About Nordic Ecolabelled

Coffee services



Version 1.3

Background to ecolabelling

Nordic Ecolabelling

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Appendix 1 Energy consumption for transport of coffee services

100 Coffee services, version 1.3, 16 February 2021

This document is a translation of an original in Swedish. In case of dispute, the original document should be taken as authoritative.

Addresses

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:

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1 Summary

This new product group for ecolabelling covers coffee services, including the delivery and installation of a coffee machine, service and maintenance of the machine and consumables for the coffee machine. All these three aspects must be included in the service for it to be able to be Nordic Swan Ecolabelled. The definition of the coffee services product group has been chosen in order to ensure that it covers the majority of the environmental impact of the service.

The Relevance Potential and Steerability analysis for Coffee services sets out the following aspects on which Nordic Ecolabelling is to focus its requirements:

- Energy consumption in the operation phase (coffee machine)
- Consumables – food (coffee, cocoa, tea, sugar, fresh and powdered milk)
- Consumables – non-food (napkins, cups)
- Materials in the coffee machine
- Transport in the usage phase
- Quality and hygiene requirements in the usage phase

The criteria cover energy requirements for the coffee machine and associated refrigerator for milk storage when in operation at the customer, under which the coffee machine must be energy efficient and tested by a third party. In addition, the coffee machine must have an energy saving mode function which should be set, e.g. when the workplace in which it is located is not staffed.

For consumables that are foodstuffs, Nordic Ecolabelling has chosen to set requirements for organic certification and for foodstuffs certified according to approved certification schemes for social responsibility. The coffee delivered in a Nordic Swan Ecolabelled coffee service must be at least 90% organically certified, according to the European Regulations (EC) No. 834/2007, (EC) No. 889/2008 and (EC) No. 1235/2008Other food consumables delivered in a Nordic Swan Ecolabelled coffee service must be at least 50% organically certified. Moreover, the coffee delivered in a Nordic Swan Ecolabelled coffee service must be at least 30% certified according to an approved certification scheme for social responsibility. For the consumables tea, cocoa and sugar at least 10% must be certified according to an approved certification scheme for social responsibility[1].

Consumables used in conjunction with coffee services include disposable cups and napkins. The napkins must be ecolabelled and the disposable cups must be produced from renewable raw materials. If the cup is Nordic Swan Ecolabelled the requirement is fulfilled.

Nordic Ecolabelling has therefore chosen to set the requirement that cups must be produced from renewable raw materials.

The coffee machine comprises a combination of materials such as metal and plastic and some electronic components. Nordic Ecolabelling sets environmental and health related requirements on all components in the machine that are in contact with food.

[1] Such as UTZ Certified, Rainforest Alliance Sustainable Agriculture Network and Fairtrade

The transport requirements in this first version of the ecolabelling criteria include all suppliers' own and leased vehicles used for driving in conjunction with the coffee service. The companies that ecolabel coffee machine's shall have a transport policy where that staff who operate transport must have completed training in Ecodriving (or equivalent) to reduce the environmental impact of transport.

As the coffee machine handles food, it is important that coffee machines are regularly undergoing service and are regularly cleaned so that they produce good quality coffee without risking the hygiene of the machine.

2 Basic facts about the criteria

What can carry the Nordic Swan Ecolabel?

The service product that can be Nordic Swan Ecolabelled is the coffee service.

The coffee service must covers the following parts to be Nordic Swan Ecolabelled:

- delivery and installation of a coffee machine that meets the definition below,
- service and maintenance of the machine, and
- consumables for the coffee machine[2].

The coffee service supplier can be:

a) Supplier of coffee services that deliver both the coffee machine, service and maintenance, and consumables for the coffee machine.

b) Supplier of coffee services that have separate agreements with coffee machine supplier (s) (including service and maintenance) and the supplier (s) of consumables, where the agreements together correspond to a delivery according to option a.

What cannot be Nordic Swan Ecolabelled

The following cannot be Nordic Swan Ecolabelled:

- solely coffee machine as a product, or
- a coffee service that uses single-use capsules, or
- a coffee service where bulk brewers and traditional espresso machines account for more than 30% of the coffee service supplier's set of coffee machines

The coffee machine

Coffee machines that can be included in the Nordic Swan Ecolabelled coffee service are fully and semi-automatic machines for professional or public use, i.e. coffee machines for workplaces or public spaces such as waiting rooms, restaurants, hotels, gas stations, convenience stores, schools and similar.

The coffee machine must provide hot coffee drinks but can also include other types of drink on its menu, such as hot chocolate, hot water, etc.

[2] The coffee service supplier must not provide fresh milk (04), napkins (O5) or cups (O6), but if these consumables are included in the service they shall comply with the relevant requirements of the criteria.

Bulk brewers and traditional espresso machines (fully or semi-automatic) may be included in the Nordic Swan Ecolabelled service if they account for no more than 30% of the coffee service supplier's set of coffee machines, within the Nordic Swan Ecolabelled coffee service. This is because bulk brewers and traditional espresso machines (fully or semi-automatic) are covered neither by the European Vending Association's Energy Management Protocol (EVA-EMP) or the DIN standard 18873-2 for energy measurement.

Capsule machines sold to professional and public environments are not covered by the Nordic Swan Ecolabelled coffee service. Coffee percolators, filter coffee machines and coffee machines for domestic use are not included either.

Consumables

Consumables means coffee, milk (powdered or fresh), cream, sugar, tea, chocolate, cups and napkins. The coffee service supplier must not provide fresh milk (04), napkins (O5) or cups (O6), but if these consumables are included in the service they shall comply with the relevant requirements of the criteria.

Nordic Swan Ecolabelled and non-Nordic Swan Ecolabelled services

The company that offers/sells the Nordic Swan Ecolabelled coffee service can offer other types of products that are not covered by the criteria for the Nordic Swan Ecolabelled coffee service. It is important that the company with the licence is clear in its communication and marketing about which service is Nordic Swan Ecolabelled.

Description of coffee machines

The design of the coffee machines may differ depending on the number of cups of coffee to be brewed. They also have different functions, which affects their design. They are connected to electricity and water supplies and normally have a water tank whose volume varies depending on the coffee machine's capacity. In the first version of the criteria the product group covers fully and semi-automatic coffee machines. A fully or semi-automatic coffee machine is a machine connected to electricity and water which is topped up with coffee and other consumables. They often offer different types of coffee drinks as options, as well as hot water for tea. These machines are on "stand-by" ready to quickly brew a cup of coffee for the user. There are also fully- and semi-automatic coffee machines/vending machines with a fridge attached where fresh milk is stored. Fresh milk is becoming increasingly popular for different types of milky coffee such as "latte", "macchiato" and "cappuccino".

Coffee machines for private use are not covered by the product group definition as the service not is geared towards public settings. From 1 January 2015 coffee machines for private use are covered by the EU's Standby Directive[3] which raises standards for the energy efficiency of these machines. Under the EU's Standby Directive, all kinds of coffee makers for private use, filter coffee makers and coffee makers such as espresso machines and capsule machines, will have to reduce their energy consumption by having an automatic function that turns them off, or puts them into standby or a similar mode when they have not been used for a certain amount of time[4]. The Standby Directive sets no requirements on the energy consumption of the brewing process itself. If the machine is sold for public environments, the Standby Directive does not apply[5]. Of these

[3] http://www.energimyndigheten.se/Foretag/Ekodesign/Produktgrupper1/Kaffemaskiner/
[4] http://www.energimyndigheten.se/Foretag/Ekodesign/Produktgrupper1/Kaffebryggare-hushall/
[5] E-mail correspondence, Johanna Whitlock, Swedish Energy Agency (11.02.2015)

machines, espresso machines and capsule machines are also found in public spaces (OCS). Coffee machines (fully and semi-automatic) in the Office Coffee Service (OCS) category that are sold to professional and public environments and which can also be tested under the European Vending Associations Energy Management Protocol (EVA-EMP) or the DIN standard 18873-2 for energy measurement are included under the criteria, but not capsule machines. The capsules are usually manufactured from aluminium, which imply a considerable amount of waste per brewed cup coffee, something Nordic Ecolabelling wants to avoid because it involves unjustified extra consumption of materials and resources in manufacture and waste management of the capsules.

A bulk (or urn-) brewer brews a large amount of coffee, 5 – 20 litres, in an insulated serving urn/container. As these brewers, and also traditional espresso machines, are not covered by the EVA-EMP protocol or the DIN 18873-2 standard for energy measurement these types of machines may not account for more than 30% of the coffee service supplier's set of coffee machines within the Nordic Swan Ecolabelled coffee service.

Justification for Nordic Swan Ecolabelling

Relevance, potential and steerability (RPS) analysis

The RPS analysis is based on a MECO analysis that was done for coffee machines during the preliminary study for catering equipment. The MECO analysis has been supplemented with information on the usage phase for coffee machines, which covers transport for the service, use of consumables and use of chemicals during operation of the coffee machine.

The RPS analysis for coffee services sets out the following aspects on which Nordic Ecolabelling is to focus its requirements:

- Energy consumption in the operation phase (coffee machine) – High RPS
- Consumables Food – High RPS
- Consumables Articles – High RPS
- Materials in the coffee machine – Medium RPS
- Transport in the usage phase – Medium RPS
- Quality assurance and hygiene requirements in the usage phase – Medium RPS
- Resources in the waste phase – Low RPS
- Chemicals in production – Low RPS
- Chemicals in the usage phase – Low RPS

In the areas with high RPS, Nordic Ecolabelling must have stringent requirements that make environmentally better products stand out. For those areas with medium RPS, Nordic Ecolabelling should have requirements that make better products stand out but careful consideration is required and the documentation burden for licence applicants must not be too heavy. For areas with low RPS, Nordic Ecolabelling must not set requirements unless there are very particular reasons to do so.

Below is a summary of the RPS analysis at this initial stage of the project.

Overall priority	Area and Level (high – medium – low) for R, P and S	Comments
High	**Energy – operation phase for the coffee machine** **High R, High P, High S**	RPS is high for the coffee machine's energy consumption in the operation phase. Having an energy-efficient coffee machine that uses less energy ensures a reduced environmental impact of the product/service. It is primarily in idle mode (the machine has heated up water ready to brew a cup of coffee) but also in making a cup of coffee that the coffee machine uses high amounts of energy. There are test methods to measure this energy consumption. The coffee machine can also be equipped with a program that shuts down the coffee machine when it is not normally being used. This is typically when the coffee machine is in an office where staff have fixed working hours. There are several types and models of coffee machine. Automatic or semi-automatic coffee machines can also include a fridge for fresh milk storage. It is important that the energy requirements cover all types of machines within the product group definition, irrespective of their design or specific options.
	Consumables in the usage phase (Food) **High R, High P, Medium S**	The consumables used in the coffee machine have high relevance. Coffee and other foods used in the coffee machine have a significant environmental impact and are also associated with considerable social implications. There is also high potential given the existing certification systems that exist in the Nordic market. There is a large existing market for organically labelled food, but also several alternative labelling systems for the environment and labour conditions for coffee, tea, chocolate and sugar. Steerability for ecolabelling has been set as medium as ecolabelling is dependent on certification systems over which ecolabelling has limited steerability. However, Nordic Ecolabelling does not currently have an opportunity to develop its own criteria for food, so this is the best system that is available. Certified organic coffee is roughly 10 – 15% more expensive and, depending on the market, more difficult to get hold of than conventional coffee, which can affect steerability.
	Consumables in the usage phase (Articles) **High R, High P, Medium S**	The same goes for non-food consumables that are covered by the coffee machines service. Relevance, Potential and Steerability are high in that there are ecolabelling criteria for paper products, filters, napkins and disposable food consumables. Access to certified/eco-labelled consumables is, however, judged to be lower than that of food. In total, this results in medium S. It is possible to set basic environmental criteria which exclude environmentally poor products and still create environmental benefits.

	Materials in coffee machines **High R, medium P, medium S**	The coffee machines components in contact with food (coffee container, water tank, pipes, tubes, etc.) may contain additives which are harmful to the environment and to health, such as plasticisers, flame retardants or lead. The coffee machine contains a large amount of metal. This is normally mainly stainless steel and aluminium plus potentially small amounts of brass components with lead content which can be in contact with foodstuffs. Metals that are limited resources are not used to any significant extent. Looking solely at the machine, this is important, but when we look at the entire coffee machine service, R is reduced somewhat. For this reason, medium R. Potential is medium as the coffee machine producer may have varying expertise on this and limited opportunities to influence the composition of materials in the coffee machine, as this involves components/parts manufactured by subcontractors. The steerability for an ecolabel to set requirements on additives in plastic parts is judged to be medium. Nordic Ecolabelling has experiences of requirements for additives in plastics from other product groups.
Medium	**Transport in the usage phase** **Medium R, medium P, low S**	Transport in the usage phase of the coffee machine is judged to have medium relevance. The greatest energy consumption in coffee machine services is the energy consumption of the coffee machine itself, and energy consumption for transport for service and topping up consumables in the usage phase is low by comparison (see Appendix 2). Transport as a whole in society, however, has a major impact on climate and the environment. It must also be pointed out that coffee service operators themselves identify transport as the main environmental burden related to their business. The potential for ecolabelling requirements on transport is judged to be medium, as there are transport vehicles with reduced environmental impact thanks to better renewable fuels and electric operation. Coffee service operators also optimise their customer visits to a relatively high extent in order to reduce transport between their customers, driven by a cost incentive. The steerability is assessed as low to medium as the conditions vary depending on how short the distances are between the service companies' customers. In densely populated areas, there are short distances between customers and it is possible to use electric vehicles with shorter reaches. Access, for example, to renewable CNG or charging stations for electric vehicles is limited and varies in the Nordic countries. It is recommended that the requirements for transport are basic for the vehicles used by the coffee service operator. Requirements on transport policy including education in Ecodriving, purchasing of environmentally friendly cars as well as a requirement for Euro 5 standard engines in the fleet are considered reasonable.
	Quality assurance and hygiene requirements **High R, Low P, Medium S**	Quality assurance and hygiene requirements for coffee machines are important for both flavour and hygiene as they handle food. The relevance is therefore high. The potential is considered to be low as the quality is not so great a problem that it affects the industry. Steerability for an ecolabel in this area is judged to be medium as an ecolabel can set requirements that the Nordic Swan Ecolabelled service's coffee machines must include regular servicing of the machine in order to ensure that the machines are cleaned regularly. The requirement should also cover the machine being subjected to regular service and health checks.

Low	**Resources – Waste phase** **Medium R, Low P, Low S**	The coffee machines contain metal, plastic and electronic components that can be collected, dismantled and recycled. This brings environmental benefits. The potential for this recycling is limited, however, as there is no concrete information on how coffee machines are recycled. Several companies claim, however, that coffee machines that have reached the end of their life and are disposed of are sent for electronics recovery, where the components are dismantled and source sorted. Nordic Ecolabelling has very limited steerability over how recovery takes place. It is possible to set ecolabelling requirements stating that the product must be able to be dismantled for recycling. However, these requirements are complicated to control. Due to the low RPS, however, Nordic Ecolabelling has chosen not to set requirements in the area of waste.
	Chemicals in the usage phase **Medium R, Low P, Medium S**	The use of chemicals in the usage phase generally only involves cleaning materials for the machine. The use of chemicals is relatively low, which is why the potential is judged to be low.
	Chemicals in production **Medium R, Low P, Low S**	The use of chemicals in the production of coffee machines is minor. Coffee machines as a rule consist of stainless steel, aluminium and plastic and coffee machines undergo surface treatment only to a little extent. The machines are possibly painted or stained when they are manufactured, but that is an isolated event and therefore it constitutes a very small part of the coffee service total environmental effect. Nordic Ecolabelling does not set any requirements on chemicals in production in the first generation criteria.

A Nordic Swan Ecolabelled coffee service

- Has energy efficient coffee machines
- Sets stringent environmental and health requirements on the coffee machine components in contact with food
- Guarantees a high proportion of organically certified coffee and other food consumables
- Sets stringent environmental requirements on consumable articles
- Is provided using energy and climate efficient transport
- Guarantees good quality assurance and hygiene requirements

Version and validity of the criteria

Nordic Ecolabelling adopted version 1.0 of the criteria for Coffee service on 5 November 2015. The criteria are valid until 31 December 2020.

The Nordic market

In the Nordic Countries we drink coffee produced of 8 – 12 kg coffee per person per year. Finland has the highest coffee consumption in the world. A large proportion of the coffee that is consumed is brewed in coffee machines at workplaces, in schools and restaurants and hotels. In Sweden 98% of workplaces provide coffee for their employees, as this is counted as a tax-free employee benefit.

It is primarily companies that offer services such as coffee in workplaces/offices that have shown an interest in ecolabelling the services they supply to workplaces and offices. Coffee services in the workplace are a growing market in the Nordic countries according

to the companies with which Nordic Ecolabelling has been in contact[6]. Coffee drinking and the requirements governing the coffee served in workplaces are increasing. Between 2008 and 2012 Swedish coffee machine operators increased their sales of consumables by approximately 60%[7].

As many people have become increasingly aware consumers of coffee in recent years, it is clear that there is also a demand for better coffee in the workplace. This sets higher requirements for employers to offer high quality coffee, which in turn leads to higher requirements for manufacturers of coffee and suppliers of coffee services. Serving environmentally certified coffee to customers and employees is seen as an important way of strengthening a company's environmental profile.

As a rule, coffee machines, ingredients and other products are manufactured by large international companies but the installation and servicing of the machines and deliveries of consumables are carried out by local contractors, known as operators. The operators are also known as vending companies but the vending industry covers vending machines for hot and cold drinks as well as food.

Sales, services and filling vending machines is generally run by local operators. The normal approach is for the operator to install the coffee machine and carry out servicing of the machine during operation. The operator also sells and delivers consumables (coffee, etc.) to the customer. Agreements may vary depending on who the customer is. In "total contracts" the operator really does manage everything and the customer only needs to put the cup in the machine and select a drink. There are several types of contracts and sometimes, e.g. a workplace can carry out daily cleaning and top up the machine with coffee but otherwise the operator provides coffee services, calibration and cleaning of the inside of the coffee machine (roughly once a month). Public companies or large companies generally buy a total solution, which means that a vending operator is responsible for the coffee machine completely, including installation, service and filling.

There are contracts where companies are only responsible for service and maintenance of the coffee machine/vending machine. In the HORECA (Hotel/Restaurant/Café) sector, customers often have their own purchasing channels for consumables such as coffee and may thus buy coffee themselves. There are, however, also customers in HORECA who buy the whole coffee machine service.

In the industry there is also a trend towards FM (Facility Management). This means that large companies manage the entire company's basic needs, such as cleaning, property service, lunch canteens and coffee machines. Major public procurement projects are more common for the state and county councils. These FM companies may in turn buy services from vending companies.

Producers, importers, service operators and suppliers in the Nordic market

Coffee machine manufacturers

Coffee machines are generally manufactured by large international companies. Sales, services and filling vending machines are generally provided by local vending operators.

[6] Coca Cola/Chaqwa, Nestle Nordic, Selecta, Beans and others.
[7] Information from vending.se (2014-11-13)

There are currently about 20 companies/brands that produce and sell coffee machines/ vending machines in the Nordic countries, a market where sales are an estimated approximately 300 000 machines a year. The machines are generally manufactured outside the Nordic countries. The producers deliver their machines to vending companies, HORECA and coffee roasting companies.

The producers of coffee machines for workplaces operating in the Scandinavian market are Electrolux (owned by Zanussi), WMF, Queen, Metos, Bravilor Bonamat and Faema.

Coffee machine operators/coffee service operators/service companies
The market for coffee machine operators/service companies who work with coffee machines can be described in several ways. The number of operators that install and maintain coffee machines can be calculated in several ways. Counting the number of private operator companies results in a considerably higher figure than if franchise concepts were counted. The number of coffee service operators who provide coffee machines, with servicing and consumables, is approximately 240[8] in Sweden, if we include every individual company, but if we look at the large franchise brands, there are about 30 company or franchise concepts that state that they offer operator services for coffee machines in Sweden. In Denmark the equivalent is approximately 20 companies or franchise concepts if we look at the companies that are members of the Danish industry organisation. In Finland there are approximately 10 coffee service operators or franchise concepts that offer coffee machines with servicing and consumables. We have no data from Norway but we estimate that the industry is at least the same size as that in Finland. The Swedish coffee service operator companies have a turnover of approximately SEK 2.8 billion[9]. If we scale up this turnover to estimate Nordic turnover proportionally with the number of operators, this is equivalent to an estimated approximately SEK 6 billion.

It is calculated that there are about 300 companies in the Nordic countries that offer coffee machines/vending machines as a service to offices, restaurants, hotels and cafés, etc. The coffee machine industry has a turnover of an estimated approximately SEK 10 billion in the Nordic countries[10].

All these operators offer what is known as a total concept in which the service covers coffee machine, service/maintenance and consumables. The majority of operators naturally provide different services that can be offered to customers. However, the scope of the service generally covers the entire product group, i.e. coffee machine + service/maintenance + consumables, but it can also be the case that some companies specialise in one or two of the three areas. According to information received from several companies, it is the consumables on which the companies have the biggest financial margin, so this aspect is generally one that companies want to include in the product or contract they have with their customers. This tends to mean that operators prefer to work with contracts that cover all three elements: coffee machine + service/maintenance + consumables.

It is common for large companies to have a coffee service concept where the operators work as a franchise. One example of this is Nestle Nordic which owns the Jede brand which is independent operators, but using machines and consumables from Nestle.

[8] Information from the Swedish industry organisation, Benny Pettersson vending.se
[9] Information from the Swedish industry organisation, Benny Pettersson vending.se
[10] Information on the coffee machine market comes from interviews with industry organisations and companies working across the entire Nordic market.

Nestle Nordic operates across the Nordic countries. Other examples of large coffee machine operators that run across all Nordic countries are Selecta, Autobar, In Cup and Chaqwa/Coca-Cola.

The data is limited as there are currently only organisations for operators, operator/vending companies in Sweden and Denmark[11]. Industry organisations in Sweden have data on their members' turnover but in Denmark the industry organisation does not gather the same data from its members. However, there is data from the European vending industry organisation that can be used to estimate the Nordic market. However, coffee services are a growing market so within a few years it is hoped that there will be industry organisations in all the Nordic countries or at least more detailed data on the market.

To estimate the size of the market, we can look at the number of coffee machines used at workplaces or public premises that are maintained and managed by coffee service operators. In Sweden there are approximately 90 000 coffee machines and in Denmark there are 50 000 coffee machines maintained by operators/coffee service companies (data from 2012)[12].

What steers retailers and end customers/purchasers/procurement?

What steers the market when purchasing coffee machines is primarily price, what the coffee tastes like and how fast a service the company offers.

The environmental issue is not as important in the current situation, but several vending companies point out that the environment and sustainability are becoming increasingly important among their customers. Most vending companies offer environmentally certified coffee and several of them think that they will be able to offer 100% certified coffee within the next few years. In contact that Nordic Ecolabelling has had with operators, it appears that the amount of certified coffee (irrespective of the certification system) in their range is 50-60%.

Few of the vending companies' customers ask about the environmental impact of the machine, however.

In public procurement there is currently very low interest in the environment. Here it is usually sufficient for suppliers to be accredited under ISO 14001. It is not particularly common for public clients to only buy or hire the coffee machine itself. Instead they purchase a function whereby a vending operator is responsible for installation, filling and servicing a machine. These in turn hire suppliers of vending machines, payment systems and content products. A large proportion of the drinks and goods provided via vending machines are also provided by the vending operator.

There are examples of national procurement criteria that work to promote eco-friendly coffee machines with associated services and products. The Swedish Competition Authority's procurement criteria for environmentally friendly drinks and goods vending machines, with associated services and products, which include coffee machines, is an example of this.

[11] Vending.dk and vending.se (13.11.2014)
[12] Vending.dk and vending.se (13.11.2014)

The environment as a competitive tool. Which environmental arguments are used in the industry?

Several of the companies that offer coffee machines to workplaces market themselves and provide information on their work for the environment and offer their customers environmentally certified ingredients for their coffee machines. Some companies also provide information on the energy efficiency of their coffee machines. However, the main focus is often on high quality coffee.

The major environmental issues when it comes to vending are that suppliers and operators seek products without additives, that the machines are resource-efficient, packaging is eco-cycle friendly and there is no unnecessary transport.

Packaging in the vending sector is constantly improved from an environmental and quality point of view. It is to do with reducing the use of natural resources, ensuring that packaging is easy to recycle and that as little energy as possible is used in manufacture, transport and recycling. The majority of products are packaged in 100% recyclable packaging. Vending machines are normally more than 90% recyclable.

There are coffee service operators within the coffee service sector that thinks that virtually all the coffee served in our workplaces will be certified and today's modern coffee machines are energy efficient. Areas where they think that Nordic Swan Ecolabelling can have the greatest environmental benefit is setting requirements on transport, packaging and the machines being recyclable.

Other labels

There is no other official type 1 ecolabel for coffee services on the Nordic market today. Several companies use their own labels or mention "eco-friendly" alternatives in their coffee services. For the ingredient coffee there are several certification systems that have been long established on the market. Four certification systems dominate the coffee market, organically grown coffee, Rainforest Alliance, Fairtrade Fairtrade/Fairtrade Labelling and UTZ Certified. The Fairtrade-certified label mainly focuses its criteria on labour conditions in coffee production. As coffee and other commodities such as tea and cocoa are produced in countries where labour conditions are and continue to be poor when measured against Nordic standards, labour conditions are an important issue for many coffee consumers.

There is a test standard for measuring the energy consumption of coffee machines in the usage phase. A test protocol has been drawn up by the European Vending Association (EVA). The results from the energy measuring protocol can be used to produce an energy rating level, which is expressed as an energy level of the machine in the scale between A++ and G, similar to Ecodesign requirements and related energy labelling requirements. See a more detailed description under 4.5 Energy requirements for the coffee machine.

Relevant legislation for the coffee machine

Coffee machines and coffee machine manufacturers are obliged to comply with the Regulation on materials and articles intended to come into contact with food (1935/2004/EC)[13]. The Regulation sets the requirement on materials intended to come into contact with food, that they must not transfer their constituents to food in quantities which could endanger human health, bring about an unacceptable change in the

[13] E-mail correspondence Cesare Bertuletti, N&W Global Vending (12.02.2015)

composition of the food or bring about deterioration in its taste and smell. It is the manufacturer or importer of the coffee machine who is responsible for ensuring that the material is suitable for use in contact with food[14]. In the only and for a coffee machine relevant material specific regulation 10/2011/EC, for plastics, there is a positive list of substances (for example monomers and additives) which are approved for use in plastic materials, with specific migration limits. The Regulation also sets requirements for migration tests which are to show that the substances may not leak out into the food over stated limit values.

There was, however, when these criteria were developed, no corresponding European regulation for metals and alloys, or rubber that are in contact with food - materials which may exist in a coffee machine and which may also come into contact with water or coffee.

Coffee machine manufacturers are also obliged to comply with the Low Voltage Directive (2006/95/EC) and the harmonised standards required for CE labelling in the sector.

The Restriction of Hazardous Substances Directive (RoHS) (2011/65/EU) seeks to reduce the risks to human health and for the environment by replacing mercury, cadmium, hexavalent chromium and flame retardants PBB and PBDE in electrical and electronic equipment with less hazardous alternatives or alternative technology. The RoHS Directive limits the content of these substances in electrical and electronic equipment[15].

Coffee machines for professional use are covered by the RoHS Directive. The RoHS Directive covers all components, including components that are not electrical/electronic, such as plastic covers. Internal cabling is also covered by the Directive. The requirement means that the coffee machine's components or homogenous materials may not contain more than 0.1% by weight of mercury, lead, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE). Each component or homogenous material in the coffee machine may not contain more than 0.01% cadmium by weight. The Directive gives in its Annex III, 6c, exemptions for copper alloys (for instance brass) regarding their lead content. According to the Directive these components may have a lead content up to 4 weight%. The RoHS Directive is also a CE labelling directive which refers to harmonised standards[16].

3 The development of the criteria

Purpose of developing the criteria

On 11 June 2014 the Nordic Ecolabelling decided to start developing criteria for coffee machines. A preliminary study for the area was conducted in spring 2014. The conclusion from the preliminary study is that this may be a suitable product group for ecolabelling. The criteria would include Nordic Swan Ecolabelling of both the coffee machine as a

[14] Swedish National Food Administration, Material i kontakt med livsmedel (Materials in contact with food) (16.02.2015)
http://www.slv.se/sv/grupp1/livsmedelsforetag/Lokaler-hantering-och-hygien/Livsmedelsforpackningar/#vem
[15] http://www.kemi.se/rohs, 22.01.2015
[16] European Commission, Enterprise and Industry, Restriction of the use of certain hazardous substances (RoHS) (24.02.2015) http://ec.europa.eu/enterprise/policies/european-standards/harmonised-standards/restriction-of-hazardous-substances/index_en.htm

product and the coffee machine as a service offered to workplaces and other areas where coffee or other hot drinks can be served.

The main aim of developing the criteria was to develop criteria for Nordic Swan Ecolabelling of coffee machines and coffee services. This aim was modified in autumn 2014 to cover coffee services. The risk that it will be difficult for the consumer to determine what is Nordic Swan Ecolabelled was considered to be high if both the coffee machine and the coffee service were to be ecolabelled. It must be clear who can apply for a Nordic Swan Ecolabel.

The project also had the subsidiary aims of specifying a product group definition, conducting an RPS analysis, and developing energy requirements for the operation of coffee machines, requirements concerning consumables, requirements concerning the materials in the coffee machines and quality and hygiene requirements. It was also considered important that the criteria can be used for licensing, in the sense that the requirements must be clear and it must be easy for producers to apply for ecolabelling.

About this criteria review/revision

The criteria development has been carried out as an internal project without an expert group but the project group has been in contact with external stakeholders in all Nordic countries during the development of the criteria. In addition to these contacts, the project group has 2015 been in contact with testing institutes to study the conditions for functional requirements (energy consumption per functional unit) and quality requirements.

List of project participants

The project began in autumn 2014 and was concluded in autumn 2015. The product group responsible was primarily Anders Moberg and was during the project replaced by Jimmy Yoler and later Caroline Karlsson from Ecolabelling Sweden. In the project, also Harri Hotulainen has acted as product adviser.

4 Justification of the requirements

The requirements that Nordic Ecolabelling sets in this first version of the criteria for coffee services have been selected based on the RPS analysis as summarised in section 2. In the areas with high RPS the requirements must be tough and clearly distinguish the best solutions or product choices for coffee services. This primarily concerns the requirements on the energy consumption of the coffee machine and consumables.

This chapter presents a proposal for requirements for criteria generation 1 while providing a justification for the requirement, which requirement level is proposed and possible limitations. The appendices referenced in the respective requirements are attachments to the document "Nordic Ecolabelling for Coffee Services".

4.1 Quality and environmental management requirements of the service

Written instructions

For the coffee machine to function well, it is important that it is maintained and serviced regularly by competent staff. A poorly maintained coffee machine can have higher energy consumption and produce coffee and drinks that do not taste good. Quality requirements

for service and maintenance are also hygienic requirements. If the coffee machine is not cleaned regularly, hygiene problems may arise as the machine deals with foodstuffs.

To ensure that the coffee machine maintains good quality, it is essential that coffee machine is regularly serviced/maintained.

Requirements that exclude substances that are harmful to the environment and to health in the coffee machine can also be seen as a quality requirement that safeguards food handling.

Written work instructions for cleaning/service of the coffee machine should therefore be available on site. This applies no matter who is doing the cleaning /service of the machine.

The work instructions must also include how exchange of parts is carried out. The written instructions must also contain recommendations for correct waste management of consumables and recommendations for the prevention of waste when dispensing drinks from the coffee machine.

These instructions must be as good as possible and contribute to compliance with the Nordic Ecolabelling criteria, in particular for spare parts/components (O13) and cleaning chemicals (O9 and O10).

Quality management requirements on the coffee service supplier
The coffee service supplier must provide assurance that there is a contact person responsible for the compliance of the licence as well as a contact person responsible for the contact towards Nordic Ecolabelling during planned changes or non-conformities of the service affecting the requirements.

Annual follow-up
To ensure that the coffee service supplier is complying with the ecolabelling requirements in the criteria document during the validity of the licence, it is required that the coffee service supplier carries out annual follow-ups. These annual follow-ups must include information according to the requirements in the criteria document that the annual follow-up is referring to. If the annual follow-up shows that conditions which have a bearing on the ecolabelling criteria (e.g. changes to coffee type, coffee machine, spare parts for the machine, replacement of cleaning chemicals, consumables, etc.) have changed, Nordic Ecolabelling must be contacted.

It is always the latest version of the annual follow-up that forms the basis for ensuring that the criteria are met. The requirements that shall be documented in the annual follow-up are:

- Requirement on consumables (O4 to O6)
- Requirement on cleaning chemicals(O9 to O10)
- Requirements on the coffee machine (O11 to O13)

O1 Written instructions

Written work instructions for cleaning/service of the coffee machine should be available on site. This applies no matter who is doing the cleaning /service of the machine.

The written instructions shall contain the information set out below:

- responsible: which role (s) is/are responsible for cleaning/service of the machine
- description: brief description of the task e.g. cleaning the machine or exchanging coffee machine parts such as tubes or pipes (spare parts must fulfil requirement O13).
- frequency: how often the tasks are to be carried out (e.g. every day, every week, every year, etc.)
- cleaning objects: which surfaces/components in the coffee machine are to be cleaned (e.g. floor, walls, components, etc.)
- cleaning chemicals that will be used (must fulfil requirement O9 and O10).
- The written instructions shall also contain recommendations for the proper disposal of consumables as well as recommendations for the prevention of spills when filling the beverage from the coffee machine.

The coffee service supplier must save and be able to demonstrate new and changed written instructions for Nordic Ecolabelling.

✉ Copy of relevant written instructions for cleaning/service as above.

O2 Quality management requirement

The coffee service supplier must designate a person responsible for the compliance of the Nordic Swan Ecolabel licence and a responsible contact person towards the Nordic Ecolabelling.

The coffee service supplier must ensure through procedures or instructions in a quality system that the Nordic Ecolabelling is contacted during changes and/or non-conformities affecting the ecolabelling criteria.

✉ Copies of procedures/ instructions ensuring that the Nordic Ecolabelling is contacted during changes and/or non-conformities.

O3 Annual follow-up

The coffee service supplier must through an annual follow-up ensure that the ecolabelling requirements are complied with during the entire validity period of the licence.

The annual follow-up shall be updated and available at the coffee service operator during the licence validity period.

If the annual follow-up shows that conditions have changed at the coffee service supplier affecting the ecolabelling criteria (e.g. change coffee, coffee machine, spare parts for the machine, replacement of cleaning chemicals etc.) the Nordic Ecolabelling shall be contacted. It is always the latest version of the annual follow-up, which forms the basis ensuring that the criteria are met.

The requirements to be included in the annual follow-up:

- Requirement on consumables (O4 to O6)
- Requirement on cleaning chemicals (O9 to O10)
- Requirements on the coffee machine (O11 to O14)

🔑 Upon control visit, it is checked that the documentation forming the basis of the annual follow-up, is recorded.

4.2 Consumables

Production of Consumables – Food

Looking at the environmental impact of coffee machines, we see that a considerable part of the environmental impact of their life cycle comes from growing and processing coffee[17]. Coffee growing/production is a well-known area with prerequisites for environmental improvements. For coffee machines it is highly relevant to set requirements for the consumables used in the coffee machine, particularly for the ingredient coffee, where there are established certification systems for sustainable growing and processing. The consumables used for coffee machines consist of the consumables that are used to produce the drinks that are in the coffee machine's menu. These are products such as coffee, tea, chocolate, milk and sugar. The production of these foodstuffs has an environmental impact that varies depending on the type of foodstuff in question.

Approximately 1,6 billion cups of coffee a day are drunk worldwide[18]. Coffee production has a negative impact on the environment in several ways. The environmental impacts mainly come from deforestation of land to prepare for growing, soil deterioration/exhaustion, use of pesticides and deteriorated water quality and hydrology. The greatest environmental impact arises from converting natural forest to conventional coffee plantations.

Around the world approximately 70 000 cups of tea are drunk per second and it is estimated that more than 50 million people are employed within the tea industry, primarily in many of the world's poorest countries in Asia and Africa. Living and working conditions for the many employees on tea plantations have been documented as being poor[19].

In coffee machines chocolate drinks are often offered in parallel with coffee drinks, or mixtures. Chocolate is made from cocoa. Cocoa growing provides important income while the organic and social consequences are often high. The low global market price of cocoa makes the life of cocoa producers insecure. For countries dependent on cocoa exports, such as the Ivory Coast and Ghana, the low prices are a major problem. Cocoa growing uses a large amount of artificial fertiliser and pesticides. Intensive growing also risk exhausting and eroding the soil[20].

Certified coffee is showing strong growth, from formerly being a niche product to a widespread phenomenon. In 2009 certified coffee accounted for 8% of global trade, the same report estimated that with the same rate of growth, 20-25% of the global coffee trade would be certified in 2015, where the Nordic countries are viewed as having higher consumer awareness of certified coffee[21]. For example, one survey showed that[22] 78% of all coffee purchased by consumers in the USA is double-certified (Fair Trade and sustainability labelled).

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[17] Uppfinnaren och konstruktören ("The Inventor and Constructor") 3/2010, "Ekodesign för konkurrenskraft i ett hållbart samhälle" ("Ecodesign for competitive advantage in a sustainable society")
http://www.swerea.se/Global/Swerea%20IVF/PDF-filer/Artiklar%20fran%20IVF/konstr_3-10.pdf
[18] D. Bello, A. Westerberg, "Hotet mot din kaffekopp" ("The threat to your coffee cup") We Effect (2014)
[19] Fairtrade, "Te", (2015-03-16)
http://fairtrade.se/produkter/te/
[20] International Cocoa Organization (ICCO) FAQ, (2015-03-16)
http://www.icco.org/faq/56-environment/120-what-are-the-effects-of-intensive-commercial-production-of-cocoa-on-the-environment.html
[21] International Trade Center (ITC), Technical Paper: Trends in the Trade of Certified Coffees (2011)
[22] A. Byers "Adding Value: Certified Coffee Trade in North America"

Fresh milk must not be included in the Nordic Swan Ecolabelled coffe. If fresh milk is included it shall comply with the relevant requirements of the criteria.

Requirements for food and food products

Requirement for organic certification

The environmental impact from using and above all producing food is huge. Many measures can also be carried out to reduce environmental impact. An LCA of restaurants that has been used as a basis for the Green Seal's environmental labelling criteria in the USA showed that food had the highest environmental impact in a restaurant. Food production uses energy, and artificial fertiliser and herbicides are often used. In Finland, approximately 50% of emissions of nutrients and 9% of emissions of greenhouse gases come from agriculture Energy consumption, for example, from fridges and in food preparation had a comparatively insignificant impact on the restaurant's total life cycle impact. This is relevant information also for coffee and other food that is not stored in refrigerated conditions. One of the most important measures for reducing the environmental impact of food in restaurants is reducing the amount of waste, i.e. food that is thrown away. For coffee machines this is not a problem in the same way, as a cup of coffee (or other drink) is only brewed when it is wanted. It is also often possible to choose a large or small cup of coffee or to control the strength of the coffee drink, which also reduces waste.

By focussing on the use of organic food, the environmental impact from serving coffee can be reduced.

The background document to Ecolabelled Hotels, Restaurants and Conferences Version 4 contains detailed descriptions of food's environmental impact. This concerns environmental problems linked to agriculture – e.g. energy consumption, herbicides, eutrophication, greenhouse gas emissions, use of genetically modified organisms (GMOs) – production/processing of food, transport, cooling and freezing, and preparation. The report "Trouble Brewing" by Greenpeace shows the presence of pesticides, evaluated by the World Health Organization as moderately to very hazardous, in tea from known tea brands[23]. Of the 49 tea brands which were tested also DDT in amounts above the detection limit was found in 67% of the samples, although DDT has been forbidden in India since 1989. Greenpeace has made a similar report on tea from China in 2012.

Nordic Ecolabelling therefore chooses, as with other criteria documents (such as Hotels, restaurants and conferences) to require compliance with the European Regulations (EC) No. 834/2007, (EC) No. 889/2008 and (EC) No. 1235/2008 for organic production, import and labelling, which is assured by the European certification schemes. For products to be able to be labelled as organic, at least 95% of the products' ingredients must be organic[24]. For coffee services Nordic Ecolabelling requires that 90% of the coffee delivered by the Nordic Swan Ecolabelled coffee service must be organically certified, counted per kg.

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[23] Green Peace. Trouble Brewing. 2014. http://www.greenpeace.org/india/Global/india/image/2014/cocktail/download/TroubleBrewing.pdf (downloaded 25.03.2015)

[24] Swedish Food Agency, Märkning av ekologisk mat (Organic food labelling) (16.02.2015): http://www.livsmedelsverket.se/livsmedel-och-innehall/ekologisk-mat1/?_t_id=1B2M2Y8AsgTpgAmY7PhCfg%3d%3d&_t_q=ekologisk+95%25&_t_tags=language%3asv%2csiteid%3a67f9c486-281d-4765-ba72-ba3914739e3b&_t_ip=193.14.171.131&_t_hit.id=Livs_Common_Model_PageTypes_ArticlePage/_335adc2d-a469-43f8-a90a-33b238238c91_sv&_t_hit.pos=1

In contact that Nordic Ecolabelling has had with coffee service operators in Sweden and Finland, it appears that certified coffee (irrespective of the certification system) in their range amounts to approximately 50-60% of the total range. However, operators have pointed out that the picture is not the same for consumer foodstuffs that are not coffee, stating that in the Finnish market, for example, there is a lack of third-party certified powder products. This is also confirmed by a consultancy report commissioned, which shows low or no figures at all for Finnish sales of organic coffee/tea/cocoa[25].

For an ecolabel as the Nordic Swan Ecolabel, environmental impact outweighs possible social effects. It is in this context important to point out that the ecological requirements also have indirect positive social consequences such as less exposure to toxic pesticides among farmers. Nordic Ecolabelling considers it reasonable that in a Nordic Swan Ecolabelled coffee service require at least 90% certified coffee and at least 50% certified organic other consumable foodstuffs (tea, chocolate, sugar, milk and cream) that are delivered in the Nordic Swan Ecolabelled coffee service, calculated per kg. For some coffee service operators in the Nordic countries the requirement may today be tough to reach, however, Nordic Ecolabelling wishes to influence the development.

Requirements for labels for social responsibility

There are social and/or ethical problems associated with the production and cultivation of food consumables in a coffee service. The development organisation We Effect describes in their report that 80% of the world's coffee is produced by small farmers who depend on coffee production for their livelihood and thus are very sensitive to the coffee market's major price fluctuations, which in turn affects them and their families' opportunities for livelihoods and development[26]. Also the low world market price of coffee slows down the development of working conditions for small-scale coffee growers, according to a report from the Swedish audit organisation Swedwatch[27].

The price of cocoa is also very low in relation to production costs, which in turn contributes to a low profitability for coffee farmers and workers. Cocoa production in West Africa is also associated with youth- and forced child labour as well as trafficking and smuggling of labour between neighbouring cocoa farms. Even harmful child labour, such as heavy lifting, working with machetes, handling of hazardous pesticides etc. are identified with cocoa cultivation according to Swedwatch[28].

China and India are producing more than half of the world's total tea[29]. Living and working conditions for employees at tea plantation are documented as poor. Environmental and human rights organisation Accountability Counsel show cases from India with inhuman working conditions such as long working hours, inadequate compensation,

[25] Bioforsk Rapport, Vol.9 Nr.139 (2014), Økologisk mat i de nordiske landene – tilgang på råvarer og faktorer som påvirker omsetning av økologisk mat (Organic food in the Nordic countries - access to ingredients and factors affecting the sale of organic food)
[26] D. Bello, A. Westerberg, "Hotet mot din kaffekopp" ("The threat to your coffee cup"), We Effect (2014)
[27] Swedwatch, "Etik för dyrt för svenska kaffebolag - En uppföljningsrapport om kaffe från Brasilien" ("Ethics to expensive for Swedish coffee companies - A follow up report about coffee in Brazil"), rapport nr.35, 2010 http://www.swedwatch.org/sites/default/files/swedwatch_-_etik_for_dyrt_for_svenska_kaffebolag.pdf
[28] Swedwatch, "Chokladens mörka hemlighet - En rapport om arbetsvillkoren på kakaoodlingarna i Västafrika" ("The chocolates dark secret - A report about labour conditions in cocoa farms in West Africa"), rapport nr.12, 2006 http://www.swedwatch.org/sites/default/files/swedwatch_-_chokladens_morka_hemlighet.pdf
[29] Tea, Wikipedia (17.03.2015)

poor hygiene and health conditions, extortion of workers and disabling of freedom of association[30].

Therefore, Nordic Ecolabelling considers it important to require that a proportion of the consumable food delivered with the Nordic Swan Ecolabelled coffee service, is labelled with labels for social responsibility.

Labels for social responsibility such as UTZ, Fair Trade (FT) and Sustainable Agriculture Network-Rainforest Alliance (SAN-RA)[31]32, are examples of labels working to reduce social and ethical problems in the production of consumable foodstuffs associated with coffee services. These follow a number of ILO Conventions and the Convention for Biodiversity[33],[34] are full members of the International Social and Environmental Accreditation and Labelling Alliance (ISEAL)[35] and follow their Codes of Good Practice[36] – internationally seen as a reference for developing credible standards.

Nordic Ecolabelling estimates that labels for social responsibility can make a difference. In an ecolabel as the Nordic Swan Ecolabel however environmental impacts outweighs possible social impacts and since the Nordic Swan Ecolabel is an ecolabel ecological requirements are more in focus compared to social/ethical requirements. The percentage of certified organic food products is therefore higher than products labelled under a label for social responsibility. It is in this context however important to point out that ecological requirements also have indirect positive social consequences such as less exposure to toxic pesticides among farmers.

Nordic Ecolabelling therefore chooses to set a requirement that at least 30% of the coffee and 10 % of the other delivered consumable foodstuffs, calculated per kg, in the Nordic Swan Ecolabelled coffee service, must be labelled under a label for social responsibility according to an approved certification scheme complying to the requirement below:

1) Fully members of the International Social and Environmental Accreditation and Labelling Alliance (ISEAL) to ensure credible standards development,
2) Third party certification (certification shall be performed by a competent, independent third party),
3) Must follow a standard having ethical/social requirements on labour and working conditions in the production.

[30] Accountability counsel, "India: Tata Tea in Assam" (17.03.2015)
http://www.accountabilitycounsel.org/communities/current-cases/india-tata-tea-in-assam/
[31] In the coffee market, three established sustainability labels/certification schemes, that use third-party verification and are considered to set requirements on the producer and the chain and are also verified by GISCO (German Initiative for Sustainable Cocoa).
[32] Panhuysen & Pierrot, Coffee Barometer 2014
https://hivos.org/sites/default/files/coffee_barometer_2014_report_1.pdf
[33] A Charter of Fair Trade Principles (2009), World Fair Trade Organization and Fairtrade Labelling Organizations International
[34] International Trade Center (ITC); Standards Map- comparison UTZ, SAN-RA, FairTrade International (21.01.2015)
http://www.standardsmap.org/quick-scan?standards=66,62,71&shortlist=66,62,71&product=Coffee&origin=Any&market=Any&cbi=78:78:755
[35] Iseal Alliance, Full Members (21.01.2015)
http://www.isealalliance.org/our-members/full-members
[36] Iseal Alliance, Our Codes of Good Practice (21.01.2015)
http://www.isealalliance.org/our-work/defining-credibility/codes-of-good-practice

Certification schemes which are considered to fulfil the above requirements are UTZ Certified, Fair Trade and Sustainable Agriculture Network - Rainforest Alliance (SAN RA).

Food products certified in accordance with labels for social responsibility can have different proportions of certified content (food products with a certified content of between 30-90% can be labelled)[37,38]. In order to ensure food products with high certified content delivered to customers in a Nordic Swan Ecolabelled coffee service Nordic Ecolabelling requires that food products, certified with a label for social responsibility, have a certified content of at least 90%.

The consultation responses on the requirement concerning certified food products related to the certified proportion of the organic coffee and the certified proportion of other food products The responses concerned the level of the proportions and ranged from them being far too strict (and costly) to being set at a reasonable level. There were also comments and questions on how the proportions would be calculated for the coffee service as a whole. Nordic Ecolabelling is confident that although the requirement concerning the proportions may be considered tough, over the long term the requirement is realistic and ecologically justified. Nordic Ecolabelling therefore chooses to keep the certified proportions set out in the consultation version. Nordic Ecolabelling also chooses to clarify areas that were highlighted as being unclear.

Production of Consumables – Articles

Consumables termed articles in the section mean napkins and cups supplied by the coffee service company that are not food. Napkins and cups are considered the most relevant to regulate as these non-food consumables have the highest turn-over in coffee services according to the information Nordic Ecolabelling has received from coffee service operators. Nordic Ecolabelling has experience on how to create criteria for these products through separate criteria for paper products and disposable items for food. Detailed descriptions of these products environmental problems and possibilities of setting environmental and health requirements for them can be seen in the criteria for Disposables for food, version 3.2 and the criteria for Tissue paper, version 5.3.

Ecolabelled napkins

The Nordic Ecolabelling's environmental requirements for these types of paper products covers everything from forestry and the choice of raw materials to low energy consumption and low carbon emissions, cleaning emissions to air and water and control of the use of chemicals and eutrophying and acidifying substances such as sulphur and nitrogen oxides.

Ecolabelled tissue used for napkins means that the fibre comes from sustainable forestry and/or recycled paper. Labelling only with the PEFC or FSC logo is not sufficient as these labels only cover the raw forest material. Paper labelled with the Nordic Swan Ecolabel or the EU Ecolabel ensures that, as well as the raw forest material, the manufacturing process has low emissions to air and water. It is manufactured with efficient energy consumption and a limited amount of chemicals.

[37] UTZ Certified, "UTZ Certified Chain of Custody for Tea and Rooibos" (2011)
[38] Rainforest Alliance, "Requirements and Guidelines for Use of the Rainforest Alliance Trademarks" (2014)

During the criteria development of coffee services only napkins with either the Nordic Swan Ecolabel or the EU Ecolabel were available among non-food consumables related to coffee services[39].

Napkins must not be included in the Nordic Swan Ecolabelled coffe. If napkins are included they shall comply with the relevant requirements of the criteria.

Requirements for disposable cups

During the criteria development, there were no disposable cups ecolabelled, but a potential ecolabelled cup (through the criteria for Disposables in contact with food) will comply to very high environmental and health requirements verified by third party. Nordic Ecolabelling therefore chooses to reward ecolabelled disposable cups and also require that non ecolabelled disposable cups contain a high proportion of renewable raw materials delivered in the coffee service. A high proportion of renewable raw materials ensure an environmentally sound use of natural resources that are renewable in contrast to finite fossil raw materials. Increased use of renewable raw materials also helps to reduce dependence on fossil raw materials, and has a positive impact on the climate issue. Renewable raw materials do not, in themselves, contribute to an increase in emissions of greenhouse gases, since the carbon dioxide (CO2) released during the waste phase is biogenic.

The requirement is set on the disposable cup and not on any cover/lid/cap supplied with the cup.

Renewable raw materials are defined as biological material reproduced in nature. This includes the degradable part of the product, waste and residues from agriculture and fish farming (both vegetarian and animal), sustainable forestry and related industries as well as the biodegradable fraction of industrial and municipal waste.

Disposable cups must not be included in the Nordic Swan Ecolabelled coffe. If disposable cups are included they shall comply with the relevant requirements of the criteria.

O4 Requirements for certified food products

The requirement concerns the food products (counted per kg) delivered in each customer agreement in the Nordic Swan Ecolabelled coffee service.

- At least 90 weight% of the coffee must be organically certified*.
- At least 50 weight% of the tea, chocolate, sugar, milk (powdered milk and/or fresh milk[40]) and the cream must together be organically certified*.
- At least 30 weight% of the coffee must be certified under a label for social responsibility**. These products must have at least 90% certified contents.
- At least 10 weight% of the tea, chocolate and sugar must together be certified under a label for social responsibility**. These products must have at least 90 weight% certified contents.

[39] Commission Decision (July 2009) establishing the ecological criteria for the award of the Community Eco-label for tissue paper

[40] Fresh milk must not be included in the Nordic Swan Ecolabelled coffe. If fresh milk is includedit shall comply with the relevant requirements of the criteria.

** Organic food means food products certified under the EU Regulations (EC) No. 834/2007, (EC) No. 889/2008 and (EC) No. 1235/2008, e.g. EU organic farming, KRAV, Luomu, Debio, Statskontrollerat ekologiskt (Ø-märket) and Tún-lífrænt.*

*** Label for social responsibility means food products certified under certification schemes complying with the requirements according to appendix 3.*

As long as the licence is valid the requirement shall be met through the annual follow-up, requirement O3.

At the time of application:

✉ A calculation of the share of food products certified according to organic certification and/or labels for social responsibility delivered in each customer agreement in the Nordic Swan Ecolabelled coffee service. For all food products, name of the producer, supplier and type of certification/label shall be reported.

O5 Requirement for napkins

The requirement applies if the napkins are included in the Nordic Swan Ecolabelled coffee service. The napkins that are includedin the Nordic Swan Ecolabelled coffee service must be ecolabelled. Ecolabelled means a product labelled with the Nordic Swan Ecolabel or the EU Ecolabel.

As long as the licence is valid the requirement shall be met through the annual follow-up, requirement O3.

At the time of application:

✉ Name and licence number of the ecolabelled napkin that is delivered with the Nordic Swan Ecolabelled coffee service.

O6 Requirement for disposable cups

The requirement applies for disposable cups that are included in the Nordic Swan Ecolabelled coffee service.

The disposable cups that are included in the Nordic Swan Ecolabelled coffee service shall be Nordic Swan Ecolabelled or fulfill the requirement below. The requirement applies only for the cup and not any cover or lid.

At least 90% by weight of the material in the cups delivered with the Nordic Swan Ecolabelled coffee service must be produced from renewable materials*.

An exception is made for non-organic filler material which can be used up to 20% weight of a disposable article. A maximum 10% by weight of the disposable article may consist of additives, surface treatment and adhesives produced from non-renewable material. In total, therefore, filler material and other non-renewable material may amount to a maximum of 30% by weight of the disposable article.

Renewable raw materials are defined as biological material reproduced in nature. This includes the degradable part of the product, waste and residues from agriculture and fish farming (both vegetarian and animal), sustainable forestry and related industries as well as the biodegradable fraction of industrial and municipal waste.

As long as the licence is valid the requirement shall be met through the annual follow-up, requirement O3.

At the time of application:

✉ Declaration from the cup supplier regarding the proportion renewable raw materials in the cups included in the Nordic Swan Ecolabelled coffee service.

✉ Name and licence number of the ecolabelled cup that is included in the Nordic Swan Ecolabelled coffee service.

4.3 Transport

Transport takes place at several points in the life cycle of coffee services. Raw materials must be transported to produce materials and components for the finished coffee machine and then the coffee machine itself must be transported. This is relevant when viewing the coffee machine as a service as the service covers service and maintenance of the coffee machine and deliveries of consumables.

It is important for the Nordic Ecolabelling to set requirements where the environmental impact is considerable. Energy consumption coupled to the transport needed in order to install the coffee machine, carry out service/maintenance of it and deliver consumables to it, has a relatively low relevance compared to the coffee machine's electricity consumption. A calculation of the energy consumption in transport for installation, service/maintenance and delivery of consumables for coffee machines has been carried out (for details see Appendix 1). Calculated energy consumption of this transport for 240 000 coffee machines in the Nordic Countries is 180 billion kWh (650 billion MJ). This is equivalent to an energy consumption of approximately 15 kWh per week per machine. Compared with the coffee machine's electricity consumption in operation, energy consumption for transport amounts to approximately 20%. Electricity consumption of one coffee machine is approximately 70 kWh per week, based on information from the Swedish Energy Agency. The above energy consumption is primary energy with a primary energy factor of 2.5 for electrical energy.

This indicates that there is no justification to set stringent requirements for transportation in Nordic Swan Ecolabelled coffee services, as opposed to Nordic Swan Ecolabelling for cleaning services whose RPS motivates extensive requirements on transport, where a requirement for maximum fuel consumption per kilometre is set for instance.

The distances between the customers of coffee service supplierss can vary considerably depending on whether operations take place in a densely or sparsely populated area. Driving on highways generally involves less braking and fewer accelerations due to traffic lights and traffic jams, which leads to lower fuel consumption. Consumption increases, however, in proportion to higher speeds, which tend to occur when driving on highways/motorways. Coffee service operators also use lighter service vehicles and heavier delivery vehicles.

The abovementioned pre-requisites makes it challenging for the Nordic Ecolabelling to set a uniform requirement for fuel or energy consumption per functional unit (e.g. per kilometre) for transports in conjunction with service of the machine or deliveries of consumables. The Nordic Ecolabelling wishes, however, to evaluate the opportunities to develop a requirement for energy efficient transports through a maximum fuel consumption requirement in the forthcoming revision of these criteria.

The following requirements (O7 and O8) apply to all vehicles used for coffee service. It applies both to vehicles that are owned and leased. The requirements do not apply if the transport is performed by an external transport company when the steerability of such a requirement is low.

Alternative fuels and electric cars

Alternative (renewable) fuels reduce the CO_2-emissions. The use of biofuels is not solely positive or unproblematic from an environmental point of view. The environmental

impacts of renewable vehicle fuel are greater than solely emissions from combustion from the vehicle itself. It is important to take into account carbon dioxide emissions when manufacturing the renewable fuel. The production of renewable raw materials for fuel has an impact on food production and forestry depending on the source of the fuel.

Alternative renewable fuels and electric vehicles can be used for transport in the coffee service. Several of these alternative renewable fuels and electric vehicles provide a reduction in CO_2-emissions linked to transport.

The development of electric cars is strong at the moment and it is expected that there will be more electric cars in the Nordic countries in the years ahead. Today's electric cars currently have reduced energy consumption in comparison with petrol vehicles. Electric cars use approximately 50% less energy than petrol cars in city driving. Electricity can be produced with many energy sources and simultaneously provide efficient use for the transport sector. Electric cars do not cause emissions and an increased proportion of transport using electric vehicles gives rise to a reduction in air pollution, which is a problem in city environments. Electric vehicles also provide a reduction in noise as they have low noise levels[41].

There are several examples of coffee service companies that use transport vehicles running on gas and electricity. The existence and use of these vehicles varies considerably between different companies and also in the Nordic countries. The availability of vehicles with alternative fuels to petrol and diesel differs in the different Nordic countries. Access to filling stations for electricity and gas is also very different in the Nordic countries and within the individual Nordic countries.

There are criteria for Nordic Ecolabelling of vehicle fuels which set requirements in the above areas. Access to Nordic Swan Ecolabelled vehicle fuel is very low in the Nordic countries so it is unfortunately not possible to set requirements, for example, on a certain proportion of Nordic Swan Ecolabelled fuel. Today there are only two Nordic Swan Ecolabelled fuel in the Nordic countries. Nordic Ecolabelling, however, hopes that availability will increase, making Nordic Swan Ecolabelled fuel accessible to more people. The Nordic Ecolabelling chooses therefore not to set requirements on alternative fuels.

Requirement on Euro standards for transport vehicles

All vehicles sold in the EU must comply with the Euro standards, whatever their make. The Euro standards have limit values for emissions from vehicles that pollute the air (NO_x, HC, CO and particles). The Euro 4 standard entered into force in October 2005 and today all new heavy vehicles must meet the requirements stated in Euro 5, which entered into force on 1 January 2011 for lighter vehicles (maximum 3,5 tonnes) and 2009-10-01 for heavier vehicles (above 3,5 tonnes). The most usual transport vehicles used among coffee service operators are service and delivery vehicles, within the N1 category.

The Euro 6 standard applies:

from the 1 of September 2014 for the approval and from 1 September 2015 concerning the registration and sale of new types of vehicles from 1 September 2015 in relation to register and selling new vehicle types N1 (light commercial vehicles), class I (vehicles <1305 kg).

[41] Elbiler i Danmark (Electric cars in Denmark), Environmental project No. 1006, 2005 MST.

from 1 September 2016 for N1, Class II (vehicles 1305 kg – 1760 kg) and

from 1 September 2016[42] for N1, Class III (vehicles >1760 kg)[43]

For all vehicles with diesel engines, emissions of nitrogen oxides will have to be considerably reduced when the Euro 6 standard enters into force. For example, the limit for emissions from vehicles in the M category (personal transport) and the category N1/class I (goods transport) is set at 80 mg/km (a further reduction of just over 50% compared with the Euro 5 standard). The limit value for total emissions of total hydrocarbons and nitrogen oxides from diesel vehicles is also lowered. For vehicles in the category M (personal transport) and the category N1 class I (goods transport) the limit is lowered to 170 mg/km.

Nordic Ecolabelling has chosen to set a requirement that 95% of the transport vehicles used for the coffee services must meet the Euro 5 standard as a minimum. This means that the coffee service company must have a fleet that consists of modern vehicles with low emissions of NOX, HC, CO and particles, which is essential in the urban environments in which the vehicle operates. The reason that the requirement sets 95% is to facilitate the conversion of vehicles that do not meet the requirement. It is not considered reasonable to set requirements for Euro 6 standard engines for the fleet of coffee service operators as the majority of the operators' vehicles consist of service vehicles, e.g. of the type VW Caddy with a weight of > 1760 kg or between 1305 kg – 1760 kg. The plan for completion of the criteria document was set at autumn 2015, which would be earlier than the date set for registration and sales of new such vehicles in line with Euro 6.

Requirement for transport policy

The Nordic Ecolabelling considers it important to set requirements for transport policy at the coffee service supplier. It shall ensure training in ecodriving that owned or leased vehicles must undergo regular maintenance and that driving is as efficient as possible. It shall also ensure that purchase of new vehicle must have low fuel consumption and tires with low rolling resistance.

The idea behind Ecodriving, or the equivalent environmentally friendly driving method, is that energy-friendly driving can reduce fuel consumption and thus CO2 emissions. Ecodriving is applicable to all motor vehicles, personal vehicles and freight vehicles. In brief, it can be said that Ecodriving means an energy-efficient driving style in which speed and acceleration are adapted such that there is no need for unnecessary braking or acceleration. Predicting and reading the traffic makes this easier. It also involves choosing engine load and gears so that the vehicle's engine works as energy-efficiently as possible. Energy-efficient driving can be said to be a combination of mental attitude and know-ledge of optimum vehicle handling. Drivers can be trained in Ecodriving in the Nordic countries.

A trend can be seen in the Nordic countries where conventional fossil fuels are replaced or mixed with renewable raw materials. Examples of mixes are biogas mixed with CNG (compressed natural gas) and petrol mixed with ethanol.

[42] Summaries of EU legislation, Reduction of pollutant emissions from light vehicles (2015-02-12) http://europa.eu/legislation_summaries/environment/air_pollution/l28186_en.htm
[43] TransportPolicy.net, EU Vehicle Definitions (2015-02-12) http://transportpolicy.net/index.php?title=EU:_Vehicle_Definitions

O7 Transport requirement

At least 95% of all vehicles used for transport for coffee services must comply with the Euro 5 standard.

The requirement covers all suppliers' own and leased vehicles used for driving in conjunction with the coffee service.

A vehicle which meets Euro 6 also meets the requirements of Euro 5. Electric cars meet the requirement.

At the time of application:

☒ A list of all vehicle registration number and year of production used in the coffee service

☒ Calculation of the percentage Euro standard 5 vehicles of the total number of vehicles used in the coffee service.

O8 Transport policy

The following policy must be in place for the suppliers' own and leased vehicles used for driving in conjunction with the coffee service (delivery and installation of the coffee machine, service and maintenance and consumables for the coffee machine).

- All drivers involved in driving in the coffee service must have completed a course in eco-driving/economical driving. Procedures must be in place to ensure that new employees complete the course no later than 6 months after being employed.
- The vehicles must undergo regular servicing.
- When new vehicles are purchased, vehicles with low fuel consumption and tires with low resistance (energy marking of tyres) must be rewarded.
- How driving is to take place as efficiently as possible in terms of distance and use of capacity.

At the time of application:

☒ A copy of transport policy which contain the above as a minimum

☒ Declaration from the course provider stating that the drivers have completed a course in eco-driving/economical driving and procedures describing how the business ensures that newly employed drivers complete training within 6 months.

4.4 Chemicals in the usage phase

Environmental requirements on coffee machine cleaning chemicals

Through requirements on environmental and health classification of cleaning products Nordic Ecolabelling ensures that products that are toxic or hazardous to the environment and health cannot be used for the maintenance and / or cleaning the coffee machines in Nordic Swan Ecolabelled coffee services.

The classification “very toxic” has been included so as to close the door on products with such a classification and because these are chemicals that are used. Nordic Ecolabelling does not believe that there is any great risk of products classified as very toxic entering the market, but has still opted to retain the requirement.

Nordic Ecolabelling also chooses to have a requirement of excluded chemical substances in the cleaning products used for maintenance and cleaning of the coffee machine. The requirement follows the Nordic Ecolabelling's policy for environmental and hazardous substances (regulates presence of CMRs, endocrine disruptors, PBT / vPvB substances or SVHC candidate listed substances). The requirement harmonises with the criteria for

the product group Hotels, restaurants and conference facilities version 4.3. In-depth background information and justification for the requirement are found in the background document for this product group.

O9 Requirement for cleaning chemicals, classification

The coffee service supplier must recommend/supply cleaning products for the coffee machine. This concerns cleaning carried out by the user/customer and the service company's own staff.

The cleaning chemical must not be classified according to Table 1 below, in line with the CLP Regulation 1272/2008 with subsequent amendments (see Table 1 below):

Table 1: Classification of the product

Classification according to CLP Regulation 1272/2008	
Hazard class	Hazard statement
Hazardous to the aquatic environment	Category acute 1 with H400 Category chronic 1 with H410 Category chronic 2 with H411 Category chronic 3 with H412 Category chronic 4 with H413
Acute toxicity	Category 1 or 2 with H300, H310 and H330 Category 3 with H301, H311 and H331 Category 4 with H302, H312 and H332
Specific target organ toxicity (STOT) with single and repeated exposure	STOT SE category 1 with H370 STOT SE category 2 with H371 STOT RE category 1 with H372 STOT RE category 2 with H373
Aspiration hazard	Category 1 with H304
Respiratory or skin sensitisation	Category 1, 1A or 1B with H334 Category 1, 1A or 1B with H317
Carcinogenicity	Category 1A and 1B with H350 Category 2 with H351
Mutagenicity	Category 1A and 1B with H340 Category 2 with H341
Reproductive toxicity	Category 1A and 1B with H360 Category 2 with H361 Additional category for effects on or via lactation with H362

Be aware that responsibility for classification lies with the cleaning chemical manufacturer.

As long as the licence is valid the requirement shall be met through the annual follow-up, requirement O3.

<u>At the time of application:</u>

✉ Safety data sheet for all the cleaning chemicals for the coffee machine in accordance with Annex II of REACH (Directive 1907/2006).

O10 Requirement for cleaning chemicals, excluded substances

The following substances must not be included in the cleaning chemicals*:

- Alkylphenol ethoxylates (APEO) or alkylphenol derivatives (APD)
- Diallyldimethylammonium chloride (DADMAC)

- Linear alkylbenzene sulphonates (LAS)
- Reactive chlorine compounds
- Silver nanoparticles
- Substances of very high concern (SVHC)
- PBT (Persistent, bioaccumulable and toxic) or vPvB (very persistent and very bio-accumulable), under EU Regulation (EC) No 1907/2006, Annex XIII, see http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:396:0001:0849:SV:PDF

** Ingoing substances are defined as, unless stated otherwise, all substances in the product – including additives (e.g. preservatives or stabilisers) in the raw materials, but not residuals from the production, incl. the production of raw materials. Residuals are defined as residuals, pollutants, contaminants etc. from the production, incl. production of the raw materials, which are present in the final product in amounts less than 100 ppm (0.0100 w/w %, 100 mg/kg), but not substances added to the raw materials or product intentionally and with a purpose – regardless of amount. Residuals in the raw materials above 1.0 % are regarded as ingoing substances. Known substances released from ingoing substances are also regarded as ingoing substances.*

Declaration is made by the chemical supplier based to the best of his/her knowledge at the given time, with reservations for new advances and new knowledge. Should such new knowledge arise, the undersigned is obliged to submit an updated declaration to Nordic Ecolabelling.

As long as the licence is valid the requirement shall be met through the annual follow-up, requirement O3.

At the time of application:

✉ Completed and signed Appendix 2 by the cleaning chemical manufacturer.

4.5 Energy requirements for the coffee machine

Energy consumption in the usage phase has a major environmental impact in the life-cycle of the coffee machine. The coffee machines use electricity to heat up the water and to run the machine's mechanical functions. The environmental impact of this is attributed to the environmental impact that arises due to electricity production in the Nordic countries. Electricity production causes climate impact, emissions of substances hazardous to health to the biosphere, and waste. The pilot study for catering equipment such as coffee machines proposes requirements for energy consumption in the usage phase for catering equipment. Coffee machines as a rule have an "idle mode" which means that the machine is running with hot water, ready to make coffee or other hot drinks. This is essential because as a rule it takes time to heat up the water for boiling coffee. In the Nordic countries we drink 8 – 12 kg of coffee per person per year and some of the coffee is brewed in coffee vending machines, for example at workplaces, in schools and at hotels. Finland has the highest coffee consumption in the world. In total there are 90 000 coffee machines in Sweden that together use approximately 130 000 000 kilowatt hours of electricity per year[44]. From this it is possible to estimate that there are approximately 200 000 – 250 000 coffee machines in the Nordic countries that consume approximately 290 000 000 – 360 000 000 kilowatt hours of electricity per year.

According to the MECO-analysis carried out by Nordic Ecolabelling for a coffee machine for catering use, the operation phase together with coffee production account for the highest individual environmental burdens. The effect can vary enormously depending on the behaviour of the consumer. If we look specifically at the coffee machine, it is important that the machine is dimensioned to its users (capacity in terms of

[44] Swedish Energy Agency – Coffee vending machines (24.02.2015)
http://www.energimyndigheten.se/Hushall/Testerresultat/Testresultat/Kaffeautomater/?tab=3

the number of cups of coffee that need to be brewed during a specific period). Coffee machines also use consumables in addition to energy and water compared with other catering equipment. Coffee vending machines use coffee in different forms. Types of coffee include ready-roasted beans, ground coffee and freeze-dried coffee powder, and the machines also use chocolate and milk powder and sometimes fresh milk too. Today there are also coffee machines with a fridge attached to the machine for fresh milk. This enables fresh milky coffee drinks to be made. This increases energy consumption in the usage phase.

What most machines have in common, however, is that it is the "idle power" or energy used in keeping the machine ready to quickly make a cup of coffee that accounts for the majority of the machine's energy consumption. In order for a cup of coffee to be made quickly, the water must be kept hot in the machine.

Nordic Ecolabelling considers that it is relevant to impose criteria on low energy consumption when the coffee machine is used. It is also relevant that the coffee machine has efficient energy consumption in the usage phase in that it has control functions that regulate the coffee machine's use during the day, linked to working hours.

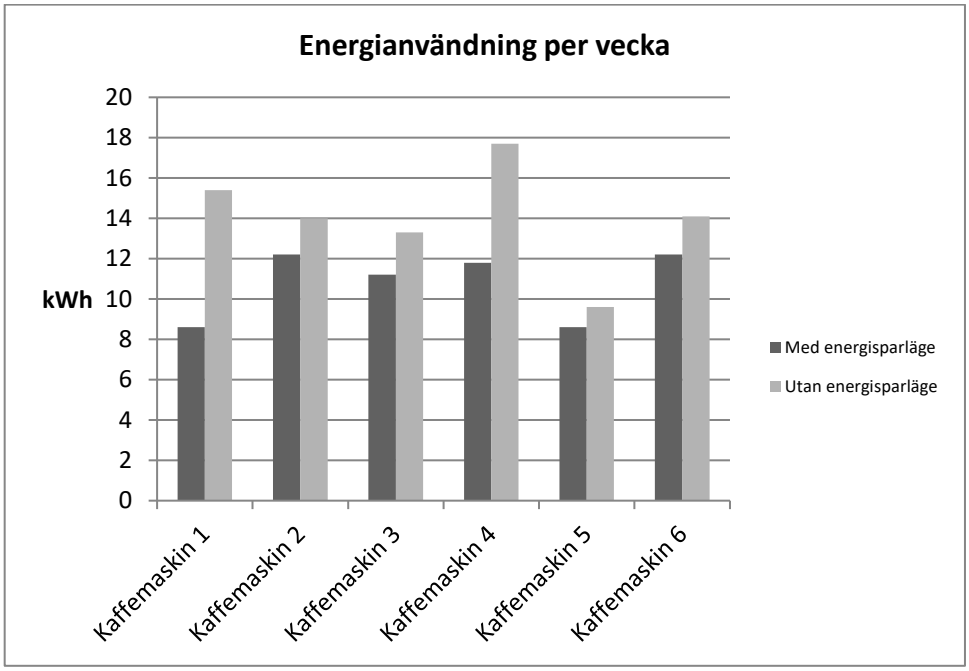
Energy requirements for the coffee machine

In 2010 the Swedish Energy Agency carried out a test of six coffee machines used in offices and workplaces[45]. All of the coffee machines were of table top model. Their water tank ranged between 0.6 to 5 litres, and the machines total volume of coffee production in brewing 30 cups of coffee ranged between 3.1 to 4.7 litres. The test was carried out according to the method for EVA-EMP Energy Measurement Protocol version 2.1, with a deviation from the test method regarding the input water temperature (instead of 25 degrees, hot water at 17 degrees was used, equivalent to the water temperature in Swedish water pipes).

In the test carried out by the Swedish Energy Agency, there was a high degree of variation in the energy consumption of different coffee machines. The results show that there is a difference of more than 50% in energy consumption between the coffee machines tested. This in turn shows that there are opportunities to reduce energy consumption with today's technology. The test results show that energy consumption varies partly depending on how large the water tank is and how the energy saving status is designed. There are no general requirements for how an energy saving mode is to work and the coffee vending machines have different solutions for this. Coffee machines can be adaptive which means that they learn which time of day the machine is used. This means that the machine can be turned off at the times of day when, for example, there are no staff in the workplace.

[45] http://www.energimyndigheten.se/Hushall/Testerresultat/Testresultat/Kaffeautomater/?tab=2, 16.10.2014.

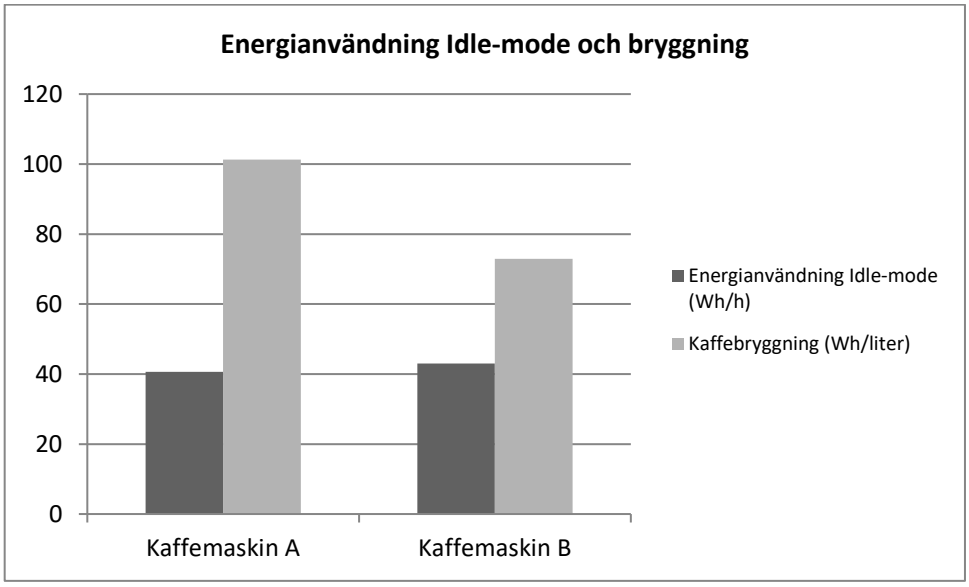
Figure 2: Energy consumption of coffee machines during a working week. The test was carried out by the Swedish Energy Agency in 2010. The test was carried out according to the EVA-EMP Energy Measurement Protocol version 2.1.



In 2007 the Danish Technological Institute carried out a test of coffee machines/coffee vending machines[46]. Two machines were tested in line with the EVA-EMP test procedure. This test reported energy consumption in different operation phases. Energy consumption in the coffee machine's warming up phase when it starts from being turned off until it is ready to brew a cup of coffee. Energy consumption in "idle mode". Energy consumption per litre of coffee brewed and energy consumption in the heating up phase is strongly related to the volume of the water tank in the coffee machine and here the two coffee machines differed considerably. It is also interesting to compare the two other operation phases. Figure 3 below shows that machine A has slightly lower energy consumption in "idle mode". This can be explained by the fact that it has a smaller water tank but the difference is not as great between the different coffee machines. Energy consumption per litre of coffee brewed also varies between the different machines according to figure 3 below.

[46] Energiforbrugende automater: Kaffeautomater, (Energy consuming vending machines: Coffee machines) Pedersen, Walloe, Klemgaard, Danish Technological Institute 2007

Figure 3: Energy consumption of coffee machines during idle mode and brewing. The test was carried out by the Danish Technological Institute in 2007. The test was carried out according to the EVA-EMP Energy Measurement Protocol



Of the coffee machines tested by the Swedish Energy Agency in 2010, four out of six had a time-controlled energy-saving mode that is turned on and off at times programmed into the machine. One of the coffee machines had what is known as adaptive switch off where the machine adapts itself to the usage pattern where it is located and starts the energy-saving mode when it is not in use, but it also had the function that it was possible to program when the machine was to start. One of the six machines tested was a machine which lacked this function entirely.

There is good potential for reducing the energy consumption of coffee machines. For coffee machines, energy consumption in the usage phase is a very important parameter, as shown in the RPS. The European Vending Association (EVA), the European industry organisation for the coffee service and vending machine industry, has developed the protocol EVA-EMP (Energy Measurement Protocol – Test Protocol for the Measurement of Energy Consumption in Vending & Dispensing Machines / Hot and Hot & Cold Drinks Machines) which is a voluntary test protocol to measure energy consumption for all types of vending machines, both chilled for fresh food and vending machines that serve hot drinks. EVA-EMP also has an associated calculation module, EVA-EMP 3.0 Calculation sheet, that can be used to produce an energy rating level (the classes used are between A++ and G). This makes it possible to compare the energy efficiency of the coffee machines.

EVA-EMP has differentiated requirements depending on the size and capacity of the coffee machine. The coffee machines are divided into four groups, See Table 1 below.

Table 1: Different coffee machine sizes in EVA-EMP[47].

Coffee machine size	Capacity
OCS (Office Coffee Service)	5L/24h
Table Top	15L/24h
Free Standing	30L/24h
High Throughput	50L/24h

As we can see in Table 1, there are four sizes with different capacities – from OCS with a capacity of 5 litres of coffee per day to High Throughput with a capacity of 50 litres of coffee per day. OCS coffee machines are suitable for small offices, and High Throughput are intended for an environment where many cups of coffee are brewed per day. The major difference between the sizes and capacity of the different coffee machines is often to do with the water tank in the coffee machine which must have hot water ready to quickly brew a cup of coffee. If the need is to quickly brew many cups of coffee, a large water tank is needed.

The German standard DIN 18873-2, "Methods for measuring of the energy use from equipment for commercial kitchens - Part 2: Commercial coffee machines" is another test standard designed to test energy consumption, measured and expressed as energy losses from fully automatic coffee machines for public use and refrigerator systems for milk. The DIN standard is not linked to any energy labelling.

As the coffee machine manufacturers extensively test their equipment in accordance with either the EVA-EMP or DIN standard, Nordic Ecolabelling chooses to set requirements on energy consumption of coffee machines in accordance with these standards, optionally which one. The refrigerator system for milk shall be tested according to DIN standard as the EVA-EMP is not designed to measure the energy consumption from the refrigerator[48]. See below motivation of energy limit values for the machines to be included in the Nordic Swan Ecolabelled coffee service.

Limit value, EVA-EMP Version 3.0B
For coffee machines tested in line with version 3.0B of the European Vending Association's Energy Measurement Protocol (EVA-EMP), or later sub-versions, energy consumption must be ≤ 140 Wh/L for coffee machines with a capacity of ≤ 5L/24h or ≤ 80 cups/day, or ≤ 190 Wh/L for coffee machines with a capacity of > 5L/24h or > 80 cups/day. The limit values have been drawn up in close consultation with the European Vending Association (EVA). The lower limit value equates to an energy level of A+ and the higher limit value to an energy level of A, according to EVA-EMP version 3.0 Calculation sheet. The levels are judged to be tough, but at the same time realistically achievable for the most energy-efficient coffee machines on the market.

Limit value, DIN 18873-2: 2013
For coffee machines tested in accordance with DIN 18873-2:2013, the energy loss must be ≤ 1.5 kWh/day for coffee machines with a capacity of < 100 cups/day and coffee machines without fresh milk, ≤ 1.9 kWh/day for coffee machines with a capacity of 100-250 cups/day with fresh milk, or ≤ 2.7 kWh/day for coffee machines with a capacity of > 250 cups/day with fresh milk.

[47] http://www.vending-europe.eu/en/standards_protocols/eva-emp.html
[48] Telephone correspondence, David Irvine, European Vending Association (EVA), (16.03.2015)

The limit values have been drawn up in close consultation with Germany's Industrial Association of House, Heating and Kitchen Technology (HKI).[49] HKI represents manufacturers of catering equipment, stainless steel furniture, professional coffee machines and kitchen ventilation. HKI Cert[50] is the part of the industrial organisation that works to enable vendors, coffee service operators and other stakeholders to share and compare energy consumption data for various catering products. HKI Cert therefore lists the energy performance of e.g. professional coffee machines, measured according to the German DIN 18873-2 standard.

Nordic Ecolabelling was able to access energy data for 77 coffee machines via HKI Cert's database. These had energy losses of between 3.47 kWh/day and 0.42 kWh/day, depending on the size of the coffee machine. The chosen limit values are judged by HKI to be challenging, to include all sizes of machines and to be achievable by the most energy-efficient machines on the market. Machines without fresh milk, irrespective of their size, have to achieve the lower limit value. Medium and large machines with fresh milk have higher limit values, since cleaning the steam system for the fresh milk is an energy-intensive process.[51] If the coffee machine has to be connected to a refrigerator, the refrigerator must be tested in line with the DIN 18873-2 standard. The refrigeration system must have an energy loss ≤ 130 W/day and litre of refrigeration capacity. The limit value has been set in agreement with HKI and its members, who see it as challenging but not impossible to achieve.

The test methods above are "self-declarations" meaning that manufacturers carry out their own tests of their coffee machines. No tests are carried out at a third-party test laboratory, according to information received from coffee machine suppliers. To ensure that the test protocols results are impartial, Nordic Ecolabelling requires that the tests must either take place in an independent testing institute or in the company's own test lab, provided that the manufacturer has a quality management system encompassing sampling and analysis and has been certified to ISO 9001 or ISO 9002. SP Technical Research Institute of Sweden stated that it is possible to carry out testing in line with the approach in the test protocol, although at the time that the new criteria were being developed, the Institute was not accredited to carry out the test protocol[52].

Nordic Ecolabelling also suggests that the coffee machine to be equipped with a stand-by or a time-based shut down function. When these criteria were first developed in 2014/2015, there was only a Standby Directive for coffee machines for domestic use. The Directive sets requirements on the power management of the machines – stating that the energy mode must switch over to standby after a certain length of time. Coffee machines indented to be used for domestic purposes can also be sold in public spaces. If these machines are sold in public spaces they are not covered by the Standby Directive. During the development of these criteria a working plan for 2015-2017 in EU was drafted aiming to evaluate the possibilities in regulating hot vending machines (coffee machines) for public use within the Ecodesign directive[53].

Neither the EVA-EMP protocol nor the DIN 18873-2 standard requires that the machine must be equipped with a standby or shutdown function, although machines with

[49] HKI Industrial Association of House, Heating and Kitchen Technology (2 Apr 2015)
http://hki-online.de/en
[50] HKI Cert commercial catering equipment (1 Apr 2015)
http://grosskuechen.cert.hki-online.de/en
[51] Telephone correspondence, Marlon Schrimpf, HKI, (20 Oct 2015)
[52] E-mail correspondence – Johan Larsson, Energy Technology, SP Technical Research Institute of Sweden
[53] Telephone correspondence, David Irvine, European Vending Association (EVA), (16.03.2015)

such features can be energy measured under both test methods. As a Nordic Swan Ecolabelled coffee service is intended for public environments, it is considered justified setting a requirement on the machine energy saving function in the form of a shutdown feature.

Based on the above description of the underlying situation, it is therefore proposed that two energy requirements are set for coffee machines and an associated refrigerator system. A requirement of low energy consumption and a requirement for an energy saving mode function which should be set, e.g. when the workplace in which it is located is not staffed.

O11 Energy requirements for the coffee machine and refrigerator

The requirement applies to the coffee machine and the associated refrigerator that is included in the Nordic Swan Ecolabelled coffee service.

For coffee machines tested according to version 3.0B of the European Vending Association's Energy Measurement Protocol (EVA-EMP), or later sub-versions:

- The energy consumption must be ≤ 140 Wh/L for coffee machines with a capacity of ≤ 5L/24h or ≤ 80 cups/day, or
- the energy consumption must be ≤ 190 Wh/L for coffee machines with a capacity of > 5L/24h or > 80 cups/day.

For coffee machines tested in accordance with DIN 18873-2:2013:

- The energy loss must be ≤ 1.5 kWh/day for coffee machines with a capacity of < 100 cups/day and coffee machines without fresh milk, or
- the energy loss must be ≤ 1.9 kWh/day for coffee machines with a capacity of 100-250 cups/day with fresh milk, or
- the energy loss must be ≤ 2.7 kWh/day for coffee machines with a capacity of > 250 cups/day with fresh milk.

If the coffee machine is produced in an integrated system with a refrigerator, the whole system must be tested in line with the limit values stated above. If the coffee machine later has to be connected to a refrigerator for milk storage, the refrigerator must be tested separately in line with DIN 18873-2:2013 and have an energy loss ≤ 130 Wh/day and litre of refrigeration capacity.

Bulk brewers and traditional espresso machines are exempted from this requirement on condition that the product group definition is met.

Requirement for testing the coffee machine under EVA-EMP, version 3.0B (14 February 2011) and DIN 18873-2: 2013 (October 2013):

If accreditation is not separately required, the testing and/or analysis laboratory shall fulfil the general requirements of standard EN ISO 17025 on general requirements for the competence of testing and calibration laboratories or have official GLP status.

The coffee machine manufacturer's own testing laboratory may be approved for analysis and testing if:

- *the authorities monitor the sampling and analysis process, or if*
- *the manufacturer has a quality management system encompassing sampling and analysis and has been certified to ISO 9001 or ISO 9002*

As long as the licence is valid the requirement shall be met through the annual follow-up, requirement O3.

<u>At the time of application:</u>

✉ Test protocol or test report from energy measurement of the coffee machine, or the coffee machine with the associated refrigerator, according to EVA-EMP version 3.0B, or later sub-versions, or DIN 18873-2: 2013.

✉ Test report from energy measurement of the refrigerator according to DIN 18873-2: 2013.

O12 Energy saving mode function

The coffee machine included in the Nordic Swan Ecolabelled coffee service must have an energy saving mode function. The function should be set, e.g. when the workplace in which it is located is not staffed.

As long as the licence is valid the requirement shall be met through the annual follow-up, requirement O3.

At the time of application:

✉ Description of how the coffee machine is equipped with an energy saving mode function.

✉ Description that the coffee machine is in an energy-saving mode feature.

4.6 Environmental and health requirements on the coffee machine's components

Production of coffee machines

The materials used in coffee machines are steel, aluminium, plastic and electronics. Metals may be surface treated with paint or varnish, or coated, e.g. in chrome and nickel. The MECO-analysis which Nordic Ecolabelling has conducted in conjunction to the preliminary study of kitchen appliances showed that coffee machines have the following composition of different materials, mainly of steel and plastic, on average 30–50% steel, 10% aluminium, 25–30% ABS, 10–20% PP and electronics 5–10%. It is worth noting that the proportion of plastic is quite high and electronics also account for a significant proportion. Coffee machines thus consist of metals, plastic parts, insulation material and electronic components. It can be relevant to set requirements on which materials are used and on additives in materials for ecolabelling in order to reduce the use of substances harmful to the environment and to health. There are additives in plastic and rubber and other material components that may contain substances harmful to the environment and health. As coffee machines handle food, it is essential that substances harmful to health, in particular, are not present in the coffee machine or migrate from the machine as they may result in exposure for those who drink coffee or other drinks from the machine.

Energy consumption during the actual production of the coffee machine constitutes a small proportion of total energy consumption in the life-cycle of the coffee machine, as shown by the MECO analysis carried out for a coffee machine (see Appendix 1). Energy consumption in the usage phase is by far the highest energy consumption in the life-cycle.

Production is often spread over several subcontractors which can make it difficult to collect data on the coffee machine composition. According to the RPS analysis Nordic Ecolabelling has done the coffee machine component materials have a relatively low environmental impact compared with other parts of the coffee service's life cycle. But at the same time, Nordic Ecolabelling's goal is to reduce the use of hazardous substances and therefore in this first version chosen to exclude environmental and hazardous substances from the coffee machine that is in contact with food. This is because the relevance to set requirements on these substances is so much higher for components in

contact with food, lifting the entire RPS for setting requirements on the coffee machine materials in contact with food. Nordic Ecolabelling sees it as a possibility in the future criteria generations to extend the requirement to cover other components / materials of the coffee machine.

Constituent substances and pollution limits

The term ingoing substances are defined, if not otherwise mentioned, as all substances in the chemical product – including additives (e.g. preservatives or stabilisers) in the raw materials/ingredients, but not residuals from the production, incl. the production of raw materials.

Residuals from production and from production of raw materials are defined as residuals, pollutants and contaminants derived from the production of the raw materials, which are present in the final product in amounts less than 100 ppm (0.0100 %w/w, 100 mg/kg), but not substances added to the raw materials or product intentionally and with a purpose – regardless of amount. Residuals in the raw materials above 1.0 % are regarded as ingoing substances. Known substances released from ingoing substances are also regarded as ingoing substances.

Declaration is made by the chemical supplier based to the best of his/her knowledge at the given time, also based on information from raw material manufacturers, recipe and available knowledge on the chemical product with reservations for new advances and new knowledge. Should such new knowledge arise, the undersigned is obliged to submit an updated declaration to Nordic Ecolabelling.

Exluded substances from coffee machine´s components in contact with foodstuffs

The requirement applies to all coffee machines included in the Nordic Swan Ecolabelled Coffee service, included bulk brewers and traditional espresso machines.

The requirement is imposed on all coffee machine components that are in contact with food, such as containers for coffee beans/coffee, grinders, water tanks as well as pipes, hoses and any connections in the machine where water or coffee water flows.

A coffee machine must comply with the Regulation 1935/2004 on materials in contact with food. Material-specific regulations for a coffee machine during the time the first generation of criteria was developed, only existed for plastic (10/2011/EU). The corresponding European regulation for metals and alloys, or rubber in contact with food, requiring specific migration levels of the substances had not yet been developed.

The positive list of the Regulation 10/2011/EU for plastic materials that come in contact with food is containing by EFSA risk assessed substances (additives, monomers, etc.). As substances that are listed in the positive list already have undergone a risk assessment by EFSA (European Food Safety Authority), they need not undergo a risk assessment according to the processes of REACH. In other words, substances identified as being Substances of Very High Concern (SVHC) can be approved for food contact[54].

Nordic Ecolabelling sees a potential to go beyond current legislation with regard to requirements of materials in contact with food. Nordic Ecolabelling therefore considers

[54] PlasticsEurope "Reach and Food Contact Regulations for Plastics: substances listed in the REACH candidate list can be used to manufacture Plastic Food Contact Materials and Articles"
http://www.plasticseurope.org/documents/document/20130823153506-reach_and_food_contact_26_april_2013.pdf

it appropriate to set requirements on all coffee machine components that are in contact with food.

See justifications for the requirement per substance / group of substances later in this subchapter.

In order to get an as complete understanding as possible of the requirement, e.g. which are the most usual components coming into contact with food, such as polymer, rubber or metal components, which are the desired functions pursued in these components are (e.g. flame retardation or softening), and which documentation burden the requirement implies on coffee machine manufacturers, Nordic Ecolabelling wishes especially to receive comments on this requirement during the hearing period.

Candidate Scheduled substances
The requirement prohibits the use of candidate list substances in the coffee machine components in contact with food. REACH defines in Article 57 of the criteria assessed for when substances assessed as particularly problematic, Substances of Very High Concern (SVHC). These substances may be included on the candidate list. There is not a list of SVHC substances. There are only a set of criteria for when a substance is considered as a SVHC. The fact that a substance is included on the candidate list in itself has no regulatory impact, but it indicates that the substance may be included in the Authorisation list.

The candidate list is published under REACH Article 59 of the Chemicals Agency (ECHA) website. The link to the list is here: http://echa.europa.eu/sv/candidate-list-table. The requirement is a way of relating to REACH and the form of communication about substances under REACH.

Endocrine disruptors
The requirement prohibits the use of endocrine disruptors in the coffee machine components in contact with food. Human exposure to endocrine disruptors is of particular concern. This is because exposure to endocrine disruptors at important times during development can cause irreversible damage to the fetus, leading to serious health effects later in life, and because the consequences for the complex endocrine system of long-term exposure to endocrine disrupting substances are largely unknown.

Endocrine disrupters are a problem in several ways. Firstly, there is no classification for endocrine disrupters, so Nordic Ecolabelling may refer to more or less official lists of substances suspected or proven to be endocrine disruptors. This unofficial status makes reference to requirement formulation difficult. Moreover, as endocrine disruptors have been shown to have a so-called "cocktail effect", making the effect of several substances greater than the "sum" of the effects. This requirement refers to the EU's priority list of substances to be examined for endocrine disruption class 1 or 2. The list can be found here: http://ec.europa.eu/environment/endocrine/documents/final_report_2007.pdf (Annex L, page 238-).

Halogenated organic compounds and hazardous flame retardants
The requirement excludes all halogenated organic compounds (such as halogenated flame retardants, organic chloroparaffins and organic fluorine compounds) in the coffee machine components in contact with food. The requirement also excludes harmful flame retardants based on the properties criteria classifications: H350, H350i, H340, H360F, H360D, H360Fd and / or H360Df.

Halogenated organic compounds (halogenated flame retardants and organic chloroparaffins) and hazardous flame retardants

All electrical and electronic products carry a risk of fire. Various flame retardants are used to minimise this risk. The choice of flame retardant is governed by various factors, including the material to be protected, fire safety standards and price. The flame retardant must also not impinge on the product's intended technical functions.

Flame retardants are intended to protect the product throughout its service life. They are therefore intentionally designed not to break down easily, which means that the substances may not be readily degradable when they enter the environment. A great deal of attention has been focused on brominated flame retardants, not least because they have been detected in breastmilk and in blood[55]. A coffee machine can consist of 25-30% ABS and 10-20% PP plus internal tubes, hoses and water tanks made from plastic and rubber material which water is pumped through and kept hot. Parts of the coffee machines plastic components that are in contact with electronics are flame resistant. This is done to comply with the Low Voltage Directive (2006/95/EC) and the harmonised standards set for vending machines: EN60335-2-75 and EN 60335-1[56].

The most common metal compounds in non-brominated flame retardants are organic phosphorus and nitrogen compounds and inorganic salts.

There are around 70 brominated flame retardants on the market and knowledge of their health and environment consequences varies. Table 4 gives a summary of the different flame retardants, along with their risks and usage restrictions. The five brominated flame retardants that have been used most and about which there is a great deal of knowledge are[57]:

- pentabromodiphenyl ether
- octabromodiphenyl ether
- decabromodiphenyl ether
- hexabromocyclododecane (HBCDD)
- tetrabromobisphenol A (TBBP-A)

The three top chemicals fall into the group of polybrominated diphenyl ethers (PBDE). Under the EU's Restriction of Hazardous Substances (RoHS) Directive, polybrominated diphenyl ethers and polybrominated biphenyls (PBB) have been prohibited in new electrical and electronic equipment since July 2006. Since 1 July 2008 decaBDE is also banned in electrical and electronic products.

No new substances were banned when the RoHS Directive (which came into force in June 2011) was revised. The flame retardants that the Commission was tasked with working into the RoHS Directive were the brominated flame retardants HBCDD and TBBP-A.

HBCDD has been identified as a Substance of Very High Concern (SVHC), and has been entered on the Candidate List (REACH). HBCDD has also been included on the

[55] Kemikalieinspektionen, Flamskyddsmedel (Swedish Chemical Agency - Flame retardants) (16.03.2015) http://www.kemi.se/flamskyddsmedel
[56] European Commission, Enterprise and Industry, Low Voltage (LVD) (24.02.2015) http://ec.europa.eu/enterprise/policies/european-standards/harmonised-standards/low-voltage/index_en.htm
[57] http://www.kemi.se/sv/Innehall/Fragor-i-fokus/Flamskyddsmedel/

Authorisation List, Annex XIV, in REACH. In animal tests, HBCDD has been shown to affect the liver and thyroid and be toxic for reproduction.

TBBP-A has also been risk assessed under the EU's Existing Substances Programme. As a result, the substance has been classified as highly toxic to aquatic organisms, and may cause damaging long-term effects in an aquatic environment. TBBP-A is considered non-readily degradable and may bioaccumulate. TBBP-A is the most widely used brominated flame retardant in global terms and is used primarily in printed circuit boards but can also be used in other plastics as Nordic Ecolabelling has experienced from developing criteria for computers, TVs and projectors, and imaging equipment in 2012.

Chloroparaffins, which can also be used as a flame retardant, are stable and non-readily degradable substances that can bioaccumulate in the environment. Short and medium-chain chloroparaffins are highly toxic to aquatic organisms and may have a harmful long-term impact on the aquatic environment. Short chain chloroparaffins have been identified as Substances of Very High Concern (SVHC), and have been entered on the Candidate List.

In summary PBBs and PBDEs may not appear in new electrical and electronic products according to RoHS 2011/65/EU, while HBCDD, TBBP-A, short and medium chain chlorinated paraffins are allowed to use, albeit with some limitations[58]. HBCDD, TBBP-A and short-chain chlorinated paraffins are on the REACH candidate list as candidates for licensing.

The coffee machine components in contact with food are usually not flame resistant, but Nordic Ecolabelling may nevertheless not exclude it. Nordic Ecolabelling also cannot guarantee that flame resistant components, for instance, plastic and rubber parts, in contact with electric/electronical parts are also not in contact with food.

Nordic Ecolabelling excludes therefore all halogenated organic compounds, such as halogenated flame retardants and chloroparaffins in the coffee machine components in contact with food. Nordic Ecolabelling also excludes flame retardants based on excluded property criteria classifications: H350, H350i, H340, H360F, H360D, H360Fd and / or H360Df.

<u>Halogenated organic compounds (organic fluorine compounds)</u>
The requirement excludes and all halogenated organic compounds such as organic fluorine compounds in the coffee machine components in contact with food.

Perfluoroalkyl compounds also called perfluoroalkyl surfactants or perfluoroalkyl acids (PFAS) is a term for a group of chemical compounds containing a completely fluorinated alkyl chain and a group that renders the compounds to have a certain solubility in water. This group of compounds differ fundamentally from most other chemicals since they are neither lipophilic (fat-loving) nor hydrophilic (water-loving) but bind to particle surfaces.

These compounds are used primarily because of their excellent surface properties and their water and oil repellent property. They are used in various industrial and consumer products where low surface energy, high chemical and thermal stability, low refractive

[58] HBCDD has the "sunset date" 21st of August 2015. After that date the substance may only be used in authorized application areas according to Reach.
HBCD Factsheet, Hexabromocyclododecane (2015-04-07)
http://www.bsef.com/uploads/Factsheet_HBCD_25-10-2012.pdf

index, high electrical insulation resistance and good resistance to corrosion and external influences are important. Important product types include floor wax and polish, paints and varnishes, degreasing agents and detergents, impregnation for textiles and leather, firefighting agents and food packaging[59].

Perfluoroalkyl compounds are very persistent (stable) and break down very slowly. As noted in the introduction, they are little water- and fat-soluble and accumulation occurs when they are attached to surfaces of particles or tissue. They bind to proteins and are found in high levels in top predators. A Nordic screening study showed PFAS compounds in all sample types examined and the highest level was found in marine mammals. The report concludes that PFAS is found in significant concentrations in the Nordic environment[60] [61]. The most focused PFAS compound perfluoroctylsulphonate (PFOS) is toxic to aquatic organisms, birds and bees[62].

Perfluorinated compounds effects on the immune system have during recent years received increasing attention. Perfluorinated compounds have a negative effect on the immune system in animals and can lead to decreased anti-body reaction or immune response to vaccination in children. This might later lead to lack of full protection among children undergoing routine children vaccination programs[63].

Antibacterial substances

Antibacterial substances are not desirable in the coffee machine's components in contact with foodstuffs. Products with antibacterial substances are increasing. One of the most common substances that are added is nano silver. The addition is made to achieve an antibacterial effect. Substances, as nano silver, are taken as biocides by the US Environmental Protection Agency (EPA). It is particularly a concern about that the release of nano silver to sewer water and other dissemination would eliminate desired

Phthalates

The requirement excludes phthalates in the coffee machine components in contact with food included in the REACH Candidate List and the EU's priority list of substances that are potential endocrine disrupting category 1 or 2, and specifically the phthalates DNOP (di-n-octyl phthalate, CAS: 117-84- 0) and DIHP (diisoheptyl phthalate, CAS: 41451-28-9) that fall outside the candidate list and the referred endocrine disrupting categories 1 and 2.

Phthalates are used chiefly as plasticisers in plastic and rubber and may account for up to 40% of the finished product. A particular focus is placed on the use of DEHP, (di-2-ethylhexyl phthalate), which is a plasticiser in PVC. Plasticisers are not firmly bound to the PVC polymer and therefore phthalates are secreted from plastic products throughout

[59] Kemikalieinspektionen, "Perfluorerade ämnen - användningen i Sverige", (The Swedish Chemical Agency - Perfluorinated compounds - the use in Sweden) Nr6/06
[60] Kallenborn, R., Berger, U., og Järnberg, U., 2004. Perfluorinated alkylated substances (PFAS) in the nordic environment
[61] http://www.sft.no/nyheter/dokumenter/pfas_nmr2004.pdf
[62] "Kartlegging av utvalgte nye organiske miljøgifter 2004. Bromerte flammehemmere, perfluoralkylstoffer, irgarol, diuron, BHT og dicofol" (Screening of selected new organic environmental toxins. Brominated flame retardants, perfluoroalkyl compounds, irgarol, diuron, BHT and dicofol) SFT: 927/2005. Available from: http://www.sft.no/miljoreferanse____37630.aspx (visited August 5th 2009)
[63] Heilmann et.al, "Persistente fluorforbindelser reducerer immunfunktionen" (Persistent fluorinated compounds reduces the immuno-function) (2014)

their lifetime. This diffuse dissemination means that phthalates are found almost everywhere in the environment[64].

DEHP, dibutyl phthalate (DBP) and butyl benzyl phthalate (BBP) are classed as toxic and as reproductive toxicants, i.e. they may cause reduced reproduction ability and foetal damage. DBP is also classed as toxic to the environment and as highly toxic to aquatic organisms. BBP, DBP and DEHP are included in the candidate list of Substance of Very High Concern. These three most harmful phthalates (DEHP, DBP and BBP) are totally banned[65] in toys and childcare items. For DINP, DIDP and DNOP, this ban applies only to toys and childcare products that a child may put in its mouth.

The EU Commission regulated in 2008 limit values of phthalates in plastics based on a risk assessment by EFSA did 2005 on the daily tolerable intake values for phthalates[66]. The regulation plastics in contact with food, 10/2011/CE, lists therefore, in its positive list in Annex 1, the following phthalates that are allowed to use as plasticisers in food contact plastic materials[67]:

Phthalate (CAS-number)
DEHP (117-81-7)
BBP (85-68-7)
DBP (84-74-2)
DINP (28553-12-0 with 68515-48-0)
DIDP (with 26761-40-0 68515-49-1)

Nordic Ecolabelling prohibits through its requirements more phthalates than the above listed ones in other criterias such as for computers version 7.1, imaging equipment version 6.2, as well as for TVs and projectors version 5.2. These criteria also have requirements for the phthalates, DHCP, DIBP, DNOP, DHP, DEP DIHP, Diisopentylphthalate and N-pentyl-isopentylphthalat based on the presence of phthalates in the EU candidate list and priority list for potential endocrine disruptors.

During the time when these criteria were developed, there was no material specific regulation for rubber in contact with food similar to that of plastic[68]. For rubber, the general rules in the Regulation 1935/2004 (FCM) are valid, where a material is intended to come into food contact must not present a hazard to human health or change the composition of the foodstuff[69].

Potential migration of phthalates from plastic materials is not only a risk from soft PVC plastic. Studies conducted on food have shown that phthalate migration from plastic food packaging also occurs from PE and PET treated food containers of aluminium, as

[64] Swedish Chemicals Agency, http://www.kemi.se/templates/Page____3283.aspx
[65] If the level of the product exceeds 0.1%.
[66] J.H Petersen & L.K. Jensen, "Phthalates and food-contact materials: enforcing the 2008 European Union plastics legislation" (2010)
[67] EU 10/2011 specifies migration limits (mg/kg food) for each phthalate. All referred phthalates may be used in "repeated use materials/articles", some only in "single use articles", some only in plastics in contact with non-fatty food. BBP, DINP and DIDP may not be used as additives in plastics in contact with infant food. The phthalates may also be used as "technical support agents" in weight percentages up to 0,1weight% in the final product. Source: Food Packaging Forum "Phthalates" - http://www.foodpackagingforum.org/Food-Packaging-Health/Phthalates#table
[68] EFSA, Non-plastic food contact materials (2015-03-19)
http://www.efsa.europa.eu/en/topics/topic/non_plastic_fcm.htm
[69] Livsmedelsverket, upplysningen (Swedish National Food Agency, Information Centre) (19.03.2015)

well as from PP plastic with a phthalate-based catalyst content. This gives an indication that the requirement should not be polymeric or material-specific[70] [71].

Nordic Ecolabelling considers it reasonable to exclude the above phthalates from the coffee machine components in contact with food. As the requirement excludes substances included in the SVHC candidate list and substances and the EU's priority list of substances that are potential endocrine disrupting category 1 or 2, Nordic Ecolabelling excludes specifically DNOP (di-n-octyl phthalate, CAS: 117-84-0) and DIHP (diisoheptyl phthalate, CAS: 41451-28-9) from being included in the coffee machine components in contact with food and harmonises thus with the other criteria within Nordic Ecolabelling such as computers, imaging equipment and televisions and projectors.

Bisphenol A

Bisphenol A (BPA) is used as a raw material or monomer in manufacturing polycarbonate plastic (PC) and in epoxy compounds. A smaller amount is used as a colour former in manufacturing thermal paper (receipts/tickets/queue tickets). Epoxy plastic is found in tins, relining of water pipes and adhesives, as well as surface coatings. 70% of the global production of BPA (4.5 million tonnes, 2010) is used for polycarbonate manufacture, while just less than 20% is used as raw materials for epoxy compounds[72].

PC is used in products such as feeding bottles, drinks bottles and plastic pipes for the construction industry. According to the European Food Safety Authority's (EFSA) latest re-evaluation of BPA in January 2015[73] it is judged that there is no health risk for consumers of any group (including the most sensitive) at current exposure levels (and these are far below the tolerable daily intake (TDI).

BPA is classified as Repr.2 with H361f, STOT SE 3 with H335, Eye Dam. 1 with H318 and Skin Sens. 1 with H317. BPA is also on the EU's list of substances that are potential endocrine disrupters.

BPA has been banned in PC plastic in feeding bottles since 2011 in the EU. Several EU countries have chosen to go further and since July 2013 BPA in food packaging intended for children under the age of three has been banned in Sweden. According to the Swedish Government's special reporters in the Bisphenol A inquiry M 2014:02 a ban is also proposed on BPA in receipts and tickets, suggesting phasing out from the surface layer in contact with food before 2020[74]. In Europe legislation has also been proposed which bans BPA in food contact plastics[75].

According to regulation 10/2011/CE (plastic food contact) BPA is a permitted additive in plastics. Nordic Ecolabelling believes it is reasonable that the substance must not be

[70] Kissin et. al "Ziegler-Natta catalysts for propylene polymerization: Chemistry of reactions leading to the formation of active centers"
[71] Cirillo et. al. "Childrens´s Exposure to Di(2-ethylhexyl)phthalate and Dibutylphthalate Plasticizers from School Meals".
[72] Swedish Chemicals Agency, Bisphenol A (17.02.2015)
https://www.kemi.se/Innehall/Fragor-i-fokus/Bisfenol-A-BPA/
[73] European Food Safety Authority (EFSA), "No consumer health risk from bisphenol A exposure" (17.02.2015)
http://www.efsa.europa.eu/en/press/news/150121.htm?wtrl=01
[74] Government Offices of Sweden, Press release, "Utredare vill förbjuda bisfenol A i kvitton och biljetter" (Investigators want to ban Bisphenol A in receipts and tickets) (17.02.2015)
http://www.regeringen.se/sb/d/19851/a/252812
[75] Wikipedia, Bisphenol A (17.02.2015)
http://en.wikipedia.org/wiki/Bisphenol_A

present in coffee machines components that are in contact with food. BPA is listed as a potential endocrine disruptor in the EU's priority list of potential endocrine disruptor, category 1, and is therefore subject to the requirement.

Heavy metals
The requirement prohibits heavy metals or compounds of tin, cadmium, chromium IV and mercury to be included in the coffee machine components in contact with food.

The tin compound tributyltin (TBT) is the organic tin compound, which is best investigated. TBT has been shown to have endocrine disruption in marine organisms.

Cadmium and cadmium compounds are acutely and chronically toxic to humans and animals. Most cadmium compounds are also carcinogenic. Cadmium is classified as very toxic by inhalation and carcinogenic. Cadmium also enhances the risk of impaired fertility and birth. Most cadmium compounds are highly acutely toxic to aquatic organisms, especially in freshwater, and acutely toxic to mammals. Cadmium also leads to chronic toxic effects in many organisms, even in very small concentrations. Cadmium bioaccumulates in fish and mammals and has a long biological half-life in mammals.

Chromium (III) and Chromium (VI) is used, inter alia, in chromium plating, in colours and pigments. Chromium (III) is essential, i.e., living organisms must have added chrome. The various forms of chromium have different effects. All chromium compounds are toxic. However, it is particularly chromium (VI), which have harmful effects because it is carcinogenic and allergenic. A number chromate compounds are on the Danish Environmental Protection Agency's list of undesirable substances. It is therefore relevant to have a ban on chrome in the criteria.

Mercury is present as inorganic and organic chemical compounds, and is one of the most dangerous pollutants. Mercury poses a threat to the environment and human health. The organic mercury compounds are particularly toxic. Mercury compounds are highly toxic to aquatic organisms and mammals. Mercury can give three chronic toxic effects, even in small quantities. Mercury can also cause kidney damage, fetal damage and lead to contact allergy.

O13 Excluded substances in the coffee machine’s components in contact with foodstuffs

The requirement applies to all coffee machines included in the Nordic Swan Ecolabelled coffee service. The requirement also applies to bulk brewers and traditional espresso machines.

The following substances may not be included* in the coffee machine´s components, or in spare parts, that are, or are intended to come into contact with foodstuffs, regardless of material type.

- Substances on the Candidate List**
- Substances considered to be potential endocrine disruptors in category 1 or 2 on the EU´s priority list of substances that are to be investigated further for endocrine disruptive effects***
- The phthalates di-n-octyl phthalate/DNOP (Cas: 117-84-0) and diisoheptyl phthalate/DIHP (Cas: 41451-28-9)
- Halogenated organic compounds, for example organic chloroparaffins, fluorine compounds and halogenated flame retardants
- Antibacterial substances (including silver ions, nano silver and nano copper)

- Flame retardants that have been given or may be given any of the following hazard statements or combinations:
  - H350 (May cause cancer)
  - H350i (May cause cancer by inhalation)
  - H340 (May cause genetic defects)
  - H360F (May damage fertility)
  - H360D (May damage the unborn child)
  - H360Fd (May damage fertility. Suspected of damaging the unborn child)
  - H360Df (May damage the unborn child. Suspected of damaging fertility)
- Tin, cadmium, chromium VI and mercury or compounds of these

** Ingoing substances are defined as, unless stated otherwise, all substances in the product – including additives (e.g. preservatives or stabilisers) in the raw materials, but not residuals from the production, incl. the production of raw materials. Residuals are defined as residuals, pollutants, contaminants etc. from the production, incl. production of the raw materials, which are present in the final product in amounts less than 100 ppm (0.0100 w/w %, 100 mg/kg), but not substances added to the raw materials or product intentionally and with a purpose – regardless of amount. Residuals in the raw materials above 1.0 % are regarded as ingoing substances. Known substances released from ingoing substances are also regarded as ingoing substances. Declaration is made by the chemical supplier based to the best of his/her knowledge at the given time, also based on information from raw material manufacturers, recipe and available knowledge on the chemical product with reservations for new advances and new knowledge. Should such new knowledge arise, the undersigned is obliged to submit an updated declaration to Nordic Ecolabelling.*

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

**** See following link: http://ec.europa.eu/environment/chemicals/endocrine/strategy/being_en.htm*

As long as the licence is valid the requirement shall be met through the annual follow-up, requirement O3.

At the time of application:

✉ Duly completed declaration from the coffee machine manufacturer, see Appendix 1.

Water quality in the coffee machine

The requirement applies to all coffee machines included in the Nordic Swan Ecolabelled coffee service and that have lead-containing components in contact with foodstuffs. The requirement also applies to bulk brewers and traditional espresso machines.

Consumers are exposed to lead through food, water, air, soil and dust. The main source of exposure is via food[76]. Lead accumulates in the body, primarily in the skeleton, and affects the nervous system. Lead is also toxic to aquatic and soil organisms. Even small quantities of lead are harmful to health. Drinking water always contains a background concentration of lead. Many lead compounds are also included on REACH's Candidate List[77].

A large number of tests carried out on drinking water by EFSA in 2011 showed values of 0.5-6 micrograms/kg, with 0.5% of the samples showing concentrations of over 100 micrograms/kg, results that came from older buildings with lead plumbing.[78]

[76] EFSA, Scientific Report of Efsa, "Lead dietary exposure in the European population" (2012) http://www.efsa.europa.eu/en/search/doc/2831.pdf
[77] Kemi, ämnen på kandidatförteckningen, (19 Feb 2015) https://www.kemi.se/Documents/Forfattningar/Reach/Amnen_pa_kandidatforteckningen_konsoliderad.pdf
[78] EFSA, Scientific Report of Efsa, "Lead dietary exposure in the European population" (2012) http://www.efsa.europa.eu/en/search/doc/2831.pdf

A coffee machine may have brass components, for example in the connections with the water main. Lead is added to brass to increase its cuttability and resistance to corrosion. These alloys may contain various levels of lead, ranging from 0.8% to 3.5%[79],[80]. Work is currently under way, for example in the valves and fittings industry, to develop lead-free brass alternatives. Under suboptimal conditions, stationary water in contact with brass components can lead to a migration of the lead into the water.

In 2011, cases were discovered in Sweden where certain coffee machines had released lead, with the brass components in contact with the water as the source of the migration. In the highlighted cases, the water output from the machines was tested and concentrations of >100 micrograms lead/litre water were found[81].

Lead must therefore not be a constituent substance in any of the coffee machine's components that are in contact with foodstuffs. Where the coffee machine has lead-containing components in contact with foodstuffs, to minimise the risk of an unacceptably high concentration of lead in the output water from the machine, there is a requirement that the machine must not release into the water more than 0.005 mg lead/kg water (5 micrograms/kg water). The WHO's recommended limit for lead in drinking water is 10 micrograms/kg water and this limit is considered suitable both for consumption under the European Drinking Water Directive (DWD, 98/83/EC)[82] and as a recommended specific migration limit for lead in contact with foodstuffs in accordance with the European Directorate for the Quality of Medicines & HealthCare of the Council of Europe (EDQM).

Compliance with the limit value is to be ensured by testing the coffee machine to the European standard EN 16889 - "Food hygiene - Production and dispense of hot beverages from hot beverage appliances - Hygiene requirements, migration test", which was identified in the criteria development work as the most relevant standard for testing newly manufactured machines. Although the methodology of the test method has been criticised for being difficult to carry out, Nordic Ecolabelling chooses to include it, as it guarantees repeatability between newly manufactured machines. In 2014/2015 CENELEC, the European Committee for Electrotechnical Standardization, conducted a project aimed at approving the standard as a common European standard.

The test is to be conducted on newly manufactured machines by an independent third party. There are also coffee machine manufacturers who prefer to test output water from machines using test methods that are related to the Drinking Water Directive. The requirement may be verified using a different test method, on condition that the independent testing institute can prove equivalence with EN 16889.

The limit value that EN 16889 refers to in the section on migration is 10 micrograms lead/kg water, measured as the maximum amount that the machine releases into the water. However, Nordic Ecolabelling chooses to set the limit in the requirement at 5 micrograms lead/kg water as the maximum amount that the machine releases into the water. Nordic Ecolabelling is aware that this is lower than the limit in the standard, and the requirement has not undergone external consultation, but considers it to be justified

[79] Mikael Hansson, R&D Manager, Ostnor (19 Feb 2015)
[80] Copper Development Association Inc., Leaded Brasses (19 Feb 2015)
http://www.copper.org/resources/properties/microstructure/lead_brasses.html
[81] Svt Nyheter, "Kaffemaskiner läcker bly" (19 Feb 2015)
http://www.svt.se/nyheter/sverige/kaffeautomater-lacker-bly
[82] EFSA, Scientific Opinion on Lead in Food (2010)
http://www.efsa.europa.eu/en/efsajournal/doc/1570.pdf

since the valves and fittings industry, for example, sets a limit of 5 micrograms lead/kg water (via the standard DIN EN-15664-1[83]), released from sources such as mixers/taps and other components made from materials such as brass, copper alloys, galvanised steel and stainless steel that are intended to come into contact with drinking water[84]. In its impact assessment and changes to the Swedish Building Regulations (BBR) in 2014, the Swedish National Board of Housing, Building and Planning (Boverket) also decided to recommend that the limit for migrated lead from water taps should be reduced to 5 micrograms/litre from a previous value of 20 micrograms/litre water[85].

Since Nordic Ecolabelling introduced requirement O14 based on views other than consultation responses, which means that the requirement was not subject to external consultation, Nordic Ecolabelling will be monitoring the requirement carefully when the criteria document becomes open for licensing.

O14 Water quality in the coffee machine

The requirement applies to all coffee machines included in the Nordic Swan Ecolabelled coffee service that have components with lead content which can be in contact with foodstuffs. The requirement also applies to bulk brewers and traditional espresso machines.

The coffee machine must not add more than 0.005 mg lead / kg of water, measured as the difference between incoming and outgoing water from the coffee machine. The coffee machine must be tested in accordance with EN 16889, performed by independent third parties.

Requirements for testing the coffee machine according to EN 16889:

If accreditation is not separately required, the testing and/or analysis laboratory shall fulfil the general requirements of standard EN ISO 17025 on general requirements for the competence of testing and calibration laboratories or have official GLP status.

✉ Test report from an independent third party in accordance with EN 16889.

5 History of the criteria

Nordic Ecolabelling adopted version 1.0 of the criteria for Coffee service on 5 November 2015. The criteria are valid until 31 December 2020.

On 6 March 2017 the Nordic Ecolabelling Board decided an extension of the product group definition with coffee service suppliers with separate agreements for coffee machine (including service and maintenance) and consumables. The new version is called 1.1.

Nordic Ecolabelling decided on 16 December 2019 to prolong the criteria with 24 months to the 31 December 2022. The new version is called 1.2.

Nordic Ecolabelling decided on 16 February 2021 to prolong the criteria with 6 months to the 30 June 2023. The new version is called 1.3.

[83] Swedish Standards Institute (SIS), Vattenförsörjning - Påverkan av metaller på dricksvatten (24 Feb 2015) http://www.sis.se/milj%C3%B6-och-h%C3%A4lsoskydd-s%C3%A4kerhet/vattenkvalitet/dricksvatten/ss-en-15664-12008a12013
[84] Mikael Hansson, R&D Manager, Ostnor (19 Feb 2015)
[85] Konsekvensutredning BBR (2014), Ändring av Boverkets byggregler (BBR)

Appendix 1 Energy consumption for transport of coffee services

Delivery, maintenance and service of coffee vending machines

Initial data:

Coffee machines in the Nordic region: 240 000, 90 000 of which in Sweden.

Deliveries of consumables and maintenance/cleaning of the machine: 2 visits/month, 24 visits/year, machine. The agreement may cover a larger amount of consumables being delivered at once. Service companies make deliveries in line with the customer's needs (order) and make visits for cleaning 1-2 times a month so as to meet hygiene requirements. And the customer ensures daily maintenance and cleaning.

Installation, service and repairs: 2 visits/year, machine.

Distance driven: 30 km, average. The distance driven varies considerably between urban and rural areas. Logistics are important. The majority of the coffee machines are located in urban areas.

Fuel consumption: 10 litres/100 km = 0.1 litres/km

Calculation of energy consumption:

Km driven 26 x 240000 x 30 km = 187 billion km

Fuel consumption, fossil: 18.7 billion litres

Energy consumption per year: 18.7 billion litres x 35 MJ/litre = 655 billion MJ = 182 billion kWh

Energy consumption per week (52 weeks), total: 12.6 billion MJ = 3.5 billion kWh

Energy consumption per week, machine= 14.6 kWh/week

It should be noted that this energy is calculated with a fuel consumption of 10 L/100 km. However, there is great potential for improved energy consumption by driving vehicles with lower fuel consumption.

Comparison with electricity consumption of coffee vending machines:

According to information from the Energy Agency, 90 000 vending machines consume 130 billion kWh electricity per year, which means 1 444 kWh, year and approximately 28 kWh per week per machine. The effective coffee vending machines in the test by the Energy Agency consumed 8.6 kWh/week – 17.7 kWh/week which shows potential for energy savings on coffee vending machines.

28 kWh electricity is equivalent to 70 kWh in primary energy using the primary energy factor 2.5.

Energy consumption for transport is thus equivalent to approximately 20% of the machine's energy consumption in primary energy.

Comparison with transport for cleaning services:

Cleaning services, background document, version 2: Total fuel and energy consumption for transport in cleaning services: 100 billion litres, 1 000 billion kWh

Energy consumption: Energy consumption 182 billion kWh of transport for maintenance and service of coffee machines amounts to approximately 18% of energy consumption (of consumed fuel) for cleaning services in the Nordic countries.