About Nordic Swan Ecolabelled

Textile services

Version 4.11 • 15 June 2018 – 30 November 2027

Nordic Ecolabelling

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Please note, the original background document contained large sections of text in several different Scandinavian languages. This is because the Nordic Ecolabelling's criteria are developed in Nordic cooperation, with all countries involved in the process.

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

Contact information

In 1989, the Nordic Council of Ministers decided to introduce a voluntary official ecolabel, the Nordic Swan Ecolabel. These organisations/companies operate the Nordic Ecolabelling system on behalf of their own country's government. For more information, see the websites:

Denmark
Ecolabelling Denmark
www.svanemaerket.dk

Finland
Ecolabelling Finland
www.joutsenmerkki.fi

Sweden
Ecolabelling Sweden
www.svanen.se

Iceland
Ecolabelling Iceland
www.svanurinn.is

Norway
Ecolabelling Norway
www.svanemerket.no

1 Summary

Textile services cover many companies and employees in the Nordic countries. In addition, hundreds of thousands of people in the Nordic countries use hired textiles every day. Textile services includes laundry and delivery of workwear, hospital textiles, textiles for hotels and restaurants, cloth hand towel rolls, mats and mops – to name but a few examples. Hiring textiles is the alternative to owning textiles or using disposable items. With the growing trend towards circular business models, the future for the textile services sector continues to look bright.

A Nordic Swan Ecolabelled textile service:

- Is energy efficient and has a low climate impact.
- Consumes limited amounts of water and uses the planet's resources sparingly.
- Uses chemicals complying with stringent environmental and health requirements. For example, detergents not containing fragrances or DADMAC.
- Reduces the environmental impact of transport involved in distribution.
- Buys large quantities of textiles which either are ecolabelled or comply with the Oeko-Tex 100 standard.

The first criteria for Nordic Swan Ecolabelling of textile services were approved in 2001 but it was possible to Nordic Swan Ecolabel laundry of cloth hand towel rolls as early as 1996. In 2017–2018 the criteria have been revised from generation 3 to generation 4. The most important changes as a consequence of the revision are presented below.

- The requirements on energy and greenhouse gases have been tightened up. The energy and CO_2 factor for electricity has been updated to better reflect the Nordic energy market.
- The chemicals requirements have been updated in line with applicable legislation.
- Requirements on CDV and point score requirements on chlorine have been tightened up.
- A point score requirement linked to requirement O11 – Content of substances harmful to the environment in laundry chemicals has been introduced.
- An obligatory requirement for the proportion of ecolabelled laundry detergents is introduced.
- The textile categories have been changed to make the requirements even more suited to specific types of laundry:
  - Textile category Hotels has been divided into two sub-categories, one for traditional hotel linen and one for linen for holiday cottage accommodation.
  - Textile category Workwear for industrial/kitchen/butchering and equivalent use has been expanded with the addition of a new sub-category: Workwear from the fishing industry.
  - The textile category Offshore mats and mops has been divided into two categories: one for mops and cleaning cloths and one for offshore mats.

- The requirements on transport have been tightened up and it has been made clear that the requirements apply whether or not the textile service uses its own drivers/vehicles or whether the service is bought in from outside.
- A point score requirement has been introduced reward measures that reduce emissions of microplastic in wastewater.
- The existing information requirement on disposal has been tightened up.
- A point score requirement has been introduced encouraging preventive measures against disposal, and re-use and material recovery.
- A new requirement has been introduced prohibiting phthalate plasticisers in mats that are bought new.
- Requirements have been introduced on working conditions for own employees and subcontractors/employment agencies.

Energy consumption is linked to a number of different environmental problems and tightening up the energy requirement is expected to lead to environmental benefits in these areas. Tightening up the greenhouse gas requirement brings environmental gains in the form of reduced climate impact from textile services. Manufacturing textiles, including raw ingredient production, produces a significant environmental burden, which means that initiatives relating to textiles and disposal involve environmental benefits. Washing synthetic textiles is a source of emissions of microplastics. The new point score requirement may help to draw the attention of the industry to this issue, give Nordic Ecolabelling an overview of the types of fibres used, and help to reduce emissions of microplastics.

2 Basic facts about the criteria

This chapter is an introduction to the criteria for Nordic Swan Ecolabelling of textile services and contains a description of the definition of the product group, a brief justification of why Nordic Ecolabelling has these criteria and a description of their version history and validity.

Products that can be labelled

The product group includes all textile services. A chain/group with several units can apply for a licence for one or more units. Each unit must fulfil the requirements and have its own licence. If all the units in a chain/group in a country are Nordic Swan Ecolabelled, they can market themselves as a Nordic Swan Ecolabelled chain/group in that country.

For cloth hand towel rolls, either the whole laundry can be Nordic Swan Ecolabelled or only the part of the laundry that handles cloth hand towel rolls.

The criteria do not apply to companies that only offer dry cleaning. The criteria for alternative dry cleaning are available for these companies.

Justification for Nordic Ecolabelling

Nordic Ecolabelling applies an evaluation model known as the RPS model (Relevance, Potential, Steerability) and a holistic, life cycle perspective. R – Relevance is assessed on the basis of which environmental problems the product group causes and how extensive those problems are. P – Potential is assessed in terms of potential environmental benefits within the product group and S –

Steerability is a measurement of how the environmental aspects can be influenced by ecolabelling.

Hundreds of thousands of people in the Nordic countries use hired textiles every day. Textile services includes laundry and delivery of workwear, hospital textiles, textiles for hotels and restaurants, cloth hand towel rolls, mats and mops – to name but a few examples. It is environmentally relevant to have criteria for Nordic Swan Ecolabelling of textile services. Life cycle analyses show that textile services are associated with environmental problems in the following areas: The laundry's energy consumption and climate impact, chemicals consumption, water consumption, purchasing of textiles, distribution and waste from discarded textiles. At the same time, data collected shows that there is a difference in the environmental performance of different laundries, which means there is potential for environmental improvements. Steerability is also high, as the laundry has a direct opportunity to influence the most important parts of the life cycle.

Nordic Ecolabelling sets requirements in the areas where there is RPS. In addition to this, Nordic Ecolabelling is focussed on setting requirements in the following environmentally strategic areas: Biodiversity, climate and energy, chemicals and resource use/resource efficiency.

A Nordic Swan Ecolabelled textile service:

- Is energy efficient and has a low climate impact.
- Consumes limited amounts of water and uses the planet's resources sparingly.
- Uses chemicals complying with stringent environmental and health requirements. For example, detergents not containing fragrances or DADMAC.
- Reduces the environmental impact of transport involved in distribution.
- Buys large quantities of which either are ecolabelled or comply with the Oeko-Tex 100 standard.

Version and validity of the criteria

The first criteria for Nordic Swan Ecolabelling of textile services were approved in 2001 but it was possible to Nordic Swan Ecolabel laundry of cloth hand towel rolls as early as 1996. The criteria have been revised three times since 2001. In the first revision, they were merged with the criteria for cloth hand towel rolls.

The period of validity of the current criteria for textile services (version 4.0) is 15 June 2018 – 30 June 2023.

Nordic Swan Ecolabel licences in the Nordic market

In May 2017 there were 76 licences distributed as follows: Denmark 25, Finland 1, Norway 19 and Sweden 31. Nordic Ecolabelling has had a major impact in the Danish, Norwegian and Swedish market. The number of licences increased in all of these countries during the validity of the previous generation of the criteria. Nordic Swan Ecolabelling of textile services has not attained the same impact in the Finnish and Icelandic markets. See Chapter 2 for a description of the Nordic textile services market.

3 The Nordic market

This chapter provides a brief description firstly of how the industry is organised in the Nordic market, and secondly of the market's development.

The Nordic market

Over the past approximately 45 years, the industrial laundries in Europe and in the Nordic countries have been characterised by consolidation, in other words, both laundry chains and smaller typically private laundries have been bought up by larger actors in the industry (Arndt, 2002). The structure of the sector has thus developed towards fewer larger and more specialised production units gathered within larger groups (Søgaard-Pedersen, 2004). This trend has continued in recent years. The Danish company De Forenede Dampvaskerier has recently bought the Swedish Textilia koncern and it was recently announced in the media that the French laundry group Elis has reached agreement with Berendsen on a takeover (Stothard, 2017).

The same trend has been seen within the Nordic countries and large actors such as Berendsen Group have operations that span national borders, in Denmark, Sweden, Norway and Finland, while Finske Lindström (including Comforta) has operations in Finland and Sweden. These two large Nordic textile service operations also have activities outside the Nordic region. Other international actors such as CWS-boco and Rentokil Initial have also become established in the Nordic textile services market.

In Denmark, the two largest actors in the market (Berendsen Tekstil Service and De Forenede Dampvaskerier) account for 70–80% of total sales in the sector (Danish Competition and Consumer Authority, 2009). The remaining 20–30% of sales is accounted for by approximately 95–100 small and medium-sized businesses (Danish Competition and Consumer Authority, 2009). The Danish Competition and Consumer Authority (2009) judges, with a certain amount of uncertainty, total turnover in the sector to be DKK 3–3.5 billion, which is slightly higher than the estimate reached by the industry organisation itself of about DKK 2.7 billion (DI Service, 2016). The difference may perhaps lie in the fact that the industry's own figures only concern the major professional laundries.

The Finnish textile services market has three parts: former municipal laundries, Lindström/Comforta and private laundries. There are 10–20 laundries that used to be run by municipalities but are now companies owned by municipalities or hospital districts. These laundries have in-house status and only wash textiles for their owners (> 90%). In-house status means that the owners do not need to put their laundry out to public tender and can instead use their own laundry. This means in turn that these companies never encounter a demand for Nordic Swan Ecolabelling. Lindström/Comforta is the market leader in Finland. Their income from Finnish operations is ~ EUR 200 million (global income EUR 300 million). Lindström has a 50–-70% share of the Finnish market. The other private laundries represent a wide-ranging group of laundries. There are a few new, modern laundries but the majority are small, local and filled with old technology. Most of them do not meet the requirements for Nordic Swan Ecolabelling of textile services.

In Norway, the number of companies in the laundry and cleaning industry has fallen from 329 in 2011 to 230 in 2015 (Statistics Norway, 2017). However, both

the number of employees (approximately 2,700) and turnover (NOK 2.3–2.6 billion) have remained stable. By far the largest chain is Nor Tekstil (700 employees and 19 laundries). Other chains include Rent-gruppen (eight laundries), Berendsen (seven laundries) and Breeze (three laundries). In addition, there are some municipally-owned hospital laundries and independent private laundries.

The Swedish laundry industry comprises approximately 300 companies employing 5,000 people between them. These figures include small dry cleaners whose business is primarily geared towards private individuals. However, a number of larger actors wash considerable amounts of dirty laundry every day: Berendsen, Rikstvätt and Textilia. The industry is characterised by strong growth. During the period 2010–2015, combined operating income rose by 24% and personnel by 14%. In 2014 the industry turned over more than SEK 4.5 billion (Swedish Textile Services Industry, 2017).

Development of the market

Below, the development of the market is described on the basis of the trends and tendencies identified during the revision.

Hiring textiles is the alternative to owning textiles or using disposable items. With the growing trend towards circular business models, the future for the textile services sector continues to look bright (ETSA, 2017).

Textile services are classically seen as a B2B (business-to-business) and B2G (business-to-government) service in which the industrial laundries number hotels, municipalities and county councils, industries and other companies among their customers. In recent years, a new branch in the B2G segment has grown stronger, namely municipalities offering their elderly residents laundry of private clothing, mainly in Denmark. This trend was already noted during the revision for generation 3 of the criteria in which the textiles category private clothing became a main category in its own right, with its own factor values. Since then, actors geared towards the consumer segment have established themselves in the market. This concerns B2C (business-to-consumer) services in which private individuals can have their clothes washed by professional laundries. One example is the Danish start-up company Washa[1], which, through its cooperation with Berendsen, offers private individuals a service in which their laundry is collected at the door, washed at a Nordic Swan Ecolabelled laundry and then delivered back to their home. A similar service is available in Sweden, known as Tvättbilen[2]. B2C services currently account for only a small proportion of the market. However, this is a market that is expected to grow as consumer behaviours such as “outsourcing”, “on demand” and “home delivery” become increasingly common.

One clear trend in terms of technical equipment in laundries is towards greater automation in the laundry process. For example, packing of washed mops, feeding mats into the washing machine and feeding wet textiles between heated rollers is normally automated. Automation can reduce the need for staff by up to 30–40% for an individual machine. The increase in electricity consumption brought about by automation is described as being marginal. Additionally, there

[1] https://dk.washa.com/
[2] http://tvattbilen.se/

is a trend towards systems for internal transport, mainly through laundry bags running across the ceiling.

"No steam", in other words where the energy is produced by smaller units at the laundry when consumption is required instead of sending steam around in pipes from a central facility (only one boiler). The advantage is greater efficiency per kg of laundered textiles. The disadvantage is that the change usually has to be made gradually which leads to the boiler being over-sized and relatively less efficient during the phasing out process.

In the field of chemicals, the clearest trend is low-temperature laundry with associated chemicals. This means a shift from thermal disinfection to chemical disinfection. The washing temperature is going down throughout the Nordic region but there are differences between the individual countries. For example, Swedish hospitals still wash at 70 ˚C for 10 minutes while there are Danish hospital laundries that wash at 40 ˚C. Lowering the washing temperature from 85 to 60 ˚C means a significant energy saving while a further drop to 40 ˚C does not involve as large gains. Washing at low temperatures makes the heat exchange less effective. The net effect of lowering the washing temperature is an energy saving, however. Another trend concerning chemicals is detergent with a focus on enzymes instead of surfactants. The technology works best on restaurant textiles and workwear and may involve lower energy consumption and less re-laundering. One challenge of enzyme-based laundry is that enzymes need longer time to work than surfactants. The laundry time is often short at industrial laundries – at about 10 minutes. Additionally, the technology is expensive and there are fears that enzymes will remain in textiles and may irritate the skin/give rise to allergies.

In general, there has been a major focus on water consumption and recovery, but according to the industry, the focus has switched to hygiene questions. At the moment, water consumption is so low that it may have consequences for hygiene. Therefore attention is being paid to rinsing water and setting up hygiene rules.

One trend in the health sector in particular is separating clothing in different colours. The trend leads to more diversified laundry, which affects the ability of the laundries to wash garments effectively. For example, red clothing can only be washed with other red garments, or clothes in similar colours. One advantage of coloured workwear versus white workwear is that the fabric does not have to be bleached with strong chemicals. Mat laundries also cite an increase in special requirements from customers. This concerns time between collections, colours, size and design of the mats such as children's mats with stimulating designs and mats with positive messages.

4 Other labels

This chapter provides an overview of other ecolabels and systems that are relevant to textile services.

Ecolabelling type 1

There is no other type 1 ecolabelling for textile services besides the Nordic Swan Ecolabel.

Purchasing requirements (GPP)

There are no EU GPP criteria for textile services. However, the Swedish National Agency for Public Procurement[3] has criteria for textile services which are partly harmonised with the Nordic Swan Ecolabel's requirements.

Environmental management

Environmental management systems bring order to a company's operations and produce improvements based on the company's own targets in the environmental field. However, environmental management systems do not contain specific requirement levels (threshold values) for the product/service. The most important systems are EMAS, which was developed by the EU, and ISO 14001, which is an international standard.

A number of laundries are EMAS or ISO 14001 certified and also comply with industry association requirements, e.g. on quality, the environment and health and safety. The Nordic Swan Ecolabel sets concrete and tough requirements on environmental impact, which the management systems do not do. However, businesses that work with management systems often find it easier to collect and document the necessary information for Nordic Ecolabelling.

Industry organisations and quality labels

ETSA (European Textile Services Association)[4] is the European industry association for textile services.

BVT (Brancheforeningen for vask og tekstiludlejning)[5] is the Danish industry association for textile services/laundries. BVT has its own approval scheme which also covers quality.

The Finnish industry association for textile services is Tekstiilihuoltoliitto ry[6] and it does not have a quality label.

There are two industry associations for textile services and dry cleaning in Iceland: Félag efnalauga og þvottahúsa and Félag efnalaugaeigenda.

NRV (Norsk Renseri- og Vaskeriforening)[7] is the Norwegian industry association for textile services and dry cleaning. There is also NVK (Norske Vaskerier Kvalitetestilsyn)[8], an organisation that carries out quality control.

[3] http://www.upphandlingsmyndigheten.se/
[4] http://www.textile-services.eu/
[5] http://danskevaskerier.di.dk/
[6] http://www.tekstiilihuolto.fi/
[7] https://www.norskindustri.no/
[8] http://vaskeritilsynet.no/

Sveriges Tvätteriförbund[9] is the industry association for the Swedish laundry industry and represents members in dry cleaning and textile services. Sveriges Tvätteriförbund has developed the "T-märket" quality label that may be used by its members.

5 About the criteria revision

This chapter sets out the purpose of the revision and describes the implementation of the project.

Purpose of the revision

The criteria for Nordic Swan Ecolabelling of textile services were evaluated in 2016. This revision draws on the conclusions reached during that evaluation. The main aim and sub-objectives of the revision are presented below.

Main aim

The main aim of the revision is to:

- Achieve additional environmental benefits
- Ensure trustworthy criteria adapted to the environmental performance of today and the future
- The Nordic Swan Ecolabel must be seen as a driving force urging sustainable development in the textile services industry
- The Nordic Swan Ecolabel is to continue to have an impact in the market
- Safeguard even more resource-efficient processing and requirements that are simple for the applicant (without being unambitious)

Sub-objectives

The main aim is to be attained through:

Area 1: Product group set-up

- The opportunity for Nordic Swan Ecolabelling has only been evaluated for certain categories of textiles, e.g. hotels and hospitals.
- The criteria take into account the growing B2C market.
- Existing textile categories have been expanded with the addition of sub-categories, particularly the Hotels category. The requirements that need specific requirement levels for these categories have been identified and the requirement levels have been expanded.

Area 2: Energy and climate requirements

- Updated energy and climate requirements have been drawn up. The requirement levels are based on information from existing licensees and non-Nordic Swan Ecolabelled laundries.

Area 3: Chemicals requirements

- The requirements on chemicals have been updated and tightened up.

[9] http://www.tvatteriforbundet.se/

Area 4: New requirements

- New requirements (point score requirements in some cases) that encourage recovery/re-use have been developed for use as a basis before consultation with a subsequent evaluation of whether or not they should be implemented in the criteria. In developing the requirement, there was a focus on making it as "fair" as possible for all laundries, irrespective of their customer base and mix of textile categories, partly via dialogue with existing licensees.
- Existing disposal requirements are adapted to the sorting carried out by the laundry, not our textile categories, to make it easier for the applicant.
- New requirements (point score requirements in some cases) on emissions of microplastics have been developed for use as a basis before consultation with a subsequent evaluation of whether or not they should be implemented in the criteria.
- New requirements on terms of employment which draw on the requirements for cleaning services have been developed for use as a basis before consultation with a subsequent evaluation of whether or not they should be implemented in the criteria.

Area 5: Textiles and mats

- New requirements for mat laundries have been developed for use as a basis before consultation with a subsequent evaluation of whether or not they should be implemented in the criteria.
- Existing requirements on purchasing textiles have been tightened up in terms of purchasing ecolabelled textiles and the documentation requirements have been simplified to make processing quicker. This tightening of the requirement has been weighed against the existing provision.

Area 6: Other

- The point score requirement has been adapted in relation to environmental benefit.
- Existing interpretations have been implemented in the criteria.
- It is ensured that the requirements do not conflict with public procurement legislation.
- The quality requirement has been evaluated regarding the Swedish laundry association's change in quality control. Where necessary a new requirement has been developed.
- Requirements on external transport and drivers are in line with requirements governing own transport.

About this revision

The revision began with an internal workshop in February 2017 and was concluded with the publication of new criteria in August 2018. Karen Dahl Jensen holds the position of Nordic product development manager and commissioned the revision. A list of the project participants is provided below.

Project group

Caroline Karlsson, Nordic project manager

Arne Godal, project advisor

Jeppe Frydendal, internal expert textile services

Internal reference
Arne Godal, product specialist Norway

Jeppe Frydendal, product specialist Denmark

Maria Tengqvist, product specialist Sweden

Harri Hotulainen, product specialist Finland

Rebecca Uggla, energy expert

Therese Rydén, communications officer

External support
Contact with external stakeholders was identified as an important parameter for the success of the project at an early stage. The external support process partly seeks to find out the prevailing attitude to the criteria and partly to make the industry aware that the criteria are being revised. It is also an opportunity for the project group to gather valuable information on the industry for the revision. The project group has held physical meetings and phone calls and been in e-mail contact with licensees, chemicals producers, suppliers of technical equipment and other stakeholders. In addition, a number of non-Nordic Swan Ecolabelled laundries have contributed data during the revision. The criteria proposal was on revision between 10 October to 5 December 2017, and genererated many comprehensive and constructive answers. Nordic Ecolabelling wish to thank all external stakeholders that contributed to the process.

6 Environmental impact of textile services

This chapter describes the areas that are significant for textile services from a life cycle perspective, in terms of the environment and health. The chapter also sets out a calculation of the carbon footprint for three key services in textile services, based on the principles of the Greenhouse Gas Protocol methodology. The calculation provides a good overview of where in the life cycle carbon dioxide emissions occur and their magnitude.

Textile services from a life cycle perspective

The actual washing/drying process at the laundry has a major impact on the life cycle of textiles. This is natural since from a life cycle perspective the textiles are “only” produced and disposed of once, while they are washed and dried a large number of times, making these processes of great importance.

By examining the product group from a life cycle perspective, Nordic Ecolabelling has judged that it is relevant to set requirements that affect every aspect of the life cycle:

- The laundry’s energy consumption and climate impact
- Chemicals consumption at the laundry

- The laundry's water consumption
- Purchasing textiles and mats with relevant requirements backwards in the chain
- Distribution
- Waste – including with a focus on disposal of textiles

Data gathered from licensees and non-Nordic Swan Ecolabelled laundries, and various industry data show that there is a major difference in energy and water consumption in the production processes of different laundries. There is also a difference in the laundry chemicals used and their environmental impact. By optimising and regulating the laundry temperature, machines with low consumption and choice of fuel in production, laundries themselves have steerability of energy and water consumption. Also laundry chemicals are developed in close dialogue between chemicals producers and laundries, which means that the laundries also have steerability regarding the chemicals that are used. It is well known that there is worse and better textile manufacturing, which is reflected in different ecolabels for textiles. As it is the laundry that buys in and owns the majority of the textiles and mats handled at the laundry and used by customers, steerability is high. There are also differences in terms of environmental performance when it comes to transport to and from customers. Transport is steerable and very visible to the laundry's customers. Investigations of what happens to discarded textiles show that there are differences regarding whether they are reused, sent for material recovery or sent for incineration or landfill. The laundries have steerability over what happens to textiles at the disposal stage.

Figure 1 Life cycle of textile services

Carbon footprint of textile services

The European Textile Services Association, ETSA, and its members charged EcoForum in Denmark with calculating the carbon footprint of three key textile services. Please, see Appendix 8 for a review of the carbon footprint for textile services

7 Justification of the requirements

This chapter presents proposals for new and revised requirements, and explains the background to the requirements, the chosen requirement levels and any changes compared with generation 3. The appendices referred to are those that appear in the criteria document “Nordic Swan Ecolabelling of Textile Services”.

7.1 Definition of the product group

The product group includes the entire textile service. A chain/group with several units can apply for a licence for one or more units. Each unit must fulfil the requirements and have its own licence. If all the units in a chain/group in a country are Nordic Swan Ecolabelled, they can market themselves as a Nordic Swan Ecolabelled chain/group in that country.

For cloth hand towel rolls, either the whole laundry can be Nordic Swan Ecolabelled or only the part of the laundry that handles cloth hand towel rolls.

The criteria do not apply to companies that only offer dry cleaning. The criteria for alternative dry cleaning are available for these companies.

Laundry of cloth hand towel rolls originally had its own criteria document. When this was merged with the criteria for textile services, it became permitted to Nordic Swan Ecolabel only the part of the laundry that handles cloth hand towel rolls. Apart from this exception, the Nordic Swan Ecolabel covers the whole laundry. Thus it is not permitted to only Nordic Swan Ecolabel particular textile categories at the laundry.

The product group definition is the same as in generation 3 of the criteria.

7.2 Description of the service

Background to requirement O1

The purpose of the requirement is to give an overall picture of the laundry that is to be Nordic Swan Ecolabelled, so that licence administration is correct and effective.

From generation 3 to generation 4 of the criteria: No change, only updated.

Background to requirement O2

The distribution of laundry between different textile categories is used as a basis for the requirement of energy, greenhouse gases, water and laundry chemicals. Only the number of kg of laundry delivered to the laundry should be counted, not relaundering. In order to adapt the requirements for energy, greenhouse gases, water and laundry chemicals even more to specific types of laundry using factor values, the textile categories have been adjusted in this criteria generation.

The textile category Workwear for industry / kitchens / butchers and the like has been expanded with a new subcategory; Work clothes from the fishing industry. These clothes require tough washing programs because fish oil, for example is difficult to wash.

The former textile category Offshore mats and mops have been divided into two categories. Mats bind a little water, while mops bind large amounts of water. Mops also contain significantly more residual moisture after washing, which means that more energy is consumed during drying. Nordic Ecolabelling therefore saw a need to distinguish these categories.

Laundries with customers in Swedish, Norwegian and Finnish fell tourism areas have a category for holiday cottage laundry. These areas receive many tourists in the summer and the winter who stay almost exclusively in holiday cottages for periods of one to two weeks. This results in bed linen and towels becoming dirtier than traditional hotel linen and towels, that are usually only used for one night or a weekend. As a consequence, holiday cottage linen requires a tougher laundry programme to clean, with higher energy consumption as a result. Linen for holiday cottage accommodation can account for up to 50% of the laundries' total amount of laundry in summer and winter. The textile category Hotels has therefore been divided into two sub-categories, one for traditional hotel linen and one for linen for holiday cottage accommodation.

Cleanroom textiles are washed in a separate process from other types of laundry. A higher level of cleanliness is required in many circumstances, from industries requiring particle-free environments (such as chip manufacturing and pharmaceuticals) to laboratories, hospital surgery suites, and similar settings.

Clean room washing is carried out separately from other laundry, with dedicated ventilation and specific wash steps. This requires higher energy and water consumption than conventional laundering.

Cleanroom textiles therefore constitute a separate textile category. They are further divided into four subcategories:

- Workwear Class A–B (ISO 4–6)
- Workwear Class C–D (ISO 7–8)
- Mops, Mats & Other Class A-B (ISO 4-6)
- Mops, Mats & Other Class C–D (ISO 7–8)[10]

[10] ISO (2015). ISO 14644-1:2015 Cleanrooms and associated controlled environments – Part 1: Classification of air cleanliness by particle concentration. Geneva: International Organization for Standardization.

The requirements for cleanliness and process control are stricter for Class A–B than Class C-D.

Background to requirement O3

Here Nordic Ecolabelling sets requirements on chemicals for subcontractors who deal with less than 1% of the textiles. This might immediately appear to involve a very small environmental impact, but on the other hand, laundry by subcontractors for an individual customer at the Nordic Swan Ecolabelled laundry accounts for 100% for the customer (even if it is less than 1% for the laundry). This customer has an expectation that requirements will be set regarding constituent substances. At the same time, it is possible to simply and clearly communicate the substances that are avoided by choosing Nordic Swan Ecolabelled textile services.

The requirement is unchanged compared with generation 3 of the criteria.

Background to requirements O4 and P1

The number of dry cleaners in the Nordic countries is gradually shrinking. In 2016 there were approximately 600 dry cleaners in all of the Nordic countries. People are increasingly wearing fewer clothes that need to be dry cleaned. Dress codes are changing ad becoming less formal, both at work and outside work. Talking to several laundries confirms this picture – the volume of dry cleaned textiles is decreasing. However, there are textiles that cannot withstand washing with water and require dry cleaning. This tends to concern a small proportion of textiles and Nordic Ecolabelling sets limited requirements on the laundry process for this reason. All chemicals used for dry cleaning must comply with requirement O17 on constituent substances.

When calculating the percentage of laundry, the amount of textiles cleaned for other Nordic Swan Ecolabelled laundries can be excluded as this amount is included in the other laundry's calculation of the percentage of laundry and this avoids counting the same amount twice. Laundries that use Nordic Ecolabelled subcontractors have a further opportunity to gain points for this.

The requirement is unchanged compared with generation 3 of the criteria.

7.3 Energy, greenhouse gases and water

Background to requirement O5

Besides climate effects, energy consumption also contributes other environmental effects such as acidification and nutrient loading. Reduced energy consumption thus has many positive environmental effects. When it comes to acidification, the fuels that contain high amounts of sulphur have a higher impact than other types of fuel. For this reason, Nordic Ecolabelling sets an additional requirement on the sulphur content of the fuel used at the laundry of a maximum 0.05% (w/w). This means in practice that fuels such as coal, coke and heavy fuel oil are excluded.

The requirement is set to ensure that the laundries that use fuels that cause the most pollution are not Nordic Swan Ecolabelled. The requirement has been tightened up compared with generation 3 of the criteria.

Background to requirements O6 and P2

The background to requirements O6 and P2 is set out below.

Laundries' energy consumption

Laundries use both electricity and heating (different fuels and to a certain extent district heating). The main fuel source in Nordic Swan Ecolabelled laundries is usually natural gas, LPG, pellets, or bio-oil. However, electricity is required to operate pumps, tumble dryers and for other mechanical work. Electricity can also be used to make steam.

Under generation 3 of the criteria, several laundries introduced energy efficiency improvements (including replacing old washing machines and central boilers) to reduce their energy consumption and meet the Nordic Swan Ecolabel's energy requirements. In addition, several laundries in Sweden have switched from fuel oil as a fuel source to bio-oil or pellets to meet the greenhouse gas requirement. By replacing fuel oil with bio-oil, a medium-sized laundry in the Nordic countries has cut its carbon dioxide emissions by 330 tonnes a year. Similarly, many laundries in Norway have switched from oil to gas. In Finland, one laundry has switched fuel to biogas and so cut its carbon dioxide emissions by 90%.

See the section on Development of the market in Chapter 2 for a description of trends and tendencies regarding energy and climate.

RPS

Several life cycle analyses show that energy consumption in the user phase (i.e. for activities that the laundry can directly influence) is high compared with other parts of the life cycle (Erberle & Möller, 2006; Frederiksen, 2004; Hansen & Holst, 2002; Frydendal, 2001; Schmidt, 2000; Frydendal, 1998; Kalliala, 1997). Schmidt (2000), which analyses cloth hand towel rolls from a life cycle perspective, divides the energy consumption into three phases as follows (Frydendal; Schmidt & Zeuthen, 2000):

- Manufacture ~ 16%
- Usage (washing/drying/disposal) ~ 80%
- Distribution ~ 5%

Although the references are not based on updated data, it is likely that energy consumption in the usage phase remains the most important. Thus the requirement regarding energy consumption in the usage phase is very relevant and very steerable. The potential in setting energy requirements is also high, in that there are major differences in how much energy the individual laundries consume – also when washing the same type of textiles. This is shown by Nordic Ecolabelling's own data collection for Nordic laundries (both Nordic Swan Ecolabelled and non-Nordic Swan Ecolabelled) that we have carried out as part of this revision. Nordic Ecolabelling has therefore focussed on reducing energy consumption in the user phase also in this revision. The focus is not only on reducing the amount of kWh used in the laundry; energy factors are used such that the "primary energy" is also included in the calculation of the energy requirement and not just in the CO_2 requirement.

Electricity and fuel

To ensure that Nordic Swan Ecolabelled laundries have high energy efficiency, the total energy consumption of the laundry, of both electricity and fuel, is examined, seen in relation to how much and which textile categories are washed.

Severely soiled laundry often requires higher temperatures and thus more energy.

Not all forms of energy are equally applicable. The term exergy is used to describe the energy quality of an amount of energy. Energy in the form of electricity is pure exergy, for example. It can be converted into mechanical energy, chemical energy, heat energy, etc. Heat energy that is spread in a room, on the other hand, has low exergy because it is harder to use for other purposes (IVA, 2012). In other words, electricity has a higher energy quality than fuel. 1 kWh of electricity can always be converted into 1 kWh of heat but not vice versa.

Electricity is produced in many different ways and the trend is for the proportion of renewable electricity in the electricity grid to increase, but fossil-produced electricity, and hydropower, continue to play a central role as regulatable energy at a European level. Regulatable energy refers to the electricity production that is stepped up or reduced depending on demand at the time. On an annual basis, however, hydropower production will not be affected by a change in demand, as the aim is always to exploit the full capacity. Thus the consequence of changed consumption in the long run will typically be a change in production of the regulatable power capacity in general – in other words typically fossil based.

There are major differences in the electricity mix of the different countries, but the electricity grid in the Nordic countries (apart from Iceland) is connected and electricity is exchanged across the market irrespective of national borders (Nord Pool, 2017). There are 12 price zones for electricity in the Nordic countries (2 in Denmark, 1 in Finland, 4 in Sweden and 5 in Norway). In Norway there is a lack of transfer capacity between different regions and power can be transported from north to south Norway and vice versa via Sweden. There is also a lack of transfer capacity between the countries and towards Europe, which means that energy can become “locked in” despite demand and a willingness to pay. In 2014 approximately 20 TWh of electricity were exported from the Nordic countries and less than 10 TWh were imported of a total approximately 380 TWh produced in the Nordic countries. The exchange capacity between the zones will increase in the future (Nordic Energy Research, 2016).

The energy requirement sums up the amount of energy and fuel used. It takes more than 1 kWh of energy to obtain 1 kWh of electricity. When the electricity is manufactured, there is a loss, partly in production, partly via transport from production to the user of the electricity. To make the figures for electricity and fuel comparable with each other, an energy factor for electricity is therefore used.

In the previous generation of the criteria, electricity consumption was recalculated to fuel energy on the basis of what was then the standard coefficient for electricity in the EU, of 2.5. This reflects the fact that due to a loss of energy in production and distribution of electricity, there was an assumed average efficiency of 40% (EU 2006) – or in popular terms, that electricity producers had to use 2.5 kWh of fuel per kWh of electricity delivered.

In 2016, a project conducted for the European Commission concluded that the factor 2.5 is no longer up to date and should be reviewed (Esser & Senfuss, 2016). They carried out calculations using a number of different methods and assumptions and reached the conclusion that the factor – depending on method – for the expected situation in 2020 should instead be between 1.59 and 2.09 (Esser

& Senfuss, 2016). Due to the complexity of the calculations, none of the selected calculation methods take into account the marginal electricity production – in other words the production that is actually affected by a change in demand (e.g. an electricity saving). It is important to bear this in mind when interpreting the report as the factor for the margin must generally be assumed to be higher than the average.

Another complicating factor is that the electricity margin can change over time. Where the norm is fossil-based, under certain circumstances and for periods it may be renewable, if there is a greater production of renewable electricity than there are recipients (critical electricity surplus).

The situation is extremely complex and it is not possible for Nordic Ecolabelling to choose a factor that is correct in all cases; whatever the factor we choose, some people will criticise us for it being too high and others for it being too low. Nordic Ecolabelling has therefore had to make a choice that may be unpopular but that we think will ensure that we are going in the right direction in terms of ensuring that Nordic Swan Ecolabelled laundries are energy-efficient.

The criteria for textile services in principle cover the whole world, and all laundries can apply for a Nordic Swan Ecolabel licence – wherever in the world the laundry is located. But Nordic Ecolabelling is based in the Nordic countries and at the moment all Nordic Swan Ecolabelled laundries are in the countries that are covered by the Nordic electricity market. In 2009 the estimated average energy factor in the Nordic countries was 1.74 kWh/kWh_{el} (Gode et al., 2011) and average emissions of climate gases in 2005-2009 were 125.5 g CO_2eq/kWh_{el} (Swedish Energy Agency, 2017), and thereafter it has been reduced to c. 59 g CO_2/kWh_{el} (Nordic Energy Research, 2016). As the energy factor is an expression of primary energy – in other words, including, for example, the energy from extracting and transporting fuel to the power station, the equivalent factor for fuel energy will be slightly lower. At the same time, the trend and the political aims are moving towards a larger and larger proportion of renewable electricity production, which will mean that both factors will gradually be improved for the average Nordic electricity market in the future.

To take into account the above expected improvements during the course of the validity of the criteria, Nordic Ecolabelling is adjusting the above factor for electricity downwards to:

- 1.5 kWh/ kWh_{el}
- 59 g CO_2/kWh_{el}

Nordisk Ecolabelling is aware that it is not actually 100% correct to use these values and that Nordic Swan Ecolabelled laundries may be located outside this electricity market.

In determining the energy requirements, no account has been taken of where the laundry is located in the world, which may seem unfair, believing that a laundry in northern Norway will need more energy for heating than a laundry in southern Spain. However, Nordic Ecolabelling's experience is that the processes emit so much excess heat that space heating is rarely necessary – not even during the winter period. However, there may be situations where, for example. office space is located so that no surplus heat from production can be utilized in

practice. Theoretically speaking, the requirements could be so that office space contributed to the energy limit value of the laundry with an amount of energy that corresponds to the amount of energy needed to keep the comfort heat in a well-insulated office building in that climate zone. However, this would complicate the requirement significantly without having a real environmental impact from it.

Self-generated renewable energy

Some laundries have invested in solar panels and similar to produce some of the electricity they use themselves. Nordic Ecolabelling wishes to welcome these kinds of initiatives – also even if it is not entirely clear how high an environmental effect this kind of initiative actually has in reality. For example, it would be far too imprecise to say that the self-generated energy is produced without any environmental impact. For example, there is not always a connection between when the solar panels produce electricity and when the laundry needs electricity. Surplus electricity is delivered out on the market and makes a positive contribution to the average for the electricity grid. On the other hand, a total greater environmental benefit is likely to be able to be attained for the same amount of money by investing the money in larger, central plants. At the same time, Nordic Ecolabelling would like the laundries to continue to focus on being energy efficient. In order to one the one hand applaud investments in self-generated electricity and on the other safeguard energy efficiency, Nordic Ecolabelling has decided that the CO_2 factor for self-generated renewable electricity can be halved in this generation of the criteria and that the electricity factor can be reduced to 1.1 for self-produced (on own land and on own plant) renewable electricity from sun and wind.

District heating

A small proportion of the laundries use district heating. The real environmental impact of district heating is determined by the local district heating network to which the laundry is connected. Where this involves heating from pure heating plants, with energy losses, this will result in a factor that is above 1.0. If, on the other hand, the plant involves CHP, the extra fuel needed to deliver 1 kWh of district heating will only be above 0.5 kWh, as this increases the total energy efficiency with simultaneous CHP production (Martinsson et al., 2012).

The fuels that are used in the district heating network also depend on the local/regional network. For CHP, using it in the process is a good approach in environmental terms, as there will thus also be a demand for heat during the summer when there are fewer people who need heating.

Energy and climate factors from the local district heating network can be used in the calculation – alternatively the following conservative factors can be used based on pure heating production with natural gas and a total beneficial effect of approximately 0.9.

Conservative district heating factors that can be used if specific data from the local district heating network is unavailable:

- 1.1 $kWh/kWh_{district\ heating}$
- 227 g CO_2/kWh_{el}

Exemptions from the requirement:

When washing severely soiled textiles, it is beneficial to treat the water while the concentration of dirt is high. In the light of this, energy consumption for internal waste water treatment plants can be exempted from the calculation of A_{energy}.

When washing industrial cloths, some laundries require that the air is sucked out of the whole laundry and incinerated in an afterburner to ensure that the VOCs that come in with the dirty cloths are not released into the environment. This is a high energy process but the waste heat from the process can be used to heat washing water and tumble dryers. To take this into account, we do allow laundries that wash industrial cloths and which are able to document the energy consumption in the afterburner using special measuring equipment to deduct 35%[11] of the energy consumption in the afterburner.

Energy consumption at internal textile cleaning can be deducted as it is not included as part of the ecolabelled operation. This like chemicals used for cleaning, which for the same reasons are also not included in the calculation (compare the total CDV value of the laundry, the total amount of anNBO or total chlorine consumption).

Iceland has a very special energy situation and its electricity production is cut off from the rest of the world. In this generation of criteria, electricity consumption in Iceland can be considered with the same factors as self-produced renewable electricity.

Requirement levels

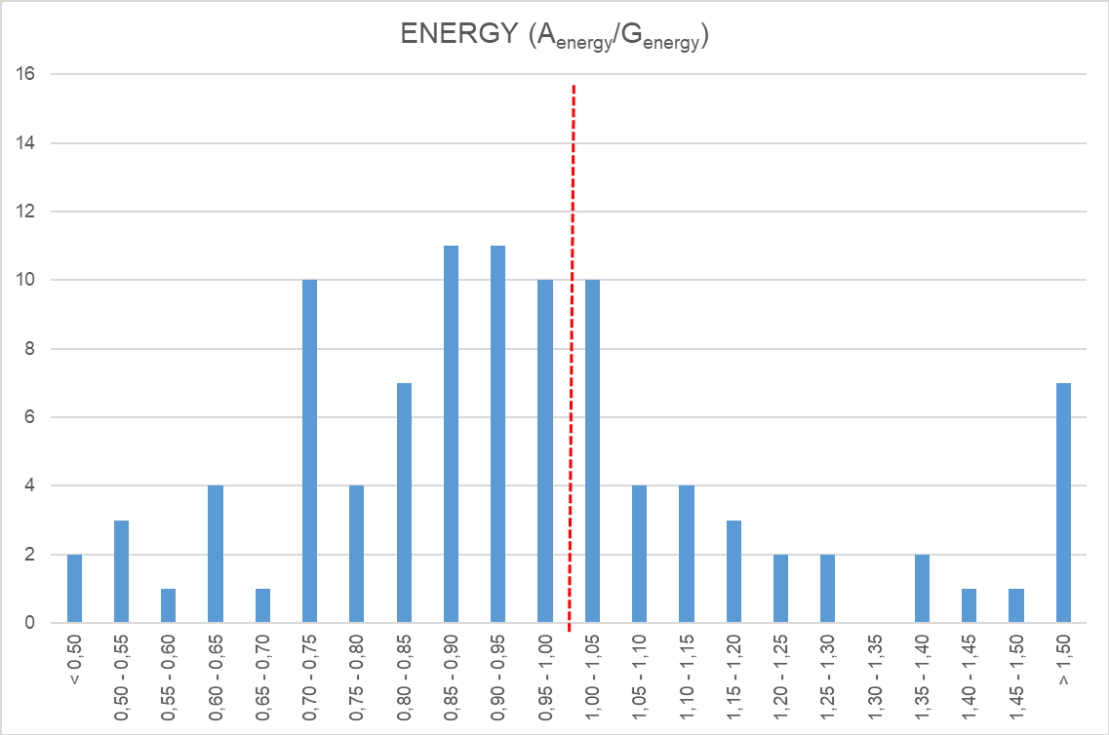
To set the requirement, Nordic Ecolabelling has gathered data from 100 laundries across the Nordic countries – both Nordic Swan Ecolabelled and non-Nordic Swan Ecolabelled. The majority of the data (71%), however comes from licensed laundries. It must be expected that the Nordic Swan Ecolabelled laundries generally perform better than the average, which is why an over-representation of data from Nordic Swan Ecolabelled laundries means that we cannot see our data as 100% representative. In other words, this means that our requirements have a tougher impact than might immediately appear when we look at our data.

For example, our analysis shows that 36% of the laundries have to improve their energy consumption if they are to meet Nordic Ecolabelling's requirements. For Nordic Swan Ecolabelled laundries 18% have to reduce their energy consumption to meet the requirements, and for non-Nordic Swan Ecolabelled laundries a whole 79% have to reduce their energy consumption to meet the requirements. 0% of the Nordic Swan Ecolabelled laundries and 52% of non-Nordic Swan Ecolabelled have an energy consumption, which is more than 20% above Nordic Ecolabelling's new tightened energy limit.

[11] The evaluation of generation 2 (Nordic Ecolabelling, 2011) concluded that there was a need to relax the energy requirement for laundries that wash industrial cloths due to their high need for energy for cleaning technologies, which can reduce the emissions of heavy metals, solvents, oils and other problematic substances from the laundered cloths. Instead of solely relaxing the actual threshold values, an opportunity is given to deduct a larger proportion of the energy that is used in VOC strippers. In this way it is only laundries that wash industrial cloths and are simultaneously making efforts to reduce the emission of such solvents into the atmosphere that are able to benefit from the relaxation of the requirements.

Regarding climate gases, there is naturally a clear link between laundries with a higher energy consumption and a high climate impact.

Figure 2 **Relative deviation of Nordic laundries from the obligatory requirement level for energy consumption**



See the table below for the difference in factor values between generation 3 and 4 of the criteria.

Table 1 **Tightening up factor values for energy consumption in kWh/kg per textile category**[12]

Textile categories	Sub-categories	F_{energy} [kwh/kg*] Generation 3	F_{energy} [kwh/kg*] Generation 4
1) Workwear for industrial/kitchen/butchering/fishing industry and equivalent use Kitchen textiles (cloths and towels)	White workwear, e.g. from the food industry	2.70	2.10
	Kitchen textiles and towels		
	Coloured workwear and other textiles		
	Workwear from fishing industry		2.50
2) Workwear for institutions/retail/service Shoes	White	2.60	1.75
	Other		
3) Hotels	Hotel linen	1.65	1.45
	Linen for holiday cottage accommodation		1.70
4) Restaurants	White cloths	2.75	2.25
	White napkins		

[12] The new criteria are slightly less strict than they would immediately appear as the factor for electricity has been reduced from 2.5 to 1.6 in generation 4 of the criteria.

	Coloured cloths and other textiles		
5) Hospitals/nursing homes	Blood-stained and contaminated textiles	2.50	2.25
	Other textiles		2.10
6) Duvets and pillows		3.00	2.50
7) Mops and cleaning cloths		1.00	2.15
8) Offshore mats		1.00	0.80
9) Other mats		0.90	0.70
10) Cloth hand towel rolls		1.80	1.70
11) Industrial cloths		3.10	3.10
12) Dry cleaning		-	-
13) Private clothes from households/institutions	White	3.20	2.75
	Other		
14) Other		0.90	0.70

* The amount of kg of laundry goods in each textile category is based on the specified data in requirement O2.

Textile category hotel (3) has been divided into two subcategories, one for traditional hotel accommodation and one for holiday cottage accommodations. The latter category has a more generous factor value for energy since the textiles are dirtier than traditional hotels. They therefore demand tougher laundry programs, higher temperatures and longer wash time to get clean. During the review, a licensee who is washing a high percentage of linen for holiday cottage accommodation has completed measurements of energy use for this particular textile category. The measurements show that energy consumption is about 30% higher than for regular hotel accommodation. As the figure is based on data sources from only one source, Nordic Ecolabelling has chosen to increase the factor value for the cottage logic by about 20% compared with hotel accommodation.

Textile category offshore mats and mops (7) have also been divided into two categories: one for mops and cleaning cloths and one for offshore mats. In addition, we have raised the factor for energy for mops and cleaners from 1.0 in generation 3 of the criteria to 2.15.

Background to requirements O7 and P3

See also background to requirements O6 and P2.

Emissions of CO_2 are closely linked to the laundries' energy consumption and Nordic Ecolabelling has chosen to continue with an obligatory threshold value for the laundry's CO_2 emissions from fuel and electricity consumed at the laundry.

The requirement level is set on the basis of the energy requirement assuming a certain electricity consumption (approximately 0.2 kWh/kg) and on the basis of natural gas as fuel. In popular terms, this means that it will typically be the CO_2 requirement that sets the actual energy requirements for those laundries that use fuels that are more carbon intensive than natural gas, e.g. oil. This, in combination with the fact that gas can be utilized more efficiently in the drying process, makes it very difficult to meet the requirements if the primary energy source of the laundry is heating oil. It can therefore be said that the Nordic

Ecolabelling requirements in practice exclude the use of fuel oil as the primary fuel.

The requirement has been tightened up compared with generation 3 of the criteria, see Table 7.

Table 2 Tightening of the factor values for greenhouse gas emissions in g CO_2 equivalents/kg per textile category

Textile categories	Sub-categories	F_{GHG}[gCO_2e/kg*] Generation 3	F_{GHG}[gCO_2e/kg*] Generation 4
1) Workwear for industrial/kitchen/butchering/fishing industry and equivalent use Kitchen textiles (cloths and towels)	White workwear, e.g. from the food industry	530	385
	Kitchen textiles and towels		
	Coloured workwear and other textiles		
	Workwear from fishing industry		465
2) Workwear for institutions/retail/service Shoes	White	510	310
	Other		
3) Hotels	Hotel linen	310	255
	Linen for holiday cottage accommodation		305
4) Restaurants	White cloths	540	420
	White napkins		
	Coloured cloths and other textiles		
5) Hospitals/nursing homes	Blood-stained and contaminated textiles	490	415
	Other textiles		385
6) Duvets and pillows		590	465
7) Mops and cleaning cloths		180	395
8) Offshore mats		180	140
9) Other mats		160	120
10) Cloth hand towel rolls		340	300
11) Industrial cloths		610	590
12) Dry cleaning		-	-
13) Private clothes from households/institutions	White	670	515
	Other		
14) Other		160	120

* *No. kg textiles in each textile category is based on data given in requirement O2.*

The CO_2 factors in Appendix 4 are updated using data from the Swedish Environmental Protection Agency (2017). For electricity, Nordic Ecolabelling uses the factor 59 g CO_2/kWh_{el}. For justification, see background to requirements O6 and P2. The factor is based on all electricity being supplied via the electricity network. For self-generated electricity from renewable energy sources, the factor can be halved to 29.5 g/kWh.

Background to requirements O8 and P4

Water is used at the laundry each time the textiles have to be washed, such that a large amount of water is used to wash a textile during its entire life cycle. However, it should be noted that it is not the laundry's water consumption that is the dominant factor. This is due to the fact that a large proportion of the textiles are made from cotton, which demands a large amount of water to grow. Approximately half of the world's cotton plantations are artificially watered. Water consumption for artificial watering of cotton is more than 7,000 litres per kg cotton as a global average even when including the land that is not artificially watered (Frydendal, 1998). By comparison, a laundry uses about 10 litres of water on average, in round numbers, per kg of laundry, which with 100 washes in the life cycle of a textile produces a water consumption at the laundry in the region of 1,000 litres of water per kg – in other words somewhat less than for growing cotton. However, it should be noted that not all textiles at a laundry are made of cotton.

As far as water consumption is concerned, setting requirements governing water consumption for growing cotton is not steerable. Cotton is produced by local farmers in many regions of the world and is traded on large exchanges. When manufacturing textiles, the cotton included in an individual textile will typically come from many different farmers in many different regions to ensure uniform quality. The part of the water consumption that takes place at the laundry, however, is steerable, and even if it is not the largest contributor, it always involves considerable consumption. Reduced water consumption at the laundry can also have a number of other benefits, such as reduced energy consumption, in that less water needs to be heated up and it is easier to recirculate the energy in the hot water. Nordic Ecolabelling has therefore chosen to set requirements on water consumption at the laundry to exclude laundries with an extremely high water consumption from Nordic Swan Ecolabelling. However, we do not see water consumption as the most important environmental parameter for a laundry.

The amount of water needed to wash the garment largely depends on the type of textiles washed, and the requirements are differentiated for this reason. A mat for example does not have very high requirements in terms of the quality of the washing water and therefore it becomes easier to recirculate the water and thus attain savings, while, for example, a pillow has a high volume, and puffs up in the drum more than other textiles, which produces higher water consumption.

Licensees and chemicals producers with whom Nordic Ecolabelling has been in contact during the revision have clearly signalled that the water consumption requirement should not be lowered further. This is because it could involve risks from a hygiene point of view. Too little water for rinsing can also result in chemicals residues remaining in the textiles after washing. In addition, the laundries can encounter problems in meeting emissions requirements imposed by municipalities/authorities as these are often set in relation to the concentration (mg/l) instead of total emissions, see the background to requirement O25.

The revision of the criteria för generation 4 has not focused on the requirement for water use. However, in the light of feedback received, the factor values for hotels, mops and cleaning cloths as well as cloth hand towel rolls have been raised. The factor value for the textile category Other has been lowered to be in line with the textile category with the lowest factor value.

7.4 Laundry chemicals

Chemicals is one of several areas in which Nordic Ecolabelling has made and continues to make a big difference. The requirement has encouraged several laundries to phase out several substances that are harmful to health or the environment and in several cases the chemicals suppliers have changed the ingredients in their standard products in order to meet the Nordic Swan Ecolabel's requirements. For example, CMR substances, borates, DADMAC and fragrances have been phased out.

Many people are surprised to hear that a laundry typically buys in more laundry chemicals than the amount of textiles cleaned. The Sophus Berendsen group, for example, bought in approximately 1,800 tonnes of textiles in 2000 while its total purchasing of laundry chemicals for the same year was approximately 4,300 tonnes (Berendsen, 2001). Although the references are not based on updated data, the amounts continue to apply. It is clear that the amounts do not say anything directly about the environmental relevance but on the other hand this helps to draw a picture of the fact that requirements on the chemicals that are used at the laundry should carry a certain weight.

At an industrial laundry many different types of chemicals are used for different purposes (Grüttner, 2008):

- Surfactants
- Complexing agents
- Bleaching agents
- Drying agents
- Other substances such as alkalis, enzymes, optical brighteners, and fragrances

In recent years new types of substance have also arisen – e.g. substances that can help to attain good hygiene despite a lower water temperature.

As well as laundry chemicals, the laundries can use a number of other chemicals such as stain removers and impregnation agents, but also to a lesser extent chemicals that do not come into direct contact with the textiles. This concerns, for example, chemicals for cleaning and, where required, disinfecting linen trolleys, boiler chemicals, salt and other chemicals for soaking facilities, as well as lubricants and other substances used in the maintenance of machinery.

However, the process chemicals are by far the most important group and in a life cycle perspective, as set out above, more process chemicals are bought in (in kg including water) than textiles are bought in. The requirements therefore solely address the process chemicals, which are defined as all the chemicals that come into contact with the textiles before, during and after the laundry process. This concerns, for example, stain removers, laundry and bleaching agents, starch, drying agents, impregnation agents, etc.

Requirements are set regarding the chemicals used in relation to the health and environmental problems, and to ensure a low risk to the environment.

Specialized laundries for industrial cloths with no wastewater discharge are exempted from requirement O15, O16 and O18 (see 015).

Background to requirement O9

At laundries the vast majority of the chemicals are handled in automatic dosing equipment where there is little risk of direct contact with the chemicals. However, there is a greater opportunity for exposure, for example, when moving suction lances and similar from an empty chemicals container to a full one and during manual dosing. Nordic Ecolabelling therefore requires that no laundry chemicals may be classified in relation to health effects mentioned in Table 10.

The chemical requirements are designed to reduce the overall environmental impact per functional unit, ie per kilogram of textile. This means that Nordic Ecolabelling limits the content of substances harmful to the environment in laundry chemicals (H410, H411 and H412) per kilogram of textiles in requirement O11 (Content of substances harmful to the environment in laundry chemicals). In this requirement, Nordic Ecolabelling has chosen not to prohibit the hazard statements H400, H410, H411, H412, and H413 on laundry chemicals used by Nordic Swan Ecolabelled laundries.

Chemicals in the hazard classes “Acute toxicity” are not desirable. This is partly because chemical residues may end up in drains after laundry, or emissions may occur during transport and storage. Certain exemptions to the requirement are made for the following reasons:

Oxalic acid (H312) is used in laundries to remove stains, e.g. of rust, that are often seen on textiles and cannot be removed during the general laundry process. There are no listed alternatives to oxalic acid, which is why Nordic Ecolabelling has exempted it from the health hazard classes. If oxalic acid is banned, the amount of textiles thrown away will increase considerably, which is not good for the environment.[13]

Peracetic acid, which is made from combining acetic acid and hydrogen peroxide, is highly reactive and has the advantage that it bleaches and disinfects at a much lower temperature than hydrogen peroxide on its own. In the processes in which peracetic acid is used, there is therefore an opportunity to lower the washing temperature and attain a significant energy saving. So as not to reduce the opportunities of Nordic Swan Ecolabelled laundries of obtaining a greater energy saving, Nordic Ecolabelling has chosen to exempt peracetic acid and hydrogen peroxide from the classification requirement.

As will be noticed, products that are solely classified as hazardous to health with H302 (harmful if ingested), are excluded. This is because we are only addressing professional use at laundries, where, for example, no children are present. At the same time, the vast majority of dosing uses automatic dosing systems, so the risk of exposure due to ingestion is minimal.

Stain removal v. disposal

To evaluate what is best in terms of the environment, a simple calculation is set up based on the following realistic assumptions: Stains on cotton textiles of 500 g that have lived half their normal lifetime in the laundry. If the textile is thrown away, 250 g of cotton textiles would have to be manufactured to replace it. This would require more than 250 g of cotton, but for the sake of simplicity we use 250

[13] Köcher, Christian; Sales Manager Nordic / Corporate Account Manager Nordic Textile Care, Ecolab. Personal meeting 2008.

g. With an economic allocation between fibre (85%) and seeds (15%) cotton growing will give rise to the following consumption based on average cotton production (Frydendal, 2001):

- 1,525 litres of water
- 2.5 g pesticides
- 74.5 g artificial fertiliser
- 5.5 MJ energy

On top of this there is energy, chemicals consumption etc. in the production of textiles (weaving, wet treatment, etc.)

For comparison, a few drops of stain remover are used to pre-treat a stain and this clearly speaks in favour of stain removal over disposal.

The risk of a laundry employee ingesting the stain removal chemicals must be assumed to be very small in a professional situation, where ingesting of food is always kept separate from production and use of chemicals. In relation to the exposure of the end user, this is a question of stain treatment agents that are used directly on the stain before (re)laundering, where the stain removal agent will be washed out and reduce the exposure of the end user to a minimum and without any opportunity for actual consumption.

The table for classification types that are not permitted for laundry chemicals has been updated in line with the CLP Regulation 1272/2008. Furthermore, the hazard statement “Aspiration toxicity” H304 is now included. Products where the classification is due to the content of enzymes and products for stain removal which are used directly on the stain before laundering are exempt.

Background to requirement O10

At laundries the vast majority of the chemicals are handled in automatic dosing equipment where there is little risk of direct contact with the chemicals. However, there is a greater opportunity for exposure, for example, when moving suction lances and similar from an empty chemicals container to a full one and during manual dosing. We therefore require that none of the constituent substances in laundry chemicals may be classified as carcinogenic, mutagenic or reprotoxic (CMR). Nordic Ecolabelling will also avoid both production and use of this type of substance in general.

Spray products may, for example, be relevant in connection with stain removal chemicals, which are used to pre-treat stains directly on the textiles and may contain enzymes that can give rise to allergies on inhalation of dust and aerosols. To avoid exposure to aerosols that may be sensitising on inhalation, we require that none of the constituent substances in spray products may be classified as sensitising with the hazard statement H334. Stain removal agents in spray bottles may not, therefore, contain enzymes.

Titanium dioxide; [in powder form containing 1 % or more of particles with aerodynamic diameter ≤ 10 µm] was classified as Carc. 2 by inhalation by the 14. ATP of CLP. In addition, the mandatory warning EUH212 was required on the packaging of solid mixtures containing 1 % or more of titanium dioxide. The mandatory EUH212 applied regardless of titanium dioxide particle size, implying that particles with aerodynamic diameter ≤ 10 µm may be released from any

solid mixture containing titanium dioxide when used. These particles, “known to be released from ingoing substances” are counted as ingoing substances according to Nordic Ecolabelling’s definition (cf. “General requirements” in the criteria document). Accordingly, all titanium dioxide occurring in solid mixtures (regardless of size) was prohibited. There has been a time limited exemption to this prohibition, which ran out in March 2025. In August 2025, the EU Court of Justice made a final decision to annul the Carc. 2 classification, meaning that titanium dioxide is no longer prohibited by this requirement.

The table for classification types that are not permitted for constituent substances in Nordic Swan Ecolabelled laundry chemicals has been updated in line with the CLP Regulation 1272/2008. Otherwise there are no amendments compared with generation 3.

Background to requirement O11

Besides the restriction on CDV, Nordic Ecolabelling additionally wants to limit the use of substances that are toxic to the aquatic environment and are not easily degradable in the aquatic environment – in other words substances with the risk phrases H410, H411 and H412. As substances with H410 are more undesirable than substances with, e.g. H412, a factor that takes this into account is added. H410 substances may, however, have considerably higher toxicity than the factor expresses, but it is extremely rare and would hardly apply to the type of substances used in laundries today.

The enzyme protease (Subtilisin, EINECS 232-752-2, CAS 9014-01-1) has been reclassified as environmentally harmful with Aquatic Chronic 2 (H411) under the new classification rules for long-term testing of chronic environmental toxicity, even though protease is readily degradable. Studies show that more than 99.99% of subtilisin is deactivated in treatment plants or in the drainage system on the way to treatment. Subtilisin is an effective enzyme that is mainly used in textile detergents and dishwashing (professional and consumer) to break down protein-based stains. An exemption to the requirement on substances harmful to the environment is necessary to enable producers to continue to produce textile detergents that work well. Protease can only be added in amounts that do not affect the classification of the end product, in other words it does not result in additional products being classified as harmful to the environment.

During the revision the possibility of removing the exemption for surfactants that are easily degradable and anaerobically degradable and are classified with H412 was explored. As the criteria for Nordic Swan Ecolabelling of laundry detergents for professional use includes the same exemption, it could not be removed in the criteria for textile services as these cannot be stricter.

In conjunction with processing applications, experience has been that sodium hypochlorite, CAS no. 7681-52-9, is classified differently by suppliers under the new CLP Regulation. Safety data sheets from different suppliers show that some suppliers classify sodium hypochlorite as H400 and H410 while other suppliers only classify sodium hypochlorite as H400. It was therefore decided that sodium hypochlorite, CAS no. 7681-52-9 and sodium dichloroisocyanurate, dihydrate, CAS no. 51580-86-0, that are classified as H410 are exempt from the requirement.

As a result of the implementation of the CLP Regulation peracetic acid, CAS-No. 79-21-0, has received the harmonized classification H400. In addition, some suppliers classify peracetic acid with H410. Peracetic acid is highly reactive and allows bleaching and disinfection at low temperatures. In processes in which peracetic acid is used, professional laundries have the possibility to wash at lower temperatures and thereby reduce energy consumption. Peracetic acid is therefore exempted from the requirement. Since peracetic acid is in equilibrium with hydrogen peroxide and acetic acid, hydrogen peroxide is also excluded from the requirement. Hydrogen peroxide is also used alone as a bleaching agent.

From generation 3 to 4: No changes, only updating.

Background to requirement P5

Points are awarded to laundries that use low-content of substances harmful to the environment in their laundry chemicals. The requirement is new in relation to generation 3 of the criteria.

Background to requirement O12

The critical dilution volume, CDV, is calculated for all chemicals that come into contact with the textiles, which, for example, includes detergents, bleaching agents, starch, rinsing agents, impregnation agents and stain removal agents. The critical dilution volume is a theoretical value which takes account of the individual substances' toxicity and biodegradability in the environment. The method has been developed in partnership with the EU Ecolabel.

In generation 3 of the criteria document, CDV was based on the choice between either CDVacute or CDVchronic. The use of chronic toxicity data is generally preferred as long-term toxicity data is considered to be of higher quality and to provide a more accurate / reliable assessment of the possible environmental impacts compared with acute toxicity data. The CDV values are now based solely on chronic toxicity factors.

Due to the degradation of the substances in the laundry process, special rules are applied to three substances: active chlorine, hydrogen peroxide and peracetic acid.

Active chlorine, such as sodium hypochlorite, is not included in the calculation of CDV. It is true that the substance can cause problematic halogenated organic compounds in the process that are piped into wastewater, but this is not steerable to include in the calculation and the use of active chlorine is already restricted for precisely the same reason, specifically in another requirement in the criteria document.

Hydrogen peroxide is not included in the calculation of CDV, because it is immediately broken down and does not constitute a real risk to the environment.

Peracetic acid is included in the calculation as acetic acid because the substance is rapidly broken down into acetic acid.

Like other chemical product groups, only chronic values are used when calculating CDV.

Below is a summary of the CDV limits in the criteria for textile services, generation 3, with threshold values for textile laundry agents for professional use (for laundry at both alternative temperature intervals). In textile detergents for professional use (TVMP) the limits are divided into three categories: severely, moderately and lightly soiled. This is a somewhat more simplified division than in the criteria for textile services. In textile services these are divided into 13 different textile categories. In order to compare the thresholds in textile services and TVMP, the following simplified assumption has been made.

Severely soiled: Workwear industrial, workwear institutional, industrial cloths and private garments.

Moderately soiled: Restaurants, hospitals, and mops.

Lightly soiled: Hotels, other mats, cloth hand towel rolls, other.

Table 3 Threshold values $CDV_{chronic}$ – summary

Degree of soiling	Textile services generation 3	TVMP 30-40 ˚C	TVMP 40-60 ˚C
Severely soiled	225,000 200,000 175,000	150,000	54,000
Moderately soiled	125,000	100,000	35,000
Lightly soiled	75,000	70,000	19,000

In a comparison one should also remember that the CDV requirement for TVMP only needs to cover the basic detergent itself. A laundry that uses a Nordic Swan Ecolabelled basic detergent at normal dosages can thus be at a CDV level of up to 150,000 with the contribution of the basic detergent alone. The contribution from laundry additives, stain removers, rinsing agents, etc. is added on top of this.

A Nordic Swan Ecolabelled laundry must be able to deliver satisfactory quality in all cases – irrespective of its customer base . At the same time, many non-Nordic Swan Ecolabelled laundries use DADMAC, which is banned from use in Nordic Swan Ecolabelled laundries (see more in the background to requirement O17). DADMAC is used by non-Nordic Swan Ecolabelled laundries during the summer season to prevent mould and thus reduce the relaundering. That it is especially in the summer is due to the higher temperature, which increases the growth of microorganisms when moist fabrics are waiting to be washed. The problem is particularly high in the hotel/restaurant sector because the peak season in summer can provide longer storage times before washing.[14] Even very minor consumption of DADMAC will cause very high CDV values. The Nordic Swan Ecolabelled laundries are thus in the forefront far below the average on the market.

In view of the above and based on licence data for all Nordic Ecolabelled laundries, Nordic Ecolabelling has estimated that the factor values can be tightened according to Table 15.

[14] Köcher, Christian; Sales Manager Nordic / Corporate Account Manager Nordic Textile Care, Ecolab. Phone call, September 2017.

Table 4 Tightening factor values for $CDV_{chronic}$ per textile category

Textile categories	Sub-categories	$F_{CDVchronic}$ [litre/kg*] generation 3	$F_{CDVchronic}$ [litre/kg*] generation 4
1) Workwear for industrial/kitchen/butchering/fishing industry and equivalent use Kitchen textiles (cloths and towels)	White workwear, e.g. from the food industry	225 000	180 000
	Kitchen textiles and towels		
	Coloured workwear and other textiles		
	Workwear from fishing industry		
2) Workwear for institutions/retail/service Shoes	White	175 000	140 000
	Other		
3) Hotels	Hotel linen	75 000	75 000
	Linen for holiday cottage accommodation		80 000
4) Restaurants	White cloths	125 000	100 000
	White napkins		
	Coloured cloths and other textiles		
5) Hospitals/nursing homes	Blood-stained and contaminated textiles	125 000	100 000
	Other textiles		
6) Duvets and pillows		75 000	60 000
7) Mops and cleaning cloths		125 000	100 000
8) Offshore mats		125 000	100 000
9) Other mats		75 000	60 000
10) Cloth hand towel rolls		75 000	60 000
11) Industrial cloths		200 000	160 000
12) Dry cleaning		-	-
13) Private clothes from households/institutions	White	175 000	140 000
	Other		
14) Other		75 000	60 000

** No. kg textiles in each textile category is based on data given in requirement O2.*

No major consequences for CDV values are expected with use of the DID list dated 2016.

Background to requirement P6

The requirement has been tightened by ten percentage points per points level. The actual effect is greater, however, as the obligatory requirement has also been tightened, see requirement O12.

Background to requirement O13

Large amounts of active chlorine compounds, such as sodium hypochlorite, have previously been used in many laundries. Today consumption has reduced but Nordic Ecolabelling knows that there are still many laundries that use chlorine in cases where it is not necessary – or use higher doses of chlorine than necessary. Active chlorine compounds are toxic for the environment themselves, but they are reactive and thus break down, but in the reaction with organic substances can create organochlorides with harmful environmental properties. On the other hand, the use of chlorine can in some cases mean a reduction in the amount of textiles thrown away. This concerns, for example, damp-stained

textiles and a number of other severe stains that can only be removed by relaundering with chlorine. This is reflected in our threshold values for the use of chlorine in the different textile categories, that are further divided to ensure that the threshold reflects actual needs as far as possible.

Nordic Ecolabelling has chosen to set limits on the total consumption of active chlorine per kg washed textiles (excluding relaundering – note, however, that chlorine for relaundering is included in the amount of chlorine consumed). However, the requirements are set, as far as possible so that in practice it can only be used where there really is a genuine need – i.e. in extremely soiled laundry and in relaundering.

Being tough on chlorine can have a downside in terms of throwing away more and thus place a greater burden on the environment in terms of growing cotton and manufacture of new textiles. Therefore no changes have been made to the requirements from generation 3 to 4.

Background to requirement P7

In relation to the licensing data, about 80% of the laundries have chlorine consumption at 2/3 of the threshold value or less. This means there are grounds to tighten up the potential points scored for chlorine. The point score requirement has been tightened up by 1/3, which means that not everyone will be able to score points. The obligatory chlorine requirement is not tightened up in the same way, as this would result in making it easier for laundries in locations with a damper and warmer climate to suffer mould on the textiles (damp staining). If the aim is to avoid these textiles being thrown away, the use of chlorine is necessary.

Bakgrunden till krav O14

Phosphorus (P) discharged into the aquatic environment contributes to nutrient salt load, which can result in algae blooms and oxygen surges. When wastewater is led through a purification plant, some of the phosphorus is precipitated in the wastewater, but some escapes and therefore we demand a reduced use of phosphorus. Also in resource contexts, phosphorus is something to be focused more on and phosphorus is considered a scarce resource.

In connection with the development of the criteria generation 4, Nordic Ecolabelling examined the possibility of banning phosphates. However, it was not possible because phosphates were allowed in the criteria for Nordic Ecolabelling of laundry detergents for professional use. The chemical requirements for textile services need to be harmonized with these. The requirement is therefore the same as in Generation 3 of the criteria.

Background to requirement O15

Nordic Ecolabelling limits the content of organic substances that are not anaerobically degradable in the chemicals to ensure that no more substances that are not immediately anaerobically degradable are discharged into the environment than necessary. The DID list uses the term anNBO = Y for substances that are anaerobically degradable.

The data examined during the evaluation showed a large spread for anNBO. In the revision attempts were made to find a reason but were unsuccessful. Notwithstanding this, the requirement level cannot be lowered in general terms

because it is in line with the requirement level for textile laundry detergents for professional use:

Lightly soiled: 0.50 / Moderately: 0.85 / Severely: 1.50. A laundry that only uses Nordic Swan Ecolabelled laundry chemicals must be able to meet the equivalent requirements for laundries.

Factor values for hotels as well as duvets and pillows are raised against the background of the response received on the criteria proposal. Otherwise, the requirement is unchanged in relation to generation 3.

Specialized laundry for industrial cloths with no wastewater discharge has tried to change the laundry detergent used, but it has not been possible to substitute it. The detergent used at the laundry have content of surfactants that are not anaerobically degradable. Since no use of wastewater and since residue have to be handled according to current legislation and authority rules - these types of laundries therefore are exempted from the requirement.

Background to requirement O16

Aerobic and anaerobic biodegradability of surfactants has been a standard requirement for surfactants in Nordic Swan Ecolabelled products. Since 2005, ready biodegradability of surfactants has been a legal requirement for products sold on the European market under the Detergents Regulation.

However, there are opportunities for exemptions from the Detergents Regulation for products for professional use. So far, this opportunity has only been used once in the EU, for a surfactant that can be used in CIP products. Because the opportunity exists, Nordic Ecolabelling considers that it is important to require surfactants (irrespective of function) to be degradable in both aerobic and anaerobic conditions.

The requirement therefore remains unchanged compared with generation 3.

Specialized laundry for industrial cloths with no wastewater discharge - see backgroudn to requirement O15.

Background to requirement O17

There are several problematic substances that are difficult to exclude through general requirements on the chemistry of the product. For this reason, Nordic Ecolabelling has drawn up a list of substances that must not be included. The aim of the list is to ban the substances that are not excluded in other requirements but which are associated with environmental and health risks. However, for clarity's sake some substances are included even if they are prohibited under other requirements. The list also contains double requirements. For example, some PBT substances are included in SVHC substances.

Alkylphenol ethoxylates (APEO) and/or alkylphenol derivatives (APD) are a group of surfactants that have shown endocrine disruptive properties. The substances have been phased out in the majority of products due to legislative requirements, but we have sometimes found them in raw materials and therefore we explicitly prohibit them in this criteria document.

LAS (linear alkylbenzene sulphonates) are a group of surfactants that have anaerobic degradability of 0% and are therefore undesirable. The substances are excluded by the requirement on surfactants but for the sake of clarity we have chosen to explicitly describe their exclusion.

DADMAC (dialkyl dimethyl ammonium chloride) is a group of substances with very high ecotoxicity, which is why the substance is often used as a last resort in the summer to protect textiles against damp stains. We consider that with better production planning the use of this type of environmentally harmful substance could be avoided.

Fluorine surfactants and other per- and polyfluorinated compounds (PFAS) constitute a group of substances that have harmful properties. Certain per- and polyfluorinated compounds can be broken down into the very stable PFOS (perfluorooctane sulphonate) and PFOA (perfluorooctanoic acid) and similar substances. These substances are found all over the globe, from the large oceans to the Arctic. PFOS have also been found in birds and fish and in their eggs. The substances are extremely persistent and are easily absorbed by the body. The substances in this group impact on the biological processes of the body and are suspected to be endocrine disruptors, carcinogenic and to have a negative impact on the human immune system. PFOA, APFO (ammonium pentadecene fluoro octanoate) and certain fluoride acids are on the Candidate list due to their reprotoxicity, as well as PBT. There are new research results showing that shorter chains (2-6 carbon atoms) have been discovered in nature.

The alternatives that exist instead of PFAS are largely wax-based. They do not have the same heat stability as PFAS and cannot restore oil resistance and protect against oleophilic chemicals. Since there are no good alternatives available on the market, impregnation agents for textiles where there is a need for re-impregnation for professional reasons are excluded. However, PFOS and PFOA and subjects on the candidate list are prohibited in all applications. When using PFAS-containing impregnating agent, the need must be justified for each type of textile and its application. This is done by the first time use of the appropriate impregnation agent for a specific use. The grounds shall be based on the customer's needs and the chemist's confirmation that alternative solutions do not exist. For the corresponding use, the laundry must log in for current customer deliveries.

Boric acid and borates. Borates are used in laundry chemicals as bleaches and several of these, including boric acid, are classified as harmful for reproduction (EU, 2008).

One of the arguments of Nordic Ecolabelling for the prohibition of optical brighteners has previously been that it is considered unnecessary to be used in the laundries. In addition, we know relatively little about the environmental properties of optical brighteners, except that it is not degradable in sludge (not anaerobically degradable). Nordic Ecolabelling has as a general policy that we are "precautionary principle" – that is, we want to avoid content that we do not know most of the environmental properties. Optical brighteners has therefore not been allowed for Nordic Swan Ecolabelled laundries. Based on the consultation comments, we have now re-examined the use of optical brighteners. One of the problems is that new white textiles have already been added optically brighteners by the manufacturer so that they appear "shiny white". Textiles

washed without optical brighteners will eventually appear grey as compared to new ones, and are therefore discarded far earlier than they would otherwise. We have though this is particularly relevant for hotels. Disposal of textiles due to grey colour results in a significant environmental impact (more textile waste, more textile production). This must be weighed against the disadvantages of using optical brighteners. It should also be mentioned that optical brighteners is not prohibited in ecolabelled textiles – neither in the Nordic Ecolabelling nor the EU Ecolabel requirements. We have therefore come to the conclusion that we will allow optical brighteners for laundries, with the following strong restrictions:

- In the chemicals requirements, we allow a limited amount of non-anaerobically degradable material. This will limit the use of optical brighteners (which is not anaerobically degradable), so it is not used more than necessary.
- In addition to this limitation, due to lack of knowledge about the properties of optical brighteners, we will set an additional documentation requirement. A separate declaration must be sent to Nordic Ecolabelling from the manufacturer of optical brighteners. The following health and environmental properties and classifications that we prohibit or strongly restrict otherwise in the criteria are not allowed for ingoing substances in optical brighteners:
    - CRM (see requirement O10)
    - Environmentally hazardous substance (see requirement O11)
    - Substances that have been evaluated in the EU to be PBT (persistent, bioaccumulable and toxic substances) or vPvB (very persistent and very bioaccumulable) (see requirement O17)
    - Substance considered to be potentially endocrine disrupter (see requirement O17)
    - Substance on the candidate list http://echa.europa.eu/candidate-list-table (see requirement O17)

Fragrances can contain substances that have an effect on both the environment and health. At the same time, the use of fragrances in the laundry process can mean the involuntary exposure of end users of the textiles In addition, fragrance is unnecessary and does not contribute towards a better laundry result. Therefore, we do not permit the use of fragrance in the products that come into contact with the textiles.

Triclosan is an antibacterial and a disinfectant which is used in many different products. There is concern that use of antibacterials and disinfectants such as triclosan may contribute towards increasing bacterial resistance (Miljøstatus i Norge, 2008A). Triclosan is bioaccumulative and classified as environmentally harmful and is on the Miljødirektoratet Priority List – a list of substances whose use the authorities in Norway wish to significantly reduce (Miljøstatus i Norge, 2008A) and on the Danish Environmental Protection Agency's list of undesirable substances (Danish Environmental Protection Agency, 2004). Studies show that on contact with sunlight, triclosan is broken down to dioxins that are harmful to health (Bakke, 2003). Triclosan is found in a number of different places, e.g. in drainage sludge and in waste water from treatment works (Dye et al, 2007), which indicates that the use of triclosan brings with it environmental exposure.

EDTA is a powerful complexing agent, which can bind metal ions and therefore is also suspected of being able to mobilise heavy metals in the aquatic environment.

However, this is a property that the industry has questioned (Cefic, 2003). EDTA is not readily degradable and the EU's risk assessment states that with the conditions in municipal water treatment plants, EDTA will not break down or only to a very limited extent (Cefic, 2002). EDTA has been permitted in the earlier criteria for professional textile laundry chemicals (version 1.2) and laundries (version 1.4) in Norway and in other areas where there has been a ban on the use of phosphorus. Today, however, more environmentally friendly alternatives exist, that are biodegradable and can replace EDTA. These include MGDA (methylglycindiacetic acid), which is why we have chosen to completely prohibit the use of EDTA.

PBT (persistent, bioaccumulative and toxic) and vPvB (very persistent and very bioaccumulative) are organic substances as defined in Annex XIII of REACH (Directive 1907/2006/EC). Nordic Ecolabelling does not generally wish to have these substances.

Most PBT/vPvB are excluded automatically from detergents due to the restrictions on environmentally hazardous substances and non-biodegradable substances. Since some of them, primarily vPvB, may possibly not be excluded in accordance with Ox, they are prohibited by Nordic Ecolabelling.

The requirement states that substances that have not yet been investigated but which fulfil the criteria for PBT and vPvB are also prohibited. The prohibition also applies to PBT and vPvB substances on the SIN list that are not yet on the SVHC list.

Endocrine disruptors are substances which can affect the endocrine balance of people and animals. Hormones control a number of processes in the body and are particularly important for the growth and development of humans, animals and plants. Changes to the hormone balance can have undesirable effects and there is a particular focus on hormones that can affect sexual development and fertility. Several studies have shown effects on animals that can be assumed to be due to an impact on the hormone balance. Emissions to the aquatic environment are on of the main sources of emission and spread of endocrine disruptors. (Miljøstatus i Norge, 2008B) The European Commission is now developing criteria for endocrine disruptors. Nordic Ecolabelling is monitoring this development and may change the requirement once the EU criteria for the identification of endocrine disruptors are published.

Substances on the candidate list and substances that are expected to be added to the candidate list are not expected to be used in the products used at Nordic Swan Ecolabelled laundries today as such substances will be excluded by other requirements. However, some substances can be assessed individually and be added to the list even if they are not CMR, PBT or vPvB substances and perhaps will not be included within the Nordic Swan Ecolabel's prohibition on endocrine disruptors. Although it is very unlikely that this would be the case – and that such a substance would be relevant to laundry chemicals, Nordic Ecolabelling has chosen to create an explicit prohibition which will also ensure harmonisation with equivalent requirements in other criteria.

Halogenated flame retardants include many substances harmful to the environment and to health, which are very toxic to aquatic organisms, carcinogenic or otherwise harmful to health. The compounds are not readily

degradable in the environment, which increases the risk of harmful effects from these substances (Miljøvejledninger, 2008). Flame retardants can occur at laundries as specialist textiles impregnated with flame retardants often have to be regenerated to retain their flame retardant properties, and this can be done at the laundry (Glensvig et al., 2005).

Nanoparticles (from nanomaterials[15]) must not be actively added, unless it is documented that they will not cause environmental and health problems. Nanoparticles include nanosilver, nanogold and nanocopper. Particular attention is being paid to nanometals such as nanosilver and nanocopper, since they occur in many products ranging from socks to refrigerators to gain an antibacterial effect. Substances such as nanosilver are classified as biocides by the US Environmental Protection Agency (EPA). There has been a particular concern that emissions of nanosilver into effluent and other dispersal could eliminate desirable bacteria and cause resistance in bacteria.

The requirement has been tightened for the exception of impregnating agents containing PFAS and relieved for optical brighteners compared with generation 3 of the criteria.

Background to requirement O18

A large proportion of the chemicals used in the industry can be ecolabelled in ecolabelling systems in the Nordic countries (e.g. the Nordic Swan Ecolabel, the EU Ecolabel and Bra Miljöval). The proportion of ecolabelled textile detergents for the professional market has increased in recent years. In addition, the requirements for non-ecolabelled chemicals are relatively limited compared with the requirements made of ecolabelled chemicals, making it important to have a certain proportion of ecolabelled products.

The requirement is easy to document because lists of the chemicals that are ecolabelled and the amounts purchased can be obtained from chemicals suppliers.

An obligatory requirement is now introduced on the proportion of ecolabelled laundry detergents for professional use. This is in line with requirements in other criteria for services such as Nordic Swan Ecolabelling of Cleaning Services. However, the requirement level is set relatively low. This is because there are some products that are considered necessary for individual laundries that cannot be ecolabelled (such as substances based on peracetic acid).

The requirement is new compared with generation 3 of the criteria.

Specialized laundry for industrial cloths with no wastewater discharge - see backgroudn to requirement O15.

Background to requirement P8

A large proportion of the chemicals used in the industry can be ecolabelled in ecolabelling systems in the Nordic countries (e.g. the Nordic Swan Ecolabel, the EU Ecolabel and Bra Miljöval). The proportion of ecolabelled textile detergents for the professional market has increased in recent years. In addition, the

[15] The definition of nanomaterial follows the European Commission’s definition of nanomaterials from 18 October 2011.

requirements for non-ecolabelled chemicals are relatively limited compared with the requirements made of ecolabelled chemicals, making it important to have a certain proportion of ecolabelled products.

The requirement is easy to document because lists of the chemicals that are ecolabelled and the amounts purchased can be obtained from chemicals suppliers.

The requirement has been tightened up compared with generation 3 of the criteria such that fewer points are scored per points level.

7.5 Transport

Background to requirements O19 and O20

Distribution between laundry and customer has a lower environmental impact than many people think. A life cycle analysis of cloth hand towel rolls (Schmidt, 2000) shows, for example, that energy consumption for distribution only amounts to 5%, while energy consumption at the laundry amounts to 80% of the total energy consumption in the life cycle (Frydendal, Schmidt & Zeuthen, 2000). This is partly due to the fact that vehicle capacity is typically used fairly well as the vehicles never drive empty as they pick up soiled textiles for the return journey. However, transport does have a certain impact which is not reduced by laundries becoming more specialised, with greater distances between the laundry and its customers. Experience of specialisation in Denmark has shown, however, that the environmental savings that laundries can attain from specialisation far exceed the increased environmental burden from having to transport the textiles longer distances between customer and laundry. Similar specialisation is increasingly being seen in Norway, where, for example, hospital laundry (requiring high laundry temperatures) justifies transport over longer distances.

Although the transport does not account for the greatest environmental impact, it is steerable and is very visible to the laundry's customers. At the same time, transport in general is an increasing problem in terms of its impact on the environment and health of society. Furthermore, in certain cases – e.g. for mat services – transport can constitute a more significant part of the environmental burden due to lower energy consumption at the laundry and a greater proportion of distribution to small customers. Nordic Ecolabelling has therefore chosen to make a number of requirements on distribution between laundry and customer although this is not the main focus of the criteria.

According to Green (2000) several laundries have outsourced distribution to external transporters, and this has been taken into account in setting the requirements.

One of these requirements is that all drivers (both internal and external drivers who drive for the licensee) must have completed a course in eco-driving run by a competent course operator (external or internal). However, where new drivers are employed, they must only complete such a course within 12 months of employment. Eco-driving usually saves 16-20% of fuel and equivalent CO_2 emissions. Individuals have saved up to 30% following a course in eco-driving.[16]

[16] Schjerpen, Mary; NAF (Norsk automobil forbund), phone conversation, September 2016.

The technology in vehicles is constantly being updated and engines are becoming more efficient, with less pollution, as shown by the tighter emissions requirements for vehicles as exemplified below by the Euro emissions standards for diesel lorries.

Table 5 Emission requirements for type approval of engines for heavy vehicles in g/kWh (DieselNet, 2017)

Directive (year of registration)	NOx	PM	HC	CO	CO2
Euro I (1994-1996)	8.0	0.36/0.61	1.1	4.5	None
Euro I (1997-2000)	7.0	0.15/0.25	1.1	4.0	None
Euro III (2001-2006)	5.0	0.1	0.66	2.1	None
Euro IV (2007-2008)	3.5	0.02	0.46	1.5	None
Euro V (2009 -2014)	2.0	0.02	0.46	1.5	None
Euro VI (2013/14-)	0.4	0.01	0.13	1.5	None

When buying cars and/or signing leasing agreements (both internally and with external transporters) Nordic Ecolabelling requires that the vehicles that are used to distribute textiles at least comply with the most recent applicable Euro emissions standard. From January 2013 this means Euro VI for lorries and EURO 5b for goods vehicles and cars (DieselNet, 2017). As new vehicles must comply with the EU's most recently applicable class/standard, in practice this means that the requirement is fulfilled as long as new vehicles are purchased.

To ensure that the Nordic Swan Ecolabelled businesses have a modern fleet with low levels of pollution, vehicles that are more than 10 years old are not permitted, unless it can be documented that they comply with the most recent applicable Euro emissions standard. In other words, they must not pollute more than an equivalent new vehicle.

In generation 4, Nordic Ecolabelling wishes to make clear that the transport requirements apply whether the laundry uses its own drivers/vehicles or buys in the service from outside. For the laundry, however, it is not possible in practice to set new requirements for their subcontractors within existing binding contracts. Therefore the requirement on external transport applies from the point at which a new contract is entered into with an external supplier.

Background to requirement P9

The point score requirement for the use of Nordic Swan Ecolabelled fuel encourages fuel with a high content of and stringent requirements on renewable raw materials and reduced climate emissions.

Electric cars have advantages such as that the discharge of hazardous substances does not occur at street level, so exposure to scalable substances will be significantly less than for traditional transport. Nordic Ecolabelling therefore wishes to premiere the use of electric cars.

Hydrogen is not rewarded because the energy consumption for hydrogen production is generally high. Nordic Ecolabelling believes that, from an environmental point of view, it is better to use electricity from, for example, solar, wind or heat energy for electric cars, instead of converting it to hydrogen with

additional electricity consumption. Since EU RED allows the use of national ellum factors, steerability is low to choose the most energy efficient hydrogen products.

The requirement is updated with regard to electric cars in relation to generation 3 of the criteria.

7.6 Textiles and mats

Background to requirement O21

Industrial laundries tend to offer their customers textile hire, in other words it is the laundry that buys and owns a large proportion of the textiles handled at the laundry and used by its customers. As a large proportion of the textile production takes place in the Far East, labour conditions and similar ethical aspects are of major importance. Nordic Ecolabelling has therefore chosen to make a number of requirements on the laundries' purchasing of textiles. Focus is solely on the textiles that the laundry itself owns, as it is not steerable to impose requirements on the textiles that the laundry's customers buy.

The requirement concerns the business' purchasing policy when purchasing textiles. Here Nordic Ecolabelling wishes to reduce the risk of workers in the textile industry in particularly in Third World countries suffering unfair working conditions. Therefore, Nordic Ecolabelling demands that businesses have a Code of Conduct in relation to purchasing textiles. The business' Code of Conduct must set requirements of the supplier of textiles and on the textile producer stating that the 10 principles of the UN Global Compact must be respected and complied with. Alternatively, it must be based on working conditions that are compatible with the ILO's eight core conventions.

The 10 principles of the UN Global Compact cover:

Human rights

- The business should support and respect protection of internationally declared human rights and
- Ensure that it does not contribute towards infringement of human rights.

Labour rights

- The business should uphold freedom of association and effectively recognise the right to collective bargaining;
- Support the eradication of all forms of forced labour; and
- Support effective abolition of child labour; and
- Abolish discrimination regarding labour and employment conditions.

The environment

- The business should support a precautionary approach to environmental challenges;
- Take the initiative to promote greater environmental accountability; and
- Encourage the development and spread of eco-friendly technologies.

Anti-corruption

- Business should counteract all forms of corruption, including extortion and bribery.17

The ILO's eight core conventions cover:

- Prohibition of child labour (Conventions 138 and 182)
- Freedom of association (Conventions 87 and 98)
- Prohibition of discrimination (Conventions 100 and 111)
- Prohibition of forced labour (Conventions 29 and 105)18

The textile industry often comprises a complex network of different actors. Unfortunately, this means that steerability regarding compliance in this case is not high. However, it is possible to demand that the licensees take these issues seriously and the requirement sends a clear signal regarding the direction in which Nordic Ecolabelling would like to progress.

For more information on Nordic Ecolabelling's attitudes to ethics in textile production, see the most recent background report on Nordic Swan Ecolabelling of textiles, hides/skins and leather.

The requirement is unchanged compared with generation 3 of the criteria.

Background to requirement O22

This requirement concerns the environmental and health qualities of the textiles. There is a major difference in the availability of ecolabelled and health-labelled products on the market in different textile categories. Therefore the requirement relates to new purchases of workwear and flat goods that require mangling, as the proportion of products on the market that can document that they meet the ecolabel criteria or Oeko-Tex 100 is slightly higher. However, to provide a benefit from buying textiles that are eco- and health-friendly – also in other areas, all purchasing that meets the standards can be included in the calculation. The ecolabelling criteria are life cycle based and additionally contain the same type of health and quality requirements for the end product as Oeko-Tex 100, which is why an ecolabel is more "valuable" than Oeko-Tex 100 and must therefore be weighted higher. The factor 5 is a subjectively defined factor.

Ecolabelled textiles means Nordic Swan Ecolabel, EU Ecolabel, Bra Miljöval (if both Class 1 and 2) and GOTS. The range of ecolabelled textiles has increased in the past few years, see the background to requirement P9 where activities with a high proportion of purchased ecolabelled textiles can score points.

As purchasing data is typically found in the businesses' financial systems and is not always indicated by weight, the business may decide to perform the calculation either based on weight or financial purchasing volume. For textile service businesses with a shared purchasing department, the requirement on textile purchasing can be documented at business level.

[17] http://www.unglobalcompact.org/
[18] http://www.uniontounion.org/ilo

The requirement has been tightened up from 75% to 85% compared with generation 3 of the criteria. Licensing data from generation 3 of the criteria shows that the Nordic Swan Ecolabelled laundries on average attain 98%. This high figure is partly explained by the fact that a few laundries have a high proportion of ecolabelled textiles. As ecolabelled textiles are weighted by factor 5 (in generation 3 of the criteria, the factor was 3), the result may be greater than 100%. On the basis of licensing data, the more stringent criterion means that approximately 30% of the laundries need to improve to continue to meet the requirement.

The laundries usually buy in thousands of different products every year and the requirement has been time-consuming to document and licence in former generation s of the criteria. In this generation, the documentation requirement is therefore simplified. Instead of laundries having to gather and send in certificates for all articles, it can base its calculation on information from its suppliers. Nordic Ecolabelling then carries out spot checks on selected products at selected suppliers.

Background to requirement P10

The number of licences for Nordic Swan Ecolabelling of textiles has increased in recent years, mainly Norwegian licences for flat goods. In May 2017 there were 22 Nordic Swan Ecolabel licences with 1,059 trade names. The equivalent figure for the EU Ecolabel was 17 licences med 271 trade names. The number of plants certified under GOTS has icnreased considerably in recent years, from 3,814 plants in 2015 to 4,642 plants in 2016 (GOTS, 2017). Textile services are described as an important actor in stimulating the ecolabelling of textiles. It is therefore of the utmost importance that the criteria for textile services continue to reward the purchase of ecolabelled textiles.

The four first points levels have been tightened up by 5-10 percentage points each compared with generation 3 of the criteria.

Background to requirement O23

Phthalates are a group of substances that can be used to make plastics and rubber soft and flexible. As they are not chemically bonded in the plastic, they can leak out to the surrounding environment and be absorbed by the body. We absorb some phthalates through direct contact and others indirectly, e.g. through food.

Many phthalate compounds have undesirable effects on health and the environment. Some phthalates are on the EU's priority list of suspected endocrine disruptors requiring further evaluation, and some have already been found to be endocrine disruptors. Phthalates have also received huge amounts of media attention and can therefore be undesirable in ecolabelled products for many reasons. Five phthalates: bis (2-ethylhexyl)phthalate (DEHP), dibutyl phthalate (DBP), benzyl butyl phthalate (BBP), dimethoxyethyl phthalate (DMEP) and diisobutyl phthalate (DIBP) have problematic properties under the list of harmonised classifications (the CLP list). In addition, DEHP, DBP and BBP are on the EU's priority list of suspected endocrine disruptors that require further investigation. (LOUS, 2009)

Some phthalate compounds are also on the Candidate list. These are: DEHP (bis (2-ethylhexyl)phthalate), DBP (dibutyl phthalate), BBP (benzyl butyl phthalate),

DiBP (diisobutyl phthalate), DPP (dipentyl phthalate), PiPP (penta isophenyl phthalate), DiPP (diisopentyl phthalate), N-pentyl-isopentyl phthalate and bis(2-methoxyethyl) phthalate. All are there on the basis of being classified as reprotoxic.

Di-isononyl phthalate (DiNP) is a common substitute for DEHP, and there are studies showing that DiNP can also interfere with the sexual development in boys (Karlstad University, 2014).

The mats used in textile services are standard mats and mats that are unique to customers (logo mats) with printing. Both types normally comprise a reverse side in nitrile rubber and a textile element either in cotton and/or synthetic yarn (polyamide or polyester). Nitrile rubber (Acrylonitrile Butadiene Rubber) normally has plasticisers added (Tranquilli, 2016). Nordic Ecolabelling has been in contact with the world-leading producers of mats during the revision. It has been found that some use phthalates as plasticisers in the rubber on the reverse of the mat while others do not. There is thus both relevance and potential for the requirement. Concerning the steerability conversations with purchasers show that mats that are unique to customers are bought new on an ongoing basis while standard mats are normally bought new before a high season.

The requirement is new compared with generation 3 of the criteria.

Background to requirements O24 and P11

According to licence data from generation 3 of the criteria, the Nordic Swan Ecolabelled laundries together threw away approximately 7,500 tonnes of textiles in 2015. This is equivalent to an average approximately 0.5% of the amount of laundry on an annual basis. In this context, disposal means textiles being removed from production. Disposal can be divided into the following three categories depending on the reasons behind it.

1. Disposal due to textile quality, wear in the laundry process and wear during use of the textiles.
2. Disposal as a consequence of lack of care/incorrect handling of the textiles, or wear as a result of textiles being used for a purpose other than their original purpose.
3. Disposal due to customer discontinuation or modification in model (typically during a new contract period where a new product range is requested).[19]
4. Loss (textiles that are lost by the customer).

Manufacturing textiles, including raw ingredient production, produces a significant environmental burden, which means that initiatives relating to textiles and disposal can provide environmental benefits. The production chain for textiles is often a complicated one, making it difficult to know how great an environmental impact is involved in actual fact. However, a calculation of the carbon footprint of textile services shows that the distribution of greenhouse gas emissions between textile production, transport and use is 52%, 5% and 45%

[19] Jordal Dujardin, Nynne; Environmental manager De Forenede Dampvaskerier A/S. Mail contact the 10 januari 2018.

respectively (Grüttner, 2015). This shows how an extended lifetime for textiles reduces the relative environmental impact from textile production.

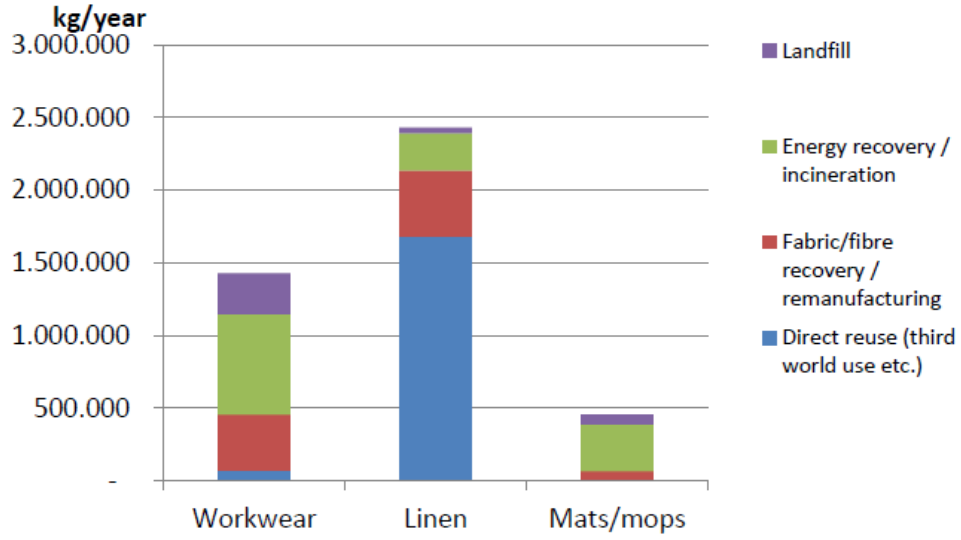
The laundries themselves are focused on reducing disposal partly because it is costly to buy new textiles. What Nordic Ecolabelling is able to contribute through a requirement on disposal is encouraging re-use/recovery – ensuring that the fibres are brought back into use again.

The European Textile Services Association, ETSA, has commissioned research to investigate what happens to textiles after disposal. Their members were asked to report the amount of textiles they throw away based on how they are disposed of, see the categories below.

- Direct re-use
- Material recovery
- Combustion with energy recovery
- Landfill
- Other (loss etc.).

The survey showed what happened to approximately 4,500 tonnes of textiles divided into workwear, linen and maps/mops.

Figure 3 **How workwear, linen and mats/mops are disposed of (Grüttner and Lilholt Sørensen, 2016)**



Grüttner & Sørensen (2016) drew the following conclusions from the survey:

- The majority of workwear goes for energy recovery through incineration (48%) A smaller proportion is re-used or recycled (5% and 27% respectively)
- Regarding linen, the majority went for direct re-use or recycling (69% and 19% respectively).
- Looking at mats, the largest proportion were incinerated (70%), while only a small proportion were re-used (2%) or recycled (13%).

According to Thomas Hahn, a researcher at the Stockholm Resilience Centre, reporting to an ecolabelling body can help companies to identify their flows[20]. Requirement O23 does not contain a threshold value and is instead what is known as an information requirement in line with Thomas Hahn's model of increasing the visibility of flows. In generation 3 of the criteria, the laundry only needed to report the weight of the total amount of textiles disposed of. In this generation of the criteria, the laundry must report the number of kg disposed of based on how they are disposed of. In addition, mats are also now covered by the requirement.

During the revision, Nordic Ecolabelling has been told of many good initiatives on the part of licensees to extent the lifetime of textiles. Everything from chipping mops and workwear in order to be able to charge customers for loss, selling/donating textiles to companies that sew clothes, bags, etc, to repairing textiles and mats on site. To encourage activities that extend the lifetime of textiles, Nordic Ecolabelling has introduced a point score requirement that rewards initiatives in the first three steps of the EU's waste hierarchy, see below.

1. Prevention
2. Reuse
3. Material recovery
4. Other recovery, e.g. energy recovery
5. Disposal

The order of priority in the waste hierarchy means that waste should preferably be prevented, secondly reused, thirdly sent for material recovery and so on. The order applies provided that it is environmentally justified and financially reasonable.

To serve as guidance but not to exercise control, the requirement contains suggestions for preventive measures that score points. Nordic Ecolabelling makes a combined assessment of all preventive measures and then awards up to 3 points. The requirement is new for this generation of the criteria.

7.7 Emissions and plastic waste

Background to requirement O25

Requirements on discharges set by municipalities/authorities

Requirements on discharges are set by municipalities/authorities in all the Nordic countries. However, these requirements may vary widely depending on the municipality or the regional authority, production volumes, discharge volumes, what is laundered and the recipient. The requirements can be set in relation to pH, BOD/COD, temperature, oil, nitrogen, phosphorus etc. The laundries find it a challenge that these requirements are set in relation to concentration (mg/l) – instead of total emissions. This can penalise laundries that comply with the Nordic Swan Ecolabel's criteria on low water consumption (and thus have higher concentrations per litre of wastewater) and energy consumption.

[20] Hahn, Thomas; Researcher at the Stockholm Resilience Centre. Ecolabelling Sweden AB's office, talk on 9 May 2016.

Wastewater treatment

This varies depending on requirements set and production. The vast majority are connected to municipal treatment works Some only have filtration of coarse particles, while newer facilities have tanks to provide more homogenous water to the wastewater system. Regarding the pH requirement, oxygen can be added where necessary.

Can Nordic Ecolabelling sets requirements on treating waste water?

There is little to indicate that municipal water treatment works are not in a position to handle wastewater from laundries so as to fulfil requirements set on emissions from water treatment plants. Internal water treatment plants are assumed to cost NOK 5–10 million. It would be difficult to set general Nordic Swan Ecolabel requirements due to major variation in local requirements and variation in production types and amounts.

The requirement therefore remains unchanged compared with generation 3 of the criteria.

Background to requirement P12

Several projects have drawn attention to problems concerning emissions of synthetic materials/microplastics when laundering textiles (Booth, 2016; Lassen, 2015 & Vermaire, 2017). However, researchers disagree on how high a proportion of the microplastics released when laundering synthetic textiles become caught in municipal water treatment plants (Bredsdorf. 2017). Applying the precautionary principle, it is important even at this early stage to make laundries, textile suppliers and textile producers aware and encourage them to take an offensive stance in this regard. Nordic Ecolabelling therefore follows the recommendations of the EU-funded Mermaids project in relation to what should be evaluated in producing textiles, to minimise emissions of microplastics during laundry (see Appendix 7).

According to the EU-based Mermaids project, it is the synthetic materials acrylic, nylon and polyester that are the greatest contributors of microplastics. Every time a polyester fleece jacket is laundered, it releases approximately 1,000,000 fibres, an acrylic scarf 300,000 and a pair of nylon socks 136, 000. Mermaids project has identified different critical parameters that have a major impact on the release of plastic microfibres in the laundry process.

Indications show that the way a yarn is designed has a big impact on the breaking/degrading of the yarn into smaller micro- and nanoparticles. Yarn producers and textile producers can use these parameters in their design to create yarn and textiles that release less microfiber during the washing process. Pre-sale washing also seems promising. Mermaids research showed that during the first wash significantly more microfibers are released. A possible option is to carry out a first controlled washing of fabrics (capturing the microfibers released during this first washing) before putting them on sale.

It is important that synthetic textile residues/microplastics are not only removed from the water but also do not end up in the sludge at municipal water treatment plants. This is because this sludge is often used as agricultural fertiliser. Research indicates that the soil to which sludge from water treatment plants is added can have up to 15 times more microplastic particles than untreated soil (Bredsdorff, 2017). Technology is available to clean the wastewater from washing

machines of textile fibres before they reach the drain (Hildonen, 2016). As well as information on textile production, laundries are also rewarded for limiting emissions of synthetic materials/microplastics in the waste water using water treatment.

There is still no valid definition of microplastics in the research literature. Nordic Ecolabelling has chosen to use the same definition of microplastics as the EU Ecolabel.

Nordic Ecolabelling is continuing to examine how emissions of microplastics can be reduced in revising the criteria for Nordic Ecolabelling of textiles, hides/skins and leather.

The requirement is new for generation 4 of the criteria.

Background to requirement O26

In order to motivate the reduction of plastic packaging and to ensure material recycling, the laundry should provide customers with the return of plastic waste and ensure that it is sent to recycling.

The requirement is unchanged compared with generation 3 of the criteria.

7.8 Quality control of laundries

Background to requirement O27

To ensure reasonable quality and a sensible work environment over and above the requirements on chemicals at the laundry, laundries must as a minimum comply with the quality and health and safety requirements of industry associations. So as to not make the Nordic Swan Ecolabel exclusive to members of the national industry associations, Nordic Ecolabelling accepts as an alternative compliance with the German Standard RAL GZ-992 (Professional Linen Care – Quality Assurance) and a combination of certified under ISO 9001 (Quality management) and EN 14065 (Textiles – Laundry processed textiles – Biocontamination control system), which we have chosen to accept on an equal footing, if at the same time the management system sets concrete targets for both bacteriological and visual purity.

Iceland lacks a national laundry organisation or quality control. Icelandic laundries can therefore have quality control carried out by a quality body in one of the other Nordic countries.

The requirement is unchanged compared with generation 3 of the criteria.

7.9 Working conditions

Background to requirements O28 and O29

In sectors with small margins, limited education requirements and low pay, it is important to ensure that both the companies and their employees are competing and working on equal terms. Therefore a requirement on working conditions has been introduced for both in-house and external employees.

The situation appears to be in good order in most of the Nordic laundry industry. The industry is regulated by regulations and tariff agreements. The use of temporary staff is also regulated on paper, also where there is no explicit

agreement. In Norway, recruitment agencies used must be on an approved list drawn up by Arbeidstilsynet. In Denmark the use of temporary cover is regulated by separate legislation. That said, the Norwegian union Industri Energi points out that despite improvements in recent years, far too much hired labour is still used. An example from Økokrim (the Norwegian police investigation of economic crime) shows a laundry that had hired in its entire workforce and saved NOK 5–6 million a year. The union takes a very positive view of efforts on the part of Nordic Ecolabelling regarding well-regulated working conditions. This will:

- eradicate actors that do not take their responsibilities seriously from the market.
- combat crime
- be an advantage for the Nordic Swan Ecolabel brand in ensuring a connection with serious operators.[21]

This is also supported by a series of newspaper articles in Dagsavisen (Fladberg, K, L., 2016, Fyen, S., 2016 and Fyen, S., 2016).

The Danish union 3F also emphasises the importance of monitoring developments in the labour market – for example the use of "enterprice" (hiring firms that have responsibility for parts of operation). But all in all the view is that working conditions in Danish laundries are good.[22]

A new EU report concludes that Norway and many other countries within the EU have wide-ranging problems with the use of hired-in labour and subcontractors. The EU body Eurofound bases the new report on input from researchers in EU member states, as well as Norway. The report shows that illegal hiring of labour and the use of subcontractors remains an extensive problem area, despite several different initiatives to limit this (Eurofound, 2016).

The consequences of this often involve social dumping and distortion of competition based on worse pay and working conditions for employees of subcontractors and from recruitment companies, compared with local Norwegian workers, for example.

The report evaluates different aspects of the labour market where there is a particular risk of breaking the law and social dumping, including:

- Subcontractors
- Freelancers
- Recruitment agencies
- Temporary labour
- "Fictitious stationing abroad"

The requirements are new for generation 4 of the criteria.

[21] Dyrkorn, Charlotte; union secretary, Industri Energi. E-mail contact 17 June 2016
[22] Petersen, Tine; negotiation secretary, 3F Transportgruppen. Phone conversation 17 June 2016.

7.10 Environmental management and regulatory requirements

7.11 Summary of points

Background to requirement O38

To ensure the greatest possible potential for product development and innovation and thus usability of the criteria, combined with a low environmental impact overall, a points system has been created. This means that if a laundry is ahead in one area, it can perform less well in other areas as long as the laundry has a low environmental impact overall.

On top of the obligatory requirements, the laundry must score at least a total of 20 points in the point score requirements. This can be attained through considerably lower consumption of energy, water or chemicals – or by putting initiatives in place in other areas as set out above.

The total points requirement is an important requirement as it is a requirement that most clearly distinguishes between laundries on the market with the best environmental performance from the rest. Nordic Ecolabelling judges that there is great potential for improvement as there is a very wide spread of environmental performance and as the industry is developing rapidly.

In generation 3, the average points total for Nordic Ecolabelled laundries was 24 points, and this was felt to be grounds to tighten up the criteria. The percentage number of points that must be earned has therefore been raised from 23% to 27%.

Compared with generation 3, it has become more difficult to attain this proportion of points as the basis for allocating points – the obligatory requirements – has been tightened up in several areas (including energy, greenhouse gases and CDV).

8 Areas without requirements

As stated in the section on development of the market in Chapter 2, actors in textile services geared towards consumers have established themselves on the market. This concerns B2C (business-to-consumer) services in which private individuals can have their clothes washed by professional laundries. So far, B2C services account of only a small proportion of the market but are expected to grow as consumer behaviours such as “outsourcing”, “on demand” and “home delivery” become increasingly common. Within one of the sub-objectives of this revision, the project group has attempted to answer the question of what a shift from laundry in the home to laundry by professional laundries means in terms of chemicals consumption and transport. The aim here is to find out whether special requirements should be developed on chemicals and transport.

The project group has reached the conclusion that special requirements in these areas are not necessary. Regarding chemicals, tough and far-reaching requirements are imposed on all laundry chemicals used in a Nordic Swan Ecolabelled laundry. The substances that are prohibited in the criteria for consumer laundry detergents but not in the chemicals requirements for textile services are listed below.

- Antimicrobial or disinfectant substances added for a purpose other than preservation
- DTPA diethylenetriamine pentaacetate
- Chlorine-based bleaching agents

On the other hand, considerably more textiles are washed per gramme of laundry detergent in a laundry. Regarding use of chlorine, this is limited by a separate requirement in textile services. The factor value for the textile category private clothing is low.

Laundering private clothing at professional laundries involves transport that would not otherwise have taken place. This can be compared with cleaning assistance in the home, for which Nordic Ecolabelling has criteria. Transport to private individuals is covered by the same requirements as transport to hospitals, hotels, etc. Energy consumption per kg textiles can, however, be expected to be lower at a laundry compared with laundry in the home. This means that energy consumption is lower at other parts of the life cycle when laundering is carried out at a laundry.

Nordic Ecolabelling will monitor the development of the B2C market in the years ahead. The relevance of additional requirements may increase as the service grows.

In previous generations of the criteria, Nordic Ecolabelling has set an information requirement in which the amount and type of fuel and the number of kilometres driven on an annual basis must be stated. The purpose of this requirement was primarily to gather data in order to set a threshold value requirement in the next revision. The most recent evaluation of the criteria concluded that it is not possible to set such a quantitative requirement. This is partly because each laundry is unique in terms of the composition of the size and the type of customer and thus differing needs for large lorries in relation to smaller goods vehicles. Similarly, the distance between customers can be significant, e.g. between a laundry in a densely populated area near one of the Nordic capitals and another laundry in a sparsely populated area.

It is true that reporting to an ecolabelling body can help companies to identify their flows. However, Nordic Ecolabelling judges that the licensees are focused on optimising their transport regardless.

9 Changes compared to previous generation

The table below lists changes compared with the previous generation of the criteria.

Table 6 Overview of changes to criteria for textile services generation 4 compared with previous generation 3.

Requirement generation 4	Requirement generation 3	Same requirement	Change	New requirement	Comment
O1	O1	X			
O2	O2		X		New textile categories.
O3	O3	X			
O4	O4	X			

P1	P1	X			
O5	O5		X		Requirement tightened up.
O6	O6		X		Requirement tightened up.
P2	P2		X		Requirement tightened up in line with O6.
O7	O7		X		Requirement tightened up.
P3	P3		X		Requirement tightened up in line with O7.
O8	O8		X		The factor values for hotels, mops and cleaning cloths as well as cloth hand towel rolls have been raised. The factor value for the textile category Other has been lowered to be in line with the textile category with the lowest factor value.
P4	P4	X			
O9	O10		X		Requirement updated in relation to the CLP Regulation 1272/2008. Hazard statement H304 is included (with exceptions).
O10	O11		X		Requirement updated in relation to the CLP Regulation 1272/2008.
O11	O12	X			No changes, only updating.
P5				X	
O12	O13		X		Requirement tightened up.
P6	P7		X		Requirement tightened up in line with O12.
O13	O14	X			
P7	P8		X		Requirement tightened up.
O14	O15	X			
O15	O16	X			
O16	O17	X			Requirement tightened up with regard to phosphates.
O17	O18		X		Requirement tightened up with regard to the exception of impregnating agents with PFAS.
O18	-			X	
P8	P9		X		The requirement has been tightened up such that fewer points are scored per points level.
O19	O9		X		It has been made clear that the requirements apply whether or not the textile service uses its own drivers/vehicles or whether the service is bought in from outside.
O20	O9 and P5		X		The requirement has been tightened up and it applies whether or not the textile service uses its own drivers/vehicles or whether the service is bought in from outside.
P9	P6	X			
O21	O21	X			
O22	O20		X		The requirement has been tightened up. Ecolabelled textiles are weighted with a higher factor. The documentation requirement has been simplified.
P10	P10	X			

O23				X	
O24	O22		X		Requirement tightened up.
P11	-			X	
O25	O23	X			
P12	-			X	
O26	O24	X			
O27	O27	X			The requirement has been clarified.
O28	-			X	
O29	-			X	
O30	O31	X			
O31	O35	X			
O32	O34	X			
O33	O32	X			
O34	O33	X			
O35	-			X	
O36	O29	X			
O37	O37	X			

The evaluation of generation 3 of the criteria showed that requirements O15 Restriction on the phosphorus content of laundry chemicals, O19 Dyes, O24 Production waste and recycling systems, O26 Delivery of laundry chemicals and O30 Environmental policy can be removed due to low RPS. These requirements are therefore not included in this generation of the criteria.

New criteria

Look at the possibility of Nordic Swan Ecolabelling at divisional or group level.

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Appendix 1 Carbon footprint of textile services

Carbon footprint of textile services

It is the European Textile Services Association, ETSA, and its members that charged EcoForum in Denmark with calculating the carbon footprint of three key textile services (Grüttner, 2015):

1. Providing a worker with workwear for one year
2. Providing a hotel bed with bed linen for one year
3. Providing an entrance door in northern Europe with mats for one year

The data collection and the calculation were carried out in line with the principles of the WBCSD/WRI Greenhouse Gas Protocol[23] methodology, which has several similarities with a life cycle analysis in line with the ISO LCA standards 14040 and 14044. The GHG Protocol classifies greenhouse gas emissions based on three "scopes":

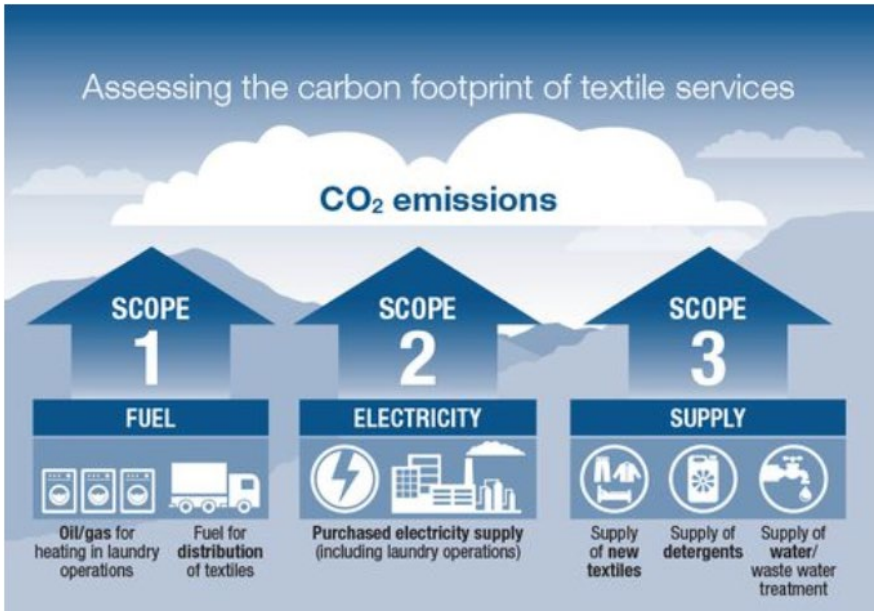
Scope 1: Direct emissions from owned or controlled sources.

Scope 2: Indirect emissions from production of purchased energy.

Scope 3: All indirect emissions that are not included in scope 2 and which arise in the reported company's value chain, both upstream and downstream.

The figure below shows emissions of greenhouse gases for textile services. Scope 1 involves use of fuel for heating and transporter/distribution, scope 2 electricity consumption and scope 3 delivery of new textiles, laundry chemicals and water, and internal water treatment where used.

Figure 1 The figure shows emissions of greenhouse gases (mainly CO_2) for textile services (ETSA, 2017)



[23] http://www.ghgprotocol.org/

The calculation includes all energy use in textile services; laundry and transport of clean/dirty textiles, delivery of laundry chemicals, new textiles and water, and internal water treatment where used. Due to a lack of reliable data, the calculation does not include the disposal of textiles at the end of their life. The table below provides a more detailed picture of the parts of the life cycle covered by the calculation.

Overview of the parts of the life cycle included in the calculation (Grüttner, 2015)

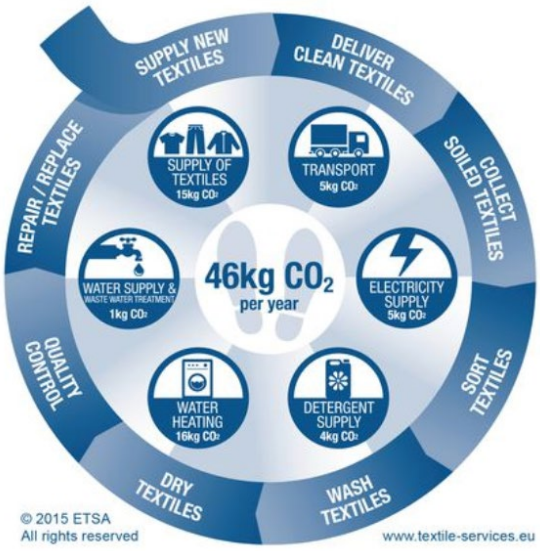
	Raw-material stage	Manufacturing stage	Use stage	Disposal stage
Textiles	Growing of cotton Extraction of crude oil and refining into polyester	Spinning Weaving Wet treatment Cutting and stitching	Use in textile services	*Not considered*
Detergents	Extraction of the relevant raw-materials	Manufacturing the industrial detergents	Consumptions in textile services	Discharge to municipal wastewater treatment plants – together with the soiling
Water	Extraction	Pre-treatment typically 'softening' by ionic exchange	Consumptions in textile services	
Electricity	Extraction of oil, gas, etc.	Manufacturing and distribution of the electricity	Consumptions in textile services	(Energy lost as heat)
Fuels like Oil/gas/diesel	Extraction of oil, gas, etc.	Refining Distribution	Consumptions in textile services	(Energy lost as heat)

Workwear

In many industries, employers provide their employees with workwear. The employer normally hires the workwear from a textile services company and employees can expect clean clothes delivered to the workplace while dirty clothes are taken back for laundry. Providing a worker with workwear for one year involves a total carbon footprint of 46 kg carbon dioxide, see figure 2.

On average workwear will undergo 47 laundry cycles before being removed from production. In comparison, the environmental impact (CO_2 emissions) of delivering new workwear is 22 times higher than washing it once.

Figure 2 The carbon footprint of equipping a worker with workwear for a year (ETSA, 2017)

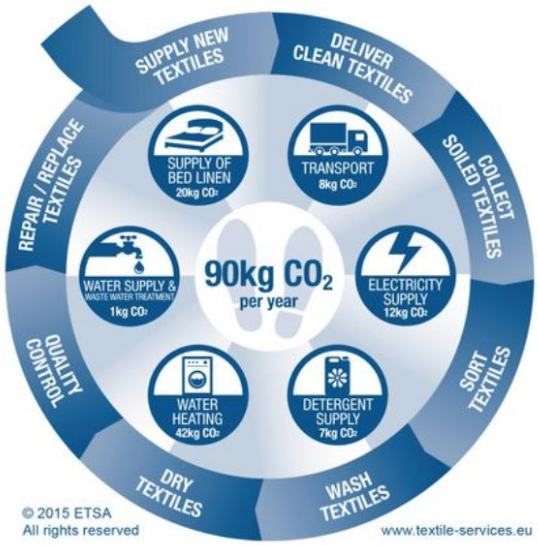


Bed linen

Bed linen and towels are changed 200 times per room per year at a hotel on average. Usually a textile service company is responsible for laundering and maintaining this service. Providing a hotel bed with bed linen for one year involves a total carbon footprint of 90 kg carbon dioxide, see figure 4.

On average bed linen will undergo 119 laundry cycles before it needs to be replaced. In comparison, the environmental impact (CO_2 emissions) of delivering new workwear is 33 times higher than washing them once.

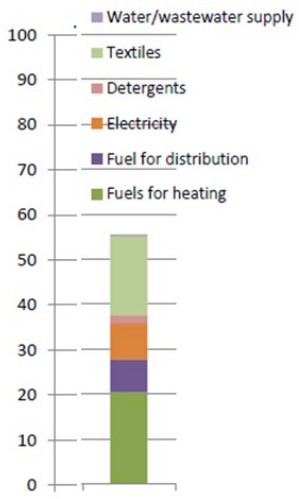
Figure 3 **Carbon footprint for providing a hotel bed with bed linen for one year (ETSA, 2017)**



Mats

There is often a mat at entrance doors to public buildings, offices, schools and similar to absorb dirt and water. These mats are replaced 50 times a year on average. Providing an entrance door in northern Europe with mats for one year involves a total carbon footprint of 56 kg carbon dioxide, see the diagram below.

Figure 4 **Carbon footprint in kg CO_2 for providing an entrance door in northern Europe with mats for one year (Grüttner and Lilholt Sørensen, 2016)**



The report provides interesting figures on how many times the different types of textile are washed during their lifetime and the reduction in climate gas emissions when the textiles are washed several times. However, because it is unclear how the amounts of CO_2 emissions are calculated, especially for the electricity consumed, it is difficult to compare the figures with values for other laundries.