About Nordic Ecolabelled

Laundry detergents and stain removers

Criteria Version 7

Background document

10 October 2018

Nordic Ecolabelling

1 Summary

This background document has been elaborated as a basis for the revision of the ecolabel criteria for laundry detergents and stain removers (hereafter denoted "laundry detergents"). The revision has taken place in the period from November 2009 to December 2011 and has resulted in version 7 of the ecolabel criteria. The evaluation of the former version of the criteria concluded that the revision should focus on adjustment of the chemical requirements were relevant, on integrating requirements in favour of products with a reduced climate impact and on investigation of the possibility of introducing requirements related to the origin and production of raw materials.

The present background document contains a description of the product group and the associated impact on the environment in a life-cycle perspective. The main environmental impacts associated with the production and use of laundry detergents are related to

- the energy used for heating of the washing water in the use stage and, secondary, for extraction and processing of raw materials
- the emission of chemicals to the environment after use

The scope of the revised ecolabel criteria primarily relates to the dosage and chemical composition of the products and high performance at low temperatures. This will ensure that the chemical load and content of hazardous substances per wash is minimised and that satisfactory performance can be achieved already at 30 °C or below. It must be recognised that only certain parts in the product life-cycle may reasonably be controlled by ecolabel requirements.

Health-related issues associated with the use of this product group are also addressed. As some of the washing chemicals are still present in the clothes after wash the content of e.g. sensitizing substances is important to consider.

Finally, the functionality of the products is highly important in relation to the credibility of the ecolabel. Performance requirements are thus also addressed.

The major changes introduced with version 7 of the criteria are:

- Documented performance required at 40°C
- More stringent dosage requirements : this ensures that the products are highly concentrated and that the overall chemical load per wash is decreased
- Exclusion of substances of high concern such as PBT / vPvB substances, potential endocrine disrupters
- Adaption of criteria to new legislation for classification and labelling of products (CLP regulation)

The revised criteria are expected to further reduce the environmental impact of laundry detergents. Imposing more stringent requirements on the dosage and chemical composition as well as facilitating the use of lower washing temperatures will reduce the overall impact of the products on the environment if used according to the on-pack recommendations.

2 Introduction

2.1 About the criteria revision

This background document serves as a source of information about the ecolabel criteria document for laundry detergents and stain removers. The document describes and motivates the ecolabel requirements which have been elaborated by Nordic Ecolabelling. The revision from criteria version 6 to version 7 has taken place from November 2009 to December 2011. The ecolabel criteria are generally valid for a period of 3-5 years before the requirements are revised. Prior to the revision process the ecolabel requirements are evaluated, and it is concluded whether the existing requirements shall be extended or revised. The new version of the criteria will be valid for at least one year before the existing requirements expire. This transition period enables the manufacturers to adjust the production to the revised criteria. The validity of the background document follows the validity of the criteria document.

An evaluation of criteria version 6 was conducted at the end of 2008. The evaluation recommended that the revision should focus primarily on adjustment and updating of the existing chemical requirements were relevant, on integrating requirements in favour of products with a reduced climate impact and on investigating of the possibility of introducing requirements related to the origin and production of raw materials. Concerning the chemical requirements, a possible ban of phosphates, a re-evaluation of the point system, updating the criteria in relation to the new regulation on classification and labelling of chemicals (CLP regulation) were highlighted. Furthermore, a clarification of the performance test description and a weighting of performance requirements in relation to consumer expectations was pointed out.

License holders and retailers have on several occasions proposed that fabric softeners are included in the product group. During 2007, a criteria project considering the inclusion fabric softeners was initiated by Nordic Ecolabelling. After the public consultation period the project was, however, terminated as the project group did not reach an agreement on the requirements and as some resistance was expressed from several stakeholders (e.g. national authorities). Nordic Ecolabelling has concluded that there are not sufficient arguments in favour of including fabric softeners in the product group at present.

Besides the conclusions from the evaluation, additional information and data compiled from the industry and other stakeholders have been used as a database for establishment of the levels of the requirements and for validation of the criteria. The industry and other relevant stakeholders have been involved in the revision process from an early stage through the following activities:

- establishment of a Nordic reference group with selected industry and other stakeholder representatives, who have been used as sparring partners during the initial preparation of the criteria
- presentation of the first criteria proposal at a stakeholder meeting in November 2010
- public consultation with industry, NGO's, authorities etc during February-April 2011

A workshop with the Nordic reference group was held in Denmark in March 2010 where the focus for the revision and relevant issues were discussed. A stakeholder meeting was

organised in Denmark in November 2010. All licence holders and other stakeholders were invited. A total of 17 stakeholders took part in the meeting where the first criteria proposal was discussed. This initiative is a relatively new approach within Nordic Ecolabelling and is launched in order to ensure increased involvement of the relevant parties from an early stage in the revision process.

2.2 Project participants

The project group consisted of the following participants:

Trine Thorup Andersen (Ecolabelling Denmark)/ Susanna Vesterlund (Ecolabelling Sweden)	Project Manager
Susanna Vesterlund (Ecolabelling Sweden)	Project Participant
Arne Godal (Ecolablling Norway)	Project Participant
Terhi Uusitalo/Hanna Korhonen (Ecolabelling Finland)	Project Participant
Trine Thorup Andersen/Anja Keller (Ecolabelling Denmark)	Project Participant
Jeppe Frydendal (Nordic Ecolabelling)/ Karen Dahl Jensen (Nordic Ecolabelling)	Nordic Criteria Manager

The Nordic reference group consisted of representatives from the following enterprises/organisations:

Cederroth

Center for Energibesparelser (formerly: Elsparefonden)

Danlind

Henkel

Cleano Production

Lilleborg

Malmö municipality

NOPA

Novozymes

Procter & Gamble

Stockholm Vatten

Unilever

The Nordic reference group has been actively involved in discussing the focus of the revised criteria and on commenting on the work of the project group during the preparation of the initial criteria proposal. The role of the reference group has been to contribute with technical information about the status and trends for laundry detergents and to outline their opinion of "the environmentally optimised laundry detergent".

3 The Nordic market for laundry detergents

3.1 Overall consumption figures

The Nordic Market for laundry detergents is considerable. The table below shows the estimated annual consumption of household laundry detergents in the Nordic countries (excluding stain removers, fabric softeners and other auxiliary washing products). Based on population figures for each country (data from Eurostat), the average use of laundry detergents per person per year is calculated.

Table 3.1 Estimated annual consumption of household laundry detergents in tonnes per year

Country	Estimated annual consumption in tonnes/year	Estimated annual consumption per person per year
Denmark	31,500 [1]	5.7 kg
Sweden	45,000 [2]	5.0 kg
Norway	20,000 [3]	4.2 kg
Finland	20,000 [4]	3.7 kg

1 SPT 2008 (Sales statistics from 2008); 2 KEMI 2006; 3 Miljømerking Norge, 2008
4 Teknokemiske Föreningen 2008

The consumption data above approximates 5-6 kg per person per year in Denmark and Sweden and around 4 kg per person per year in Norway and Finland. The differences in consumption patterns may - apart from uncertainties of the consumption estimates - relate to differences in washing habits. The level of dosing, the filling of the machine and the preference for compact / supercompact products will e.g. affect the overall consumption of laundry detergents in tonnes. Most areas and households in Denmark have middle hard or hard water, whereas the water is predominantly soft in the other Nordic countries (GEUS 2009, Ympäristö 2009, Svenskt Vatten, Oslo Kommune 2009, Grunnvann i Norge). This may explain the higher average consumption per person in Denmark as the recommended dosage for laundry detergents increase with increasing water hardness.

3.2 The manufacturers

The manufacturers of laundry detergents in the Nordic countries primarily consist of small/middle-sized companies who manufacture the products locally and mostly under private label. Some of the major, market leading brands sold on the Nordic market are, however, produced by multinational enterprises with production typically placed outside the Nordic countries.

The Nordic market for laundry detergents and stain removers is overall dominated by multinational enterprises such as P&G (Procter & Gamble) (Nordic key brand: Ariel), Unilever (Nordic key brands: Omo/Via/Bio Luvil) and Reckitt Benckiser (Nordic key brands: Vanish, Woolite). On a global basis, P&G and Unilever account for about 50% of the total sales of laundry detergents (Dansk Kemi 2005).

JohnsonDiversey and Ecolab are big manufacturers of laundry detergents for the professional market. However, some of their products are also used in household

applications, e.g. in smaller common laundries and institutions with regular household machines.

A number of small and middle-sized enterprises also have considerable market shares in the Nordic Countries – with a large weight of ecolabelled products. Small and middle-sized manufacturers of household laundry detergents for the Nordic Market are e.g. (but not limited to):

Danish manufacturers:
a/s Blumøller (part of Sara Lee Corporation)
danlind as
Nopa A/S

Swedish manufacturers:
Aktiv Kemi AB
Cederroth International AB
Kempartner AB
Tvätt-Lina AB

Norwegian manufacturers:
Lilleborg AS - Dagligvare

Finnish manufacturers:
Berner Oy
Elokuu Luonnontuote OY
KiiltoClean OY
Ole hyvä Luonnontuote Oy
Oy Faintend Ltd
Soft Protector Oy

Others:
Dalli de Klok B.V. (The Netherlands, part of the Dalli group)
Henkel

3.3 Washing habits in the Northern countries

In 2008, the International Association for soaps, detergents and maintenance products (AISE) commissioned a survey of consumer washing habits across Europe. In short, the survey showed the following figures for Scandinavia:

- Preferred type of detergent: Regular and compact laundry powders
- Average washing temperature: 54.5 °C (*European average 42.6 °C*)
- Loading of the machine: 53% of washes conducted with a full load
- Awareness of differences between regular and concentrated products: 61%
- Top 2 percieved impacts on the environment: Washing at low temperatures with a full load

The major drivers for the purchase of laundry detergents are price (35%), environmental reasons (26%), product/brand (22%) and other reasons ("free riders") (17%). According to this survey, the environmental awareness in relation to purchase of laundry detergents

is higher in Scandinavia (26%) compared to the rest of Europe, where this driver accounts for approximately 17-21% (AISE 2008).

Based on a similar, but older survey conducted by AISE in 1998, the regional differences in washing habits is relatively small within the Nordic countries. At that time the distribution of washes conducted in the temperature intervals ≤30 ºC, 31-40 ºC, 40-60 ºC and ≥ 61 ºC showed some differences while the average washing temperature was 49-50 ºC in Denmark, Sweden and Finland and 53 ºC in Norway (AISE 1998).

3.4 Market penetration of ecolabelled laundry detergents

In Denmark the Nordic Ecolabel labelled laundry detergents accounted for approx. 20% of the total sales of detergents in the retail trade in 2006 (ACNielsen, 2007). In Norway the share of Nordic Ecolabelled detergents is approx. 50% of the total sales (Miljømerking Norge, 2008), 8 % in Finland (SFS-Miljömärkning + Teknokemiska Föreningen) and approx. 80 % in Sweden (SIS Miljömärkning, 2008). The potential for ecolabelled products is thus considerable. The public focus on environment, health and climate related issues are generally high and it is estimated that the distribution of ecolabelled products can be increased on the Nordic market. Based on questionnaires send out during the evaluation of the criteria (version 6) several license-holders confirm a potential for increasing the number of ecolabelled products.

The production of ecolabelled products is a niche for the minor manufacturers that differentiate products with the Nordic Ecolabel (or other ecolabels) from the large, multinational brands on the market. In Sweden, however, two leading retailer groups (ICA and COOP) have a policy implying that only ecolabelled washing- and cleaning products are marketed. As a consequence, the large multinational brands are generally ecolabelled in Sweden. In Norway, Nordic Ecolabelled laundry detergents are also marketed under the Omo brand (one of the market leading brands in Norway. Several of the licenseholders in e.g. Sweden and Denmark have informed that the Nordic Ecolabel is not a major competitive parameter, as many manufacturers already hold a license within this product group and as ecolabelling is often a requirement from the retailers (based on questionnaire sent out during criteria evaluation 2008). The Nordic Ecolabel is thus not regarded a major advantage from one company to the other by these manufacturers.

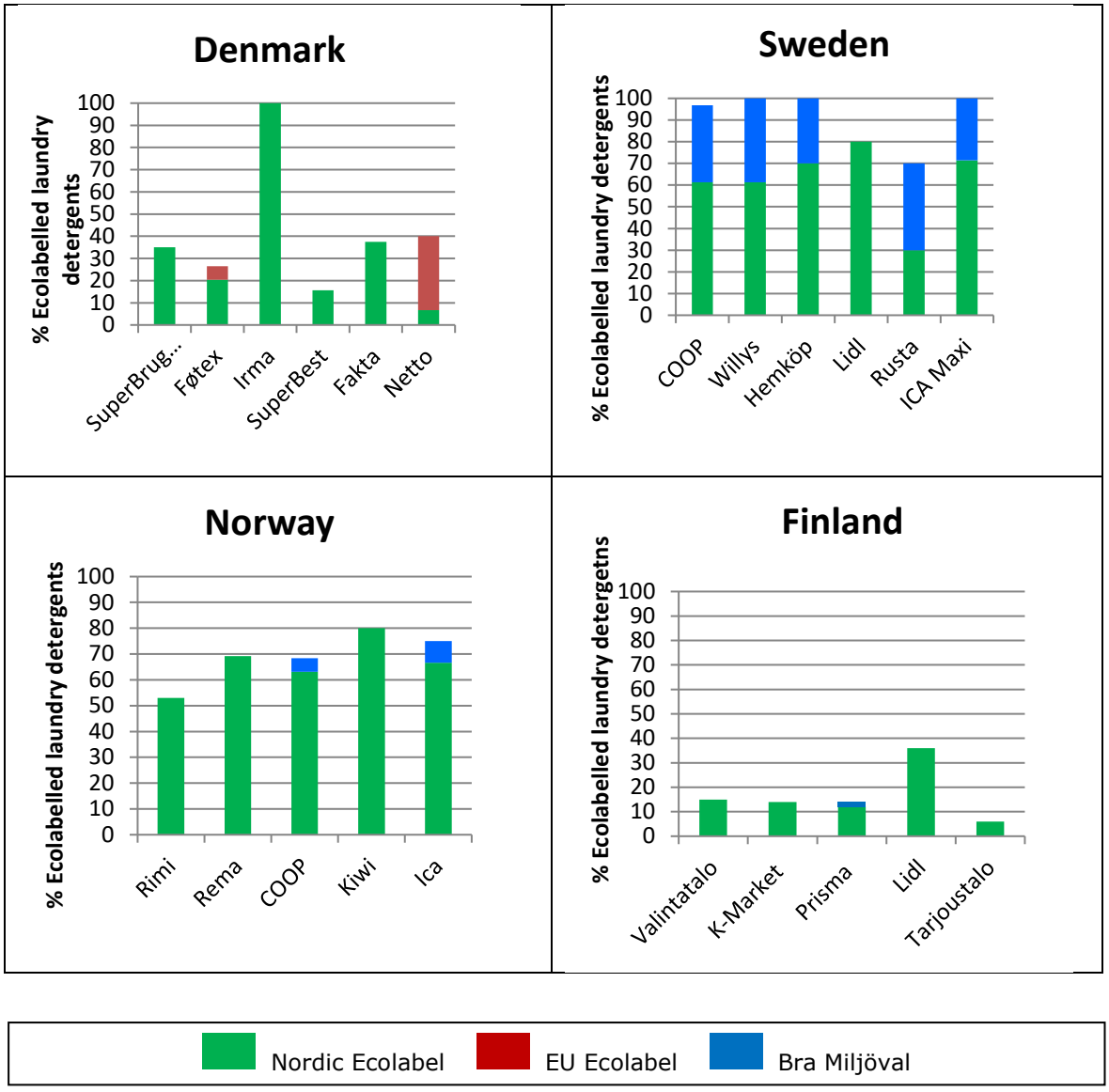
The number of Nordic Ecolabel licenses and registrations in the Nordic countries per November 2009 is seen in the tables below. In Denmark a number of licenses have been merged during 2009, mainly due to the introduction of new fees.

Table 3.2 Number of licenses and tradenames in the Nordic countries (Dec. 2010):

	Sweden	Finland	Norway	Denmark	Total
Licenses	8	2	13	20	43
Total no. of trade names (incl registrations)	110	39	70	142	361

In January/February 2010, a market screening was conducted by Nordic Ecolabelling in order to assess the share of ecolabelled products relative to the total supply of laundry detergents (consumer market only). Five to six major retail shops were visited in Copenhagen, Stockholm, Oslo and Helsinki, respectively, and all product names were registered, including information of labelling and product claims related to environmental benefits. The survey included both laundry detergents (incl. speciality detergents) and stain removers. The survey was based on the number of tradenames found in the shops and does not include any figures on actual sales. The results are presented in figure 3.1 below. See Appendix 1 for further description.

Figure 3.1 Mini survey of the market share of ecolabelled products in major retail shops, January/February 2010 (random check)



The screening was only conducted in retailer shops and did not include other types of trade channels, such as internet shops. The result of the market screening indicated the following tendencies:

- The Nordic Ecolabel is the dominant ecolabel, whereas other ecolabels (EU-Ecolabel "Flower" in Denmark and BraMiljöval in Sweden, Norway and Finland) generally have a lower presence in the retail shops
- In Sweden and Norway, products with the Nordic Ecolabel account for >50% of the products available in all retail shops except for one (Rusta). The total share of ecolabelled products was >60% in all shops.
- In Denmark and Finland the share of ecolabelled products is generally much lower, although there are big differences between the supply at different retailers in Denmark (from 7%-100%)
- The percentage of products available with the Nordic Ecolabel in the shops visited showed relatively good accordance with the estimated sales figures presented above.

4 Environmental impact of laundry detergents

4.1 Manufacture and composition of laundry detergents

Different methods of manufacturing powder laundry detergents are used. In *the blender process* (often favoured by small manufacturers) the ingredients are mixed in large vessels before being packaged. The blenders can accommodate loads up to about 4000-5000 kg. After the ingredients inside the blender have been mixed, the mix is allowed to run out onto a conveyor belt or other channelling device that transports the detergent to the packaging stage. (eNotes 2006).

In *the spray drying process*, most of the raw materials are initially mixed into a concentrated aqueous slurry. The slurry is heated and pumped to the top of a tower where it is sprayed through nozzles under high pressure to produce small droplets. The droplets fall through a current of hot air, forming hollow granules as they dry. This process results in a relatively "fluffy" powder. After the granules have been cooled, heat sensitive ingredients that are not compatible with the spray drying temperatures (such as bleach, enzymes and fragrance) are added. Traditional spray drying produces relatively low density powders. New technology has enabled the soap and detergent industry to reduce the air inside the granules during spray drying to achieve higher densities. Production rates are as high as up to 80.000 kg detergent per hour (SDA 2009, Bayly et al 2009).

A process called *agglomeration* is typically used for compact powders. The dry ingredients for the detergent are first fed into a large machine known as an agglomerator. After the dry ingredients have been blended, liquid ingredients are sprayed on the dry mix. The resulting mixture is a hot, viscous liquid. As the liquid leaves the machine, it collects on a drying belt where its own heat, exposure to air, and hot air blowers render it easy to crush or crumble. The newly made detergent is then pulverized and pushed through sizing screens. The result of this process is a dry detergent made up of granules of the mixed detergent. The agglomeration process can produce more than 20.000 kg detergent per hour. (eNotes 2006).

For tablets, the process resembles production of a compact detergent. The detergent is compressed into tablets which are surrounded by a coating in order to prevent crumbling.

Both batch and continuous blending processes are used to manufacture liquid and gel detergents. Stabilizers may be added during manufacturing to ensure the uniformity and stability of the finished product. In a typical continuous process, dry and liquid ingredients are added and blended to a uniform mixture. Recently, more concentrated liquid products have been introduced. One method of producing these products uses new high-energy mixing processes in combination with stabilizing agents (SDA 2009).

There is a large supply of laundry detergents and stain removers on the market and the variation within the product group is considerable. The consumers may e.g. choose between compact or traditional detergents, detergents for cold water or detergents for regular washing temperatures, detergents for white or coloured textiles, speciality

detergents for delicate fabrics etc. Most of these detergents are available either as powder or liquid formulations. More recently also tablets and gel detergents have entered the market. For stain removers there is a choice between pre-treatment stain removers used directly on the stains and in-wash stain removers, which are dosed in the washing machine. In addition, stain removers intended for other types of textiles than clothing, e.g. carpets and furniture, are also available.

The composition of the products thus varies according to the use and nature (solid/liquid) of the product. According to the manufacturers with whom Nordic Ecolabelling are in dialogue with, the choice of raw materials also depends on the sales price of the product. Low cost (and sometimes less effective) raw materials are often used in discount products whereas the more expensive brands typically contain a higher level of more expensive, high performance chemicals.

Table 4.1 lists the main types of ingredients typically used in laundry detergents and stain removers and their primary function. Not all of the listed ingredients are necessarily present in a given product but laundry detergents are rather complex formulations, often containing 15-25 different ingredients. Surfactants (incl. soaps) and builders are on a volume basis the most important ingredients in laundry detergents.

Tabel 4.1 Ingredients in laundry detergents and stain removers

Ingredient type	Function	Examples
Anti-redeposition agents	Prevents dissolved dirt in the washing water to reattach to the textiles. Prevents greying.	CMC, CEC, polymers, starch
Bleaching agents	Removes or decolorizes (whitens or lightens) stains that are not removed by surfactants	Perborate, percarbonate, hydrogen peroxide, peracids, sodium hypochlorite
Bleach activators	Activates the bleaching agent. Peracid precursors.	TAED
Bleach catalysts	Makes hydrogen peroxide or singlet oxygen more effective when reacting on stains. Enables bleaching at lower temperatures. They are complex organic molecules with a metallic center.	Manganese complexes
Buffering agents	Stabilises the pH of the washwater to maintain the cleaning efficiency. Cleaning is reduced under acidic conditions	Carbonate, citrate, citric acid
Builders (and co-builders)	Binds calcium in the water and in the soil on the clothing. Allow better access to the soil for surfactants and thus improves cleaning	Phophate, phosphonate, zeolite, silicates, carbonates, citrate, polycarboxylates
Colorants	Aesthetic / marketing value	Various colouring agents
Corrosion-inhibitors	Protects the washing machine agains corrotion	Silicates
Dye-transfer inhibitors (DTI)	Prevents transfer of dyes from one textile to another	Polymers, co-polymers (e.g. PVP or PVPI)
Enzymes	Specific stain removal, biodetergency, whiteness, color and fabric care	Proteases, lipases, amylases, cellulases, mannanase, pectinase
Fabric whitening agents (optical brighteners)	Reflect ultra-violet sunlight as white, visible light. Gives impression of whiteness.	FWA-1, FWA-5
Fillers	Adds structure	Sodium sulphate (In liquid products: water)
Fragrance	Aesthetic / marketing value	Various fragrance mixtures
Hydrotropes	Increases the solubility of other ingredients in liquid products. Regulates viscosity.	Cumene/xylene/toluene sulphonates, urea, ethanol
Preservatives	Prevent growth of microorganisms in liquid products	Various types of preservatives
Soap	Cleaning agent. Reduces surface tension and loosens/disperses/ suspends the soil.	Soluble sodium or potassium salts of fatty acids (C8-C22)
Solvents	Dissolution of ingredients (in liquid products)	Alcohols
Suds inhibotors	Reduces the quantity of suds (foam) in the washing machine	Soap, low foaming surfactants, silicones
Surfactants	Cleaning agent. Reduces surface tension and loosens/disperses/ suspends the soil.	Alkyl ether sulphates, alkyl sulphates, alcohol ethoxylates, alcohol alcoxylates

4.2 Life Cycle Assessment (LCA) of laundry detergents

The major laundry detergent life cycle stages from cradle to grave can be illustrated by the following flow diagram:

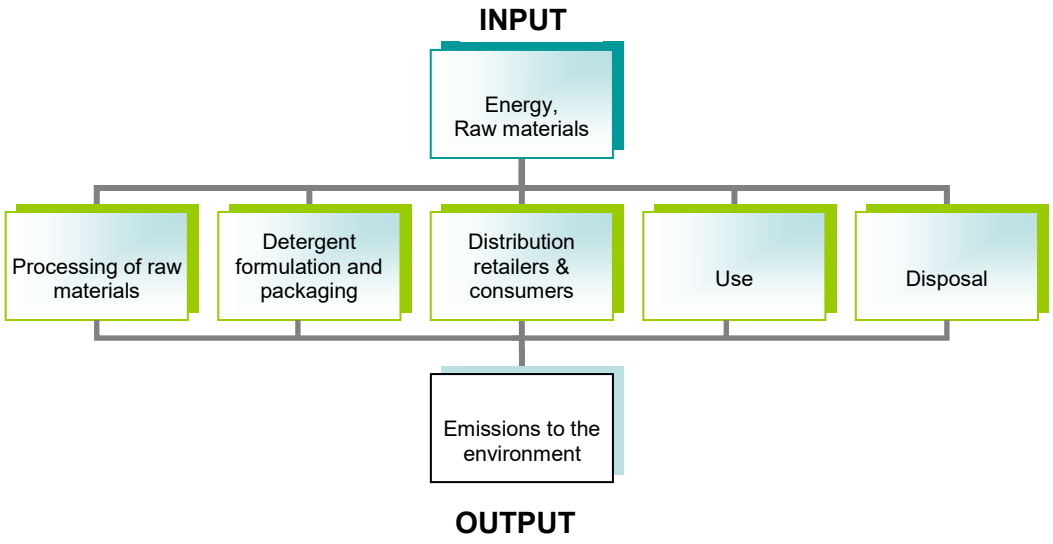


Figure 4.2 The life cycle stages of laundry detergents

Every stage in the life cycle will to some extent have an impact on the environment such as use of energy, emissions to water and air and generation of waste. Cradle-to-grave life cycle assessment (LCA) is a tool for assessing mass balance of inputs and outputs in a system and organising the relative contributions of each life stage into different categories of environmental impact. Several LCAs for laundry detergents have been published by the industry. The LCAs consider environmental indicators like primary energy consumption, total solid waste, water consumption, aquatic ecotoxicity, eutrophication, acidification, human toxicity, photochemical oxidant formation, depletion of the ozone layer and climate change potential. The functional unit of the LCAs is typically one wash cycle. The environmental indicators considered in the life cycle assessments are not directly comparable. Thus, the LCAs do not indicate which indicators have the highest overall weight as contribution to climate change is e.g. not directly comparable to aquatic ecotoxicity. The LCAs analyse the relative contributions from each life stage to each of the environmental indicators included in the analyses. The LCAs are often used for comparison of different products within the category in order to demonstrate differences in environmental impacts and benefits of certain products. LCAs conducted by the industry thus often have a goal of promoting some products to others.

LCA of a generic washing powder
The environmental impacts of laundry detergents are illustrated by the below figure showing the relative environmental contributions from the different stages of the lifecycle of a generic European laundry detergent (powder), with focus on energy consumption, water emissions and solid waste.

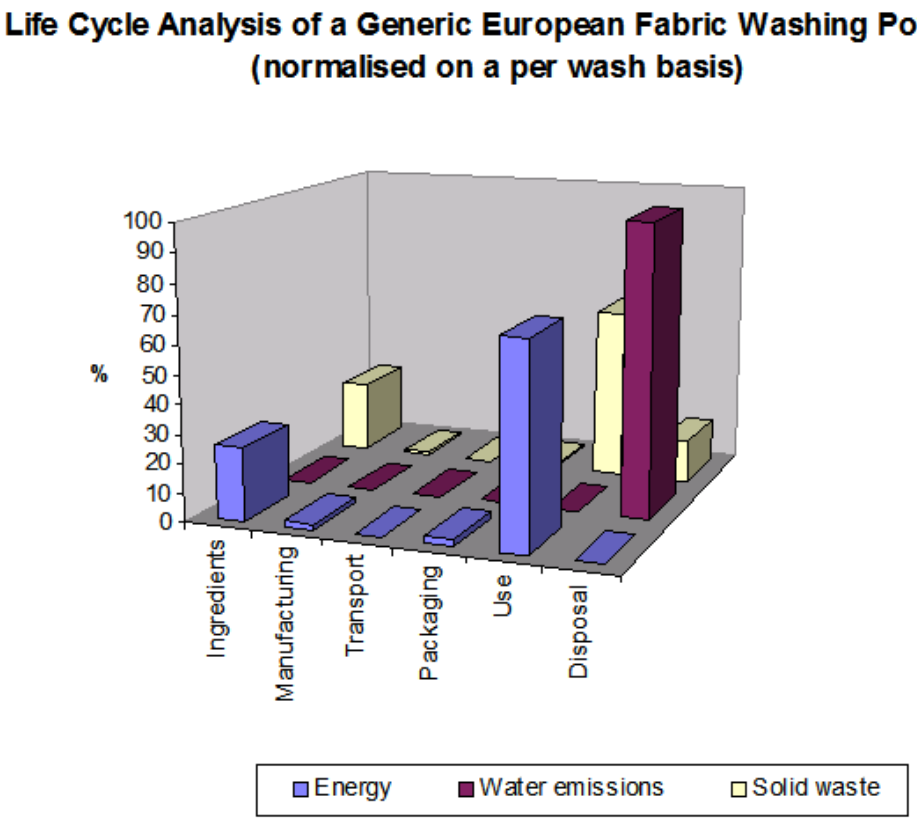


Figure 4.3 Life-Cycle Analysis of a Generic European Fabric Washing Powder (AISE 2007)

The figure shows that the use and disposal stages as well as the ingredient stage are associated with the highest contributions to energy consumption, water emissions and solid waste production in a life cycle perspective. The energy consumption is primarily connected to the use stage and relates to the energy used for heating of the water in the washing machine. Energy consumption is also considerable during processing of raw materials and relates to the extraction of raw materials, transport and manufacturing of final chemicals (AISE 2001, Van Hoof et al 2003). Water emissions are dominant in the disposal stage and primarily relate to contributions to BOD/COD and metal emissions (alkali metals: Na, Ca). The BOD is a measure of the level of degradable organic material whereas the COD is a measure of the total level of organic material, in this case in the waste water from laundering. However, the water emissions of BOD only reflect a minor part of the total BOD present in the detergent as on average 90% is removed during waste water treatment. More than 99% of metals emissions occur during the disposal stage (AISE 2001). Contributions to aquatic toxicity and eutrophication of laundry detergents are primarily driven by organic water borne emissions not removed during waste water treatment (Van Hoof et al 2003). Solid waste is produced mainly in the use stage followed by the ingredient production stage and is associated with the use of energy (ashes from energy generation). The use stage thus has the highest contributions to the total energy consumption and waste production. It is also evident from the figure that the manufacturing process, the transportation and the packaging of the products have relatively low contributions to the overall environmental impact of the products.

Comparative LCA of different laundry detergent formulations

In a comparative LCA of laundry detergent formulations in the UK, the environmental profiles for 5 different types of formulations was analysed (compact/regular powders, compact/regular liquids and tablets). All products in the analyses are manufactured by Procter & Gamble. The result of the LCA showed, that for all the different product formulations, the use stage (washing process) is the key contributor for most of the environmental indicators analysed (>70% of the total contribution). It was thus concluded that the highest potential for improvement is the development of formulations providing efficient cleaning at low washing temperatures. Furthermore, the study concluded that compact formulations (powder and liquids) are environmentally preferable to regular products, mainly because of the lower use of chemicals per wash. With respect to aquatic toxicity, the major contributions from detergent ingredients arise from surfactants and fragrances. Figure 4.4 shows the contributions from the various life cycle stages to primary energy for year 2001 UK laundry detergent formulations (Van Hoof et al 2003). (Contributions to other environmental indicators such as emissions to water and solid waste production are thus not included in the figure). It can also be seen from the figure that even though the relative contribution related to packaging and disposal is low, there may be differences between the different types of products.

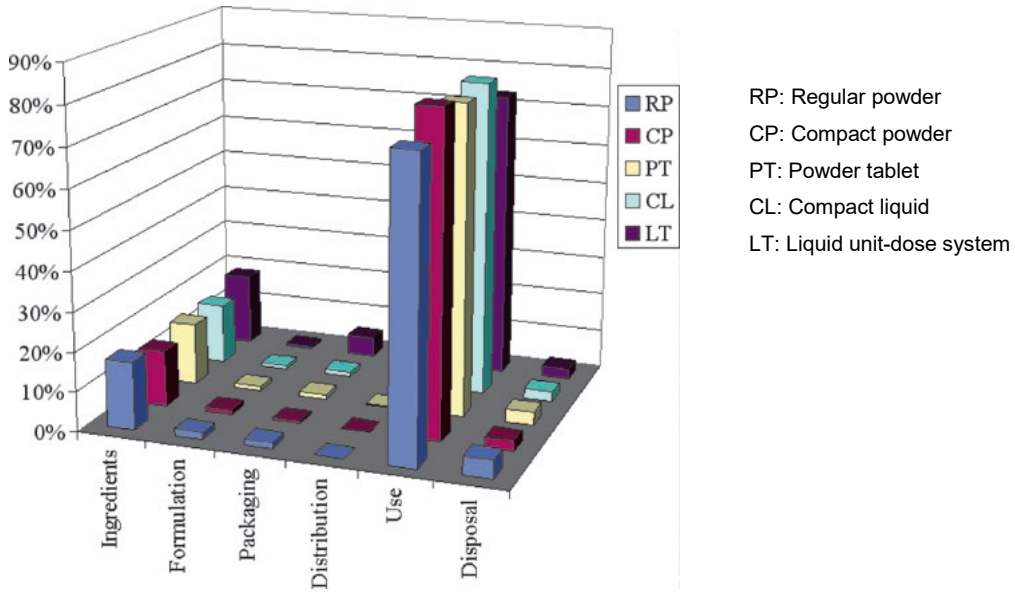


Fig 4.4 Contribution from the various life-cycle stages to primary energy for 5 different types of laundry formulations (from Van Hoof et al 2003)

Comparative LCA of products used at low versus regular temperature

An LCA was conducted by P&G in 2006 comparing the environmental burdens of their Ariel "Actif á froid" products (2006) used at lower temperatures (~33 ºC) compared to regular Ariel products and average washing temperatures (~45-48 ºC) (1998-2001). The results of the study indicated that significant savings in total primary energy consumption could be obtained with the "Ariel Actif á Froid" formulation (27% savings compared to the Ariel 2001 formulation). Furthermore the study indicated that there was no significant environmental trade-off's for the "Actif á Froid" formulation on the other environmental parameters, including the ecotoxicity potential (P&G 2006). The study did

not compare the washing performance of the two products. It shall also be noted that detergent formulations may generally have changed in the period from 1998-2001 and up to 2006 – and that the environmental performance may thus generally expect to improve with the continuous development of more concentrated formulations etc.

Summarising the conclusions of the available LCAs

The LCAs summarised above are produced by the industry and obviously have a purpose of demonstrating certain benefits of the latest product innovations. It is, however, beyond the scope of this background report to go deeply into the chosen methodology and selection of parameters. The LCAs should be used as a tool for indicating the most significant environmental impacts keeping in mind that the focus of the studies are primarily related to primary energy consumption. The above LCAs reach the same overall conclusions although the focus of the studies vary. It is evident that the major environmental impact associated with laundry detergents in a life cycle perspective are related to:

- the energy used for heating of the washing water in the use stage and, to a lesser extent, the energy used for extraction and processing of raw materials (incl. the associated solid waste of energy production)
- the emissions to the environment (water) after use

Due to the nature of LCAs, neither the magnitude nor the absolute environmental impact of the different contributions is considered. The LCA do thus not answer fundamental questions like e.g.:

- Are the water emissions e.g. at a level that is considered critical compared to the overall load from the waste water treatment plants (WWTPs)?
- How does the overall energy consumption from manufacture and use of laundry detergents e.g. compare to washing without using detergents?
- Is the environmental impact related to water emissions e.g. more or less critical than the environmental impact related to extraction of raw materials?

The focus of the ecolabel criteria should, however, consider the major identified impacts to the extent that realistic and controllable requirements can be made. The LCAs also indicate that less weight should be put on the detergent manufacturing process, the transportation of the products and the packaging.

4.3 Renewable and non-renewable resources

During the latest years a lot of attention has been put to the use of fossil fuel based ingredients versus vegetable based ingredients. This discussion is relevant considering the future limitations on fossil fuels and the concern of global warming. Global warming is to a high extent related to the burning of fossil fuels.

In laundry detergents it is mostly surfactants and various polymers that are derived from the petro-chemical industry. Many of the bulk ingredients in the detergents are inorganic (e.g. builders like zeolite, silicates, carbonates) and are not replaceable by renewable resources. Some renewable raw materials and ingredients are already used in laundry detergents such as soaps (typically derived from vegetable oils) and enzymes. Enzymes used in laundry detergents are still mainly produced in laboratories. Other ingredients may partly consist of renewable materials such as fatty acid based surfactants, alkyl

polyglycosides (APG) and biopolymers. Fossil and animal based fatty acids may also be used in production, but in this criteria version the origin of these materials is not under observation, since the focus is on sustainable plant production.

Although the environmental benefits of moving away from petro-chemical based ingredients may seem obvious, replacement with renewable resources are associated with some concerns - both ecologically, economically and socially. The increased demand for renewables leads to increased pressure on the demand for arable land. Major topics of concern are loss of natural habitats (e.g. rainforest, other areas of high biological value) and increased food costs combined with reduced food supplies (WWF 2009, RSPO 2009). Roundtable for Sustainable Palm Oil (RSPO) is one of the initiatives that aim at promoting the growth and use of sustainable vegetable oils. Similar initiatives are under development for other renewable products, such as soy-oil and sugarcane (www.bettersugarcane.org, www.responsiblesoy.org). A possible promotion of the use of renewable raw materials in ecolabelled detergents would imply that the production of renewable raw materials (especially vegetable oil production) is sustainable. Some important considerations in relation to a possible integration of requirements promoting renewable substances are:

- It is presently uncertain whether there is an overall benefit of a (partial) replacement of renewable raw materials with non renewable raw material with respect to climate impact. Relevant data for global warming potential on ingredients used in laundry detergents (renewable as well as non renewable) are scarce. Based on the available LCAs it is mostly the use of laundry detergents that contributes to global warming through considerable energy consumption. The climate impact from extraction and processing of raw materials is secondary to the use stage.
- An increased demand for renewable raw materials leads to increased pressure on arable land – which may contribute to deforestation (increased global warming) and reduced food supplies on a global scale.
- The availability of renewable and sustainable raw materials for detergents may be limited and expensive and may put a strain especially on smaller manufacturers.

  An example of "green" or (partly) renewable ingredients for detergents is Methyl ester sulfonates (MES). MES have been on the market for some years but has so far not been price competitive to e.g. LAS, which on a global scale is one of the most widely, used surfactants in laundry detergents. However, with increasing petro-chemical prices and improvement of the MES production process, MES may become a realistic alternative to petro-chemical based surfactants such as LAS. MES have been highlighted for their high biodegradability, low aquatic toxicity and good environmental profile. MES are obtained from plant and tallow resources and are being promoted as "green surfactants" with application both within the detergent and personal care industry. Although the benefits of MES as a possible replacement for substances like LAS have been highlighted and although regulatory and environmental bodies advocate the use of green chemistry, concerns about feedstock availability have also been expressed in relation to the use of MES (Satsuki 1994, Research and Markets 2009).

4.4 Environmental effects of the products after use

4.4.1 Emissions to the environment

Upon use of laundry detergents in households, the detergents are discharged with the wash water to the sewage treatment system or directly to the environment e.g. via a septic tank, for example in rural areas. Table 4.2 shows the percentage of households that are connected to waste water treatment plants (WWTPs) in the Nordic countries.

Table 4.2 Households connected to WWTPs in the Nordic countries

	Denmark	Sweden	Norway	Finland
Households connected to WWTPs	89% [1]	85% [2]	82% [3]	>80% [4]

1 Wikipedia 2009 (data from WHO); 2 Svenskt vatten 2000; 3 Statistics Norway 2009; 4 VVY 2010

Although waste water treatment is considered highly efficient in the Nordic countries, regional differences apply in the level of sewage treatment. In sparsely populated areas, sewage treatment is often limited to mechanical treatment (e.g. Statistics Norway 2009).

As indicated by the AISE life cycle assessment (AISE 2001) water emissions from laundering primarily relate to contributions to BOD/COD and metal emissions. Even though at least 90% of the BOD is removed during waste water treatment[1] a considerable part of detergent chemicals will be discharged to the environment due to the volume of laundry detergents used and considering that between 10-20% of the households are not connected to a WWTP. This means that approximately 10% of the laundry detergents from consumers, in the Nordic countries, that are connected to WWTPs pass through the WWTP (at a cleaning effect of 90%), which corresponds to approximately 9 902 tons per year. On top of this there are 15% of the households in the Nordic countries that are not connected to WWTPs at all, which leads to approximately 17475 tons per year from them. If these two figures are summarized that ends up being 27 000 tons of detergents per year that end up in the recipient.

Furthermore, whereas the waste water treatment primarily removes degradable organics and nutrients (phosphor, nitrogen), low molecular and slowly biodegradable/ persistant substances (micropollutants) may not be fully removed or degraded in the mechanical/ biological treatment and will end up in sludge or recipient water bodies. Examples of micropollutants from household and domestic care products are e.g. fragrances, presservatives, sunscreen agents (RIWA 2007, EU COM 2001). Accordingly, properties such as biodegradability, bioaccumulation potential and toxicity in aquatic environments are key factors when assessing the environmental impact of the products. The major part of the metals discharged from laundry detergents is sodium (Saouter et al 2004). This is not surprising since considerable amounts of sodium is contained in laundry detergents (e.g. as sodium sulphate, soaps).

Both the amounts of chemicals used for washing and the properties of the chemicals are important to consider. Reducing the amount of chemicals per wash dose is not in itself an environmental improvement unless the properties of the chemicals are also taken into account. The share of efficient, high performance chemicals used for concentrated products is thus higher per wash load compared to regular products which contain a larger bulk of relatively inert fillers.

[1] 90% BOD removal is a European average from the 2001 LCA, the level is assumed to be higher in the Nordic countries anno 2009

4.4.2 Solid waste

According to the LCA studies previously mentioned, solid wastes are generated mainly by two processes in the life cycle of laundry detergents: waste produced as a by product of energy consumption (ashes) and waste produced after use of the detergents. Upon use of laundry detergents solid waste is generated as sludge from waste water treatment and as packaging waste. Packaging waste is either recycled as cardboard or discarded with the municipal waste, which may be either incinerated or deposited in landfills. According to the LCAs the solid waste fraction from the disposal stage (incl. disposal of packaging and sewage sludge) is relatively small compared to the waste generated during the use and raw material production stage. However, the relative impact of the packaging of different types of detergents may vary as seen in the figure 4.4.

As a considerable amount of the municipal waste water sludge produced is re-used for soil improvement in agriculture, the presence of detergent chemicals in the waste water sludge has given rise to some concern. Different national strategies apply regarding goal for re-use of sludge in agriculture but generally the goal is to have a high level of re-use either in agriculture or for other purposes. The remaining sludge may be incinerated with re-use of the ashes for industrial purpose or simply incinerated or deposited as waste. Table 4.3 shows the extent of sludge used for soil improvement (in agriculture) in the Nordic countries.

Table 4.3 Use of wastewater sludge for soil improvement

	Denmark	Sweden	Norway	Finland
Percentage used for soil improvement	59% [1] (2002 data)	20% [2]	58% [3]	3% [4]

[1] Miljøstyrelsen 2008. [2] Svenskt Vatten 2008, [3] Statistics Norway 2009, [4] VVY 2010

The European Sewage Sludge Directive (86/278/EEC) sets the framework for the protection of the environment, especially soil, in relation to the re-use of municipal sewage sludge in agriculture. The Sewage Sludge Directive e.g. sets the framework for establishment of cut-off values for heavy metals in the sludge and is implemented by executive orders on national levels. Denmark has some of the most strict cut-off values for heavy metals in Europe (Miljøstyrelsen 2009a). In addition, national cut-off values are also established in Denmark for selected xenobiotics including LAS (linear alkyl benzene sulphonates), PAH's (polycyclic aromatic hydrocarbons), NPE (nonylphenolethoxylates and DEHP (diethylhexyl phthalate). These selected xenobiotics are indicators for the overall level of xenobiotics in the sludge. The Danish Environmental Protection Agency conducts surveys of national as well as international projects and monitoring programmes regarding sewage sludge and level of contaminants. These surveys generally indicate that the level of xenobiotics in sewage sludge is low and that the substances are degraded to a high extent in the WWTP's (Miljøstyrelsen 2009a). A revision of the Sewage Sludge Directive is expected in 2010.

4.5 Health considerations

In addition to the environmental impact of laundry detergents (and auxiliary washing products) both the manufacture and use of the products may also impact the health. Health is critical for the consumers and health aspects are an integrated part of the Nordic ecolabel criteria where relevant. The strategy of the Nordic Ecolabel specifies that in addition to improving the external environment through more sustainable

consumption, the ecolabel shall also improve the working environment and the manufacture of products that are safe for the consumer. Exposure to laundry chemicals may occur during and after use. The physical contact with the detergent during use (i.e. dosing in the washing machine) is rather limited. Products used in spray form (e.g. some pre-treatment stain removers) may expose the user to inhalation of small droplets of the products during use. Furthermore, workers may be exposed to laundry chemicals during the manufacture of laundry detergents. However, as demonstrated by the manufacturers audited by Nordic Ecolabelling, the manufacturing process is often fully automated and/ or precautionary measures are implemented for hazardous substances such as enzymes.

After washing, some of the ingoing chemicals may be left in the clothes. Some chemicals are designed to stay or leave traces in the clothes – e.g. fragrances and chemicals used for softening of the textiles. Other chemicals may stay in the clothes after washing due to insufficient rinsing in the wash process and/or poor solubility. Depending on their inherent properties, chemicals left in the textiles after washing may give rise to allergy and skin irritation.

4.6 Environmental benefits and motivation for the ecolabel

The previous chapters describe the composition and manufacture of laundry detergents and the main environmental impacts associated with the products in a life cycle perspective. The available LCAs for laundry detergents indicate that the energy consumption associated with the use stage and the formulation of the detergent (with respect to the level of compaction, the size and nature of the chemical load per wash) are the largest contributors to the overall environmental impacts derived from laundering. Aspects like the potential use of renewable versus non-renewable ingredients and possible impact on human health are also important issues to consider in the ecolabel criteria.

The Nordic Ecolabel criteria for chemical products typically have a high focus on the nature of the ingoing chemicals and the faith and effects of the chemicals after use. Nordic Ecolabelling thus sees a potential for further enhancement of ecolabelled products by keeping and developing the existing focus on the ingoing chemicals and by integrating requirements that favour products that are efficient at lower washing temperatures compared to the average of today (approximately 55 °C). Large savings on the energy use can be obtained by decreasing the washing temperature as illustrated by the following figures:

- If the washing temperature is lowered from 60° to 30°C and from 40° to 20°C, the household energy used for washing is reduced by **60%** (DONG Energy[2])
- If each household in Europe reduced the washing temperature from 60° to 40°C or from 40° til 30°C, **12 mio. tonnes of CO_2** could be saved – corresponding to the emission from 3 mio. cars (Novozymes[3])

[2] http://www.dongenergy.dk/privat/energiforum/sparenergi/hverdagensstroemslugere/vaskemaskinen/Pages/saenktemperaturennaarduvasker.aspx
[3] http://www.novozymes.com/da/MainStructure/PressAndPublications/PressRelease/2009/Cold+is+cool.htm

- Switching from 60° til 40°C ("one click down") will reduce the household energy used for washing with approx. **38%** and the overall energy consumption in households by **2-4%** (German Eco-Institute[4])
- In EU, households account for approx. **30%** of the total electricity consumption (European Environmental agency 2008[5]).

Within the development of cold water and low temperature products manufacturers of ecolabelled products are already at front. The first cold water products for use at 20 °C on the Nordic market were thus ecolabelled with the EU-Ecolabel "the Flower" or the Nordic Ecolabel. During the last couple of years, the number of products with claims of low temperature has increased markedly. As evident from the market survey, a long range of products claim efficiency at 30 ºC, and even 15 ºC efficiency claims are found on certain products such as Ariel's Excel Gel. Today several variants of ecolabelled products with documented performance at temperatures lower than 40 °C (20 or 30 ºC) are available, and this development should be promoted through the revised criteria. (Version 6 of the ecolabel criteria does not have requirements that specifically promote the development of products with a reduced climate profile.) However, aspects like cleaning performance, hygiene and machine performance/maintainance may be compromised when reducing the washing temperature. These parameters thus need consideration when establishing the requirements. It also needs to be considered that many machines used in households today do not have cold water washing programmes or regular programmes with lower temperatures than 30 ºC. With the new Ecodesign regulation, household washing machines shall offer a 20 ºC programme by July 2014 (Com 2009). It is estimated that more than 75% of all household washing machines which are less than 5 years old can handle coldwater products, and almost all new machines on the market will be able to wash with cold water (Elforsk 2006).

In a test for the Danish consumer magazine TÆNK, 5 liquid detergents for cold water were tested for their washing performance at both 15 °C and 40 °C. Two of the products were ecolabelled with the Nordic Ecolabel. The test concluded that out of the 5 products tested the two ecolabelled products had the best washing performance in terms of stain removal. Furthermore the washing performance was equal to the performance of a regular product tested at 40 °C for 4 out of 5 products. The cold water products were also tested at 40 °C and performed slightly better at 40 °C compared to 15 °C with respect to stain removal. The test also measured bacteria removal at different temperatures by wash of pre-contaminated stain strips. The test showed that in order to remove bacteria a wash temperature of 60 °C is required. There was no difference in bacteria removal between 15 °C and 40 °C (TÆNK 2010).

It should be kept in mind that energy consumption during use and the environmental impact of the detergent ingredients used are not comparable parameters. Thus – a product that performs well at low temperatures may still have a considerable impact on the aquatic environment (depending on the level of sewage treatment etc.). Thus, keeping focus on the biodegradability and the ecotoxicity and biodegradability of the ingredients should still have a high focus in the ecolabel criteria.

[4] http://www.oeko.de/oekodoc/289/2006-008-de.pdf
[5] http://www.eea.europa.eu/publications/eea_report_2008_6

5 Basic facts about the criteria

5.1 Products that can be labelled

The product group "laundry detergents" comprises laundry detergents and stain removers in powder, liquid or any other form and should mainly be marketed towards consumers. The products shall be used for washing of textiles, and are intended to be used principally in household machines, the products can also be used in household machines in for example launderettes and common laundries.

The ecolabel criteria distinguish between detergents for regular wash of white/ coloured textiles ("heavy-duty detergents") and speciality detergents used for delicate wash ("low-duty detergents"). Speciality detergents are detergents promoting special fabric care: e.g. use for delicate fabrics such as viscose, wool, silk, microfiber or other fabrics requiring special care. Special care could be e.g. no bleach, no enzymes, gentle wash at low temperature in excess water.

The product group does not comprise products that are dosed via carriers such as sheets, cloths or other materials. The criteria do not specifically exclude products for professional use in laundrettes and common laundries – as such products may be equivalent to household products in their content and use. However, the criteria are not intended for professional products used for specific applications in institutions and industry in industrial washing machines. The Nordic Ecolabel has separate criteria for laundry detergents for professional use.

5.2 Version and validity of the criteria

Laundry detergents was one of the first product groups to become ecolabelled within the Nordic Ecolabelling system. The criteria have been revised several times and have mainly focused on regulating the nature and content of the ingoing chemicals.

Version 1 (adopted 1992) of the criteria excluded the use of phosphate, EDTA, NTA, optical brighteners and colouring agents. Limits were imposed on the content of phophonates and sodium perborate. For surfactants, requirements regarding toxicity, degradability and bioaccumulation were set. The criteria also contained requirements for maximal dosage so that only concentrated products could be labelled.

Version 2 (adopted 1993) imposed stricter requirements for the maximal dosage of powder detergents.

Version 3 (adopted 1995) implied a reconstruction of the criteria document with the introduction of a point system where the total impact with respect to ecotoxicity, biodegradability, total amount of chemicals, phosphate, inorganic substances, organic substances and packaging (weight/utility relationship) were assessed. Further requirements regulating the content of hazardous substances were introduced.

Version 4 (adopted 2001) introduced a distinction between products for hard and soft water (matrixes, performance test, Ecolabel logo) and the product group was expanded to include speciality detergents (version 4.0) and stain removers (version 4.4).

Version 5 (adopted 2006) introduced a harmonisation of the chemical calculations with the principles used in the EU Ecolabel Scheme (integration of Critial Dilution Volume

(CDV) and the DID list) and a major change of the performance test. The requirements were adjusted so that they enabled ecolabelling of liquid detergents.

*Version 6 (*adopted 2008) was in practice a prolongation of criteria version 5.3 with the primary change that fragrance requirement R15B was phased out (more stringent requirement to fragrances).

Version 7 (adopted 2011) introduces mandatory requirements of performance at low temperature (30 ºC) for colour-safe detergents more stringent dosage requirements and strict limitation on use of phosphorous and substances classified as environmentally harmful. A new requirement on origin, traceability and control of vegetable raw materials has been introduced.

5.3 Other labelling schemes

Other labelling schemes with focus on environment and/or health are available on the market. In the Nordic coutries, the most well-known and widespread of these labels are:

BraMiljöval is the ecolabel of the Swedish Society for Nature Conservation (SSNC). The criteria are not specific for different product groups but constitute a common set of criteria for chemical products. Products such as laundry detergents, bleaching agents, fabric softeners and stain removers can be labelled with BraMiljöval. The criteria are based on requirements or exclusion of specific ingredients and ingredient groups. There are no requirements for the total environmental impact of the product per functional unit nor the performance. The requirements are not directly comparable to the Nordic ecolabel criteria.

The EU Ecolabel Scheme also has criteria for laundry detergents. These criteria are similar to the Nordic Ecolabel criteria in their structure, whereas the specific cut-off levels are adapted to the European market. At present stain removers are not covered by the EU Ecolabel criteria. Generally there are fewer and less stringent criteria compared to the Nordic Ecolabel. The EU Ecolabel criteria for laundry detergents have just been revised. The new version of the criteria was published on April 28th 2011. Harmonisation of the Nordic Ecolabel criteria with the revised EU Ecolabel criteria has been considered where relevant and as long as it is not regarded as a deteoriation of the Nordic Ecolabel criteria.

Ecocert is a French certification body who focus on the origin of the raw materials (vegetable raw materials) as well as the share or raw materials that are grown organically (http://www.ecocert.com).

The *Asthma and Allergy associations* have a declaration scheme that cover laundry detergents. The criteria are not publically available but have a primary focus on allergy. The criteria are not common for the different Nordic Asthma and Allergy associations. Where the Nordic Ecolabel criteria deal with allergy based on health classification of the ingoing substances, the A&A associations have a different approach and the requirements are based i.e. on clinical reports from doctors and of prevalence of allergies for single substances. Colouring agents and fragrances are generally excluded in the declaration schemes. The A&A declaration scheme and the Nordic Ecolabel are often used in combination on certain products/brands. The Norwegian Asthma and Allergy Association (NAAF) specifically requires that the products comply with the Nordic Ecolabel environmental requirements.

AISE (The International Association for soaps, detergents and maintenance products) has a voluntary labelling scheme called "sustainable cleaning". This is based on a charter on sustainability which the companies can commit to. Members committed to the sustainable cleaning charter make use of the "washright" panel on their laundry detergents, advising the consumer of how to reduce the environmental impact of washing. http://www.sustainable-cleaning.com/DA_symbol.html.

Other less known labelling schemes also exist. These are not necessarily ecolabels but are often regarded as such by the consumers. Examples are
the Finnish label "Avainlippu" and the Swedish label "Gröna Kvisten"

6 Justification of the ecolabel requirements, criteria version 7

The requirements specified in the criteria document are described and motivated in detail in this chapter. The structure of this chapter is identical to the criteria document version 7.

1) Environmental requirements

1.1 Product description:

R1: Description of the product and packaging
This purpose of requirement is to give an overview of the composition of the products (incl. packaging) encompassed by the ecolabel application. This information is a precondition for checking the compliance with some of the subsequent requirements in the criteria document. This requirement is adjusted compared to previous criteria versions, as it is expanded to include information on the composition and weight of the packaging material.

1.2 Excluded or limited substances and mixtures:

R2-R3: Product classification and exclusion of CMR Substances,
By imposing requirements on the overall environmental and health classification of the products, the ecolabel criteria signal that products that are toxic or hazardous to environmental and human health are not candidates for the ecolabel. The requirement is mostly a precautionary measure as laundry detergents are generally not associated with such product classifications.

Exclusion of CMR substances and limitation on the content of environmentally hazardous ingredients are standard requirements in Nordic Ecolabelling for chemical/technical products. Exclusion of CMR substances has a high signal value. Substances like perborates, which are now classified as toxic to reproduction, have until recently been widely used in laundry detergents and certain components in fragrance mixtures are also known to possess CMR properties. By defining criteria which imply that substances characterised by certain intrinsic properties shall not be used in ecolabelled products, the ecolabel respond to doubts in relation to the safe use of specific chemicals, and thereby address consumers' environmental and/or health concern.

Substances on the candidate list and substances anticipated to enter the candidate list for authorization under REACH (substances of very high concern) based on CMR properties are thus excluded from ecolabelled products (with the exception of possible pollutants). The European Chemicals Agency (ECHA) defines substances of very high concern as substances being classified as CMR and substances fulfilling the PBT (Persistant, Bioaccumulative and Toxic) criteria or the vPvB (very Persistant and very Bioaccumulative) criteria. Furthermore, case by case studies of other problematic substances, such as endocrine disrupters, may enter the list. Substances fulfilling the PBT or vPvB criteria and substances categorised as (potential) endocrine disrupters are specifically excluded via requirement R6.

An inclusion of the new hazard class 'Irreversible effects on the eye (Category 1, H318)' would mean that also the risk phrase R41 should be included in the list of unacceptable

classifications as it is the direct translation of H318 according to the transformation table provided in annex VII of the CLP regulation.

At the moment there are many detergents classified as Xi (Irritant) and carry the risk phrase R41 (Risk of serious damage to eyes), due to the ingoing substances that are needed for good performance. Therefore an inclusion of this risk phrase is not possible in this requirement.

When a substance or preparation is classified (according to the DSD/DPD[6]) as corrosive and assigned either the risk statement R34 (Causes burns) or R35 (Causes severe burns), the risk of severe damage to eyes is considered implicit, and the risk statement R41 shall not be included in the label[7]. The same principle is applied in CLP as well, but the hazard statement for Corrosive Categories 1A, 1B and 1C specifically mentions the hazard for eyes (H314: Causes severe skin burns and eye damage) whereas in the 'old' risk phrases eyes are not mentioned.

By only excluding the most corrosive substances (R34, R35 and/or Corrosive, category 1A, 1B and 1C) from licensed products we can assume a sufficient level of consumer protection also regarding any risk to the safety of eyes while at the same time expecting also good washing results.

Stain removers have been exempted from the requirement in R2 concerning classification as Xn with R22. This is due to the fact that stain removers can contain over 40% of percarbonates which will lead to a classification as R22, since percarbonates are classified as R22.

R4: Sensitizing substances

Allergy is an increasing problem. In Denmark for example, approximately 20% of the population is to some extent suffering from contact allergy (Thyssen et al, 2007). Some ingredients used in laundry detergents and stain removers are designed to stay in/leave traces in the textile (e.g. fragrances) while other substances may be left in the textile due to incrustation of poorly soluble substances or poor / insufficient rinsing in the washing process. Exposure to detergent chemicals in the laundered textiles could thus represent at potential risk of development of allergic reactions – like exposure to all other chemicals in the society.

Most laundry detergents and stain removers on the market contain substances that are classified as sensitizing either by respiration or by skin contact. Examples of such substances are enzymes, which are classified as respiratory sensitizers. Some enzyme formulations are also known to contain stabilizers and preservatives classified as skin sensitizers. Other examples include certain bleach catalysts and fragrance ingredients, which may be classified as skin sensitizers. Enzymes and bleach catalysts are important for the function of the product, especially in the process of stain removal. Enzymes and certain bleach catalysts may also improve the product performance at low wash temperatures, leading to savings on the energy consumption in the use stage. Enzymes may also reduce the overall content of surfactants in the product formulation and decrease the content of chemicals used per wash (Nielsen and Skagerlind 2007), and are generally less toxic to aquatic organisms compared to surfactants. The environmental benefits of enzymes and bleach catalysts in laundry detergents are thus considered to be substantial. Furthermore, no data have been found that indicate an increased risk of developing allergy due to residues of enzymes and bleach

[6] Directive on dangerous substances, Annex VI: General classification and labelling requirements for dangerous substances and preparations
[7] Directive on dangerous substances, Annex VI: General classification and labelling requirements for dangerous substances and preparations

catalysts in washed textiles. The Nordic Astma and Allergy associations also allow enzymes in laundry detergents.

Fragrances are cosmetic ingredients which are added to give the laundry a pleasant smell and/or to mask (possible) unpleasant smell. Fragrance is one of the most frequent causes of contact allergy, although the overall prevalence of fragrance allergy is relatively low – a german study has shown that approximately 4% of the adult population is suffering from fragrance allergy (Videncenter for Allergi 2010). Most fragrance formulations are furthermore classified as hazardous for the aquatic environment.

The content and composition of fragrances in ecolabelled laundry detergents is effectively limited through the limitation of environmentally hazardous substances (R3), limitation of sensitizing fragrance substances (R5) and by the Critical Dilution Volume (R9). The possibility of marketing fragranced product variants is an important sales parameter, and the prevalence of ecolabelled products on the market is heavily compromised if fragrances are not allowed. It is concluded that a complete exclusion of fragrances is not quite in proportion with the possible impact of low amounts of fragrances on the environment. Furthermore, a complete ban of fragrances in ecolabelled laundry detergents may lead to an unintended use of fabric softeners as a means of delivering a fragranced scent to the washed textiles. There is a wide selection of both fragranced and fragrance free laundry detergents and stain removers on the market, and the consumer thus has the possibility of choosing according to preference.

Substances that are classified as R42, ie substances that may cause sensitization by inhalation, such as some fragrances are furthermore excluded from spray products in order to minimize the potential risk of allergic reactions occurring from the direct exposure to aerosol droplets. This applies mainly to stain removers which are often sold with spray pumps.

A note was added, that if enzymes are to be used in spray products (like for example stain removers) they have to be risk assessed in accordance to the AISE standard (AISE, 6 October 2010). It is furthermore required that all enzymes must be added either as liquids or encapsulated granulates in order to ensure safe working environment conditions when working with enzymes. (Previously, the term "non-dusting granulates" was used. This is, however, a misleading term as granulates may give rise to dust formation if handled inappropriately).

In the criteria document it is specified that preservatives and stabilizers, which are classified as sensitizing may be a part of an enzyme raw material if the enzyme raw material are added as liquids or as encapsulated granulates.

R5: Fragrance

Limitation on the content of sensitizing fragrance substances and other fragrance substances of concern is imposed in order to minimise the risk of allergy when using an ecolabelled laundry detergent/stain remover. Most fragrances do contain sensitizing substances as described under R4, but a total ban is not considered to be in proportion with the possible impact of low amounts of fragrances on the environment. A complete ban of sensitizing fragrance ingredients is expected to markedly compromise the market penetration of ecolabelled laundry detergents and thus decrease the overall environmental benefit of the ecolabelled products in this category.

Conformity with the Code of Practice of the International Fragrance Association ensures that manufacture, handling and use of the fragrance is fulfils certain standards regarding

prohibited substances, restricted use and purity. The IFRA Code of Practice supports commitment to provide products that are safe for use by the consumer and to the environment. The Code of Practice applies to the manufacture and handling of all fragrance materials, for all types of applications and contains the full set of IFRA Standards (IFRA).

R6: Other excluded substances

Although the current criteria document aim at limiting certain environmental properties (e.g. requirement 3, 9 and 10) rather than specific substance groups, certain substances are, however, excluded.

APEO and APD

The product must not contain alkylphenol ethoxylates (APEO) or alkylphenol derivatives (APD).

APEO is excluded because its degradation products are not readily degradable and some degradation products have been declared by the EU to be endocrine disrupting (e.g. nonylphenol). APD are substances that are derived from APEO and are excluded because they are not readily degradable and are harmful to health. These two substances were reinserted in the requirement after the hearing due to comments from the hearing and also to make it easier during the licensing process (ie to give the person handling the application a direct yes or no wheter these are ingoing substances or not).

Both substances are explicitly excluded even though they are covered by the detergents regulations, but the Nordic Ecolabelling still wants to keep this as a separate requirement to make the comunitacation toward people outside the Ecolabelling organization clearer.

PBT and vPvB substances

Substances fulfilling the PBT (Persistant, Bioaccumulative and Toxic) and vPvB (very Persistant and very Bioaccumulative) criteria on the candidate list for "substances of very high concern" (*according to the criteria in Annex XIII of the REACH Regulation)* are excluded from ecolabelled products. Exclusion of PBT and vPvB substances has a high signal value, but is not assessed to have a major impact on the product formulation in practise as those substances that are presently evaluated as fulfilling the PBT / vPvB substances are not relevant detergent ingredients (ESIS 2010) . By defining criteria which imply that substances characterised by certain intrinsic properties shall not be used in ecolabelled products, the ecolabel may respond to doubts in relation to the safe use of specific chemicals, and thereby address environmental and/or consumer concern. Reference is made to the text under R2-R3.

(Potential) Endocrine disrupters:

Endocrine disrupting compounds (EDC) is an area of increasing concern. Within the framework for classification and labelling of substances there are no classification criteria for endocrine disrupting chemicals. EU has made an initial evaluation of more than 500 potential endocrine disrupting compounds as a part of the strategy on endocrine disrupters. These substances have been divided into three categories depending on the weight of evidence (or lack of evidence) for endocrine disrupting effects. Based on this categorisation, a candidate list has been established indicating which substances should be prioritized for further investigation. The categories I and II indicate potential endocrine disrupting effects observed in in-vivo and/or in-vitro studies (EU Endocrine Disrupters Website 2009). The vast majority of the potential EDCs on the candidate list are not relevant in the context of laundry detergents (e.g. pesticides, PCBs). However, with the large focus on endocrine disrupting effects and the possible impact related to the use of consumer products, EDCs are

excluded from this product group as a preventive measure. Nevertheless, the requirement excludes e.g. certain parabenes that have been identified as preservatives in liquid laundry detergents (based on market screening conducted by Nordic Ecolabelling 2010).

Substances on the candidate list and substances anticipated to enter the candidate list for authorization under REACH (Substances of very high concern, SVHC) based on CMR properties are excluded from ecolabelled products (with the exception of possible pollutants). The European Chemicals Agency (ECHA) defines substances of very high concern as substances being classified as CMR and substances fulfilling the PBT (Persistant, Bioaccumulative and Toxic) criteria or the vPvB (very Persistant and very Bioaccumulative) criteria.
Furthermore, case by case studies of other problematic substances, such as endocrine disrupters, may enter the list of Substances of very high concern. The Nordic Ecolabelling does not consider this to be a large risk for this product group since there are more requirements on the substances than just CMR, PBT, vPvB and endocrine disruptors. But the Nordic Ecolabelling wants to have these substances listed to prevent new products to have such substances in the future and to make external communication easier, which was added after the public hearing. EU Ecolabel has the same type of requirement.

Antimicrobial/disinfecting agents (for other purposes than preservation) are generally unwanted in laundry detergent and other household products as chemical disinfection is not required for household washing purposes. Due to their mode of action, substances with disinfecting or antimicrobial properties generally have a high aquatic toxicity and are often poorly biodegradable due to inhibitory effects on bacteria. Use of antimicrobials and disinfecting agents should also generally be reduced in relation to the possible development of resistant bacteria. Currently, antimicrobial or disinfecting agents do not seem to be used in household laundry detergents in Europe. However, the use of e.g. nanosilver as bactericides in products on markets outside Europe has been reported (The Project on Emerging Nanotechnologies; Nanogist Co. 2009) and the Nordic Ecolabel should be prepared for the possible appearance of such products on the market in the future. Claims of antimicrobial effect is not accepted, but mixtures containing for example TAED and percarbonates used for bleaching are okay as long as no antimicrobial effect is claimed.

EDTA, DTPA
EDTA and DTPA can re-mobilise metals from sediments and soils leading to contamination of surface and ground waters. The aerobic and anaerobic biodegradability of EDTA is furthermore limited. Risk assessment of EDTA has concluded a need for limitation of the risk in a range of applications, although not for domestic detergents as the use of EDTA in these products is limited (EU RAR 2004). Exclusion of EDTA in the ecolabel criteria is thus a preventive measure. This also ensures that it can be communicated to the consumers that ecolabelled products are EDTA free. DTPA has the similar properties to EDTA.

[Note that the complexing agent Nitrolo Triacetic Acid (NTA) has previously been included in this criterion as NTA was evaluated as possibly carcinogenic to humans by IARC (IARC 1999). NTA is now officially classified as carcinogenic and is thus excluded through criterion R3: CMR substances].

Nitromusks and polycyclic musks generally have unwanted health and environmental properties. Some are already excluded through the exclusion of CMR substances. Communication with suppliers of fragrance (personal communication, 2009) has confirmed that many companies all over Europe still use polycyclic musk in consumer products. The use of nitromusks is apparently very limited, but manufacturers outside Europe still produce for example Musk

Ambrettte, which is prohibited by IFRA. Exclusion of nitro- and polycyclic musks is thus still considered relevant as a preventive measure.

Substance	**Cas-no.**
Musk xylene	81-15-2
Musk ambrette	83-66-9
Moskene	116-66-5
Musk tibetine	145-39-1
Musk ketone	81-14-1
HHCB	114109-62-5, 114109-63-6, 1222-05-5, 78448-48-3 and 78448-49-4
AHTN	1506-02-1 and 21145-77-7

Chlorine based bleach generally have unwanted health and environmental properties. Reactive chlorine compounds such as hypochlorite are toxic but degrade quickly. Hypochlorite is classified as acutely toxic (R50/H400) and will thus not be covered by the general requirement for environmentally hazardous substances (R8). Since reactive chlorine compounds react with organic substances, organic chlorine compounds can form in the waste water system. These may be toxic, persistent and bioaccumulable. Reactive chlorine compounds include hypochlorites, chlorine gas, chloramines (NH_xCl_y) and chlorine dioxide (ClO_2). Use of chlorine based bleach is not common in household detergents in Northern Europe but is used e.g. as part of the detergent system in professional laundries. Furthermore, it has been commented by stakeholders that chlorine based bleach is sometimes used in association with low temperature wash in other parts of the world (e.g. in USA) in order to reduce bacterial growth. The exclusion is thus seen as a preventive measure.

Optical brighteners are added to laundry detergents in order to give white/bright textiles a white look and to reduce ”greying” after several washes. Optical brighteners absorb light in a certain wavelength spectrum and re-emit light in the blue region, making the textile look white. Optical brighteners are not readily biodegradable. They are however photodegradeable in the presence of light (HERA-project 2003 & 2004), which has been showed by different studies. But since the Nordic region has less daylight in the winter than the rest of Europe it is still an issue to avoid optical brighteners. Optical brighteners absorbs to the sludge in the water treatment plants, which is not wanted, since there is a wish to keep the sludge as free from chemicals as possible. Optical brighteners are still monitored in for examaple Sweden and were put up on the list of substances that “Naturvårdsverket” (Swedish Environmental Protection Agency) was screening in 2010 (Naturvårdsverket, 2010).

Experiences from the professional laundering industry (in Northern Europe) have shown that optical brighteners are not regarded as necessary. Some stakeholders have likewise commented that the use of optical brighteners is not a great “consumer demand” in Scandinavia. The customers will only notice a difference if textiles washed with and without optical brighteners if they are compared against each other. It can be argued that in other parts of Europe – where dress habits are different – the degree of whiteness of the textile may be more important and may increase the lifetime of the textile (i.e. the clothes are not disposed after a short lifetime). However, in the Nordic Countries where optical brighteners are already phased out in Nordic Ecolabelled products, it is not seen as a necessity to re-introduce optical brighteners in the ecolabel criteria – although the general criterion on aerobic/anaerobic degradability addresses substances with poor degradability. The ban of optical brighteners may be re-assessed in the next revision if documentation supporting longer lifetime of the textiles or other environmental benefits can be documented.

R7 Phosphorous

Phosphorous is a source of eutrophication of water bodies. Phosphate emission from agriculture is one of the major contributors of P to the aquatic environment (EEA 2005). Phosphates from detergents may play only a minor role in the overall phosphate emissions to the aquatic environment, especially in areas where phosphate is effectively removed from waste water. Generally, the emissions of P via point sources (including waste water) have decreased during the last 30 years. This is mainly due to improved waste water treatment, especially in northern and western Europe, following the implementation of the EU Waste Water Treatment Directive (1991/271/EC) (EEA 2005). After the hearing the exclusion of phospahtes was changed to a limit of the total amount of phosphorous in the products, see the new requirement R7.

The Detergents Regulation (648/2004/EC) has recently been reviewed and has among other issues addressed the use of phosphates. A proposal for amendment of the Regulation is currently being processed (COM(2010) 597 final). This proposal introduces a limitation of the use of phosphates and other phosphorous compounds in household detergents implying that the content of phosphorous shall be lower than 0.5% on a weight basis. The upcoming regulation of phosphates in detergents confirms that eutrophication caused by the use of phosphate is still a subject of high relevance although the contribution from detergents may be minor compared to other sources of phosphate.

Phosphates are already banned in laundry detergents in Norway and Sweden (as well as in a range of other European countries). Allowing phosphate in ecolabelled products will thus contradict the national bans already implemented. The following text has been included in the criteria document, Spetember 2014: Note the national legislations concerning phosphorous in the Nordic countries. In Norway phosphorus is regulated in "Forskrift om begrensning i bruk av helse- og miljøfarlige kjemikalier og andre produkter (produktforskriften)", §2- 12 and § 2-14. In Sweden phosphorus is regulated in Regulation 1998:944.

Many of the large retailers in Scandinavia have voluntarily decided to phase out phosphates in laundry detergents (due to e.g. public concern of eutrophication and/or increasing raw material prices). High market shares of phosphate free detergents are already a reality in several European countries (CSTEE 2003).

The EU commission has proposed to limit the total amounts of phosphorous in products to 0.5 wt% in the revision of the detergent regulation. A limit of 0.2 wt% phosphorous has been suggested for Sweden and Finland. Norway already has this limit implemented. Due to this the Nordic Ecolabelling has decided to limit the amount of phosphorous to 0.2 wt%. But since the rest of the requirements have been set with the functional unit of grams per kg wash, the limits for each category was calculated with the highest accepted dosage in requirement R9. This resulted in:
-Laundry detergents (heavy duty + detergents for delicates) < 0,030g/kg wash
-Stain removers (in wash) < 0,010 g/kg wash
-Stain removers (pretreatment) < 0,0050 g/kg wash

To compare the phosphorous from version 6 to version 7 some calculations are need. In version 6 the limit was set as:
P from phosphates can at the maximum be 1,15g of P/kg wash and phosphonates maximum 0,15g/kg wash.

If assuming a phosphonate such as $C_2H_8O_7P_2.4Na$ that would mean a total amount of phosphorous (from phosphonate and phosphates) of 1,18g/kg wash.

The new limit is therefore a lot stricter than in the previous version. If all the phosphorous in the heavy duty detergent (in version 7) would come from phosphates such as STPP that would be about 0,11g phosphate/ kg wash (STPP contains 25% phosphates). This means that it is more or less a ban of phosphates, since a phosphate based laundry detergent requires a lot more phosphate than 0,11g/kg wash (0,8wt in the formulation).

R8 Colouring agents

A ban of *Colouring agents* has been discussed as these substances do not contribute to the performance of the products. Colouring agents are added to many raw materials to disguise a dull color/signal a specific effect and may also be used in e.g. tablets to identify different layers with different functions. This is often seen in dishwashing tablets and may also be applicable for laundry detergent tablets. Liquid products may also be coloured. Some detergent raw materials are coloured and even if the manufacturer does not deliberately add colour to the detergent, it can be hard to avoid. Many colouring agents are not readily biodegradable and will thus be regulated through the general environmental requirements on toxicity and biodegradability (R8-R11). Colouring agents are added in minute concentrations and are not seen as major issue in relation to the environmental impact of laundry detergents. Likewise, colouring agents without environmental data will be assessed as classified with R50/53 (H410). A specific ban is thus not considered justified.

Colouring agents are only approved in liquid products to make it easier to dose the product correctly.

The requirement of colouring agents not being bioaccumulative is inserted in the criteria to make sure that the colouring agents used are not bioaccumulative, even though they are added in very small quantities.

The requitement gives room for colourig agents approved for foodstuffs. Colouring agents used in food are not considered environmentally hazardous. Colouring agents that are not bioaccumulative are not absorbed by the food chain and their environmental hazard is therefore limited.

1.3 Dosage, toxicity and biodegradability:

R9 Dosage

Compaction of laundry detergents is identified as an important parameter governing the environmental impact of laundry detergents. This is also indicated both in LCA studies (Van Hoof et al 2003, P&G 2003) and in a risk assessment based approach (P&G 2005). The terms compaction and concentration are often confused. Concentration is the result of a lowered chemical load per dosage whereas compaction relates to the density of the product (and also the level of filling of the packaging) - i.e. how much space does a given number of dosages require.

The ecolabel criteria aim at providing sustainable products with minimum environmental impact for the consumer. As the products become more concentrated, the amount of total chemicals per wash is reduced to a minimum. Concentration of the products is usually achieved by reducing the amount of "fillers" (e.g. carbonates, sulphates) and by the development of ingredients with a higher performance on a volume basis. The development of efficient enzyme combinations may also reduce the load of traditional wash chemicals such as surfactants. Based on the market screening in the initial phase of the revision of the

criteria, it is obvious that concentration of the products and lowered dosage is an ongoing trend.

The requirement of a maximum dosage (formerly: total chemicals) is tightened compared to the previous version of the criteria and limits are established for solid and liquid products (in grams and ml active ingredients per kg wash, respectively). In the former criteria, requirements were put on total chemicals excl. complexing agents (builders) and on the content of complexing agents, respectively. The maximum dosage level in the former criteria was thus [maximum total chemicals = 14 g/kg wash + maximum level of complexing agents = 6 g/kg wash] = 20 g/kg wash. By current standards, 20 g/kg wash is a very high dosage. The new dosage limits are established with reference to the dosage levels for the available ecolabelled formulations and to the products registered in the market screening conducted by Nordic Ecolabelling in January/February 2010 (Appendix 1), where dosage recommendations for all products identified in the selected retailer shops were registered (data not shown). The new dosage limits ensure compliance for concentrated powder products on the market, but exclude "fluffy" (non-compact) products with high amounts of fillers and, in general, products with very high dosages. Even though liquids generally have a lower content of active ingredients per dosage compared to powders, comparable dosage limits are set for liquids on a volume basis, as the ecolabel should not encourage use of dilute products with a high water percentage.

For liquid pretreatment stain removers the dosage has been calculated from the weight of 2ml per stain and 6 applications per wash in a 4.5 kg wash load.

The International Association for Soaps, Detergents and Maintenance products (AISE) has in 2009 launched "Laundry Sustainability Projects" (LSP projects) for heavy-duty powder and heavy-duty liquid products (LSP2 for powders and LSP-L for liquids). The LSP projects are voluntary initiatives to which the AISE members can commit. The goals of the LSP projects are e.g. lowered washing doses and optimised use of packaging materials. AISE's proposed maximum dose for heavy- duty powder detergents is set at 85 g/wash (corresponding to ~19 g/kg wash in a 4.5kg load) whereas the proposed maximum for heavy-duty liquids is 75 ml/wash (corresponding to ~17 ml/wash in a 4.5kg load), based on middlehard water. The revised ecolabel criteria suggest slightly lower limits for the maximum dosage of heavy-duty powder detergents (~82 g/wash) whereas the dosage limits for liquids exceeds the AISE proposal. However, with increased stringency on both performance requirements and chemical requirements, a further reduction of dosage limits for liquids is not considered realistic at this stage. The revised criteria also specify which dosage limits that apply for different levels of water hardness, for different levels of soiling and for recommendations of prewash and subsequent wash. The levels were based on the information gathered at the mini survey in 2010 (see figure 3.1) where a lot of products were checked. The EU Ecolabel has a limit in the new criteria set (decision of April 28th 2010) limiting the range between dosage to soft and hard water to a maximum of 2 times, i.e. 200%.

The limit for tablets concerning the different levels of soiling was increased to 150%, since it is difficult to make recommendation in parts of tablets. This will then lead to for example 2 tablets for normally soiled laundry and 3 tablets to heavily soiled laundry.

R10 Environmentally hazardous substances

Substances that are toxic to the environment and are at the same time not readily degradable (R50/53, R51/53 and R52/53 or H410, H411 and H412) represent a potential problem for the aquatic environment. Many ingredients in laundry detergents eventually end up in the

aquatic environment through sewage treatment systems or directly to the environment e.g. via a septic tank.

A cut-off level for these substances has been set after inspection of ecolabelled laundry detergents. The requirement has been changed compared to the previous criteria version is now based on a weighted approach that regulates the content of the most environmentally hazardous substances so that R50/R53 (forthcoming CLP classification: H410) compounds are chiefly restricted. This requirement will primarily restrict certain perfume compounds, and will restrict high levels of possible hazardous contaminants/impurities in detergent raw materials. Although the weighted approach is not directly comparable to the former cut-off levels for environmentally hazardous substances, analysis of existing formulations have shown that the scope of the requirement is similar to version 6 (only slightly tightened).

The weighting in the formula below is linked to the classification limits for each classification. There was a need to improve how these different environmental classifications were totalled through the use of a weighting system to better reflect the actual environmental impact. I.e. it is viable to permit more of a less environmentally hazardous substance than of a more hazardous substance.

Requirement:

Dosage (g/kg laundry)*(100*$_{konc}$R50/53 + 10*$_{konc}$R51/53 + $_{konc}$R52/53) ≤ 0,18 g/kg vask

The relationship between the different classifications is shown in the table below (KIFS 1994:12):

	Classification of the preparation		
Classification of substance	N; R50/53	N; R51/53	N; R52/53
N; R50/53	Conc. ≥ 25%	2.5% ≤ Conc. < 25%	0.25% ≤ Conc. < 2,5%
N; R51/53		Conc. ≥ 25%	2.5% ≤ Conc. < 25%
N; R52/53			Conc. ≥ 25%

Exemption for protease

Protease (Subtilisin, EINECS 232-752-2, CAS 9014-01-1) is an efficient enzyme used mainly in laundry detergents and automatic dishwashing detergernts to degradehydrolyze protein based stains. Protease cannot be replaced by other enzymes. Chronical long term tests have been done on protease which has lead to a classification as Aquatic Chronic 2 (H411), eventhough protease is readily biodegradeable. The Nordic Ecolabelling exempts protease from the requirement regarding environmentally hazardous substances to be able to continue the ecolabelling of laundry detergents and automatic dishwashing detergents that perform well.

R11: CDV

This requirement aims at setting a high standard and benchmarks the ecolabelled products based on the total product formulation. The CDV balances the biodegradability and aquatic toxicity of the whole formulation. The CDV is a tool for prioritising products with an optimised environmental profile in relation to the emission of chemicals to WWTPs/the aquatic environment after use. More than 50 different ecolabelled product formulations already on the market have been examined in order to evaluate the CDV level (including heavy-duty detergents, low-duty detergents and stain removers). The evaluation showed relatively large fluctuations in the CDV values (acute & chronic) between the different countries and depending on the nature of the formulations (i.e. choice of surfactants, builder system, presence of fragrance etc).

In the current criteria document, the CDV is based on choosing between either CDV_{acute} or $CDV_{chronic}$. Generally, the use of chronic toxicity data is preferred as long term toxicity data are considered of higher quality and as giving a more precise/reliable estimate of potential environmental effects compared to acute toxicity data. The CDV values are thus based exclusively on chronic toxicity factors. The limit value of 45,000 l/kg wash remains unchanged compared to the previous criteria version. This value is considered appropriate – and rather tough in connexion with the simultaneous increased stringency of both dosage and performance requirements.

After the hearing the choice between chronic and acute values was reinserted. The limits have been made a bit stricter than in the previous version of the criteria based on license data. The new limit for CDVacute is 100 000, which is a limit approximately corresponding to the limit for CDVchronic for coloursafe and white detergents. There have been discussions about having different levels for coloursafe and whites since the requirement on 30°C washing is only for coloursafe. But since the opening for use of acute data have been made after the hearing which is a relaxation to the hearing it was decided to set the limit for all detergents at 100 000litres. The main change expected to have a well performing product at 30°C is to increase the concentration of or change what kind of enzymes[8] there are in the products. Changes of surfactants may also be needed, but probably not in such high limits/amounts that it would considerably effect the value of CDV.

For many substances on the DID list the "chronic" toxicity factors are, nevertheless, based on acute toxicity values and certain substances (such as fragrances, silicates, various surfactants), which get a higher weight in the CDVchronic calculation than may be reasonable, due to the lack of chronic data. The proposed CDV values take this into account to a wide extent. It is, however, important that new chronic data are presented and made available. For substances for which the chronic TF values on the DID list are based on acute toxicity data, chronic ecotoxicity values presented to Nordic Ecolabelling should be considered in order to correctly estimate the chronic TF for the substance. In the newly adopted EU Ecolabel criteria for laundry detergents, a CDVchronic limit of 35,000 l/kg wash applies (based on middlehard water). This limit is rather strict compared to Nordic the Ecolabel criteria. However, the EU Ecolabel criteria have more relaxed requirements in other aspects. The performance requirement in the current criteria for the performance test is e.g. based on testing at 30 ºC for both test and reference detergent, whereas for the Nordic Ecolabel the product has to be tested at a maximum of 30 ºC for colour-safe and detergents for delicate textiles against the reference at 40 ºC for colour-safe detergents.

Liquid products generally have a lower level of total chemicals per functional unit compared to powders (or other solid products) due to the water content in liquids. However, liquid detergents typically contain a much higher level of surfactants per functional unit compared to powders. Surfactants have a high contribution to the CDV, whereas powders often contain high amounts of relatively "inert" substances like zeolite, carbonates and sulphates etc. which generally have a low contribution to the CDV. Thus, the CDV levels are identical for powders and liquids. This implies that liquids have a higher contribution to aquatic toxicity per gram active ingredient. The critical dilution volume per wash is, however, the same.

R12: Biodegradability (aerobic, anaerobic)
A general requirement to the content of not readily biodegradable (aerobic) and not anaerobically biodegradable organics reduces the level of non-biodegradable organics to a

[8] Nielsen, P.H., Life Cycle Assessment Supports Cold-wash enzymes, SÖFW Journal, 131, 10-2005.

minimum in ecolabelled laundry detergents and stain removers. The requirement for biodegradability of organics promotes that ecolabelled products as a whole have an optimal biodegradation profile and that the possible accumulation of non-biodegradable substances in waste water sludge and other relevant environmental compartments is reduced.

Substances commonly used in laundry detergents that are *not aerobically biodegradable* (aNBO) are e.g.

- Polycarboxylates, CMC, silicone, PVNO/PVPI, phosphonates, polymers, fragrance, colour, optical brighteners (fluorescent whitening agents).

Substances commonly used in laundry detergents that are *not anaerobically biodegradable* (anNBO) are e.g.

- Certain surfactants (e.g. sulphonated anionics), polycarboxylates, CMC, silicone, PVNO/PVPI, phosphonates, polymers, fragrance, colour, optical brighteners (fluorescent whitening agents), iminodisuccinate, EDDS. Furthermore, data for anaerobic biodegradability are not available (according to the DID list) for a range of other substances commonly used, such as MGDA, various organic acids and glycol ethers etc.

The bulk aNBO/anNBO substances currently used in ecolabelled laundry detergents are typically dominated by complexing agents suchs as polycarboxylates and soil releasing agents such as CMC and various polymers.

[*Note that TAED should be considered anaerobically biodegradable as qualified documentation for anaerobic biodegradability of TAED according to OECD 311 has been presented to Ecolabelling Denmark. Cumene Sulphonates are on the DID-list as DIDnr139 with the following data:*
aNBO = R, DF=0,05, anNBO=O. These data are not in line with the data published during the HERA[9] project, which is considered a highly reliable source. And since cumene sulphonates have a BCF = 1,41 and logKow = -2,7 it is not bioaccumulative it can be excludedfrom the calculation of anNBO according to the exemption in appendix 1 in the criteria document.]

With general requirements to the biodegradability of the organic substances, the aNBO/ anNBO limits combined with the CDV limit ensures, that the overall content of not readily biodegradable and/or toxic substances is limited, while at the same time allowing some flexibility in the product composition. Although the focus of the ecolabel criteria should address the inherent properties of chemicals rather than setting limitations of specific substances/functional ingredients, some exceptions apply (as specified under requirement R6 on excluded substances and R10 on anaerobic biodegradability with respect to surfactants).

Surfactants
Aerobic and anaerobic biodegradability of surfactants has been a standard requirement for ecolabelled detergents. Ready biodegradability of surfactants has since 2005 been a legal requirement for products sold on the European market according to the Detergents Regulation (Regulation 648/2004/EC). Manufacturers of surfactants and/or detergents for professional use may, under specific conditions, ask for derogation for the requirement of aerobic degradability if the ultimate biodegradability fails to meet the criteria in Annex III to the Regulation (at least 60% or 70% depending on the test method within twenty-eight days). Surfactants not meeting the level of primary biodegradability stipulated in Annex II (at least 80%) will not be granted derogation.

[9] http://www.heraproject.com/

Regulation 648/2004/EC does not define requirements to anaerobic biodegradability of ingredients in detergents. The status regarding the regulation is that it is currently not recommended that anaerobic biodegradability is used as an additional pass/fail criterion for the environmental acceptability of surfactants (COM 2009a). In the new EU Ecolabel criteria for laundry detergents (Comission decision April 28th 2011) it is no longer a requirement that all surfactants need to be anaerobically biodegradable.

In an opinion concerning the environmental risk assessment of non biodegradable Detergent Surfactants under Anaerobic Conditions, the Scientific Committee on Health and Environmental Risks (SCHER) concluded that a requirement of anaerobic degradation of surfactants is not in itself regarded as an effective measure of environmental protection. The opinion states that "a poor biodegradability under anaerobic conditions is not expected to produce substantial modifications in the risk for freshwater ecosystems as the surfactant removal in the WWTP seems to be regulated by its aerobic biodegradability". Furthermore, it is stated that "there is evidence indicating that fulfilling the criteria for ready and ultimate aerobic biodegradability is essential for achieving a significant dissipation/removal of surfactants in the WWTP, while anaerobic biodegradation plays a minor role in the overall dissipation/removal". The information reviewed by the SCHER also states that "fulfilling the criteria for ultimate biodegradation under anaerobic conditions leads to a significant reduction in the surfactant sludge concentration in those cases where anaerobic sludge digestion process is included in the overall treatment. However, the measured concentrations of anaerobically degradable surfactants in sludge are still significant" (SCHER 2005).

It should also be noted that the "list of unwanted substances" (LOUS) administered by the Danish EPA is currently under revision. This list has until now included "surfactants that do not degrade under anaerobic conditions". In the revised list, this substance group has been removed from list. The explanation for this being that these substances are no longer considered to pose the same problem in relation to waste, and that new data have shown that LAS is not as problematic as previously assumed (Miljøstyrelsen 2010).

It is recognised, that anaerobic biodegradability of surfactants is not the most important parameter influencing the overall environmental impact of laundry detergents. However, there are also arguments in favour of reducing or excluding such surfactants from ecolabelled products:

- Surfactants are used in high concentrations in laundry detergents and are the key ingredients contributing to the overall aquatic toxicity, when these products are used and released 'down the drain' (Van Hoof et al 2003)
- The Danish authorities have since 1987 regulated the content of LAS (Linear Alkylbenzene Sulphonates) in sewage sludge used for agricultural purposes
- It is recognised that anaerobically biodegradable surfactants (like e.g. soaps) are present in anaerobic compartments (together with surfactants that resist anaerobic degradation). Anaerobic biodegradation of surfactants having this potential is, however, assumed to occur, when the substances are desorbed from particles in sludge, sediment or soil and become bio available to microorganisms (only substances that are bioavailable can cause toxic effects)
- A large range of surfactants used in modern detergent products (primarily non-ionic surfactants) already fulfil the requirement of anaerobic biodegradability. Note that some of the frequently used nonionic surfactants (DID no 28+29), which are anaerobically biodegradable, have a higher aquatic toxicity compared to surfactants such as LAS, that does not degrade under anaerobic conditions (DID no 1+2) and thus have a higher contribution to the CDV than e.g. LAS.

- Opinions from stakeholders representing authorities and/or organisations involved in wastewater treatment and sludge disposal are that the ecolabels should generally aim to limit the accumulation of non-biodegradable substances in the environment if other alternatives exist.

Based on an evaluation of the requirement on anaerobic biodegradability of surfactants (conducted by Nordic Ecolabelling in the autumn of 2010) it has been decided to maintain the current requirement for anaerobic biodegradation for surfactants. Nordic Ecolabelling is aware that risk assessments of substances like LAS indicate a low risk for effects in the environment and that the substances will gradually be degraded in the environment (incl. sludge) upon exposure to oxygen. However, Nordic Ecolabelling does not wish to promote an increased use of substances that are not degradable under aerobic or anaerobic conditions and which have potential to accumulate in various environmental compartments. -Even if this use is within the limits already established for non-biodegradable substances. A potential relaxation of the requirement enabling the use of (low concentrations) of surfactants that are not anaerobically biodegradable is only foreseen if it can be documented that specific environmental gains/benefits can be achieved by such a modification. There are data indicating that the Methyl Ester Sulphonates, a group of anionic surfactants based on renewable raw materials (see also chapter 4.3), could be relevant and efficient alternatives to some surfactants used today (see also chapter 4.3). MES are readily biodegradable and have a relatively low aquatic toxicity compared to many other high volume surfactants (Ghazali and Ahmand 2003). Furthermore, MES are based on renewable raw materials rather whereas most high volume surfactants today are based on materials from the petrochemical industry. However, information regarding the potential for MES to replace high volume surfactants and possible decrease the overall surfactant level and reduce CDV levels due to lower ecotoxicity is not available at this stage.

The limits for aNBO and anNBO are expressed in g/kg wash and are set at 1.0 g/kg wash and 0.5 g/kg wash for heavy-duty and low-duty, respectively. The levels thus remain unchanged compared to criteria version 6 and correspond to a maximum content of aNBO and/or anNBO substances of approx. 7-10% by weight (depending on the specific dosage of the product). The new levels for stain removers has been set from data gained from currently Swan labelled stain removers, where it has been found that stain removers do not contain as much non aerobic and anaerobic degradable substances as the detergents, whereas there is no point in setting the limits as for the detergents.

1.4 Origin and traceability of renewable, vegetable based ingredients:

R13: Origin, traceability and control of vegetable raw materials
Nordic Ecolabelling has typically placed requirements on renewable (vegetable) raw materials in product categories where the use and processing of such materials has a major contribution to the environmental impact of the product in a life-cycle perspective. Examples of such product groups are paper products, furniture and textiles. So far sustainability requirements have only been introduced to a limited extent in chemical/technical products. The Ecolabel criteria for chemical/technical products have primarily addressed the inherent properties of the ingredients and the function of the products. During the latest years climate changes and deforestation of rainforests has led to increased interest on the origin of the raw materials even in chemical/technical products. In laundry detergents typical vegetable based raw materials are fatty acids/soaps and vegetable based surfactants derived from e.g. palm oil or rapeseed.

Some of the market leading detergent manufacturers are already communicating commitments to the use of certified sustainable ingredients (e.g. Unilevers commitment to

using certified sustainable palm oil: http://www.unilever.com/images/es_Unilever_PalmOil_v71_tcm13-126357.pdf). Currently, the most well known certification scheme for sustainable organic ingredients applicable for laundry detergents is the Roundtable for Sustainable Palm Oil (RSPO).

Nordic Ecolabelling is at present uncertain about the impact of having a mandatory requirement e.g. on the use of certified sustainable palm oil in the Ecolabel criteria due to the concerns and uncertainties regarding this issue (as described in chapter 4.3). A consequence of such a requirement may simply be a shift from the use of palm oil based ingredients towards non-certified organics from other vegetable sources than palm kernel oil, e.g. soy-, rapeseed- or coconut fatty acids, given that the price and availability of the certified ingredients differ markedly from what is used today. In order to establish a better basis for potential requirements on the use of sustainability of raw materials in future criteria, a need for more detailed information about the organic raw materials is identified. Thus, a documentation requirement is placed on the origin of the organic raw materials (covering fatty acids, soaps and oils) used and on the (possible) use of certified sustainable ingredients, such as RSPO certified palm oil, in the products. Through this requirement, more knowledge will be obtained about the nature and origin of the organic raw materials (fatty acids, soaps and oils) that are currently used in laundry detergents. This is expected to provide a basis for development of criteria promoting the use of certified sustainable ingredients. As this document places a certain administrative and possibly economic burden on the manufacturers, the requirement may, however, have the unintended side effect that certified raw materials are substituted with not certified materials.

The requirement includes ingredients based on at least 75% vegetable raw materials and which are present in the final product in concentrations >1.0%). The requirement thus includes those ingredients in the products which are primarily of vegetable origin. The requirement thus includes those ingredients in the products which are primarily of vegetable origin. It also implies that the manufacturer or license holder must know which vegetable raw materials that are used and ensure that they do not origin from environment with high biological and/or social values as specified further below:

- Protected areas or areas or areas which are going through official procedures aiming at establishing protection
- Areas with uncertain ownership or user rights
- Illegally manufactured/harvested renewable raw materials. *Renewable raw materials which have been extracted/handled/transported in a way that are inconsistant with current national legislation or international conventions (e.g. species listed in CITES[10], corruption, bribery).*
- Genetically modified organisms (GMO)[11] *Exclusion of GMOs is based on the precautionary principle. GMO are generally not accepted in certified organic products. Several NGOs, such as FSC, prohibit the use of genetically modified wood. Use of GMOs is often discussed in relation to food safety and land. There is currently a lack of knowledge of the impact of GMO crops on local agicultural/forest environments and of the possible risk of environmental and health related impacts. Even though the GMO discussions primarily relate to food safety, the same general questions arise in relation to use of GMOs in other products. Exclusion of GMOs in ecolabelled products imply that the consumers can choose GMO free products.*

[10] www.cites.org
[11] A definition of "genetically modified organisms" is to be found in the EU-directive 2001/18/EG.

In order to ensure that the vegetable raw materials are produced in a sustainable way the detergent manufacturer must have a procedure stating how the raw materials are controlled. In case relevant certificates for controlled production of the raw materials are available these may be forwarded. Examples could be certificates for ecological farming or RSPO certificate for palm oil. Estabilished traceability systems such as Chain of Custody certificates (CoC) or voluntary third party certifications, e.g. implementation of ISO 9000 and/or ISO 14000 or EMAS, can support the legal origin of the raw materials.

The scope of the criteria has been specified to cover only fatty acids, soaps and oils. Thus the criteria focuses on the most relevant ingredients. Vegetable based surfactants are excluded from the documentation requirement at this stage: it is typical within the production of surfactants that raw materials are acquired from several sources. This could make the documentation rather complex and in some cases unfeasible. The chosen approach shall probably be assessed in the next revision of the criteria and the requirement may be altered to cover also surfactants if it can be shown to be feasible.

The documentation must be presented as stated in the requirement and in the relevant appendix. It is however encouraged to enhance the documentation by providing relevant certificates such as for ecological production, as this provides a more stringent manner of documentation. RSPO is in this context considered an adequate enough system to grant a reasonable level of sustainable palm oil production and no further documentation is thus needed.

It is also encouraged to employ a traceability system, but it is not an absolute requirement to have a certified CoC (Chain of Custody) system, since this would at this stage limit the availability of raw materials for this kind of production. It might also put a pressure on using more fossil based raw materials. In the future more stringent requirements will most likely be put in place, and the requirement will also cover the origin of fossil and animal based ingredients.

The GMO ban is specified to cover only plant material, and is based on the precautionary principle. It is however possible to use GMO products which are produced in closed systems, and hence do not pose a threat to the environment. There is a limit of 0.9 % for the inclusion of GMO material, which is the same as in the EU GMO regulation.

1.5 Packaging:

R14: Weight-Utility Ratio

In a life-cycle perspective, the packaging has a relatively low impact on the environment (Chapter 4.3). However, it is still relevant to reduce the consumption of packaging material to a minimum in accordance with the aim of the packaging and packaging waste directive (Directive 94/62/EC). The life-cycle analyses also indicate that differences apply regarding the relative impact of the packaging for different types of products. Requirements to the packaging material were also considered as being of high relevance according to the discussions at the workshop with the reference group (Appendix 2). From a communication point of view, it is a relevant signal to the consumers that packaging is reduced to a minimum for ecolabelled products.

The weight-utility ratio (WUR) aims at reducing the amount of packaging material relative to the net content of the product and is not a new requirement. The requirement is modified in the current criteria version and separate values are introduced for powders and "other products", respectively. The value for powders is lowered, based on an evaluation of existing

ecolabelled products. The evaluation showed that the WUR value for paper/cardboard packaging for powders could reasonably be tightened, whereas the WUR is strict enough for cardboard packaging for tablets as well as plastic packaging for liquids. With a possible tightening of the requirement for e.g. tablets – more secondary packaging would, according to the manufacturers, be needed in order to stabilise the transportation loads. This is an unintended consequence that may be the result of too tight WUR limits, therefore the limit has been kept at 1,5g/kg laundry for tablets etc.

With respect to the recycling figures (ri) for reused packaging components, a higher number than 1 can be used if the applicant can demonstrate that the packaging component is actually recycled. This can be demonstrated e.g. by indicating the sales (or expected sales – figures should be provided by the retailer) of primary packaging versus refill packaging, respectively. Alternatively, provided that both primary and refill packaging are available for the consumer at all times, the applicant may estimate the number of times the primary packaging can reasonably be re-used by refill. (The extent of re-use of a cardboard box is e.g. expected to be lower than a plastic or metal container).

R15 Plastic packaging

The exclusion of halogenated plastics is not a new requirement and serves to prohibit the use of halogenated plastics, which may be associated with both health- and environmental problems. This relates primarily to the use of certain additives, hereunder phthalates, and the disposal of the plastics. During combustion of PVC, acid is formed which must be neutralised by addition of calcium. When combusting 1 kg of PVC, 2 kg of waste products are thus formed (by dry/semidry cleaning). Furthermore, the product used for cleaning of the combustion smoke must be handled specifically (Videncenter for Affald, 2009).

With a general exclusion of halogenated plastics phthalate plasticisers are indirectly excluded as these are only used in PVC plast (DPF 2010). The requirement for plastic packaging has a high signal value, but is in practice not regarded as having a major impact on the choice of packaging. Halogenated plastics such as PVC are not considered as being highly relevant packaging materials for this product group (PVC labels may, however, be found on the market). Usually polyethylene and polypropylene is used for packaging of liquid products.

The requirement regarding labelling of plastic packaging is not a new requirement. This requirement is placed in order to ease sorting of different types of plastic during waste management. In Sweden, sorting of plastic packaging for recycling purposes is no longer required at the recycling stations as modern techniques for seperation of different types of plastic is applied ("Förpacknings- och Tidningsinsamlingen 2010"). In Denmark, functional return-systems have not been implemented for plastic packaging from households. Statistic data from 2007 show that approximately 22% of the total plastic packaging used was recycled (Miljøstyrelsen 2009b). In Denmark, Norway and Finland, manual sorting of plastic packaging is still conducted by consumers (to some extent) and at recycling stations/further down the waste management chain.

1.6 Consumer guidance:

R16-R18: Dosage instruction, consumer guidance, claims

The information required on the packaging of ecolabelled products addresses dosing instructions and optimised use of the products in order to facilitate correct dosing and the lowest possible environmental impact of the washing process. Overdosing of laundry detergents is a common phenomenon (Brückner 2007, Elforsk 2005). It is questionable whether more accurate dosing information / information text on the packaging will alter the habits of the consumer, as a large proportion of the consumer's dose "by the feel" (Brückner

2007, Elforsk 2005). Campaigns like AISEs voluntary industry initiative (the wash-right campaign, www.washright.com) has introduced clear and visible labelling in the form of easily recognisable pictogram's on the packaging (voluntary commitment for manufacturers). Such pictograms are considered very informative. However, the possible introduction of new but similair pictograms (that are only for Ecolabelled products) in the ecolabel criteria has been evaluated, but it is concluded that this may cause confusion. An introduction of unique ecolabel pictograms will increase the "burden" of information for manufacturers already committed to using the wash-rigth symbols. The space is often very limited on the packs due to the many declaration and consumer information requirements already laid down by the Detergents regulation, as well as the demand for placing the information in many different languages by the manufacturers. The manufacturers may choose whether the washing advices are placed as text or symbols, giving the possibility of using the wash-right symbols and adding the remaining information required by the Ecolabel. The requirements ensure that the recommended dosage on the package complies with the dosage used to document the performance of the product. Furthermore, the requirement ensures that claims of the efficiency and specific benefits of the products are documented. Even though lowering of the wash temperature is generally recommended in order to reduce the energy consumption, the washing advices takes into account special conditions that may apply for consumers in case of infectious diseases in the household.

In version 6 of the criteria the washing advices included an advice to always wash bedding at 60 ºC in case of allergy to house dust, this requirement has been kept in this version as well.

The text in R18 concerning claims (in text or as symbols*) on low temperature, cold water products, has been clarified to state that when the "normal way of using the product" is at a low temperature, below 30°C, it needs to be tested at the claimed temperature in accordance to the test protocol in appendices 6a-c (as in R19). A test performed at a temperature below 30°C still requires the reference product to be tested at 40°C as described in the appendices.
**Pictograms such as for example washtubs with 20ºC and similar are included here.*

If a stainremover is claimed to have effect on certain stains, the stain remover needs to fulfill the requirements for performance for each of the claimed stains in accordance with R19.

1.7 Performance:

R19: Fitness for use
Documentation of performance is crucial for the credibility of the Ecolabel. Fulfilling the performance requirement ensures that the product is fit for use and fulfils the consumers' expectations of a satisfactory functioning detergent. Note that the dosage used in the performance test shall correspond to the dosage recommended on the packaging for the relevant water hardness used in the test. The same dosage shall also be used for calculation of the environmental requirements in the criteria document (based on the dosage in g/kg wash).

Reduction of the mandatory washing temperature for heavy-duty detergents
One important change has been introduced with version 7 of the criteria: It is now mandatory that performance is documented at 30 °C for colour-safe detergents (as opposed to 40 °C in the former criteria for colour-safe detergents). The reference product still remains at 40 °C to maintain the quality level of today. If a lower temperature is claimed on the product, the test shall, however, be performed at this temperature. As previously described (chapter 4.2 and 4.6) and also discussed at the workshop (Appendix 2), lowering of the washing temperature is considered one of the most important factors reducing the environmental impact of laundry detergents. Thus, ecolabelled products should be at forefront and set a reasonable standard for the performance at lowered temperatures and ensure that possible

temperature claims are supported by satisfactory performance. A range of existing eco-labelled detergents have already documented performance at 30 °C in order to support the temperature claims on the packaging (as specified by the testing requirements in version 5 and 6 of the criteria). There are also ecolabelled coldwater products available on the market, which have documented the performance at 20 °C compared to the reference detergent tested at 40 °C. This data support that it is possible to fulfil the performance requirement at 30 °C or even lower by use of the current performance test. The purpose of testing against the reference detergent at 40 °C is to ensure that the overall washing performance of the ecolabelled product is not compromised when reducing the temperature. The consumer should thus be able to achieve the same level of washing performance even though the temperature is decreased from 40°C to 30°C.

The saving in energy when lowering the wash temperature from 40°C to 30°C is about 30%[12] of the energy for the laundry machine. The same article (Life Cycle Assessment Supports Cold-Wash Enzymes) goes on to show results when using a standard product at 30°C and 40°C. When extra enzymes are added to the 30°C wash the result is better than the 40°C wash.
The environmental gain will be large even when the requirement only is set for colour-safe detergents, since most of the washed loads are coloured. At an internal questionnaire within the Nordic Ecolabelling it was found that approximately 70% of the loads were coloured (compared to 27% whites and 3% others such as handwash etc). A producer and a retailing chain have also supported the fact that more of the loads run in the households are coloured than whites.

Stain removers and whitewash will be tested at 40°C in this version of the criteria but will be evaluated in the next version of the criteria, since the Nordic Ecolabelling have found out that the challenge to have whitewash products with performance at 30°C compared to the reference at 40°C is more difficult than coloursafe detergents at the moment. In the same way as described above for coloursafe detergents the test temperature for whitewash products should be lowered if a lower washing temperature is indicated on the label or in the marketing material, ie if for example a detergent for white wash has a recommended wash temperature at 30ºC the product needs to be tested at 30ºC against the reference detergent at 40ºC.

Hygienic aspects of decreasing the washing temperature
In relation to lowered washing temperatures, aspects like hygiene and development of biofilm in the machine are often brought up. Especially in regions with hard water, the deposition of calcium combined with soap and other detergent ingredients provide a substrate for development of bio-film in the machine. This problem increases with decreasing washing temperatures and may lead to a reduced lifetime of the machine and possibly problems with smell. It is, however, not expected that all washes in a household are conducted at 20-30 °C (or lower). Following the machine manufacturer's instructions and running a high temperature wash (≥ 60 °C) now and then should prevent possible problems with smell or biofilm (DONG 2010). Washing in cold water has been a reality for many years in other regions, e.g. Spain and countries outside Europe (Japan, Asia). Hygiene, i.e. sufficient removal of bacteria in the laundry, is also a major concern for the consumers when lowering the temperature on their washing programmes. However, the high pH of the washing water and the dilution effect will ensure an effective removal of bacteria during the wash (DONG 2010). (The pH of the washing water is typically in the range pH 9-11 for powders/tablets and pH 8-10 for liquids; personal communication with detergent

[12] Nielsen, P.H., Life Cycle Assessment Supports Cold-wash enzymes, SÖFW Journal, 131, 10-2005.

manufacturer). In relation to household laundering, bacteria are not considered a problem except in case of infectious diseases in the household (DONG 2010). In a recently published test of liquid cold water detergents it is evident that in order to effectively remove bacteria from the laundry (bacteria from pre-contaminated stain strips) the wash temperature needs to be 60 °C. However, the general cleaning performance of the cold water detergents tested was satisfactory at 15 °C for normally soiled clothes and comparable to the performance of a regular laundry detergent tested at 40 °C (TÆNK 2010).

In a German study of the hygienic aspects of coldwater washing, the reduction in the number of colony forming units (CFU) for selected microorganisms was measured in pre-contaminated laundry (before and after wash) at 30 °C, 40 °C and 60 °C as well as in the washing machine. The results showed that for heavy-duty powder detergents for white wash, the reduction in CFU was > 99.9% at both 30 °C, 40 °C and 60 °C. For heavy-duty powder colour detergents, the reduction in CFU was > 99.9% at 60 °C and 99.5%-99.6% at 30 °C and 99.3%-99.5% at 40 °C. The bacteria removal was thus only slightly lower at 30 °C and 40 °C compared to 60 °C, and there was hardly any difference in the removal of bacteria between 30 °C and 40 °C. Comparison of CMU removal for liquid heavy-duty detergents used at different washing temperatures was not made. With respect to the machine hygiene, the reduction of CFU for four different types of heavy-duty detergents (white and colour detergents in both powder and liquid form) was 99.8%-99.9% at 60 °C. When reducing the washing temperature to either "cold water", 30 °C or 40 °C, the removal of CFU was only slightly decreased as the CMU removal was in the range 96.5% to 99.9%. There was no significant difference in the results for "cold water", 30 °C or 40 °C, respectively. The study also concluded that the removal of bacteria at lower washing temperatures for normally soiled laundry was sufficient. (Lichtenberg et al 2006).

Generally, the manufacturers do not recommend that all laundry is washed at low temperatures and 60 °C will thus typically be the preferred washing temperature for bed linen and underwear. Following the mandatory recommendation under R15 to "Run a 60 °C wash now and again and follow the machine manufacturer's recommendations regarding maintenance – rinse adequately and leave the machine open between washes" should ensure that biofilms (and associated bad smell) are not formed in the machine.

Reference detergent and testing strategies
The Nordic Ecolabel performance test is based on the principles laid down in EN 60456, which also defines the composition of the reference detergent, IEC-A. This reference detergent is used to evaluate the performance of the products tested. During the years, some criticism of the performance test has been put forward by (some) license holders. It is argued that the dosage of the reference compound, IEC-A, is very high compared to average dosages of laundry detergents nowadays and that the composition is not updated. Furthermore, the reference detergent e.g. contains perborate, which is classified as toxic to reproduction (Repr. Cat 2; R61). CMR substances are not allowed in ecolabelled detergents, and the use of such substances may furthermore be prohibited by the test laboratories. The Nordic Ecolabel performance test has been subject to modifications and improvements during the years. It is rather costly to change any parameter in the test as this requires thorough validation by testing. Furthermore it is also argued that the reference detergent is solely a reference detergent against which the tested products are benchmarked. The crucial point is thus to define the required level of performance of the tested products relative to the reference, i.e. to ensure that the delta values (the differences in test result for the reference detergent relative to the test product) are reasonable.

During the revision of the ecolabel criteria (version 6 to 7) no budget has been allocated for making (further) changes to the Nordic Ecolabel performance test. Within the framework of

the EU Ecolabel, a revision of the existing performance test has been conducted (during 2010). This revision included evaluation and modification of the dosage of the reference detergent, adaption of the performance test to low washing temperatures, modification on number of wash cycles, introduction of a new/modified set of stain monitors. The revision was headed by Leitat Technological Center (in Spain) and was followed by a working group consisting of other test institutes, detergent manufacturers, competent bodies within the EU Ecolabel system (including Ecolabelling Denmark) etc. In criteria version 6 it was optional whether the Nordic Ecolabel performance test or the EU Ecolabel performance test (adopted 2003 or later) was used for testing of laundry detergents.

The new criteria for laundry detergents for the EU Ecolabel, published April 28th 2011 include a new performance test. This test is different from the test in the Nordic Ecolabel. Some of the differences are presented in the table below. The EU Ecolabel test has been changed in the way that both reference product and test product are tested at 30 °C. Data showing how this effect the actual performance of the products have not been shown, ie how much the performance of today's products performance results differ from the ones at 30°C. The reference product is not a "cold water formulation" and may therefore not be as good when lowering the temperature. The differences in the tests have led to the decision that the EU Ecolabel test will not be accepted as a test method in this version of the criteria. Once the EU Ecolabel test has been further tested it may come to be included in later versions of the Nordic Ecolabel criteria for laundry detergents.

Table 6.1. comparison between the EU Ecolabel test and the Nordic Ecolabel test

Parameter	**Nordic Ecolabel**	**EU Ecolabel**
Incrustation, chemical wear and change of dimension	Included	Not included
Washing machine	Wascator or Miele	Only Miele
Water hardness	5,5 dH	14 dH
Temperature	Product (colour-safe and delicate textiles): 30°C Reference: 40°C (colour-safe), 30 °C (delicate textiles) Product (white): 40°C Reference: 40°C	Product: 30°C Reference: 30°C
Stains/soiltypes (examples)	Body fat /pigment	Not included
	Not included	Blood
Requirements on the results for stain removal		May have 3 failures

The performance test has been slightly changed as it is now required to test 5 stains instead of 4. It has also been introduced that only 80% of the stains must meet the performance requirement.

After the hearing the requirement to do a test with pure water when not using a Wascator machine has been excluded. This has been discussed within the Nordic Ecolabelling and decided that as long as all tests are done on the same machine it is not necessary to run pure water for comparison, since it is a costly process and the producer may use the slots in the machine for better purposes than to run water.

After the hearing an addition of new Miele machine types have been added since the ones stated in the criteria are not produced anymore. The new models added to the document are W5000-series and W3365. These were added after discussions with Miele. When the adjustments were done in February 2014 Miele was contacted to update the models of washing machines in the document. They were also asked to look at the "specification" used

in the EU Ecolabel criteria for layndry detergents, see table below. Miele[13] said that the model W3375 (which has replaced W3365 in appendix 6 in the criteria document) fulfills the requirements stated in the table below. After this discussion with Miele the text in appendix 6 regarding the models of the washing machines was updated so to indicate what machines that still are on the market and also which one that may be found at test laboratories. Miele statade that the model W3375 is the one most similar to the one that previous was recommended.
Programmable electronic Miele household washing machines with a rated capacity of 5 – 6 kg which fulfil the following requirements:

	Cotton wash program (at 40 ºC, 30ºC, 20ºC[1], 15ºC[1])	Delicateprogram[2] (at 30ºC, 20ºC[1], 15ºC[1])
Duration Main Wash	50 – 70 min	30 – 40 min
Total Program Duration	100 – 120 min	55 – 65 min
Water Quantity Main Wash	15 ± 2 l	20 ± 2 l
Total Water Quantity	55 ± 5 l	64 ± 5 l
Number of Rinse Cycles	3	3
Final spin speed	1200 rpm	600 rpm

[1]For cold water products
[2]Some newer Miele washing machines offer an equivalent synthetic program

Colourfastness for delicates has previous been done on ready made clothing, but in this version an alternative has been added which gives the test lab an opportunity to also use other textiles ("fabrics") that are already of a determined colourfastness 4. This addition was made since it includes extra work for the labs to buy the garments, test them and then sometimes realize that they were not ok and have to buy new pieces.

Appendix 1 has been updated on the requirements set on the test laboratories performing performance tests on the laundry detergents to also include test labs with ISO 9001 certification.

The main idea is to have the products tested at independent test laboratories that are certified according to ISO 17025, ISO 9001 or have official GLP-approval.

There have been discussions about if there should be other requirements on the test laboratories if they are the producer's own laboratory. But since this laundry detergent test is a very specified test (the machine is specified, the test material, the reference and the whole procedure) it has been decided that the requirements are kept as they were in version 6, ie:

But the producer's laboratory can be used if the following is included:

- The ecolabelling organisation must have access to monitor the performance of the test.
- The ecolabelling organisation must have access to all data on the product.
- The tests must be anonymised for the test laboratory.
- The conduction of the performance tests must be described in the quality control system.

In version 7.1 there has been a change in the requirement regarding laundry detergents for delicates so that one stain type can be 0,0. This means that one stain does not have to be 5 units better than water.

[13] Personlig kontakt med Bo Göran Danielsson, Miele Sverige (2014-01-30)

The new requirement is written as
ΔY for one of the tested stain type can be 0,0.

1.8 Overall environmental performance (heavy- and low-duty detergents)

It was decided to remove the requirement of the point table, which was used in the previous version, since the rest of the requirements in this version are very strict and there were no large gains to make by including a point table. Lower wash temperature is included in the requirement for performance test of colour-safe detergents and the CDV is stricter than the previous version. The wish of promoting perfume free products by giving them extra points has been discussed, but since a perfume free product has a little more openings to add other ingredients in the CDV, aNBO, anNBO as well as the limit of environmentally harmful substances, they are already naturally promoted.

2) Quality and regulatory requirements

O1-O9
The requirements O1-O9 are standard requirements in for products labelled with the Nordic Ecolabel. The quality and regulatory requirements are imposed in order to ensure that applicants meet authorities' requirements and exercise satisfactory control in relation to the production of ecolabelled products - including correct notification of the Nordic Ecolabelling organisation. It must be stressed that certification of the quality and ecomanagement systems is not a requirement. Another intention of the requirements is to ensure that the relevant persons within the enterprise awarded the Nordic Ecolabelling licence are familiar with the rules applicable to marketing of Nordic Ecolabelled products.

Changes made after the public hearing

Table 6.2. Changes made after the public hearing:

Require-ment (changed number)	Text during the hearing	Changed text	Comments
R4	a)Substances classified as respiratory sensitizers with H334/ R42 (according to Regulation 1272/2008 and Directive 67/548/EEC, respectively) may not be used in spray products. b) Only the following categories of substances classified as sensitizing with H334/ R42 and/or H317/ R43 (according to Regulation 1272/2008 and Directive 67/548/EEC, respectively) may be included in the product: - Enzymes - Bleach-catalysts - Fragrance (see requirement R5) The requirement also includes stabilizers and other auxiliary substances in the enzyme-, bleach-catalyst- and fragrance ingredients. Enzymes must be added as liquids or as encapsulated granulates.	Substances classified as respiratory sensitizers (according to Regulation 1272/2008 and Directive 67/548/EEC, respectively) with H334/ R42 and/or H317/R43 may not be used in the products. The following substances are exempted from the requirement above, except spray products: -Enzymes, if they are added as liquids or as encapsulated granulates -Bleach-catalysts -Fragrance (see requirement R5) Enzymes can be used in spray products if a risk assessment is included in the documentation according to AISE's: "Exposure measurements of enzymes for risk assessment of spray products, AISE, 6 October 2010". http://www.aise.eu/reach/documents/AISE_SprayProducts_October06%272010.pdf.	The requirement has been made clearer and an exemption for enzymes classified as snsitizing have been added as long as they have been risk assessed according to the AISE guidelines.
R6 (R7)	The following substances must not be included in the product, neither as part of the formulation nor as part of any ingredient included in the formulation: -Phosphates (as STPP or equivalent)	New phosphorus requirement: Total amount of phosphorous (P): Heavy duty detergents < 0,030g/kg wash Detergents for delicates < 0,030g/kg wash Stain removers (pretreatment)< 0,010g/kg wash Stain removers (in wash) < 0,0050g/kg wash	The phosphate ban has been exchanged to a limit of all phosphorous compounds in line with the suggested law requirement in the European Union (0,2wt% P)
R6	-	-APEO (alkylphenolethoxylates) -APD (alkylphenol derivatives) -Substances of very high concern	Addition of APEO, APD and substances of very high concern due to hearing comments and to make it easier in communication toward the market.
R7 (K9)	-	For tablets, this could imply a maxiumum dosage span of 150 % from normally soiled textiles to heavily soiled textiles (e.g. from 2 to 3 tablets).	For the dosage limit from normal to heavily soiled textiles a separate requirement for tablets has been added, due to the fact that there is a similar requirement for tablets for dosage from soft to hard water. It is easier for a tablet producer to ask the consumer to dose whole and halg tablets than 30%.
R7 (R9)	Dosage = in-wash dosage, incl. content of water in the formulation	Dosage = in-wash dosage, excl. content of water in the formulation, ie active content.	The dosage was after the hearing changed to "active content" instead of including

			water.
New R8	No separate requirement on colouring agents	Colouring agents may be added to liquid products provided that the colouring agent in question has been approved for use in foodstuffs or is not bioaccumulable. Colouring agents are not regarded as bioaccumulable if BCF<500 or logKow<4.0. If information is available on both BCF and logKow, the information on BCF must be used.	The requirement on colouring agents to only be added in liquids and only if they are not bioaccumulative was reinserted after the hearing in the same way as it was in version 6.0. Nordic Ecolabelling does not want to open up to colouring agents that are bioaccumulative.
R10 (R11)	Only limits to CDVchronic	Limits to both CDVchronic and CDVacute	CDVacute has been reinserted after the hearing since the internal CDV evaluation is not yet finalized. The applicant shall fulfill either CDVacute or CDVchronic.
R10 (R12)	All surfactants must be anaerobically biodegradable. The content of organic substances in the product that are aerobically non-biodegradable (not readily biodegradable) (aNBO) and/or anaerobically non-biodegradable (anNBO) must not exceed the following limits:	All surfactants must be aerobically and anaerobically biodegradable. The content of organic substances in the product that are aerobically non-biodegradable (not readily biodegradable) (aNBO) and/or anaerobically non-biodegradable (anNBO) must not exceed the following limits (i.e both the limit for aNBO and for anNBO shall be fulfilled):	The requirement has been clarified that the surfactants need to be degradeable both aerobic and anaerobic. It has also been clarified that both requirements on anNBO and aNBO needs to be fulfilled for organics.
R11 (R13)	This requirement includes raw materials consisting of ≥ 75% vegetable based materials* and which are present in the final product in concentrations > 1.0% (by weight).	This requirement includes fatty acids, soap and oils consisting of ≥ 75 % vegetable based materials* and which are present in the final product in concentrations > 1.0% (by weight).	The requirement has been changed to only cover fatty acids, oils and soaps.
R12 (R14)	ri = recycling figure, i.e. the number of times the packaging component (i) is used for the same purpose through a return or refill system. The default value for r is set to 1 (= no re-use). Only if the applicant can document that the packaging component is re-used for the same purpose, a higher value for r can be used in the calculation.	ri = recycling figure, i.e. the number of times the packaging component (i) is used for the same purpose through a return or refill system. The default value for r is set to 1 (= no re-use). Only if the applicant can document that the packaging component is re-used for the same purpose and how many times, a higher value for r can be used in the calculation.	The requirement has been updated with a text stating that the number of times a packaging is reused should be stated, to avoid misunderstandings.
K15 (K17)		-If you are allergic to house dust, always wash bedding at 60 °C or above	The information about washing beddings at 60 °C or above has been reinserted.
R16 (R18)	A product must always pass the performance test at the lowest wash temperature claimed to be efficient on the packaging.	For cold water products, where there are claims on the packaging or other forms of marketing, is stated that the product can be used for washing in cold water (i.e. ”cold water product” or similair, indicating a normal user temperature at < 30 °C), the performance should be tested (according to the test method in R19) at the lowest temperature where effect is stated, at 20 °C or lower (where the reference is still washed at 40°C)	A clarification of the meaning of coldwater products and that they are to be tested versus the reference at 40°C.
R17 (R19) + app 6	The cleaning effect for detergents are determined by washing soiled cloths (strips) in a washing machine at 30°C* using a specified programme and is evaluated by means of a comparison of the wash results of the	The cleaning effect for coloursafe detergents are determined by washing soiled cloths (strips) in a washing machine at 30°C* using a specified programme and is evaluated by means of a comparison	The requirement of performance at 30°C is changed to only be for coloursafe detergents, but compared to the reference at 40°C.

	test product with the results produced by a reference product at 40°C	of the wash results of the test product with the results produced by a reference product at 40°C. The cleaning effect for coloursafe detergents are determined by washing soiled cloths (strips) in a washing machine at 30°C* using a specified programme and is evaluated by means of a comparison of the wash results of the test product with the results produced by a reference product at 40°C. For detergents for white wash the performance is tested by wahsing soiled cloths (strips) in a washing machine at 40°C** using a specified programme and is evaluated by means of a comparison of the wash results of the test product with the results produced by a reference product at 40°C.	
K18-K19	Point system	Point system removed	The point system has been removed since the extra environmental gains made in such a system is small when the rest of the requirements are as stringent as they are in this version
Appendix 6a-c	Alternatively a Miele Novotronic W375 may be used (technical specifications: Programmable electronic washing machine with connection to drainage outlet and set at medium performance) or other models of Miele	Alternatively a Miele Novotronic W375 may be used (technical specifications: Programmable electronic washing machine with connection to drainage outlet and set at medium performance) or other models of Miele e.g. WM918, WM986, W5000-series, W3365, W986 or W918.	Additional models of the washing machine models from Miele have been added. The requirement on having to run tests on pure water when using a Miele machine has been removed.
Appendix 1	The analysis laboratory used shall fulfil the general requirements of standard EN ISO 17025 or have official GLP status.	The analysis laboratory used shall fulfil the general requirements of standard EN ISO 17025 or ISO9001 or have official GLP status.	Test laboratory for efficiency labs has been changed to include ISO 9001-certified labs.
Appendix 6A			The text has been moved around to make it more logic and more readable.
Appendix 6B			Colourfastness can be done on textiles as well as on finished clothing.

7 Changes in relation to the previous criteria version

In general, criteria version 7 has fewer requirements as some of the former requirements have been omitted, some are integrated under the general environmental requirements and the structure of the document has been simplified. The document is thus no longer divided into separate chapters for laundry detergents, speciality detergents and stain removers and the number of environmental requirements have been reduced in number from 39 to 19 requirements. Furthermore, with fewer requirements and more weight on the central environmental parameters, the transparency of the criteria document has increased. Due to the long history of the criteria for laundry detergents, the product group may be considered "mature", especially with regard to imposing further requirements on environment and health. It can thus be argued that the environmental performance of the products has reached a rather high level through previous revisions and that tightening of the existing criteria is not necessarily relevant in all aspects. Thus, emphasis has been put on the use stage (mandatory requirement for performance at 30 °C for colour-safe detergents. With the introduction of a documentation requirement for the origin and traceability for vegetable based substances, knowledge will be gained in relation to possible future requirements on the use of sustainable raw materials. The major changes compared to previous criteria version are described below:

Definitions:

- The terms "heavy-duty" and "low-duty" detergents have been introduced, replacing the formerly used designations "laundry detergents" and "laundry detergents for delicate textiles". The purpose of this is to harmonise the definitions according to the Detergents Regulation EC No /648/2004)
- Transition to the CLP regulation (EC No. 1272/2008)

Increased stringency of main environmental requirements:

- Dosage levels more stringent, only concentrated and compact detergents can be ecolabelled
- Colour-safe detergents must fulfil the performance requirement at 30 °C
- Exclusion of PBT, vPvB substances, antimicrobials, endocrine disrupters and chlorine based bleaching agents
- Stricter limitation on the use of phosphorous
- CDV levels tightened
- More stringent requirements on phosphorous.
- The point table has been removed from the criteria

New requirements introduced:

- Documentation requirement on the origin and traceability of renewable, vegetable based ingredients
- Requirement regarding claims on packaging and documentation hereof

Table 7.1 gives a complete overview of the changes in the criteria from version 6 to version 7.

Table 7.1 Overview of changes from criteria version 6 to 7.

Version 6	Version 7	Changes from version 6 to 7 and comments
R1 Formulation	R1 Description of product and packaging	Description of packaging has been added to this requirement
R2 Classification of product	R2 Product classification	No change
R3 Environmentally harmful substances	R10 Environmentally hazardous substances	New weighted approach for limitation of environmentally hazardous substances introduced but scope of requirement unchanged
R4 CMR substances	R3 CMR substances	Adaption to new regulation for classification and labelling. Exclusion of substances classified R64 added.
R5 Sensitsing substances	R4 Sensitizing substances	Minor change
R6 Surfactants	R12 Biodegradability – anaerobic (anNBO)	Aerobic and anaerobic degradation of surfactants: integrated in R12 (anaerobic biodegradability)
R7 APEO, APD, chlor, borate, perborate, optical brighteners	R6 Other excluded substances	Requirement adjusted. Borate/perborate covered by R2 (classified as toxic to reproduction) APEO, APD and optical brighteners still excluded. Additional substance categories have been excluded.
R8 Enzymes	R4 Sensitizing substances	Requirement for enzymes integrated in R4 on sensitizing substances
R9 Colouring agents	R8 Colouring agents	No change
R10 Preservatives		Covered by general requirements (CDV, biodegradability, R10-R12)
R11 EDTA, NTA	R6 Other excluded substances	Exclusion of DTPA added. NTA is covered by R3.
R12 Maximim content (complexing agents)	R7 Phosphorous R9 Dosage	Requirement omitted. Complexing agents are integrated in requirement R9 on dosage. A new requirement on phosphorous has been included in the criteria as requirement R7.
R13 IFRA	R5 Fragrances	No change. Compliance with IFRA code of practice integrated in R5 on fragrances
R14 Musk fragrances	R6 Other excluded substances	No change. Exclusion of musk fragrances integrated in R6 on other excluded ingredients
R15 Limitation/declaration (allergens in fragrance)	R5 Fragrances	No change. Limitation of allergens in fragrance integrated in R5 on fragrances
R16 Halogenated plastics	R15 Plastic packaging	No change Requirement integrated in R13 on plastic packaging
R17 Labelling of plastic packaging	R15 Plastic packaging	No change (except for wording)
R18 Weight/utility ratio	R14 Weight/utility ratio	Requirement differentiated for powders and other product types as powders generally have a lower WUR.

Version 6	Version 7	Changes from version 6 to 7 and comments
		More stringent requirement for powder products compared to former requirement.
R19 Declaration of contents		Requirement omitted. Covered by legislation, no need for repetition
R20 Mandatory information	R16 Dosage instructions + R17 Mandatory consumer information on packaging	Modified. Information already covered by legislation is omitted. Adjustment of washing advices, former advices for "coldwater products" now applicable for all products
R21/R27/R33 Total chemicals	R9 Dosage	More stringent requirements to maximum dosage
R22/R28/R34 Critical Dilution Volume	R11 Critical Dilution Volume	Modified limits for CDV
R23/R29/R35 aNBO	R12 Biodegradability – aerobic/anaerobic	Modified. Aerobic and anaerobic biodegradability in a joint requirement.
R24/R30/R36 anNBO	R12 Biodegradability – aerobic/anaerobic	Modified. Aerobic and anaerobic biodegradability in a joint requirement.
R25/R31/R37 Points	Removed	The requirement of points was removed after the public hearing since the requirements in the criteria document were considered to be strict enough and that the gain made by the point table was not large enough.
R26/R32/R38 Performance	R19 Fitness for use	The changes made in the Nordic Ecolabel Performance test are that coulorsafe detergents are to be tested at 30°C, while the reference stays at 40°C. For whites and stain removers the test is performed at 40°C with the reference at 40°C.
R39 Consumer information (Stain removers)	R16 Claims on the packaging	Requirement integrated in R16 . Possible claims on the content of organic or certified, sustainable raw materials should be documented and the weight % stated on the packaging.
R40-R48 Quality and regulatory requirements	O1-O9 Quality and regula-tory requirements	No changes
	R13 Origin of renewable, vegetable based subst.	New requirement
	R18 Claims on the packaging	New requirement (but integrates former requirement R39
3.2 Requirements for laboratories	Appendix 1B	The test laboratories for performance tests have been changed.
Appendix 3-5	Appendix 6a-c	The requirement of a test with pure water in other washing machines besides Wascator has been removed. There has also been an addition of which machine models that can be used. There has been an inclusion of the possibility to use "textiles sold by the metre" for colourfastness measurements.

Consequences of the revision for existing Ecolabel license holders:
The purpose of the Ecolabel is to drive a development towards more sustainable products and sustainable consumption. This is a stepwise approach implying that once a criteria document has been revised, a certain part of the ecolabelled products on the market may not automatically comply due to increased stringency.
In relation to the re-assessment of existing Ecolabel licenses for laundry detergents it is thus acknowledged that a certain part of the products may not comply with the criteria at the time of criteria adoption. This is primarily due to:

- The requirement for documentation of performance at 30 °C (new external test or comparative in-house test at both 40 and 30 °C) for colour-safe detergents.
- Modification of the performance test for stain removers (number of stain types tested and required performance for 80% of stains tested)
- A possible need for reformulation (and re-testing) in order to comply with the revised CDV limit
- New approach for calculation of the content of environmentally hazardous substances

8 Future criteria

Relevant issues for future criteria are considered to be a further investigation of the impact on the ingredient stage on the overall environmental impact of the products and to lower the washing temperature for white wash and for stain remover to 30 °C and to review the exemption for liquid products (white wash) to be tested against a reference without bleaching agents. According to LCA studies, the ingredient stage (manufacturing/extraction) has a significant contribution to the environmental impact in a life-cycle perspective. The possibility of placing requirements on the use of renewable, sustainable ingredients shall also be investigated based on the experiences gained with the newly placed requirement on the origin and traceability of renewable, vegetable based substances (requirement R11). Furthermore, the implementation and results of the new EU Ecolabel performance test shall be evaluated and it shall be considered whether this test is regarded as being more updated and adequate for the evaluation of the performance of the products. The ongoing trend towards reduced washing temperatures should also be followed and considered in relation to the future ecolabel requirements.

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Appendix 1

Market screening, Laundry detergents, January-February 2010

Market Screening

A screening of the market for laundry detergents was conducted in January/February 2010 by Nordic Ecolabelling. In Denmark, Sweden, Norway and Finland, 5-6 major retail stores per country were visited. The chosen stores included large, well assorted supermarkets/stores and discount supermarkets. The selected supermarkets/stores were assumed to represent preferred shopping locations for laundry detergents for the consumers. It should, however, be recognized that this survey was only an "up-to-the-minute" of the market in the regions visited. The survey solely indicates the presence of the products in the stores and not the actual sales volumes.
In each store, the trade names of all laundry detergents and stain removers were registered. Fabric softeners were not included in the survey as this is not a part of the product group as defined by the ecolabel criteria. Furthermore, it was registered whether the products were ecolabelled and/or carried any claims related to the environment, climate and performance. Information about dosage and ingredient declaration was also registered (data not shown here).

Results

The overall results of the market screening are shown in table A1 below.

Based on the number of trade names registered, the market screening indicates that ecolabelled laundry detergents have moderate to high market shares in the retail shops visited in the Nordic countries and that there large regional differences apply. Ecolabelled products account for 70-100% of the assortment in the retailers visited in Sweden, 50-80% in Norway, 25-100% in Denmark and below 36% in Finland. It is also evident that the Nordic Ecolabel is the primary ecolabel. The two other ecolabels identified, Bra Miljöval and the EU Ecolabel, have relatively low shares of the product assortment. Even though the screening is solely based on the presence- and not the sales volumes of the different products in the stores - the screening indicates a high prevalence of ecolabelled products on the market.

It was also evident that liquid products have gained large market shares in the Nordic Countries. In the majority of retailers visited, the share of liquid laundry detergents (based on trade name) was in the range 30-50%.

Table A1: Results of market screening January-February 2010

Country	Region	Store visited	Total no. of pro-ducts	% products in liquid form (liquids, gels)	No. of products with an ecolabel* (all ecolabels)	% Ecolabelled pro-ducts	% Products with Nordic Ecolabel
Denmark	Copenhagen	SuperBrugsen	40	50%	14	35%	35%
		Føtex	49	57%	13 [3 EU Flower]	27%	20%
		Irma	10	30%	10	100%	100%
		SuperBest	51	51%	8	16%	16%
		Fakta	8	0%	3	38%	38%
		Netto	15	33%	6 [5 EU Flower]	40%	7%
Sweden	Stockholm	COOP	31	42%	30 [11 Bra Miljöval]	96%	61%
		Willys	31	29%	31 [12 Bra Miljöval]	100%	61%
		Hemköb	30	41%	30 [9 Bra Miljöval]	100%	70%
		Lidl	15	33%	12	80%	80%
		Rusta	10	0%	7 [4 Bra Miljöval]	70%	30%
		Ica Maxi	35	31%	35 [10 Bra Miljöval]	100%	71%
Norway	Oslo	Rimi	17	15%	9	53%	53%
		Rema	13	33%	9	69%	69%
		COOP	19	24%	13 [1 Bra Miljöval]	68%	63%
		Kiwi	10	22%	8	80%	80%
		ICA	12	22%	9 [1 Bra Miljöval]	75%	67%
Finland	Helsinki	Valintatalo	41	32%	6	15%	15%
		Kauklahti	37	35%	5	14%	14%
		K-Market Sello	110	41%	14 [2 Bra Miljöval]	13%	11%
		Prisma Sello	11	18%	4	36%	36%
		Lidl	53	47%	3	6%	6%
		Tarjoustalo					

*Number in [parantheses] indicate the number of ecolabelled products carrying another ecolabel than the Nordic Ecolabel

Product claims

Many of the products carry claims related to the specific content of the product and/or claims related to environmental profile/sustainability. These claims are of interest in relation to the ecolabel, as such claims in some cases signals a message that is comparable or parallel to aspects of the ecolabels. The claims may also compete with the ecolabel in terms of signaling a good environmental profile.

Examples of claims related to the content or lack of certain ingredients – in relation to health/environmental profile of product:

- Free from [one or more of the following substances]:
  - Perfume
  - Phosphate
  - Colouring agents
  - Zeolites
  - Optical brighteners
  - Bleaching agents (colour detergents)
  - Preservatives

- Product declared in cooperation with the [national] Asthma & Allergy Association (i.e. indicates that the product is free of perfume, colour and that a range of other ingredients are limited or excluded)

Examples of claims related to environmental profile/sustainability:

- Save energy and water
- Save time and energy
- Wash at 30 °C and save energy
- Efficient from 30 °C (common claim for products sold in Denmark and Norway)
- Use of AISE's "Washright" panel (encourages lowered dose, lowered wash temperature, filling of the machine etc)
- Shining clean at 15 °C (specifically for certain products under the Ariel brand)
- Shining white clothes even at low temperatures
- Shining bright colours even at low temperatures
- Coldwater detergent
- Clean wash in cold water
- Turn down the temperature on click (e.g. to XX °C)
- Bleaching effect from 40 °C
- Manufactured in [country]
- Plant & mineral based ingredients harnessing the power of nature
- Cleaner planet plan (specifically for products under the Omo brand)
- CO_2 savings during use
- 40% reduced packaging waste
- Ecological, minimal impact on aquatic environment, not tested on animals
- No over-fertilization of watercourses

Dosage and density

The dosage and density of the individual products was recorded in order to get an overview of the dosage pr wash for products on the market anno 2010 (data not shown here). These data were used as a reference for the establishment of limit values for dosage.

Appendix 2

Workshop on future criteria for laundry detergents held in Copenhagen, March 2, 2010.

Agenda:

Workshop March 2, 2010:

"Future ecolabel criteria for laundry detergents"

Nordic Ecolabelling is pleased to welcome you to our workshop held in Copenhagen on March 2. At this workshop we will discuss the focus of the future (revised) ecolabel criteria for laundry detergents under the Nordic Ecolabelling Scheme. The workshop is a new initiative in our work which aims at involving stakeholders in an early step of the criteria revision process. We look forward to some fruitful discussions and hope that together we can find a common frame of reference on how we see the "environmentally optimised laundry detergent".

Agenda of the day:

10.00 – 10.30 Welcome and introduction, presentation of participants (Trine Thorup Andersen)

10.30 – 11.10 Brainstorm in plenum: environmental impact of laundry detergents throughout the life-cycle (Intro by Jeppe Frydendal)

11.10 – 13.00 Working in groups: selecting the most important properties of laundry detergents with regard to environment/health/quality (Intro by Terhi Uusitalo)

Including "working lunch" served in the meeting room

13.00 – 13.20 Sum-up of by each group

13.20 – 13.35 *Coffee break*

13.35 – 14.30 Working in groups: defining RPS (relevance, potential, stearability) for the prioritised properties (environment/health/quality) (Intro by Susanna Vesterlund)

14.30 – 14.50 Sum-up of by each group

14.50 – 15.00 Sum up of the day, what happens next (Trine Thorup Andersen)

Summary of group work:

Group work, session 1:

"Selecting the most important properties of laundry detergents with regard to environment/health/quality"

Environment

	Group 1	Group 2	Group 3	Group 4
1	Energy use / wash temperature	Biodegradability (aerobic/anaerobic)	Energy consumption at the consumer	Concentration (incl. correct dosage system and consumer education)
2	Compactation	Wash temperature	Energy consumption raw materials	New data for the DID list
3	Packaging (filling, recyclability)	Concentration and dosage	Toxicity: inherent properties vs risk	Temperature of reference detergent: 30ºC
4	Dosage	Toxicity	Consumer behavior (temperature, load, wash frequency, dose)	Responsible marketing guide (consumer information)
5	Raw materials: properties versus functionability	Packaging (recyclable, refill, use of recycled material)		Requirements on recyclability

Health

	Group 1	Group 2
1	No perfume ? (provocative suggestion from P&G!)	Toxicity (CRM, Acute/Chronic)
2		Asthma and allergy (preservatives, perfumes, inhalation: enzymes, zeolites)

Quality

	Group 3	Group 4
1	Performance test (+ soil level)	Ensure high performance against a reference
2	Dosability	Communicate that it is not greenwash
3	Rinsability	

Group work, session 2:

"Defining RPS for the prioritized properties"

Environment

Environmental parameter	Suggested type of requirement	R	P	S
Energy consumption, wash temperature	Performance test at 30 ºC Consumer information about environmentally optimized washing habits	XX XX	XX X	XX (X)
Compactation	Total chemicals (+ density ?)	XX	X	XX
Packaging (filling, recyclability)	Degree of filling Use of recycled materials Promotion of refills	X X X	X XX (X)	XX XX -
Correct/controlled Dosage	Fixed dosing units (tablets, other dosage units e.g. in packaging)	XX	XX	(X)
Biodegradability	Limits for aNBO/anNBO	XX	X	XX
Toxicity	(Already regulated through CDV etc)	(X)	(X)	XX

Health

RPS was not completed for health related issues