



THE ECOLOGICAL COUNCIL

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Greening the house hold chemicals

- Danish contribution to the REC-project “Consuming green”

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Preface

This report is the contribution of the Danish Ecological Council to the “Consuming Green” project, carried out by NGOs in Latvia, Estonia, Lithuania, Poland, Sweden and Denmark, financed by REC – the Regional Environmental Office for Central and Eastern Europe - and the Danish Outdoor Council. Naturskyddsforeningen, Sweden, has contributed to chapter II below by including Swedish experiences, especially with the Falcon-label.

Chapter I presents the general Danish experiences with instruments to promote less hazardous household chemicals.

Chapter II goes through the more detailed criteria for eco-labelling in the Nordic countries and in the EU.

Chapter III gives a short overview of the most important hazardous compounds in laundry detergents and in hand dishwashing agents.

I want to thank Torben Madsen, DHI in Denmark and staff from the Danish Eco-label secretariat for good comments during the process.

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I. Danish experiences with greening the house hold chemicals

1. Eco-labelling

Eco-labelling is a voluntary market based instrument, with the implied strengths and weaknesses. In environmental terms, such labels can be quite successful. However, they rely on the commitment of private and public consumers, and on the interest of manufacturers and dealers in producing and marketing eco-labelled goods. Eco-labelling can promote a market for more environmentally friendly products, which can later become mandatory by law. Eco-labelled products can gain ground by using instruments like green taxes, subsidies and green public procurement.

The greatest advantage of eco-labels is their ability to communicate a complex message in a simple form. But in order to reach this simple message it is necessary to look at many environmental properties and weigh them together, based on life cycle assessment. The labels, e.g. the EU Flower and the Nordic Swan label, are based on *relative* criteria, used as a consumer guide to the best possible products in terms of environmental properties among the marketed products fulfilling identical needs. Furthermore the labelling criteria are based on compromises between the countries involved. The Swan covers the five Nordic countries, while the Flower covers the EU – today 15 countries, but soon 25 countries.

Common eco-labels used in Denmark

Denmark has a number of different eco-labels, based on vastly different notions, with very different requirements for conferment, and of very varying credibility. Here we will only describe the Swan and the Flower, which are relevant for detergents and dishwashing agents, and which have relatively high credibility. For both labels the requirements are revised and tightened up approximately every three years, so they can continually serve to propel a process, in which more environmentally friendly products are developed within different product categories. Both labels are voluntary, and manufacturers have to pay for achieving the label and entitlement to its use.

EU Flower label

The Flower is the EU eco-label, which can be awarded to the environmentally best non-food products on the market according to a number of criteria, fixed in such a way that a certain proportion – ranging from five to thirty per cent – of a specific product category would qualify for the Flower label.

Criteria are based on life cycle analyses and are developed co-operatively by EU member nations and representatives of industry, commerce, and consumers.

The main asset of the Flower label is its Europe-wide coverage, and its main shortcoming is that the working out of criteria requires consensus among the EU countries. This is the reason why, as of now, much fewer product categories carry the Flower label than the Swan-label, and that some labelling criteria are relatively weak.

The Nordic Swan

The Swan label is the Nordic Council of Ministers' eco-label for non-food products and dates back to 1989. Thus, the Swan label is a state approved Nordic eco-label, awarded according to a number of criteria that vary between products. National and Nordic eco-label boards work out these criteria co-operatively, the target being – as for the Flower label – that a certain proportion ((up to thirty per cent) of products on the market can meet the criteria. Thus, the criteria are not finite requirements, but rather a set of requirements to sift out environmentally 'good' products from the bad ones.

Eco-labelling cannot stand alone

The overall goal of environmental efforts is to bring about a sustainable development, in which resource consumption and environmental impacts respect nature's tolerance limits and a notion of global justice. Fundamental instruments towards such a goal are e.g. the introduction of bans on production and use of toxic substances, introduction of standards to secure energy and resource efficiency in the production and use of products, and laws to secure sustainable end-of-life recycling.

However, this is an extremely lengthy process, and therefore has to be supplemented with other instruments that can be implemented swiftly, on a voluntary basis, and with a known environmental effect. Eco-labelling can thus support the development of substitutions for environmentally harmful goods, subsequently to be banned.

Eco-labels such as the Nordic Swan and the EU Flower therefore must be seen as an offer to those consumers, manufacturers, and retailers who – in environmental terms – wish to proceed further and faster than the often quite heel-dragging legislation and standardisation process. Yet, they can never render legislation dispensable.

Consumers, retailers, and manufacturers all need to join in

For eco-labelling to obtain environmental thrust, consumers need to be familiar with the labels and demand them, thus creating an incentive for manufacturers to develop an eco-labelled product range, and for retailers to stock eco-labelled products.

Conversely, manufacturers have options of developing a new market for eco-labelled goods via product development and marketing, so retailers are encouraged to stock their products, thus offering consumers more and wider opportunities for sustainable behaviour.

Hence, efforts towards more and superior eco-labelled products involve three interlocking stages. It is essential to prevent that all players leave it at observing the situation and each other. Consumers need to actually buy the eco-labelled products, and forward-looking consumer movements have to demand more eco-labelled products.

Retailers and chain stores need to make a deliberate stake on a large eco-labelled selection, and producers need to make a positive effort to introduce new eco-labelled products to a market where the political consumer makes a difference.

Risk of protectionism

Demands on free trade must not – either globally, in the EU, or in individual member countries – stand in the way of essential environmental requirements. All the same, we need to make sure that environmental requirements do not degenerate into sheer protectionism.

Systems have to be adjusted, so suppliers in all parts of the world are able to apply for and obtain an eco-label, and the rich countries must help poorer countries to be able to comply with the criteria of eco-labelling. Denmark for instance helps companies in South Africa to produce textiles that can be eco-labelled when exported to the EU.

Requirements of the Flower and Swan labels must be tightened up

The basic criteria of the Swan and the EU Flower label are for certain products too lenient. For instance, requirements for the EU Flower label for cotton textiles should be stiffened to include a demand for pesticide-free cultivation – as is already the case with the Swan label. Today, EU Flower labelled fabrics allow the use of highly hazardous pesticides in production, e.g. methyl parathion.

Criteria drawn up relative to other equivalent products must therefore currently be supplemented with a number of absolute demands, e.g. on the absence of particularly hazardous substances, based on the ‘undesired substances’ lists of the Nordic environmental agencies. This is already the case for detergents where substances like alkylphenol-ethoxylates are banned in eco-labelled products.

Eco-labelling of “black” products

For a number of ”black ” products, e.g. petrol and diesel cars, golf courses, liquid textile softeners, and power mowers it is an open question if they can at all become environmentally friendly and hence qualify for a Swan or Flower label. On the other hand, there will still be an environmental benefit to reap from choosing the least ”black ” of such black products.

The Danish Ecological Council (DEC) finds that “black ” products should not be eco-labelled. However, they may well qualify for labelling on single parameters such as power consumption. Recently DEC has supported a campaign with the goal that consumers should choose cars with the lowest fuel consumption. But at the same time we demand general restrictions on the use of private cars – like road pricing.

Fabric softeners is another product, which is unnecessary for most purposes, and it is questionable whether such a product should be eco-labelled, even if one fabric softener is less hazardous than others.

Fees payable for eco-labelling licenses must be removed

The present fees charged for a number of recognised eco-labels seriously discourage product development and marketing of far more eco-labelled products.

The Danish Ecological Council finds it unconscionable and illogical that a fee is inflicted on the manufacturers of environmentally superior products. Recognised and credible eco-labels should therefore be made free of charge without undue delay, as part of efforts towards a more sustainable development. For the EU Flower label, this would require a directive amendment, while the fee on the Swan label can be abolished directly.

2. Green public procurement policy

The public sector – state institutions as well as institutions belonging to local administration/entities (municipalities and counties) – purchases large amounts of goods of many kinds. In most countries the major part of hospitals, schools at all levels and kindergardens belong to the public sector. If the public sector agrees on environmental requirements to certain goods, it will have a great power towards the producers and distributors of these goods. And if the public sector can promote that more environmentally friendly products are brought on the market, this will also promote that such products are brought on the private consumer market.

Since 1991 it has been government policy in Denmark, that the state must develop and adopt a green procurement policy, and the municipalities and counties are recommended to do the same. Environment must be taken into account equal to price, quality, service etc. Also when the institutions make call for tenders, according to the EU procurement directives they must include environmental requirements.

Doubts have been raised on the interpretation of the EU-directives on public procurement – whether these allow public institutions to set up environmental demands in their tenders, if these demands are more strict than existing directives. In July 2001 the EU Commission issued an interpretative note giving better opportunities for public institutions to set up such demands. The note states that the public purchasers are invited to make demands on eco-labels, regarding the fulfilment of the technical criteria for obtaining such a label. And also that those eco-labelling requirements can comprise European labels (e.g. the EU Flower), cross-national regional eco-labels (e.g. the Nordic Swan), national labels (e.g. the Danish Ø label for organic food), and global labels (e.g. the FSC label for wood that has been produced under sustainable conditions).

The Danish Procurement Service, which serves state as well as county and municipal institutions, makes so-called framework contracts for different product groups. These describe that not only price and quality matters but also environmental requirements for the goods. Such a framework contract has been issued in 1999 covering detergents and cleaning agents. The environmental requirements focus on environment and health as well as the working environment. The requirements are set up in three levels:

Level 1: a number of rather strict requirements concerning environment and working environment, including a ban on perfumes

Level 2: like level 1, except that perfume is allowed

Level 3: Fewer requirements.

Institutions that subscribe to the framework contracts are recommended normally to use products that apply to level 1. If they have smelling problems that can not be solved in another way they can use products from level 2. Only for special tasks, for instance cleaning of very dirty objects, they can add products from level 3.

The main requirements relevant to detergents and hand dish washing detergents are:

Level 1:

- substances classified as toxic, harmful, corrosive, sensitising, carcinogenic, teratogenic, mutagenic or irritating with certain risk sentences (R 37, 38, 41) must not be added above a triviality limit, which is defined in a statutory order

- Substances with a limit value according to the working environment law must not exceed 0,5%.
- Substances classified as hazardous to the environment, with R 50-53 must not exceed 2,5%, and substances with R-51-53 must not exceed 25%
- Substances on the List of Undesired Substances from the Danish EPA must not be added, including nonylphenoethoxylates and kat-ionic surfactants
- Optical whitener, EDTA, NTA, colours and perfume must not be added.

Level 2: like level 1, except that perfume is allowed

Level 3:

- Products must not be classified as corrosive
- substances classified as toxic, harmful, corrosive, sensitising, carcinogenic, teratogenic, or mutagenic must not be added above a triviality limit, which is defined in a statutory order
- Substances on the List of Undesired Substances from the Danish EPA must not be added, including nonylphenoethoxylates and kat-ionic surfactants

In call for tenders the institutions must ask the suppliers to describe their environmental performance, for instance if the packagings for detergents and hand dish washing agents have automatic dosage control.

The Danish Ecological Council finds that the public sector must, as part of a green purchasing policy, make the purchase of eco-labelled goods mandatory for all product lines, services, and building materials, provided an adequate supply of eco-labelled goods exists within the product group in point. Products with less hazardous chemicals should be an important part of a green public procurement policy.

3. Green taxes

Denmark has not used green taxes in order to promote the sales of more environmentally friendly detergents or dish washing agents. But the instrument is used for similar purposes. There are green taxes on chlorinated organic solvents, for instance perchloroethylene, which is used as a dry cleaning agent, and on the industrial green house gasses (HFC, PFC and SF₆), which are used in different products like refrigerators and shoes.

4. NGO-activities

Danish NGOs have backed the use of eco-labelling by participating in information campaigns together with the Ministry of environment. In this way the common campaigns have taken advantage of the high credibility that the environmental NGOs have in the public. One of the NGO – The Active Consumers in Denmark – made a special campaign in 2000 against detergents with LAS, especially Ariel. They produced posters and put them up in Copenhagen and other cities in Denmark, at café's, Universities and other education centres. They also produced a flyer, which was distributed to customers in supermarkets – asking them to buy detergents without LAS. The flyer stated that LAS is normally not labelled. Therefore it must be avoided by choosing eco-labelled products.

The campaign contributed, together with a test made by the Danish Consumer Agency, see below, to a decision later taken by Proctor & Gamble to remove LAS from Ariel.

5. Tests and information to the public

The market share of eco-labelled laundry detergents remained at a very low level until 1999. The larger companies that sell the products – all importers like Proctor&Gamble and Unilever – has kept a boycott against eco-labelling on the Danish market, and this is still the situation. Only smaller producers, mainly those affiliated to the COOP-chain (the co-operative retailers chain, which in Denmark has more than 30% of the total retailers market for daily goods), market eco-labelled laundry detergents. But in 1999 the situation changed. The Consumers Agency¹ made a survey on the brands on the market – their price, efficiency and environmental impact. The result was that one of the eco-labelled products² were the most effective, the cheapest and the most environmentally friendly at the same time. This had a very quick effect on the market. Within few months the sales of eco-labelled products in the largest Danish retailers chain was doubled 17 times – later it was reduced a bit again, but still 10 times higher than before the survey. But still the sales of eco-labelled products are much smaller than in Sweden.

The big importers were criticised by environmental and consumer groups, especially Proctor&Gamble, the producer of Ariel, because they already marketed eco-labelled Ariel in Sweden. But the company stated that the eco-labelled product was not more environmentally friendly than the non-labelled. The difference was especially the content of LAS in the non-labelled. Today environmentally better alternatives to LAS exist.

After the survey from the Consumers Agency Proctor&Gamble reacted by changing the product and remove LAS, but still they would not apply for eco-labelling. In 2001 The Consumers Agency³ made a new test, which indicated that the environmental impact of the eco-labelled products and the non-labelled product Ariel is about the same. But the survey was based on an index which left out some of the important environmental parameters like the content of perfume. Therefore the Danish Eco-label secretariat questioned the conclusion and found that the eco-labelled products still was more environmentally friendly, if all relevant parameters would be included.

But no doubt the large non-labelled products on the market had improved in terms of environment, i.e. by substituting LAS with more environmentally friendly detergents. This is of course a progress for the environment – which would not have happened (at least not so quickly) if we did not have the eco-labelled products on the market. But it is a problem of communication. Now the big companies can claim that their products are as good as the eco-labelled in terms of environment. This can reduce the motivation for consumers to buy eco-labelled products in general. Therefore it is still important to put pressure on the big companies to join the eco-labelling scheme.

It is important for the companies to consider that consumers trust eco-labelling. As eco-labelling is a third party certification scheme where the criteria are set up by a third party and the control is carried out by a third party as well. As a consumer it is not possible to read the full contents on the package and if there is an eco-label the consumer knows that a credible part has checked the environmental aspects of the product.

¹ “Råd og resultater” no. 10, 1999 (in Danish), Forbrugerstyrelsen – a governmental agency belonging to the Ministry of Economy and Industry

² Bluecare from COOP

³ See www.fi.dk/test (in Danish)

6. International co-operation

ICLEI – International Council for Local Environmental Initiatives

ICLEI is an organisation that promote environmental initiatives on a voluntary basis. ICLEI has among other things promoted green public procurement policy, and has put pressure on the EU to improve its procurement directives, so that they permit green public procurement policy, see above. ICLEI has a network for green procurement, called Big-net, chaired by the municipality of Kolding, Denmark. On 8-11 September ICLEI holds a conference – “Ecoprocura” - in Gothenburg in Sweden on green public procurement, where they will start a campaign for eco-procurement in Europe. Later ICLEI wants to expand the campaign to be worldwide. ICLEI supports local projects on public procurement. One of those is in Burgas in Bulgaria, where they among other things reduce the use of pesticides in the town. The project will be presented in Gothenburg. See www.iclei.org/europe/ecoprocura.

In November 2002 a conference was held in Kolding, Denmark for local authorities (counties and municipalities) as a follow-up to the Johannesburg summit. The “10 Kolding Key Political Reflections” was presented and adopted, pointing out how local authorities can contribute to Agenda 21. Number 7 is: “Green public procurement provides an effective tool for developing sustainable patterns of production and consumption, and must be pursued by many more European local authorities”.

ICLEI has members in:

Estonia: Tartu

Latvia: Riga and Jurmala

Lithuania: 0⁴

Poland: Katowice, Gdansk

Sustainable Cities and Towns Campaign

This proces started up with a conference in Aalborg in Denmark in 1994, where the Aalborg charter was adopted. 2,000 cities and towns have signed up. Now the municipality of Aalborg is preparing a “Aalborg + 10” conference next year. In the autumn they will decide about the themes of the conference. It is most probable that green public procurement and chemicals will be included⁵.

⁴ Bjarne Rasmussen, Storstroem County, Denmark says that Klaipeda and some other town in Lithuania are members of ICLEI, but according to ICLEIs home page they do not have members in Lithuania.

⁵ Personal communication, Steffen Thomsen, Municipality of Aalborg, Denmark.

II. Household chemicals and eco-labelling in EU and Nordic countries

Introduction

In this report we will present and compare the criteria of the Nordic Swan and the EU Flower. We will also mention Good Environmental Choice (“Bra Miljöval”) which is run by the Swedish Society for Nature Conservation (Svenska Naturskyddsföreningen). All criteria mentioned in the following can be found on www.ecolabel.dk.

The Swan is much more widespread on the market than the Flower. This is not only because of a competition between the two on the Nordic market. If we compare the Nordic EU-member states (Denmark, Sweden and Finland) with other EU member states, who do not have their own eco-labelling scheme, these do not have more Flower licenses than the Nordic countries – most of them have much less.

The criteria set of the Flower and the Swan have major similarities – both are based on life cycle analyses, meaning that environmental effects in principle from all parts of the chain from production of raw materials over industrial production and consumption to disposal. But the Swan and the Flower also have differences in their methods and units. If you compare the latest versions for the product groups covered by this report, you can not say that one is more progressive or restrictive than the other.

The aquatic toxicity is calculated in two different indices. The Swan uses “Toxicity and degradability Score” (TD or TDS), while the Flower uses Critical Dilution Volume (CDV). The TD focuses on acute toxicity, while CDV focuses on chronic effects.

Product group	The Swan	The Flower
Hand dish washing agents	14	6
Laundry detergents	47	3
Machine dish washing agents	28	6
All groups	858	134

Table1: Number of licenses of the Swan and the Flower in the Nordic countries

1. Laundry detergents

The Swan as well as the Flower criteria covers in principle all laundry detergents, powder as well as liquid. But in practise it is very difficult for liquid products to meet the requirements. Because they have no complex builders. The complex building has to be made by the detergents, and these are more toxic to the environment. No liquid products have the Swan label, while one has the Flower.

Focus of the labelling

The Flower:

- Savings of transport and energy by favouring compact laundry detergents
- Reduction of water pollution by reducing the volume of total chemicals used in the products and by limiting the use of potentially hazardous ingredients

- The minimisation of waste production by reducing the amount of primary packaging.

The Swan:

About the same as the Flower, but presented in a shorter form: the total quantity of chemicals, hazardous chemicals and the packaging.

Compared to this the Polish/Baltic NGO-project has a more narrow focus, only on chemicals that are hazardous to the environment. Therefore we will focus on that part of the criteria in this report.

History of the criteria

The criteria of the Swan as well as the Flower has been and will be regularly strengthened. The latest Swan criteria are from 2001 and will be valid until June 2005. New Flower criteria⁶ came into power from 1 March 2003 and will be valid until 29 February 2008. But already existing licenses according to the old Flower criteria will be valid until September 2004.

One of the main changes from the first to the second criteria set for the Flower as well as the Swan is that now the surfactants have to be readily biodegradable not only under aerobic (in an environment with oxygen) but also under anaerobic conditions (with oxygen deficit). The Swan criteria also demands biodegradability under both conditions.

Another progress in the Flower is that the requirement of max. aquatic toxicity – the Critical Dilution Volume (CDV) has been reduced from 10,000 to 4,500 l/wash. This also limits the use of perfumes, as these have strong effects in the aquatic environment and therefore a substantial influence on the dilution volume. The limit value, above which the forbidden substances (see table 2) may not be used, has been reduced to 0.01% - while it is 0.1% in the Flower criteria for hand dish washing detergents and cleansing agents.

The Danish EPA (Miljøstyrelsen) still finds a number of weaknesses in the Flower:

- The CDV should be reduced to 3,000-3,500 l/wash
- The max content of phosphates should be reduced to 20 g/wash
- Perfume/fragrances should not be allowed

Perfume is also allowed in the Swan. It is normally not used in eco-labelled products on the Danish market – but it is used in other Nordic countries. According to Unilever, only 10% of the laundry detergents on the Swedish market are fragrance-free.

The criteria on hazardous chemicals

The exact formulation of the product shall be provided to the Competent Body together with safety data sheets and the classification for each ingredient, as documentation of the compliance with the criteria.

Parameter	The Swan	The Flower
Phosphates	Soft water area: 5 g/wash ⁷ Hard water area: 30 g/wash (covers complex builders, including phosphates)	Maximum 25 g/wash ⁸
Biodegradability of	Readily biodegradable, aerobic	Readily biodegradable, aerobic

⁶ Official Journal of the European Union, 22 March 2003

⁷ Measured as total P. In Norway the legislation provides an even lower limit

⁸ Measured as sodium tripolyphosphate (STTP)

surfactants	conditions. Anaerobic: 60% biodegradability	conditions Anaerobic: 60% biodegradability
Phosphonates	Phosphonates and NTA together below 0.5 g/wash ⁹	Amount of not readily biodegradable (aerobic) phosphonates less than 0.5 g/wash
Forbidden substances	Alkyl phenol ethoxylates (APEO) Other substances with a serious classification ¹⁰ EDTA Optical whiteners Colorants Reactive chlorine compounds, e.g. sodium hypochlorite, organochlorines	Alkyl phenol ethoxylates (APEO) and derivatives thereof NTA ¹¹ and EDTA ¹² Quaternary ammonium salts, not readily biodegradable ¹³ A number of musk compounds Other substances with a serious classification ¹⁴ Etc. ¹⁵
Allergic effect	The product must not be classified as R 43 ¹⁶ . Allergens must be declared on the packaging	Must not be classified as R 43 ¹⁷ . A number of allergens are banned, see "Forbidden substances"
General classification	The product must not be classified as harmful, corrosive, irritant with R 41 ¹⁸ , etc.	Only the most serious classifications (see "Forbidden substances")
Fragrances/perfume	Must follow the code of practice of the International Fragrance Association	Must follow the code of practice of the International Fragrance Association Must be declared on the packaging
Total amount of chemicals	Soft water areas: 50 g/wash Hard water areas: 100 g/wash (60 g functional dose, 40 g builders)	100 g/wash
Aquatic toxicity	Toxicity and degradability (TD): Target value: 8,100 Maximum permissible amount: 14,000	Critical dilution volume (CDV) ¹⁹ : maximum 4,500 l/wash

Table 2: Selected chemical criteria of the Nordic Swan and the EU Flower

⁹ There are further restrictions according to national regulation - in Denmark for NTA and in Norway for phosphorous

¹⁰ For instance R 53 (May cause long term adverse effects in the aquatic environment) in combination with R 50 (very toxic ...) or R 51 (toxic to aquatic organisms), except that such substances can be added in a quantity below 0.05 g/wash

¹¹ Nitritotriacetat

¹² Ethylenediamine tetraacetate

¹³ Normally the quaternary ammonium compounds will not be readily biodegradable. But on request of industry this modification was added, in case they can find compounds that *are* readily biodegradable. In comparison, the Flower criteria for hand dishwashing agents, just plainly says that quaternary ammonium compounds are forbidden.

¹⁴ For instance R 53 (May cause long term adverse effects in the aquatic environment) in combination with R 50 (very toxic ...) or R 51 (toxic to aquatic organisms)

¹⁵ The bans cover amounts above 0.01%

¹⁶ "May cause sensitisation by skin contact"

¹⁷ "May cause sensitisation by skin contact"

¹⁸ "Risk of serious damage to the eyes"

¹⁹ The amount of water that the dosage for one wash must be diluted in, in order to be non-harmful to aquatic organisms

If you try to compare the figures in the Flower and the Swan, you must multiply the figures from the Swan criteria with 1.3, because a Swan unit wash is 3.5 kg, while a Flower unit wash is 4.5 kg.

The table tells that the Swan forbids ingredients that are classified as harmful to the eyes (R 41), while the Flower has no restriction here. But experience show that in practise all detergents have about the same harmful effects to the eyes. Therefore industry argues that a requirement of testing will lead to unnecessary and painful animal testing. Therefore the Danish Eco-labelling secretariat presumes, that the Swan will have to give up this requirement²⁰.

The Flower presents a Detergent Ingredients Database (DID list) of the most commonly used detergent ingredients, their toxicity, biodegradability etc. Producers must use the list to see, if their product meets the criteria. If the product contains substances, which are not on the list, the criteria document presents a precise method, which the producer must follow. Parallel to this the Swan has a Chemicals List with the data and indices required, and also a procedure to follow, if substances are not on the list. The producer can also choose not to test a substance. In that case it must be calculated as “worst case”.

It has been decided, that the Flower and the Swan competent bodies should try to unite the DID- list and the Chemicals list. This work is currently in progress and is led by the Norwegian competent body for the Nordic Swan.

As can be seen in table 2, the maximum amount of chemicals per wash as well as the phosphorous content in the Swan is differentiated for areas with hard and soft water – defined as below and above 14°dH – while the Flower does differentiate in this way.

The Nordic Swan is referring to the EU classification system, even though Norway and Iceland are not members of the EU – but they take part in the European Economic Space (EES) agreement, which is also based on the EU directives, for instance for classification and labelling of chemical substances and products.

The criteria concerning anaerobic biodegradability of surfactants means that LAS, which is a main ingredient among surfactants, though it is not forbidden, will normally not meet the criteria.

The criteria concerning fragrances/perfume means that these are allowed, which is one of the weaknesses of both set of criteria – as many fragrances and perfumes can cause allergic reactions, even though they are not classified as allergic.

Phosphonates and alternatives

Phosphonates are regarded as toxic to aquatic organisms and not readily biodegradable. Therefore the use is limited, but it is not forbidden like in Bra Miljöval. It is more complicated to forbid it in hard water areas. The alternatives are zeolites, citrates and polycarboxylates. Zeolites and citrates are non-hazardous, but not very effective as metal-binders. Zeolite can cause smelling problems in the washing machines, because sludge can accumulate and collect bacteria, if you use too low

²⁰ Personal communication, Jørgen Toldsted, Danish Eco-labelling secretariat

temperatures. It can be avoided, if you sometimes wash by at least 60°C and 95°C is even better²¹. But besides this zeolites wears the clothes during repeated washing.

Polycarboxylates are not readily biodegradable neither under anaerobic nor aerobic conditions, but it can still meet the requirements of eco-labelling, because the biodegradation requirements only apply to surfactants.

It is now discussed between Danish scientists whether phosphonates are really toxic to aquatic organisms. Another theory is that they, under laboratory conditions, prevent the organisms from getting access to food. Hence the organisms starve – but they are not poisoned²². If this is true, this effect will not be relevant in nature, and in that case phosphonates are not as hazardous, as they are regarded today – and probably not more hazardous than polycarboxylates.

The Danish position on phosphates

The major part of Denmark has hard water. Therefore it is not as easy as for instance in Norway to remove phosphorous from detergents. When the discussion reached its peak in the 1980'ies there was a fear that phosphate would be substituted by substances like NTA and EDTA, which could be more toxic to health and the environment. At the same time the sewage cleaning system was improved, and in the period 1987-93 all cleaning plants in cities and towns – and those belonging to industries – were extended with phosphate cleaning. It has been estimated that only 25-40% of the phosphorous (P) in urban sewage water comes from detergents. Therefore it would be necessary to have P-cleaning, even if P was removed totally from detergents.

Some Danish municipalities add phosphates to the sewage before cleaning, because otherwise the bacteria in the cleaning plants would be inhibited in their growth. So you might reach the paradox that if all consumers used eco-labelled detergents with no or low amounts of phosphates, you would have to add even more phosphates to some cleaning plants.

On the other hand around 20% of the population live in the country side, where there is no P-cleaning. Here people are recommended to use detergents without P. This recommendation is hard to communicate and implement, when even eco-labelled detergents can contain P. The criteria for Bra Miljöval (Good Environmental Choice) states that there has to be a text saying that the washing powder is not suitable for households not connected to sewage treatment plants.

Besides phosphorous is also a question of resources. It takes much energy to extract P from minerals.

2. Hand dishwashing detergents

²¹ In earlier days it was common to wash by 95°C, but for energy conservation reasons most people wash by 40° today. But also for hygienic reasons it is important to wash underwear and bed linen by 60°, and this would help to avoid the smelling problems. But it can be necessary to use 95° a few time, if you have already got the smelling problems. The Danish Consumer Council has a guide on their homepage (in Danish) about how to avoid smelling problems in washing machines. They recommend to let the soap drawer be left open, when the machine is not used.

²² Torben Madsen, DHI (Danish Hydraulic Institute), personal communication.

Also here we will concentrate on the criteria concerning chemicals that are hazardous to health or environment – although the Swan as well as the Flower also include other criteria concerning packaging, transport etc.

Scope of the eco-labelling

In both eco-labels the product group is defined as dishwashing detergents for households as well as for professional use.

Products, which are meant to be disinfecting or prevents growth of micro-organisms (e.g. bacteria) – not only preserving the product itself, but disinfecting the water and the dishes - are excluded from labelling. It is also forbidden to claim on the packaging or in other communication, that the product has an anti-microbial function. The reason is that the authorities have expressed a clear attitude against these products, because they are superfluous and may present a risk of forming resistance in bacteria.

The aims of the Swan criteria are to

- Prevent the use of substances with a negative effect on aquatic organisms in the short and long term, i.e. reduce the content of non-aerobically degradable ingredients
- Limit harmful effects on health of fragrances
- Reduce packaging quantities
- Entail a more precise dosage recommendation, to prevent consumers from using too high dosage

The Swan also includes requirements for cleaning ability. The aim of the Flower criteria are almost the same as the Swan.

History of the labelling criteria

The decision to develop Swan criteria was taken in 1993, and the first criteria came into force from 1996 – in Sweden, Norway and Finland (Denmark joined the Swan from 1997).

Evaluations in 1997 and 2000 showed that the market share of eco-labelled products was relatively small. In 2000 the market share for the Swan was 12% as an average in the Nordic countries. But in Sweden Bra Miljöval has a market share of 93% in 1997 – their criteria have been in force from 1990.

In 2001 revised Swan criteria was issued. New requirements were added regarding

- health and fragrances
- anaerobic biodegradability of surfactants

Products that are harmful to the eyes (R 41) or sensitising at skin contact (R 43) are no longer permitted.

Flower criteria were issued in 2001²³.

There is a trend towards more concentrated products used in smaller dosage. The concentrated products have an average solids content of 34%, while the average for the non-concentrated are around 16%. The hand dish washing detergents are normally overdosed by around 100% compared to what is necessary, and the recommended dosage on the packaging is often too high. For the concentrated products the dosage should be 2 ml/5 l water, for non-concentrated 3 ml²⁴.

²³ Official Journal of the European Communities, 8 August 2001.

²⁴ Hand Dishwashing Detergents, Technical Report no. 9, 1996, Forbrugerstyrelsen (Consumer Agency)

Environmental effect of the labelling

A Danish survey²⁵ concluded that hand dishwashing agents are the fifth most important chemical pollutant from households, even though that one half of the Danish households have dish washing machine. Also these households use hand dish washing, because certain kinds of dishes are unable to withstand the dish washing machine.

The main environmental effect of eco-labelling has been a reduction of the use and emission of non-anaerobically biodegradable surfactants. The reduction, due to the first edition of the criteria, was in 2000 calculated as 100 t, out of 1800 t of total consumption in the Nordic countries. There are on an average 6% non-anaerobically biodegradable surfactants in the hand dish washing agents on the Nordic market, but this average covers very large differences – 12% on the Danish market and only 1% on the Swedish. Before Bra Miljöval was introduced in Sweden in 1990 the level was 17%. This can be seen as the level we would probably still have, if we had not introduced eco-labelling.

The criteria on hazardous chemicals

Parameter	The Swan	The Flower
Biodegradability Of surfactants	Readily biodegradable, aerobic conditions. Anaerobic: 60% biodegradability	Readily biodegradable, aerobic conditions. Anaerobic: 60% biodegradability
Biodegradability Of other ingredients	Non Readily Biodegradable Ingredients must not exceed 40 mg/ recommended dosage. Anaerobic: 240 mg/dosage	
Forbidden substances	Alkyl phenol ethoxylates (APEO) NTA ²⁶ and EDTA ²⁷ A number of musk compounds	Alkyl phenol ethoxylates (APEO) NTA ²⁸ and EDTA ²⁹ Quaternary ammonium compounds A number of musk compounds Other substances with a serious classification ³⁰ Etc. ³¹
Allergic effect	Must not be classified as R 42 ³² or R 43 ³³	Must not be classified as R 42 ³⁴ or R 43 ³⁵
General classification	The product must not be classified	?

²⁵ Charting of the Environmental Impact of the Activities of the Family, Working Report no. 26, 1996, Miljøstyrelsen (Danish EPA)

²⁶ Nitritotriacetat

²⁷ Ethylenediamine tetraacetate

²⁸ Nitritotriacetat

²⁹ Ethylenediamine tetraacetate

³⁰ For instance R 51 (toxic to aquatic organisms) and R 53 (May cause long term adverse effects in the aquatic environment)

³¹ The bans cover ingredients in amounts above 0.1% in the product

³² "May cause sensitisation by inhalation"

³³ "May cause sensitisation by skin contact"

³⁴ "May cause sensitisation by inhalation"

³⁵ "May cause sensitisation by skin contact"

	as harmful, corrosive, irritant with R 41 ³⁶ , etc.	
Fragrances/perfume ³⁷	Must follow the code of practice of the International Fragrance Association Must be declared on the packaging Forbidden in products for professional use	Must follow the code of practice of the International Fragrance Association Must be declared on the packaging
Colouring agents	Must be permitted for use in foodstuffs or cosmetics in the EU	Must be permitted for use in foodstuffs ³⁸
Preservatives	Must not be bio-accumulative	Must not be bio-accumulative
Total amount of surfactants	No direct limit, but indirectly limited by the maximum dosage, see “dosage instructions”	Max 0.4 g/l water, for dirty dishes
Aquatic toxicity	Toxicity and degradability score (TDS): maximum 1,000 Limit value according to a toxicity index	Critical dilution volume (CDV) ³⁹ : maximum 170 l
Dosage instructions	Must be included, and based on the results of a performance test. The recommended dosage must not exceed 10 g/5 litre water.	Standard text required: follow the recommended dosage etc. Dosage must be indicated for dirty as well as “not very dirty” dishes

Table 3: Selected chemical criteria of the Nordic Swan and the EU Flower

Like for the laundry detergents described above the Flower presents a Detergent Ingredients Database (DID list) of the most commonly used detergent ingredients, their toxicity, biodegradability etc. Producers must use the list to see, if their product meets the criteria. If the product contains substances, which are not on the list, the criteria document presents a precise method, which the producer must follow. Parallel to this the Swan has a Chemicals List with the data and indices required.

3. Bleaching agents

Bleaching agents are included in laundry detergents for white wash. You can also buy bleaching agents separately. The most common is sodium hypochlorite, which is also used by some people for special kinds of house cleaning. Many campaigns from governmental bodies as well as NGOs have urged people not to use sodium hypochlorite, telling people that it is unnecessary. The consumption has also been reduced (I am looking for precise figures), but it is hard to get rid of.

There are no eco-labelling criteria for separate bleaching agents, neither in the Swan or the Flower. Good Environmental choice has criteria for bleaching agents. But to be used as part of laundry

³⁶ “Risk of serious damage to the eyes”

³⁷ Except the musk compounds that are banned, see above

³⁸ According to directive 94/36/EEC with amendments

³⁹ The amount of water that the dosage for one litre water for dish washing must be diluted in, in order to be non-harmful to aquatic organisms

detergents percarbonate and perborate are allowed, except that content of perborate counts negative in the score, meaning that it might contribute to non-compliance with the criteria. Perborates are not permitted in Good Environmental choice, neither in the criteria for bleaching agents nor laundry detergents.

III. Hazardous substances in laundry detergents and hand dishwashing detergents

Surfactants

Function: Surfactants can remove dirt from clothes or dishes and keep the dirt dissolved in the washing water. Often you use a mixture of an-ionic and non-ionic surfactants.

All surfactants will harm aquatic organisms if they are not readily biodegradable. Modern surfactants will normally be readily biodegradable under aerobic conditions – with available oxygen. Therefore the question is whether they are anaerobically biodegradable – under conditions without available oxygen. Here the demand in the Swan as well as the Flower is 60% anaerobic biodegradability.

The reason for setting a demand to anaerobic biodegradability is that anaerobic conditions can occur in sediment in the aquatic environment and in sewage sludge when it is spread on agricultural fields.

The Swan and the Flower also limits the acute toxicity to aquatic organisms of the ingredients.

An-ionic surfactants

Linear Alkylbenzene Sulphonates (LAS) is a group of surfactants with 10 to 13 C-atoms. LAS is aerobically biodegradable. It has not been proven anaerobically degradable, although this is still controversial among scientists. In general sulphates are more anaerobically degradable than sulphonates. Therefore detergents with sulphates should be chosen if possible.

LAS is partly degraded during sewage treatment, but part of it will pass through to the recipient, and around 20% will rest in the sludge. Therefore LAS enters the soil environment when sludge is recycled for agricultural use. Whether LAS can cause problems if the sludge is recycled for agricultural use is controversial. Tests have shown half lives of LAS in soil between 7 and 22 days. Another study showed that 98-99% of LAS in the upper soil layer would degrade within one year. If sewage is treated in a septic tank, LAS will not be degraded.

Most LAS compounds have low to moderate bioaccumulation potential – except the C₁₃₋₂ component that has a high potential.

There are other surfactants that are also not anaerobically degradable. Therefore the ecolabel criteria do not refer to LAS but to the anaerobic biodegradability.

An-ionic surfactants can also be fatty acid soaps, which are easily degradable in sewage treatment plants as well as in nature provided that the soaps are bioavailable.

Non-ionic surfactants

Alkyl phenol ethoxylates (APEO)

belong to the non-ionic surfactants. Especially octyl- and nonyl-phenol ethoxylates are persistent and highly toxic to aquatic organisms. Nonyl-phenol ethoxylates degrade to nonyl phenols, which are suspected endocrine disrupters that can change the sexual development of aquatic organisms, and perhaps do the same to humans.

Alcohol ethoxylates also belong to the non-ionic surfactants. They are highly toxic to aquatic organisms, but normally they will be degraded in sewage treatment plants.

Cat-ionic surfactants - Quaternary ammonium salts

Some quaternary ammonium salts are not readily biodegradable whereas others are. The Swan-criteria say that quaternary ammonium salts *can* be used, if they *are* readily biodegradable. A similar approach is used in the Flower criteria for laundry detergents.

Complex binders

Function: Complex binders are used to bind calcium and magnesium in the water and to stabilise the pH. Some complex binders like phosphonates can also bind metal-ions.

Phosphates

are often used in high amounts in areas with hard water. Phosphates contribute, together with nitrates to eutrophication – overgrowth of algae in freshwater as well as in the sea. Phosphates as well as nitrates have to be present to induce eutrophication. In each environment one of them will be the limiting factor. It is rather complicated to calculate which of them will be the limiting factor in a certain environment. In Denmark for instance phosphates are the limiting factor in fresh water, in fjords and coastal waters, while nitrates are the limiting factor in more open seas like the Kattegat between Denmark and Sweden. But in the Baltic Sea phosphates can also be the limiting factor in parts of the open sea.

In areas with hard water a ban on phosphates might lead to use of NTA and EDTA (see sections about these) in stead, and these are much more toxic to health and the environment. Therefore it is important, if you ban phosphorous in such areas, that you know what the substitute will be.

It is also a question of the quality of the sewage cleaning systems. In Denmark all treatment plants in cities and towns – and those belonging to industries – have been extended with phosphate cleaning. It has been estimated that 25-40% of the phosphorous (P) in urban sewage water comes from detergents. Therefore it would be necessary to have P-cleaning, even if P was removed totally from detergents.

If there is no phosphate cleaning it is always important to use detergents without P. In Central and Eastern Europe you still have many sewage cleaning plants without P-cleaning, and in Western countries like Denmark and Sweden still there is no P-cleaning in the country side. Besides, phosphorous is also a question of resources. It takes much energy to extract P from minerals.

Phosphonates

Phosphonates are often regarded as toxic to aquatic organisms and not readily biodegradable – neither under aerobic or anaerobic conditions. But according to recent assessments phosphonates do not seem to be toxic – the only problem seems to be their persistence⁴⁰. The bioaccumulation potential of phosphonates seems to be low.

Apparently phosphonates rather than being toxic to algae, they, under laboratory conditions, prevent the organisms from getting access to essential nutrients. Hence the organisms cannot grow and growth is the parameter used to evaluate the effect of the chemical in the laboratory⁴¹. This effect will not be relevant in nature, and in that case phosphonates are not as hazardous, as they are often regarded today – and probably not more hazardous than polycarboxylates.

Zeolites and **citrates** are non-hazardous, but not very effective as metal-binders. Citrates are easily degradable, while zeolites are not. Zeolite can cause smelling problems in the washing machines, because sludge can accumulate and collect bacteria, if you use too low temperatures. It can be avoided, if you sometimes wash by at least 60°C, and 95°C is even better⁴². But besides this zeolites wear the clothes during repeated washing.

Zeolites might cause problems in indoor environment, because they stay in the clothes and can be found in dust, where they might cause lung symptoms.

Also carbonates and silicates have low toxicity, and they are easily degradable.

Polycarboxylates

are not readily biodegradable neither under anaerobic nor aerobic conditions, but they seem to have very low toxic effects to aquatic organisms as well as to humans – acute as well as chronic effects. Detergents with polycarboxylates can still meet the requirements of eco-labelling, because the biodegradation requirements only apply to surfactants.

EDTA (Ethylenediamine tetraacetate)

is not easily degradable in sewage treatment plants or in the aquatic environment. It binds heavy metals that would normally be removed from the sewage water by the cleaning plant. Therefore it can cause emission of heavy metals to the aquatic environment.

EDTA has also shown teratogenic effects in animal testing, and the same effect is suspected in humans.

NTA (Nitrilotriacetat)

causes the same hazards as EDTA. Besides it is a suspected carcinogen.

⁴⁰ Review from: Water Research, 37 (2003) 2533-2546: Environmental chemistry of phosphonates", Bernd Kowack, and a risk assessment from the Australian authorities: National Industrial Chemicals Notification and Assessment Scheme - Phosphonate LR2, 4 July 2002, File No: STD/1016

⁴¹ Torben Madsen, DHI (Danish Hydraulic Institute), personal communication.

⁴² In earlier days it was common to wash cotton by 95°C, but for energy conservation reasons most people wash by 40° today. But also for hygienic reasons it is important to wash underwear and bed linen by 60°, and this would help to avoid the smelling problems. But it can be necessary to use 95° a few times, if you have already got the smelling problems. The Danish Consumer Council has a guide on their homepage (in Danish) about how to avoid smelling problems in washing machines. They recommend to let the soap drawer be left open, when the machine is not used.

Optical whiteners

Are toxic to aquatic organisms and they are not easily degradable. They can cause irritation – and perhaps allergy - to humans because of residues in the clothes after washing.

Bleaching agents

Percarbonates have irritating effect by direct contact, but are not known to have serious long term effects.

Sodium-perborates have a low acute toxicity, but they will partly degrade to borates that are suspected teratogens. As the degradation will take place in the washing machine, and the borates will go with the sewage, the risk of exposure to humans is low.

Hydrogen peroxide is corrosive to the skin and the eyes in high concentrations, but do not have known harmful effects to environment or health in the low concentrations, which can be used in detergents. It is easily degradable with a half-life between 8 and 31 hours in water.

Reactive chlorine compounds, e.g. sodium hypochlorite, are the most harmful bleaching agents. They can cause damage to the environment, especially the indoor environment by forming organic chlorine compounds like chloroform. The effect of sodium hypochlorite on the effectivity of sewage cleaning plants (activated sludge) has been tested, and it does not seem to have serious effect in the concentrations occurring in municipal sewage. In the aquatic environment sodium hypochlorite will rapidly react with other substances. Therefore the inherent toxicity of hypochlorite will have very little, if any, relevance.

Sodium hypochlorite emits toxic fumes. It can cause accidents if it comes in contact with acids because of high emission of chlorine gas.

Sodium hypochlorite can damage the fertility of mice (sperm head abnormalities).

Also bleaching activators can be used, to make the bleaching agent function at lower temperatures. Here Tetra-acethylene-ethylene-diamin (TAED) can be used.

Fragrances/perfume

Many fragrances and perfumes can cause hypersensitivity – contact allergy or intolerance, even though they are not classified as allergic. A Danish study has indicated that 1.1% of the normal population are allergic to specific perfumes (Balsam of Peru and a fragrance mix). This reaction is chronic, and there is no known cure. The symptoms can be alleviated with steroid creams, but this can cause side effects.

Fragrances are also hazardous to aquatic organisms.

Musk compounds – polycyclic musks or musk oils – is a special group of fragrances. Two of the musks – AHTN and HHCB have been tested and found not easily biodegradable and with a potential for bioaccumulation. But biodegradation does occur, by different soil born fungi.

Very many substances are used as fragrances, and only few of them are tested thoroughly. For instance AHTN and HHCB have not been tested for allergenicity.

Other compounds

Disinfecting agents - products, which are meant to be disinfecting or prevents growth of micro-organisms (e.g. bacteria) – not only preserving the product itself, but disinfecting the water and the dishes - are excluded from labelling. an anti-microbial function. they are superfluous and may present a risk of forming resistance in bacteria.

Enzymes are regarded harmless to the environment, but they can cause inhalation allergy, if humans inhale them in a dry form. Today, enzymes are marketed in a granulated form, where the allergic effect is effectively reduced. In order to avoid problems washing powder must not contain enzyme producing micro-organisms.

Further information

Can be found in T.Madsen et.al.: Environmental and health assessment of substances in household detergents and cosmetic detergent products, Environmental projects no. 615, 2001, Danish Environmental Protection Agency, www.mst.dk.