVL report b 1256, 1997).

Emissions into water

Emission requirements for organic chlorine compounds (AOX) are not included in these criteria since SSNC does not permit the chlorine bleaching chemicals that account for the majority of current AOX emissions.

Other emissions that are important to address arise from organic material (COD) and nutrient salts, such as phosphorous. Nutrient salts provide nourishment for plants, algae and aquatic micro-organisms. When the rate of growth becomes too great it results in oxygen depletion. Organisms that live in the water die and this leads to hydrogen sulphide on the waterbed which kills all higher organisms. Much the same occurs with organic emissions.

Over-fertilisation and oxygen depletion of the waterbed are a big problem in the baltic, kattegatt and many swedish waterways. Since the sixties, COD emissions from the forestry industry have steadily fallen. Emissions of organic material from the pulp and paper industry totalled 350,000 tonnes in 1994. This is more than seven times the amount released by all the sewage treatment plants in Sweden over the same period. Emissions of phosphorous by the forestry industry are roughly 30 percent of emissions from sewage treatment plants.

In earlier versions of its criteria for paper SSNC has set limits for COD emissions. In 1993 it was recommended that the upper limit be reduced to 20 kilograms of COD per tonne of pulp produced. This figure now applies for rank Good Environmental Choice paper.

SSNC has studied how low emissions could be with the best available technology (BAT) (Naturvårdsverket Report 4384, etc). The results are the foundation for the COD requirement in Good Environmental Choice rank A, together with statistics for emissions from all swedish pulp mills in 1995.

The COD requirement for rank B is based on the requirements for rank A 1993, with some minor adjustments.

COD requirements should be further stiffened in future criteria, particularly in the case of sulphite pulp manufacture. One should also consider requirements for nitrogen emission into water, since these emissions contribute to over-fertilisation of the sea. This applies particularly to the southern gulf of bothnia, the baltic and the norwegian sea.

These criteria also introduce maximum levels for emissions of phosphorous. The requirement for rank A is based on the emission levels of the best mills and studies of the best available technology carried out by naturvårdsverket in 1993. The requirement for rank B is based on the swan eco-labelling criteria for paper, together with reports on emissions from paper mills. SSNC places the priority on reducing COD emissions rather then lowering emissions of phosphorous, since emissions of organic substances are so much greater.

Samples of COD and phosphorous emissions into waterways must be taken after treatment and analysed on unsedimented samples. The water flow at the time of sampling must be reported. SSNC has regulations covering sampling. The values that are reported must also appear in the annual environmental report for the plant.

Emissions into the air

Emissions of sulphur oxides (SOx) and nitrogen oxides (NOx) acidify the land and water. Sulphur has a greater acidifying effect than nitrogen oxides, but nitrogen oxides also contribute to the over-fertilisation of waterways. Emissions of sulphur from the forestry industry have fallen by more than 90 percent since the late seventies. This is because the industry uses less oil and better emission control technology. Even so, the forestry industry still accounts for a large proportion of swedish emissions of sulphur. Their emissions of nitrogen oxides are less significant but improvements can be made.

The 1993 version of Good Environmental Choice criteria set upper limits for sulphur emissions. Now, similar requirements are being introduced for emissions of nitrogen oxides.

The new rank A requirements for sulphur and nitrogen oxides are based on emissions from the best swedish mills, together with naturvårdsverket's 1993 assessment of the best available technology. The requirements for rank B are based on the 1993 criteria, the swan criteria for paper and emissions from all swedish paper mills.

Certain allowances have been made in the case of sulphite pulp to avoid disqualifying swedish sulphite pulp mills completely. SSNC gives priority to reducing emissions of sulphur rather than nitrogen oxides, since emissions of sulphur are so much greater. Information about emissions of nitrogen oxides and sulphur (in gaseous form, reduced and oxidised) must cover all emissions from manufacture, combustion plants and processes. Even diffuse emissions, such as leakage from pipes and machinery, must be reported.

The energy requirements in these criteria reduce the consumption of fossil fuel, which in turn reduces emissions of sulphur and nitrogen. SSNC has taken this into consideration. The requirements for sulphur in particular could be stiffened in future criteria. The precise extent depends on the results of the energy requirements in this version of criteria.

Waste

Waste from paper and pulp manufacture is both a waste of resources and an environmental burden since it must be disposed of. SSNC considers it important to minimise the amount of waste, but no requirements have been set in this version of paper criteria for the amount of waste. The reason is that the criteria are likely to become overcomplicated if there are too many requirements.

Furthermore, SSNC believes that development is already moving in the right direction since it pays for companies to reduce the amount of waste.

Information about waste from paper and pulp manufacture must be included in applications for eco-labelling, in order to provide a useful background for the next version of the criteria.

Recycling

The finished paper must be easy to recycle. A manufacturer who applies for the Good Environmental Choice eco-label must have a certificate from an established swedish plant confirming that the paper is suitable for recycling.

6. Good Environmental Choice criteria for paper

These criteria apply to paper for photocopying, printing or writing purposes, absorbent paper and paper pulp. The criteria do not apply to cardboard. In the case of refined paper products, such as envelopes and finished publications, SSNC refers you to special supplements. The criteria include requirements for:

1. Raw materials
2. Production
    - 2.1 environmental work
    - 2.2 energy
    - 2.3 chemicals
    - 2.4 emissions
3. Recycling

In order for a product to obtain the Good Environmental Choice eco-label rank a, all constituent pulp must meet the criteria for rank A. A product that is approved as rank B must consist of pulp that meets either rank A or rank B. Unless stated otherwise the following criteria apply to eco-labelling for rank A and rank b.

1. Raw materials

1.1 felling of ecologically important forest

Suppliers of forestry raw materials who buy raw materials from felling operations in swedish forests that should be protected to conserve biodiversity or essential conservation interests may not supply raw materials to the production plants where the product is manufactured. (the term “felling operations” refers here to all forestry measures apart from those taken in an effort to preserve and promote the natural biodiversity.)
Swedish forests that ought to be protected to preserve biodiversity and essential conservation interests are defined as:

Forestry areas in Sweden that fall into one or more of the following categories:
1. Impediment (Impediment is production of less then 1 m^3 per hectare per year)
2. Key biotopes according to Skogsstyrelsen’s definition and methodology.
3. Predominantly mixed age and layered natural forest with a good proportion of old/large trees and an abundance of large dead trees in various stages of decay.
4. Land above the SSNC’s conservation limit for highland forest, whose management is not certified under the national/regional forest stewardship council (FSC) standard. (note: when a national FSC standard is established the equivalent definition from the FSC document will replace the above definition.)

1.2 raw material requirements

The requirements entail that a certain percentage of the constituent raw fibre consists of:

- Recycled fibre (fibre used by consumers) and/or
- Forestry raw materials that are certified in accordance with the current national/regional FSC standard for the area where the raw material is harvested. This requirement applies to swedish and imported new fibre.
- This requirement can be met by a mixture of pulp grades in which the total percentage of recycled fibre and/or certified forestry raw material in the finished paper meets or exceeds the required percentage.
- Good environmental choice rank A for absorbent paper products: 90 percent or more of the constituent raw fibre must meet the requirements
- Good environmental choice rank B for absorbent paper products: 90 percent or more of the constituent raw fibre must meet the requirements
- Good environmental choice rank A for printing paper products: 80 percent or more of the constituent raw fibre must meet the requirements
- Good environmental choice rank B for printing paper products: 30 percent or more of the constituent raw fibre must meet the requirements

2. Production

2.1 environmental work

The manufacture of paper, pulp, important raw materials and insert materials, must comply with the safety regulations, emission requirements and environmental legislation that applies in the country of manufacture. Paper and the pulp used to make it must be manufactured at mills which have:

1. An environmental policy established by company management, in which the company undertakes to improve its environmental work.
2. Clear targets with deadlines
3. Clearly defined and documented responsibility for the achievement of environmental targets.
4. Proposals for how environmental targets can be achieved.
5. Routines for following up and reporting environmental targets. These must include an annual environmental report which gives energy key figures, information about raw materials, emissions and the use of certain chemicals which are requested on application for Good Environmental Choice approval.
6. Documented environmental requirements for manufacturers and suppliers.

To obtain approval for Good Environmental Choice rank A eco-labelling the paper and pulp must have been manufactured at mills that meet the above requirements and where the environmental management systems and environmental audit work are also registered by emas or certified to iso 14000.

2.2 energy consumption

Supply of electricity

Of the electricity bought from the grid (gross supply) a given percentage must be carry the Good Environmental Choice eco-label for electricity supplies. This requirement

only applies to manufacturing plants in Sweden and refers to the total gross supply of electricity to the plant, even if the mill manufactures other types of pulp than those assessed, or supplies electricity back to the grid.

Net use of energy
To qualify for the rank A eco-label, pulp manufacture must comply with the following figures:

Pulp type key figures for energy balances* (mwh/tonne of pulp)

Bleached sulphate pulp
Unbleached sulphate pulp
Sulphite pulp
Ctmp pulp
Tmp pulp
Recycled pulp
Ground pulp

To qualify for the rank B eco-label, pulp manufacture must comply with the following figures:

Pulp type key figures for energy balances* (mwh/tonne of pulp)

Bleached sulphate pulp
Unbleached sulphate pulp
Sulphite pulp
Ctmp pulp
Tmp pulp
Recycled pulp
Ground pulp

(*total energy balance, definition: electricity obtained from the grid and fossil fuels, which is supplied to the process and used externally. External use also includes energy that is transferred from pulp and paper manufacture in so-called integrated production. No conversion figures may be used in the calculation of electrical energy or heat energy. Electrical energy balance, definition: electrical energy that is supplied to the manufacturing plant from the grid, minus electricity that is generated in the process and supplied to the grid.)

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- For eco-labelling as Good Environmental Choice rank A: 60% or more
- For eco-labelling as Good Environmental Choice rank B: 30% or more

Supply of fossil fuel during manufacture of pulp

This requirement applies to the gross supply of fossil fuel to the entire plant, even if the mill manufactures other types of pulp than that being assessed.

to qualify for eco-labelling as Good Environmental Choice rank A, the supply of fossil fuel for production of each and every one of the pulp components must not exceed 0.2 mwh/tonne of pulp (approx. 17 kg of fuel oil/tonne of pulp).

to qualify for eco-labelling as Good Environmental Choice rank B, the supply of fossil fuel for production of each and every one of the pulp components must not exceed 0.6 mwh/tonne of pulp (approx. 51 kg of fuel oil/tonne of pulp).

2.3 chemicals

A manufacturer who applies for Good Environmental Choice eco-labelling must report which additives and catalysts are used during manufacture and which types of pulp are included in the paper. The manufacturer must also state which of these substances are also expected to be present in the finished paper.

chemical concentrations must be reported in weight percent. General terms such as “surfactant” or “emulsifier” may not be used. Substances with higher concentrations than one percent by weight must be reported with their complete chemical name and cas number. Suppliers of chemicals must certify that no prohibited chemicals are present in the products that are used. The manufacturer must submit a written certificate that all chemical requirements are met at the time of application and henceforward.

Emissions into water

To qualify for the rank A eco-label, the following limits must not be exceeded during pulp manufacture:

Pulp type emissions (kg/tonne of pulp)

Bleached sulphate pulp
Unbleached sulphate pulp
Sulphite pulp
Ctmp pulp
Tmp pulp
Recycled pulp
Ground pulp

Product emissions (kg/tonne of pulp)
COD
Paper manufacture

To qualify for the rank B eco-label, the following limits must not be exceeded during pulp manufacture:

Pulp type emissions (kg/tonne of pulp)

Bleached sulphate pulp

Unbleached sulphate pulp
Sulphite pulp
Ctmp pulp
Tmp pulp
Recycled pulp
Ground pulp
Product emissions (kg/tonne of pulp)
COD
Paper manufacture

Emissions into air

To qualify for the rank A eco-label, the following limits must not be exceeded during pulp & paper manufacture:

Pulp type emissions (kg/tonne of pulp)

Bleached sulphate pulp
Unbleached sulphate pulp
Sulphite pulp
Ctmp pulp
Tmp pulp
Recycled pulp
Ground pulp
Product emissions (kg/tonne of pulp)
sulphur
Paper manufacture

To qualify for the rank B eco-label, the following limits must not be exceeded during pulp & paper manufacture:

Pulp type emissions (kg/tonne of pulp)

Bleached sulphate pulp
Unbleached sulphate pulp
Sulphite pulp
Ctmp pulp
Tmp pulp
Recycled pulp
Ground pulp
Product emissions (kg/tonne of pulp)
sulphur
Paper manufacture

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Trace chemicals in paper products
The paper may not contain more than two percent by weight of organic substances that have poor biodegradability or are ultimately biodegradable. Substances that are readily biodegradable or fully biodegradable are permitted in higher concentrations.

Dyes
The paper may not contain more than one percent by weight of dye. The concentration may be measured or calculated using the manufacturer's information concerning the degree of fixing and concentration added. Dyes that are acutely toxic to fish, crustaceans or algae at concentrations <100 mg/l (test according to oecd 203, 202 and 201) are not permitted.

Optical brighteners
Optical brighteners that have poor biodegradability may not be used. Any readily biodegradable optical brighteners must be tested specially before they will be permitted.

Slimicides
The following biocides may be used as slimicides (14):
· Bromochloro-5,5-dimethyl-hydantoin (bcdmh)
· 2,2-dibromo-3-cyano-acetamide (dbnpa)
· Glutaraldehyde (ga)
· Poly(oxyethylene bis(di-methyl-iminoethylene)di-chloride (poidc)
· 5-chloro-2-methyl-4-isothiazolin-3-on/methyl-4-isothiazolin-3-on
· 3,4-dichloro-5-oxo-1,2-dithiol
Under normal operating conditions slimicides should be added at the recommended dosage or lower.

The following slimicides are not permitted:
· 2-bromo-2-nitropropan-1,2-dil (15)
· Bromohydroxyacetophenone (15)

Other prohibited chemicals
· Chlorinated bleaching chemicals
· Edta
· Polyethenimines
· Phthalates, e.g. Dibutylphthalate or diisononylphthalate
· Chromoctadecanoate
· Alkylphenolethoxylates, e.g. Octylphenolethoxylate or nonylphenolethoxylate
· Di(c18-c20)alkyl dimethylammonium chloride, i.e. Dhtdmac, dsdmac, dtdmac, etc.
Polyethenimines are retention agents that have poor biodegradability as well as being toxic to aquatic organisms. Phthalates and chrome compounds such as chromoctadecanoate should be taken out of use according to kemi's limitation list. The ban on alkylphenolethoxylates applies to all substances that can be converted into alkylphenols that biodegrade slowly and are bioaccumulating. Alkylphenolethoxylates

and phthalates are also suspected to interfere with human hormones. Di(c18-c20)alkyl dimethylammonium chlorides, i.e. Dhtdmac, dsdmac, dtdmac, etc., Biodegrade slowly and are highly toxic to algae. They can be replaced with new readily biodegradable esterquaternary compounds.

For Good Environmental Choice rank A the following are also prohibited:

- Dicyandiamide-formaldehyde condensate
- Polyhydroxyalkylpolyamine
- Mineral oil (when used as a defoamer in paper manufacture and water treatment)
- Linear alkylbenzenesulphonates, lass

Dicyandiamide-formaldehyde condensate and polyhydroxyalkylpolyamine are two toxic dye fixers that have poor biodegradability. Dyes that are absorbed better by the fibre can reduce the need for fixers. The mineral oils that are used as defoamers contain hydrocarbons that may have poor biodegradability and be bioaccumulating, as well as being difficult to separate in sewage treatment plants. Certain chain lengths of linear alkylbenzenesulphonates appear on the note list since they have poor biodegradability and are toxic to aquatic organisms. Technical grade consists of a blend of different isomers and chain lengths of varying environmental hazard. Linear alkylbenzenesulphonates are therefore prohibited completely.

Test methods for environmental hazard (16)

To show that a substance is readily biodegradable it must be tested according to oecd 301 or equivalent. Complete biodegradability, incomplete biodegradability and poor biodegradability are shown by testing according to oecd 302 or equivalent. Tests of acute toxicity to fish (lc50), crustaceans (ec50), algae (ic50) must be carried out according to oecd test 203, 202 and 201 respectively, or equivalents.
New tests must be carried out by laboratories that follow good laboratory practise (glp) or are authorized to en 45000 or iso/iec guide 25. (17)

2.4 emissions from production

See tables “emissions into water” and “emissions into the air” on page 18.

3. Recycling

It must be possible to recycle printing paper products. This must be backed up by a certificate from a recycled paper mill.

/fotnot/
14 others may be added after approval by kemi and SSNC.
15 prohibition does not apply if the same substance is used as a preservative in additives and catalysts.
16 oecd guidelines for the testing of chemicals; isbn 92-64-14018-2.
17 in Sweden laboratories are authorized by swedac. Tel: 033-17 77 00

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Summary of criteria

Requirements for

Raw materials
Timber from swedish forests should be protected to safeguard biodiversity and essential conservation interests. Total of FSC labelled fibre (swedish and overseas) and/or recycled fibre (post-consumer)

Environmental work
Production of pulp, raw materials and additives

Production plant’s environmental management system including environmental audit work

Energy use
Total gross supply of fossil fuel to pulp mill
Gross percentage of supplied electrical energy (pulp and paper production) that carries the Good Environmental Choice eco-label (swedish mills)

Energy balance for production of all constituents:

Bleached sulphate pulp
Unbleached sulphate pulp
Sulphite pulp
Ctmp pulp
Tmp pulp
Recycled pulp
Ground pulp

Chemicals
Added organic substances that are not classed as readily or completely biodegradable

Dyes

Optical brighteners

Permitted slimicides

Substances not permitted in the chemical products that are added during manufacture of pulp or paper

Good environmental choice rank A
Good environmental choice rank A

Must not be present or handled by suppliers of timber
Absorbent paper
Printed paper

Must be carried out in accordance with all relevant regulations covering the working environment and external environment in the country of manufacture

/rang A/
Certification to emas or iso 14001

/rang B/
Must meet certain basic requirements

Mwh/tonne of pulp

(mwh/tonne of pulp)
Total electricity

Must not exceed 2% of paper's weight (including dyes)

Must not exceed 1% of paper's weight
Acute toxicity level for fish, crustaceans or algae must not be <100 mg/l.

Optical brighteners with poor biodegradability are not permitted.

Bromochloro-5,5-dimethyl-hydantoin (bcdmh)
2,2-dibromo-3-cyano-acetamide (dbnpa)
Glutaraldehyde (ga)
Poly(oxyethylene bis(di-methyl-iminoethylene)di-chloride (poidc)
5-chloro-2-methyl-4-isothiazolin-3-on/methyl-4-isothiazolin-3-on
3,4-dichloro-5-oxo-1,2-dithiol

/rang A/
Chlorinated bleaching chemicals
Edta
Polyethenimines
Phthalates
Chromoctadecanoate
Alkylphenolethoxylate
Di(c18-c20)alkyl dimethylammonium chloride
2-bromo-2-nitropropane-1,3-diol
Bromohydroxyacetophenone
Dicyandiamide-formaldehyde condensate
Polyhydroxyalkylpolyamine
Mineral oil (as defoamer)
Linear alkylbenzenesulphonates, las

/rang B/
Chlorinated bleaching chemicals
Edta
Polyethenimines
Phthalates
Chromoctadecanoate
Alkylphenolethoxylate
Di(c18-c20)alkyl dimethylammonium chloride
2-bromo-2-nitropropane-1,3-diol
Bromohydroxyacetophenone

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Summary of criteria

/tabellhuvud/
Emissions from production
Good environmental choice rank A (kg/tonne of pulp)
Good environmental choice rank B (kg/tonne of pulp)

Max. Emissions into water during production of all constituents: COD/p
Bleached sulphate pulp
Unbleached sulphate pulp
Sulphite pulp
Ctmp pulp
Tmp pulp
Recycled pulp
Ground pulp
(kg/tonne of paper)
Paper manufacture

Max. Emissions into air during production of all constituents: sulphur/nox
Bleached sulphate pulp
Unbleached sulphate pulp
Sulphite pulp
Ctmp pulp
Tmp pulp
Recycled pulp
Ground pulp
(kg/tonne of paper)
Paper manufacture

Waste amounts and types of waste must be reported for entire mill

Recycling
End product must be well-suited for fibre recovery using existing technology.

Certificate from recycled paper mill must be provided for printing paper.

Appendix 1.
Energy conversion figures, fossil fuels:

Fuel	**thermal value**
Thick oil (wrd, eo 3-5)	11.5 mwh/tonne
Heating oil (e0 1)	11.8 mwh/tonne
Lpg (propane - butane)	12.8 mwh/tonne
Pit coal	7.5 mwh/tonne
Natural gas	10.8 mwh/tonne
Peat (50% moisture content)	0.5 mwh/tonne

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[paper pulp] as its name implies, A fibrous pulp, providing the starting material for the manufacturer of paper. The fibres are almost exclusively of vegetable origin. The plants that are technically important for the manufacture of paper are known as paper plants. The four main cereal crops were once used widely (for the manufacture of coarse paper), but nowadays wood fibres are completely dominant. These are primarily obtained from spruce and pine, although aspen, birch and silver fir are used occasionally.

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