

About Nordic Swan Ecolabelled

Packaging for Liquid Foods



Version 1.0

Background to Nordic Swan Ecolabelling
17/10/2017

Draft for consultation

Contents

About Nordic Swan Ecolabelled	1
1 Summary	3
2 Basic facts about the criteria	4
3 The Nordic market	6
4 Other labels	8
5 The criteria development process	13
6 Food packaging and sustainable development	14
6.1 RPS analysis	14
6.2 Material in the product group	20
7 Justification of the requirements	24
7.1 Product group definition	24
7.2 Overall requirement areas	25
7.3 Requirements of Nordic Swan Ecolabelled packaging	28
7.4 Requirements of constituent substances	40
7.5 Requirements of chemical products and substances on conversion	53
7.6 Quality and regulatory requirements	60
7.7 Processing tools	62
7.8 Areas that are not subject to requirements	62
8 Terms and definitions	64

Appendix 1. The design of the Nordic Swan Ecolabel on packaging

103 Packaging for Liquid Foods , version 1.0, 17/10/2017

Note: This background document has large continuous text sections in several different Scandinavian languages. The reason is that the development of the Nordic Swan Ecolabelling criteria is subject to Nordic cooperation, with all countries being involved in the process.

Nordic Ecolabelling believes that, for as long as it concerns large continuous text sections, this variation in the language used can be seen as a confirmation of the Nordic cooperation that is one of the strengths of developing the Nordic Swan Ecolabelling criteria.

Addresses

In 1989, the Nordic Council of Ministers decided to introduce a voluntary official ecolabel, the Swan. The following organisations/companies are responsible for the official "Swan" Nordic Ecolabel on behalf of their own country's government. For more information, see the websites:

Denmark

Ecolabelling Denmark
Danish Standards Foundation
Göteborg Plads 1
DK-2150 Nordhavn
Tel: +45 72 300 450
info@ecolabel.dk
www.ecolabel.dk

Iceland

Ecolabelling Iceland
Umhverfisstofnun
Suðurlandsbraut 24
IS-108 Reykjavik
Tel: +354 591 20 00
ust@ust.is
www.svanurinn.is

Norway

Ecolabelling Norway
Henrik Ibsens gate 20
NO-0255 Oslo
Tel: +47 24 14 46 00
info@svanemarket.no
www.svanemarket.no

Finland

Ecolabelling Finland
Box 489
FI-00101 Helsinki
Tel: +358 9 61 22 50 00
joutsen@ecolabel.fi
www.ecolabel.fi

Sweden

Ecolabelling Sweden
Box 38114
SE-100 64 Stockholm
Tel: +46 8 55 55 24 00
info@svanen.se
www.svanen.se

This document may only be copied in its entirety and without any kind of alteration. It may be quoted from provided that Nordic Ecolabelling is stated as the source.

1 Summary

During the last two years, Nordic Swan Ecolabelling has developed criteria for packaging for liquid food products. The preliminary study performed comprised the following material:

- Carton packaging
- Polymers (such as PET bottles)
- Aluminium
- Glass

The study showed that it is relevant for the packaging for liquid foods of various materials to be subject to Nordic Swan Ecolabelling, but the potential and steerability is generally considered to be very low, especially for glass, fossil-fuel polymers and aluminium. There are no good opportunities to influence or distinguish the best products in the markets. The aforementioned materials are predominantly non-renewable. From an environmental viewpoint, for these non-renewable materials it is relevant that they can be recycled or reused. There are well-established recycling systems for glass and PET bottles, and also aluminium cans, in the Nordic region, with the deposit system driving the take-back system. The potential for environmental benefits in the final stage of the life cycle is therefore considered to be low for these types of material. In combination with the low steerability to distinguish the best products of fossil-fuel plastic, aluminium and glass, it is therefore assessed that Nordic Ecolabelling will not include these materials in this first version of the criteria development.

The criteria are intended to stimulate the development of renewable materials. Environmental benefits can be expected with regard to renewable material replacing products from a fossil source. This will conserve fossil resources and reduce emissions of greenhouse gases. The criteria therefore focus on sustainably produced raw materials, chemicals and waste, and on ensuring that environmental benefits are not achieved at the expense of the packaging's primary function, which is to protect and contain the food product. The focus of the criteria is thus on where there is relevance, potential and steerability to achieve environmental benefits.

Nordic Swan Ecolabelled packaging in contact with liquid foods:

- consists of a high ratio of renewable material, in order to conserve the Earth's resources;
- fulfils the requirements of the traceability of wood fibre and the requirements of the certification of raw materials;
- fulfils the high requirements made of constituent chemicals, for the benefit of health aspects, as well as opportunities for reuse;
- does not contain recycled plastic or paper to ensure that no harmful substances migrate to the product.; and
- can be recycled, which promotes the circular economy.

At least 90% by weight of primary packaging must be made from biobased material. Due to the requirements, primarily packaging made from biobased polymers and comprising carton packaging can be Nordic Ecolabelled under the first generation of the criteria.

Packaging for liquid foods is not a traditional Nordic Swan Ecolabelled product, since here it is the actual packaging that is Nordic Swan Ecolabelled, and not the product inside the packaging. To make this clear to the consumers, a special label for Nordic Ecolabelled packaging for liquid foods must be used. Guidelines for the use and placement of the label have also been developed. For example, the label should not be placed on the front side (shelf-facing side) of the product.

2 Basic facts about the criteria

Justification for Nordic Swan Ecolabelling

Nordic Ecolabelling's mission is to contribute to sustainable consumption. Our objective is therefore to recognise products with low environmental impacts and high functionality. Since packaging for foods plays an important role in reducing environmental impacts during a food product's life cycle, it is relevant for Nordic Ecolabelling to also have criteria for the packaging.

Packaging of foods is used extensively in our society. Often, packaging is considered to be unnecessary and adverse for the environment, while also generating large amounts of refuse at home for consumers. Yet packaging is necessary, to contain and protect the food in a secure way. Nordic Ecolabelling therefore wishes to promote the important positive significance of packaging in preserving food quality. Packaging serves as important protection from spoiling the food and effectively prevents food waste. Large volumes of food products are thrown out every year¹ and without appropriate packaging, these volumes, and their environmental impact, would be even greater. Packaging thus reduces environmental impacts during the food product's life cycle and contributes to sustainable solutions.²

Products that can be labelled

Nordic Ecolabelling's criteria for packaging for liquid food products are focused on the packaging being produced with a high ratio of renewable material. The product group definition is not limited to one particular type of material, but the ratio of renewable material must be indicative. Due to the requirements, primarily packaging made from biobased polymers and comprising carton packaging can be Nordic Ecolabelled under the first generation of these criteria.

The definition of the product group in the criteria is as follows:

"The product group consists of primary packaging for liquid pre-packaged food products. The actual content, i.e. the liquid food product, is not included in the product group. Should any doubt arise as to which packaging is included in the product group, this will be decided by Nordic Ecolabelling.

Packaging intended to be in contact with a liquid food product for a short time, e.g. take away coffee cups and pizza packs, cannot be Nordic Swan Ecolabelled according to these criteria. These products can be Nordic Swan Ecolabelled according to Nordic Ecolabelling's Criteria for Disposables for Food."

¹ <http://www.fao.org/docrep/018/i3347e/i3347e.pdf> (accessed 2017-06-15)

² https://www.researchgate.net/publication/301776599_Williams_H_2011_Food_packaging_for_sustainable_development (accessed 2017-06-15)

The brand owner of a pre-packaged food product may apply for a licence for its primary packaging. This hereby refers to e.g. breweries, dairies and other food producers, as well as brand owners such as various retail chains for which food companies manufacture products under their own names. Packaging manufacturers may also be licensed provided that the packaging manufacturer has full control over the manufacture of the primary packaging covered by the Nordic Ecolabelling requirements. In the case of plastic bottles this means, for example, that the packaging manufacturer is responsible for ensuring that all accessories included in the primary packaging such as labels, stoppers etc. comply with Nordic Ecolabelling requirements.

Nordic Swan Ecolabelling of packaging

As background material for the criteria development of packaging for liquid foods, several consumer researches have been conducted. The surveys aimed to find out e.g. how aware the Nordic consumers are of the environmental impact of food packaging and to what extent they consider Nordic Swan Ecolabel as a relevant guide to environmentally friendly packaging.

The studies showed that more and more of today's consumers are aware of the packaging's environmental impact and therefore consider the Nordic Swan Label on a packaging as a relevant tool. Seven out of 10 consumers found it positive to buy food in Nordic Ecolabelled packaging, while only 3 percent of the survey respondents were against. The Nordic Swan Ecolabel on a packaging also adds value for the food manufacturers. The studies showed that half of the consumers would gain a more positive impression of a food product if the packaging was Nordic Swan labelled [and 1 out of 3 were also willing to pay more for the food product if the packaging is Nordic Swan Ecolabelled.]

The Nordic Swan Ecolabel can only be found on non-food products and services, so food cannot be ecolabelled. Therefore, it is important for Nordic Ecolabelling that it is clear that here it is the actual packaging that is Nordic Swan Ecolabelled, and not the product inside the packaging. To make this clear to the consumers, a special label for Nordic Ecolabelled packaging for liquid foods must be used. Guidelines for the use and placement of the label have also been developed. For example, the label should not be placed on the front side (shelf-facing side) of the product. The consumer surveys showed that the label that clearly indicates that it is the packaging which is ecolabelled and not the content will prevent misunderstandings.

Label to be used on Swan Ecolabelled packaging for liquid foods can be seen in Image 1:

Version A without explanatory text



Version B with explanatory text

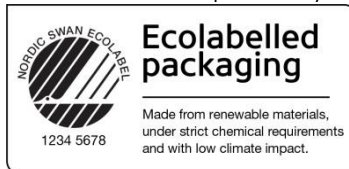


Image 1. The label to be used on the Nordic Swan Ecolabelled packaging.

Appendix 1 contains guidelines for using the label on Nordic Swan Ecolabelled packaging.

3 The Nordic market

This section considers beverage cartons and biopolymers since the delineation of the product group definition indicates that in this first phase of the criteria, mainly packaging of biobased material and carton packaging of liquid food can be Nordic Swan Ecolabelled. The labelling on packaging is considered in section 4.

Packaging of food

Out of the total global packaging market from the beginning of 2000, paper and paperboard packaging accounted for the largest share of the market, at 38%.³ Plastic packaging accounted for 30% of revenue, and the share of rigid plastic was the fastest growing element of the packaging market. This development has been driven by several factors, such as increased demand for soft drinks in PET bottles, and for bottled water.⁴ In Europe, the demand for plastic was 49 million tonnes in 2015, of which 40% as packaging material. Most of the plastic packaging was intended for one-off use.⁵ The plastic packaging volume is expected to double in the next 15 years, with a fourfold increase up to 2050 of 318 million tonnes per year – which is more than the current overall plastic industry's production.⁶ Traditional packaging material such as metal, glass and also paper-based material has also been replaced with rigid plastic in the market for food products. The global consumption of beverage packaging accounted for approximately 14% of all packaging in 2005.⁷

Beverage cartons

The first records of paper used for carton packaging of liquid foods date back to the early 1900s.⁸ In the Nordic countries, paperboard packaging was introduced for dairy products in the 1950s.^{9 10} In the 1960s, aseptic packaging was launched which allowed for long-term storage without requiring refrigeration. After this, the supply of this range of products increased intensively.

Carton packaging of liquid foods is primarily used for dairy products, but also juice, soya products, soups, vegetables and sauces are packaged in cartons today. A wide and growing range of dairy products are available in the Nordic markets: various types of milk (skimmed milk, semi-skimmed milk, lactose-free milk, etc.), cream, sour milk and yoghurt can be found on shops' shelves. The Nordic milk market is special since there is a high ratio of fresh milk. In most countries further south in Europe, milk is sold as long-lasting products. Bottles are also more commonly used for dairy products.¹¹

³ Market Statistics and Future Trends in Global Packaging, WPO – World Packaging Organisation 2008. http://www.worldpackaging.org/i4a/doclibrary/index.cfm?category_id=4

⁴ Market Statistics and Future Trends in Global Packaging, WPO – World Packaging Organisation 2008. http://www.worldpackaging.org/i4a/doclibrary/index.cfm?category_id=4

⁵ Naturskyddsforeningen 2017, Rätt plast på rätt plats – om svårnedbrytbar plast i naturen och plastens roll i den cirkulära ekonomin (Right plastic in the right place – about slowly degradable plastic in nature and plastic's role in the circular economy).

⁶ Ellen MacArthur Foundation, The new plastics economy – rethink the future of plastics, January 2016. https://www.ellenmacarthurfoundation.org/assets/downloads/EllenMacArthurFoundation_TheNewPlasticsEconomy_15-3-16.pdf

⁷ Market Statistics and Future Trends in Global Packaging, WPO – World Packaging Organisation 2008. http://www.worldpackaging.org/i4a/doclibrary/index.cfm?category_id=4

⁸ <http://www.ace.be/beverage-cartons/our-industry/history>

⁹ <http://www.tetrapak.com/about-tetra-pak/the-company/history>

¹⁰ <http://www.elopak.com/about/our-history>

¹¹ Nordic Ecolabelling's internal market analysis of packaging of liquid food products, 2014.

The Nordic market for beverage cartons is substantial and is dominated by a small number of operators on the supplier, subsupplier and customer sides. There are three large suppliers in the European market for beverage cartons - the two Nordic companies, Tetrapak¹² and Elopak¹³ and the German supplier, SIG Combibloc¹⁴. There are also others, e.g. in Italy.

Carton packaging for liquid foods comprises B2B products whereby the packaging manufacturer markets its products to foodsuppliers. As an example, dairies in the Nordic countries, such as Arla in Denmark and Sweden, Tine and Q-mejerier in Norway, and Valio in Finland, all use carton packaging for their products. Besides food producers and suppliers, the large everyday commodities chains also play an important role in the markets, due to their control of the most important sales channels. Most of these also have their own brands of e.g. juice or milk products packaged in carton packaging. The product naturally plays the most important role in the marketing of foods. Environmental characteristics are primarily marketed with segmented product ranges, e.g. organic products.

Biobased polymers

Today, bioplastics already play an important role e.g. in the field of packaging¹⁵. Development of bio-based polymers is dynamic, global production of bio-based polymers is expected to grow during the next five years¹⁶. Considering the global production of bio-based polymers, worldwide share of bio-based polymers in market segments of packaging is assumed to grow from 24% to 46% between years 2013-2020¹⁷.

As an example of the development of bio-based polymers, global companies, such as Coca-Cola, PepsiCo, Nestlé and Danone have attempted to sidestep the traditional petrochemical route and create bio-PET^{18 19 20}. PET bottles can now also be created from sugar cane molasses, an organic agricultural by-product in sugar production²¹. Bio-PET can be used with both virgin and recycled PET to make the so-called 'Mixed PET'. It is also fully compatible with standard PET recycling processes. According to Coca-Colas sustainability commitments 2020, the company is committed to Use PlantBottle™ packaging for all PET plastic bottles (up to 30% plant material)²².

¹² <http://www.tetrapak.com/>

¹³ <http://www.elopak.com/>

¹⁴ <http://www.sig.biz/sig-global/en/sig-global/>

¹⁵ Michael Carus & nova-Team, Jan Ravenstijn, Wolfgang Baltus, Dirk Carrez, Harald Kaeb, Stefan Zepnik:2013. Bio-based Polymers in the World Capacities, Production and Applications: Status Quo and Trends towards 2020 available at <http://bio-based.eu/markets/>

¹⁶ Michael Carus & nova-Team, Jan Ravenstijn, Wolfgang Baltus, Dirk Carrez, Harald Kaeb, Stefan Zepnik:2013. Bio-based Polymers in the World Capacities, Production and Applications: Status Quo and Trends towards 2020 available at <http://bio-based.eu/markets/>

¹⁷ Market study on bio-based building blocks and polymers in the world - Capacities, production and applications: status quo and trends toward 2020. Presentation given by Michael Carus, Florence Aeschelmann nova-Institut GmbH, Hürth (Cologne), Germany. 24 February 2015, Oslo.

¹⁸ <http://www.pepsico.com/live/pressrelease/PepsiCo-Develops-Worlds-First-100-Percent-Plant-Based-Renewably-Sourced-PET-Bott03152011>

¹⁹ <http://www.coca-colacompany.com/press-center/press-releases/coca-cola-produces-worlds-first-pet-bottle-made-entirely-from-plants>

²⁰ <http://www.nestle-waters.com/media/featuredstories/danone-and-nestle-waters-launch-naturall-bottle-alliance-with-california-startup-to-develop-100-bio-based-bottles>

²¹ www.sidel.com/about-sidel/sustainability/pet/recycling-and-reusing-pet

²² Coca-Cola, sustainability report 2013/2014, <http://www.coca-colacompany.com/packaging-recovery>

The development of biopolymers can also be seen in the markets of the Nordic countries. The Swedish juice manufacturer Brämhult and the Danish brand Valsø Lille, that are part of the juicer group Ecked-Granini, began in 2016 with juice bottles of Braskem's bio-based PE²³. Coca Cola has, as mentioned in previous paragraph, developed its PlantBottle of PET. Dairies such as Arla²⁴ and Tine²⁵ together with Tetra Pak launched biobased screw caps in their products. Valio in Finland, has renewable Tetra Rex® in lactose free milk product^{26,27}. In the products of Elopak, second generation renewable PE is used, made of European-sourced biomass that is not in competition with food supply²⁸.

There is a great deal of innovation going on in the world of packaging, and new materials are being brought to market, including nanocellulose²⁹. There are also products that are edible, such as “Ooho, the edible water bottle” or plastic made from the milk protein casein³⁰. See also biopolymers in the Chapter 6.2.

4 Other labels

One of the functions of food packaging is to intermediate information about the food product contained in the packaging. While some information must be presented due to provisions in existing legislation, other information may have been added voluntarily by the food producer. The following section focuses on labelling and expressions which mainly concern packaging or other related environmental aspects. The introduction also gives a brief description of product labelling and other types of printed information concerning food products.

Labelling concerning food products (labels, symbols and expressions)

Pre-packaged food products must be labelled with various information such as a list of ingredients and constituent substances, as well as the best-before date or expiry date. These labels are governed by legislation. The general labelling rules are stated in EU Regulation 1169/2011 concerning food product information to consumers.³¹

The EU symbol **the Leaf** must be found on packaging of organic food products and these should adhere to the EU regulations for organic production. There are also a number of national organic labels, such as state-controlled organic in Denmark, **the Ø label** (Norway), **KRAV** (Sweden) and **Luomu** (Finland).

There are also other voluntary raw materials labelling schemes, such as **Rainforest Alliance Certified**³² for agricultural products, and various nutritional and health claims that may be used by food producers. If the manufacturer wishes to make nutritional or health claims, they

²³ <http://www.packnews.se/default.asp?id=10336&show=more> 2017-06-16

²⁴ <http://www.arla.se/vara-produkter/vara-forpackningar/var-forpackning-med-skruvkork/>

²⁵ <http://www.tine.no/presserom/nyheter/f%C3%B8rst-med-biokork-p%C3%A5-melkekartonger>

²⁶ <http://www.valio.fi/valio-ottaa-kaytoon-100-prosenttisesti-uusiutuvan-maitotolkin-ensimmaisena-maailmassa/>

²⁷ <http://www.tetrapak.com/about-tetra-pak/press-room/news/valio-launches-milk-product-in-worlds-first-fully-renewable-carton>

²⁸ <http://www.elopak.com/news-media/news/news/bio-based-pe-moves-elopak-closer-to-100-renewable-vision>

²⁹ Abstract from the article “Nanocellulose in bio-based food packaging applications”, Azeredo et al, 2016, Industrial Crops and Products: <http://www.sciencedirect.com/science/article/pii/S092666901630156X> (accessed 06.10.2016)

³⁰ <https://www.acs.org/content/acs/en/pressroom/newsreleases/2016/august/edible-food-packaging-made-from-milk-proteins-video.html> (accessed 06.10.2016)

³¹ <http://www.livsmedelsverket.se/produktion-handel--kontroll/livsmedelsinformation-markning-och-pastaenden/regler-om-livsmedelsinformation-och-markning/>

³² <http://www.rainforest-alliance.org/business/agriculture/certification>

must adhere to the relevant regulations in food safety legislation.³³ One example is the **Keyhole**³⁴ label, which is the symbol of a number of approved nutritional claims in Sweden, Norway and Denmark. There are also a number of other labels, such as **Fairtrade**-labelled³⁵ products, which aim to improve the working and living conditions of farmers and workers in countries with widespread poverty.

Labelling which concerns packaging (labels, symbols and expressions)

There are many different labels, symbols and expressions related to packaging in different ways. The results of consumer surveys show, however, that consumers' level of knowledge of what the various labels stand for can be very low. FSC is probably the best-established label for packaging in the Nordic countries. Even though it is very common, it seems that still only very few people know and understand what the label stands for.³⁶

The following sections consider various labelling, symbols and expressions intended to give consumers information concerning packaging.

Glass and fork symbol

Food contact materials must be labelled in accordance with Article 15 of EU Regulation 1935/2004/EC. Labelling with the **glass and fork symbol** or "for food products" is used on all materials which it is safe to use in conjunction with food. This applies to packaging, as well as serving products such as plates and coffee percolators.

Life-cycle-analysis based labelling

Nordic Swan Ecolabelling is the system which makes it easiest for consumers to choose the products which are a good choice for the environment. The products are approved on the basis of established environmental requirements and the organisations administering the system make all the complex assessments relating to the products' environmental impacts. The system excludes products that fail to meet the requirements and compliance is monitored by an independent third party.

Other environmental labels besides the Nordic Swan Ecolabel have criteria for packaging of food, but not so many criteria include packaging for liquid food products. The GEN (Global Ecolabelling Network) website³⁷ e.g. presents China's CEC for Disposable Food & Drink Containers, Green Seal in America for Food Service Packaging,³⁸ Green Label Singapore for Food Packaging, Crockery and Cutlery,³⁹ and Green Label in Hong Kong for Degradable Food/Drink Containers and Bags.⁴⁰ The New Zealand Ecolabelling Trust has criteria for Packaging and Paperboard Products,⁴¹ which e.g. include egg cartons and fruit trays.

³³ <http://www.livsmedelverket.se/livsmedel-och-innehall/text-pa-forpackning-markning/narings--och-halsopastaenden-pa-livsmedel/>

³⁴ <http://www.livsmedelverket.se/om-oss/press/nyheter/pressmeddelanden/nyckelhalet-gor-skillnad/>

³⁵ <http://www.fairtrade.net/>

³⁶ Nordic Swan Ecolabelling and FSC in a Nordic consumer survey commissioned by Nordic Ecolabelling (YouGov 2015).

³⁷ <http://www.globalecolabelling.net/>

³⁸ http://www.green Seal.org/GreenBusiness/Standards.aspx?vid=StandardCategory&cid=0&search=GS_35

³⁹ <http://sgls.pixart.com.sg/categoryinfo.php?cid=34>

⁴⁰ <http://www.greencouncil.org/eng/greenlabel/cert.asp>

⁴¹ http://www.environmentalchoice.org.nz/specifications/published_specifications/index.htm

The Sustainable Packaging Coalition (SPC)

The Sustainable Packaging Coalition (SPC) has created a framework for the assessment of sustainable packaging (based on how it is defined by SPC). The SPC definition has criteria for materials use, energy use, water consumption, clean production and transport, costs and performance, and impacts on society and working conditions⁴². This is all based on a life cycle analysis perspective and to some extent includes the relationship between product and packaging system.⁴³

KRAV's packaging pilot

In May 2016, KRAV in Sweden published its *Förpackningslots* (Packaging Pilot) for KRAV-labelled companies⁴⁴. Here, KRAV summarises its food packaging rules. KRAV-labelled packaging must comply with three aspects:

- Give the product maximum protection and sustainability
- Be non-toxic
- Be resource- and climate-efficient

KRAV-labelled companies must be able to show clearly how they work systematically to continuously environmentally optimise their packaging. KRAV performs annual controls to assess whether the company has worked in line with KRAV's packaging rules.

Labelling of raw materials

Today, paper products can be labelled with the **FSC** (Forest Stewardship Council) or **PEFC** (Programme for Endorsement of Forest Certification) raw material labels. FSC and PEFC were originally certification systems for sustainable forestry and traceability (Chain of Custody), but this label is now being used more and more on various products and packaging. To include this label on a product, the product's raw fibres must originate from sustainable forestry and contain a given amount of FSC/PEFC-labelled timber. FSC/PEFC labelling is, however, solely intended for certified wood raw material in the product and does not describe the environmental impacts of later phases in the product's life cycle. There are similar labelling systems for biobased plastic, such as labelling related to the renewable raw material used. This may be Bonsucro-labelled sugar cane, **RSPO** (Roundtable of Sustainable Palm Oil)-labelled palm oil, or **RTRS** (Roundtable of Responsible Soy) or **ProTerra**-labelled soya. Like FSC and PEFC, these labelling systems solely concern the actual production of the raw material, and not its environmental impact in later stages of the production chain.

Labelling concerning biobased origin, composting and degradability

There are also other systems for labelling of biobased raw materials, such as **ISCC Plus**⁴⁵ (International Sustainability and Carbon Certification) and **RSB**⁴⁶ (Roundtable on Sustainable Biomaterials). These are global labelling schemes concerning sustainability and ethics. The ISCC system also concerns greenhouse gas emissions. The European Commission has, among other things, recognised ISCC as one of the labelling systems to show compliance with the EU Directive on Renewable Energy (RED). ISCC PLUS has also been developed e.g. for food, feed,

⁴² <http://sustainablepackaging.org/uploads/Documents/Definition%20of%20Sustainable%20Packaging.pdf>

⁴³ Daniel Hellström och Annika Olsson; Managing packaging design for sustainable development - a compass for strategic directions, first edition, John Wiley and Sons Ltd. 2017

⁴⁴ <http://www.krav.se/nyhet/kravs-forpackninglots>

⁴⁵ <http://www.iscc-system.org/en/iscc-system>

<https://www.scsglobalservices.com/roundtable-on-sustainable-biomaterials-rsb> (accessed 2017_0615)

bioplastics and other bioenergy applications. ISCC also makes it possible to label the end-products. Based on the type of product (whether it is biobased or partly biobased), various labels and claims can be used on the end-products.

Braskem, a polymerproducer from Brazil has also registered the **I'm green** trademark with related symbols. The expression "I'm green" and the alternative symbols can both be used for products made from the biobased polyethylene which the company markets.⁴⁷ Coca Cola's **PlantBottle™** with related symbol is another example of a company choosing to communicate based on the packaging material's raw material source.⁴⁸

A number of standards and labels are used to show that products are biobased and biodegradable.⁴⁹ Some the standards, such as EN 16640, use radiocarbon (isotope C14) as the analysis method to show the origin of the material in a specific product, while others focus on the degree of degradability of a product in various conditions.

The EN 13432 standard applies to composting in industrial facilities, and certain national standards, such as NF T 51-800, and Vinçotte's certification, also consider domestic composting.⁵⁰ Labelling schemes for composting in industrial conditions and which are also found in the Nordic markets are the Seedling logo⁵¹ or OK Compost⁵².

In addition to the aforementioned labelling, there are also several other environmental statements (environmental claims), such as "bioplastic", "biobased" and "biodegradable", which are often used for products without referring to any particular label or standard. Currently there is no mandatory labelling scheme requiring producers to disclose the amount of biobased material in their products.⁵³ Yet producers may give this information to consumers and thereby confirm their marketing claims. Evidence that the producer fulfils biobased requirements should be matched to the EU's CEN/TS 16137 standard: 2011 Plastics – Determination of biobased carbon content. The standard specifies calculation methods for the content of biobased carbon and is based on measurement of the C14 concentration.

Recycling symbols

Various different recycling symbols can be found on different packaging. The aim is to help consumers to identify how the various types of packaging can/shall be recycled. According to EU Directive 94/62 /EC on packaging and packaging waste, to facilitate recycling, packaging should be provided with information on the nature of the packaging materials used. Materials can be identified by numbering or abbreviations⁵⁴.

The **universal recycling symbol** (three arrows travelling in a continuous direction to form a Mobius loop) is often seen on packaging. This is a public recycling symbol, rather than a

⁴⁷

http://www.braskem.com.br/Portal/Principal/Arquivos/ModuloHTML/Documentos/1069/I_m_green_Communication_Guide.pdf (accessed 2017-06-15)

⁴⁸ <http://www.coca-colacompany.com/stories/great-things-come-in-innovative-packaging-an-introduction-to-plantbottle-packaging> 2017-06-13

⁴⁹ http://docs.european-bioplastics.org/2016/publications/fs/EUBP_fs_standards.pdf

⁵⁰ <http://www.okcompost.be/en/recognising-ok-environment-logos/ok-compost-amp-ok-compost-home/>

⁵¹ <http://en.european-bioplastics.org/standards/labelling/compostability-label/>

⁵² <http://www.okcompost.be/en/vincotte-amp-en-13432/>

⁵³ <https://www.scsglobalservices.com/roundtable-on-sustainable-biomaterials-rsb> <http://en.european-bioplastics.org/standards/labelling/bio-based-label/>

⁵⁴ <http://eur-lex.europa.eu/legal-content/SV/TXT/PDF/?uri=CELEX:31997D0129&from=DE>

trademark. The symbol indicates that the packaging is recyclable, or contains recycled fibres. But it does not guarantee that recycling is organised.

The **Green Dot** symbol is also often seen on packaging. It is a symbol to show that the packaging charge has been paid in the country in which the packaging/packaged item is marketed.⁵⁵ The Green Dot is used in Norway and Sweden. In Finland the equivalent **Rinki** label is used.⁵⁶ Recycling companies have also developed detailed packaging labelling to make it easier for consumers to recycle correctly.^{57 58} An example is text with the pictogram "Beverage cartons must be recycled" in Norway (see image 2). Another example is the Swedish Förpacknings- och Tidningsinsamlingen's (FTI) various pictograms to use on packaging.⁵⁹

The **Tidyman** symbol is also often found on packaging. The origins of Tidyman⁶⁰ are rather unclear, but it is widely used and the symbol is still one of the most globally recognised symbols. The symbol does not concern recycling, but is a reminder to consumers that a good citizen does not litter the countryside with rubbish, but disposes of packaging waste in an appropriate way.



Image 2. Various recycling symbols on packaging. Tidyman, the universal recycling symbol and the Green Dot, together with the pictogram (to the left of the Green Dot) showing that beverage cartons must be recycled. Furthest to the right is FTI's pictogram that can be used as a guide for sorting plastic packaging.

Other instruments

Environmental product declarations (EPDs)

Environmental product declarations provide detailed environmental information without making any absolute requirements of the products. There are thus no predetermined requirement levels. The value of a declaration depends on the buyer's knowledge of which environmental factors are important for the product. There is no international system for environmental product declarations, but work is under way in this area within ISO. To create an environmental product declaration (**EPD**, Environmental Product Declaration) product-specific rules (**PCR**, product category rules) must exist or be created. These product-specific rules set requirements of the EPDs for a given product category.

An example of an environmental product declaration is the international EPD[®] system,⁶¹ which describes the environmental performance of goods or a service based on a life cycle

⁵⁵ <http://www.grontpunkt.no/emballasjemerking/>

⁵⁶ <http://rinkiin.fi/for-hushall/rinki-market/>

⁵⁷ <https://www.grontpunkt.no/emballasjemerking/>

⁵⁸ <http://www.ftiab.se/394.html>

⁵⁹ <http://www.ftiab.se/download/18.319a52e515ad8a9a7e97d3/1490879760135/Anvisningar+2017-03-31.pdf>
accessed 2017-06-04

⁶⁰ <https://tidymanlogo.wordpress.com/history-of-the-tidyman/>

⁶¹ <http://www.environdec.com/en/>

analysis (**LCA**, Life Cycle Analysis). Today there are 48 EPD categories within wood and paper products. There are also product-specific rules for beverage cartons.

Green Public Procurement (GPP) requirements

The EU's Green Public Procurement (GPP) has set joint criteria for public procurement. This has been done in order to have verifiable environmental criteria for products and services that are based on scientific data and a life-cycle approach. There are currently no GPP or national procurement documents for packaging for liquid food products.

Environmental management

Environmental management systems bring order to a company's own operations and produce improvements based on the company's own objectives in the environmental field. However, an environmental management system does not contain any specific requirement levels (threshold values) for the products or their production. The most important systems are **ISO 14001**, which is an international standard, and **EMAS**, which has been developed within the EU. These are generally applied by packaging manufacturers.

Product Environmental Footprint

Within the EU, an ongoing project is the Product Environmental Footprint (**PEF**), which aims to develop a method to calculate the environmental impacts of products and organisations.⁶² The project is currently in a pilot phase. Under the project, product- and sector-specific rules will be developed for environmental footprints and various verification methods, as well as opportunities to communicate environmental performance to business partners, consumers and other stakeholders. Dairy products and bottled water are examples of pilot projects in this work, which is expected to be completed at the end of 2017.

5 The criteria development process

Purpose of developing the criteria

The overall objective of the criteria development is to submit a proposal for Nordic Swan Ecolabelling's new criteria for packaging for liquid foods. The project was running in parallel with the revision of the Nordic Swan Ecolabelling Criteria for Disposables for Food, since the criteria are similar to each other. The criteria are intended to promote renewable raw materials in order to reduce dependence on fossil raw materials. The focus is also on sustainably produced raw materials, chemicals and packaging recycling, based on the circular economy.

Packaging for liquid foods is not a traditional Nordic Swan Ecolabelled product in the sense that only the actual packaging is Nordic Swan Ecolabelled, and not the product inside the packaging. The conclusion drawn in the preliminary study was that to minimise the risk of confusion about what is Nordic Swan Ecolabelled, the packaging or its contents, a Nordic Swan Ecolabel with the sub-text that the ecolabelling concerns the packaging must be used. During the criteria development, rules and guidelines were also developed for the design, placement, etc. of the Nordic Swan Ecolabel on the packaging. See also section 2.

⁶² http://ec.europa.eu/environment/eussd/smgp/dev_methods.htm

About the development of these criteria

The work was performed as an internal criteria development project within Nordic Ecolabelling. The working group was in contact with various operators in the industry, such as food producers and suppliers, packaging manufacturers, materials producers, the waste industry, research institutes and public authorities. During the criteria development, Nordic Ecolabelling's communication and market group developed rules and guidelines for the design, placement, etc. of a modified Nordic Swan Ecolabel on packaging. The modified Nordic Swan Ecolabel was also tested among consumers.

6 Food packaging and sustainable development

Section 6 describes the sustainable development of food packaging in further detail, thereby justifying the requirements made in the criteria.

6.1 RPS analysis

Nordic Ecolabelling assesses a product's environmental impact throughout its life cycle. In order to achieve environmental benefits, Nordic Ecolabelling must be able to set requirements that are relevant for the environment. It must also be possible to distinguish between environment-friendly and other products. Finally, it must be possible for the producer to manage an environmental problem via the Nordic Swan Ecolabelling requirements. These three parameters should be considered together, and are called RPS (Relevance – Potential – Steerability).

Packaging's most important function is to contain and protect the packaged product.⁶³ This includes various phases of a product's life cycle, such as transport, storage and distribution to and in shops, and use after purchase (such as storage and possible emptying by the consumer at home). Packaging that does not fulfil any of its basic functions (to preserve and protect the product, etc.) will probably lead to a lot of waste of the packaged food, which is not desirable from an environmental viewpoint. Large volumes of food products are thrown out every year and without appropriate packaging, these volumes, and thereby the environmental impact, would be even greater.

Since the packaging is considered to be part of the packaged product, often the packaging's environmental impact is investigated together with the product. These investigations show that the environmental impacts of packaging and the material in them generally only account for a few per cent of the packaged products' environmental impacts.^{64 65} The investigations also show that there can be an environmental justification for allowing a higher environmental impact related to packaging. This is subject to the condition that the volume of product (food waste) can be reduced. The reason is that the benefits of reducing food waste exceed the environmental impacts from the production or optimisation of packaging. This applies especially to food products with a high environmental impact, such as meat and dairy products.⁶⁶

⁶³ <http://eur-lex.europa.eu/legal-content/SV/TXT/PDF/?uri=CELEX:01994L0062-20150526&from=EN> (accessed 2016-12-20)

⁶⁴ http://denkstatt.at/files/How_Packaging_Contributes_to_Food_Waste_Prevention_V1.2.pdf (2015-060-14)

⁶⁵ Katajajuuri J-M, 2007. i boken Järvi-Kääriäinen, T. ja Ollila. M. Toimiva pakkaus. Pakkaustutkimus (Association of Packaging Technology and Research) - PTR ry. pp. 16-23.

⁶⁶ <http://kau.diva-portal.org/smash/get/diva2:413913/FULLTEXT01.pdf> (accessed 2017-06-14)

From an environmental viewpoint, it would therefore be relevant to develop function-based criteria for packaging whereby the product and its packaging are considered together, but this is highly complex. There is no potential or steerability to cover every area. Since packaging plays an important role in reducing environmental impacts during a food product's life cycle, it is relevant for Nordic Ecolabelling to have criteria for this packaging. Nordic Swan Ecolabelling aims to promote products with a low environmental impact, low consumption of resources, and high functionality.

On commencement of the development of criteria for packaging of liquid food products, a preliminary study concerned the materials paper based packaging, , polymers (such as PET bottles), aluminium and glass. On investigating packaging excluding the product, the production of the packaging's constituent materials is of greatest environmental significance (glass, polymers, aluminium, paperboard). According to the LCA analyses, the transport and conversion of packaging, including filling and distribution to shops, are of less significance.⁶⁷ The waste phase, and thereby consumer behaviour, is decisive in the final phase of the packaging's life cycle. Packaging can either be discarded or sorted to existing recycling systems, provided that these recycling systems exist.

The preliminary study showed that it is clearly relevant to assess the environmental benefits of each individual material, but the potential and steerability is generally considered to be very low, especially for glass, fossil-fuel plastic and aluminium. Manufacturing these materials is energy-intensive and thereby related to high CO₂ emissions. Besides greenhouse gas emissions, there is also the major challenge related to pollution of natural habitats: in the case of aluminium, for example, the bauxite mining industry affects the environment, and in the case of polymers, there is the effect of the production of fossil raw materials, such as oil drilling. Leakage of plastic to the marine environment is also emphasised as a major challenge.⁶⁸ Even though there are relevant environmental problems related to these materials, it can be difficult to determine the materials' traceability and thereby their sustainability. Today, there is neither steerability nor any opportunity to identify the best products in the markets.

Moreover, these materials are predominantly non-renewable materials. For such materials, it is highly relevant in environmental terms that they can be recycled or reused. There are well-established recycling systems for glass and PET bottles, as well as aluminium cans, in the Nordic region, with the deposit system driving the take-back system. In this deposit system, take-back levels of almost 90% are not unusual.^{69 70 71 72} The potential environmental benefits in the final phase of the life cycle for the products included in the deposit system are therefore deemed to be low. In combination with the low steerability to distinguish the best products of fossil-fuel plastic, aluminium and glass, it is therefore assessed that Nordic Ecolabelling will not include these materials in the first version of this criteria development.

The driving force behind Nordic Ecolabelling's criteria is to promote renewable raw materials in order to reduce dependence on fossil raw materials. Since, according to the LCA analyses,

⁶⁷ Falkenstein, Wellenreuther & Detzel, 2010. LCA studies comparing beverage cartons and alternative packaging: can overall conclusions be drawn? Int J Life Cycle Assess DOI 10.1007/s11367-010-0218-x
http://www.ace.be/uploads/Modules/Publications/lca_studies_article_published_1_july_2010.pdf

⁶⁸ http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf

⁶⁹ <http://www.palpa.fi/yritys/palautusasteet-1>

⁷⁰ <http://infinitem.no/infinitem/english/deposit-facts-of-2013>

⁷¹ http://www.dansk-retursystem.dk/content/dk/om_dansk_retursystem/nogletal_arsrapporter

⁷² <http://www.pantamera.nu/sv/v%C3%A4lkommen-till-returpack>

the manufacture of packaging material (polymers, paperboard, etc.)^{73 74 75} has the greatest environmental impact, the emphasis of the RPS analysis is on the constituent materials. RPS for pulp and paper manufacturing is presented in further detail in the Background Document to Nordic Swan Ecolabelling of Paper Products, Basic and Chemical Modules, version 2 (2011). Environmental problems concerning paperboard manufacture are related to forestry and actual pulp and paperboard production, in the form of energy consumption, emissions to air and water, and the chemicals used.

Nordic Ecolabelling has assessed that there is relevance (R), potential (P) and steerability (S) for environmental benefits if the focus of the criteria for packaging for liquid food products

- consists of a high ratio of renewable material, in order to conserve the Earth's resources;
- fulfils the requirements of the traceability of wood fibre and the requirements of the certification of raw materials;
- fulfils the high requirements of chemicals, for the benefit of health aspects, as well as recycling opportunities;
- does not contain recycled plastic or paper to ensure that no harmful substances migrate to the product; and
- concerns packaging that can be recycled, to promote the circular economy.

Below, these aspects are considered in further detail.

High element of biobased material

The criteria are intended to stimulate the development of renewable material. Environmental benefits can be expected with regard to renewable material replacing products from a fossil source. This will conserve fossil resources and reduce emissions of greenhouse gases.⁷⁶ Renewable resources as such do not contribute to increased emissions of greenhouse gases, since the CO₂ released in the waste phase is considered to be biogenetic and is part of the natural CO₂ cycle. In World Economic Forum's "The New Plastic Economy" renewable resources are highlighted as an alternative to reduce the negative environmental impacts of plastic.⁷⁷ Biobased products and biomass are also one of the prioritised areas which the EU has identified in its action plan.⁷⁸

Sustainably produced raw materials and energy efficiency in production

Environmental benefits of the criteria are also related to the opportunities to promote sustainable production of renewable raw materials. When biobased materials are promoted to replace other materials (such as fossil-fuel plastic or aluminium) it is vital that the biobased material is produced sustainably without creating environmental problems in other areas (called a burden shift). One example of this is land use change, which can lead to increased

⁷³ http://www.billerudkorsnas.com/PageFiles/20097/LCA_report_BillerudKorsnas2015_Final.pdf

⁷⁴ <https://endpoint895270.azureedge.net/static/se/documents/sustainability-downloads/lca%20nordic%20final%20report.pdf>

⁷⁵ <http://www.environdec.com/en/EPD-Search/?query=elopak>

⁷⁶ Wolf O. Crank M. Patel M. Marscheider-Weidemann F. Schleich J. Hüsing B. Angerer G. 2005, Techno-economic feasibility of large-scale production of bio-based polymers in Europe, Joint Research Centre, Institute for Prospective Technological Studies, Technical report EUR 22103 EN

⁷⁷ http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf

⁷⁸ <https://ec.europa.eu/research/bioeconomy/index.cfm?pg=policy&lib=strategy>

CO₂ emissions and reduced biodiversity, due to increased cultivation of raw materials for biopolymer manufacture. It is difficult to predict the consequences of changes in land use, but it is important not to consider renewable raw materials solely as an unlimited resource.^{79 80}

Sustainable raw materials production entails using various certification schemes to ensure the traceability of the raw material and its origins. Certification systems protect e.g. forests from illegal felling and fulfil a number of different environmental interests and social aspects. For some time, Nordic Ecolabelling has set requirements for sustainable forestry in products which include fibre raw materials (FSC and PEFC certification). It is also possible to promote the sustainable production of biobased raw materials and use of secondary raw materials (residual products from other production), so as not to compete with food production. Consumption of first-generation biobased polymers (food crops primarily used for food production) has dominated in the first generation of polymers, but it is even more important to promote second-generation biopolymers (non-food crops, residual products from e.g. farming or forestry), or even third-generation biopolymers (algae) in the production of biopolymers. Nordic Ecolabelling would rather promote the use of second- and third-generation biobased polymers than first-generation, but as yet these are in short supply. Most second- and third-generation products are still at the trial stage. For this reason, with certain limitations, Nordic Ecolabelling also approves first-generation biopolymers in the first generation of the criteria for packaging of liquid food products. See also the background text for requirement O14.

Environmental benefits are also related to the opportunities to promote energy and resource efficiency in the production of biobased polymers, and thereby also contribute to measures to reduce the climate impact. Several LCA studies of packaging show that one of the most important factors regarding the packaging's environmental impacts is the energy used to manufacture constituent materials, such as polymers and paperboard. The energy sources used are difficult to control, however, and are often related to external factors, such as the country where production is located and which energy sources are available there, and whether the power source is hydropower, coal or nuclear power, etc. How efficiently energy is used at the production site is also important. Efficient production which uses less energy than other equivalent production will generally have lower energy consumption and thereby climate emissions. Since many biopolymer materials are relatively new, there should also be potential to optimise the production processes. It is therefore relevant to set requirements concerning the energy used in the production of renewable raw materials, including biobased polymers. Energy consumption requirements are considered to be an indirect requirement to reduce the climate impact.

Other significant environmental impacts are related to the consumption of resources. The theoretically simplest way to limit the energy and climate impact of packaging is to ensure that it does not comprise unnecessary amounts of material. The manufacturer often focuses on resource efficiency for economic reasons, and the opportunities to set relevant requirements for these materials are therefore considered to be insignificant.

⁷⁹ UNEP (2009): Towards sustainable production and use of resources: Assessing Biofuels. International Panel for Sustainable Resource Management, United Nations Environment Programme

⁸⁰ Memo from Force Technology "The land use aspect" 2010

More stringent requirements of chemicals

The Nordic Swan Ecolabel is primarily an environmental label, but in addition to environmental aspects, there is also focus on health aspects for product groups where this is relevant. Health-related issues are also related to environmental issues, since impacts on human beings also affect the environment. Packaging in contact with food are a product group for which requirements of chemicals are being scrutinised more closely, due to the health-related aspects.

The criteria focus on setting requirement of the chemicals used in the production of constituent materials and conversion. Chemicals used in plastic and paperboard may have problematic environmental and health-related characteristics. They may be persistent, bioaccumulative and toxic, or have carcinogenic and endocrine-disrupting effects. Bisphenol A (BPA), isocyanates and certain phthalates used as plasticisers are examples of substances that have negative effects on human health and the environment.

Studies indicate that food contact materials can be an underestimated source of chemical food contamination⁸¹. Contamination may occur in several ways. Non-inert materials, like paperboard or plastics, can be a direct source of migrants. Chemicals may also migrate from the outside through the packaging. A special case of migration is “off-set migration”: the printed, outside layer of a food packaging can transfer chemicals to the inside, direct food contact layer when both layers are in direct contact with each other. Off-set migration may occur when e.g. paperboard is stored in rolls, or when paper cups are stacked into each other⁸².

Substances which migrate easily are usually low-molecular and volatile, e.g. additives such as antioxidants, non-intentionally added substances (NIAS), or residual monomers from production. One example is polyurethane glue, which is used for the lamination of polymers in food packaging. PUR glue may contain pre-polymer isocyanates and thereby free diisocyanate monomers. Isocyanates have been upgraded to Carc 2 H351. If the lamination has not hardened before the food is packaged, there is a risk that isocyanates migrate to the food product, giving rise to primary aromatic amines (PAA). Some of them may be carcinogenic. The isocyanate example shows that not only constituent substances and materials in contact with food, but also process conditions, can affect migration to food. Any migration will generally depend on various different factors, such as the physical chemical characteristics of the migrating substances, the packaging material and the type of food (e.g. fat content). Temperature, contact time and packaging size in proportion to food volume also affect migration (packaging of smaller size has greater proportional volume).

Even though most migration studies have focused on polymer-based packaging, certain other types of material such as ink, additives and surfacing/coating can reasonably be expected to function as quasi-polymers. Printing ink used on packaging in contact with food is also a potential source of contamination of the packaged food.^{83 84} More than five thousand

⁸¹ <http://www.foodpackagingforum.org/>

^{82 82} <http://www.foodpackagingforum.org/>

⁸³ Food contact materials and articles: Printing Inks Check lists for compliance in industry and trade and control by food inspection. 2012:521 TemaNord.
[http://www.evira.fi/files/attachments/fi/elintarvikkeet/valmistus_ja_myynti/kontaktimateriaalit/food_contact_materials_and_articles_printing_inks .pdf](http://www.evira.fi/files/attachments/fi/elintarvikkeet/valmistus_ja_myynti/kontaktimateriaalit/food_contact_materials_and_articles_printing_inks.pdf)

⁸⁴ Bradley, E.L., et al., Printing ink compounds in foods: UK survey results. Food Additives and Contaminants: Part B, 2012: <http://www.tandfonline.com/doi/abs/10.1080/19393210.2012.725>

different chemicals are used to produce printing ink.⁸⁵ A small proportion of these substances have been assessed by EFSA (the European Food Safety Authority)⁸⁶ and limited to a specific migration level (SML). Printing ink can migrate through the porous paper/paperboard and into the food product. Substances present in a recycled material can also migrate to the bulk material and from there into the food product. The use of barrier material can therefore significantly reduce food contamination. An example is a carton provided with an inner bag containing the food product, the bag being made from aluminium foil or plastic with barrier properties.

Packaging that is in contact with food must fulfil EU Regulation 1935/2004 on materials and articles intended to come into contact with food. Packaging must also be manufactured in accordance with EU Regulation 2023/2006 on good manufacturing practice for materials and articles intended to come into contact with food.

EU Regulation 1935/2004/EC generally states that packaging must not

- emit substances to food that can be detrimental to human health; or
- entail a change in and/or diminish the food's colour, smell, taste or other physical characteristics.

For food contact materials of plastic a special regulation has been developed: EU Directive 2002/72/EC, which is now replaced by Regulation no. 10/2011 with subsequent amendments concerning plastic materials and articles intended to come into contact with food. For cardboard or paper products no statutory requirements are made, other than general legislation (Regulation 1935/2004). None of the Nordic countries have any special requirements of these materials.⁸⁷

Since primary packaging for liquid foods is material in contact with food, both environmental and health aspects are emphasised in the Nordic Ecolabelling criteria. Due to aforementioned, the following chemical requirements are set in the criteria. Besides material in contact with food being required to fulfil current legislation,⁸⁸ Nordic Ecolabelling requires pulp, paper and paperboard in packaging to fulfil German BFR's⁸⁹ or CEPI's⁹⁰ recommendations (see also requirement O3). In requirement O4, the primary packaging shall be tested for potential migrating substances. In addition, Nordic Ecolabelling prohibits a number of chemicals in Nordic Swan Ecolabelled packaging, even though these chemicals are permitted under the authorities' regulations. Nordic Ecolabelling therefore sets the requirement that chemical substances with problematic characteristics shall not be included in chemical products used in the production/assembly of Nordic Swan Ecolabelled packaging.

⁸⁵ Food contact materials and articles: Printing Inks Check lists for compliance in industry and trade and control by food inspection. 2012:521TemaNord.

http://www.evira.fi/files/attachments/fi/elintarvikkeet/valmistus_ja_myynti/kontaktimateriaalit/food_contact_materials_and_articles__printing_inks_.pdf

⁸⁶ <http://www.efsa.europa.eu/>

⁸⁷ European Commission, Summary of the national legislation, Sanco E6/MS(28/09/2010):http://ec.europa.eu/food/food/chemicalsafety/foodcontact/documents_en.htm

⁸⁸ (EU Regulation no. 1935/2004, EU Regulation no. 2023/2006) and plastic packaging and plastic elements must comply with EU Regulation no. 10/2011.

⁸⁹ <https://bfr.ble.de/kse/faces/resources/pdf/360-english.pdf> (2017-06-15)

⁹⁰<http://www.cepi.org/system/files/public/documents/publications/foodcontact/2012/Industry%20guideline-updated2012final.pdf>

It is specified that the requirements in this criteria document are overall requirements in regulations and recommendations. This means that a chemical may be prohibited from Nordic Swan Ecolabelled packaging even though it is permitted under regulations and recommendations. See also the more detailed chemical requirements, Chapter 7.5, requirements for polymers O17-O18 and paperboard (O12 and O13).

Nordic Ecolabelling has assessed that even though the production chains can be long, there is sufficient potential and steerability to set requirements of the constituent substances in material used in packaging.

Packaging must be easily recyclable

A major environmental benefit can be achieved if packaging is recyclable in the final phase of the packaging's life cycle.⁹¹ The European Parliament recently presented an ambitious objective for the increased recyclability of packaging⁹² in order to benefit the circular economy and thereby also collection and recycling. There is potential to increase the recycling ratio in the Nordic countries, but the steerability to make direct requirements of the waste phase is generally considered to be rather low. The final phase of packaging's life cycle is affected by many factors, such as the sorting opportunities in each country or municipality, and how consumers sort the packaging in the final phase.

Nordic Ecolabelling can, however, generally work for the recycling of packaging and sets requirements intended to support this process, for example as requirements concerning composition of materials and purity that promote health aspects, as well as recycling opportunities.

There is also potential to benefit the circular economy by using recovered material such as recycled fibre or recycled plastic as the material in packaging. From a CO₂ perspective, there is an environmental benefit from working for packaging products made from recycled materials and which can also be part of existing recirculation systems. Nordic Ecolabelling has determined, however, that recycled paper/paperboard and plastic will not be included in the criteria. There is a risk that these recycled materials may contain pollutants that can migrate to food products. Nordic Ecolabelling therefore finds that the use of recycled materials must be promoted, but that it is more relevant to use these recycled materials for products for which there is no risk of migration to food products. More detailed information about this can be found in section 7, Justification of the requirements.

6.2 Material in the product group

In the first-generation criteria, the product group has been delimited to solely include primary packaging made from a high ratio of biobased material indicating that plastic packaging made from biobased polymers and carton packaging can be Nordic Ecolabelled. Yet since carton packaging is a multi-layer product which can include several materials, fossil-based polymers and aluminium are also described briefly in this section.

⁹¹ Nordic Council of Ministers, Karl Hillman, Anders Damgaard, Ola Eriksson, Daniel Jonsson and Lena Fluck, "Climate Benefits of Material Recycling – Inventory of Average Greenhouse Gas Emissions for Denmark, Norway and Sweden", TemaNord 2015:547.

⁹² http://europa.eu/rapid/press-release_IP-17-104_sv.htm

Carton packaging

Paper and paperboard often occur in food packaging, including as beverage cartons.

Liquid packaging board (LPB) is used for various liquid packaging applications, of which the most common is milk and juice packaging. Beverage cartons are made of, on average (by weight)⁹³:

- 75% paperboard,
- 21% polymers, mostly polyethylene (PE), to prevent leakage
- 4% aluminium, to protect drinks from light and oxygen

Liquid packaging board is used for fresh and long-life drink and food products, enabling distribution either at ambient temperatures or under refrigerated conditions. Extended shelf life from half year to one year in a room temperature can be achieved by the aseptic packing of UHT (ultra-high-temperature) products⁹⁴. The long shelf life products require high barrier coated paperboard with is attained by coating the paper board with aluminium or other barriers consisting of multilayers.

Manufacture of paperboard only uses 100% virgin wood fibre, to ensure good quality.⁹⁵ Cellulose fibres from wood may be bleached and non-bleached. Paperboard packaging for liquids is a multi-layer product which is made from chemical pulp and also CTMP (chemi-thermomechanical pulp) in the centre, to achieve good rigidity.^{96 97} The surface may be coated, depending on the end-use. The board is usually coated with barrier films such as molten polyethylene (extrusion coating). Other specific polymers may also be extruded. The different layers accomplish different tasks, such as reducing moisture penetration, reducing oxygen penetration, acting as light barrier, and preventing odours and chemicals to absorb to food⁹⁸. Printing is often done by the flexo-graphic method⁹⁹.

Polymers

Biobased polymers

The European organisation for bioplastic (European Bioplastics) defines bioplastic as follows:¹⁰⁰

⁹³ <http://www.ace.be/beverage-cartons/what-are-beverage-cartons> (hämtat 2017-06-14)

⁹⁴ [Järvi-Kääriäinen, T. ja Ollila, M. 2007. Toimiva pakkaus. Pakkaustutkimus \(Association of Packaging Technology and Research\) - PTR ry](#)

⁹⁵ <http://www.ace.be/beverage-cartons/production/from-wood-fibre-to-paperboard> (accessed 2017-06-14)

⁹⁶ Kiviranta, A. 2000. Paperboard grades. Paper and Board Grades. Papermaking Science and Technology, Book 18. Ed. Hannu Paulapuro. Publ. Fapet Oy. Jyväskylä Finland. pp. 54-72

⁹⁷ Kirwan, M. 2005. Paper and paperboard packaging technology.

⁹⁸ <http://ilsu.eu/publication/packaging-materials-9-multilayer-packaging-for-food-and-beverages/> (hämtat 2017-06-14)

⁹⁹ [Järvi-Kääriäinen, T. ja Ollila, M. 2007. Toimiva pakkaus. Pakkaustutkimus \(Association of Packaging Technology and Research\) - PTR ry.](#)

¹⁰⁰ Definition of "Bioplastics" on the website of European Bioplastics, see <http://en.european-bioplastics.org/press/faq-bioplastics/#define> (accessed 17.11.2015)

- Plastic based on renewable raw materials
- Biodegradable polymers which fulfil all of the criteria for scientifically assessed norms for the biodegradability and composting of plastic and plastic products. In Europe this is EN 13432.

Bioplastic must fulfil either bullet point one or bullet point two. Note that, according to this definition, fossil-based biodegradable polymers will be called bioplastic. Since there is a risk of misunderstanding, Nordic Ecolabelling does not use the term "Bioplastic" in these criteria. Instead, the focus is on the raw material for polymers, i.e. it must be biobased.

The European Committee for Standardization (CEN) has published a standard for definitions which do not concern biobased polymer in particular, but biobased products and concepts related thereto¹⁰¹. Here, biobased is defined as "derived from biomass", and a biobased product is a product fully or partly based on biomass. Plastic that is biobased by applying the mass balance principle has also been introduced in the market. This is a system whereby a specific volume of biobased raw material is mixed with fossil raw materials at the start of the production process. This is then sent into the facility together, without traceability as to what goes where. Finally, biobased polymer equivalent to the volume of renewable raw material originally entering the system is sold. See more about Nordic Ecolabelling's position on mass balance in requirement O2.

Examples of various types of biobased polymers are:

- Polymers extracted directly from biomass. These is e.g. polysaccharides such as starch and cellulose, or chitin and proteins such as casein (milk protein). An example of a known starch polymer is Mater-Bi® from Novamont S.p.A. in Italy.¹⁰²
- Polymers produced through classical chemical synthesis by using monomers of biobased origin. Monomers may be produced by fermentation or chemical synthesis. An example is PLA (polylactate), which is polymerised from lactic acid monomers. NatureWorks makes PLA from maize.¹⁰³ Another example is polyethylene, which is made from ethylene from sugar cane produced by Braskem in Brazil.¹⁰⁴
- Polymers produced by bacterial fermentation of sugar or lipids. One example is PHA (Polyhydroxyalkanoates).

Today, biobased plastics play an important role in the packaging area.¹⁰⁵ There are two main production trends. One is new types of plastic (such as PLA) and the other is the use of renewable raw materials for production of the traditional types of plastic, such as polyethylene, called stand-in bioplastic. The bioplastic market was previously dominated by plastic materials which are made for composting and/or marketed as degradable. In recent years there has been a great increase in biobased plastic with the same characteristics as

¹⁰¹ <http://www.cen.eu/work/areas/chemical/biobased/Pages/default.aspx> (accessed 26.10.2016)

¹⁰² <http://www.novamont.com/eng/mater-bi> (accessed 26.10.2016)

¹⁰³ <http://www.natureworkslc.com/The-Ingeo-Journey/Eco-Profile-and-LCA/How-Ingeo-is-Made> (accessed 26.10.2016)

¹⁰⁴ <http://www.braskem.com/site.aspx/Im-greenTM-Polyethylene> (accessed 26.10.2016)

¹⁰⁵ Michael Carus & nova-Team, Jan Ravenstijn, Wolfgang Baltus, Dirk Carrez, Harald Kaeb, Stefan Zepnik:2013. Bio-based Polymers in the World Capacities, Production and Applications: Status Quo and Trends towards 2020 available at <http://bio-based.eu/markets/>

fossil-fuel plastic (stand-in), which is not compostable/degradable, and which can be included in recirculation systems and directly replace fossil-fuel plastic.¹⁰⁶

There are approximately 115 producers in the market that play a significant role for the biobased polymers' production capacity¹⁰⁷. The most dynamic development is expected for "stand-in" polymers, which are chemically equivalent to the petrochemical counterparts such as PET, PE and PP, but which are fully or partly based on biomass. It is difficult to find out how many raw materials suppliers are relevant for the production of biobased polymers. It is possible to solely produce the raw material, such as lactic acid or succinic acid, from biobased raw materials, and to sell this on to a producer of the actual polymer. This means that the producer of the actual polymer may have several different raw material suppliers.

Fossil-based polymers

Since Nordic Swan Ecolabelled packaging will mainly comprise biobased material, primary packaging made from 100% fossil-based polymers is not relevant. These may still be included as a layer of paperboard packaging for liquids and polymer bottles, in order to achieve the required barrier properties. Polyethylene (PE) is a good liquid barrier and ethylene-vinyl-alcohol (EVOH) is used as an acid barrier for e.g. juice and yoghurt, in order to prolong the food's shelf life. High-density polyethylene (HDPE) and low-density polyethylene (LDPE) or polypropylene (PP) can be used in screw caps. Secondary packaging may also consist of polymers such as LDPE.

Aluminium

Aluminium itself can be used as packaging, but is also used as a barrier in contact with food, in order to achieve various required functions in packaging (gas and liquid barriers). So far, aluminium is one of the best barriers, e.g. in aseptic packaging of which the content has no additives and preservatives, but which has a long shelf life and can therefore be stored at room temperature, instead of refrigeration. It is not easy to replace aluminium as the barrier in packaging. In some products, such as fresh juice, fossil-based ethylene-vinyl-alcohol (EVOH) can be used as an alternative to aluminium. Today there is no biobased material in the market that can replace aluminium.

From an environmental viewpoint, aluminium is one of the most adverse raw materials in carton packaging's life cycle^{108 109} and should be replaced with other material. There are several environmental problems related to the production of aluminium, such as bauxite extraction, high energy consumption and emissions during production. Electrolysis of virgin aluminium is energy-intensive. Smelting of recovered aluminium requires far less energy than primary production; only around 5% of the energy required to produce the primary metal is required in the recycling process.¹¹⁰ Recycling of aluminium is therefore desirable and theoretically, aluminium is 100% recyclable without losing any of its natural properties. It is estimated that more than half of all of the aluminium produced in the European Union

¹⁰⁶ "Bio-based Building Blocks and Polymers in the World, Capacities, Production and Applications: Status Quo and Trends towards 2020", Nova Institute, 2015. Available on the website: <http://en.european-bioplastics.org/market/market-development/market-data-methodology/> (accessed 5.11.2015)

¹⁰⁷ European Bioplastics' website: <http://en.european-bioplastics.org/market/market-development/market-data-methodology/> (accessed 05.11.2015)

¹⁰⁸ <http://assets.tetrapak.com/static/se/documents/sustainability-downloads/lca%20nordic%20final%20report.pdf>

¹⁰⁹ <http://www.environdec.com/en/EPD-Search/?query=elopak>

¹¹⁰ <http://www.alueurope.eu/about-aluminium/properties/>

(EU-27) originates from recovered aluminium.¹¹¹ See also more about aluminium in requirement O2 concerning materials composition.

There are initiatives for sustainable production of aluminum today¹¹². The Aluminium Stewardship Initiative (ASI) standard covers aluminium's value chain, including handling of biodiversity within mining operations, indigenous people's rights, greenhouse gas emissions, waste handling and traceability. A Chain of Custody is being developed. The aim is for ASI's certification programme, including the traceability standard, to be launched at the end of 2017.

7 Justification of the requirements

This chapter presents proposed requirements and explains the background to the requirements and the chosen requirement levels. The appendices referred to are appendices in the criteria document: Nordic Swan Ecolabelling of Packaging for Liquid Foods.

7.1 Product group definition

What can carry the Nordic Swan Ecolabel?

Nordic Ecolabelling's criteria for packaging of liquid foods are based on a high ratio of renewable material. The product group definition is not limited to one particular type of material, but the ratio of renewable material must be indicative. Under the requirements, primarily packaging for liquid foods made from biobased polymers and carton packaging for liquids may be the subject of a Nordic Swan Ecolabelling licence application.

The definition of the product group is as follows:

"The product group consists of primary packaging* for liquid pre-packaged foods**. The actual content, i.e. the liquid food product, is not included in the product group. Should any doubt arise as to which packaging is included in the product group, this will be decided by Nordic Ecolabelling.

Packaging intended to be in contact with a liquid food product for a short time, e.g. take away coffee cups and pizza packs, cannot be Nordic Swan Ecolabelled according to these criteria. These products can be Nordic Swan Ecolabelled according to Nordic Ecolabelling's Criteria for Disposables for Food."

It can sometimes be a little difficult to define "liquid food products". An example is yoghurt that is labelled with a unit of weight on the packaging, although there is also drinkable yoghurt in the market that is labelled with a unit of volume on the packaging. In these borderline cases, the starting point is the packaging and its material, which determines what can be Nordic Swan Ecolabelled.

¹¹¹ Environmental Profile Report for the European Aluminium Industry April 2013- Data for the year 2010. Life Cycle Inventory data for aluminium production and transformation processes in Europe.

¹¹² <http://www.isealliance.org/online-community/organisations/aluminium-stewardship-initiative>

** In accordance with EU Directive 94/62/EC¹¹³ on packaging and packaging waste, the term "primary packaging" is defined as consumer packaging, i.e. packaging conceived so as to constitute a sales unit to the final user or consumer at the point of sale.*

*** The term "pre-packaged foodstuff" is defined in accordance with EU Regulation 1169/2011: an individual product that in unchanged condition is intended to be sold to final consumers and mass caterers and which consists of a food product and the packaging in which it is placed before it is offered for sale, irrespective of whether the packaging contains the food in full or only in part, but in any case so that the packaging contains the food product in such a way that the contents cannot be altered without opening or changing the packaging; food products that are packaged at the place of sale at the consumer's request, or are pre-packaged for direct sale will not be considered to be pre-packaged foodstuffs.*

Licence holders

Brand owners of a pre-packaged food product may apply for a licence for their primary packaging. This hereby refers to e.g. breweries, dairies and other food producers, as well as brand owners such as various retail chains for which food companies produce under their own names. (Hereinafter brand owners are named food producers in this document.) Packaging manufacturers may also be licensed provided that the packaging manufacturer has full control over the manufacture of the primary packaging covered by the Nordic Ecolabelling requirements. In the case of plastic bottles this means, for example, that the packaging manufacturer is responsible for ensuring that all accessories included in the primary packaging such as labels, stoppers etc. comply with Nordic Ecolabelling requirements.

7.2 Overall requirement areas

This section considers overall requirement areas, product description and the material included in packaging. Some key definitions are highlighted at the beginning of the section. Concepts and definitions are also specified further in Chapter 8, Terms and definitions.

Definitions

In contrast to Nordic Ecolabelling's other criteria, the term product not only refers to the Nordic Swan Ecolabelled packaging, but the packaged food and its packaging.

Nordic Swan Ecolabelled packaging is primary packaging in which the food is packaged. (Hereinafter the term **primary packaging** is used for Nordic Swan Ecolabelled packaging in this document.) The definition of packaging adheres to the definitions specified in EU Directive 94/62/EC concerning packaging and packaging waste: **Primary packaging** is consumer packaging, i.e. packaging conceived so as to constitute a sales unit to the final user or consumer at the point of sale.

Secondary packaging is group packaging, i.e. packaging that is designed in such a way that at the point of sale they comprise a group of a certain number of sales units, irrespective of whether they are sold as such a group to the consumer, or are solely used to complement the shelves at the point of sale. Secondary packaging can be removed from the product without this affecting the product's characteristics.

¹¹³ <http://eur-lex.europa.eu/legal-content/SV/TXT/PDF/?uri=CELEX:01994L0062-20150526&from=EN> accessed 2016-12-20

Tertiary packaging is transport packaging, i.e. packaging that is designed in such a way that it supports the handling and transport of a number of sales units or group packaging, in order to prevent damage from physical handling or transport damage.

In this case the **packaging system** comprises food products and all related levels of packaging (primary, secondary and tertiary packaging).

Biobased means that the material consists of biomass that may have undergone physical, chemical or biological treatment(s). Biomass has a biological origin, but excludes material that is found embedded in geological and/or fossil formations. Examples of biomass are: (all or parts of) plants, trees, algae, marine organisms, microorganisms, animals, etc.

Biobased polymer/plastic: Polymer/plastic that is fully or partly based on biomass. Nordic Ecolabelling does not consider that biodegradable/compostable fossil-fuel plastic should be considered to be biobased plastic.

The definitions of biobased polymer/plastic are based on the definitions in the European standard EN 16575:2014114 and also include secondary raw materials in Nordic Ecolabelling's criteria.

Secondary raw materials are defined as residual products from other production and manufacturing processes, such as waste products from the food industry, or by-products such as straw from cereal production or bagasse from sugar cane production.

Full traceability (for biobased polymers): Full traceability means that there is control of the renewable material throughout the production process, such as by using a separate production line solely for renewable raw materials, so that the final polymer solely comprises renewable raw materials.

Mass balance method (for biobased polymers): The mass balance method means a mix of fossil and biobased raw materials at the start of the production process, with mathematical allocation of the renewable raw material to the final polymer. This entails that there is no full traceability of the renewable raw material throughout the production process, and that the amount of renewable raw material in the final polymer can vary.

Overview of requirements

Below is an overview of the requirements made in the criteria. The overview is structured so as to clarify who is primarily responsible for documenting specific requirements in the criteria. Packaging may comprise several materials and manufacturing consists of long chains of suppliers and possible sub-suppliers, which can make it difficult for potential licence holders to ultimately see which requirements must be documented by whom. In certain cases, the requirements can overlap each other, but in these respects it is clarified who is to document what.

¹¹⁴ <https://biobs.jrc.ec.europa.eu/sites/default/files/generated/files/policy/CEN%20Bio-Based%20Definitions%20EN16575.pdf> (accessed 11.10.2016)

The overview is structured as follows:

- Requirements of Nordic Swan Ecolabelling packaging, i.e. primary packaging in which the food is packaged (O1-O8). These requirements apply to food producers, but primarily to packaging manufacturers, since the manufacture of packaging (manufacture of preforms, conversion) is subject to these requirements. Note that the quality and regulatory requirements (O24–O32) at the end of the document apply to licence holders. For a definition of what is meant by producer in these criteria, see section 7.1.
- Requirements of material included in packaging. The requirements are distributed according to constituent key materials: pulp, paper and paperboard (O9–O13) and polymers (O14–O18). Primarily the manufacturer of these materials must document the requirements.
- Requirements of chemicals on conversion and finishing of packaging. Primarily the chemicals producers/suppliers are responsible for certifying compliance with the chemicals requirements (O19–O23).

Table 1. Overview of the requirements made in the criteria.

Requirement no.	Name of requirement	Who documents?	Use declaration
Requirement of primary packaging (Nordic Swan Ecolabelled packaging - packaging in which the food is packaged)			
O1	Information on the food and its packaging	Food producer/ packaging manufacturer	2 3
O2	Materials composition	Packaging manufacturer	3
O3	Material in contact with food	Food producer/ packaging manufacturer	
O4	Testing - migrates	Food producer/ packaging manufacturer	
O5	Packaging design	Packaging manufacturer	
O6	Recycling of primary packaging	Packaging manufacturer	3
O7	Plastic packaging - recycling design	Packaging manufacturer	
O8	Information to consumer	Food producer	
Requirements of constituent material (e.g. polymers, paperboard)			
Pulp, paper and paperboard			
O9	Pulp	Pulp producer	MSA*
O10	Paper and paperboard	Paper manufacturer	MSA
O11	Wood raw material	Pulp producer	MSA
O12	Optical brightener and anti-bacterial agent	Paper manufacturer	MSA
O13	Coating and impregnation	Chemical producer, pulp and paper producer	5 MSA
* MSA, My Swan Account, is Nordic Ecolabelling's web-based application guide for pulp and paper producers.			

Polymers			
O14	Agricultural raw materials, including palm oil, soya and sugar cane	Polymer producer	
O15	GMO	Polymer producer	
O16	Energy - biobased polymers	Polymer producer	
O17	Plastic additives	Polymer producer	7
O18	Residual monomers of plastic	Polymer producer	7
Requirements of chemical products and substances on conversion/finishing			
O19	Classification of chemical products	Chemical manufacturer/supplier	5
O20	Chemical substances, CMR	Chemical manufacturer/supplier	5
O21	Other excluded substances	Chemical manufacturer/supplier	5
O22	Inks for printing and dyeing	Chemical manufacturer/supplier	5
O23	Adhesives	Chemical manufacturer/supplier	5
Quality and regulatory requirements			
O24	Responsible person and organisation	Food producer/ packaging manufacturer	
O25	Documentation	Food producer/ packaging manufacturer	
O26	Packaging quality	Food producer/ packaging manufacturer	
O27	Planned changes	Food producer/ packaging manufacturer	
O28	Unforeseen non-conformities	Food producer/ packaging manufacturer	
O29	Traceability	Food producer/ packaging manufacturer	
O30	Take-back system	Food producer/ packaging manufacturer	
O31	Laws and regulations	Food producer/ packaging manufacturer	
O32	Subsuppliers	Food producer/ packaging manufacturer	

7.3 Requirements of Nordic Swan Ecolabelled packaging

Requirements in this section concern Nordic Swan Ecolabelled packaging, i.e. primary packaging in which the food is packaged. Primarily the packaging manufacturer and food producer must document the requirements in this section. But in certain cases the requirements also apply to other manufacturers. Reference is made to this requirement at relevant places in the document.

O1 Information on the food and its packaging

The food producer and packaging manufacturer must state the following information concerning

- **the food** packaged in Nordic Swan Ecolabelled packaging. Report all product names and brands, volume units and how long the food is intended to be kept in the packaging. State information concerning the primary packaging (manufacturer, trade name, type of packaging e.g. bottle, stopper, label).
- **Primary packaging*** - trade name, design and a technical description of how production will look. The description must also include any conversion at subsuppliers. Subsuppliers must be described with company name, production site, contact person and the production processes performed (e.g. coating, printing, labels and stoppers).
- Information on **constituent material** and function in the primary packaging (e.g. paperboard, polymers including type such as PE, PP, PLA, etc.) and the quantities of the various types of material (% by weight of each material in relation to the packaging's total weight). The overview must include the trade name of the material and manufacturer and a product data sheet or similar for them all must also be enclosed. See also requirement O2 concerning the constituent materials, in which requirements are made of the input material.
- **Chemical products** used in the conversion of primary packaging, e.g. printing ink. The list of chemical products must include full name, function and manufacturer. A safety data sheet must also be enclosed which must be in accordance with Annex II in REACH (Regulation 907/2006/EC).
- Information concerning **the packaging system**. Also state the trade name, manufacturer and material used for the secondary** and tertiary packaging*** or other elements**** which accompany the primary packaging on marketing to end-consumers.

Extrusion coating and adhesives are considered to be constituent material, but not other chemical products such as printing ink or mineral coating.

** Primary packaging is consumer packaging, i.e. packaging conceived so as to constitute a sales unit to the final user or consumer at the point of sale.*

*** Secondary packaging is group packaging that can be removed from the product without this affecting the product's characteristics.*

**** Tertiary packaging is transport packaging which supports handling and transport.*

***** "Other elements" are components which belong to the packaging, but which are not directly necessary to wrap the food. Examples of "other elements" are supplementary components such as straws.*

- ☒ Descriptions in accordance with the requirements. Appendix 2 is completed by the food producer, Appendix 3 by packaging manufacturer. A product data sheet must be enclosed as part of the documentation.

Background to the requirement O1

The requirement is made in order to give Nordic Ecolabelling an overview of the primary packaging, which types of food it is to be used for, how it is produced, and the packaging system of which it will be part. Nordic Ecolabelling also requires information concerning e.g. labels and labelling adhesives, printing ink and toner used for date labelling, and other related elements added in the primary packaging. This will make it easier to see which criteria requirements are relevant for this particular packaging. Information concerning the constituent material volumes is important in the requirement concerning constituent materials (O2). Appendix 2 is completed by the food producer, Appendix 3 is used by packaging manufacturer.

Even though the product group definition concerns primary packaging, Nordic Ecolabelling requires information concerning the packaging system. Packaging system means the product and various levels of packaging, i.e. primary, secondary and tertiary.¹¹⁵ The packaging levels are interrelated and influence each other. (Also see the background text to requirement O5.) Primarily packaging manufacturers and brand owners of food products document the requirements of Nordic Swan Ecolabelled packaging. But in certain cases the requirements may also need to be documented by contracted subsuppliers. For more information: see section 7.1 concerning the product group definition and which packaging can be Nordic Swan Ecolabelled. Finally, Nordic Ecolabelling requires information on all subsuppliers used.

O2 Constituent materials

At least 90% by weight of primary packaging must be made from biobased material*.

Maximum 10% by weight of packaging may consist of non-renewable material. Extrusion coating/lamination and adhesives must be included in the calculation of constituent materials. Other chemicals, such as mineras, printing ink and additives, may not be included.

Other elements described in O1 must be included in the constituent materials.

Metal shall not be used. The requirement does not apply threaded metallic seals or foil that can be removed completely at the opening of the packaging and sorted into metal recycling.

Recycled plastic and recycled pulp/paper/paperboard must not be included.

PVC or plastic based on other types of halogenated plastics must not be used.

** Biobased material: mass balance is not approved to calculate the ratio of biobased material in packaging which solely comprises plastic, e.g. plastic bottles, but there must be full traceability for the biobased plastic. For constituent components of plastic, such as stoppers and coatings in multi-layer packaging, or biobased plastic included with less than 10% by weight in the packaging, mass balance can be used, subject to the following conditions:*

- Biobased polymers must be used for the material production of polymers.
- Mass balance must be controlled by an independent third party. As a minimum, it must be controlled that the amount of purchased biobased raw material is equivalent to the amount of polymer sold as biobased.

If the mass balance method is used, the packaging manufacturer must report, e.g. with an invoice, that biobased polymers are purchased.

For definitions of the terms "biobased" and "component", see Chapter , Terms and definitions.

- Calculation showing that at least 90% by weight of the packaging is made from biobased material. Appendix 3 must be used.
- In packaging which solely comprises plastic, it must be confirmed that there is full traceability, e.g. in the form of separate production lines or as batched production. Alternatively, an analysis of biobased content according to the method under the EN 16640: 201 and EN 16785-1:2015 standards, or equivalent methods, can be enclosed.
- For constituent components of plastic such as stoppers or coatings for which mass balance can be used, a declaration from an independent party must be submitted, showing that:

¹¹⁵ Daniel Hellström och Annika Olsson; Managing packaging design for sustainable development - a compass for strategic directions, first edition, John Wiley and Sons Ltd. 2017.

- biobased polymers are registered/booked as material production of polymers; and that
- there is a control system for purchased biobased raw materials and the amount of biobased polymer sold.

The packaging manufacturer must report, e.g. with an invoice, that biobased polymers are purchased.

- Declarations from the packaging manufacturer and food producer, and also any supplier of material, that metal, PVC and PVCD and recycled plastic, as well as recycled pulp/paper/paperboard, are not included. Appendix 3 must be used.

Background to the requirement O2

The requirement of constituent materials is one of the most important in the criteria and is directed at biobased raw materials, which from an environmental viewpoint is one of the principal reasons for drawing up the criteria. According to the requirement, at least 90% of the constituent materials in the packaging must be made from biobased raw materials. In addition, maximum 10% of the product may consist of extrusion coating/lamination, adhesives and additives of non-renewable raw materials. Minerals such as the filler kaolin, calcium carbonate, chalk and silicates may be used in both paper and plastic material, and the volumes will vary. These are not included in the constituent materials. In O7 it is, however, required that the density in plastic does not exceed 1 g/cm³. More information on this can be found in the background text to this requirement. There is, however, a prohibition against using metal and recycled plastic, as well as recycled pulp/paper/paperboard in primary packaging. The requirement does not apply to threaded metallic seals or foil that can be removed completely at the opening of the packaging and sorted into metal recycling.

Biobased materials

Nordic Ecolabelling generally wishes to promote the use of biobased materials in these criteria. In terms of resources, it is advantageous to use renewable rather than fossil raw materials. This will help to reduce dependence on fossil raw materials and since the resource is biobased, it can be built up again. Biobased raw materials as such will not contribute to increased emissions of climate gases compared to fossil raw materials, since fossil raw materials are not part of the natural cycle. It is important, on the other hand, that biobased raw materials are used on a sustainable basis; see also the requirements in Chapter 7.4.

A high ratio of biobased material in packaging has certain consequences and, in the case of carton packaging, can limit the materials that can be included. A high ratio of biobased material would entail that primarily packaging made from biobased polymers and carton packaging with biobased laminates/stoppers could currently be the basis for an application for a Nordic Swan Ecolabelling licence.

Calculation of ratio of biobased material

The calculation of biobased material in packaging will vary depending on whether it is packaging made solely from plastic, such as a plastic bottle, or a component included in packaging, such as layers, or which belongs to packaging, such as a screw cap. Polymers that are biobased via mass balance cannot be approved in packaging that consists solely of plastic. The mass balance method means a mix of fossil and biobased raw materials in production, with mathematical allocation of the renewable raw material to the final polymer.

Nordic Ecolabelling considers it important to have full traceability for the biobased raw material in Nordic Swan Ecolabelled packaging. Requiring full traceability entails that the actual product will come to contain biobased raw materials. Nordic Ecolabelling takes a positive standpoint on biobased raw materials coming into the production flow and considers it important that Nordic Swan Ecolabelled packaging actually contains biobased raw materials, with regard to our credibility and communication with the world at large and with consumers. For biobased polymers in plastic packaging, it must be confirmed that there is full traceability, e.g. in the form of separate production lines or as batched production. Alternatively, an analysis of biobased content according to the method under the EN 16640: 201, EN 16785-1:2015 standards, or equivalent methods, can be enclosed.

For constituent components such as screw tops and layers in packaging, or for plastic which accounts for a small part of the packaging (below 10% by weight), the mass balance method can be used, provided that renewable raw materials are actually used in the production of polymer materials, and not as e.g. energy during production. This is in order to promote the market supply of biobased polymers. The mass balance system must be controlled with a certificate from an independent third party stating that biobased polymers are registered/booked for the production of polymer materials, and that, as a minimum, it is controlled that the volume of biobased raw materials purchased corresponds to the volume of polymer sold as biobased.

Metal

Metal may not be used in Nordic Swan Ecolabelled packaging. An example is aluminium which has the required barrier properties, in terms of the product's sustainability, in the packaging, but there are several environmental problems related to aluminium production, such as high energy consumption and emissions during production (see also section 6.2). From an environmental viewpoint it would be relevant that aluminium can be recycled, but the aluminium included as a barrier in multi-layer packaging is not recycled today, so it is not possible to set recycling requirements. Nordic Ecolabelling believes that the environmental impacts related to aluminium production are so extensive that aluminium is excluded from this first generation of the criteria. The requirement does not apply to threaded metallic seals or foil that thereafter consumer can remove completely at the opening of the packaging and sort into metal recycling. Possibilities to include metal shall be considered in the next generation of the Criteria. See also aluminium in chapter 6.2.

Recycled material

Nordic Ecolabelling is generally positive towards using recycled material. From a CO₂ perspective, there is an environmental benefit from working for packaging products made from recycled materials and which can also be part of existing recirculation systems. There are still risks concerning the use of recycled material in contact with food. Recycled material may contain contaminants¹¹⁶ which might possibly migrate to the food. It is not technically possible to test every batch of incoming recycled material, nor can all manufacturing batches of recycled material be tested.¹¹⁷ For recycled plastic to be used in contact with food, in

¹¹⁶ http://www.foodpackagingforum.org/fpf-2016/wp-content/uploads/2015/11/FPF_Dossier08_Plastic-recycling.pdf

¹¹⁷ Barthelemy E, Spyropoulos D, Milana MR, et al. 2014. Safety evaluation of mechanical recycling processes used to produce polyethylene terephthalate (PET) intended for food contact applications. Food Addit Contam A. 31:490

addition to current legislation¹¹⁸ the plastic recycling process must be approved by the European Food Safety Authority (EFSA).¹¹⁹ There are currently no approved recycling processes for plastic in the regulation.¹²⁰ Even though no such list has been created yet, there are products containing recycled plastic intended to come into contact with food on the market today.

For recycled paper and paperboard, there are no rules in European legislation similar to those for approval of plastic. For paper and paperboard, general regulations for material in contact with food, Regulation no. 1935/2004, must be complied with. The possible migration to food of mineral oils from printing ink originating from return fibre has been identified in the European Parliament's Resolution on the Implementation of the Food Contact Materials Regulation (EC) no. 1935/2004. Nordic Ecolabelling has decided that recycled material such as recycled PET will not be included in the first generation of the criteria. Nordic Ecolabelling believes that the use of recycled material must be promoted, but that it is more relevant to use these recycled materials for other products for which there is no risk of migration to food. The possibility of using recycled plastic must be reviewed in the next generation of the criteria. See also the 6.1 RPS section concerning the use of recycled material.

PVC and PVDC

PVC is sometimes used in labels and packaging. PVC and other halogenated plastics are excluded from Nordic Swan Ecolabelled products since they lead to adverse environmental impacts in waste handling and contain substances with adverse health effects. The most important problem areas for PVC and PVDC are described in Nordic Ecolabelling's background report for floors¹²¹. Here is a brief summary of the issues: The most important problem areas are waste handling, use of additives and dioxin emissions. According to the report "Hazardous substances in plastic materials" published by the Norwegian Environment Agency in 2013, PVC can be added to more than 50% of plasticisers, of which phthalates are still the most popular.¹²² PVC requires stabilisation in order to tolerate the temperature required for the production of a PVC product (extrusion, injection moulding, etc.). Stabilisers can be based on lead, metal compounds (such as barium-zinc and calcium-zinc), tin or cadmium. In modern production plant, the environmental impact is reduced, e.g. dioxin emissions from production. Dioxins can also be formed when waste is incinerated. Within the EU, the Waste Directive (91/689/EC) sets limits for emissions of dioxins from incineration plants. In overall terms, the environmental impacts related to the production, use and disposal of PVC are steadily diminishing, among other things due to new knowledge and the technological development. Yet there is every indication that there are still problems related to PVC, nor is there sufficiently adequate control of the PVC which is imported to the EU and the Nordic countries from other parts of the world that are not subject to the same European limitations. The use of PVC is therefore prohibited.

¹¹⁸ Recycled plastic must comply with Regulation no. 10/2011 on plastic materials and articles intended to come into contact with food and EU Regulation 282/2008 on recycled plastic materials and articles intended to come into contact with food.

<http://www.efsa.europa.eu/en/topics/topic/plastics-and-plastic-recycling>

¹²⁰ The Danish Veterinary and Food Administration's consultation response to generation 4 of criteria for Nordic Swan Ecolabelling of disposables for food.

¹²¹ Nordic Ecolabelling. About Nordic Swan Ecolabelled floors, Version 6.0. Background to ecolabelling, 18 November 2014. <http://www.svanemarket.no/for-bedrifter/sok-om-svanemarket/svanens-krav/byggevarer-og-hus/gulv/> (accessed 3.10 2016)

¹²² Norwegian Environment Agency, Hazardous substances in plastic materials, Cowi, January 2013

O3 Material in contact with food

Besides material in contact with food being required to fulfil current legislation* and plastic packaging and elements of plastic being required to comply with EU Regulations**, pulp, paper and paperboard in packaging must also comply with one of the following recommendations:

- BfR's recommendation XXXVI. Paper and board for food contact, July 2015 or more recent versions, or
- CEPI's Industry guideline for the Compliance of Paper & Board materials and articles for food contact, published on 2 September 2012, or more recent versions.

* *EU Regulation 1935/2004 with related amendments on materials and articles intended to come into contact with food, and EU Regulation 2023/2006 on good manufacturing practice for materials and articles intended to come into contact with food.*

** *EU Regulation 10/2011 with related amendments on plastic materials and articles intended to come into contact with food.*

- Producer must enclose copies of certificates, declarations or analysis results showing that material in contact with food fulfils legislation and, for paper products, one of the aforementioned recommendations.

Background to the requirement O3

Regulation 1935/2004/EC and Directive 2002/72/EC are official requirements to be fulfilled by all packaging. For cardboard or paper products no statutory requirements are made, other than general legislation (Regulation 1935/2004). None of the Nordic countries have any special requirements of these materials,¹²³ and it is therefore necessary for BfR's recommendations or CEPI's industry guide to be followed in order to give further reassurance that the product is safe to use. In these recommendations, limitations are e.g. set concerning the amounts used of certain chemical substances in the manufacturing process, prohibition of certain azo dyes, and threshold values for the heavy metals lead and cadmium in paperboard. These are requirements and guidelines that are approved in the industry, at least in the Nordic region. Legality and thereby the requirement must be documented by the party manufacturing the end-product (the food and its packaging). But the requirement applies to all material that is in contact with food and the packaging manufacturer/raw materials producer is responsible for and delivers documentation for the manufacturer of the end-product.

O4 Testing of migrates

Migration from finished primary packaging shall not exceed 10 µg/kg (10 ppb) per migrating substance.

Primary packaging must be tested with regard to the toxicity of its overall migrate i.e. all substances that migrate (or are extractable) from the finished article using different solvents depending on the intended use.

Testmethod in accordance with the Food Additives & Contaminants testing method: Part A 33 (6) or similar.

- Test result from an independent third party in accordance with the method described in the requirement.

¹²³ European Commission, Summary of the national legislation, Sanco
E6/MS(28/09/2010):http://ec.europa.eu/food/food/chemicalsafety/foodcontact/documents_en.htm

Background to the requirement O4

Nordic Ecolabelling's requirements of chemicals (chapter 7.5) comprise constituent substances in chemical products, but contaminants such as reagents, including monomers and by-products, are not counted as constituent substances in concentrations below ≤ 100.0 ppm and are thereby exempt from the requirement. Substances which migrate easily are usually low-molecular and volatile, e.g. additives such as antioxidants, non-intentionally added substances (NIAS) or residual monomers from production. Non-intentionally added substances (NIAS) are chemical compounds that are not added intentionally during the manufacturing process, but which may occur in material in contact with food. Awareness of such substances has increased in recent years due to the increased sensitivity of the chemical analyses. NIAS may originate from various sources and include degradation products from materials in contact with food and contamination with adverse products from the original material.¹²⁴ These can migrate to food and consumers can thereby probably be exposed to these chemicals. Nordic Ecolabelling therefore sets the requirement that the primary packaging shall be tested by an independent third party for the toxicity of the overall migrating substances, i.e. all substances which migrate from the packaging with the help of various solvents (aqueous, acid, fatty), depending on the intended use.¹²⁵ The testing is based on the recommendation which Nordic Ecolabelling has received in consultation of Nordic Ecolabelling Criteria for the Disposables for Food.¹²⁶

Migration from the primary packaging may not exceed 10 $\mu\text{g}/\text{kg}$ (10 ppb) per substance. In principle, NIAS is included in Regulations EC 1935/2004 and EC 10/2011, while NIAS is not listed in the plastic regulation. There are currently no threshold values either for migration or exposure, in any regulations. In practice, test laboratories often recommend a threshold value of 10 $\mu\text{g}/\text{kg}$ (10 ppb) in food, on which Nordic Ecolabelling's threshold value is also based. The level is actually defined in Regulation EC 10/2011 for migration through a functional barrier for the substances which are added intentionally, but are not listed in the Regulation.

O5 Packaging design

1. A packaging manufacturer must have procedures for the design phase of the primary packaging for ensuring that primary packaging is
 - resource-efficient from a materials viewpoint;
 - optimised from a transport viewpoint, e.g. that the packaging's structure, and the quality and amount of materials, are matched to the relevant pressures during transport, warehousing and distribution, in order to avoid crushing/loss and that air is not transported unnecessarily;
 - easy to open, reclose and empty; and
 - easy to recycle and reuse.

The packaging manufacturer must also have procedures for dialogue with customers regarding recommendation for secondary and tertiary packaging that are adapted to the primary packaging.

2. Packaging manufacturers shall have procedures showing how they work with strategic goals to reduce environmental impact in the production of packaging (e.g. mapping of energy efficiency measures, dialogue with subcontractors to reduce environmental impact in raw material production.)

¹²⁴ http://www.foodpackagingforum.org/fpf-2016/wp-content/uploads/2015/11/FPF_Dossier03_NIAS.pdf

¹²⁵ <http://www.tandfonline.com/doi/full/10.1080/19440049.2016.1184941>

¹²⁶ Food packaging Forum Foundation. Consultation - proposal on revised criteria for Nordic Swan Ecolabelling of disposables for food Comments, 2 February 2017.

The goals shall be quantitative and time-based and they shall be determined by the management.

- ☒ Enclose procedures for the design of primary packaging and for the dialog with customers, showing fulfilment of the requirement.
- ☒ Enclose procedures for policy or equivalent documentation of the manufacturer's work with environmental goals, showing fulfilment of the requirement.

Background to the requirement O5

Packaging design is the art of packaging the product as well as possible and at all stages, and effectively using the production equipment, transport and warehousing resources, as well as sales in the shops.

Design must also promote packaging that is optimised from an environmental viewpoint. It is difficult for Nordic Ecolabelling to set direct requirements on e.g. transport from an environmental point of view but Nordic Ecolabelling can work indirectly to promote these design adjustments. Requirement O5 is created for the design of packaging from an environmental viewpoint. The packaging manufacturer must have procedures to ensure that environmental issues are taken into account in the packaging design. By requiring the packaging manufacturer shall have procedures, wishes Nordic Ecolabelling to promote packaging that is focused on sustainability throughout the distribution chain. For example, Nordic Ecolabelling will promote packaging with optimised volume, air and packaging material with regard to primary, secondary and tertiary packaging during transport. From an environmental viewpoint, transport generally play a smaller role in packaging's life cycle, and Nordic Ecolabelling has very low steerability to set requirements of transport. Yet there are opportunities to set indirect requirements of transport contractors by focusing on the packaging design. The same applies to recycling of packaging or reuse of e.g. secondary and/or tertiary packaging by the producer. It is important that material for recirculation is not from the outset designed so as to limit opportunities to recycle the material. The EU's action plan for the circular economy also discusses product design. Manufacturers, users and recyclers do not necessarily share the same interests and packaging designers do not always seem to know how materials and, most of all, the composition of the various materials, function technically in the recycling phase. The new German packaging act, approved in May 2017, encourages packaging manufacturers to include recycling aspects in packaging design.¹²⁷

According to the requirement, the packaging manufacturer must also have procedures for dialogue with customers regarding recommendation for secondary and tertiary packaging that are adapted to the primary packaging. The packaging system is the product and various levels of packaging, i.e. primary, secondary and tertiary packaging.¹²⁸ The packaging levels are interrelated and influence each other so that a change at one level has an impact on the others. As an example, reducing e.g. the volume of materials at one packaging level can lead to an increase in material volumes at another stage. It is therefore important to adjust the packaging system. Packaging manufacturers do not have the controllability of secondary and tertiary packaging used by the food producer. However, they can provide a recommendation for environmentally-friendly packaging and therefore the packaging manufacturers shall have

¹²⁷ <http://www.bmub.bund.de/pressemitteilung/neues-verpackungsgesetz-passiert-den-bundesrat/>

¹²⁸ Daniel Hellström och Annika Olsson; Managing packaging design for sustainable development - a compass for strategic directions, first edition, John Wiley and Sons Ltd. 2017.

procedures for this. See also further secondary and tertiary packaging in section 7.8 Areas that are not subject to requirements.

It is also required that packaging manufacturers have routines for working with strategic goals to reduce environmental impact in their packaging production. This may be in the form of e.g. mapping of energy efficiency measures or dialogue with subcontractors to reduce environmental impact in raw material production. Then there will be concrete environmental work in the company that can be documented and lead to real environmental gains.

O6 Recycling of primary packaging

It must be possible to recycle primary packaging in today's existing recirculation systems in the Nordic countries.

Incineration with energy recovery is not considered to be material recovery.

Example of polymers/plastic from which materials cannot be recycled include biodegradable/compostable plastics such as PLA.

- Documentation showing which material the packaging is made from, see O1.

O7 Plastic packaging with recycling design

For packaging which solely consists of plastic the following applies:

Filler

Filler such as CaCO₃ shall not be added to plastic packaging in a concentration so that the plastic's density exceeds 1 g/cm³.

Dyes

Plastic bottles and closing devices, such as stoppers, shall not be dyed black.

Dyes that are used must fulfil requirements O19-O22.

Label/scanning plastic size

Labels/scanning plastic shall not cover more than 60% of the packaging surface. The requirement does not apply if the same material is used in the scanning plastic/label as in the packaging.

Adhesives for labels

Adhesive used to attach labels to packaging must be hot-melt adhesive (melts at 60 to 80°C) or water-soluble and alkaline.

- Enclose information on the type of mineral in the plastic and a calculation showing that the density measurement is not exceeded.
- Packaging specification (including labels and stoppers) or declaration showing which plastic is used, information on dyeing and the size of the label in relation to the packaging.
- Documentation (e.g. as a safety data sheet) of the adhesive showing that the it is hot-melt adhesive or water-soluble and alkaline.

O8 Information to consumers

Packaging must be clearly marked with indicative information on how it is to be sorted. The information must be clearly visible to the end-consumer and be of such a nature that the consumer understands what is meant. Labelling can be in the form of symbols/pictograms* or text, e.g. "Paper packaging" or "Plastic packaging". Labelling can be embossed, stamped or printed.

** Symbols are e.g. the labels advocated by the Green Dot, FTI or Rinki. General symbols such as recycling symbols or general text can also be used, but must first be approved by Nordic Ecolabelling. Note, however that, the Green Dot label will not be approved as a general symbol.*

- ☒ Enclose documentation such as a picture of the embossing, label, artwork or equivalent, to document fulfilment of the requirement.

Background to the requirements O6-O8

The waste phase plays an important role in the packaging's life cycle and it is therefore relevant for Nordic Ecolabelling to set requirements for this. There is potential to increase the recycling ratio in the Nordic countries, but the steerability of direct requirements of the waste phase is generally considered to be rather low. The waste phase is influenced by many factors, such as sorting opportunities in each country or municipality, and how the consumer ultimately sorts waste. Nordic Ecolabelling can, however, generally work for the recycling of packaging and set requirements intended to support this process. Therefore, sets the requirement for material recycling of primary packaging (O6). Nordic Swan Ecolabelled packaging which solely consists of plastic is now subject to further requirements to facilitate the recycling of materials in the final phase of the packaging's life cycle (O7). In addition to this, the Nordic Ecolabelling can work to increase recovery rates by attempting to stimulate that food packaging actually are recycled (Requirement for Information to consumers O8). Food packaging is valuable in the recycling process since food packaging comprises a high ratio of virgin material. The statutory requirements of material in contact with food are furthermore stringent with regard to chemicals, which should also be an advantage from a recycling perspective. The Nordic Council of Ministers' report "Climate benefits of material recycling"¹²⁹ shows that there are climate-related benefits from recycling plastic, since emissions from secondary production are lower for all types of material. It is thus highly relevant to set requirements which promote the recycling of packaging in this product group.

Recycling of primary packaging

According to requirement O6, it must be possible to recycle materials from primary packaging in today's existing recirculation systems in the Nordic countries.

Yet there is potential to increase the recycling ratio in the Nordic countries. Compared to bottles in the deposit system, the recycling ratio for plastic bottles and beverage cartons outside the deposit system is lower.^{130 131 132} For beverage cartons, the highest recycling ratio is achieved in Norway (60%). whereas in the EU, the recycling rate of beverage cartons was 47% in 2016.¹³³ For plastic bottles in the Nordic region (under 40%) the recycling rate is lower. Nordic Ecolabelling will therefore promote packaging that can be material recycled in existing Nordic recycling systems. In addition, the waste phase is influenced by many factors, such as sorting opportunities in each country or municipality, and how the consumer ultimately sorts waste, which also affects the steerability of the recycling requirement. In Sweden, Finland and Norway the producer is responsible for packaging.^{134 135 136} A party that puts packaging on the market also has a responsibility to handle the packaging after use. The organisation structure of collection and recycling varies between countries. For example, by joining Förpacknings-

¹²⁹ Nordic Council of Ministers, Tema Nord 2015:547, Climate benefits of material recycling – Inventory of Average Greenhouse Emissions for Denmark, Norway and Sweden, p. 74

¹³⁰ <https://www.grontpunkt.no/gjenvinning> (accessed 2017-06-30)

¹³¹ <http://assets.tetrapak.com/static/se/documents/sustainability-downloads/lca%20nordic%20final%20report.pdf>

¹³² <http://ftiab.se/180.html> (accessed 2017-06-30)

¹³³ <http://www.ace.be/mediaroom/90/50/Beverage-carton-recycling-on-the-rise-in-Europe> (hämtat 2017-09-28)

¹³⁴ <http://www.ftiab.se/148.html>, accessed 2017-05-31

¹³⁵ <http://rinkiin.fi/var-verksamhet/> accessed 2017-05-31

¹³⁶ <https://www.grontpunkt.no/> accessed 2017-05-31

och Tidningsinsamlingen (FTI) in Sweden, or Rinki in Finland, these organisations, as commissioned by producers, can handle the packaging delivered by households for recycling. In Denmark, packaging waste is defined as household waste in the individual municipalities' regulations. This entails that recycling opportunities can vary across the different municipalities.¹³⁷

Since Nordic Ecolabelling wishes to promote the development of materials recycling processes, incineration with energy recovery is not deemed to be recycling in these criteria. By setting requirements of the recycling of plastic, there is an indirect prohibition of polymers/plastics that cannot be recycled. An example of this is degradable/compostable plastics such as PLA. Compostable/degradable plastics such as PLA cannot be recycled in today's systems, and can also present problems for the existing recycling of materials. Composting and biogas facilities do not wish to have these plastics either, as they create problems in the facilities. Any other material than organic waste is discarded before the composting or biogas process. These compostable/degradable plastics therefore do not match the EU's objective of increased recycling of materials and the circular economy. The requirement that packaging should be recyclable material applies to the main material in packaging, and thereby packaging which solely comprises plastic cannot consist of compostable/degradable plastic. On the other hand, compostable/degradable plastics can be used as laminate, coating, etc. in e.g. paperboard products. In such cases the plastic will still be sorted and sent for incineration, as the situation is today. Nordic Ecolabelling wishes to point out that this requirement can be adjusted if, in the future, a recirculation system is created for compostable/degradable plastics.

Plastic packaging with recycling design

Nordic Ecolabelling wishes to facilitate that the products gradually added to the material recycling system are of the highest possible quality and purity. Therefore, a requirement for the design the plastic packaging is applied. A folder from the Swedish materials association Plastkretsen, together with Förpacknings- och Tidningsinsamlingen (FTI)¹³⁸, also draws attention to the fact that dyes and printing ink affect recycling potential and the quality of the recycled plastic. Reduced use of chemical dyes is therefore an obvious recommendation. In particular, strong, solid dyes with carbon black pigment can create problems in modern automatic sorting facilities, since the NIR technology cannot identify the material. These products can therefore end up in the residual fraction, so that they are not recycled. Therefore, it is also required that plastic packaging which solely consists of plastic may not be dyed black. The requirement also applies to closing devices, e.g. stoppers. Undyed plastic has the highest recycling value and is therefore easier to recycle. To ensure that the requirement does not have an excessively stringent impact in this generation of the criteria, plastic packaging may be dyed, but not in a black colour. The dyes that may be included must fulfil requirements O19–O22. From a recycling viewpoint, requirements are also made of the adhesives used to adhere labels. One item of advice from Plastkretsen and FTI is to use as little adhesive as possible and that the label glue should be soluble in water at 60–80°C, and alternatively be an alkaline-soluble hot-melt adhesive. This is to make it easier to remove the label.

¹³⁷ <http://mst.dk/virkksomhed-myndighed/affald/affaldsfraktioner/förpackning/kommunernes-indsamling-af-förpackningaffald/> accessed 2016-12-20

¹³⁸ Plastkretsen and Förpacknings och tidningsinsamlingen, Bättre förutsättningar för återvinning av plastförpackningar (Better conditions for the recycling of plastic packaging)

The materials commonly used for labels are PP, PE, PET and paper. When plastic packaging is sorted using IR, the detector can only separate one plastic material at a time. If plastic packaging carries a label of another type of plastic, this impedes sorting. Nordic Ecolabelling therefore requires that any label/scanning plastic covers maximum 60% of the packaging's surface. If the same material is used for the label/scanning plastic as for the packaging, this requirement can be disregarded.

The requirement is also made that the density of the plastic may not exceed 1 g/cm³. Inorganic filler such as calcium carbonate is an additive commonly used in many types of plastic. Excessive amounts of inorganic filler make the plastic difficult to recycle since it becomes too heavy and sinks to the bottom of the recycling facility, and thereby ends up in the fraction sent for incineration. Since the criteria are to promote the recycling of materials, the addition of excessive amounts of inorganic filler is problematic for plastic. The density of 1 g/cm³ is based on FTI's guidelines for the recycling of plastic packaging.¹³⁹ This means that inorganic additives may be included, but the volume is limited from a recycling viewpoint.

Information to consumers

The waste phase of packaging's life cycle is affected by many factors such as the how consumers sort the packaging in the final phase. Studies show that households do not generally have any objections to sorting their waste.¹⁴⁰ But households do often lack clearer information on how to sort packaging at source.¹⁴¹ This information breach can be decisive for the motivation to sort waste. Requirements are therefore set in the criteria for how packaging should display the information that the packaging is to be recycled. The requirement is also in line with Article 4 of the European Waste Directive 2008/98/EC concerning the waste hierarchy, of which the first section considers a prioritisation scheme for preventive measures, preparation for reuse and recycling of materials.

It is important that the labelling is clearly visible and of such a nature that it can be understood by the consumer. It is stated that this is possible using symbols/pictograms such as those recommended by the Green Dot, FTI or Rinki. If the same product is sold in several Nordic countries, the labelling may be identical, even if the recommended symbols can vary across national borders. It is also possible to use text labels. General recirculation symbols can also be used, such as three arrows in a circle, or general text such as "recirculate me". In such case this must be specifically approved by Nordic Ecolabelling. It must be emphasised that the label or text used is of such a nature that it is easy for an ordinary consumer to understand what it means, as the intention of the requirement is to increase the sorting of products and increase opportunities for the product materials to be recycled. The Green Dot label will not be approved as a sorting symbol since this is only a receipt label showing that remuneration has been paid for the packaging.

7.4 Requirements of constituent substances

Pulp, paper and paperboard

The requirements of pulp, paper and board included in packaging are specified below. General requirements of the manufacture of pulp and paper can be found in Nordic Ecolabelling's modular system for paper products, to which the following requirements refer:

¹³⁹ Förpacknings och tidningsinsamlingen, 2017. Plastic packaging, a recycling manual from FTI, version 0,7.

¹⁴⁰ <http://norden.diva-portal.org/smash/get/diva2:788195/FULLTEXT03.pdf>

¹⁴¹ IVL Swedish Environmental Research Institute, Kunskapsunderlag för ökad kälsortering av plastförpackningar (Knowledge basis for increased sorting at source of plastic packaging)

- Basic Module for Nordic Swan Ecolabelling of Paper products, version 2 or later.
- Chemical Module for Nordic Swan Ecolabelling of Paper Products, version 2 or later.

In addition to the existing criteria for paper products specified above, other paper, board and cardboard types may be included in packaging, and which are not subject to the aforementioned criteria. These are subject to their own specific requirements of energy and emissions to air and water. These are specified as separate reference values in O10 below.

In addition to the following requirements, requirement O22, in section 7.5, Requirements of Chemical Products on Conversion, still applies to pulp, paper and paperboard.

Pulp and paper manufacturers must document the requirement in the web-based application guide, My Swan Account. <http://www.nordic-ecolabel.org/portals/paper/my-swan-account1/> My Swan Account can be accessed via the Internet addresses on page 2 of this document, or via <http://www.nordic-ecolabel.org/portals/paper/my-swan-account1/> <http://www.nordic-ecolabel.org/portals/paper/my-swan-account1/>

O9 Pulp

Pulp has to meet all the relevant requirements in the Basic Module for Paper Products, version 2 or later.

Documentation of the requirements must be done in the application tool My Swan Account (MSA). Please contact Nordic Ecolabelling for username and password.

- The pulp manufacturer must show that the requirements are fulfilled with completed forms in MSA.

O10 Paper and paperboard

Paper and paperboard covered by the Basic Module for Paper Products

Paper and board that is covered by the Basic Module for the “Nordic Swan Ecolabelling of Paper Products” version 2 or later must meet all the requirements in the Basic Module and the Chemicals Module for Paper Products, version 2 or later with the exception of R7 Fiber raw materials and R11 Transport in the Basic Module. There is an own requirement for fiber raw material in this criteria document, see O11.

If the paper or board already carries the Nordic Swan Ecolabel, or has been checked by Nordic Ecolabelling the requirement is considered to be fulfilled, except for fiber raw materials, which shall be documented according to requirement O11 below. State the licence certificate or information on the trading name and the manufacturer of the assessed material.

Paper and paperboard not covered by the Basic Module

Paper and board that are not covered by the Basic Module for the Nordic Swan Ecolabelling of Paper Products version 2 or later must meet all the relevant requirements in the Basic Module and the Chemicals Module for Paper Products, version 2 or later, with the exception of R7 Fiber raw materials and R11 Transport in the Basic Module. There is an own requirement for fiber raw material in this criteria document, see O11.

For energy and emissions to air and water, the reference values and requirement limits for the paper machine apply, as stated below or those given in the Criteria for Disposables in contact with food, version 4 or later. The calculation methods used in the Basic Module for Paper Products, version 2, are to be used.

Table 2. Reference values for energy

	Energy – reference values (kWh/tonne board)	
	Fuel	Electricity
Liquid packaging board	1700	800

Table 3. Reference values for COD, P, S and NOx

	Reference values (kg/tonne board)			
	COD	P	S	NOx
Liquid packaging board	2	0.01	0.15	0.7

An application for approval of pulp, paper and board is to be made via the electronic application tool My Swan Account (MSA). Contact Nordic Ecolabelling for a user name and password.

- The manufacturer must show that the requirements are fulfilled with completed forms in MSA.

Background to the requirements O9-O10

For paperboard-based products, primarily four areas are of greatest significance on assessing the product's environmental impact. The first is forestry, and the others are related to chemicals use, emissions to air and water, and energy consumption for production of pulp and paperboard. These environmental impacts are described exhaustively in the background document for paper modules – the Basic Module.¹⁴²

Nordic Ecolabelling has longstanding experience with requirements of pulp and paper products. General requirements of pulp and paper manufacture can be found in Nordic Ecolabelling, Basic Module for Paper Products, version 2. Since in overall terms paper, cartonboard and pulp in packaging resemble other paper and pulp types included in the Basic Module, the packaging of paper or cartonboard must also comply with these requirements in the Basic Module. Reference is made to all relevant requirements in the Basic Module, but with the exception of the requirement of CO₂ emissions from transport and requirement for the certified fibre raw material (O11). New reference values and requirement limits are also introduced for energy and emissions for the liquid packaging board that is not included in the Basic Module today. The proposed new reference values are based on contact with the industry. It is also pointed out that recycled pulp/paper/paperboard is prohibited in O2.

O11 Fiber raw material

1. Tree species listed on Nordic Ecolabelling's list of prohibited tree species* must not be used in pulp/board.
**The list of prohibited tree species is located on the website: www.nordic-ecolabel.org/wood/*
2. The pulp producer must state the name (species name) of the wood raw material used in the production of pulp.

¹⁴² Nordic Ecolabelling. Background to Nordic Swan Ecolabelling of Paper Products - Basic Module and Chemical Module, version 2. 22 June 2011.

3. The pulp,- and paper/board producer must be Chain of Custody certified in accordance to FSC or PEFC.

4. Certification.

Paper/board: yearly/the latest 12 months, a minimum of 70% of the wood raw material that are used in the paper/board must origin from forestry certified under the FSC or PEFC schemes. The remaining proportion of wood raw material must be covered by the FSC/PEFC control schemes (FSC controlled wood/PEFC controlled sources).

Pulp: If the pulp is used directly in the finished packaging, for instance as pressed pulp, yearly/the latest 12 months, a minimum of 70% of the wood raw material in the pulp must origin from forestry certified under the FSC or PEFC schemes. The remaining proportion of wood raw material must be covered by the FSC/PEFC control schemes (FSC controlled wood/PEFC controlled sources).

- Declaration from the pulp producer that the requirement to tree species not permitted to be used are met. Appendix 4 may be used.
- Name (species name) of the wood raw materials used in the pulp production. Appendix 4 can be used.
- A valid FSC/PEFC Chain of Custody certificate from the pulp,- and paper/paperboard producer covering all the wood raw materials in the pulp/paper/paperboard.
- Certification pulp/paper/paperboard: The producer of the packaging shall document, for instance based on invoice or delivery note, that the requirement of minimum 70% certified pulp/paper/paperboard are purchased on a yearly basis.

Background to the requirement O11

There is an own requirement to wood raw materials in pulp/paper/paperboard/ in this criteria document instead of referring to the Basic Module as before. This is due to the new forestry requirement approved by Nordic Ecolabelling after the approval of the Basic Module and in all new and revised criteria documents it is the new forestry requirement that should apply. The formulation of the requirement is based on the requirement as formulated in appendix 1E in the Basic Module. However, the formulations are adjusted to be suitable for carton packaging.

Nordic Ecolabelling wants to contribute to sustainable forestry (ecologically, economically and socially). From a life cycle perspective, forestry is an important part of a wood-based product's environmental impact. Nordic Ecolabelling's forest requirement focuses on sustainable forestry and traceability of wood raw materials. Sustainably managed forests deliver a whole host of benefits to society in the form of wood for materials and energy, protection against global warming, a place to live and thrive for local communities and indigenous peoples, preservation of biodiversity, and protection of water and soil against pollution, erosion and so on. By setting a requirement that wood raw materials must come from certified forestry, Nordic Ecolabelling supports the trend towards more sustainable forestry. There is now also a ban on the use of the tree species listed at: www.nordic-ecolabelling.org/wood/.

The criteria on which the list is based are:

- IUCN's red list of species categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) and relevant wood species that are Near Threatened (NT).

- CITES, lists I, II and III.

- Non-sustainable forestry, such as logging from high conservation value forest (HCVF), intact forest landscapes (IFL) and areas in countries/regions with high levels of corruption.

There is also a requirement that the pulp/paper/board producer are Chain of Custody (CoC) certified in line with FSC/PEFC's schemes. The requirement for Chain of Custody certification contributes to traceability in the supply chain within the FSC and PEFCs guidance and control systems for traceability. The company's Chain of Custody certification proves how certified wood is kept separate from not certified wood in the production, administration and warehousing and is checked annually by independent certification bodies. The certification limit of 70% is based on the situation and availability of certified material in the market. See also Nordic Ecolabelling's background document for the Basic Module for Paper Products.

O12 Optical brighteners and anti-bacterial agents

Optical brighteners shall not be added in paper and paperboard.

Chemicals intended to provide antibacterial properties may not be added.

An antibacterial chemical is a chemical which prevents or stops the growth of microorganisms such as bacteria, mould or protozoa (unicellular organisms). Silver compounds, nano silver and nano gold are considered to be antibacterial substances.

Declaration from the pulp/paperboard manufacturer stating that the requirement is fulfilled.

Background to the requirement O12

The prohibition of optical brighteners is set to limit the use of chemicals that can lead to health and environmental problems. Optical brighteners are prohibited in the paper criteria from Blaue Engel, and in the background document to the EU's document for public procurement of paper (GPP for Copying and graphic paper)¹⁴³ the grounds for the prohibition are stated to be that optical brighteners can give allergies, are toxic and are poorly degradable in aquatic environments. In the German BfR regulations, the use of optical brighteners such as sulphonated stilbene derivatives is approved at up to 0.3 % in paper in contact with food, but it must be possible to prove that they are not transferred to food.¹⁴⁴ Nordic Ecolabelling does not know that optical brighteners are used in the production of liquid packaging board today but has chosen to go further than BfR regulations and introduce a prohibition.

Antibacterial substances are a type of biocide. A substance with an antibacterial effect is defined as "An antibacterial chemical that impedes or stops the growth of microorganisms such as bacteria, fungi or protozoa (unicellular organisms)". Silver compounds, nano silver and nano gold are considered to be antibacterial substances.

Antibacterial substances are biologically active and often harmful to the environment. There is a significant concern that the increased use of these substances can increase bacteria's

¹⁴³ EU GPP criteria (2008) Copying and graphic paper: Technical background report. Available at: http://ec.europa.eu/environment/gpp/pdf/toolkit/paper_GPP_background_report.pdf (accessed 21.05.2013)

¹⁴⁴ Database BfR Recommendations on Food Contact Materials (2012) Federal Institute for Risk Assessment in Germany. Available at: http://www.bfr.bund.de/en/database_bfr_recommendations_on_food_contact_materials_formerly_plastics_recommendations_-1711.html (accessed 21.05.2013)

resistance to antibiotics.¹⁴⁵ Both nano silver and silver ions affect aquatic organisms. One problem is also that silver particles can reduce the effectiveness of water treatment plants. Silver can also continue into the aquatic environment and cause damage there. Nordic Ecolabelling has therefore introduced a requirement to prohibit chemicals added in order to achieve an antibacterial effect. Nordic Ecolabelling is not aware of antibacterial chemicals being used in food packaging in the Nordic markets, but there is carton packaging in e.g. other continents where nano silver may be added in order to extend the shelf-life of food.

O13 Coatings and impregnations

Chromium compounds and fluorinated compounds must not be ingoing substances in the chemicals used for coating/impregnating/mixing into the pulp/paper/board/.

The following requirements apply to the silicone treatment of packaging or parts thereof:

- Solvent-based silicone coatings must not be used.
- Octamethylcyclotetrasiloxane, D4 (CAS 556-67-2) and decamethylcyclopentasiloxane, D5 (CAS 541-02-6) must not be present in the chemical products used for silicone treatment. The requirement does not apply to D4 and D5 contained as impurities*
- Organotin catalysts must not be used in the production of the silicone polymer.

** Impurity refers to residues from primary production which may be found in the commercial product at concentrations below 800 ppm (0.08% by weight, 800 mg/kg). Finished commercial product refers to the silicone emulsion's coating bath.*

- Declaration from the chemical supplier that chromium or fluorinated compounds are not ingoing substances in the coating/impregnation chemicals. Appendix 5 may be used. Safety data sheet for the product.
- Declaration from the manufacturer of the pulp/paper/paperboard that no chromium or fluorinated compounds were added in the production of the pulp or paper/paperboard.
- Declaration from the chemical supplier that octamethylcyclotetrasiloxane, D4, and/or decamethylcyclopentasiloxane, D5, are not present in the chemical products used for silicone treatment in concentrations above 800 ppm. State the amount of D4 and D5. Appendix 5 may be used.

Background to the requirement O13

The requirement originates from Nordic Ecolabelling's Criteria for Grease-Proof Paper. Here, the requirement is made that chromium or fluorine compounds may not be included in chemical products used for the coating/impregnation of packaging. For silicone treatment, solvent-based coatings/finishing may not be used and organotin catalysts are prohibited in the production of silicone polymers. The limit for pollutants (D4 and D5) is 800 ppm, based on experience of what it is possible for the industry to fulfil today.

Chromium coatings are no longer used in Europe, but it cannot be ruled out that they might be used in other places around the world. Chromium compounds are not readily degradable and can accumulate in organisms to varying degrees. Hexavalent chromium compounds are classified as very toxic to aquatic organisms. Trivalent chromium compounds are generally

¹⁴⁵ Forbrugerkemi (2010) "Nanosølv bekymrer i Tyskland" (Nano silver raises concerns in Germany). Available at: <http://www.forbrugerkemi.dk/nyheder/nanoteknologi/nanosolv-bekymrer-i-tyskland/?searchterm=nanosolv> (accessed 21.05.2013)

somewhat less toxic, although certain species can be particularly sensitive to these. The emission of chromium to the waste system from factories or factory wastewater should thus be avoided.

The requirement that coating/impregnation chemicals/chemicals added to pulp must not contain fluorinated compounds has been set in order to prevent the dispersal of fluorinated compounds such as PFAS (perfluoroalkyl sulphonates) in the environment.¹⁴⁶ PFAS is an umbrella term for various types of fluorinated compounds that are persistent and tend to bioaccumulate. PFOS (perfluorooctane sulphonate) and PFOA (perfluorooctanoic acid) are the two fluorinated compounds about which most is currently known. Both of these have serious effects on health and the environment. Long-chain perfluorocarboxylic acids (C9-PFCA – C14-PFCA) are another type of fluorinated substance that is also persistent, with high potential for bioaccumulation. There is less knowledge about short-chain perfluorinated compounds, but a new literature review published in 2015 by the Danish Ministry of the Environment shows that some short-chain PFAS may be just as harmful as the long-chain compounds they replace.¹⁴⁷ The study shows that the new substances have the potential to accumulate in nature, and since they have to be used in higher concentrations to achieve the same effect, the conclusion is that they are not a good enough alternative to the substances that have been partially phased out. Studies show that fluorinated coatings are used in food packaging and that various fluorinated compounds can migrate from paper and paperboard in contact with food.^{148,149} ¹⁵⁰ The authorities in many countries have developed a strong focus on the use and occurrence of fluorinated substances in products and the environment. Previously, fluorinated compounds were mainly used as a coating to make the product waterproof, but since the price of chemicals has dropped, fluorinated compounds have also been added to the paper pulp, with the result that the paper may contain up to 10 times more fluorinated compounds than if it was just coated.¹⁵¹ It should be noted that this requirement applies to the addition of fluorine. Wood contains natural fluorine, and fluorinated compounds may therefore be found in products made from wood, even if no fluorine is added in the production process or as a coating¹⁵².

Siloxanes are not readily degradable and therefore have the capacity to accumulate in the environment. Siloxanes are volatile and can become easily enriched in sludge from wastewater. Cyclic siloxanes are a group of compounds that the authorities have long had in their sights. Of the cyclic siloxanes, there has been a particular focus on octamethylcyclotetrasiloxane (D4) and decamethylcyclotetrasiloxane (D5), and D5 is on the priority list of the Norwegian authorities, for example¹⁵³. The requirement therefore limits the

¹⁴⁶ Miljøstatus i Norge: <http://www.miljostatus.no/Tema/Kjemikalier/Noen-farlige-kjemikalier/PFOS-PFOA-og-andre-PFCs/>, (accessed 22.10.2015)

¹⁴⁷ Danish Ministry of the Environment, 2015: Short-chain polyfluoroalkyl substances (PFAS), A literature review of information on human health effects and environmental fate and effect aspects of short-chain PFAS, Environmental project No. 1707, 2015

¹⁴⁸ Trier X. et al, 2011: Polyfluorinated surfactants (PFS) in paper and board coatings for food packaging, Environ Sci Pollut Res Int. 2011 Aug;18(7):1108-20

¹⁴⁹ Tænk (2012) Muffinsformer, Denmark. Tænk des/2013: 8–11.

¹⁵⁰ The Danish Veterinary and Food Administration 2012, Migration af fluorerede stoffer fra fødevarekontaktmaterialer af pap og papir, J. nr.: 2010-20-793-00107

¹⁵¹ Background document to the Criteria for the Nordic Swan Ecolabelling of Grease-proof Paper, version 4, November 2014

¹⁵²

<https://www.foedevarestyrelsen.dk/SiteCollectionDocuments/Kemi%20og%20foedevarekvalitet/FKM/Fakta%20ark%20fluorerede%20stoffer.pdf> (accessed 25.10.2016)

¹⁵³ <http://www.miljostatus.no/prioritetslisten> (accessed 05.10.2016)

use of these two siloxanes, but permits silicone coatings. See also the background document for Grease-proof Paper for more information on the silicone requirement.

Polymers

The requirements in this section concern the production of biobased and fossil polymers, unless otherwise specified in the requirement. "Pure plastic packaging" is packaging of which the primary material is biobased polymers, e.g. bottles made from bio-PE. Biobased polymers are plastic that is fully or partly based on biomass. The definitions of biobased and biobased polymer/plastic are based on the definitions in the European EN 16575:2014 standard.¹⁵⁴

O14 Agricultural raw materials including palm oil, soy and sugar cane

Agricultural raw materials shall fulfil the following requirements. The requirement does not apply to secondary raw materials*.

For all agricultural raw materials, state the name (in Latin and English), plus geographical origin (country/state) and supplier of the agricultural raw materials used.

Sugar cane

For bio-based plastic in packaging that only consist of plastic or that constitute more than 10% by weight in the packaging: sugar cane must be Bonsucro-certified.

Palm oil and soy oil:

Bio-based plastic in packaging that only consist of plastic:

Palm oil and soy oil can not be used as a raw material in the production of bio-based plastic.

Bio-based plastic used for coating or that constitute less than 10% by weight in the packaging:

Palm-and soy oil are allowed as a raw material in bio-based plastic used as coating and in plastic that constitute less than 10% by weight in the packaging. This also applies if the bio-based plastic for coating is bio-based by using the mass balance method. The raw materials shall have the following certification:

- Palm oil, palm kernel oil and palm oil derivatives must be RSPO certified
- Soy oil must be RTRS certified

Certified raw material (sugar cane, palm oil and soy oil)

Producer of biobased polymer or suppliers of certified raw materials must be traceability (Chain of Custody, CoC) certified in line with the current certification system, and the traceability must be assured via the mass balance system. The book and claim system is not accepted.

The producer of the bio-based polymer must document the purchase of certified raw materials.

The licenseholder/producer of the packaging must document that it is purchased bio-based polymer with the use of certified raw materials, for instance by a specification on the invoice or delivery note.

** Secondary raw materials are defined here as residual products from other production processes, such as waste products from the food industry, by-products such as straw from grain production, by-products from maize and dried palm leaves. PFAD from palm oil is not counted as a residual/waste product.*

¹⁵⁴ <https://biobs.jrc.ec.europa.eu/sites/default/files/generated/files/policy/CEN%20Bio-Based%20Definitions%20EN16575.pdf> (accessed 11.10.2016)

Nordic Ecolabelling may assess other certification schemes for the raw materials above as they become relevant. The certification scheme will be assessed according to Nordic Ecolabelling's requirements concerning standards and certification systems, as set out in Appendix 6.

- Name (in Latin and English language) and geographic origin (country/state) of the agricultural raw materials used.
- Copy of valid CoC certificate or certification number. Documentation such as an invoice or delivery note from the producer of the bio-based polymer and the packaging, showing that bio-based polymer with certified raw material was purchased.

Background to the requirement O14

There is a specific requirement for the renewable raw materials palm oil, soy oil and sugar cane. These raw materials can be associated with major environmental and social problems. The establishment of palm oil plantations is one of the main reasons behind the destruction of rainforest, which threatens the habitats of indigenous peoples, plants and animals. The rainforests are particularly important for biodiversity, since they are the richest ecosystems on the planet in terms of species density. Cutting down rainforest is also a serious threat to the planet's climate, and rainforest conservation was one of the themes at the UN's climate negotiations in Paris in 2015. Other environmental problems related to palm oil are the use of toxins in production, air pollution from the burning of the original forest, soil erosion and silting in rivers and watercourses, plus discharges of wastewater from the palm oil mills. Palm oil production is also associated with social problems, such as the risk of labour rights abuses.¹⁵⁵

Soy beans are grown on land that is often established in the place of forest and forest savannah in South America. 80% of the world's soy production takes place in the USA, Brazil and Argentina.¹⁵⁶ Soy production is one of the greatest threats to the rainforest on the American continent, particularly in the southern Amazon.¹⁵⁷ This is due directly to the felling of rainforest in order to establish soy fields, and to soy cultivation forcing small-scale farmers off their previous land and into the rainforest. Soy has also brought land changes to the savannah in South America, known as the Cerrado – which is one of the areas declared a biodiversity hotspot.¹⁵⁸ Use of chemicals in production is also a serious environmental and health problem.

Nordic Ecolabelling wishes the requirements to have an extra focus on the two raw materials above. For Nordic Ecolabelling the starting point is to set as strict requirements as possible for these raw materials, depending on their use in the specific product group. Nordic Ecolabelling is not currently aware that the raw materials palm oil and soy oil are relevant raw materials in any specific production of bio-based polymers, and therefore have a prohibition. However, it can not be ruled out that these raw materials become relevant in the future. The standards for certification of palm oil (RSPO) and soy oil (RTRS) have been assessed by the expert group for renewable raw materials at Nordic Ecolabelling, and the conclusion is that both the standards have their shortcomings.

¹⁵⁵ OLSEN LJ, FENGER NA & GRAVERSEN J 2011. Palmeolie - Danmarks rolle i forhold til den globale produktion af palmeolie. WWF Report DK. WWF World Wide Fund for Nature Denmark.

¹⁵⁶ <http://www.worldwildlife.org/industries/soy>, (27.01.2016)

¹⁵⁷ <http://www.regnskog.no/no/hva-du-kan-gjore/bruk-mindre-palmeolje/lys-uten-palmeolje>, (27.01.2016)

¹⁵⁸ <http://www.cepf.net/resources/hotspots/South-America/Pages/default.aspx>, (27.01.2016)

For bio-based polymers used as coating, and where we allow the use of the mass balance method, as well as for bio-based plastic that constitute less than 10% by weight in the packaging, the raw materials palm oil and soy oil are allowed if they are certified according to RSPO or RTRS. Nordic Ecolabelling evaluates that these are the best tools on the market for a more sustainable production. Both RSPO and RTRS have a positive development, and Nordic Ecolabelling will follow the development of the systems and evaluate if it is possible in the future to accept these two systems on a general basis. For the use of mass balance in the calculation of the biobased material, see O2.

Sugar cane, on the other hand, is a highly relevant raw material, with the green polyethylene produced by Braskem, for example, using ethanol from sugar cane in its production. Sugar cane is not currently associated as strongly with the problems of rainforest destruction mentioned above as palm oil and soy oil are, but there can also be challenges linked to its production. Over the period 1960–2008, the land used for sugar cane cultivation rose from 1.4 to 9 Mha. Around 65% of newly planted sugar cane is grown on plains (grasslands and savannahs) and the remainder comprises areas previously used for other types of farming. According to the background document for the Nordic Swan Ecolabelling of Biofuels¹⁵⁹, only one producer of sugar cane in Brazil is located in the area around the Amazon. However, as demand for sugar cane as a raw material rises, opportunities to expand the production areas are being explored. A loss of biodiversity in the rainforest may therefore become a problem associated with sugar cane in the future. At this point in time, the Cerrado is under the greatest pressure from the sugar cane industry. The Cerrado is a tropical savannah in Brazil that has unique biodiversity and specific ecosystems that are under threat.¹⁶⁰

Nordic Ecolabelling's expert group on renewable raw materials has also assessed the standard for certification of sugar cane, Bonsucro, and has concluded that in its current form it does not meet Nordic Ecolabelling's requirements concerning standards. For one thing, it is unclear whether the standard goes any further than the relevant legislation, plus it does not refer to any international conventions. Nevertheless, the standard is considered the best available tool in the market for sustainable sugar cane production, which is why requirements are set concerning certified raw material.

Nordic Ecolabelling may also assess and approve other certification schemes. In such a case, a certification scheme will be assessed according to the requirements concerning standards, as set out in Appendix 6 of the criteria.

For all the certifications, a requirement is set concerning traceability at mass balance level. The book and claim system is not approved.

O15 Genetically modified raw materials

The requirement applies to bio-based polymer in packaging that only consist of plastic and if the bio-based polymer makes up more than 10% of the packaging by weight.

- The use of genetically modified agricultural raw materials in the production of bio-based polymer packaging is prohibited.
- GMO based on bacterias or enzymes manufactured in closed systems is allowed.
- Secondary raw materials are exempted from the requirement, see O14 for a definition.

¹⁵⁹ About the Nordic Swan Ecolabelling of Biofuels, version 2, June 2012

¹⁶⁰ http://www.wwf.dk/wwfs_arbejde/skov/soja/skovomrader/cerrado/ (accessed 14.07.2016)

- Declaration from the manufacturer of the bio-based polymer that genetically modified raw materials are not used.

Background to the requirement O15

Nordic Ecolabelling prohibits genetically modified agricultural raw materials. The requirement concerns packaging that solely comprises plastic and for plastic included in the packaging at more than 10% by weight. The requirement does not concern constituent material such as layers in packaging. GMO (genetically-modified organisms) based on bacteria or enzymes produced in closed systems are permitted.

The ban on GMOs are based on the precautionary principle. GMOs (genetically modified organisms) are a much debated topic and many countries have banned the cultivation of GM crops. The themes of the debate include food safety, land use, lack of scientific knowledge about the effects of GM crops under local agricultural/forestry conditions and the risk of negative impacts on health and the environment. The argument often put forward by advocates of genetic modification is that it will reduce the use of herbicides. Recent studies have, however, raised questions about this.¹⁶¹ The report from Genøk: "Genetically Modified Organisms – A Summary of Potential Adverse Effects Relevant to Sustainable Development"¹⁶², commissioned by Nordic Ecolabelling in 2011, states that GMO has possible negative effects along the whole value chain from plant research and development, via growing, to storage, use and waste handling. The report also describes a lack of scientific research in several of these phases and a lack of assessment of the overall picture. The report particularly highlights the lack of research results on the long-term effects of GM plants. It is important to make clear that Nordic Ecolabelling is not an opponent of the technology in itself, but is concerned about the consequences when genetically modified plants spread into nature.

O16 Energy – bio-based polymers

The requirement applies to bio-based polymers that make up more than 10% of the packaging by weight. Requirement a) or b) must be fulfilled.

a) The manufacturer of the polymer (production plant) must be certified in line with ISO 50001.

or

b) The energy consumed in the production of the bio-based polymers must not exceed 50 MJ/kg polymer. The calculation of energy consumption must include all the processes from monomer production to finished polymer. Energy from cultivation and extraction of the raw material, transport of the raw material to the production site and the energy content of the actual raw material should not be included in the calculation.

Energy from both renewable and non-renewable energy sources must be included in the calculation.

- For alternative a) certificate showing that the manufacturer of the polymer (production plant) is certified in line with ISO 50001.
- For alternative b) information about electricity and fuel consumption and copy of invoice or confirmation of consumption from the supplier. State total kg polymer produced plus a calculation of total energy consumption in MJ/kg polymer produced. A description must be provided of how the energy consumption from the different subprocesses is included in the calculation.

¹⁶¹ <http://www.bioteknologiradet.no/2012/06/gmo-kan-gi-mindre-sproytemidler/> (accessed 08.10.2016)

¹⁶² Georgina Catacora-Vargas, 2011, Genetically Modified Organisms – A Summary of Potential Adverse Effects Relevant to Sustainable Development, Biosafety Report 2011/02, GenØk – Centre for Biosafety

Background to the requirement O16

LCA studies of packaging show that one of the most important factors in packaging's environmental impact is the energy used to manufacture constituent materials such as polymers. Environmental benefits are also related to the opportunities to promote energy efficiency in the production of biobased polymers, and thereby contribute to reducing the climate impact. Since many biopolymer materials are relatively new, there should also be potential to optimise the production processes. It is therefore relevant to set requirements concerning the energy used in the production of biobased polymers. Energy consumption requirements are considered to be an indirect requirement to reduce the climate impact.

The requirement concerns biobased polymers included in packaging at more than 10% by weight. The requirement has two alternatives, to ensure flexibility. There are two options for fulfilling the requirement. An additional option has been added, whereby the requirement can be fulfilled by being certified in line with ISO 50001. ISO 50001 is an international energy management system which among other things, includes controlling purchases and measuring consumption, employee engagement and focus on maintenance of equipment and machinery to maximize energy efficiency. It is a standard suitable for all types of productions and both small and large enterprises can certify themselves. It is pointed out that such a standard does not stipulate an absolute energy requirement, but that production constantly focuses on improving energy efficiency.

In the another alternative, the energy consumed in the production of the bio-based polymers must not exceed 50 MJ/kg polymer. The requirement for energy consumption is based on information from the literature, but it is limited with information. See more detailed background documents for Nordic Ecolabelling Criteria for Disposables.

O17 Additives in plastic

Additives in plastic, such as stabilisers, antioxidants, plasticisers, colourants/pigments and fillers (except for inorganic fillers) must meet the requirement concerning classification of chemical products, O19, and the requirements concerning incoming substances in the chemical products, O20 and O21.

☒ Declaration from the plastic manufacturer that the requirement is fulfilled. Appendix 7 may be used. Safety data sheet for the additive.

Background to the requirement O17

Plastic polymers can include a compound of additives such as stabilisers, antioxidants, antistatic agents, lubricants, plasticisers and pigments, and also unintentionally added substances and pollutants. Additives are needed to give the plastic certain required physical characteristics and to ensure effective processing and handling of the plastic packaging. Additives are also added to biobased polymers in order to improve the material's characteristics.¹⁶³ In Europe, additives for biopolymers are regulated in accordance with the European Commission's Regulation 10/2011. This requirement clearly specifies that additives to plastic must fulfil the requirement for classification of chemical products and the requirement of constituent substances. It is specifically stated that requirement O22 Colourants on dyeing/colouring applies to polymers. Note that requirements concerning additives in plastic apply to packaging which solely comprises plastic, such as a plastic bottle,

¹⁶³ http://www.foodpackagingforum.org/fpf-2016/wp-content/uploads/2015/11/FPF_Dossier06_Bioplastics.pdf

and components that are included in packaging, such as layers or screw caps. Setting requirements of additives used in the production of polymers corresponds to Nordic Ecolabelling's requirements of chemicals used to produce other primary materials for packaging, i.e. pulp and paper. Requirements of additives in plastic are thus in balance with the requirements structure in the criteria.

O18 Residual monomers in polymers

In the primary packaging, residual monomers that have a classification listed in Table 4 below may only be present in the polymer to a maximum of 100 ppm per polymer.

The content of residual monomers must be measured on the newly produced polymer.

Table 4. Classification of CMR substances

Classification under CLP Regulation (EC) No 1272/2008		
Hazard class	Category	Hazard code
Carcinogenic	Carc. 1A/1B	H350
	Carc. 2	H351
Germ cell mutagenicity	Muta. 1A/B	H340
	Muta. 2	H341
Reproductive toxicity	Repr. 1A/1B	H360, H361
	Repr. 2	H362

- ☒ Declaration from the polymer manufacturer that the content is no more than 100 ppm. Appendix 7 may be used.

Background to the requirement O18

Residual monomers in polymers may have negative health effects. Remains from degradation products, e.g. residual monomers, can migrate to packaged food. Several residual monomers can have carcinogenic, mutagenic and reprotoxic characteristics, and Nordic Ecolabelling therefore sets a requirement in this respect.

Example of residual monomer that may be present in polymers used in materials in contact with food is styrene from the production of polystyrene. Styrene is classified as toxic for reproduction (Rep 2 H362d) and is a suspected endocrine disruptor. Products made from 100% polystyrene (PS) cannot be labelled due to the requirement that at least 90% of the packaging by weight must comprise bio-based materials. Polystyrene may, however, be present in components. There are no specific requirements concerning styrene in the regulations on plastic materials in contact with food. All that applies is the general migration limit.

Another residual monomer covered by the requirement is bisphenol A. Bisphenol A is employed in the production of polycarbonate and is used to make containers for food and drinks, soda bottles and storage containers. As the use of some fossil plastic is permitted, the use of polycarbonate cannot be ruled out. Bisphenol A is classified as toxic for reproduction and is banned from use in baby bottles in the EU. Sweden¹⁶⁴ and Denmark¹⁶⁵ also have a ban on bisphenol A in products in contact with food for children under 3 years of age.

¹⁶⁴ <http://www.kemi.se/vagledning-for/konsumenter/kemiska-amnen/bisfenol-a> (accessed 07.10.2016)

¹⁶⁵ <http://mst.dk/borger/kemikalier-i-hverdagen/kend-kemikalierne/bisphenol-a/> (accessed 07.10.2016)

The requirement limit is 100 ppm, which corresponds to the general impurities limit we have with regard to substances in chemical products. The requirement concerns actual plastic packaging, i.e. packaging solely comprising plastic (such as a plastic bottle), and components included in packaging (such as a coating or screw cap).

7.5 Requirements of chemical products and substances on conversion

According to Nordic Ecolabelling's overall principles, the Nordic Swan Ecolabel must be a powerful tool that works to phase out substances that are hazardous for the environment and health. The vision is for Nordic Swan Ecolabelled products not to contain prioritised substances that are hazardous for the environment and health. Prioritised substances are e.g. substances that are classified as CRM or environmentally hazardous and which are persistent, bioaccumulative and toxic (PBT substances) and/or very persistent and very bioaccumulative (vPvB substances). The precautionary principle is the starting point when substances are suspected of having serious environment and health characteristics. Official regulations (classification, labelling, official lists and regulation) are used to exclude substances and products that are hazardous for the environment and health in the criteria. As the Nordic Swan Ecolabel is an ecolabel, the requirements in the criteria are more stringent than legislation. This entails that the chemical may be prohibited from Nordic Swan Ecolabelled packaging, even though it is permitted under the authorities' regulations.

Nordic Ecolabelling's requirements concerning chemicals primarily concern chemical products and constituent substances in chemical products such as **adhesives and printing ink**, and which are used in the production/assembly (conversion) of the packaging.

The requirement also concerns the finishing of packaging at the food producer, e.g. glueing of labels or printing of best-before date on the packaging, if this is not covered by the packaging manufacture.

Primarily the chemicals producer delivering chemicals for packaging production is responsible for documenting that requirements of chemicals are fulfilled.

The requirement does not apply to:

- chemicals for the production and printing of secondary and tertiary packaging;
- auxiliary chemicals used in production, such as lubricants, cleaning chemicals, etc.;
and
- chemicals in production of pulp/paperboard, as these must fulfil the requirements in Nordic Swan Ecolabelling of paper products – Chemicals Module, version 2 or later. Chemicals used in the production of pulp/paperboard must also fulfil the following requirements in this criteria document:
 - O12 and O13 which includes addition of chemicals to pulp/board
 - O22 which applies to dyes for printing and dyeing

Note that the requirements of additives in plastic (O17) apply to the polymer manufacturer and refer to requirements of chemicals (O19-O21).

Nordic Ecolabelling's requirements concerning chemicals concern chemical products, e.g. the classification of printing ink, but can also concern individual requirements of constituent substances in chemical products, e.g. pigments in printing ink. The requirements apply to all constituent substances in the chemical product, but not to contaminants, unless otherwise specified in the requirement. Constituent substances and contaminants are defined as follows:

Constituent substances: all substances in the chemical product, including additives (e.g. preservatives and stabilisers) from the raw materials. Known degradation products from constituent substances (e.g. formaldehyde, acrylamide, in-situ generated preservatives) are also considered to be constituent substances.

Contaminants: residual substances from production, including raw materials production, which are found in a raw material or the final chemical product, equivalent to concentrations ≤ 100 ppm ($\leq 0.01\%$ by weight, ≤ 100 mg/kg) in the chemical product. Examples of what are considered to be contaminants are residual concentrations of the following: reagents, including monomers catalysts, by-products, "scavengers", i.e. chemicals used to eliminate/minimise adverse substances, cleaning agents for production equipment, "carry-over" from other or previous production lines.

O19 Classification of chemical products

Chemical products used in the assembly (conversion) and finishing of primary packaging, such as printing ink and adhesives, must not be classified according to Table 5 below. The classification must be in accordance with current legislation (CLP Regulation 1272/2008 or later).

Table 5. Classification of chemical product

Classification under CLP Regulation (EC) No 1272/2008		
Hazard class	Category	Hazard code
Hazardous to the aquatic environment	Aquatic Acute 1	H400
	Aquatic Chronic 1-4	H410, H411, H412
Acute toxicity	Acute Tox. 1, 2	H330, H310, H300
	Acute Tox. 3	H331, H301, H311
Specific target organ toxicity	STOT SE 1	H370
	STOT RE 1	H372
Allergenic	Resp. Sens. 1 or	H334
	Skin Sens 1	H317
Carcinogenic	Carc. 1A/1B	H350
	Carc. 2	H351
Germ cell mutagenicity	Muta. 1A/B	H340
	Muta. 2	H341
Reproductive toxicity	Repr. 1A/1B	H360, H361
	Repr. 2	H362

The classifications in the Table concern all classification variants. For example, H350 also covers classification H350i.

The manufacturer of the chemical products is responsible for classification.

- Declaration from the producer of the chemical product in accordance with Appendix 5.
- Safety data sheet in accordance with the current statutory requirement in the country of application, e.g. Annex II to REACH (Council Regulation (EC) no. 1907/2006) for all chemical products.

Background to the requirement O19

Nordic Ecolabelling aims for the health and environmental effects of chemical products used in the manufacture of Nordic Swan Ecolabelled products to be as low as possible. Requirements are therefore made of the classification of chemical products, which is also a general chemicals requirement in several Nordic Swan Ecolabelling criteria documents. Chemical products classified as carcinogenic, mutagenic, reprotoxic, very toxic, toxic, hazardous for the environment or allergenic may not be used in the manufacture of the Nordic Swan Ecolabelled packaging. The classification requirement concerns chemical products used in the production and finishing of the primary packaging.

O20 CMR substances

The chemical products used in the assembly (conversion) and finishing of primary packaging, e.g. printing ink and adhesives, may not include substances (see definition above) that are classified as carcinogenic (Carc.), mutagenic (Muta.) or reprotoxic (Repr.) in accordance with CLP Regulation 1272/2008, see Table 6 below.

An exemption is made for formaldehyde in additives, see O23.

Table 6. Classification of CMR substances

Classification under CLP Regulation (EC) No 1272/2008		
Hazard class	Category	Hazard code
Carcinogenic	Carc. 1A/1B	H350
	Carc. 2	H351
Germ cell mutagenicity	Muta. 1A/B	H340
	Muta. 2	H341
Reproductive toxicity	Repr. 1A/1B	H360, H361
	Repr. 2	H362

The classifications in the Table concern all classification variants. For example, H350 also covers classification H350i.

- Declaration from the producer of the chemical product in accordance with Appendix 5.
- Safety data sheet in accordance with the current statutory requirement in the country of application, e.g. Annex II to REACH (Council Regulation (EC) no. 1907/2006) for all chemical products.

O21 Other substances excluded from use

The following substances must not be constituent in the chemical products used in the assembly (conversion) and finishing of primary packaging e.g. printing ink and adhesives,

- Substances on the EU Candidate List.*
- Substances evaluated by the EU to be PBT (persistent, bioaccumulative and toxic) or vPvB substances (very persistent and very bioaccumulative), in accordance with the criteria in Appendix XIII of REACH and substances that have not yet been evaluated but which meet these criteria.
- Substances considered to be potential endocrine disruptors in category 1 or 2 on the EU's priority list of substances that are to be investigated further for endocrine disruptive effects.**

In addition, the following substances and substance groups may not be included. There may be overlap between the substances listed below and the substances or groups of substances listed above.

- Alkylphenol ethoxylates (APEO) and other alkylphenol derivatives (substances that release alkylphenols on degradation).
- Phthalates.^{***}
- Bisphenols A, bisphenol F and bisphenol S
- Butylhydroxytoluene (BHT)
- Antibacterial agents (e.g. nanosilver)^{****}
- Halogenated organic compounds. An exceptions is made for: - halogenated organic pigments that meet the European Council's "Resolution AP (89) 1 on the use of colourants in plastic materials coming into contact with food", point 2.5
- Methylisothiazolinone (MI)

* *The Candidate List can be found on the ECHA website: <http://echa.europa.eu/candidate-list-table>*

** *See Annex 1 – Candidate list of 553 substances at: http://ec.europa.eu/environment/chemicals/endocrine/strategy/being_en.htm*

*** *The prohibition does not include polyethylene terephthalate (PET).*

**** *An antibacterial agent is a chemical/product that inhibits or stops growth of microorganisms such as bacteria, fungi or protozoa (single-celled organisms).*

- Declaration from the producer of the chemical product in accordance with Appendix 5.
- Safety data sheets according to prevailing European legislation for chemical products.

Background to the requirements O20- O21

Nordic Ecolabelling's vision is for Nordic Swan Ecolabelled products not to include prioritised substances that are hazardous for health and the environment and it is especially relevant to focus on this for this product group that is in contact with food. Prioritised substances are e.g. substances that are classified as CRM or environmentally hazardous or which are persistent, bioaccumulative and toxic (PBT substances) and/or very persistent and very bioaccumulative (vPvB substances). Nordic Ecolabelling therefore sets the requirement that chemical substances with problematic characteristics may not be included in chemical products used in the production/assembly of Nordic Swan Ecolabelled packaging.

Substances of Very High Concern (SVHC) fulfil the criteria in Article 57 of the REACH regulation, which gives the following definition: Substances that are CMR (category 1 and 2 under the Dangerous Substances Directive 67/548/EEC or category 1A and 1B under the CLP Regulation), PBT substances, vPvB substances (see section below) and substances that have endocrine disruptive properties or are environmentally harmful without meeting the criteria for PBT or vPvB. SVHCs may be included on the Candidate List with a view to them being inscribed on the Authorisation List, which means that the substance becomes regulated (ban, phasing out or other form of restriction). Since these substances face being phased out or banned, it is only logical for Nordic Ecolabelling not to permit this type of substance in ecolabelled products. A substance may meet the criteria for SVHC without being included on the Candidate List, so there is no direct equivalence between SVHC and the Candidate List. To avoid cross-references between PBT, vPvB, CMR and endocrine disruptors, instead of excluding SVHC (which does cover some CMR, PBT, vPvB, etc.) Nordic Ecolabelling chooses to exclude from use the substances on the Candidate List and to separately exclude PBT, vPvB and endocrine disruptors. This should still cover all SVHC substances. "Persistent, bioaccumulative and toxic (PBT) organic substances" and "Very persistent and very

bioaccumulative (vPvB) organic substances" are substances whose inherent properties are not desirable in Nordic Swan Ecolabelled products. PBT and vPvB are defined in Annex XIII of REACH (Regulation no. 1907/2006).

Potential endocrine disruptors are substances which can affect the endocrine balance of people and animals. Changes in the endocrine balance can have adverse effects, and there is extra focus on hormones which affect sexual development and reproduction. Nordic Ecolabelling prohibits the use of substances that are considered to be potential endocrine disruptors, category 1 (there is evidence of a change in endocrine activity in at least one animal species) or category 2 (there is evidence of biological activity related to changes in the endocrine balance), in line with the EU's original report on "endocrine disruptors" or later studies. This entails a ban on substances such as bisphenol A, several phthalates and certain alkylphenols. Phthalates are, nonetheless, a separate item of the prohibited list, in order to make it very clear that phthalates are prohibited. It can still be noted that the prohibition does not include polyethylene terephthalate (PET), since these can also be interpreted to be phthalates. Phthalates are a group of substances that comprise many different substances. They are mainly used as plasticisers in plastic and since they are not chemically bound in the plastic, they can leak out to the surroundings. Several phthalates are reprotoxic and environmentally hazardous. For some phthalates, food is considered to be the main exposure route, where food contact materials are a relevant source¹⁶⁶. Some phthalates are listed in Annex 1 of Regulation no. 10/2011 on plastic materials and articles intended to come into contact with food, which means that it is permitted to use them. Even though limitations to their use have been introduced, phthalates that are classified as reprotoxic, such as DEHP, are permitted. A prohibition will therefore ensure that these substances are not included in a Nordic Swan Ecolabelled packaging. See also the background text to PVC requirements under O3.

Butyl hydroxytoluene (BHT) and bisphenols A-F are included on the list of prohibited substances based on the consultation responses received concerning the criteria for disposables and how these are relevant substances in food contact materials. BHT does not have an official harmonised classification and is not included on the EU's list of suspected endocrine-disrupting substances. BHT is, however, suspected of being an endocrine disruptor, even though it is not included on the EU's list, and is on the indicative list for self-classification, including CMR characteristics and environmental hazards. Nordic Ecolabelling has considered ChemSec's SIN.LIST for food contact¹⁶⁷ and registered that BHT is included in this list. On the basis that this is a relevant chemical in food contact materials, Nordic Ecolabelling specifically added BHT to the list of prohibited substances, since it is not included in the EU's list of endocrine-disrupting substances or the requirement of CMR-classified substances.

The SIN.LIST for food contact also includes other bisphenols besides Bisphenol A, such as Bisphenol F and S. These can be used as a substitute for bisphenol A. Nordic Ecolabelling has therefore introduced a general prohibition of bisphenol A, F and S on the basis of the precautionary principle and the suspicion that these substances may be endocrine disruptors.¹⁶⁸

¹⁶⁶ <http://www.foodpackagingforum.org/food-packaging-health/phthalates> (accessed 03.10.2016)

¹⁶⁷ <http://sinlist.chemsec.org/search/search?query=&uses=15> (accessed 24.04.2017)

¹⁶⁸ Johanna R. Rochester and Ashley L. Bolden Bisphenol S and F: A Systematic Review and Comparison of the Hormonal Activity of Bisphenol A Substitutes Environ Health Perspect; DOI:10.1289/ehp.1408989 <http://ehp.niehs.nih.gov/wp-content/uploads/advpub/2015/3/ehp.1408989.acco.pdf>

Alkylphenoethoxylates can be broken down into alkylphenols that are not easily degradable and of which some are suspected to be endocrine disruptors. There is a strong political ambition in the Nordic countries to phase out these substances and they are e.g. included on the Danish list of¹⁶⁹ adverse substances.

Halogenated solvents are a large environmental and health and safety problem, and many chlorinated solvents are ozone-depleting and some are classified as carcinogenic.

Antibacterial substances/products are not wished for in ecolabelled products, and especially not in products in direct contact with food. An increase can be seen in products to which antibacterial agents have been added. An example is nano silver in everything from socks and toothbrushes to refrigerators. Antibacterial substances are a type of biocide. If the use of biocides increases, bacteria can develop resistance to substances that are highly necessary for hygiene and health in other contexts (see also the background text in requirement O12 for paperboard).

Isothiazolinones (MI) are effective preservatives which function in low concentrations. They are sensitising, however, and there is ongoing discussion within the EU concerning any limitation of MI in particular (CAS 2682-20-4). Allergies to preservatives, particularly MI (CAS 2682-20-4), have risen in recent years¹⁷⁰ and Nordic Ecolabelling does not wish to contribute to unnecessary exposure. The Scientific Committee on Consumer Safety (SCCS) also notes that for leave-on products there is no safe concentration of MI with regard to sensitisation/allergies.¹⁷¹

O22 Colourants for printing and dyeing

The requirement applies to colourants for printing, dyeing and shading.

All colourants used for printing, dyeing and shading must be declared and safety data sheets for the products must be submitted. All colourants must meet the following requirements:

- The colourants must meet BfR's (Federal Institute for Risk Assessment) recommendations: "IX. Colorants for Plastics and other Polymers Used in Commodities"
- Halogenated organic pigments must meet the European Council's "Resolution AP (89) 1 on the use of colourants in plastic materials coming into contact with food".

Declaration from the manufacturer of the colourant that the requirement is fulfilled. Appendix 5 may be used.

Background to the requirement O22

Since packaging products are in contact with food, it is considered particularly important to set requirements concerning printing dyes, gradation colours and dyeing, since there may be problematic substances. The requirement concerning the content of the dyes must fulfil BfR's recommendations, as well as Resolution AP (89) 1 requirements for halogenated organic pigments (see also below). Besides requirement O22, the general chemicals requirements,

¹⁶⁹ <http://www2.mst.dk/udgiv/publikationer/2010/978-87-92617-15-6/pdf/978-87-92617-16-3.pdf> (accessed 05.10.2016)

¹⁷⁰ http://ec.europa.eu/health/scientific_committees/consumer_safety/docs/sccs_o_145.pdf

¹⁷¹ http://ec.europa.eu/health/scientific_committees/consumer_safety/docs/sccs_o_145.pdf

such as classification requirement O19 and requirements of constituent substances, O20 and O21, also apply to dyes on the manufacture of packaging (conversion). On the other hand, requirement O22 and requirements of dyes in the Chemicals Module for paper products apply to dyes used in the manufacture of paperboard/pulp.

The requirement must be documented by sending a data sheet for the colourants used, as well as a declaration from the manufacturer of the colourant that the requirement is fulfilled.

The colourants used must meet the recommendations of the Federal Institute for Risk Assessment (BfR): IX. Colorants for Plastics and other Polymers Used in Commodities. The recommendations can be found on BfR's website.¹⁷² BfR's recommendations are a type of restriction list that sets maximum limits for the content of different substances, including various oils and fatty acids, heavy metals and aromatic amines. BfR writes in its recommendation that the most suitable colourants for plastic are insoluble pigments that are incorporated so well in the plastic that they do not migrate out into the foodstuff. Incorrect use of soluble colourants poses a risk that they might migrate out into the food. Since the recommendations do not prohibit the use of toxic substances, it is extremely important that colourants do not migrate into the food. The recommendations point out that this should be verified (see also the requirement for testing av migrates O4).

Colourants that are not in direct contact with food are not covered by the legislation, and Nordic Ecolabelling therefore believes it is relevant to set requirements for colourants that are used to print on the disposable article. BfR's recommendations on colourants have been drawn up for plastic products, but contact with the industry shows that these guidelines are also used for paper products. The recommendations are generally accepted in the absence of an EN standard. In addition to BfR's recommendations, organic pigments must also meet Resolution AP (89) 1 on the use of colourants in plastic materials coming into contact with food.¹⁷³ This requirement prohibits substances such as PCBs, which are not covered by BfR's recommendations. PCBs were found in analyses of paint that contained organic pigments. It is known that PCBs are present in two organic pigments, azo pigments and phthalocyanine pigments. Now, however, PCBs have also been found in products with other pigments. PCBs are not added, but can be formed in the production process as a result of reactions between various chlorinated solvents and the organic pigment. These pigments may be used in a wide range of products, including paint, textiles, paper and food.¹⁷⁴ Concern has been expressed about the content of PCBs, and the Norwegian authorities have looked at the Council of Europe's recommendation with a view to introducing measures against PCBs in pigments.

O23 Adhesives

Ethylene glycol ethers or rosin must not be ingoing substances in adhesives. The exception is modified rosin derivative which is not classified as allergenic.

Formaldehyde generated during the production process may amount to no more than 250 ppm (0.0250% by weight) measured in newly produced polymer dispersion*. The content of free formaldehyde in hardened adhesive must not exceed 10 ppm (0.001% by weight)**.

Hotmelt adhesives are exempted from the requirement to document formaldehyde.

Information on test methods and analysis laboratories is provided in Appendix 8.

¹⁷² <https://bfr.ble.de/kse/faces/resources/pdf/090-english.pdf;jsessionid=FE1429F27793CC9BFA3F7E53BEF85B04>
(accessed 07.10.2016)

¹⁷³

<https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=09000016804f8648>

¹⁷⁴ Hu D, Hornbuckle KC. Inadvertent polychlorinated biphenyls in commercial paint pigments. *Environ Sci Technol* 44(8):2822–2827 (2009)

** Measured using the VdL-RL 03 method "In-can concentration of formaldehyde determined by the acetyl-acetone method" or the Merckoquant method (see Appendix X of RAL-UZ 102), or some other equivalent method.*

*** Measured using the Merckoquant method (see Appendix X of RAL-UZ 102), or some other equivalent method.*

- Safety data sheet for the product. Declaration from the adhesive producer that the requirement is fulfilled. Appendix 5 may be used. Results of analysis of the formaldehyde content of the adhesive.

Background to the requirement O23

Adhesive may be used to bond together the packaging or to affix coatings and labels and so on. In most cases, it is not in direct contact with food, but contact may occur unintentionally at the seams and edges or via migration through the packaging or in the gas phase for volatile compounds.¹⁷⁵ Many different types of adhesive may be used in materials in contact with food, depending on the material and function, including reactive polyurethane (PU) adhesive, adhesive based on natural polymers such as dextrin and starch, and hotmelt adhesive. Adhesives may contain problematic substances, and Nordic Ecolabelling therefore sets requirements concerning certain constituent substances in adhesives via the general chemical requirements in O19 and O20 and other specific substances in this requirement.

Rosin is prohibited because it can cause contact allergies. Rosin is tapped from pine trees as a resin and extracted with turpentine. The blend contains many allergens. Formaldehyde is also allergenic, in addition to being classified as carcinogenic. A separate impurity limit has been introduced for formaldehyde. The content of formaldehyde must not exceed 250 ppm in newly produced polymer dispersion and there is a limit of 10 ppm in hardened adhesive. To document the requirement, one must submit the results of testing carried out in accordance with the Merckoquant method or the VdL-RL 03 method "In-can concentration of formaldehyde determined by the acetyl-acetone method." If the VdL-RL 03 method is used, it must be calibrated to measure results <100 ppm in order to be valid. The formaldehyde requirement does not require documentation of hotmelt adhesives, since such adhesives do not contain these substances.

7.6 Quality and regulatory requirements

Quality and regulatory requirements are general requirements that are always included in Nordic Ecolabelling's product criteria. The purpose of these is to ensure that fundamental quality assurance and applicable environmental requirements from the authorities are dealt with appropriately. They must also ensure compliance with Nordic Ecolabelling's requirements for the product throughout the term of validity of the licence.

O24 Responsible person and organisation

The company will appoint individuals who are responsible for ensuring the fulfilment of the Nordic Swan Ecolabelling requirements, for marketing and for finance, as well as a contact person for communication with Nordic Ecolabelling.

- Organisational chart showing who is responsible for the above.

¹⁷⁵ Migration testing of adhesives intended for food contact materials, FEICA – Guidance paper, May 2016

O25 Documentation

The producer must archive the documentation that is sent in with the application, or in a similar way maintain information in the Nordic Ecolabelling data system.

🔍 This is checked on site as necessary.

O26 Quality of the packaging

The producer must guarantee that the quality of the Nordic Swan Ecolabelled packaging does not deteriorate during the term of validity of the licence.

🔍 The claims archive is checked on site.

O27 Planned changes

Written notice of planned product and marketing changes that affect fulfilment of the Nordic Swan Ecolabelling requirements must be notified in writing to Nordic Ecolabelling.

☒ Procedures detailing how planned product and marketing changes are handled.

O28 Unforeseen non-conformities

A written report on any unforeseen non-conformities that affect fulfilment of the Nordic Swan Ecolabelling requirements must be submitted to Nordic Ecolabelling and logged.

☒ Procedures describing how unforeseen non-conformities will be handled.

O29 Traceability

The producer must be able to trace the Nordic Swan Ecolabelled packaging in their production.

☒ Description of/procedures for fulfilment of the requirement.

O30 Take-back system

Relevant national regulations, legislation and/or agreements within the sector regarding take-back systems for products and packaging must be complied with in all the Nordic countries where the Nordic Swan Ecolabelled packaging is marketed.

☒ Declaration from the applicant regarding affiliation to existing recycling/processing agreements.

O31 Laws and regulations

The producer must ensure compliance with all relevant applicable local laws and provisions at all production facilities for the Nordic Swan Ecolabelled product, e.g. with regard to safety, working environment, environmental legislation and facility-specific terms/concessions.

🔍 The requirement is controlled on-site.

O32 Subsuppliers

The producer must ensure that all subsuppliers and external processors engaged for the production of packaging that is to carry the Nordic Swan Ecolabel fulfil the requirements relevant for their activities, as specified in the criteria.

☒ Documentation to show that the requirement is fulfilled.

Background to the requirements

The supply chain in the manufacturing process for Nordic Swan Ecolabelled packaging can be long. Subsuppliers may be e.g. used in the manufacturing process or several components are

used in packaging, such as labels, stoppers, etc., and it is therefore considered to be relevant to specify that the producer must ensure that all suppliers engaged for production also fulfil relevant requirements in the criteria.

7.7 Processing tools

Nordic Ecolabelling has developed the web-based application guide My Swan Account (MSA) for paper and paperboard manufacturers.¹⁷⁶ The tool also applies to pulp and chemicals producers wishing to have their products controlled by Nordic Ecolabelling. Paper customers can search MSA for Nordic Swan Ecolabelling-controlled pulp and chemicals.

7.8 Areas that are not subject to requirements

This section presents requirements that are not included in the criteria, but which were discussed during the development of the criteria.

Secondary and tertiary packaging

Since these criteria focus on packaging as such, it is justified to set requirements not only of the primary packaging, but also of the secondary and tertiary packaging that is used. The packaging system is the product and various levels of packaging, i.e. primary, secondary and tertiary packaging.¹⁷⁷ The packaging levels are interrelated and influence each other so that a change at one level has an impact on the others. As an example, reducing e.g. the volume of materials at one packaging level can lead to an increase in material volumes at another stage.

Secondary and tertiary packaging are required in order to adequately protect the packaged food throughout the distribution chain, so as to avoid crushing/waste. During the criteria development work it has been discussed about the possibility of requiring secondary and tertiary packaging ie that they may not contain PVC / PVDC, shall be made of renewable material and shall be recycled or recycled. However, in this first generation of criteria, it has been decided that requirements for secondary and tertiary packaging should not be included. However, the secondary requirement for secondary and tertiary packaging is subject to the requirement for packaging design (see O5). Opportunities to set requirements for the secondary and tertiary packaging should also be reviewed to the next generation of criteria.

Transport

From an environmental viewpoint, it is important to limit transport. During the criteria development the opportunity to set requirements of transport (transport route, vehicle quality, fuel used) was discussed, as well as setting indirect requirements of packaging's spatial volume in order to avoid unnecessary transport of air. In this first generation of the criteria, the decision has been taken, however, that this will not be included in the criteria. The packaging manufacturer must, however, have procedures to ensure that environmental issues are taken into account in the packaging design (O5), by requiring that packaging are optimised from a transport aspect. Opportunities to set requirements of transport and e.g. the external filling ratio must be reviewed for the next generation of the criteria.

¹⁷⁶ <http://www.nordic-ecolabel.org/portals/paper/my-swan-account1/>

¹⁷⁷ Daniel Hellström och Annika Olsson; Managing packaging design for sustainable development - a compass for strategic directions, first edition, John Wiley and Sons Ltd. 2017.

Absolute requirements of packaging design

The waste phase plays a major role in the packaging's life cycle and it is therefore relevant for Nordic Ecolabelling to set requirements for this. There has been discussion of the opportunities to set absolute requirements created for the design of packaging products intended for recirculation of packaging. One example is the requirement made of packaging design so that it is easy to empty the packaging of its content or separate various materials/components from each other and flatten the packaging after use. However, it is difficult to set such absolute requirements and Nordic Ecolabelling has therefore instead chosen to set an indirect requirement of packaging design, whereby the food producer must have procedures to require packaging to be optimised from a recycling aspect (O5). The same applies to efficient use of resources. Nordic Ecolabelling use to set requirements on the product's function. Good quality, i.e. functional characteristics, is important, as a good packaging function saves resources. Opportunities to set requirements of packaging design and function must also be reviewed for the next generation of the criteria.

Work to increase the recycling ratio

During the course of the work the opportunity to work for changes in consumer behaviour was also discussed. However, there are also other paths to changed consumer behaviour besides information flow, such as printed text on a product (O8), which may perhaps also be even more effective. An example is "nudging", a new trend which official authorities are already beginning to use. Nudging is about gently leading people in the preferred direction without using carrot or whip. Knowledge of nudging thus opens up opportunities to propose a new type of measures and steering tools, to contribute to more sustainable consumption. In Denmark, the non-profit organisation "iNudgeYou" works on assignments for e.g. the Danish Ministry of the Environment and the Danish Energy Agency. In Norway, too, there is an independent organisation, GreeNudge, which among other things has written a report on opportunities for nudging in Norway's climate policy.

Requirement of energy on conversion

Under criteria development, the opportunity to set requirements of energy on conversion has been discussed. According to the LCA analyses, the production of constituent material in packaging is of great significance from an environmental viewpoint (production of polymers, aluminium and paperboard). Conversion of packaging is of less significance, which also concerns filling and distribution to shops. In the conversion phase, the greatest environmental impacts will be from the use of electricity in production, and therefore opportunities were discussed to set requirements of energy use in conversion facilities where packaging (preforms, sleeves) is manufactured. The decision was taken that this will not be included in the first generation of the criteria, but that this opportunity to set energy requirements must be reviewed for the next generation of the criteria.

8 Terms and definitions

Term	Explanation or definition
Auxiliary component	Components which belong to the packaging, but which are not directly necessary to wrap the food. Examples of auxiliary components are labels, straws or corrugated cardboard packaging/paperboard as in a bag-in-box to support a bag of plastic.
Biobased	<p>Biobased means that the material consists of biomass that may have undergone physical, chemical or biological treatment(s). Biomass has a biological origin, but excludes material that is found embedded in geological and/or fossil formations. Examples of biomass are: (all or parts of) plants, trees, algae, marine organisms, microorganisms, animals, etc.</p> <p>Biobased polymer/plastic: Polymer/plastic that is fully or partly based on biomass. Nordic Ecolabelling does not consider that biodegradable/compostable fossil-fuel plastic should be considered to be biobased plastic.</p> <p>The definition of biobased polymer/plastic is based on the definitions in the European standard EN 16575:2014 and also includes secondary raw materials.</p>
Biomass	In accordance with the Renewable Energy Directive 2009, biomass is the biologically degradable element of products, waste and residual products of biological origin from agriculture (including material of vegetable and animal origin), forestry and related industry, including fishing and aquaculture, as well as the biologically degradable elements of industrial waste and municipal waste.
Blanks	Preform of packaging. Preforms are delivered from the packaging manufacturer to the food manufacturer for further processing as a filling. See also conversion.
Bonsucro	Bonsucro (formerly the Better Sugar Cane Initiative, BSI) comprises guidelines for the sustainable production and processing of sugar cane. The first version of the Bonsucro criteria was adopted and published on 27 June 2010.
Component:	A component is one or more materials and/or chemical products which together fulfil a required function in packaging production. Examples of components are laminated paperboard or plastic screw tops.

Conversion	Conversion is the manufacturing phases in which e.g. rolls of liquid packaging board are processed into final products (packaging in which food is packaged). In the case of beverage cartons, conversion comprises phases whereby paperboard roll is processed into blanks, including coating, printing and cutting. According to these criteria, relevant elements of food filling may also be included.
Full traceability (for biobased polymers)	Full traceability means that there is control of the renewable raw material throughout the production process, such as by using a separate production line solely for renewable raw materials, so that the final polymer solely comprises renewable raw materials.
Mass balance method (for biobased polymers):	The mass balance method means a mix of fossil and biobased raw materials at the start of the production process, with mathematical allocation of the renewable raw material to the final polymer. This entails that there is no full traceability of the renewable raw material throughout the production process, and that the amount of renewable raw material in the final polymer can vary.
Material	Examples of material that may be included in packaging: paper, paperboard, synthetic polymers such as PLA, PP, PE, and PET, as well as metals.
Intermediate product	In these criteria, intermediate products are packaging that does not contain packaged food. See also the definition of final product.
NIAS	Non-intentionally added substances (NIAS). Substances not added intentionally.
MSA	My Swan Account. Nordic Ecolabelling's web-based application guide for paper and paperboard manufacturers. The tool also applies to pulp and chemicals producers wishing to have their products controlled by Nordic Ecolabelling.
Packaging	According to the EU Directive on packaging and packaging waste, 94/62/EC, packaging is all products made from material of any type and which is used to contain, protect, handle, deliver and present products, from raw material to final product, and from producer to user and consumer. Disposable items used for the same purpose are also considered to be packaging. Norway is not an EU member state, but is subject to the EEA agreement See also primary, secondary and tertiary packaging.
Primary packaging	Consumer packaging, i.e. packaging conceived so as to constitute a sales unit to the final user or consumer at the point of sale. According to these criteria, primary packaging may be Nordic Swan Ecolabelled.
Product	In contrast to Nordic Ecolabelling's other criteria, the term product not only refers to the Nordic Swan Ecolabelled packaging, but also the packaged food and its packaging.

Renewable raw material	A renewable raw material is defined as a raw material (primary or secondary) originating from biological material which is renewed continuously in nature within the immediate future, such as cereals and wood (European standard EN 16575:2014).
Secondary raw materials	Secondary raw materials are defined as residual products from other production and manufacturing processes, such as waste products from the food industry, or by-products such as straw from cereal production or bagasse from sugar cane production.
Secondary packaging	Group packaging, i.e. packaging that is designed in such a way that at the point of sale they comprise a group of a certain number of sales units, irrespective of whether they are sold as such a group to the final user or consumer, or are solely used to complement the shelves at the point of sale. Secondary packaging can be removed from the product without this affecting the product's characteristics.
Tertiary packaging	Transport packaging, i.e. packaging that is designed in such a way that it supports the handling and transport of a number of sales units or group packaging in order to prevent damage from physical handling or transport damage. Transport packaging does not include road, rail, ship and air freight containers.
RSPO	Roundtable on Sustainable Palm Oil (RSPO) was created by organisations involved in the entire palm oil supply chain. The standard comprises eight principles and 39 criteria for sustainable palm oil production. The criteria comprise social, economic, organic and general aspects. There is great interest in the system and several companies have been granted certificates.
RTRS	Roundtable on Responsible Soy (RTRS) is initiated by operators from the entire soya production and distribution chain. The first version of the criteria was adopted and published on 10 June 2010.
Recycled material	<p>Recycled material is defined in accordance with ISO 14021 in the following two categories.</p> <p>Material in the pre-consumer phase. Material that has been taken from the waste flow during the manufacturing process. The exception is the re-use of material that is generated in a process, e.g. waste that can be recycled within the same process that generated it.</p> <p>Material in the post-consumer phase. Material generated by households or by trade, industry or institutional facilities in their role as end-users of a product that can no longer be used for its intended purpose. This includes the return of materials from the distribution chain.</p>

Appendix 1. The design of the Nordic Swan Ecolabel on packaging

Symbol for use on Nordic Swan Ecolabel packaging for liquid food products

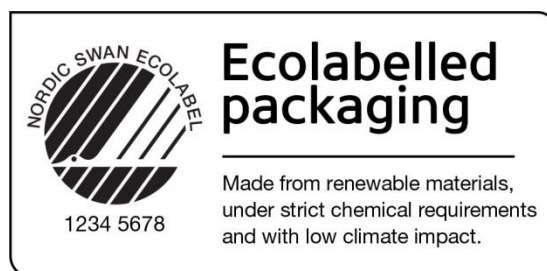
Two versions of the label have been created for use on Nordic Swan Ecolabel packaging for liquid food products, with or without an explanatory text.

The producer is free to choose which version to use, but we recommend using version A, as consumer surveys show that a large majority of consumers prefer this.

The label may be used on the packaging itself and in marketing of the product, for as long as the licence is valid.

Version A – recommended version

with explanatory text:



Version B

without explanatory text:



Rules for use of the label on Nordic Swan Ecolabelled packaging for liquid foods

1. The label is only used in black.
2. Only a version of the label provided by Nordic Ecolabelling or downloaded from our website may be used. The symbol may never be changed or distorted.
3. The label must be placed on the reverse side of the packaging and together with any other labelling schemes relating to the actual packaging. The label may never be placed on the front (shelf-facing side) of the packaging.
4. The logo must be placed with space to other logos and/or elements on the packaging.
5. The label must be used in a size which ensures that text in the smallest font is clear and legible. Minimum breadth 30 mm.
6. The packaging design must be approved by the national ecolabelling organisation before being put into production.



Rules for use of the label in marketing

Rules will be drawn up for the use of the symbol in marketing. The general rule is that there must never be any doubt concerning which element of the product is Nordic Swan Ecolabelled