BACKGROUND REPORT

EU ECO-LABEL FOR SHAMPOO AND SOAPS

FIRST AHWG-MEETING FOR THE DEVELOPMENT OF CRITERIA FOR SOAPS AND SHAMPOOS.

TIME: MONDAY 8 NOVEMBER 10.00-17.00.
PLACE: 5 AVENUE DE BEAULIEU, BRUSSELS

ECOLABELLING NORWAY
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The Flower makes it easy to choose green
www.eco-label.com

THE EUROPEAN ECO-LABEL- THE FLOWER

The Flower is the symbol of the European Eco-label – your guide to greener products and services.

It is a VOLUNTARY scheme designed to encourage businesses to market products and services that are kinder to the environment and for European consumers - including public and private purchasers - to easily identify them.

You can find the Flower throughout the European Union as well as in Norway, Liechtenstein and Iceland. The European Eco-label is part of a broader strategy aimed at promoting sustainable consumption and production.

Key aims

- **to achieve significant environmental improvements** - by developing, publishing and promoting criteria that push the market forward, in order to minimise the environmental impacts of a wide range of products and services over their whole life-cycle;
- **to ensure the credibility of the award** – by efficient administration and through criteria which:
  - are environmentally strong;
  - are based on good science, including the precautionary principle;
  - take account of consumer health;
  - require good product performance;
  - are developed transparently and cost-effectively, with the participation of stakeholders;
  - are reasonably attainable;
  - are up to date.
- **to encourage manufacturers, retailers and service providers to apply for the award**, to publicise their own participation in the scheme, and to promote the availability of eco-labelled products and information about them;
- **to encourage purchasers to buy products and services with the award;**
- **to improve consumer awareness and behaviour** regarding the environmentally optimal use of products and services

How the eco-labelling Scheme works

It takes hard work and commitment to set up criteria. Every product group is designed and crafted to meet high environmental and performance standards. Ecological criteria for each product are defined on the basis of life cycle considerations (LCC) taken from a "cradle-to-grave" view of the environmental impacts of a product group.

How Eco-label Criteria are developed and adopted

Proposals for the definition of product groups and ecological criteria are made either on the request of the EUEB or by the Commission. The Commission gives a mandate to the EUEB (lead Competent Body) to develop or review the eco-label criteria. Priority product groups will be listed in the joint working plan. On the basis of these mandates the appropriate EUEB member, supported by a working group and the Commission will draft appropriate eco-label criteria and the assessment and verification requirements related to these criteria. All interested parties are invited to participate in this process. The Competent Body will take into account the results of feasibility and market studies, life cycle considerations and an improvement analysis. A regular feed-back process to the whole EUEB is ensured. Finalised criteria are submitted to the Regulatory Committee of national authorities and voted upon. If the Committee takes a favourable view of the proposal, the Commission proceeds with its adoption and publication. Otherwise, the Committee submits the proposal to the Council of Ministers for decision.

More information: http://europa.eu.int/comm/environment/ecolabel/index_en.htm

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1 Summary

The European Commission has decided to develop ecolabelling criteria for soaps and shampoos. Ecolabelling Norway will lead the development process that will be done in close co-operation with all interested parties.

This report contains the results of background studies and discussion of the feasibility of ecolabelling soaps and shampoos. It will be used in the 1st meeting of the ad-Hoc Working Group. The main objective of this meeting is to decide whether or not ecolabelling criteria should be developed for this product group.

The product group is not yet defined but could included all products intended for regular cleaning of human body and hair.

Shampoos, soaps, shower products and conditioners are products used regularly by everybody and the consumption in Europe is high, approximately 1 million tons pr year in Western Europe.

Studies indicate that the main environmental impact of shampoos arise from the use phase, i.e. the consumption of water and energy for the cleaning process. The potential of reducing these impacts by ecolabelling is probably quite small. This report concludes that ecolabelling could be used to reduce another significant impact of these products: Their effect on aquatic environments after use.

2 Introduction

2.1 Background for the project

Ecolabelling Norway has been appointed lead country for the development of eco-label criteria for soaps and shampoos. The contract was signed in June 2004 and the project is estimated to be finished in December 2005. The project is divided into 2 phases:

In phase 1 the aim is to evaluate the feasibility of eco-labelling of soaps and shampoos based on earlier studies, and to determine whether criteria should be developed. The decision will be based on the background material and the recommendations made by the ad-Hoc Working Group. Phase 1 will be finalised by the end of 2004.
If EUEB decides to develop eco-label criteria, phase 2 of the project will start in January 2004. The ahwg will meet to discuss the requirements, in 2 meetings that will be held during spring/summer 2005. The draft criteria will be presented to the EUEB in September 2005 and in the Regulatory Committee for approval in December 2005.

This report gives a summary of the initial investigations carried out by Ecolabelling Norway.

2.2 Ecolabelling of cleaning products

The EU Eco-label started working on ecolabelling of detergents in the early nineties. Laundry detergents was the first product group for which criteria was developed. Although classified as cosmetic products in the European legislation, soaps and shampoos may also be regarded as cleaning products. The development of eco-label criteria for these products is therefore seen as a continuation of the previous work in this area.

In 1996 the European Commission initiated a first study of the possibilities for ecolabelling of shampoos. An LCA study was performed by the French company Ecobilan in 1997 as a part of the feasibility study. This study included the system "cleaning and drying of hair" and is discussed in detail in chapter 5 of this report. The Competent Bodies did not give priority to this product group at the time. Since then eco-label criteria for shampoos and similar products have been developed in several other ecolabelling schemes: The Nordic Swan, Good Environmental Choice (Sweden) and the Taiwanese, Korean and Thai ecolabels. (See summary of these criteria in Annex 1.) Several interested parties, among them numerous consumer organisations, have welcomed these initiatives, and asked for European criteria in the area. Toiletries also came out with a high score in the recently performed study on "Prioritisation of New Ecolabel Product Groups". It was therefore decided to launch a new initiative for soaps and shampoos. The work will be based on previous LCA-studies and work done in other eco-labelling schemes.

2.3 Legislation

Soaps, shampoos and the other related products are classified as cosmetic products and hence are regulated by the Cosmetics directive, 76/768/EEC, with subsequent adaptations. Unlike household cleaning agents these products are not regulated by the Dangerous Substances Directive 67/548/EEC and the Dangerous Preparations Directive xx/yyy/EEC. The legislation for soaps and shampoos is more oriented towards health issues than the legislation for detergents, which is more focused on environmental protection.

On the whole the requirements contained in the Cosmetics Directive relate to the substances that may be present in cosmetic products. Substances that are classified as carcinogenic, mutagenic or toxic to reproduction in categories 1 or 2 may not be present in cosmetic products. Substances classified in category 3 must be assessed by the EU Scientific Committee, which evaluate the safety for use in consumer products. The annexes to the Directive specify the substances that are not allowed and those that are allowed in limited quantities. List of approved colouring agents, preservatives and UV filters are given in separate annexes. Only the listed ingredients may be used in cosmetic products subject to certain restrictions defined in the annexes.

Annex II of the Cosmetics Directive specify substances that are not allowed in cosmetic products. These include carcinogenic substances, radioactive substances, certain metals, narcotic substances and some specified colouring agents and fragrance substances.

Annex III specifies substances that are allowed to use but subject to certain restrictions. These include substances toxic to reproduction, substances harmful to health, carcinogenic substances, endocrine disruptors, allergenic substances, colouring agents and fragrance substances.

Annex IV lists approved colouring agents. Annex V lists substances that are not contained in the areas of application of the Directive. Annex VI lists approved preservatives and Annex VII approved UV filters.

The Cosmetics Directive does not regulate the use of ingredients based on environmental properties, only effects on human health.

The Cosmetics Directive does not include products intended for use on animals. These are regulated in the Dangerous Substances Directive and Dangerous Preparations Directive.

2.4 Overview project tasks

In the first phase of this project the information on previous work and LCA-studies has been collected and organised in this document.
The findings will be discussed at the first ahwg-meeting, and this dicussion will should be aimed at resolving important issues like:

- What are the most important negative environmental impacts of soaps and shampoos?
- What potential exists for reducing these impacts?
- Is ecolabelling an appropriate tool for reducing the environmental impact of soaps, shampoos and related products?
- What product categories should be included?
- Which functional unit should be chosen?
- Can the functional unit be linked to a efficiency test?

The working group together with the lead competent body will be asked to give a recommendation to the EUEB whether criteria should be developed. The EUEB will then decide on how to proceed at its meeting in December 2004. If there is a positive attitude in the EUEB, the ahwg will continue with phase 2 of the project and important tasks will then be:

- Identifying the negative impacts on health and the environment that can be influenced by ecolabelling requirements.
- Finding quantitative parameters that are good measures of the environmental impacts.
- Setting requirements based on these parameters.
- Setting requirement levels based on the priority of the requirement and the total market share of products that should be able to fulfil the requirements.
- Proposal and discussion of draft ecolabelling criteria

3 The market

Soaps, shampoos and conditioners are high-volume products. The following table shows some key-figures on the European Market. Most of

the figures come from COLIPA statistics. COLIPA is the main cosmetics producers organisation: The European Cosmetic, Toiletry & Perfumery Association. Figures from the new member states are unfortunately lacking.

The COLIPA statistics contain accurate data of the sales of cosmetic products in Western Europe. However the categories are quite broad. The segment "Hair Care" contains not only shampoos and condtioners but also other products like hair lotions, hair sprays, setting lotions/mousses, hair creams, colouring shampoos and perms. We do not have the exact figures for shampoo and conditioner sales except for a few countries. Based on figures from these countries we have calculated the fraction of shampoos and conditioners of the total hair care segment to be 37 %. Soaps and shower products form part of the market segment "Toiletries" which also includes (among others) deodorants, depilatories and products for toothbrushing, shaving and foot-care. Based on statistics from a few countries we have calculated the fraction of soaps and shower products of the total Toiletries segment to be 11 %.

Table 1. RSP (Retail sales price) volume in some Western European countries

Product	Hair care		Toiletries		Shampoos and conditioners		Soaps and shower products	
Country	Million Euros	% of total	Million Euros	% of total	Million Euros	% hair care	Million Euros	% of toiletries
Europe	13991	100	13766	100	5176	calculated 37 %	1505	Calculated 11 %
Italy	1788	12,8	2176	15,8	595	33	286	
UK	2231	15,9	2434	17,7	850	38	294	
Germany	2873	20,5	3316	24,1			214	
France	2466	17,6	1984	14,4				
Be-Ne-Lux	1110	7,9	975	7,1				
Norway	232	1,7	224	1,6	114	50	91	
Finland	233	1,7	136	1,0	116	50	21	
Denmark	266	1,9	209	1,5				
Sweden	370	2,6	316	2,3				

Based on our calculations and the COLIPA statistics we conclude that the total european market for liquid and solid soaps, shampoos, conditioners and shower products seems to be 6680 million Euros for 2003.

Based on an average price of 2 Euros pr 300 ml bottle the total sales volume is 1000 million litres. Assuming a density close to that of water we get a very rough estimate of 1 million tons of soaps, shampoos, conditioners and shower products.

The market seems to be dominated by a few large companies. However there are also many small- and medium-sized enterprises that produce soaps and shampoos. These companies have traditionally been the ones that are most interested in ecolabelling. Even though soaps and shampoos

are quite similar to household detergents it is not typical that the same companies produce household detergents and soaps and shampoos. It is more common that companies that produce soaps and shampoos also produce other cosmetic products.

One overall market trend is that the products are more and more specialized. The consumption of specialized shampoos (for normal, fatty, dry hair, dandruff shampoos) while the “general use” shampoos are losing market shares. Another tendency is that liquid soaps increase in market share whereas solid soaps decrease.

4 Technical review of soap and shampoos

4.1 Subcategories

Within the product groups soaps and shampoos there are many sub-categories of products. If conditioners are included there are even more products. The cosmetic frame formulations published by COLIPA reflects this fact. They have given frame formulations for the following sub-categories that lie within the general frame of this project:

- shampoos – liquid and cream
- soap shampoo
- shampoo plus conditioning lotion
- hair conditioner
- hair conditioner (silicone based)
- soap – toilet
- liquid soap
- bath and shower products

The frame formulations were published for safety reasons. F ex if a product is ingested the health service providers should be able to have information readily available on the contents of the products. It can be assumed that the involved parties have made the formulations to fit as many products as possible, i.e. they are very representative of the products on the market.

The general shampoo formulation is based on anionic surfactants (e.g. lauryl sulphate and lauryl ether sulphate), amphoteric surfactants (e.g. cocoamidopropyl betaine) and non-ionic surfactants (e.g. cocoamide MEA). Furthermore the shampoos contain ingredients to modify the appearance (e.g. fragrance, colour, pearlescent agents) and user properties (e.g. viscosity controlling agents) as well as ingredients for protecting the products (e.g. preservatives and chelating agents).

Soap shampoos are simpler products based on a vegetable soap base (e.g. saponified fats and oils like stearates and laurates), ethanol, plant extracts and essential oils.

Conditioners are quite different from shampoos. Main ingredients are oils, waxes, silicones and fatty alcohols with ethanol as a frequently used solvent. Emulsifying agents like cetyl alcohol and polymers (e.g.

polyquaternium-10) are other typical conditioner ingredients little used in shampoos. Otherwise many ingredients from shampoos are also found in conditioners. Silicone based conditioners are simpler products. They are based on silicones and contain few other ingredients: Emulsifying agents, ethanol and additional ingredients are mentioned.

Solid soaps are based on saponified vegetable oils (e.g. tallow,palm oil or coconut oil) and a few percent of other surfactants such as cocamidepropyl betaine. Re-humidifying ingredients are becoming more common. Fragrance and colour is common as well as plant extracts and vitamins. Additionally a few ingredients are added to modify product properties (chelating agents, antioxidants).

Liquid soaps are more similar to shampoos. Lauryl ether sulphates is typically used as main ingredient and cocoamidopropyl betaine is also common. Some liquid soaps are soap (saponified vegetable or animal oils) based. Soap based products often contain plant extracts. A large majority of the products contain colour and fragrance. Emollients (e.g. PEG-7 Glyceryl cocoate) and humectants (e.g. glycerol) are frequently used as skin conditioning agents. Preservatives are almost always used in liquid soaps. Finally viscosity controlling agents are added to make the product easier to use.

Bath and shower products are like a mixture of ordinary shampoo and liquid soaps in composition. Soap (saponified vegetable oils) is not mentioned in the formulation.

The formulations of actual products we have studied in this project confirm many of the trends from the frame formulations but they also show that a large number of ingredients are used. These ingredients are not mentioned in the frame formulations.

4.2 Content of products

Regulations require that soaps and shampoos should have a list of ingredients on the label. The names used are standardised ”INCI” names. Hence it is easy to get an overview of the contents of these products. The products are mostly liquid, in water solution. The content of ingredients is typically 15-20 %. Solid soaps are exceptions. They contain little water (5-10 %).

In all the cleaning products surfactants are the dominant type of ingredient. Their main function is to loosen ”soil” (dirt and grease) and retain them in suspension in the water. Conditioners are different even though they too contain surfactants as very important ingredients.

Anionic surfactants are almost always included and they are often the ingredient(s) present in the highest quantity. Lauryl ether sulphate and lauryl sulphate are very common, except in soap shampoos and conditioners. They have a high cleaning activity and also are the ingredients giving most foam.

Amphoteric surfactants are also very common but less so than anionic surfactants. They have a cleaning effect but is also used to make the product milder and they are foamstablizing. The most utilized amphoteric surfactant is Cocoamidoproyl betaine.

Non-ionic surfactants are found in many products and fulfil many different functions, f.ex. as emulsifiers. Coco ethanolamide is commonly employed.

Cationic surfactants are important ingredients in conditioners where they stay on the hair and reduce the friction between individual hairs making the hair more easy to comb. Cationic surfactants also have cleaning effect.

Some ingredients are added to control the viscosity (sodium cloride, hydroxycellulose derviatives) and regulate the pH (lactic acid and citric acid).

Preservatives prevent the growth of micro-organisms that would otherwise reduce the life-time of the products. Isothiazolinones (e.g. Kathon), parabenes, phenoxyethanol and sodium benzoate are commonly used.

Colourants and fragrances are added for esthetic purposes.

Complex binders (e.g. disodium EDTA) are added in order to bind metal ions in the water thus preventing the metals from contributing to degradation of the other ingredients.

5 Scientific investigations of soaps and shampoos

The most important information sources are the two LCAs, one ingredient risk analysis and a study on solid soaps. They are 8-9 years old which means that the background data is still older. However they point at some main trends that should be still valid today.

LCA on shampoo performed by Ecobilan commissioned by the European Commission for ecolabelling purposes.

LCA on shampoos performed by Chalmers Technical University and commissioned by KTF (the Swedish detergent producers organisation).

Risk analysis for shampoo ingredients carried out by Chalmers and commissioned by KTF.

The Danish study on solid soaps by CETOX contains an assessment of environmental impact by classification looking at the ingredients in relation to environmental risk phrases.

A swedish report on baby products (including soap and shampoo) and a danish report on soaps are also important information sources.

All the mentioned reports are described in the following sub-chapters.

5.1 Ecobilan Life Cycle Analysis

The French company Ecobilan did their LCA in 1996 commissioned by the European Ecolabel.

In the Ecobilan study only one shampoo was studied but the analysis included several ways of producing the main surfactants.

Functional unit
The functional unit for Ecobilan was dry weight of organic substances (”using a dose of shampoo containing 3 grams of dry organic matter”) Ecobilan based their study on a very simplified shampoo formulation containing Ammonium lauryl ether sulphate, 3 EO (8 %), Ammonium lauryl sulphate (1 %), Sodium lauryl ether sulphate, 2 EO (9 %) and unspecified Other ingredients (11 %). The reason was that they could not obtain a shampoo formulation.

System boundaries:
The Ecobilan LCA seems to base the system boundaries on the system ”cleaning and drying of hair”. They have included the energy consumption of a hair dryer (together with the associated emissions) in the system.

The LCA have focused on some global and regional effects such as Resource depletion, global warming, acidification, eutrophication and photo-oxidant formation.

The study have looked at the entire life-cycle of the products from production of raw materials to the disposal of the product. The study has looked at the production of the surfactants using 4 different source materials (1 petrochemical and 3 of natural origin) and 3 different industrial processes. It is difficult to determine whether the Ecobilan study contains data from the raw material production and refining/processing.

A water and energy consumption of cleaning was 7,5 l water heated from 15 °C to 35 °C. For drying the estimate was 5 minutes use of a 1000 W hair dryer.

Conclusions
The study concludes that the main environmental load in the system comes from the use phase. Ecobilan includes the emissions of shampoo ingredients as being part of the use phase.

Specifically the energy consumption and associated resource depletion and emissions from the heating of water causes the main environmental load. The study also find that the packaging causes a large part of the remaining environmental load (when the use phase is excluded). The energy source used for heating water but also for production processes has a lot of impact on the final results of the analysis.

The study recommends a few requirements for ecolabelling of shampoos based on the findings and some other considerations.

- Consumer information on the bottle urging the consumer to use lower water temperatures and/or less time hair drying.
- Consumer information on the bottle urging the consumer to use less water.
- A requirement limiting the amount of packaging pr unit dry weight of shampoo.
- A requirement limiting the use of ingredients with a high Nitrogen-content.
- Use only readily biodegradable surfactants.
- Shampoos containing ingredients classified as carcinogenic, mutagenic and teratogenic should be excluded.

Evaluation
The LCA is important background material for ecolabelling purposes. The main advantage is that it allows the products to be examined from cradle to grave and it enables us to identify the life stages that are major contributors to the environmental benefits studied.

The study could not determine any significant difference in environmental impact between using raw materials of a natural origin rather than of petrochemical origin. This is in part because there are many effects that are difficult to quantify such as land use and loss of species, and if quantified these parameters are difficult to compare with other parameters, e.g. global warming.

The use phase is found to be the phase where the highest environmental impact. The study assumes the impact to be similar for all shampoos. This should be investigated.

Some effects are not included in the study. The study does not include local effects such as the toxicological impact on water recipients of the products, or rather the fraction of the products that reaches these environments.

5.2 Chalmers LCA

The Swedish technical University Chalmers performed an LCA in 1997 (authored by Lisa Person) that was commissioned by KTF, the Swedish Manufacturers organisation.

3 different shampoo formulations were studied, thus enabling a comparison between different products. Shampoo 1: Caring and conditioning shampoo from a leading branch. Shampoo 2: A basic cleansing shampoo on the market. Shampoo 3: Shampoo 2 reformulated (Sodium chloride is added) to fulfil the requirements of the Nordic Swan by addition of an inorganic “inert” salt. Shampoos 1 and 2 are products on the market whereas shampoo no 3 is a theoretical product. The quality and user properties of shampoo no 3 are not known.

Functional unit: Wet weight (The amount of shampoo necessary for 1000 hair washes using a standardized dose of 15,4 grams for simple cleaning shampoo and 15,8 grams for a caring shampoo with several cosmetic functions).

The system boundaries seems to be all processes and products used for cleaning of hair. This means that the consumption of water and energy for heating the water (together with the associated emissions) for the washing process is included but not energy consumption for drying of hair.

The study focused on global and regional effects such as resource depletion, global warming, acidification, eutrophication and photo-oxidant formation. In addition human health effects from air and water emissions was calculated.

The study employs weighting methods in order to compare different kinds of impacts. E.g. EPS weighting is employed to compare depletion of different kinds of resource depletion. In this way Uranium consumption and petroleum consumption can be included in the same parameter.

The Chalmers LCA study concludes:
1. The use phase totally dominates the environmental loadings in the life-cycle of shampoo.
2. The environmental impact of the packaging is larger than expected.
3. A shampoo fulfilling the Nordic Swan eco-labelling criteria does not have lower environmental impact than a similar shampoo that cannot fulfil the requirements.
4. There are no significant differences in the environmental impacts between the main product categories studied.

They summarise by claiming that since the use phase is so dominant it might be assumed that, from an ecological point of view, it does not matter what shampoo is used.

The report also claim that their is practically no difference in environmental impact between shampoos 2 and 3. Shampoo no 2 cannot fulfil the Nordic Swan ecolabelling criteria whereas shampoo no 3 (equal to no 2 except a small addition of Sodium Chloride) fulfil the criteria. They remark that this is hardly surprising since shampoo 2 and 3 are very similar in composition.

Evaluation:
The findings of this study are interesting. When evaluating the LCA we must bear in mind the following aspects:

1. The study only concerns shampoos. Other products require different water and energy consumption in the use phase. E.g. soap bars for hand washing should require far less water and energy consumption and hence the use phase shouldn be far less dominating.
2. The functional dosage was wet weight, i.e. the whole product. This means that generally more concentrated products will have a higher score than less concentrated products. Hence the comparison of products is of less value.
3. Some environmental impacts were not studied, e.g. local effects. The environmental impact of the ingredients on aquatic recipients is an

example. Hence the LCA cannot be said to give a full view of the environmental impact of the products.

4. The shampoos 2 and 3 have very similar environmental impact but only no 3 fulfil the Nordic Swan Ecolabelling requirements at that time (1996). This result is of little interest as it is hardly surprising that a product that barely fulfils the requirements has an environmental impact close to that of a product that barely misses the requirements.

Ecobilan concludes with a much smaller use phase impact than Chalmers when compared to the other life stages. The reason is that Chalmers stipulate a much higher water consumption and a lower start temperature than Ecobilan. We do not have enough data to determine which study lies closest to the truth but it is interesting to see the large impact of these basic assumptions.

5.3 Chalmers Risk Analysis

Chalmers University of Technology performed in 1997 an initial risk assessment for the aquatic environment of 24 compounds utilized in shampoo formulations. Out of these 24 compounds the analysis could not demonstrate environmental safety for the following 5 ingredients in the standard USES environment:

i) Cocoamido propyl betaine
ii) Formic acid
iii) hexyl cinnamic aldehyde
iv) Dipropylene glycol
v) 2-bromo-2-nitropropane-1,3-diol

Three different exposure scenarios were used, one according to a standard USES scenario, the two others swedish scenarios. The swedish scenarios yielded a different result: Out of these 24 compounds the analysis could not demonstrate environmental safety for just one compound 2-bromo-2-nitropropane-1,3-diol.

What can we learn from this study?
We can get an understanding of which ingredients have the greatest potential for creating a negative environmental impact. The study also show that the potential for acute impact of shampoo ingredients on the aquatic environment is small. However it is questionable what the study can tell us about the impact of a steady release of shampoo ingredients on aquatic environments where many other pollutants are released and who is adversely affected by other effects such as oxygen depletion and eutrophication.

The study should not be interpreted to mean that shampoo and soap use is not a negative environmental factor. However the effects of emissions of shampoo ingredients is probably of little importance when compared to the total releases of water pollutants in Europe. If we compare further the total water pollution is probably less important in Europe than air pollution causing the greenhouse effect and other problems.

5.4 Results from study of soaps

The Danish Center for Integrated Environment and Toxicology (CETOX) performed in 1998 a study on the environmental and health impact of 27 liquid soaps and 39 solid soaps. The study focused on the effects of the contents of the products on the environment and health after use.

The environmental effects were measured by the classification status according to the Dangerous Preparations Directive and the anaerobic biodegradability. The health impacts were assessed using a safety analysis according to the Cosmetics Directive.

The ingredients were assessed according to the rules of the Dangerous Substances Directive (67/548/EEC) into a number of classes:

N;R50/53:
Coco fatty acid monoethanolamide (Cocoamide MEA), Triclosan, Imidazolidinyl urea, 2-bromo-2-nitropropane-1,3-diol, 5-bromo-5-nitro-1,3-dioxan and methylchloroisothiazolinon.

N; R51/53:
Coco fatty acid diethanolamide (Cocoamide DEA), sorbic acid and Potassium sorbate, butylparaben and butylhydroxytoluene (BHT).

R52/53:
Tetrasodium EDTA

R52:
Tocopheryl acetate.

N; R50:
Alkyl ether sulphates, alkyl sulphates, amidopropyl betaines, alkyl- and alkyl ether sulfosuccinates, lauroamphodiacetates and lauriminodipropionates.

No classification:
Fatty acid soaps, alkylisethionates, alkyl polyglycosides, PEG (<10 EO), phenoxyethanol, parabenes (ethyl-, methyl- and propyl-) and sodium benzoate.

Assessed as not anaerobically biodegradable:
Triclosan, BHT, Tocopheryl acetate, alkyl- and alkyl ether sulfosuccinates, alkylisethionates,.

Assessed as anaerobically biodegradable:
Coco fatty acid monoethanolamide, Coco fatty acid diethanolamide, Alkyl ether sulphates, alkyl sulphates, Fatty acid soaps, alkyl polyglycosides, PEG (<10 EO) and sodium benzoate.

Conclusions of the study:
37 of the 39 studied solid soaps were found not to fulfil the criteria for classification as environmentally harmful according to the Dangerous

Preperations Directive. 2 solid soaps could be classified as environmentally harmful. This was due to the fact that these soaps contains synthetic anionic surfactants as main ingredients instead of the traditional saponified fats or oils.

9 out of the 27 liquid soaps soaps could be classified as environmentally harmful. This was due to the content of Cocoamide MEA, Cocoamide DEA, Triclosan, Imidazolidinyl urea and sodium olefin sulphonate.

Assessment of health impact should not be based on the ingredients classifications. The product does not necessarily cause skin irritation just beause of a large content of a surfactant with irritative properties. Other ingredients may reduce the irritation effects. Hence the health assessment focused on known problematic substances such as perfumes. The study recommended the use of unperfumed products.

5.5 Other studies

In a study by the Swedish Society for Conservation of Nature (May 2001) 14 shampoos and 12 soaps for use on babies were examined. A number of pass/fail requirements regarding health and environment were used. Environment: R50/53, R53, low biodegradability and environmentally harmful in other ways (e.g. content of heavy metals). The health requirements concerned risk of allergy, cancerogeneous or genotoxic potential and endocrine disruptive properties.

Only 4 of the 14 shampoos fulfilled the requirements. 10 of the products that failed did so because of perfume and/or colouring agents. Among the compounds causing failure to fulfil requirements are the preservatives: Methyl dibromo glutaronitrile, Quaternium-15, imidazolidinyl urea, Cetrimonium chloride, methylchloroisothiazolinone and methylisothiazoloinone. The poorly biodegradable Cetyl alcohol and the ingredients containing monoethanolamines (MEA) and diethanolamines (DEA) are other examples. MEA and DEA are singled out because of warnings from the American government agency FDA regarding possible carcenogenous activity.

Only one of the 12 soaps fulfilled the requirements. It is a solid soap. One other soap would have fulfilled the requirements if it had not contained perfume. 6 products contained perfume and/or colouring agents. The antioxidant BHT are used in several products. Disodium EDTA, Tetrasodium EDTA and Cocoamide DEA are examples of other ingredients that are assessed as harmful to the environment and/or health.

Generally they found that solid soaps contain less ingredients harmful to the health and the environment.

A study carried out by the Danish Green Information Centre in 1999 concluded as follows regarding environmental impact:

- release of shampoo and soap ingredients to waste water treatment plants and aquatic environments is a major environmental impact.

- Release of CO_2, SO_2 and NO_x from energy production is the other major environmental impact.
- The most problematic ingredients are those that are poorly biodegradable, toxic to aquatic organisms and not potentially biodegradable.
- Using ecolabelled products ensures that the most harmful substances are not used.

Conclusions regarding health impact:

- Perfume ingredients are the most problematic ingredients regarding health.
- Soaps and shampoos can dry out skin.
- Many ingredients are known to, or suspected of causing allergies, f ex BHT, propylene glycol, lanolin, and certain perfume ingredients such as eugenol, isoeugenol, oak moss , geraniol, hydroxycitronellal, α-amyl cinnamalehyd, cinnamaldehyd and cinnamal alcohol.
- The products impact on health depends on frequency of wash, water temperature, skin type, age of person, health status and ingredients of the product
- The effect of pH on product health impact is not clear

5.6 Results from study of 50 products

In the initial phase of the project a study was carried out on 50 different products on the market. The majority of these products are what the producers would call ”green” products, i.e. products with less environmental impact than the average product. These products have been analysed and calculations have been made to determine the total toxicological effect using the Critical Dilution Volume (CDV) parameter.

$$CDV = \Sigma W_i * TF_i * DF_i$$

W_i = Weight of ingredient i per functional unit.
TF_i = Toxicity factor for ingredient i.
DF_i = Degradation factor for ingredient i.

The idea behind the CDV factor is that it gives a measure of the volume of water necessary to dilute a functional unit of shampoo until there is no adverse effect. Weight of all organic substances was used as functional unit. The functional unit is 1 gram organic ingredients. Calculations have also been made on the basis of dry weight, i.e. all ingredients including inorganics. These calculations show results a little lower (5-10 %) than the results displayed below. Generally the use of inorganic substances was very low. Mostly inert salts were used and the amount differed little from product to product.

Table 2. Average results for different product categories

Product group	CDV (l/g AC)
All products	9371
Shampoos	8353
Liquid soaps	10729
Solid soaps	2224
Conditioners	16333
Shower products	9181

The tendency is that Liquid soaps, shampoos and shower products lie in the area 7500-10000 l/g AC. Solid soaps are much lower and conditioners much higher.

A large percentage of the CDV is taken by 3 ingredients: Cocoamidopropyl betaine, lauryl ether sulphate and perfume. Cocoamidopropyl betaine alone accounts for 50-80 % in most of the products where it is used. Lauryl ether sulphate typically accounts for 20-40 % of the CDV. Perfume typically accounts for 5-15 % of the CDV but the figure can be much higher, especially in products without cocoamidopropylbetaine or lauryl ether sulphate.

Our studies show that the product contain a few ingredients that are not biodegradable or for which no biodegradability is available. However the quantities are low. We have the following trends:

- Generally < 20 mg/g AC ingredients not readily biodegradable (OECD 301 A-F)
- Generally < 50 mg/g AC ingredients not anaerobically degradable (OECD 11734)
- Conditioners contain far more compounds with less biodegradability.
- Biological additives such as “aloe vera gel” are generally not tested and must accordingly be treated as not biodegradable.

It is probably more important to reduce compounds which are both highly toxic and have a low biodegradability. Many of the products contain the ingredients mentioned in the danish study mentioned in the previous chapter but the products also contain many other ingredients. Hence it is difficult to compare the contents of ingredients with “environmental” risk phrases (R50/53, R50, R51/53, R51 and R52).

Some shampoo and soap ingredients are either confirmed as, or suspected to be endocrine disruptors. Of these ingredients only butylparaben was found in the examined products.

Very few of the products contained preservatives that produce formaldehyde upon degradation. These preservatives are, however, not uncommon in soaps and shampoos as we found out by checking labels of other products.

6 Discussion

In this chapter we discuss the environmental and health impact of soaps and shampoos and related product. Other important topics such as defintion of the product group and test of user properties are also discussed.

We will focus on the following questions:
What kind of environmental impact do we find?
How big is the problem?
What is the potential of reducing the problem?
What is the potential of reducing the problem by ecolabelling of the products?

6.1 Definition of the product group

One of the most important considerations we must make in this project is which products should be included. When the product group was first evaluated as possible for ecolabelling only shampoos were considered. Since then it has been decided by the Commission to include soaps as well.

In general it makes sense to make the product group as broad as possible in order to save resources and enable ecolabelling of whole product ranges. However the products included must have a certain degree of similarity ("common denominator"). F. ex. a common function or common way of application.

It seems reasonable to include products that have a mainly cleaning purpose, made for rinsing off after use and are intended for use by human beings.

Another way of defining the product group is to look at the content of the products and include all products with similar chemical composition.

Thirdly we could look at who use the products. Most products are used domestically but a significant portion is used by professionals such as hairdressers. A significant part of the soap is consumed away from home f. ex. in public toilets.

Finally we could look at the situation where the product is being used. What other products do we use in the shower? Are there products on the market that are combinations of soaps or shampoos and other products?

Based on our study of 50 products and on the knowledge we have available on these products we recommend as a minimum to include the following products for cleaning body and hair: **Liquid soaps, solid soaps, shampoos as well as different "shower" products.** Other cleansing products such as facial wash or hand cleansing gels are so different that it is not recommended to include them.

Some shampoos are in the form of powder or gel. We know too little about these products to make a recommendation.

Shampoos are mainly cleaning products but its more and more common to use "caring" shampoos, e.g. products with other functions than cleaning. The list of functions is long but includes: Nurturing, protecting, moisturising, making antistatic and brilliant, giving volume, smoothing, toning. The composition of these products are different from simple shampoos with a predominantly caring function but not very different. We recommend to include **"caring" shampoos**.

Pure conditioners have no cleansing function. They leave a residue on the hair that lessens the friction between the individual hairs and makes the hair feel softer and silkier. The composition is different from shampoos. The conditioners typically contain cationic surfactants with environmentally harmful properties. However alternatives to these harmful ingredients now exist. Furthermore many shampoos today are 2 in 1, i.e. they contain conditioner. Hence it is recommended to include **conditioners**.

To our knowledge the products used by professionals and the products used in public places are quite similar to those used domestically. An exception should be made for products used for special purposes f ex in hospitals. Products that should also have a disinfecting function should not be included. **"Professional products"** should be included with the exception of products that also should be disinfecting.

How about products not intended for use by human beings? The Nordic Swan has included products for use on animal pets. Such products are not regulated by the Cosmetics Directive but rather by the Directive on production, distribution, etc of dangerous substances. We know little about products for use on pets but we recommend that the inclusion of such products be discussed.

It is recommended that (liquid) shampoos, conditioners, shower products, liquid soaps and solid soaps be included in the product group. "Professional" products should be included in the same way as domestic products.

The inclusion of shampoos in the form of powders and gels should be discussed. The inclusion of products (with similar purposes) for animals, especially pets, should be discussed.
Cleansing products such as facial wash and hand cleansing gels should not be included.

6.2 Extraction and refining of raw materials

The LCAs shed little light on the early part of the products life cycle. Generally the reports do not distinguish between the extraction and processing of raw materials and the further processing into ingredients. For some ingredients there are few steps from raw material to ingredients, whereas for others there are many steps. We know from other cleaning products (household detergents) that the impact from this early life phase can be quite considerable, but that unfortunately it is very difficult to get enough accurate data to set requirements.

We have too little data to determine whether there are significant differences in environmental impact in the production of the same ingredient by different companies. Similarly we know too little to determine the potential for reducing the environmental impact in this life phase. One interesting example is given in the Ecobilan study. They claim that work is underway to utilise rest products from palm kernel oil production to avoid the typically very high methane emissions. We know that exploration and refining of petroleum cause very different impacts in different countries. The same probably applies to growing of plant feedstocks.

What we do know from experience is that it is difficult for a detergent producer to persuade a raw material supplier to reduce his environmental impact because of ecolabelling requirements. The benefits of supplying ingredients to an ecolabelled products might seem small for the ingredients producers. The benefits for the raw material suppliers are even less obvious.

The ingredients of soaps and shampoos are mainly derived from two main sources: Plants and petroleum. The production is very different for products coming from these two sources. Many companies prefer to use raw materials not sourced from petroleum. The reasons are related to health and the environment. Even though new petroleum reserves are steadily being found and the extraction efficiency increases the petroleum resources are beyond doubt limited. It takes millions of years to build up and the world-wide reserves are shrinking. There will come a shift towards plant sourced raw materials no matter what is done in ecolabelling or other policies. The question is whether ecolabelling should encourage that shift to happen as early as possible. This should be discussed. The questions is difficult because many of the negative impacts of farming are local rather than global and many are difficult to quantify.

The Ecobilan study compared the impacts of the production of their shampoos three surfactants (Ammonium Lauryl ether sulphate (3 EO), Ammonium Lauryl sulphate and Sodium Lauryl Sulphate (2EO)) from three different systems:

- ”S-Pc” petrochemical
- ”S-PKO” palm kernel oil
- ”S-CNO” coconut oil

The differences in environmental impact between these processes and source materials were found to be small. The use of petrochemical surfactants increases the oil consumption whereas the release of methane is high for palm kernel oil. It is not clear whether the emissions from extraction and refining of oil is included. There are a number of environmental loads that are difficult to quantify such as pollution of land by pesticides, salination of land and loss of species.

We can conclude that:

- the negative environmental impacts of the early life stages of shampoos and soaps are considerable but far less than those of the use phase
- we have little information about quantified negative impacts of these early life stages
- from experience we know that it is difficult to get this information
- raw material suppliers/processers see little benefit of supplying material for ecolabelled products and hence may show little will to reduce their impacts

The above conclusions are less valid for products where the stages from raw material to finished product are few and the contact between raw material suppliers/processors and shampoos producer is close.

6.3 Production of ingredients

A large number of ingredients are used in soaps and shampoos. The LCAs show that the environmental impact of ingredients production is considerable but does not discern between raw material extraction and processing and the subsequent production of ingredients. The studies give little indication on which ingredients that gives the largest impact and whether there is a significant difference between shampoos in this respect. The studies shows that the negative impacts are found in all areas studied, f.ex. resource depletion, greenhouse effects and other effects from water and air pollution. We cannot single out one dominant negative environmental impact from ingredients production.

One study shows that the energy requirement for producing shampoo and soap ingredients lie in the area 9-60 MJ/kg, with mineral salts having the smallest consumption and complicated organics such as fragrances and preservatives having the largest consumption. The study did not find significant differences in energy consumption between ingredients fulfilling the same function. However they recommended ingredients from renewable sources because petroleum is a very scarce resource.

What is the potential for reducing the overall environmental burden from ingredient production? The Ecobilan study show little difference between the different processes indicating that the potential is not high. The Chalmers study looks at the overall differences between three shampoos and come to the same conclusions. However, this study is ten years old and examines only 3 (in reality only 2) different products. More data is needed before a conclusion can be made.

Can ecolabelling reduce the impact of ingredient manufacture?
The ingredients producer is certainly ”closer” to the manufacturer of the shampoo or soap than the raw materials extractor/processor. In this respect the potential for influencing the ingredient producer is good. However it can be difficult for the ingredient producer to isolate the environmental load of just one ingredient. This seems to be the case for the Chalmers LCA where aggregate data are used instead of specified data.

Conclusions:

- the environmental impact of ingredient production is high in all categories studied but far less than in the use phase
- the environmental impacts are largely connected to energy use and as such varies according to energy source

6.4 Production of soaps, shampoos and related products

Production of these products is very simple. The most important impacts comes from energy use for mixing and heating of ingredients. Both LCA clearly show that these impacts are very small compared to all other life phases. Hence we recommend not to include requirements regarding the production phase.

6.5 The use phase

First the use phase must be defined. Both LCAs include the cleaning process and the release of shampoo ingredients to the water environment. One LCA includes the drying of hair. In this discussion we have chosen not to include drying of hair as a part of the use phase. The reason is mainly that the extent of hair-dryer use is unknown. We have also chosen not to include discharge of shampoo ingredients to the environment as a part of the use phase because these emissions because this impact is removed in time from the use phase. The impact on sewage treatment plants is closer in time but still represents a post-use effect in our eyes. However this is primary a procedural question without any important consequences.

Both LCAs conclude that the most important global and regional environmental impacts are caused by the use phase. Specifically the energy use for heating the water used when washing the hair is the culprit. Water and energy is required to make the products work. The consumption of water and thus also energy should be far less for hand washing with soaps, hence the use phase is probably less dominating for these products. The water and energy consumption for the washing of the whole body with soap is unknown but could be comparable to shampoo. Conditioners are almost only used in conjunction with shampoo either in combined products or separate products. The consumption of water energy for conditioner use is difficult to estimate. The relative role of the use phase in the conditioner life sycle is unknown at this point of time.

How is the potential for reducing this impact?
The root to this question lies in consumer behaviour. The LCAs does not analyse this question but simply takes the consumption as a given fact. They also use very different estimates for energy and water consumption:

Ecobilan 7,5 litres of water heated from 15 °C to 35 °C with natural gas.
Chalmers 25 litres of water heated from 8 °C to 38 °C with the average energy mix for building heating in Sweden.

These studies only consider hair wash. When we consider the other products we want to include the picture becomes even more complex.

How do consumers really behave? We have no access to quantitative studies that shows exact consumer behaviour. Probably the behaviour is different in different geographical areas and between people with different hair volume, gender, age, activity level etc.

Other detergents and cleaning products works by a combination of mechanical work, chemical action and water temperature. The general rule is that if one factor is reduced another factor must be increased. Based on this basic premise we could assume that f ex as water temperature or mechanical work is reduced the chemical action must increase. When we talk about shampoos and soaps we must, however, bear in mind that the products must not damage the skin and hair. This factor is much more important than for f ex hand dishwashing agents.

How can the impacts of the use phase be reduced?
There are probably many ways but the two main possibilities seems to be:

1. Influencing consumer behaviour.
2. Modifying product properties.

Regarding 1)
The frequency of cleaning and the use of hot water is very closely linked to consumer behaviour. The motives behind the consumer behaviour must be studied before any recommendations can be made.

Many consumers have the idea that very frequent wash of body and hair gives a better hygiene. They define good hygiene as a state where very few harmful bacteria are present and hence the risk of illnesses are reduced. In short they think that they can prevent illnesses from ocurring by washing frequently and/or very thoroughly. It is of course true that a basic level of washing will reduce the probability of illnesses but there is no evidence to support the notion that e.g. a daily shower reduces the likelihood of illness from a level of e.g. 3 times a week. A much more important motive for the consumer to wash is probably to ”feel” clean and smell good. To look good. To be socially accepted.

In fact some research suggest that frequent use of these product may have a detrimental effect. The natural content of fat in the outer layers of the skin may be partially removed leading to dryness of the skin. The consumer should be made aware of this possibility. Some products contain ingredients that counteract this effect.

Another motive for cleaning the body is the side-effects like heating (or cooling) the body and feeling fresh. Heating the body tissues also reduces muscular tension and improve well-being.

How can consumer behaviour be influenced?
There are many tools for reducing environmental impacts: Examples are information campaigns, economic incentives, direct regulations and ecolabelling.

Direct regulations seems improbable.

Economic incentives probably has some influence. A high price of energy reduces energy use.

An information campaign could also be effective. An interesting example is the ”wash right” campaign launched by the manufacturers of domestic cleaning agents such as laundry detergents, dishwashing agents and hard surface cleaners. By giving advice on how to apply the correct dosage and other simple measures the consumption of these detergents were reduced.

How can ecolabelling influence consumer behaviour?
The possibilities are limited by the very nature of ecolabelling. Only the product is labelled, not the washing process. Consumer advice on the label is one possibility. The consumer could be advised to use less water and cooler water when washing the hair and body. We believe that the probability of reducing use phase consumption of energy and water by such consumer advice is quite small but the possibility should be considered. Probably water saving equipment on the shower and energy prices are more effective in saving energy and water.

Possible consumer information:
”Heating of water puts a heavy burden on the environment. Use less water and cooler water when washing body and hair”

Regarding 2).
Can the products be designed in a way that the environmental impact of the use phase is reduced? Soaps and shampoos are cleaning products and as such it is interesting to compare them with other cleaning products. The industry has been working hard to develop Laundry Detergents that work well at lower temperatures and their work have been sucessful. Can we hope for similar savings in this field? Certainly the potential is much less for soaps and shampoos than for laundry detergents because people take a shower not only to clean hair and body. We do not know how the efficiency of soaps, shampoo and shower products at lower temperatures. We also do not know how little water is required to apply and rinse of the products. Certainly the consumer who prefer to use little water and cooler water should have the possibility to do so. Another important aspect is the efficiency of the products. Are there some products that requires less dosage to perform the same action? Can some products keep the hair or body in the desired state longer than others? Soaps and shower products are often used daily whereas shampoos and conditioners are less frequently used. Soaps and shower products are mainly used for cleaning whereas many shampoos and certainly all conditioners fulfil other functions.

We do not know the potential environmental benefit of production design on use phase burdens but probably it is small. Perhaps the consumption of these products can be reduced by appropriate packaging design, f.ex. restricting the size of the tip of the bottle so that the amount of product coming out is easy to control. Dsipensers are another possibility.

Another very important consideration we must make when discussing efficient products is that the products should not damage the skin and hair. High efficiency could easily come in conflict with skin compatibility. High efficiency could also come in conflict with strict requirements on the content of the products. Ecolabelled products should have a minimum requirements to eliminate the risk that products that are very diluted are ecolabelled and hence damage the reputation of the ecolabel. This issue is discussed in the chapter on ”Fitness for Use”.

Conclusion:
If we look at soaps and shampoos as products we conclude that the release of the product into treatment plants and the environment is the largest negative environmental impact of soaps and shampoos.

If we include all activities connected to shampoos and soaps the conclusion is different. Then the use phase gives the largest environmental impacts. We are discussing ecolabelling of shampoos and soaps and not ecolabelling of the system cleaning of hair and body. Still it is reasonable to discuss the usage of hot water during the cleaning process even in the context of ecolabelling even though the possibilities reducing those impacts might be small.

The following possibilities should be discussed:

- Requiring that the packaging is designed in a way that product comsumption is reduced.
- The possibilities of reducing use phase impacts (energy and water) by product composition.
- The possibility of reducing use phase impacts (energy and water) by information text on the bottle.

6.5 Disposal

Shampoo/soap ingredients end up in the sewer after use. A proportion of the waste water is treated with mechanical, chemical or biological means. A significant part of European households are not connected to treatment plants and the product ends up in water recipients untreated.

The part of the product ingredients that is not completely degraded or ends up in sludge, sediments or air end up in water recipients where they cause detrimental effect to aquatic organisms. The combined effects of these ingredients, intact or partially degraded, is not known. What we do know is that the water quality of many salt and fresh water recipients in Europe is quite bad. The reasons are many and probably the impact of soaps and shampoos is quite small compared to the total emissions.

We propose the inclusion of requirements to reduce the potential bad effects of shampoo release.

The requirements should be quantitative and targeted against the ingredients that are most likely to cause damage.

What negative impacts can the 1 million tons of shampoo soap and related products cause after its use?

- Oxygen consumption. Possible parameter: BOD or COD.
- Direct toxic effects. Possible parameter: CDV. Quantity of R50/53
- Eutrophication. Possible parameter: Quantity of P and/or N
- Hormone disruption. Restriction of known or suspected disruptors
- Accumulation of non-degraded ingredients
  Possible parameter:Restriction of ingredients with low degradability

The oxygen consumption and eutrophication caused by these products is probably extremely minimal. The quantity of organic material from other sources is very high. Direct toxic effect of the product is probably much more important even though the ingredients are partly degraded before entering recipients. One important aspect is that this happens all the time. A steady influx of cleaning product ingredients enters recipients constantly. Hence ”chronic” effects are likely to occur in addition to the expected ”acute” effects.

The Critical Dilution Volume gives a measure of a products total ”toxic load”. It is based on tests on organisms of all three ”trophic” levels and on a number of toxic effects (as measured in the OECD toxicity tests 201, 202 and 203). The DID-list contains the necessary data for many widely used ingredients which means that the need for additional testing is not great.

Some ingredients are very toxic and have a low biodegradability and/or high potential bioaccumulation. These compounds can be very damaging even though they are used in so small quantities that they do not give a high contribution to the CDV score. They can be accumulated in recipients and organisms and cause a negative impact that is far greater than the CDV indicates. These compounds could be regulated based on their inherent properties or specifically in the form of a negative list. In some ecolabelling criteria documents for household detergents the use of compounds that are classified as, or fulfils the criteria for classification as, R50/53 or R51/53 is restricted. In some ecolabelling criteria the use of phosphonates, EDTA, NTA, APEOs, etc are restricted. In fact the use of negative lists is very wide-spread in ecolabelling criteria around the world. Specific exclusion of named ingredients should be used with care because the risk exists that the alternatives are as bad, or worse than, the ingredients we want to restrict. The advantage of negative lists is that they are easy to understand and easy to control. We recommend that negative lists be used as little as possible. Requirements should rather be based on inherent properties.

The precautionary principle is an important guideline for ecolabelling schemes. It states that if we have a suspicion that an ingredient, process, etc may cause environmental problems we should regulate that problem even before we have scientific proof that the problem exists. One such potential problem is the accumulation of man-made compounds in nature. Such accumulation can be measured by testing recipients but very few

tests are made. In order to reduce the likelihood of accumulation in the environment the detergents directive has placed very strict restrictions on surfactants with a low biodegradability. The Detergents Directive does not regulate soaps and shampoos, but very many of the ingredients are the same in household detergents and in shampoos and soaps. For the environment it is immaterial whether a compound comes from a soap or a dishwashing agent.

Hence we propose that surfactants with a low biodegradability, both in aerobic and anaerobic compartments, should be restricted.

What about other ingredients? Surfactants are the main ingredients and they are toxic by nature because of their dipolar properties. Other ingredients could equally pose a problem if they accumulate. Some ingredients have not been tested. Fragrance compounds is a typical example. Some compounds have low degradability because of their function. Preservatives are typical examples.

Experience has shown that it is, for most cleaning products, possible to formulate a product without surfactants with low biodegradability but it is more difficult to get rid of all ingredients with low biodegradability.

There are some bad effects on organisms that are not covered in the standard OECD toxicity tests. One of these is endocrine disruption. Some compounds are so similar to hormones that they causes the same response as hormones in organisms. Especially the disruption of the reproductive system is a cause for concern. The EU has a list of confirmed and suspected endocrine disruptors.

What is the potential for reducing these impacts?
Our experience is that the levels of these parameters vary a lot from product to product. There exist many alternative ingredients for each function in soaps and shampoos. They have different ecological impact and hence the possibilities for reducing impacts should be great.

What is the potential to reduce these impacts by using ecolabelling?
It has been the experience of several ecolabels that an ecolabel is an effective tool for changing the content of products (like household detergents) to reduce these impacts.

6.6 Packaging

Both LCAs found a higher impact from packaging than expected. This is partially due to the high weight of packaging compared to the content of ingredients in the product. It should also be noted that production data on the materials used in packaging is readily available, whereas data for the early life stages of e.g. shampoo ingredients is much more difficult to find.

Packaging is normally only used once and incinerated or landfilled after use. Packaging is normally made from non-renewable sources. A large part of the product ingredients comes from renewable sources. This is part of the reason why packaging scores so high on resource depletion. Packaging accounts for twice as much resource depletion as the

production of the ingredients. Global warming potential shows the same pattern. Acidification and eutrophication is about three times higher for packaging than for ingredients production. In photo-oxidant formation the impact of packaging is especially high, 35 % of the use phase, far higher than for the other parameters.

We do not have extensive knowledge of packaging materials but we do know that polyethylene (PE) and polypropylene (PP) are much used in primary packaging. PS is used but less extensive. The Ecobilan study has made calculations based on PVC but it is not clear how much of this material is used. Secondary packaging contains plastics but in addition cardboard or corrugated board is very common. Tertiary packaging is often reused pallets.

From our study of 50 products we have a fairly good idea of the weight of primary packaging used. Commonly the ratio of primary packaging to product is in the vicinity of 0,05-0,1 g packaging pr gram product. A 300 ml shampoo product is typically contained in a 30 gram bottle. The shampoos studied in the Chalmers LCA has 0,84 g primary packaging pr g shampoo and 0,012 g secondary packaging pr g shampoo. Generally these ratios decreases with increasing product size.

What are the possibilities of reducing negative impacts from the packaging?

The amount of packaging varies a lot from product to product, hence a clear potential is there. Care must be taken when setting the requirements so that not only economy size products can fulfil the requirements.

Several materials can be used in packaging. Negative impacts are much less if reuse or recycling is done. Hence the negative impacts can be reduced if:

- Materials with a high environmental impact is avoided.
- The product contains recycled material.
- The packaging can be separated into mono-material parts.
- The plastic parts are labelled with plastic type.

The less harmful plastic types are widely used so it seems unproblematic to eliminate PVC (see evaluation at the end of the chapter. Packaging made of mono-material parts are also widespread so the use of laminates of different materials could be banned without problems. However we must take into consideration the fact that there exists some refill packages made of laminates. Inclusion of recycled material is possible but some technical problems exist, so care should be taken not to set strict criteria depending on use of these materials. Plastic labelling is wide-spread and should be unproblematic.

How can ecolabelling contribute to reducing the negative impacts of packaging?

The experience from other detergent products is that ecolabelling indeed is an effective tool in reducing the impact of packaging. Requirements are typically aimed at two targets: Reducing total quantity of packaging materials, reducing the quantity of ”virgin” packaging materials and reducing the use of the most harmful materials.

The primary packaging is the dominant packaging component. Packaging waste could be reduced by reducing the weight of primary packaging, reusing the packaging or using recycled material in the packaging. Not only can this reduce packaging waste. All the other mentioned environmental effects (greenhouse effect, photo-oxidant formation) will also be reduced because less ”virgin” material will be produced. A quantitative measure of the packaging that take into account all these three factors would be a good basis for a requirement. The weight/utility ratio of the Nordic Swan is an example.

$VIF =\_ ((W_i + N_i) / (D_i \times r))$

W_i = The weight (grams) of packaging-component i (primary-, secondary- or tertiary packaging) inclusive label.

N_i = Weight (grams) of not-recycled material of packaging-component (primary-, secondary- or tertiary packaging). If the packaging component does not contain recycled material then $N_i = V_i$.

D_i = gram product the packaging-component contains.

r = Return number, i.e. the number of times packaging-component **i** is used for the same purpose through a system of return or refill (r=1 if no reuse occurs).

If the packaging is reused t is set to 20 for plastics and 10 for corrugated board unless the applicant can document a higher number.

PVC is a material that is very different from the other plastic types employed. It has an extremely long life time and the degradation products are not known. Hence it should not be landfilled. It can be recycled but must be separated from other materials before recycling. In the production processes of PVC and its raw materials some waste materials that are difficult to handle are produced, e.g. the ash from incineration of EDC-tar. Some problematic pollution also occur, e.g. dioxin release.

6.7 Health impact of soaps and shampoos

Soaps and shampoos are products that come into close contact with skin but only for a short time. However these products are used very often. Hence the skin exposure is great. Care must be taken to avoid not only acute effects but also chronic effects, effects that only happen after a longer period of time. This is especially true for children and for persons with sensitive skin or weakened immune system

Ingredients classified as carcinogenic, mutagenic or teratogenic (CMT) should be avoided in ecolabelled products. However the Ecolabelling regulation already contain a ban on these compounds so there is no need for a specific requirement in these criteria.

The Cosmetics Directive aims at making cosmetic products ”safe” to use by providing protection from known ingredients with bad effects and in some ingredient categories (e.g. colouring agents) by restricting allowed ingredients to those listed in the Annexes. The Directive gives a degree of protection to consumers but still some people get health problems. Medical experts agree that it is not possible to determine a ”safe” concentration of a compound in relation to e.g. contact allergy. Allergic persons can get reactions from a very small quantity of an allergen. Research also indicates that people who do not have an allergy can be sensitized from very small doses.

The Nordic Swan bans ingredients that can be classified as sensitizing Xi with the risk phrases R42 and/or R43. A similar requirement should be considered in this project.

Some ingredients that are suspected or confirmed to be harmful to human health are still allowed. This includes musk xylene and musk ketone.

Some compounds that are found in soaps and shampoos are sensitizing or allergenic.

Hence we can conclude that some products contain compounds that gives an elevated risk of health problems. The extent of health problems is not known but we should take care not to award the ecolabel to products that poses an increased health risk compared to the majority of products.

Can these problems be reduced?
Many products do not contain the known problematic substances, but still function well. Hence the potential for reduction of health problems is evident.

Can these problems be reduced by ecolabelling?
Ecolabelling requirements restricting the use of certain compounds have proven to be successful in household detergents. However care must be taken not to formulate the criteria too strict so that f. ex. no fragrances may be used. Non-fragranced products can and should be used for children and people in institutions with weakened immune defence system. However very few ordinary consumers wants products without fragrance. The smell is still an important part of the functions of these products.

6.8 Animal testing

Cosmetic ingredients have traditionally been tested on animals in order to reduce health risk to human beings. Many people object to these tests arguing that they cause unnecessary suffering for animals. They also argue that there now exists alternatives for animal testing. The Cosmetics Directive forbids the marketing of ingredients or combinations of ingredients that have been tested on animals after 30 June 2000. However the Directive contains an possibility for postponing the implementation of this requirement for a maximum of 2 years. It should

be discussed if the Cosmetics Directive give adequate guarantee against animal testing.

6.9 User properties

As mentioned earlier the general purpose of the products we want to include is cleaning of body and hair. Conditioning products could also be included, partly because they are so widely used in conjunction with shampoos. As pointed out earlier in this report, the products have many other functions. One report mentions no less than 15 functions a shampoo can have, including:

- softening
- antistatic
- untangling
- thinning
- moisturizing
- nourishing
- protecting
- giving volume
- smoothing

For the EU Ecolabel it is very important that ecolabelled products are no less effecicient than the majority of products on the market. Ecolabelling requirements are quantitative and linked to a functional unit. No matter how the functional unit is defined there exists a possibility that manufacturers can “dilute” their products until they fulfil the criteria. If functional is “wet weight” i.e. 1 weight unit shampoo, the producer can just add water until the requirements are met. If the unit is “dry weight”, i.e. 1 weight unit of ingredients excluding water the producer can just add inert inorganic ingredients until the requirements are met. It is even possible to dilute the product with “inert” organic ingredients if the unit is set to 1 weight unit of organic ingredients! The problem can be eliminated if the functional unit is linked to an efficiency test. F ex it is theoretically possible to define the functional unit as the amount of product necessary for a standard task f.ex. cleaning of a standard size protion of skin. From the information we have standardised test of efficiency do not exists. Simple tests exist, e.g. foam stability tests, but the correlation between this property and product efficiency is not straightforward.

Even though we probably cannot find such a standardised test to link with the functional unit, there still exists ways to establish a products efficiency. The manufacturers have ways of measuring a products efficiency. Such tests can be laboratory tests or consumer tests but more likely a combination of the two types of tests are used.

Ecolabelling criteria should contain requirements on user properties of the products but since no standardised comprehensive tests seem to exist we must be ready to accept different tests. It is possible to set minimum requirements on test quality and extent (e.g. number of people asked). The test should also be comparative. Ecolabelled products does not have to be of better quality than other products but at the same time should not be faw below the market average in efficiency. Hence using a market-

leading product in the same product subcategory as comparison seems reasonable.

7 Recommendations

Ecolabelling Norway recommend to develop ecolabelling criteria for soaps and shampoos. There are considerable environmental impacts connected with these products and we believe that ecolabelling could be an efficient tool for the reduction of these impacts.

If it is decided to move on with the criteria development process we must discuss ways of limiting the environmental and health impacts of soaps and shampoos. We must take into account technical and economic feasibility. Furthermore the criteria should be as simple and easy to communicate as possible.

In order to make as good decisions as possible we need more background data. The need for more data is especially acute for the early life stages such as raw material extraction and processing and ingredients production. More information on the market, i.e. detailed sales figures and information about product formulations and market shares is also vital for the success of the project. One example: We need to have an idea of how large a portion of the products on the market can fulfil a certain set of requirements.

The product group should be defined as early as possible in the process. We propose to include shampoos, conditioners, liquid soaps, solid soaps, shower products as well as combined products. Products intended for ordinary consumers as well as ”professional users” should be included. Inclusion of products for use on animals should be considered.

The core of the criteria consists of quantitative requirements. It is essential to find a functional unit that is strongly connected to the fulfilment of the products function. The lack of a standardized efficiency tests means that we must consider a functional unit not linked to such a test. As a starting point for the discussions we propose weight of organic ingredients as a basis for the functional unit. Functional unit = 1 gram organic ingredients.

If 1 gram of organic ingredients is chosen as functional unit there exists a theoretical possibility that a manufacturer will ”dilute” their product with organic ingredients with low toxicity. Furthermore if we have no test for efficiency we risk allowing products that have low efficiency. This can reduce consumer confidence in the products. The introduction of a requirement on product efficiency should be discussed. ”Efficiency” can be defined as cleaning efficiency or efficiency in fulfilling any of the other product functions.

Ways of reducing the impact of the use phase (water and energy consumption for the cleaning or conditioning process) should be discussed. Is it possible to design products that requires less water and lower water temperature? Can we influence consumer behaviour by

requiring information text on the label advising consumers to use less, and colder, water?

The impact of raw material extraction/refining and ingredient production is considerable. How can we get information to enable us to set requirements? What is the likelihood of reducing the environmental impact of ingredients manufacture and raw material extraction and processing?

The production phase seems to have a negligible environmental impact and should not be made a priority.

Transport activities is difficult to regulate without making geographical restrictions, i.e. Central European producers can get the label whereas South European producers can not.

After use the products contents and the packaging is disposed of. Some of the contents are degraded but a significant portion of the 1 million tons used in Europe every year ends up in aquatic recipients. Experience have shown that ecolabels are most effective in influencing the content of the products. We ask the aHWG to consider requirements on CDV, compounds classified as R50/53 and R51/53, compounds with low degradability in anaerobic and aerobic conditions, endocrine disruptors and certain other environmentally harmful compounds.

Packaging waste and environmental impacts concerned with the production of new packaging material can easily be influenced by ecolabelling. This should be discussed.

The Cosmetics Directive ensures a minimum level of safety for the consumers. Still many people get health problems that is suspected to be linked with soaps and shampoos. We should consider giving the consumer an increased ”margin of safety” compared to what the Directive gives.

Annex 1. Criteria documents for related product groups

This document is intended to give an overview of common requirements in criteria documents for related product groups (cleaning products) of the EU Flower.

Ingredient concerned	**Requirements**
Surfactants	Must be anaerobic and aerobic degradable
All ingredients	Must not be classified as: R40, R45, R46, R49, R50/53, R51/53, R59, R60, R61, R62, R63 and R64.
All ingredients	APEOs, APDs, EDTA and NTA not allowed.
All ingredients	· A strict limit on the Critical Dilution Volume. · CDV=__ (weight i pr gram AC) * DFi / TFi
Biocides	· Only allowed if its function is to preserve the product · Prohibited to claim that the product has antimicrobial action · Preservatives classified as R50/53 or R51/53 are only allowed if they are not potentially bioaccumulating.
Dyes or colouring agents	Must be accepted for use in Cosmetics directive, 76/768/EEC, as a colour in foodstuff or must not be classified as R50/53 or R51/53.
Fragrances	· Nitromusks or polycyclic musks are excluded. · Must be used in accordance with IFRA Code of Practise.
Sensitising substances	· The product shall not be classified with R42 or R43. · The sum of ingredients classified as R42 or R43 must be < 0,1 % of the product.
Cleaning performance	· The products cleaning performance must be demonstrated. · The performance must be equal to, or better than a market leading product or generic reference. · The performance must also be better than that of pure water.
Packaging	· The weight of packaging pr functional unit is limited. · Plastic parts must be labelled to ease recycling · Primary packaging shall be separable into mono-material parts.
Consumer information	· Dosage instructions must be given · Other instructions in order to reduce environmental impact, e.g. reducing water temperature

Annex 2. Requirements of other ecolabels

There exists ecolabelling criteria for soaps, shampoos, conditioners or related products in 5 ecolabelling schemes in the world.

Ecolabelling program	Countries	Product definition	Number of licences / licensed products
Nordic Swan	Denmark, Finland, Norway, Sweden, Iceland	Solid or liquid products for cleaning body and hair or for hair conditioning. Also products for animals with similar purposes.	21 licences
Good environmental Choice (GEC)	Sweden	Shampoos, conditioners, liquid or solid soaps, shower products. Also hand cleaners and wet napkins.	Ca 90 products
Environmental labelling	Korea	Soap	8 licences/26 products
Thai Green Label	Thailand	Shampoo incl shampoo with conditioner	0
Thai Green Label	Thailand	Soap	0
Green Mark	Taiwan	Body Cleansers	7 products
Green Mark	Taiwan	Shampoo	1 product

The criteria of the Nordic Swan and GEC are the most comprehensive. The criteria of the other ecolabels largely consists of exclusions list, i.e. lists of ingredients not allowed or allowed in specified small quantities.

The criteria of GEC are different for different categories of ingredients. E.g. there are special requirements for surfactants, which are different for those of complexing agents, etc. Many of the requirements are identical to those of the Nordic Swan but some are different. The most noticeable differences are that the Nordic Swan criteria contain more ”neutral” requirements = requirements that concern all ingredients and that the GEC criteria have lists of ingredients pre-qualified in accordance with the criteria.

In the following pages the requirements of the criteria documents for the Nordic Swan and GEC are listed, and an overview of restricted perfume ingredients and other ingredients specifically excluded in Ecolabelling criteria are given.

Concerns	Nordic Swan	GEC
Definition of the product group	· Solid and liquid cosmetic products that are mainly used to clean the body skin and hair and that are rinsed off with water after use. · Solid and liquid cosmetic products for hair with a conditioning function that are rinsed off with water after use. · Products with similar functions intended for use on animals.	Liquid and solid soaps, hand cleaners, shower cremes, hair shampoos, hair conditioners and sanitary napkins.
Product	Not tested on animals in the last 5 years	
All ingredients	Must not be classified as Carcinogenic, Mutagenic or Teratogenic (CMT), nor as Xi with R42 and/or R43	
All ingredients	Substances that cause endocrine disruption (EU-list) are forbidden	
All ingredients	Total content of not easily biodegradable ingredients in: i) shampoo, shower products and liquid soaps < 15 mg/g AC ii) Solid soaps <10 mg/g AC iii) Conditioners < 30 mg/g AC	
All ingredients	Total content of not anaerobically biodegradable ingredients: ii) Shampoo, shower products and liquid soaps < 15 mg/g AC ii) Solid soaps <10 mg/g AC iii) Conditioners < 30 mg/g AC	
All organic ingredients	Total CDV must not exceed the following limits: ii) shampoo, shower products and liquid soaps < 350 l/g AC ii) Solid soaps <85 l/g AC iii) Conditioners < 600 l/g AC	
All ingredients	LAS, APEO and APDs are excluded	

Concerns	Nordic Swan	GEC
Surfactants	All surfactants must be readily biodegradable (aerobic) and anaerobically biodegradable.	All surfactants must be readily biodegradable (aerobic) and anaerobically biodegradable. Additionally surfactants must have a low residue of organic chlorinated compounds and LC50 must be lower than 1 mg/l.
Preservatives	· Must be approved according to the Cosmetics Directive · The use of preservatives for other purposes than preservation is not allowed · Must not be potentially bioaccumulating · Must not produce compounds classified as K3 or K4 upon decomposition	· The use of preservatives for other purposes than preservation is not allowed · Must be potentially biodegradable according to OECD 302. · Must have a BCF<100, or if BCF is not known the logKow<3. · Toxicity results must be given for Daphnia and fish. Max Concentration = Lowest tox result * 200. · The ingredient must not be potentially damaging for the health, considering allergenic, cancerogenic, genetic and teratogenic effects. Endocrine disruption effects are also considered.
Complexing agents	· NTA is not allowed · EDTA and phosphonates are only allowed in solid soaps and only in total amount < 0,6 mg/g AC	· The complexing agent cannot have more than 100 points/gram according to the GEC points scheme. · The ingredient must not be potentially damaging for the health, considering allergenic, cancerogenic, genetic and teratogenic effects. Endocrine disruption effects are also considered.
Solvents		· The solvent must be readily biodegradable · The solvent must have a BCF<100, or if BCF is not known the logKow<3. · LC50>100 mg/l · The ingredient must not be potentially damaging for the health, considering allergenic, cancerogenic, genetic and teratogenic effects. Endocrine disruption effects are also considered.

Concerns	Nordic Swan	GEC
Thickeners and hydrotropes		· The thickener/hydrotrope must be readily biodegradable. Thickeners that are not readily biodegradable are allowed < 0,5 %. · The thickener/hydrotrope must have a BCF < 100, or if BCF is not known the logKow < 3. · LC50 > 10 mg/l · The ingredient must not be potentially damaging for the health, considering allergenic, cancerogenic, genetic and teratogenic effects. Endocrine disruption effects are also considered.
Humectant/ emulsifier		· The humectant/emulsifier must be readily biodegradable. · The humectant/emulsifier must be anaerobically biodegradable. Exception are made for ingreidents not likely to end up in anaerobic compartments. · The humectant/emulsifier must have a BCF < 100, or if BCF is not known the logKow < 3. · LC50 > 1 mg/l · The ingredient must not be potentially damaging for the health, considering allergenic, cancerogenic, genetic and teratogenic effects. Endocrine disruption effects are also considered.

Concerns	Nordic Swan	GEC
Conditioning agents		· The conditioning agent must be readily biodegradable. Conditioning agent that are only potentially biodegradable are allowed in maximum amount of 2 %. · The conditioning agent must be anaerobically biodegradable. Exception are made for ingredients not likely to end up in anaerobic compartments. · The conditioning agent must have a BCF<100, or if BCF is not known the logKow<3. · LC50>1 mg/l · The conditioning agent must not be potentially damaging for the health, considering allergenic, cancerogenic, genetic and teratogenic effects. Endocrine disruption effects are also considered.
Fragrances	· Fragrances use must be in accordance with IFRA Guidelines · Fragrances are not allowed in products aimed at children · Musk xylene and musk ketone are not allowed · Certain specified (#) perfume ingredients are allowed in total amount of < 0,01 %.	· Fragrances are allowed in a maximum concentration of 0,5 %. · Fragrances use must be in accordance with IFRA Guidelines · Nitro musks and polycyclic musks are mot allowed · Fragrance ingredients that are not active components (smelling) shall fulfil the requirements for Other ingredients · A total declaration of the contents must be given
Colouring agents	Colouring agents must be approved according to Cosmetics Directive annex IV.	Colouring agents must be readily biodegradable or be approved as colour in foodstuffs according to Swedish law. If a foodstuff colouring agent is used information about biodegradability must be given.
Organic Colouring agents	Organic Colouring agents must not be potentially bioaccumulating	

Concerns	Nordic Swan	GEC
Bases		Only Carbonates or hydroxydes are approved as pH-increasing agents.
Acids		· Only organic acids are allowed as pH-decreasing agents. · The conditioning agent must be readily biodegradable. · The conditioning agent must have a BCF<100, or if BCF is not known the logKow<3. · LC50>1 mg/l
pH-regulators	Boric acid, borates and perborates are not allowed.	
Biological additives		· Biological additives are allowed in a maximum of 0,3 % of the active content, i.e. product without water. · Plant extracts must be extracted with water or solvents that fulfil the requirements in these criteria.
Enzymes	· Enzymes are exempt from the requirement on R42-classified ingredients. · If added, enzymes must be as liquid or as a not dust-producing granulate.	
Other additives	·	· The additives must be readily biodegradable. · The additives must be anaerobically biodegradable. Exception are made for ingredients not likely to end up in anaerobic compartments. · LC50>1 mg/l · The additives must have a BCF<100, or if BCF is not known the logKow<3. · The additives must not be potentially damaging for the health, considering allergenic, cancerogenic, genetic and teratogenic effects. Endocrine disruption effects are also considered.

Concerns	Nordic Swan	GEC
Packaging	· WUR= Weight/utility Relationship must not exceed 0,30 g/g product. WUR= Weight of all packaging/weight of product · Chlorinated plastics are not allowed in packaging incl label · Primary packaging must be labelled according to DIN 6120 or similar standards · Packaging must be designed so that appropriate dosing of product is made easier, i.e. by making the hole not too big.	· The only plastic materials allowed for packaging are polyethylene (PE), polypropylene (PP) and polyeteneterephtalate (PET). · The packaging must consist of single material parts that are easy to separate from each other. Refill packaging weighing < 30 % of the original primary packaging are exempt from this requirement. · Carton packaging must consist > 80 % recycled fibre. · If virgin fibre is used for the remaining part of the carton at least 30 % of this part must come from FSC-certified forestry. · Packaging must as much as possible be adjusted to the recommendations of ”REPA”. · The packaging may not contain metal parts. Large packaging that is reused is exempt from this requirement.
Product	The products efficiency must be satisfactory compared to existing products on the market.	
Information on the packaging		The recommended dosage must be given on the packaging.

Restricted perfume ingredients (Nordic Swan)

The following fragrance substances must not be present in the product in quantities exceeding 0.01%.

Name	**Cas-no.**
Amyl cinnamal	122-40-7
Benzyl alcohol	100-51-6
Amylcinnamyl alcohol	101-85-9
Coumarin	91-64-5
Geraniol	106-24-1
Hydroxymethylpentylcyclohexenecarboxaldehyd (Methyl heptine carbonate)	31906-04-4
Anisyl alcohol	105-13-5
Benzyl cinnamat	103-41-3
Farnesol	4602-84-0
Linalool	78-70-6
Benzyl benzoate	120-51-4
Citronellol	106-22-9
Hexyl cinnamaldehyd	101-86-0
Methyl heptin carbonat	111-12-6
3-methyl-4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-3-buten-2-on (-Methylione)	127-51-5
Oak moss	90028-68-5
Tree moss	90028-67-4

Overview of ingredients specifically exluded in Ecolabelling criteria

Ingredients	Which ecolabel
Phosphonates	Thai Green Label, Green Mark
EDTA > 0,1 %	Thai Green Label, Green Mark
EDTA + phosphonates excluded in other products than solid soap. Max 0,6 mg/g active content in solid soaps.	NORDIC SWAN
NTA	Thai Green Label, Green Mark, NORDIC SWAN
Linear alkyl benzene sulphonates (LAS)	NORDIC SWAN
Alkyl phenol	Thai Green Label
Alkyl phenol ethoxylates (APEO)	Green Mark, NORDIC SWAN
Alkyl phenol derivatives (APD)	NORDIC SWAN
Perborates	Green Mark
Boric acid, borates and perborates	NORDIC SWAN
Musk xylene and musk ketone	NORDIC SWAN
Nitro musks and polycyclic musks	GEC
Fluorescent whitener	Green Mark
Dimethyl silicone copolymers	Thai Green Label
Branced carboxylic acids and alcohols	Thai Green Label
Quartenary protein hydrolysate	Thai Green Label
PEG esters of branched carboxylic acids	Thai Green Label
PEG > 30 EO	Thai Green Label
Polyvinylpyrrolidone (PVP)	Thai Green Label
1,2-benzisothiazolin-3-one (BIT)	Thai Green Label
2,4-dichlorobenzyl alcohol	Thai Green Label
formaldehyde	Thai Green Label

Chloroacetamide	Thai Green Label
5-chloro-2-methyl-4-isothiazolin-3-one (CMI)	Thai Green Label
Ortophenylphenol	Thai Green Label
Ortononylphenol	Thai Green Label
Cyclohexanone	Thai Green Label
Hexane	Thai Green Label
Methanol	Thai Green Label
1-butanol	Thai Green Label
n-butanol	Thai Green Label
t-butanol	Thai Green Label
Dearomatized white spirit D 100 and D 70	Thai Green Label
Cyclohexanol	Thai Green Label
Decane	Thai Green Label
Heptane	Thai Green Label
i-parafins	Thai Green Label
Methyl isobutyl ketone	Thai Green Label
Higher aromates such as mesitylene	Thai Green Label
Chlorinated hydrocarbons	Thai Green Label
Toluene	Thai Green Label
Halogenated organic solvents	Thai Green Label
BHT > 0,01 %	Thai Green Label, Green Mark
Phosphates > 0,05 %	Green Mark
UV adsorption agents	Green Mark
PVC in packaging	Green Mark