About Nordic Ecolabelled

Solid fuels and firelighting products

Version 3.5

Background document 03/12/2024

Nordic Ecolabelling

Contents

087 Solid fuels and firelighting products, version 3.5, 03/12/2024

Note: The original document, of which this is a translation, was written in a combination of several Scandinavian languages. The reason for this is that the Nordic countries work in close collaboration to develop the Nordic Ecolabelling criteria. Nordic Ecolabelling is of the opinion that this variation in the original document (provided there is coherence) can be seen as confirmation of this strong Nordic partnership, which enables and drives the development of the Nordic Ecolabel's criteria.

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

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1 Summary

The overall aim of this revision is to ensure that the Nordic Ecolabel's criteria continue to secure a positive environmental benefit via ecolabelling and that the criteria are viable and clear for the industry. The revision has considered the areas that were apparent on the evaluation of the criteria. This revision has also focused on expanding the product group with the possibility of also bringing wood briquettes, wood chips, firewood, barbecue charcoal/briquettes and firelighting products under the Nordic Ecolabel.

Product group message

Nordic Ecolabelled solid fuels – pellets, wood briquettes, wood chips, firewood, barbecue charcoal/briquettes and firelighting products - consist of renewable material from sustainably produced, controlled sources. The energy consumption during the production is limited in order to ensure energy efficiency and reduce climate impact. The energy requirement thus includes stringent requirements concerning the use of fossil fuels, as these are highly significant for emissions of greenhouse gases in a life cycle perspective for solid fuels. Stringent requirements for quality properties ensure good combustion properties.

MECO and RPS analyses

To obtain an overview of the key environmental impacts in the products' life cycles, an environmental assessment of the product group was performed as a qualitative MECO analysis for each of the four product areas. MECO stands for the assessment of Materials, Energy, Chemicals and Other characteristics and describes the principal environmental impacts during the product group's life cycle phases. This was followed by an overall RPS analysis for the product group as a whole. RPS was found for the following:

- Raw materials contained in solid fuels and firelighting products
- Energy consumption and impact on the climate
- The quality of the solid fuels and firelighting products

Market description

A brief description of the Nordic market shows that distribution and sales of solid fuels partly take place via manufacturers, but also largely via wholesalers, builder's merchants, retail chains and online-based businesses (many product types). Consumers consider price first and foremost and then quality and function/environment when purchasing solid fuels. The description of the market also shows that environmental statements used in marketing by builder's merchants and retailers focus on the use of sustainable and carbon-neutral raw materials.

Changes in the revised version

Based on the assessment, the MECO and RPS analyses and the market description, the main changes in the revision focus on:

- expanding the criteria to include briquettes, wood chips, firewood, charcoal/briquettes and firelighting products.
- tightening and updating the criteria for sustainable raw materials

- amending requirements concerning energy consumption and setting more stringent requirements for the use of fossil raw materials in the production phase
- tightening the requirements for quality aspects

All changes and amendments to the requirements are listed in Chapter 8. Further details about the changes to requirements and new requirements can be found in Chapter 7.

2 Basic facts about the criteria

2.1 Products that may be Nordic Ecolabelled

The product group comprises the following solid fuels for consumer and industrial use: pellets, briquettes, wood chips, firewood, charcoal/briquettes and firelighting products. The material in the products is made from renewable raw materials. The product group also includes composite products that combine functions of the above-mentioned product types (e.g. products that serve both as a solid fuel and firelighting product). However, these products must demonstrate that they comply with all of the Nordic Ecolabel's requirements within the different product types that the product has combined.

Liquid fuels for transport, heating and industrial production may not be Nordic Ecolabelled according to these criteria, but may be Nordic Ecolabelled according to the criteria for biofuels. Nor does the product group include liquid firelighting products defined by the EN 1860:3:2003 standard, matches, smoking wood chips and disposable barbecue grills.

Product group message

Nordic Ecolabelled solid fuels – pellets, briquettes, wood chips, firewood, barbecue charcoal/briquettes and firelighting products - consist of renewable material from sustainably produced, controlled sources. The energy consumption during the production is limited in order to ensure energy efficiency and reduce climate impact. The energy requirement thus includes stringent requirements concerning the use of fossil fuels, as these are highly significant for emissions of greenhouse gases in a life cycle perspective for solid fuels. Stringent requirements for quality properties ensure good combustion properties.

Nordic Ecolabelled solid fuels and firelighting products:

- consist of renewable materials – e.g. wood, herbaceous crops and fruit biomass
- consist of sustainably produced raw materials – to conserve the earth's resources
- meet stringent requirements for energy consumption – to reduce climate impact
- meet stringent quality requirements – to ensure good combustion properties

2.2 The version and validity of the criteria

The ecolabel licence is valid providing the criteria are fulfilled and until the criteria expire. The validity period of the criteria may be extended or adjusted, in which case the licence is automatically extended and the licensee informed.

Revised criteria shall be published at least one year prior to the expiry of the present criteria. The licensee is then offered the opportunity to renew their licence.

3 The Nordic market

This chapter briefly describes the Nordic market for the individual types of solid fuels, and outlines the solid fuel industry in each of the Nordic countries (data from 2013-2015).

3.1 The Nordic market for solid fuels

Pellets

There are currently three main types of purchasers/end-users of pellets:

- Private homeowners
- Small-size businesses and public institutions (schools, etc.)
- Major manufacturers of electricity and Combined Heat and Power (CHP)

The main factors influencing the market for pellets are quality, price and service. The market is characterised by a large number of pellet providers: Producers of pellets, builder's merchants, petrol stations and many small-size businesses that primarily sell their products online and deliver to the customer's doorstep. Nowadays, large quantities of pellets are being imported to the Scandinavian market for use in industries, CHP production and by private homeowners. The price of the imported pellets is low and it is very difficult for producers in Scandinavia to compete with these prices. However, the pellets produced in Scandinavia can compete on quality and reliability of supply. Pellets are marketed partly with the FSC/PEFC label and are also certified as complying with the quality provisions of the EN14961 standard, ENplus or DINplus (applies in particular in Denmark). Pellets that are to be exported to Germany must have DINplus certification. Experience says that customers do not demand FSC/PEFC labelled pellets.

Pellets are a uniform type of fuel that, in comparison with other solid biofuels, are associated with a green image. The wide range means there is considerable pressure in the market, particularly on prices, but there is also variation in quality, which is the potential for the Nordic Ecolabel.

Wood briquettes

Sales of briquettes are generally increasing in all the Nordic countries, where they are used as an alternative to firewood. Wood briquettes are sold widely via builder's merchants, retail chains and lots of small companies, which primarily sell their products online and deliver to the customer's doorstep, either in bags, sacks or on pallets. Briquettes are typically made from wood residual products (sawdust). There are also some types that are made entirely or partly from bark, peat and brown coal

(lignite). According to the findings of a Danish study,[1] there are good quality and poor quality briquettes on the market and this is often reflected in the price. Only a small percentage of the briquettes that are sold to private customers in the Nordic market are certified in compliance with quality or raw material standards.

Firewood

Availability (access to wood) and price are the main determinants of demand in the market for firewood. Because of the problem of emissions from wood-burning stoves, there is greater awareness among buyers that the wood must be dry (moisture content below 18%) before use. Firewood is now therefore increasingly being marketed as “kiln-dried”. Dialogues with industry stakeholders[2] reveal, however, that a significant part of the firewood being sold as dry/kiln-dried is not dry enough, which means there is still a problem with poor combustion and emissions. The EN ISO 17225-5:2014 standard for biofuels includes requirements for firewood. There are no legislative provisions or Nordic labelling schemes to provide guidance to consumers with regard to firewood.

Barbecue charcoal and briquettes

The market for barbecue charcoal/briquettes is characterised by a wide range of different types of products and brands. A large percentage of barbecue charcoal/briquettes in the Swedish, Norwegian and Finnish markets is FSC labelled, while only a small percentage of those on the Danish market is FSC labelled. Furthermore, the Swedish market has barbecue charcoal marked with the "Bra Miljöval" (Good Environmental Choice) ecolabel. Tests[3],[4],[5] of barbecue charcoal/briquettes show that consumers are looking for barbecue charcoal that is easy to light and is of good quality with regard to durability and temperature.

There are no legislative provisions or labelling schemes (other than the "Bra Miljöval" (Good Environmental Choice) ecolabel) to provide consumers with guidance in this area.

Firelighting products

The Nordic market for firelighting products and, in particular, alternatives to the traditional fossil fuel products (solid and liquid), has grown dramatically in the past five years[6]. Firelighting products are covered by quality standards to a limited extent only. This means that there are many products in the market of widely varying quality. A significant amount of the products are manufactured in Asia. Test[7],[8] of firelighting products show that consumers are looking for firelighting products that is easy to light, burns with a powerful flame and does not smell. There are no labelling schemes (other than the "Bra Miljöval" (Good Environmental Choice) ecolabel) to provide consumers with guidance with regard to firelighting products.

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[1] Denmark's supply of wood chips in the energy market of the future; The Danish Forest Association, 2013
[2] Interview with Tommy Bruus-Jensen, former Chairman of the Danish Biofuel Association, 22 January 2015
[3] http://www.kokosbriketten.dk/public/Image/Kokosbriketten/bestitest.pdf, 6 June 2015
[4] http://www.icakuriren.se/Test-Rad/Tester/Test-av-grillkol/, 6 June 2015
[5] http://www.testfakta.se/tester/hem-och-hush%C3%A5ll/ingen-brikett-%C3%A4r-bra-p%C3%A5-allt, 6 June 2015
[6] Interview with Bjane Malmkjær, Fritz Schur, January 2015
[7] http://www.grillguru.dk/forum/viewtopic.php?t=9276, besøgt oktober 2015
[8] http://www.hyttemag.no/vi-tester/i-fyr-og-flamme, besøgt september 2015

3.2 Sweden

In 2013, 53.5 TWh of unprocessed forest fuels (wood chips, bark, sawdust and firewood) were produced in Sweden[9]. That represents a good 40% of the Swedish biofuel consumption or just under 15% of the whole of Sweden's energy consumption. Alongside the pulp and sawmill industries, forestry is a major producer of solid biofuels. Large quantities of the fuels are by-products from the sawmill industry and the pulp industry in the form of black liquor.

Pellets: In 2015, 1.7 million tonnes (8 TWh) of pellets were used in Sweden. Approximately 32% of this was for the housing market, the rest was for larger companies and municipal buildings. In 2015, Swedish production of pellets was approximately 1.6 million tonnes from 80 Swedish pellet producers[10].

Briquettes: There are 6-8 producers of briquettes in Sweden. A significant amount of the production is aimed at large companies and public bodies, such as heating plants, schools, hospitals and industries[11].

Wood chips: According to the Swedish Wood Fuel Association, there are about 20 major suppliers of wood chips in the country. Wood chips are delivered either in skips or by trailer. The raw material comprises harvesting residues, wood from thinning operations, recycled wood, sawdust and bark[12].

Barbecue charcoal/briquettes: Sweden has a small-scale production of barbecue charcoal/briquettes. Approximately 24,000 tonnes/year[13], which is about 10 million bags of barbecue charcoal/briquettes, are used.

Firelighting products: There are several solid firelighting products made of renewable raw materials in the Swedish market; brown blocks, white sachets, firelighting paper, fibrous material, firelighter blocks with paper and firelighting gel. All products are sold in the manufacturer's name and under private labels, particularly at builder's merchants, retail chains and petrol stations.

The Swedish Bioenergy Association (Svebio) has about 300 members comprising enterprises and manufacturers and a couple of hundred private members. Svebio is active in the whole production chain from raw material production, production of energy raw materials to purchasers of energy raw materials in the form of heating plants and industries[14]. The Swedish Association of Pellet Producers comprises 14 producers of pellets and a number of production equipment manufacturers and fitters[15]. The Swedish Wood Fuel Association is for Swedish producers of firewood, wood chips, forestry and wood industry by-products such as pellets, briquettes, wood chips, sawdust, wood powder, bark and recycled wood. The members produce and supply about 80% of the wood fuel that is sold to central and district heating plants, CHP plants and other biofuel facilities in the Swedish commercial market[16].

[9] The Swedish Energy Agency. Production of unprocessed wood fuels 2013. ES 2014:09.
[10] http://pelletsforbundet.se/statistik/ (2 August 2016)
[11] http://www.tradbransle.se/fakta-om-tradbransle/fakta-om-briketter/ (2 August 2016)
[12] http://www.tradbransle.se/fakta-om-tradbransle/fakta-om-grot/ (182016-08-02)
[13] Interview with Gryfskand, February 2015, Stockholm
[14] https://www.svebio.se/om-oss-0
[15] http://pelletsforbundet.se/
[16] http://www.tradbransle.se/

3.3 Denmark

Pellets: 9 Danish manufacturers produced 99,930 tonnes of pellets in 2012: this is approximately a 25% decrease from the more or less constant level of about 135,000 tonnes. The import of pellets to Denmark has increased significantly from approximately 200,000 tonnes in 2001 to more than 1.8 million tonnes in 2012. The dramatic increase is primarily due to demand from CHP plants where fossil fuels (mainly coal) have been replaced by sustainable energy sources[17] as part of Denmark's energy and climate policy. In 2012, private homeowners accounted for approximately 500,000 tonnes compared with about 200,000 tonnes in 2001. As previously mentioned, there has been a dramatic increase in the import of pellets.

For the part of production that is based on dry raw materials, the current level is restricted by the producers' access to raw materials (sawdust and shavings from the wood industry).

Briquettes: In Denmark, there are a couple of small-scale briquette producers that primarily sell their products locally. Several types of wood briquettes for stoves have appeared in the Danish market in recent years and the use of this type of fuel has increased greatly. Years ago, wood briquettes were few and not very visible in the Danish market. Based on data from Statistics Denmark and a firewood reseller survey, it is estimated that consumption was around 100,000 tonnes in 2012[18].

Wood chips: Danish consumption of wood chips in 2012 amounted to about 1.75 million tonnes (2.2 million m^3) or approximately 17.5 PJ, broken down as follows[19]:

- Approximately 100 decentralised heating and CHP plants: 55% of total consumption.
- 4 centralised power plants (DONG, Østkraft & Verdo): 30%.
- 4 industrial companies: 10%.
- An unknown number of farm furnaces, institutions, nurseries, retail, etc.: approximately 5%.
- 80% of the wood chips are produced in Danish forests. The rest is imported.

Firewood: The total consumption of firewood in Denmark in 2013 is estimated at 22 PJ, representing just over 50% of the biomass fuel used in Danish CHP plants[20]. It is estimated that 15% (3,308 TJ) of firewood was imported in 2013. This figure is a qualified estimate, based on three elements. Firstly, it is estimated that just over 8% of the firewood market is made up of firewood crates, which are imported. Secondly, it is estimated that firewood processed from whole, imported logs makes up just over 2% of the firewood market. Thirdly, based on consumer data, it is estimated that briquettes account for almost 5% of the consumption.

Barbecue charcoal/briquettes: It is mainly barbecue briquettes (and not barbecue charcoal) that are sold in the Danish market, and consumption has remained stable in recent years at about 25,000 tonnes/year[21]. Denmark does not produce any barbecue charcoal/briquettes.

[17] http://www.ens.dk/politik/dansk-klima-energipolitik
[18] Environmental impact of sawdust briquettes use, Report No. 4 from the Danish Environmental Protection Agency, 2013
[19] Denmark's supply of wood chips in the energy market of the future; The Danish Forest Association, 2013
[20] Hansen T.: Firewood consumption in Denmark 2013, the Danish Energy Agency, 2015
[21] Interview with Bjaren Malmkjær, Fritz Schur, 3 March 2015

Firelighting products: There are two producers of firelighting products (white and brown blocks) in Denmark: HVK (Fritz Schur) and Burner. The products are sold mainly in Scandinavia. Solid firelighting products made of renewable raw materials are widespread in the Danish market, where they are mainly sold at builder's merchants, retail chains, grocery stores and petrol stations. They are mainly sold as brown blocks, white sachets and fibrous material.

The Danish Biofuel Association[22] represents 62 members, who import and sell solid biofuels (pellets, wood briquettes, wood chips, firewood, barbecue charcoal and barbecue briquettes and firelighting products). Many of the members import the fuels from abroad and market them on their websites. Danish forestry also sells and markets firewood and wood chips.

3.4 Norway

In 2012, bio-energy accounted for 16% of the total energy consumption of households[23].

Firewood, wood chips, pellets and briquettes are the main solid biofuels in the Norwegian market. The market for firewood is commercialised only to a slight extent and is fragmented. This means that information about prices and volumes is limited and unreliable. The use of firewood in Norway is a result of both private harvesting and purchase of wood. According to Statistics Norway (SSB),[24] the purchase of firewood accounts for approximately 40% of consumption.

The market for processed fuels, such as pellets, briquettes and wood chips, is better documented, but the market is vulnerable in terms of high overheads, low prices for substitutes, such as electricity and oil, demand and public funding. The turnover for solid biofuel producers in Norway is generally low and a number of producers operate in a secondary market, mainly targeted at technology and production equipment or bio-energy production.

Pellets: The Norwegian Bioenergy Association (NoBio)[25] has compiled information about the production and sales of pellets in 2013. In total, it has registered and collected data from six producers of pellets in Norway. The production of pellets is down significantly on 2012. While production amounted to 124,170 tonnes in 2012, total production in 2013 was 48,921 tonnes. The main reason for this is that Biowood's pellets production plant at Averøya was closed down in 2012. Total consumption of pellets in Norway has increased from 66,188 in 2012 to 93,879 tonnes in 2013. This increase can be attributed to growing demand from the central and district heating industry in general.

Briquettes: The Norwegian Bioenergy Association (NoBio) has collected data from nine producers and four importers of briquettes. Production of briquettes in Norway has increased from 31,659 tonnes in 2011 to 34,236 tonnes in 2012. According to Nobio, consumption is on the same level as in 2011, but is still higher than national production. Demand is met by importing briquettes, although imports were down significantly in 2012 compared with 2011. Most of the briquettes imported are

[22] http://www.biobraendselsforeningen.dk/
[23] Statistics Norway (SSB) «Statistics: Energy balance. Production and consumption, by energy product» 2013.
[24] «Statistics: The Balance of Energy. Production and consumption, by energy product» 2013.
[25] http://nobio.no/dokumenter/4-statistikk/

supplied in 10 to 20 kilo sacks, which are sold to households as a substitute for firewood.

Wood chips: In Norway, wood chips are mainly used in district heating plants and industrial facilities. Norwegian district heating plants consumed approximately 1.3 GWh of wood chips in 2012.

Norwegian district heating plants use a total of 100 MW of installed power, based on wood chips and pure recycled wood (The Norwegian Water Resources and Energy Directorate (NVE)'s district heating database, June 2011).

Barbecue charcoal/briquettes: Norway imports large quantities of barbecue briquettes. In 2012, it imported 1955 tonnes (turnover of EUR 186,489). The figure in 2013 was 1883 tonnes (turnover of EUR 181,240)[26]. It has not been possible to find data for the production of barbecue charcoal/briquettes in Norway.

Firelighting products: Solid firelighting products made of renewable raw materials are widespread in the Norwegian market, where they are mainly sold at builder's merchants, retail chains, grocery stores and petrol stations.

In 2014, a consumer test was conducted on the following products: brown blocks, white sachets, firelighting paper, fibre firelighter rolls and fire-starter logs.

The Norwegian Bioenergy Association (NoBio)[27] is the industry association that represents the bio-energy market in Norway.

3.5 Finland

Wood is the main source of bio-energy in Finland and accounted for 24% of total energy consumption in 2013. Most of the wood-based energy (64%) comes from residual products from forestry operations and forest industries[28].

Pellets: Finland's consumption of pellets in 2014[29] was 240,000 tonnes/year, of which 181,000 tonnes were used in heating/electricity generation plants and other major industries. 46,000 tonnes of pellets were imported and 56,000 tonnes were exported. In 2013, there were 27 pellet manufacturers and approximately 20 other producers of pellets in Finland. More than 26,000 private households and 1,000 large-scale industrial facilities used pellets for heating.

Pellets/wood chips/firewood: The table below[30] shows the use of solid biofuels in Finland in 2012. Firewood is used in private households, but wood chips are primarily used in industrial facilities.

Table 1: Use of solid fuels (pellets, wood chips and firewood) in Finland in 2012

Type of fuel	Use in 2012 (PJ)	%
Pellets	3.3	0.7
Wood chips	59.4	14.2
Firewood	60.4	14.4

[26] Interview with Gryfskand, 3 February 2015, Stockholm
[27] http://nobio.no/
[28] IEA Bioenergy Task 40 - Country report of Finland 2014
[29] http://www.bioenergytrade.org/downloads/iea-task-40-country-report-2014-finland.pdf
[30] European Pellet Report, PellCert Project, 2012

Barbecue charcoal/briquettes: Finland has a small-scale production of barbecue charcoal/briquettes. The largest manufacturer (RPK Hiili) produces approximately 250 tonnes of barbecue charcoal a year[31]. In 2005, Finland imported 1783 tonnes of barbecue charcoal/briquettes, and 2700 tonnes in 2013[32].

Firelighting products: There are several solid firelighting products made of renewable raw materials in the Finnish market; brown blocks, white sachets, firelighting paper, fibrous material, firelighter blocks with paper and firelighting gel. All products are sold both in the manufacturer's name and under private label especially in builder's merchants, retail chains, grocery stores and petrol stations.

Bioenergia,[33] the Bioenergy Association of Finland, represents the interests of the bioenergy sector in Finland.

The Association has more than 300 members who represent all aspects of the bioenergy chain, from producers of raw materials, energy and energy raw materials, to research and so on.

4 Other labelling schemes and controls

This chapter summarises the main labelling schemes for solid biofuels; pellets, briquettes, wood chips, firewood, barbecue charcoal/briquettes and firelighting products. A summary of relevant EU directives, legislation and regulations can be found in Appendix 4. A summary of relevant standards can be found in Appendix 5.

ENplus

ENplus[34] is a quality certification scheme for pellets, developed by the European Biomass Association (AEBIOM). The objective of the ENplus scheme for pellets is to guarantee the supply of pellets for heating and CHP up to 1 MW output power in residential, commercial and public buildings with a constant and clearly defined quality. The production, logistics and delivery procedures are controlled to ensure that supplied pellets maintain a constant high level of quality. The product certification is therefore combined with a system certification. With the classes ENplus-A1 and ENplus-A2, and class EN-B, three grades are defined, based on the specifications of the European standard EN ISO 17225-2:2014.

ENplus requirements differ from EN ISO 17225-2:2014 in the following:

- Mandatory requirements on ash melting temperature (voluntary under EN 14961-2).
- ENplus A1 requires an ash deformation temperature of ≥ 1200°C.
- ENplus A2 and EN-B require an ash deformation temperature of 1100°C.
- The ash used for analyses is produced at 815°C.
- For EN-B, chemically treated wood is not permitted as a raw material.

[31] Rautiainen M. et al. (2012): Biocoal production, properties and use, University of Helsinki, Department of Forest Sciences
[32] http://www.factfish.com/statistic-country/finland/wood+charcoal,+import+weight
[33] http://www.bioenergia.fi/English
[34] http://www.enplus-pellets.eu/, accessed 8 July 2016

DINplus

DINplus[35] is a quality certification scheme for pellets, developed by DinCertco in Germany and is widely used for pellets produced in Germany and pellets that are sold/marketed in the German market. Specifications are based on the specifications of the EN ISO 17225-2:2014 European standard and assure the same quality level as ENplus.

Blaue Engel

Under the Blaue Angel ecolabel, criteria for labelling of pellets and wood chips are called “Technically dried wood chips/wood pellets (RAL-UZ 153)”[36].

There are currently two producers who hold licences and have labelled a number of pellets products. The criteria are linked to DIN EN17225 with regard to specifications of wood raw materials and quality.

There are also requirements for sustainable wood raw materials and energy consumption in the drying process of wood chips/pellets.

Bra Miljöval

The “Bra Miljöval" (Good Environmental Choice) ecolabel provides a set of criteria for biofuels (2013:2[37]) which include many types of renewable solid, liquid and gaseous fuels. Pellets, briquettes, firewood, wood chips, biogas, barbecue charcoal and briquettes and firelighting products are examples of product types. There are currently five licences: one for biogas, one for barbecue charcoal/briquettes, one for pellets and two for firelighting products.

The criteria stipulate that non-renewable energy, which is part of the product's life cycle, must account for a maximum of 10% of the product's energy content. Moreover, there are requirements for sustainable renewable raw materials and chemical products and constituent substances classified as CMR.

Green Gold Label

The Green Gold Label[38] was established by the Dutch energy company Essent and Control Union Certifications. GGL employs the track and trace system in the certification programme. It covers standards for specific activities in the supply chain of solid biomass, as well as for the supply chain as a whole. This includes production, processing, transport and final energy transformation. GGL requires the tracking custody of the biomass. Currently, there are eight Green Gold Label standards and 2 Clean Raw Material (CRM) certificates. Different standards are specified for either the producer of raw materials, the user of biomass for power generation or power plant.

GGL Standard 8 is prepared for compliance with greenhouse gas reduction targets, while CRM is the specific clean wood certificate for pretreated biomass.

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35 http://www.dincertco.de/en/dincertco/produkte_leistungen/zertifizierung_produkte/brennstoffe/holzpellets_heizkessel/holzpellets_heizkessel.html, accessed 8 July 2016

36 https://www.blauer-engel.de/en/products/energy-heating/technically-dried-wood-chips-wood-pellets/wood-pellets

37 http://www.naturskyddsforeningen.se/bra-miljoval/biobransle, 21 April 2015

38 http://www.greengoldlabel.org/site/pagina.php?id=51 (7 May 2015)

GGL also provides additional guidelines for pellets manufacturing and transportation on existing certification systems for forest management (FSC, PEFC, etc.) and agricultural certification systems (Organic and EUREGAP) which have been approved by GGL. In July 2016, there were 14 certified businesses from all over the world.

Sustainable Biomass Partnership (SBP)

SBP[39] is a certification system for sustainable biomass, developed by seven major European energy producers[40] that account for the purchase of more than 70% of industrial pellets in Europe.

In addition to the collection and communication of climate data, SBP builds on standards and requirements for responsible forest management. In certain areas, this is most easily documented using the FSC or PEFC schemes for certification.

Raw materials labelling and traceability systems

Sustainability labels for wood are very relevant within the solid biofuels product group (pellets, briquettes, wood chips, firewood, barbecue charcoal and briquettes). FSC and PEFC are the two most dominant sustainability certifications for wood and wood-based products. Although there are some differences between the schemes, Nordic Ecolabelling considers them both to be at the leading edge of the legislation, and thus driving change towards more sustainable forestry. Today, FSC and PEFC labels are widespread in the labelling of solid biofuels, particularly barbecue charcoal and briquettes.

5 Aims of the revision

Evaluation of the current version 2 of the criteria for the Nordic Ecolabelling of pellets (2015) resulted in a proposal to revise the criteria, primarily by tightening the current requirement level for quality, updating the raw material requirements, energy consumption, and expanding the product group to include briquettes, wood chips, firewood, barbecue charcoal and briquettes and firelighting products.

Based on the recommendations in the evaluation report, the objectives of the revision have been to:

- Establish the product group definition to cover the new types of products: briquettes, wood chips, firewood, barbecue charcoal and briquettes and firelighting products.
- Establish new criteria for materials, energy requirements and production-specific quality requirements that apply to the new product types. The starting point should be the same requirements that already apply to pellets, but the requirement levels need to be reviewed. New product-specific requirements for the new products must be developed for the parameters where a high RPS is found and which are not already covered by requirements for pellets.
- Update raw material requirements: the requirements should be updated to comply with the EN ISO 17225:2014 standard for Solid Biofuels. In addition,

[39] http://www.sustainablebiomasspartnership.org/ (2 March 2015)
[40] DONG Energy, Drax, E-ON, ENGIE, RWE, Vattenfall and HOFOR.

requirements for wood raw materials must be updated in line with the Nordic Ecolabel's new forest requirements including requirements for traceability.
- Update raw material quality requirements (e.g. residual and waste wood) to comply with the EN ISO 17225:2014 standard.
- Amend the energy consumption requirement so that it is also possible to produce pellets from virgin wood raw materials, i.e. that in future there will be two differentiated energy requirements for pellets; one for pellets produced from residual products and one for pellets produced from virgin raw materials.
- Review the requirement for the impact on the climate of the used energy raw materials. It is considered that the requirement level can be increased, possibly with a prohibition on the use of fossil fuels for drying raw materials.
- Update the quality requirement. The requirement for testing methods and quality parameters must be updated to comply with the EN ISO 17225:2014 standard. A particular focus on the quality parameters for water content, dust, ash content and ash melting point.

About this revision of criteria

The revision was conducted by Product Group Manager Thomas Christensen (DK) as the project manager, and Eva-Lotta Lindholm (S) as the project adviser. Stinus Kappel Andersen (DK), Kristian Kruse (N), Eva-Lotta Lindholm (S) and Harri Hotulainen (Fin) are the national contacts.

The revision was conducted as an internal Nordic Ecolabelling project with an ongoing dialogue with international and national stakeholders. A consultation is scheduled for mid September - November 2016 with a consultation meeting to be held in Sweden at the end of the consultation period for the whole of the Nordic and international industry.

6 Environmental impact of "the product group"

The solid fuels product group (including firelighting products) comprises uniform types of materials and an overall uniform function, which is to produce energy in the form of heat by burning fuels.

A so-called MECO analysis was performed in conjunction with Nordic Ecolabelling's evaluation of the criteria in 2015[41]. MECO stands for the assessment of Materials, Energy, Chemicals and Other characteristics and describes the principal environmental impacts during the products' life cycle phases. The MECO analyses are based on LCA studies, datasets from generic databases and scientific reports. Based on the MECO analysis, an RPS analysis was conducted which identifies the relevance, steerability and potential of the various environmental aspects of the solid fuels: pellets, briquettes, wood chips, firewood, barbecue charcoal and briquettes and firelighting products.

Nordic Ecolabelling uses the RPS analysis to pinpoint the environmental issues that are most relevant (R) in the life cycle of the products and assess what potential (P) exists for reducing adverse effects on the environment in these areas. At the same time, it is important to examine how the manufacturers in particular can make changes to the products (steerability = S) that will trigger the potential for

[41] The separate MECO analysis for solid fuels is written in Danish and is available upon request from Nordic Ecolabelling: tc@ecolabel.dk

environmental improvements. This section describes the key findings of the RPS analysis. The complete analysis is in Danish, but can be demanded at Nordic Ecolabel.

The RPS analysis for solid fuels: pellets, briquettes, wood chips, firewood, barbecue charcoal and briquettes and firelighting products, shows that RPS has been found in a life cycle for the following areas:

- Raw materials contained in solid fuels and firelighting products
- Energy consumption and impact on the climate
- The quality of the solid fuels and firelighting products

Raw materials contained in solid fuels and firelighting products

Raw materials for the solid fuels (pellets, briquettes, wood chips, firewood, barbecue charcoal and briquettes and firelighting products) are mainly wood raw materials (virgin or chemically untreated wood residues) or other vegetable raw materials and are thus renewable raw materials. Requirements concerning sustainable production of renewable raw materials are therefore highly relevant (R) and can be ensured by setting requirements for the use of sustainability standards (P). Requirements for the use of certified raw materials and traceability standards will also strengthen the traceability (S) of renewable raw materials that are used in the Nordic Ecolabelled solid fuels.

The quality of the solid fuels is largely determined by the “purity” of the raw materials that make up the fuels. Requirements concerning additives, binders, fillers or fossil raw materials are therefore extremely relevant (R) and can be ensured by setting requirements for the use of quality standards (P). Requirements for fuels to be tested for additives, for example, by an independent, qualified third party increase steerability (S) of unwanted substances in the Nordic Ecolabelled solid fuels.

Energy consumption and impact on the climate

There is high relevance associated with energy consumption in raw materials production and, in particular, in the actual solid fuels production process. The potential (P) and steerability (S) for energy requirements in the raw material phase are, however, assessed to be low, since transportation in the forest and from the forest to the production facilities is now already optimised by the industry.

The greatest energy relevance for some types of solid fuels, such as pellets, wood briquettes and barbecue charcoal/briquettes, is in the actual raw material drying process (and for barbecue charcoal/briquettes plus the distillation process) for the finished product. Since there is a big difference in production technologies and their energy efficiencies, there is potential (P) for stringent energy requirements.

The steerability (S) is also considered to be good, since energy consumption is already a focus area for the industry. Furthermore, the RPS analysis shows that there is limited potential (P) for the energy requirement to include all the processes that use electricity to power the machinery, since the pellet and briquette factories use the same electricity-powered technologies (debarking, chipping, grinding, pressing, cooling and sifting) to a great extent.

The use of fossil fuels in the production of solid fuels is of utmost relevance (R) from a climate and life cycle perspective, as they emit high levels of greenhouse gases during combustion.

Both renewable raw materials and fossil fuels release CO_2 during burning, and thus contribute to the greenhouse effect. The benefit of burning renewables is that they do not contribute additional CO_2 to the atmosphere, as is the case with fossil fuels, provided that the biomass, for example, comes from sustainable sources.

Moreover, CO_2 in new biomass is absorbed much more quickly than fossil sources. Biomass therefore has a relatively short impact on the climate compared with fossil CO_2, where the effect lasts for thousands of years[42]. The use of fossil fuels to dry pellets, wood briquettes, wood chips, firewood and barbecue charcoal/briquettes is common in Europe, unlike Scandinavia. This means there is considerable potential (P) and good steerability (S) for restricting the use of fossil fuels in the drying processes.

The quality of the solid fuels and firelighting products

Material composition and production methods vary greatly for the individual product types of solid fuels (pellets, wood briquettes, wood chips, firewood, barbecue charcoal/briquettes and firelighting products). This has a major impact on the quality of the products.

It is therefore highly relevant (R) to ensure that the quality of the solid fuels is good. This can be ensured through requirements to apply quality standards (P). Steerability (S) of the solid fuel quality is increased by requiring relevant quality parameters to be tested by independent, qualified third parties.

Imposing stringent requirements for the quality of the solid fuels ensures not only good combustion properties, but also an indirect restriction on emissions of harmful substances, such as particulate matter, OGC, CO, VOC and NOx, in the use phase.

7 Reasons for requirements

7.1 Product group definition

The product group comprises the following solid fuels for consumer and industrial use: Pellets, briquettes, wood chips, firewood, charcoal/briquettes and firelighting products. The material in the products is made from renewable raw materials.

The product group also includes composite products that combine functions of the above-mentioned product types (e.g. products that serve both as a solid fuel and firelighting product). However, these products must demonstrate that they comply with all of the Nordic Ecolabel's requirements within the different product types that the product has combined.

Liquid fuels for transport, heating and industrial production may not be Nordic Ecolabelled according to these criteria, but may be Nordic Ecolabelled according to the criteria for biofuels.

[42] Cheeubini F. et al: “CO2 emissions from biomass combustion for bioenergy: atmospheric decay and contribution to global warming”, March 2011

Nor does the product group include liquid firelighting products defined by the EN 1860:3:2003 standard, matches, smoking wood chips and disposable barbecue grills.

Background

Pellets, briquettes, wood chips and firewood: The definition of pellets, briquettes, wood chips and firewood is consistent with EN ISO 17225 part 1-5:2014 (solid biofuels), previously EN 14961:2012. This standard determines the fuel quality classes and specifications for solid biofuels for general use. The classification principle of the solid biofuels is based on origin and source, major traded forms (briquettes, pellets, wood chips, sawdust, firewood, straw, miscanthus (elephant grass), reed canary bales, grains, olive residues, etc.) and properties of solid biofuels. The classification system is flexible. A hierarchical classification system includes four sub-groups: woody biomass, herbaceous biomass, fruit biomass and biomass blends and mixtures. The standard involves special requirements for chemically treated biomass (other than heat, air or water). EN ISO 17225:2014 consists of the following parts: Part 1: General requirements, Part 2: Graded wood pellets, Part 3: Graded wood briquettes, Part 4: Graded wood chips, Part 5: Graded firewood, Part 6: Graded non-woody pellets, Part 7: Graded non-woody briquettes.

Barbecue charcoal and briquettes: The requirement for the definition of barbecue charcoal and briquettes is consistent with the general definition in EN 1860-2:2005.

Firelighting products: The requirement for firelighting products is consistent with the general definition of solid and thickened liquid firelighting products in compliance with the definition in EN 1860-3:2003.

There are also solid fuel types on the market that combine the features of the above product types (e.g. products that serve as both a solid fuel and a firelighting product). Typical for these product types is that they consist of a combustible solid material to which a lighter fluid/material has been added or that they are packaged inside paper or plastic for use as firelighting material. As there is no specific quality standard for this product type, these products must demonstrate that they comply with all of the Nordic Ecolabel's requirements within the different product types that the product has combined.

A considerable amount of the material in solid fuels is renewable, but they can also contain inorganic and organic fossil materials as fillers or additives. Nordic Ecolabelling works to achieve a greater use of renewable raw materials for those product areas where this makes sense.

Nordic Ecolabelling of products based on renewable raw materials will thus be able to help consumers and businesses to choose solid fuels with minimal impact on the environment. Additives, fillers or chemicals from non-renewable sources or recycled material may be necessary, however, and a requirement for all products to consist of 100% renewable materials is therefore not possible.

Both biomass (vegetable raw materials) and fossil fuels release CO_2 during burning, and thus contribute to the greenhouse effect. The benefit of burning biomass is that it does not contribute additional CO_2 to the atmosphere, as is the case with fossil fuels, provided that the biomass comes from sustainable sources.

The creation and transport of biomass leave a marginal CO_2 footprint, which is lower than the CO_2 footprint created, for example, by fossil oil. This is the conclusion of an IPCC report[43], which examines the total emission from all energy sources.

To achieve a clear definition of the product group, only solid fuels are included in the product definition. Liquid fuels for transport, heating and industrial production therefore may not be Nordic Ecolabelled according to these criteria, but may be Nordic Ecolabelled according to the criteria for biofuels. Liquid firelighting products, defined by the EN 1860-3:2003 standard, are not included in the product group, as they are not considered solid fuels. The steerability (S) on liquid firelighting products is considered to be low as these products also can be used as primary fuels for example bio-fireplaces and oil lamps. Nor does the product group include matches, as the purpose of matches is to emit thermal energy for a very short period of time in order to ignite the actual firelighting products. Smoking wood chips may not be Nordic Ecolabelled according to these criteria. The purpose of smoking wood chips is to generate smoke and thus transfer flavour to the food. Smoke carries emissions that are harmful to health, such as particulate matter, OGC, CO, VOC and NOx in the use phase.

Barbecue charcoal and briquettes may be impregnated with lighter fluid (which is usually fossil) for easy lighting. This is typical, for example, for the charcoal in disposable barbecue grills.

In the view of Nordic Ecolabelling, barbecue products should be 100% free from impurities and additives, which can bring unwanted smoke and flavours to the food on the barbecue. A new report[44] by The Danish Veterinary and Food Administration (DVFA) concludes that there is a risk that the shorter the distance between the food and the source of heat, the greater the amount of carcinogenic PAH compounds. The rack on a disposable barbecue grill is very close to the charcoal. The product also contains several materials (metal rack and tray) that are not solid fuels. For this reason, disposable barbecue grills may not be Nordic Ecolabelled according to these criteria.

7.2 Production and product description

Background to requirement O1 Description of the product

The intention of the requirement is to provide an adequate picture of the life cycle of the product and any packaging: what raw materials and production processes are used, what binders or additives are used, and so on. The requirement will thus give an insight into the product(s) in the application, in order to ensure the application is processed correctly.

7.3 Resources

Background to requirement O2 Material composition

The requirement that pellets contain 100% by weight of renewable materials remains unchanged in version 3 of the criteria.

In version 3, the product definition has been extended to include briquettes, wood chips, firewood, barbecue charcoal/briquettes and firelighting products.

[43] http://www.danskenergi.dk/~/media/Biomasse/SummaryForPolicymakers.ashx, 31 March 2015
[44] The Danish Veterinary and Food Administration (DVFA): Final report on PAH in smoked meat and fish and grilled meat, November 2015

The raw material in these product types must also be 100% by weight renewable materials. The background to the requirements for a high percentage of renewable raw materials is presented above in Section 7 Product definition.

The requirement for product definition, classification and types of raw materials in pellets, wood briquettes, firewood, wood chips and barbecue charcoal/briquettes is consistent with EN ISO 17225 part 1-5:2014[45].

Barbecue charcoal/briquettes and firelighting products are covered by EN ISO 17225:2014 itself but Nordic Ecolabelling believes, that it is appropriate that these too should meet the defined requirements for raw materials in the standard.

The requirement for that the wood raw materials in pellets, wood briquettes, firewood and wood chips has to be class A1 (class A2 is also allowed for wood chips and firewood) ensures, that only pure raw materials from stemwood with or without bark and chemically untreated residual products from forestry industries are used in the products. The reason for requiring class A1/A2 raw materials is to ensure a high quality of pellets, briquettes and wood chips and firewood, which is required particularly in small and medium-sized boilers to ensure a clean and efficient combustion.

Both the EN ISO 17225 part 2 and 3 and the ENplus standard[46] operate with 3 quality classes (A1, A2 and B), with class A1 permitting use of the “purest” raw materials. The ENplus standard largely corresponds to EN ISO 17225-2 and 3 for pellets and briquettes, except that ENplus does not allow the use of demolition wood and chemically treated wood[47]. Nordic Ecolabelling has chosen to not include abelling of non woody pellets and briquettes (according to EN ISO 17225: 2014 Part 6 and 7) in this criteria generation. This is because these types of products are only used in a very limited extent in the Nordic marked, and that they do not meet the same quality standards as for wood pellets and wood briquettes. If Nordic Ecolebelling receives a specific interest in including non-woody pellets/-briquettes in the product group, Nordic Ecolabelling will look favourably to do so.

Raw materials for barbecue charcoal/briquettes must derive from stemwood, residual products from forest industries or stone/kernel fruits similarly to ensure that only pure raw materials are used in the products. Requirements for types of raw materials are consistent with EN ISO 17225 part 1:2014. Barbecue charcoal/briquettes are primarily made of wood. However, there are also barbecue briquettes on the market whose raw material is coir fibre (by-product of the coconut milk industry). The Nordic Ecolabel wishes to make it possible for barbecue charcoal/briquettes produced using fibrous materials from stone/kernel fruits to be Nordic Ecolabelled.

There is wide variation in the use of raw materials for firelighting products, which is why the Nordic Ecolabel also permits, in addition to pure virgin wood, the use of fibre and fruit materials from agriculture and horticulture. Requirements for types of raw materials are consistent with EN ISO 17225 part 1:2014.

[45] EN ISO 17225-1 Solid biofuels – Fuel specifications and classes, Part 1: General requirements, Part 2: Graded wood pellets, Part 3: Graded wood briquettes, Part 4: Graded wood chips, Part 5: Graded firewood.
[46] The European pellet industry's own quality standard for pellets/briquettes - http://www.enplus-pellets.eu
[47] ENplus accepts wood that has been treated with wood preservatives against insect attack, which does not classify as chemically-treated wood.

Liquid oil is not covered by EN ISO 17225:2014. Renewable raw materials in oils used in firelighting products therefore have their own definition which, for example, permits raw materials with vegetable and animal origins.

Type of raw material: 1.2.1 According to EN ISO 17225-2:2014, chemically untreated wood residues may contain negligible amounts of glue, grease and other additives used in sawmills during production of timber and timber products from virgin wood. The Nordic Ecolabel wishes to set requirements for the use of pure raw materials to ensure clean combustion. The requirement limits for impurities/additives for the individual product types are stipulated in O13-O15 and O17 requirement specifications.

In the consultation of the criteria generation 3, it was proposed to allow the use of maximum 50% palm oil/palm kernel oil and their derivatives in each firelighting products. The requirement has been changed after the consultation. Now it is not allowed to use palm oil/palm kernel oil and their derivatives in firelighting products. An expanded market analysis of firelighting products shows that there are products on the market that does not use palm oil. These firelighting products uses triglycerides (esters) extracted from rapeseed, sunflowers and grapes. There is also firelighting products on the market that have not been added a flammable liquid or wax. Nordic Ecolabelling is aware that the majority of all types of solid firelighting products on the market are based on methyl ester or vegetable stearin derived from palm oil, see requirements O5.

7.3.1 Wood

The requirement for wood applies to all types of solid fuels and firelighting products that contain wood, including wood boards in firelighting products.

Wood raw materials from the tree species (salix/poplar/hybrid asp) used in solid fuels and firelighting products grown as energy forest on arable land are exempt requirements O4, but must meet the requirements O3 and O6.

Wood in pulp and fluff pulp has to comply with requirement O7.

Background to O3 Tree species that may not be used in Nordic Ecolabelled solid fuels and firelighting products

Nordic Ecolabelling requires that a number of tree species are not permitted for use in Nordic Ecolabelled solid fuels and firelighting products. The requirement only applies to virgin forest tree species and not tree species defined as wood residues from the wood processing industry classified as 1.2.1 (chemically untreated wood residues) according to EN ISO 17225-1:2014.

The list of protected species is based on tree species that are relevant to the Nordic Ecolabel's criteria, i.e. tree species that have the potential to be included in Nordic Ecolabelled products. The scientific name and the most common trade names are given for the listed tree species. The list of scientific and trade names is not always adequate, as there may be more than one scientific name or trade name for the listed tree species than the list indicates. The list includes closely related or similar tree species as a precautionary measure.

Criteria for species on the list are wood originating from:

- IUCN Red List, categorised as Critically Endangered (**CR**), Endangered (**EN**), Vulnerable (**VU**) and relevant species as Near Threatened (**NT**)
- Tree species listed by CITES, Appendices I, II and III.
- Unsustainable forestry practices, such as felling of trees in HCVF, IFL areas in countries/regions with high levels of corruption.

The IUCN Red List[48] of threatened species is the world's most comprehensive inventory of the global conservation status of biological species, including trees. The IUCN Red List provides consistent criteria to assess the risk of extinction for thousands of species and subspecies. These criteria cover all countries and all species in the world. Nordic Ecolabelling wishes to prohibit the use of tree species listed as endangered (categories CR, EN and VU) and individual tree species with the status NT, in cases where the IUCN Red List specifies the scientific family name and "spp", which indicates that there are several tree species.

A large number of the tree species (apart from 6 tree species) listed on the IUCN Red List, categorised as CR, EN and VU, are also listed by CITES[49]. CITES is an international convention that regulates international trade in wild fauna and flora. CITES includes around 5,600 animal species and around 28,000 plant species, some of which are relevant timber tree species (mainly tropical species). Depending on how endangered they are, the species are included in Appendix I, II or III. Species listed in Appendix I are highly endangered and trade in these species is totally banned. Special import and export permits are required for the other tree species (Appendices II and III). CITES is regulated by EU legislation (Council Regulation (EC) No 338/97) and trees with valid CITES permits are considered to be legally harvested under EUTR. The Nordic Ecolabelling ban on the use of tree species listed by CITES (Appendix I, II or III) thus goes beyond the EU legislation.

There may be other tree species that are not currently listed on the IUCN national Red Lists or by CITES. Nevertheless, Nordic Ecolabelling believes it may be relevant to prohibit the use of such species in Nordic Ecolabelled products, due to the risk of unsustainable forest management even though they have been certified. This is the case, for example, with the Siberian Larch, which is a popular tree species because it provides high-quality timber for building purposes. This species is widespread in the boreal zone. In Russia, there are vast tracts of forest that are largely untouched by human activity, known as Intact Forest Landscapes (IFL)[50].

These pristine forest areas are threatened by clearing, logging, infrastructure development, etc.[51] Corruption is also a serious problem in Russia. This is evidenced by Transparency International's Corruption Perceptions Index (CPI)[52]. Siberian Larch, and in particular the species Larix sibirica, Larix gmelinii, Larix cajanderi and Larix sukaczewii, is widespread in these so-called IFL areas in Russia.

[48] http://www.iucnredlist.org/
[49] https://www.cites.org/sites/default/files/eng/com/pc/19/e19-11-05.pdf, accessed 20 October 2015
[50] Aksenov et al. 2002. Atlas of Russia's Intact Forest Landscapes. Global Forest Watch Russia.
[51] http://www.worldwildlife.org/ecoregions/pa0601> (accessed 14 September 2015)
[52] http://www.transparency.org/cpi2014 (accessed 14 September 2015)

There has been a growing focus in recent years on the legality and sustainability of European imports of wood, especially from tropical countries and countries where corruption is rife.

Environmental organisations have thrown the spotlight onto problems related to the trade and use of endangered wood types and timber from sensitive forest ecosystems. Organisations and consumers have been concerned that their use of wood products is contributing to the extinction of wood types or the destruction of forests and other unique forest environments. According to the findings of a recent survey[53], illegal logging accounts for 50-90% of all felling activities in key tropical producer countries and 15-30% globally. As a consequence of this survey and other findings, the European Union adopted the Timber Regulation EU 995/2010[54], which prohibits the marketing and sale of illegally harvested timber in the European Union market. The Regulation covers imported wood and timber harvested in the EU. The EU Timber Regulation (EUTR) came into force on 3 March 2013. It contains obligations for all players operating in the European market for timber or timber products. The objective of the regulation is to tackle the problem of illegal harvesting of timber and prevent the trade of illegally felled wood. Illegal logging contributes in several places in the world to unsustainable forestry practices e.g. deforestation, forest degradation and major secondary effects such as loss of biodiversity.

Nordic Ecolabel is positive towards EUTR's focus on combating illegal logging, but is also aware of the challenges involved in protecting endangered tree species and wood from sensitive forest areas, so-called High Conservation Value Forestry (HCVF) such as hotspots of high biodiversity (e.g. rainforests) or Intact Forest Landscapes (IFL). Preservation of rainforests is also a central theme in the UN climate negotiations when it comes to regulating the earth's climate.

Several reports show, for example, that the Amazon plays a key role in precipitation patterns and temperatures elsewhere in the world[55],[56],[57]. Deforestation in the Amazon can for example lead to drought in the United States and floods in Norway.

The list of protected tree species is available for viewing at www.nordic-ecolabeliing.org/wood/. The applicant shall provide a declaration of compliance with the requirement that protected tree species are not used in Nordic Ecolabelled products. Appendix 3 may be used. Nordic Ecolabelling may demand more documentation for a specific tree species.

Background to requirement O4, Wood raw materials

The requirements for wood raw material is in this criteria generation 3 updated with Nordic Ecolabel new forest requirements. This means a new requirment to Chain of custody certification. The requirement to the share of certified wood raw material in the pellets is adjusted from a minimun of 70% in the criteria generation 2, to a minimum of 50% in this generation 3. The requirment is specified in details below.

[53] Nellemann, C., INTERPOL Environmental Crime Programme (eds). 2012. Green Carbon, Black Trade: Illegal Logging, Tax Fraud and Laundering in the World's Tropical Forests. A Rapid Response Assessment. United Nations Environment Programme
[54] http://ec.europa.eu/environment/forests/timber_regulation.htm
[55] Nobre, A.D, 2014. The Future Climate of Amazonia, Scientific Assessment Report. Sponsored by CCST-INPE, INPA and ARA. São José dosCampos, Brazil, 42p.
[56] http://news.mongabay.com/2014/12/tropical-deforestation-could-disrupt-rainfall-globally/
[57] Medvigy et al., 2013, Simulated Changes in Northwest U.S. Climate in Response to Amazon Deforestation, J. Climate, 26, 9115–9136.

Name of the wood raw material. Nordic Ecolabelling requires information to be provided about which tree species are used in Nordic Ecolabelled products. The requirement makes it possible to check the Chain of Custody certificates in the supply chain (check whether the stated tree species is covered by the Chain of Custody certificates in question) and also provide information for future forestry-related requirements.

If wood residues is used in the Nordic Ecolabelled solid fuel, particularly in the form of fibre raw materials, it is not always possible to specify the species name of all wood raw materials used. In this case, the requirement for documentation of wood residues must be complied.

FSC, PEFC and EUTR. The Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification schemes (PEFC) together cover 98% of the world's certified sustainably-managed forest areas[58], and together are predominant in the global market for certified sustainable wood.

Both these schemes cover Forest Management certification of forests and subsequent Chain of Custody (CoC) certification, which documents the traceability of timber and timber products from certified forests. The systems are commonly regarded by forest owners, forest industries, manufacturers and distributors of wood products, and public authorities as reliable systems for sustainable forestry practices.

FSC's updated traceability standard from 2015[59] and PEFC's traceability standard from 2013[60] comply in all respects with the requirements of the EU Timber Regulation (995/2010/EC)[61] which prohibits the marketing and sale of illegally harvested timber in the EU. The Regulation covers imported wood and timber harvested in the EU. Nordic Ecolabelling recognises both FSC and PEFC as schemes that provide sufficient guarantees for legal and sustainable forestry practices. Barbecue charcoal and briquettes are not currently covered by EUTR and Nordic Ecolabelling therefore requires 100% of the wood raw material used in Nordic Ecolabelled barbecue charcoal/briquettes to be certified as sustainably forested under the FSC or PEFC schemes. This provides, as mentioned above, sufficient guarantee for legal and sustainable forestry practices.

Traceability certification.

Pellets, briquettes, wood chips, firewood and firelighting products: Nordic Ecolabelling requires that suppliers of wood raw materials have Chain of Custody certification under the FSC/PEFC schemes. The requirement for Chain of Custody certification contributes to traceability in the supply chain under FSC's and PEFC's guidelines and regulatory frameworks for traceability. The company's Chain of Custody certification proves how certified wood is kept separate from other wood during production, administration and warehousing and is inspected annually by independent certification bodies. Chain of Custody certification can vary according to the minimum content of certified wood and the way in which this is calculated. Both schemes allow, under specific circumstances and rules, wood from certified forests to be mixed with recycled material or legal wood from non-certified forests. There is thus no guarantee that a batch of FSC or PEFC certified wood necessarily comes from a certified forest.

[58] UN: Forest Products – Annual market review 2011-2012, ch. 10
[59] https://ic.fsc.org/en/our-impact/timber-legality/ensuring-compliance, accessed 21 December 2015
[60] http://www.pefc.org/certification-services/eu-timber-regulation, accessed 21 December 2015
[61] http://ec.europa.eu/environment/forests/timber_regulation.htm

In all cases, the remaining share of the wood shall comply with a number of minimum requirements for it to be considered “legal timber”. Several traceability verification methods are allowed by the FSC and PEFC schemes. They are the physical separation method, percentage-based method and volume-credit method. Nordic Ecolabelling accepts all of FSC's and PEFC's methods for traceability verification and the percentage of certified and controlled wood raw materials.

The applicant/manufacturer must submit a valid FSC/PEFC Chain of Custody certificate that covers all wood raw materials used in the Nordic Ecolabelled solid fuel or firelighting product as documentation.

Subcontractors (e.g. a local sawmill carpenter) who does not have a chain of custody certification can in certain cases be exempted from the above requirement. The premise is that the subcontractor can guarantee that the specific wood raw material is purchased from a FSC/PEFC Chain for Custody certified supplier, and that the wood material fulfils the Swan requirements. The exception is introduced because the use of FSC/PEFC Chain of Custody certification, in particularly small wood processing industries, is still limited.

As documentation, the supplier must present; a invoices for the specific wood, documentation showing that the supplier is FSC/PEFC Chain of Custody certified together with the suppliers Chain of Custody certificated. The Chain of Custody certificate has to comply with the data on the invoice. The volume of purchased certified wood raw material must appear on the invoice. The applicants must have an agreement with the wood supplier, which describes how the supplier guarantees that the delivered certified wood matches the information on the invoice. The agreement shall also specify that the wood supplier is required to notify the applicant if the wood supplier is replaced. Nordic Ecolabelling may request further information.

The criteria for solid fuels and firelighting products follow the requirements to class and types of raw materials defined in EN ISO 17225-1 2014. Normally the Nordic Ecolabel uses the concept of "recycled material", according to ISO 14021, to define by-products and wood residues from the wood processing industries. The concept of "recycled material" are not included in EN ISO 17225: 2014. To clarify the requirement, Nordic Ecolabel uses the same terminology as defined in EN ISO 17225: 2014. The definition of by products and wood residues from wood processing industries has not changed compared to the Nordic Ecolabels normally definition. Wood residues from wood processing industries are, for example sawdust, wood chips and bark. In the production of Swan labelled wood chips or firewood residues from the forest operation as branches with or without leaves/needles are allowed to use. Roots and stumps may not be used.

Industries that purchased virgin wood material in order to primarily make wood chips are not defines as wood residues. Industries that process raw wood are counted as primary wood processing industries.

<u>Barbecue charcoal/briquettes:</u>

Nordic Ecolabelling requires the manufacturer of barbecue charcoal to have Chain of Custody certification under the FSC/PEFC schemes. When applying for Nordic Ecolabelling of barbecue briquettes, Nordic Ecolabelling requires both manufacturers of barbecue charcoal and manufacturers of barbecue briquettes to have Chain of Custody certification under the FSC/PEFC schemes.

Trade in charcoal from illegally harvested forests is taking place on a large scale, mainly in regions of the African continent and also in South America.

In a report published in 2015, FERN[62] states that 90% of the barbecue charcoal that is sold in the UK comes from Africa and South America. In a report published in 2014, the WWF estimates[63] that an area the size of a football pitch is lost every second as a result of illegal logging. Moreover, the illegal trade in charcoal is helping finance terrorist groups[64], such as al-Shabaab in Nigeria, Somalia, etc. The United Nations and the USA have therefore together banned the import of charcoal from several African countries[65].

Barbecue charcoal and briquettes from illegally harvested timber is also sold in the Scandinavian market. There are a lot of "traders" in Europe that repackage barbecue charcoal and briquettes and then sell them as European-produced products (greenwashing)[66].

A similar problem may occur among European manufacturers of barbecue briquettes who buy barbecue charcoal on the market, pulverise it and then compress it into barbecue briquettes that are sold as "produced in Europe". For this reason, Nordic Ecolabelling requires both manufacturers of barbecue charcoal and manufacturers of barbecue briquettes to have Chain of Custody certification under the FSC/PEFC schemes. Requirements for traceability using FSC's transfer method/PEFC's physical separation method (full traceability) ensure that the wood raw material can be traced back to the forest.

Certified wood raw materials.

Pellets and briquettes: Applicants/manufacturers must have documentation to show that a minimum of 95% of the wood raw materials used in the Nordic Ecolabelled product, or product line on an annual basis, is wood residues from the wood processing industry classified as 1.2.1 (chemically untreated wood residues) according to EN ISO 17225-1:2014. The requirement that suppliers of wood raw materials have Chain of Custody certification under the FSC/PEFC schemes ensures that wood raw materials complies with FSC's and PEFC's guidelines and regulatory frameworks for traceability.

Residual products from sawmills are the primary type of raw material used in the production of pellets and briquettes in the Nordic countries. Round wood/solid wood is used only in limited quantities during periods when availability of residual products is restricted[67]. From a life-cycle assessment perspective, from the sawmill to the production of pellets/briquettes, solid wood has a greater impact on the climate than residual products[68].

[62] FERN Report "Playing with fire", August 2015, http://www.fern.org/charcoal
[63] WWF Report "Illegal timber trade 6 August 2014",*http://www.wwf.eu/?226851/EU-countries-failing-to-halt-illegal-timber-trade*
[64] Dagens Industri newspaper 11 October 2014*http://www.di.se/artiklar/2014/10/11/terrorgrupp-tjanar-miljarder/*
[65] UN Resolution 2036; p.22; *http://www.un.org/ga/search/view_doc.asp?symbol=S/RES/2036(2012)*)
[66] Interview with Alexander Brömer, Gruvskand, Stockholm. 31 October 2014
[67] Nordic Ecolabelling. 2015. Evaluation of Nordic Ecolabelled wood pellets. Version 2. NMN 5 November 2015.
[68] Concito (Denmark's green think tank): Does the use of biomass reduce CO2 in the atmosphere? November 2011

Nordic Ecolabelling therefore requires that a maximum of 5% round wood/solid wood (defined as 1.1.3 stemwood, according to EN ISO 17225-1:2014) must be used annually in the production of Nordic Ecolabelled pellets/briquettes.

Applicants/manufacturers must have documentation to show that minimum 50% of wood raw materials used in Nordic Ecolabelled pellets/wood briquette, must be certified as sustainably forested under the FSC or PEFC schemes. The remaining percentage of wood raw materials must be FSC Controlled Wood or wood from PEFC Controlled Sources. The requirements to a limit of minimum of 50% FSC/PEFC certified wood material is set in dialogue with the wood industry. Sawmills and other wood processing industries want to use its certified raw materials credits for primary products such as timber. Therefore, there is only a reduced amount of wood residues on the marked, certified as FSC or PEFC.

Wood chips, firewood and firelighting products: Applicants/manufacturers must have documentation to show that a minimum of 70% of wood raw materials used in the Nordic Ecolabelled product or product line is certified as sustainably forested under FSC/PEFC or is recycled material. The remaining percentage of wood raw materials must be FSC Controlled Wood, wood from PEFC Controlled Sources or recycled material.

The requirement limit that a minimum of 70% of wood raw materials be certified as sustainably forested under the FSC or PEFC schemes, corresponds to FSC's and PEFC's requirement limits for the use of the respective logos on products, for example, “FSC mix” and “PEFC certified”. Together, FSC and PEFC have five official logos. Further details about the use of logos can be found on the FSC[69] and PEFC[70] websites. The requirement can make it easier for manufacturers of Nordic Ecolabelled products to document the requirement, as they can demand labelled FSC/PEFC products.

A record must be kept to prove compliance with the requirement for a percentage of certified timber or wood recidues from the wood processing industries. The percentage of certified material must be documented on an invoice or delivery note (paper or e-invoice) with certification codes for the certified company/companies from which the wood raw material was purchased.

It must be clearly stated on the invoice or delivery note which parts of the delivery are certified (there must be a claim/material category, e.g. FSC MIX 70% and FSC 100% relating to the product in question on the invoice or delivery note, when it comes to FSC certified goods). A valid label with the relevant scheme's logo on the actual product or on an unbroken package, in which the wood product (or a batch of wood products) are sold, may also be used to demonstrate compliance with the requirement. On this may be listed a certification number or licence code, that provides information about the authorised trader who sold the product in question as being certified. The certification schemes have different rules regarding labelling and logo use. Should there be any doubt, it is advisable to consult the websites of the schemes for detailed information on the rules.

Barbecue charcoal/briquettes: Applicants/manufacturers must have documentation to show that 100% of wood raw materials used in Nordic Ecolabelled barbecue charcoal/briquettes, must be certified as sustainably forested under the FSC or PEFC schemes. Unlike the other types of products in the product group, only FSC/PEFC

[69] http://welcome.fsc.org/understanding-the-fsc-labels.27.htm
[70] http://www.pefc.co.uk/chain-of-custody-logo-use/pefc-label

certified wood might be used for barbecue charcoal/briquettes. Recycled material that is not covered by FSC/PEFC may therefore not be used. Documentation: Certified wood raw materials (FSC and PEFC) must be accounted/recorded from the manufacturer's Chain of Custody account to the Nordic Ecolabelled product/production line.

Certification and accreditation. The certification (check and approve compliance with the standard, and that the Chain of Custody and any use of label are in order) must be conducted by an independent, competent and accredited third party and must follow relevant international guidelines for certification: ISO/IEC 17065:2012: Conformity assessment - Requirements for bodies certifying products, processes and services, EN ISO/IEC 17021:2011 Conformity assessment - Requirements for bodies providing audit and certification of management systems).

The accreditation (check and approve that the certification firm is working correctly) must be performed by a national or international body, whose systems and procedures are consistent with the relevant international guidelines for accreditation bodies ("EN ISO/IEC 17011:2004 Conformity assessment - General requirements for accreditation bodies accrediting conformity assessment bodies" or equivalent).

7.3.2 Solid and liquid renewable raw materials other than wood in barbecue charcoal/briquettes and firelighting products and the tree species (salix/poplar/hybrid asp) grown as energy forest on arable land

The requirements apply to solid and liquid renewable raw materials other than wood in barbecue charcoal/briquettes and firelighting products, for example, soy oil, palm oil, sugar cane, bio oil, coir and pulp. The requirement also includes wood materials from the tree species (salix/poplar/hybrid asp) grown as energy forest on arable land, that can be used for example wood chips.

Background to requirement O5 Renewable raw materials from soy- and palm oil, palm kernel oil and their derivatives and sugar cane

Palm oil is the primary vegetable raw material used in the production of fatty acid, methyl ester, stearin or oil for firelighting products as an alternative to paraffin. Soy oil can also be used as an alternative to paraffin. Sugar cane can be used for the production of bioethanol. The cultivation of oil palm, soy and sugar cane is associated with a number of environmental and social problems.

Issues surrounding the production of palm oil:

As the consumption of vegetable oils has increased over the last 30 years, the cultivation of vegetable oil crops has increased faster than any other industrial crop during the last forty years[71]. The total area of oil palm plantations has since 1990 increased by almost 10 million hectares. The largest increases occurred in Malaysia and Indonesia. Palm oil may be separated in a number of different oils with different characteristics. Palm oil is used in products like cooking oils, margarine, liquid detergents, soaps, cosmetics, waxes and polishes and for livestock feed.

In the early 1970s there was a drastic expansion of palm oil plantations in Malaysia and Indonesia. In 2000 the two countries accounted for just over half of the world's palm oil plantations, while Nigeria accounted for 30% of world production of palm oil.

[71] RSPO 2012. Promoting The Growth And Use Of Sustainable Palm Oil - Factsheet.

The greatest environmental problem linked to the production of palm oil is the conversion of natural areas into palm oil plantations, as the erosion of natural habitats poses a critical threat to many endangered species. In addition, there may be environmental problems associated with the use of toxins in production, air pollution from burning forests, soil erosion and heavy sedimentation to rivers and streams, as well as discharge of wastewater from palm oil mills.

Large-scale palm oil production creates in addition to the natural and environmental problems also social problems in Southeast Asia. In the production there are risks of violations of labor rights, where the use of chemical and pesticide constitutes a health risk for plantation workers[72]. High unemployment in Indonesia and illegal work in Malaysia increases the risk of wages below the minimum wage, poor response to requests to participate in trade unions and unsafe working conditions. The expansion of palm oil plantations is also helping to displace locals. As a result of many disagreements about ownership of the land the plantation company is the most conflict-prone land-based sector in Indonesia and Malaysia.

Issues surrounding the production of soy:

The intensive production of soy in eg Argentina and Brazil have different environmental and natural consequences. Agricultural production of soy and exports from Argentina and Brazil affect the environment on both a local and global level. By deforestation, draining of wetlands and the establishment of monocultures such as soy bean fields, increases the risk of loss of biodiversity and habitat fragmentation. Worldwide over the last three decades there has in average beeb cleared about 13 million hectares of forest a year. When clearing forest you removes ecosystems, and conversion of natural areas for cultivation can separate the natural habitats of large area. Lack of pathways between natural habitats reduces the genetic flow between populations and increases the risk of species or their food resources to disappear.

The environmental and natural consequences are in particular associated with conversion of natural or semi-natural areas to cultivation areas together with a specialization of culturing methods and use of pesticides.

The extent of pesticide use in e.q Argentina is so widespread in the soy production, that many Argentineans daily gets in to contact with toxins[73]. In addition to farmers and farm workers who handle sprays, are also locals who live near the soya fields.

Issues surrounding the production of sugar cane:

Sugarcane is per today not attached so strongly to problems with the deforestation of rainforest as mentioned above for palm oil and soybean oil, but there may also be challenges associated with this production. In the period 1960 - 2008 the areal of grown sugarcane has increased from 1.4 to 9 Mha. Approximately 65% of newly planted sugar cane takes place on plains (grasslands and savannahs) and the remainder area is made up of areas previously used for growing other crops. However, with an increase in demand for sugar cane as a feedstock, the possibility of expansion of production areas is explored. Therefore, the loss of biodiversity in the rainforest (related to cultivation of sugar cane) can become a problem in the future. Today it is the Cerrado which is under the greatest pressure from the sugar cane

[72] OLSEN LJ, FENGER NA & GRAVERSEN J 2011a. Palmeolie - Danmarks rolle i forhold til den globale produktion af palmeolie. WWF Verdensnaturfonden Denmark.
[73] Hermansen J. et all: Soja og Palmeolie, certificeringsordninger til dokumentation af bæredygtighed i produktionen, DCA rapport nr. 029, marts 2013

industry. The Cerrado is a tropical savanna in Brazil, and has a unique biodiversity and specific ecosystems that are threatened[74].

An expert Group in Nordic Ecolabel has explored the standard for palm oil (Round Table on Sustainable Palm Oil, RSPO[75]), soybean (Round Table on Responsible Soy Association, RTRS[76]) and sugar cane (Bonsucro[77]) in details. The conclusion for all three standards is that they currently do not meet the Nordic Ecolabel requirements for raw material certification schemes. This is mainly due to lack of absolute requirements for the protection of important biological areas, and lack of requirements and compliance with basic international conventions. This means that renewable raw materials from palm oil and soybean oil and sugar cane must not be used in Swan labelled charcoal/-briquettes and firelighting products.

Background to requirement O6 Traceability and verification of renewable raw materials in barbecue charcoal/briquettes and firelighting products and the tree species (salix/poplar/hybrid asp) grown as energy forest on arable land

Since use of land is, also a relevant environmental parameter in this product group, requirements should be set concerning the areas from which the renewable raw materials originate.

The aim is to ensure that areas of high biological or social value are not used for cultivation. For Nordic Ecolabelled charcoal/briquettes or firelighting products made from renewable raw materials, it is therefore important to set requirements concerning the areas from which the raw materials are sourced. Most criteria documents do this by ensuring the origin of the raw material.

A need for traceability is the basis for all vegetable raw material requirements. Traceability tells us where the raw material comes from and who produced it. For many years, Nordic Ecolabelling has made traceability a requirement in criteria that include wood raw materials.

These criteria also set requirements for the traceability of vegetable raw materials, in the same way as the criteria for the Nordic Ecolabelling of liquid fuels. There must be a written policy in place for the purchase of raw materials to also ensure that all raw materials come from legal sources. The criteria therefore contain requirements that renewable raw materials must not be sourced from:

- protected areas or areas under preparation as protected areas
- areas where ownership or usage rights are unclear
- illegally harvested crops

If the renewable raw material can be defined as a waste or residue, there must be traceability to the process from which the waste or residue derived by means of invoices.

Vegetable raw materials for barbecue charcoal/briquettes or firelighting products may, for example, be herbaceous biomass from agriculture and horticulture or fibrous material from coconuts.

[74] http://www.wwf.dk/wwfs_arbejde/skov/soja/skovomrader/cerrado/ (besøgt 10. december 2017)
[75] http://www.rspo.org/
[76] http://www.responsiblesoy.org/en/
[77] http://bonsucro.com/

FSC and PEFC do not consider energy forest grown on arable land as forest, and therefore this form of cultivation is not covered by these standards. Typically fast-growing tree species are salix/poplar and hybrid aspen, which are grown as so-called coppice with short rotation. The tree species (salix / poplar / hybrid asp) grown as energy forest on arable land are covered by this requirement.

Nordic Ecolabelling consider that all raw materials grown within EU borders meet the requirement

Background to requirement O7 Cellulose-based pulp or fluff in firelighting products

The requirement is new in this version of the criteria and is aimed at firelighting products consisting of or containing cellulose-based pulp or fluff. For example, there are several forms of so-called ignition paper, which is fluff coated with oil or stearin. Composite products, that are a combined solid fuel and firelighting product, may also contain ignition paper.

Production of cellulose-based pulp or fluff has a considerable impact on the environment in terms of extraction and processing of raw materials, energy consumption and emissions to air and water.

Nordic Ecolabelling has extensive experience of requirements relating to cellulose-based pulp and fluff. Requirements for these products are contained in the Nordic Ecolabel's Basic Module for paper products, Version 2. Requirements for energy use and emissions in the production of fluff is located in the Nordic Ecolabelling criteria for sanitary products, generation 6. Nordic Ecolabelling’s criteria for paper only complies copy- and printing paper which is not used particular in firelighting products. The requirement therefor only complies cellulose-based pulp and fluff. The requirement also covers individual packaging, i.e. when a firelighting product and individual packaging constitute a single unit.

7.3.3 Requirements for working conditions in the production of barbeque charcoal/briquettes

Background to requirement O8 Working conditions

The requirement for working conditions is the new criterion generation 3. Nordic Ecolabelling wishes to make sure that the production of charcoal/briquettes is done in an environmentally and socially sustainable manner. Production of barbecue charcoal and briquettes occurs widely in Asia and Africa[78] under very poor working and health conditions. The charcoal are often produced under primitive conditions, with huge environmental and human consequences[79].

Nordic Ecolabelling has good experience in setting requirements for compliance with the relevant UN and ILO conventions in other criteria documents, such as criteria for office equipment, PCs and biofuels. The licensee must have a written procedure (Code of Conduct) showing how the license works to ensure that the relevant requirements in UN Conventions are complied with by all producers/suppliers of barbecue charcoal and briquettes in the supply chain. This procedure (Code of Conduct) must also be communicated to all producers/suppliers of barbecue charcoal and briquettes in the supply chain.

[78] www.tft-earth.org (2016-11-15)
[79] FERN repport (august 2015): ”Playing with fire – Human misery, environmental destruction and summer BBQ´s”

The requirement follows the UN Global Compact[80], which aims to create international principles on human rights, labour, environment and corruption. UN Global Compact consists of 10 overall principles and includes requirements for i.e. compliance with the 8 ILO conventions. In addition to the UN Global Compact, the procedure must also include requirements to meet the UN Children's Convention (Article 32) and the UN Convention (61/295) concerning people's rights.

Nordic Ecolabelling appreciates that it may be very difficult to ensure that the working environment at all sub-contractors in all parts of the computer production chain is satisfactory. Nevertheless, Nordic Ecolabelling is confident that the more production facilities and raw material suppliers are confronted with a requirement/signal from their customers that a code of conduct must be met, the more the possibility that such conditions in fact will be improved.

In the hearing, it emerged that several producers of charcoal/wood briquettes in Asia is certified by BSCI (The Business Social Compliance Initiative[81]). Members of the BSCI are required to incorporate a Code of Conduct, which consists of 11 principles they continually need to work to live. The principles are also based on compliance with relevant UN and ILO conventions. Nordic Ecolabelling estimates that BSCI scheme is not yet sufficiently widespread among manufacturers of charcoal/wood briquettes to require certification under this scheme. Companies certified by BSCI may use this as part of the documentation for the requirement.

7.4 Chemicals

Requirements for chemicals are new and did not exist in the previous version of the criteria, which only included pellets.

Since the product group has now been extended to include a number of new solid fuel types, for example firelighting products, it is relevant to ensure that chemical products do not pose any risks to the environment or health.

The chemical requirements cover all constituent substances, chemicals and chemical products that are added to the solid fuels or used in the production of solid fuels. Here, manufacture is defined as all manufacturing/processing activities conducted by the manufacturer of solid fuels or by its subcontractors.

The requirements relate to oil, grease, wax, stearin, adhesives, binders, dyes, etc.

The requirements do not cover:

- Auxiliary chemicals used during manufacture, such as lubricants, cleaning chemicals and so on.
- Refining processes, i.e. refining of vegetable oils.
- Production of paper and paper products.
- Individual, product and transport packaging.

The requirements apply to all constituent substances in the chemical product, but not impurities (compare with the definition below) unless otherwise stated in specific requirements.

[80] http://www.unglobalcompact.org
[81] http://www.bsci-intl.org/ (2016-12-22)

Constituent substances are taken to be any substances in the chemical product, including additives in the ingredients (e.g. preservatives and stabilisers), but not impurities. Substances known to be degradation products from the constituent substances (such as formaldehyde and arylamine) are also considered to be constituent substances.

Impurities are defined as residual products from the production, including the raw material production, that can be found in the final chemical product in concentrations below 100 ppm (0.01% by weight, 100 mg/kg). Impurities in the raw material at concentrations of more than 1% are always regarded as constituent substances.

Examples of impurities are residual reagents, residual monomers, catalysts, bi-products and residual cleaning products from the production equipment and carry-overs from other production lines.

Background to requirement O9 Chemical products

The requirements for chemical products are particularly relevant to solid fuels that have been impregnated with a flammable product such as oil, stearin, grease, wax, etc. or to which binding agents have been added. Nordic Ecolabelling works to ensure that any environmental and health impacts of chemical products are as small as possible. The requirement therefore includes chemicals that are toxic, harmful to the environment and harmful to the ozone layer, and chemicals that are carcinogenic, mutagenic or reprotoxic (abbreviated as CMR).

Fatty acid (methyl esters), classified as harmful to the environment with hazard statements H400 (very toxic to aquatic life) and H411 (toxic to aquatic life with long-lasting effects) are exempted from the requirement. At present, methyl esters produced from rape, sunflowers, palm oil/palm kernel oil are more or less the only alternative available as a substitute for petroleum-based oil (paraffin), which is dominant in the firelighting products market today. This oil is not only produced from fossil oil, it is classified as H304 (May be fatal if swallowed and enters airways) and is therefore subject to special regulations for the labelling of oils[82]. Methyl esters produced from palm oil are not classified under this hazard category. As mentioned earlier Nordic Ecolabelling do not permits palm oil and soybean oil. Stearin based on fatty acids produced from animal by-products is an alternative to methyl ester produced from palm oil.

Auxiliary chemicals used for activation of thickeners classified with H412 has been exempted from the requirement after the hearing. Gel firelighting products consisting of ethanol, which is added a polymer to thicken the liquid. In order to activate the polymer, it is necessary to add an auxiliary chemical which is classified with H412. Gel firelighting products contains less than 0.5% by weight of the auxiliary chemical (thickener) of the finished firelighting product. According to manufacturers of gel firelighting products, it is not possible to substitute the auxiliary chemicals, which therefore has been excempted from the H412 requirement. Auxiliary chemicals used for activation of thickeners classified with H412 must be combined with maximum 0.5% by weight in the finished firelighting product.

Nordic Ecolabelling allows so-called thickened liquid firelighting products, where adhesives and soap are added to fatty acids, which solidify when cooled. The type of adhesive most commonly used are formaldehyde-based adhesives, which make up 1-10% of the firelighting products and are thus classified as H341 and H350. Formaldehyde is a toxic and sensitising agent that has a carcinogenic effect and its use must therefore be restricted as much as possible. Formaldehyde-based

[82] http://mst.dk/virksomhed-myndighed/kemikalier/regulering-og-regler/faktaark-om-kemikaliereglerne/lampeolier/

adhesives often contain methanol as a stabiliser. Formaldehyde is unstable in an aqueous solution, and the solution therefore contains a stabiliser that reduces the tendency to polymerise. The solution can be stabilised by adding methanol, which is classified as H351, H301, H331 and H370.

Nordic Ecolabelling does not want to make an exception for formaldehyde-based adhesives, making it difficult for thickened liquid firelighting products to be awarded an ecolabel.

Background to requirement 10 CMR classificaion of constituent substances

Substances that may cause cancer, change genetic material or interfere with reproduction (known as CMR substances in categories 1A and 1B) are prioritised substances within the EU's chemical legislation due to their inherently dangerous properties. It is therefore important to reduce and eventually totally prohibit the use of CMR substances.

Nordic Ecolabelling seeks to ensure that the health and environmental impacts of the products are as low as possible. Requirements are therefore made for the prohibition of CMR substances in solid fuels and firelighting products.

7.5 Energy consumption

The RPS analysis shows that most of the total energy consumption takes place during the actual pellet production process (sawmills + production). This is because energy is required for the processes of debarking, stripping, chipping, drying/boiling, crushing/grinding, compressing and cooling.

Most energy is used for drying wet raw materials. A report published[83] by the Swedish pellets industry shows that in the production of pellets (sawmills + pellet plants), when the moisture content of raw materials is 50-55%, 66% of the energy is used to dry the raw materials, 33% is used to power the machinery (electricity) and 1% is used for transportation. If pellet production is extended to the whole life cycle, energy is also used to operate machinery in the forests, to transport raw materials out of the forests to the pellet plants, to transport processed raw materials and during the combustion phase. However, these are still limited quantities compared to the production phase[84].

In a life-cycle perspective for pellets, the use of fossil fuels is of major significance for emissions of greenhouse gases. Fossil energy raw materials (as fuel) are mainly used to operate machinery in the forests, to transport raw materials out of the forests to sawmills, to dry raw materials, and for the electricity that powers machinery at sawmills and pellet plants.

Nordic Ecolabelling has chosen only to set energy requirements for the process that covers the drying/boiling of raw materials in the production of solid fuels, as this particular process has a high RPS. The processes of harvesting and transporting raw materials are relevant (R), but there are limited potential (P) and steerability (S) as the industry itself is constantly improving the efficiency of these parameters. The maximum distance for the transportation of raw materials by truck from the forest to

[83] Hagberg, L., Särnholm, E., Gode, J., Ekvall, T.,Rydberg, T. 2009. LCA calculations on Swedish wood pellet production chain – according to the Renewable Energy Directive. IVL. Stockholm
[84] CHEN S: “Life Cycle Assessment of Wood Pellet”, Department of Energy and Environment - Division of Environmental System Analysis CHALMERS UNIVERSITY OF TECHNOLOGY, Göteborg, Sweden, 2009

the plant is about 100 km in Sweden, Latvia and Russia, while in Canada the distance is 200 km[85].

The point is that it is the market, which determines how far it is worth transporting raw materials, which is why the Nordic Ecolabel's energy requirements do not include these processes.

Requirement for energy consumption

The requirement for energy consumption includes the manufacturer's own production of pellets, wood briquettes, wood chips, firewood and barbeque charcoal/briquettes and possible energy used for drying/cooking/distilling of raw materials at external suppliers. The requirement for how much energy the producer can use to dry the raw material depends on the moisture content in the purchased raw materials.

The manufacturer shall initially outline its energy flows in the relevant processes. In production of various products, allocation can be used if the energy flows cannot be separated. This should generally be based on weight, for example, per. tonnes of product. Allocation method must be approved by Nordic Ecolabelling.

Background to requirement O11 Fossil energy sources

The requirement also existed in the previous version 2 of the criteria and specifies requirements for which types of raw materials can be used for drying/boiling raw materials for pellets. In version 3 of the criteria, the requirement has been tightened and its wording has been modified, but it continues to focus on limiting the use of fossil energy sources in the drying/boiling process. In this version, the requirement has been extended to include the product types wood briquettes, wood chips, firewood and barbecue charcoal/briquettes, since the conclusions of the RPS analysis for pellets may be transferred to these new product types, i.e. that there are RPS to limit the use of fossil energy sources in the raw material drying process.

In version 2 of the criteria, we require that fuels used for pellet production (drying/boiling) shall contribute a maximum of 100 kg CO_2 per tonne of pellets to the greenhouse effect. This means that between 30% (coal/peat) and 50% (natural gas) of the energy used for drying/boiling may come from fossil sources.

According to the findings of two Swedish studies,[86] [87] biofuels (wood) are used almost exclusively for the drying/boiling process in the production of pellets and wood briquettes in Scandinavia and countries where timber is readily available.

Nordic Ecolabelling therefore proposes a tightening of requirements so that energy produced by fossil sources may not exceed 5% of the total annual energy consumption for drying/boiling raw materials for the production of 1 tonne of pellets and wood briquettes, wood chips, firewood and barbecue charcoal/briquettes) per year. The requirement includes any use of fossil energy sources for starting up drying processes.

The requirement has been adjusted after the hearing so energy from fossil sources only may be used for starting the process of drying/cooking/distillation of raw

[85] Hansson J. et.al 2014; Greenhouse gas performance of heat and electricity from wood pellet value chains – based on pellets for the Swedish market. IVL, Biofuels, Bioproducts & Biorefining
[86] Höglund, J. 2011. Greenhouse gas emissions for Swedish pellets production. IVL Swedish Environmental Research Institute
[87] Hagberg, L., Särnholm, E., Gode, J., Ekvall, T.,Rydberg, T. 2009. LCA calculations on Swedish wood pellet production chain – according to the Renewable Energy Directive. IVL. Stockholm

materials for the production of pellets, wood briquettes, wood chips, firewood and barbeque charcoal/briquettes. The fossil share may not exceed 10% of the total annual energy consumption (start-up for drying/cooking). For barbeque charcoal/briquettes, the requirement applies both the start-up process for drying and distillation. The requirement for energy consumption includes the manufacturer's own production of pellets, briquettes, wood chips, firewood and barbeque charcoal/briquettes and possible energy used for drying/cooking/distilling of raw materials at external suppliers.

Natural gas or diesel are the primary fossil energy types alternatively used in the raw material drying process in the production of solid biofuels. Nordic Ecolabelling categorises peat as a fossil fuel in these criteria due to the high emission factor for carbon dioxide when peat is burned (350 g CO_2/kWh[88]).

For the production of barbecue charcoal and briquettes, the requirement covers both the energy used to dry raw materials and the actual distillation process.

Background to requirement O12 Energy consumption in the production of pellets, wood briquettes and barbecue charcoal and briquettes

Pellets and wood briquettes: The requirement also existed in the previous version 2 of the criteria, but has now been amended so that only the energy consumption for drying/boiling raw materials in the production of pellets and wood briquettes is covered. The wording of the requirement has also been modified so it is now differentiated according to the moisture content of the raw material. An absolute requirement for energy consumption for the drying and distillation process in the production of barbecue charcoal or briquettes (kWh/tonne barbecue charcoal/briquettes) has been introduced for the barbecue charcoal and barbecue briquettes product types.

Version 2 of the criteria requires that energy consumption for pellet production must not exceed 1200 kWh primary energy per tonne of pellets. The processes included in the requirement are debarking, chipping, drying, grinding, boiling, pressing, cooling and sifting.

As mentioned earlier, the RPS analysis shows that energy consumption for the production of pellets and wood briquettes is significant, and that the drying of damp raw materials is the process that consumes most energy. Furthermore, the RPS analysis shows that there is limited potential (P) for the energy requirement to include all the processes that use electricity to power the machinery, since the pellet factories, to a great extent, use the same electricity-powered technologies (debarking, chipping, grinding, pressing, cooling and sifting).

The requirement for energy consumption therefore only covers energy for the drying/boiling process in this version 3 of the criteria.

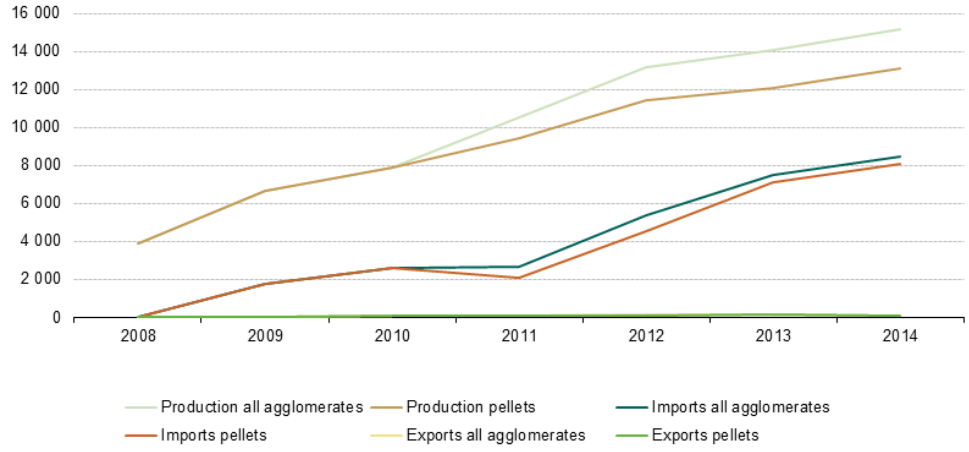
The evaluation of version 2 of the criteria showed that the limit value of 1200 kWh/tonnes of pellets is based partly on the use of dry raw materials (moisture content >20%) and that the dry energy partly comes from waste heat from external

[88] http://www.biograce.net/home, accessed 16 June 2016.

production, i.e. pellet plants are located at sites where there is a surplus of heat from pulp or paper mills or are close to a heating plant[89].

By-products from the forest industry are the dominant raw materials used in the production of pellets today, with residual/waste wood, wood chips and sawdust most commonly used. The majority of these raw materials are “moist” materials, which require drying.

In recent years, it has become more common to use moist/wet raw materials in pellet production due to increased competition for dry raw materials from the pellets industry and other industries[90]. The EU policy of promoting sustainable sources of energy has also resulted in increased production/demand for pellets (see Figure 1[91] below. The unit on the y-axis is 1000 tonnes).



(*) EU-27: 2008–11.

Figure 1: Development in the demand and production of pellets in the EU 2008-2014

It is unclear what percentage of waste heat from the Nordic production of pellets/wood briquettes can be used to dry raw materials. Information from interviews with pellet manufacturers in Sweden, in connection with an evaluation of version 2 of the criteria, indicates that only a marginal percentage of the pellet manufacturers use waste heat.

Energy used in the pellet-drying process

The requirement limit is based on how much energy is needed to remove water from the raw material. Sawdust used to produce pellets usually has a moisture content of 50-55% prior to drying. After drying, the moisture content should be below 15% [92,93]. The total weight of the sawdust is the dry substance plus the water content. Sawdust

[89] The evaluation is based on a study of the energy requirements in the pellets criteria, carried out as a Ph.D study in 2012 by Charlotta Porsö at the Swedish University of Agricultural Sciences, together with Eva-Lotta Lindholm at Ecolabelling Sweden (Miljömärkning Sverige AB).
[90] Hagberg, L et al. 2009. LCA calculations on Swedish wood pellet production chains – according to the Renewable Energy Directive, IVL Swedish Environmental Research Institute, IVL Report B1873, available online:
http://www3.ivl.se/rapporter/pdf/B1873.pdf
[91] http://ec.europa.eu/eurostat/statistics-explained/index.php/Forestry_statistics_in_detail
[92] Wimmerstedt, R. & Linde, B. 1998. Assessment of Technique and Economy of Biofuel Drying. Stockholm: Värmeforsk Service AB.
[93] Wimmerstedt, R. & Hallström, A. 1984. Drying of Peat and Biofuels, Techniques, Economy and Development Needs. Lund's Institute of Technology: Department of Chemical Engineering.

contains unbound and bound water. Unbound water is the moisture between the fibres in the sawdust and is usually removed using evaporation. Bound water is the moisture inside the fibre of the sawdust. More energy is required to remove the bound water, as it first has to be heated and then transported to the surface by diffusion before being evaporated[94].

The drying process for wood raw materials can be divided into three stages. In stage one, the unbound water is evaporated and the drying time and temperature are constant. In stage two, the sawdust starts to form dry patches, the drying time reduces and the temperature of the material starts to get closer to the temperature of the drying gas.

Stage 3 commences when the moisture content drops below 20%. All unbound water has then been evaporated and only bound water is left, which means that the drying rate decreases further[95] [96].

Nordic Ecolabelling has compiled data on the use of energy in different drying models that are used in pellet plants to remove 1 tonne of water from biomass. See Table 7.

Table 2: Energy consumption for the evaporation of one tonne of water from biomass.

Type of dryer	kWh per tonne of evaporated water
Direct-fired dryers	
Rotary (drum dryer)[97]	1000
Bed/conveyor (belt dryer)[98]	1050 - 1350
Low-temperature dryer[99]	1000
Indirect-fired dryers	
Steam dryer (Super-heated steam dryer)[100]	750
Steam dryer (ÅF 2005)[101]	810

The total energy used to dry a tonne of pellets, calculated using the compilation of energy used to remove 1 tonne of water from biomass, is presented in Table 8. The table shows the amount of water that has to be evaporated to obtain a moisture content of 10%, depending on the original moisture content of the raw material. It can be seen that if a raw material has a moisture content of 55% (1.1 tonne of water has to be removed by drying), then between 825 and 1485 kWh/tonnes of pellets are needed to dry the raw material, depending on the drying model. Nordic Ecolabelled pellets must not have a moisture content of more than 8% (see requirement O13) which means that slightly more energy is used than the amount specified at 10% in the table below.

[94] Mujumdar, A.S. & Menon, A., S. 1995. Drying of Solids: Principles, Classification and Selection of dryers. I Mujumdar, A.S. (Editor) Handbook of Industrial Drying. (Second Edition). Marcel Dekker, Inc. 1-20-22.
[95] Ibid
[96] Pang, S. (2001). Improving MDF fibre drying operation by application of a mathematical model. Drying Technology, 19 (8), 1789-1805.
[97] Thek, G & Obernberger, I. 2010. The Pellet Handbook: The Production and Thermal Utilization of Biomass Pellets.
[98] ibid
[99] ibid
[100] ibid
[101] ÅF Process. 2005. Internal report that the Nordic Ecolabel commissioned ÅF to prepare prior to the development of version 1 of the pellets criteria.

Table 3: Drying raw materials for 1 tonnes of pellets with 10% moisture content.

Moisture content of raw material	**55%**	**50%**	**40%**	**30%**	**20%**	**10%**
Tonne of water to evaporate to 10%	1.10	0.90	0.60	0.39	0.23	0.11
	kWh/tonne	**kWh/tonne**	**kWh/tonne**	**kWh/tonne**	**kWh/tonne**	**kWh/tonne**
Direct-fired dryers						
Rotary (drum dryer)	1100	900	600	386	225	113
Bed/conveyor (belt dryer)	1150-1485	945-1215	630-810	410-527	242-311	116-149
Low temperature dryer	1100	900	600	386	225	113
Indirect-fired dryers						
Steam (super-heated steam dryer)	825	675	450	289	169	84
Steam dryer (ÅF 2005)	891	729	486	312	182	91

The most common methods used for drying are air, steam or smoke. Air is effective as its capacity to absorb water vapour increases as the temperate increases.[102] Rotary dryers, pneumatic dryers, bed/conveyor dryers and fluid bed dryers use hot air or smoke as a heating gas. Rotary dryers are the commonest type of dryer and are usually direct-fired. This means that the heating gas is in direct contact with the material that needs drying[103] [104].

The most common steam dryer model is an indirect-fired dryer. First the steam is heated using heating steam and then the material to be dried is mixed with the steam, i.e. the heating gas never comes into contact with the material. Steam drying is often a much faster method than air drying and the risk of fire is virtually non-existent. Another advantage is that the steam can be recirculated and reused, or can be used to generate district heating or electricity. The limited prevalence of the steam dryer model in the industry is primarily due to the initial investment cost. It is also more expensive than air drying and a steam dryer is not a profitable investment unless it is integrated with another process that can make use of the surplus heat that it produces[105],[106],[107].

Nordic Ecolabelling wants to introduce an energy requirement that makes it possible to comply with the energy requirements of the Nordic Ecolabel using both drying technologies (direct- and indirect fired). The requirement level ensures that the most energy-demanding production sites do not meet the requirements. Moreover, O11

[102] Jensen, T. 2014. Production of Pellets Integrated with a Thermal Power Station: Economic and Technical Evaluation. Master thesis. The Faculty of Health, Science and Technology. Karlstad University.
[103] Kudra, T. & Mujumdar, A., S. (2009). Advanced Drying Technologies. New York: Tylor & Francis Group, LLC.
[104] Pang, S. & Mujumdar, A.S. (2010). Drying of woody biomass for bioenergy: Drying technologies and optimization for an integrated bioenergy plant. Drying Technology, 28 (5), 690-701.
[105] Amos, W.A. 1998. Report on biomass drying technology. National Renewable Energy Laboratory Golden, CO.
[106] Kudra, T. & Mujumdar, A., S. (2009). Advanced Drying Technologies. New York: Tylor & Francis Group, LLC.
[107] Wimmerstedt, R. & Hallström, A. 1984. Drying of Peat and Biofuels (Techniques, Economy and Development Needs. Lund Institute of Technology: Department of Chemical Engineering

Fossil energy sources requires renewable raw materials to be used in the dryers, which is the most energy-demanding process.

Electricity can not be used as an energy source for drying/cooking /distillation unless the electricity is self-produced from renewable sources. With self-produced thought that the producer owns power generation unit. The use of electricity as a heat source is inefficient compared to other forms of energy.

After the hearing, it has been clarified that external produced excess heat can be usede for drying/cooking and distillation. However, the fossil share may not exceed 10% of the total annual energy consumption (start-up for drying/cooking/distillation).

Barbecue charcoal and barbecue briquettes: This is a completely new requirement in this version 3 of the criteria. The requirement covers energy consumption for drying and distillation of raw materials in the production of barbecue charcoal or barbecue briquettes.

There is a high RPS (relevance - potential - steerability) for limiting the energy consumption in the production of barbecue charcoal and barbecue briquettes, where most of the consumption is in the actual production of barbecue charcoal[108]. This is primarily due to the drying and distillation (pyrolysis) processes, which are very energy-intensive. The use of electricity to power the machinery is very limited in relation to these processes, and electricity is therefore exempted from the requirement. Energy is used in the production of barbecue briquettes to dry raw materials (crushed barbecue charcoal mixed with binding agents and water) before and after the briquettes are pressed.

Production technology is of major importance to the energy efficiency and environmental impacts (emissions, particulate matter and uncombusted gases) in the production of barbecue charcoal. A study comparing[109] traditional and modern industrial production of charcoal shows that the production methods differ greatly in energy efficiency and environmental impacts.

Nordic Ecolabelling wants to introduce an energy requirement that ensures that only modern industrial forms of production for charcoal are able to meet the energy requirements of the Nordic Ecolabel, i.e. forms of production that use retorts and where pyrolysis gases from the distillation process are used to dry raw materials and make the process more efficient. In addition to the energy requirement, there has been introduced a requirement for production form in requirements O16, which requires that the distillation process must take place in an automatic closed-loop production system, where the flue gasses from the distillation processes is collected and reused in the drying/distillation processes, before they are released into the air.

Data from five separate production facilities of equivalent modern industrial production facilities show that, on average, these facilities use 3,800 kWh/tonnes of barbecue charcoal[110].

All five production facilities uses about 5 m^3 beech wood to produce 1 tonne of barbecue charcoal. This is equivalent to a total energy input of 15000 kWh/ton barbecue charcoal: 5 m^3 * 580 kg/ m^3 (density oven-dry beech) * 5,3 kWh (energy

[108] Rousset P. et al: “LCA of eucalyptus wood charcoal briquettes”, Journal of Cleaner Production 19 (2011) 1647e1653
[109] http://envimpact.org/node/153 viewed 4 June 2016
[110] Production data comes from dialogue with European manufacturer of barbecue charcoal and briquettes.

content per. kg of dry wood). This concurs with the findings of a study[111] from 2013, which shows that when using modern technologies (retorts and use of pyrolysis gases), between 3 - 7 m^3 of wood is used to produce 1 tonne of barbecue charcoal. The consumption of wood in the production of barbecue charcoal using traditional kiln-technology is between 8-12 m^3 of wood is used to produce 1 tonne of barbecue charcoal.

The production of the briquettes occurs by crushing of charcoal, which is then added a binder (starch dissolved in water), before the mixed material passes into a mold and dried in an oven. Energy data from the aforesaid production facilities shows that these uses on average 550 kWh/ton of briquettes in the drying process.

Based on the above data, Nordic Ecolabelling has set requirements for maximum energy consumption for drying and distillation processes to 4,000 kWh/tonnes of barbecue charcoal and 4,600 kWh/tonnes of barbecue briquettes.

A review of products on the market shows that the energy content of barbecue briquettes lies between 25,000-30,000 kJ/kg (typical around 29,000 kJ/kg). This can be used as a rule of thumb for controlling the energy content. In accordance with requirement O16, this must be checked annually by an independent third party in the years following licensing.

In order to ensure an efficient process, the input of raw materials may not exceed 3000 kg (density oven dry wood/other renewable raw materials) to produce 1 tonne of barbecue charcoal.

The requirement ensures that there can be used varying input of raw materials (m^3), depending on the density of the raw material.

For instance, if the raw material is beech you are allowed to use: 3000 kg/580 kg/m^3 = 5.2 m^3 beech. If the raw material is pine or coconut shells, you are allowed to use: 3000 kg/430 kg/m^3 = 7 m^3.

The energy content of wood depends on a number of parameters, such as type of wood and moisture content. Nordic Ecolabelling has therefore stipulated reference values for different types of fuels that are used in the calculation of energy.

Electricity can not be used as an energy source for drying/cooking/distillation unless the electricity is self-produced from renewable sources. With self-produced thought that the producer owns power generation unit. The use of electricity as a heat source is inefficient compared to other forms of energy.

After the hearing, it has been clarified that external produced excess heat can be usede for drying/cooking and distillation. However, the fossil share may not exceed 10% of the total annual energy consumption (start-up for drying/cooking/distillation).

7.6 Use and quality requirements

This chapter covers the requirements relating to quality and information for pellets, wood briquettes, wood chips, firewood, barbecue charcoal and briquettes and firelighting products.

[111] E. Marshal, W. Kusiak (2013): Charcoal production in the Bieszczady Mts. in the past and at present, s. 164-183

Background to the O13 quality specification requirement for pellets, briquettes and wood chips

The requirement has been amended and tightened for a number of quality properties in relation to version 2 of the criteria. The requirement has been updated to comply with ISO 17225-2 for pellets and extended to include the product type's briquettes and wood chips according to ISO 17225-3 and -4.

For pellets, this means new content requirements for the following heavy metals; arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc.

Sampling requirements have been updated in compliance with EN14778, EN 14780 and EN ISO 18135 - Solid biofuels (Sampling and Methods for sample preparation).

The European Biomass Association (AEBIOM[112]) has developed its own quality assurance standard for pellets, ENplus class A1, which is based on the specifications of the ISO 17225-2 standard, but has stricter limits for individual quality parameters. Nordic Ecolabelling requirement to pellets is identical with ENplus, version 3.0 – August 2015. An overview of requirement levels for the Nordic Ecolabel, ENplus and DINplus standards is presented in Appendix 1.

Requirements for the length of pellets has been amended in relation to version 2 of the criteria, where the requirement is consistent with EN 14961-2 (now ISO 17225-2). The Nordic Ecolabel now requires the length of pellets to be between 3,15 and 40 mm. The amount of pellets longer than 40 mm can be 1 w-%. Maximum length shall be < 45 mm. The requirement is identical with ENplus.

The requirement for the moisture content of pellets (≤10%) has been unchanged in relation to version 2, which is the same level as ISO 17225-2 and ENplus. Water is naturally bound in wood and if the percentage of water is too high, the heat output will be low and the risk of a build-up of chimney deposits will increase.

A very low water content is not necessarily the same as a good wood pellet, because the wood pellet won't have the required strength unless it has the right moisture content.

The requirement for the ash content of pellets has been adjusted in version 3 from (≤ 0.5) to (≤ 0.7), which is the same level as ISO 17225-2 and ENplus. An ash content of 0.7% by weight means that only debranched and debarked raw materials may be used in Nordic Ecolabelled pellets and briquettes.

The requirement for the durability of pellets (mechanical durability) has been tightened in relation to version 2 of the criteria from ≥97.5 to ≥98.0, which is the same level as ENplus and stricter than ISO 17225-2. The durability of a pellet is an important quality parameter as it affects the pellet's tendency to crumble. The mechanical durability is one of the most important quality requirements for pellets that are used in small boilers for heating private residential properties, since the requirement for a high percentage of fines may cause problems for the automatic feeding system of the boilers[113].

[112] http://www.aebiom.org/, accessed 22 June 2016
[113] Thek, G & Obernberger, I. 2010. The Pellet Handbook: The Production and Thermal Utilization of Biomass Pellets.

The requirement for the calorific value of pellets has been adjusted from ≥17.1 MJ/kg or 4,75 kWh/kg in version 2 of the criteria to ≥16,5 MJ/kg or 4,6 kWh/kg, which is consistent with ISO 17225-2 and ENplus.

The requirement for the ash melting behaviour deformation temperature of pellets has been adjusted from T ≥1,300C° in version 2 of the criteria to DT ≥1,200C°.

The requirement is identical to ENplus, which also requires T ≥1,200C°, while ISO 17225-2 only has a disclosure requirement. A requirement for a high ash melting point ensures that slag does not accumulate during combustion[114].

The requirement for additives in pellets is a separate requirement (K13) in version 2 of the criteria, which in this version 3 has been moved to requirements for quality specifications. The requirement also covers wood briquettes. Additives are permitted up to a maximum of 2% by weight. Of that amount, 1.8% by weight may come from the production process and 0.2% by weight from post-production. The requirement level is equivalent to ISO 17225-2 and ENplus for pellets and ISO 17225-3 for briquettes.

ISO 17225-2 permits unmodified additions, such as starch and grease from agricultural and forestry operations in the pellet production process. Grease may reduce the energy consumption in the pellet pressing process[115, 116] and starches may increase the mechanical durability of the pellets, i.e. reduce dust from pellets. Some studies show that additives such as lignosulphonate, residues from the production of paper pulp, and different types of starches (potato and corn starch) can cause sintering in the pellet boiler.

Lignosulphonate can also result in higher particle emissions (200 mg/m^3 10% O_2) and emissions of SO_2 in comparison with a normal level of 30-50 mg/m^3 10% O_2) for pellets[117].

Many manufacturers market their pellets with the statement “Contains no additives”. Interviews with Nordic pellet manufacturers in conjunction with an evaluation of version 2 of the criteria show that it is possible to produce pellets with good durability without the use of additives.

There has been introduced a new requirement for the temperature of the pellets at the last loading point for truck deliveries to end-user at maximum 40 °C. The requirement follows ENplus, while this is not a requirement of EN ISO 17225-2.

Quality properties and requirement levels for briquettes are consistent with ISO 17225-3, Class A1, which is also identical to ENplus, version 2.0 – March 2016.

Nordic Ecolabel permit an uncertainty of ± 2% of the requirements for moisture content in relation to the requirements limit M≤12. This means, that the moisture content may be up to 14%. This is because some producers of briquettes is using chip from wood processing industries where the moisture content varies between 12-15%. To avoid having to use extra energy to dry the chip down to under 12%, Nordic

[114] Strömberg & Herstad Svärd. 2012 Bränslehandboken (The Fuel Handbook). VÄRMEFORSK ISSN 1653-1248.
[115] Haas, J & Hackstock, R. 1998. Brennstoffversorgung mit Biomassepellets. Berichte aus Energie- und Umweltforschung, No 6. Bundersministerium für Wissenschaft und Verkehr. Austria.
[116] Ståhl, M. et al. 2014. SUSTAINABLE IMPROVEMENTS IN THE WOOD FUEL PELLET CHAIN Proceedings of SEEP2014, 23-25 November 2014, Dubai-UAE.
[117] Rönnbäck, M. et al. 2011. Experimental evaluation of pellet quality - Burners for houses and large buildings. Swedish National Testing and Research Institute SP. Report 2011:60.

Ecolabelling has chosen to confer an uncertainty of ± 2% into the requirement boundary. Briquettes are increasingly used by private homeowners in stoves and small boilers as a replacement or supplement to firewood.

This sets high requirement to the stove/boiler as well as the quality of the used briquettes, to ensure a clean and efficient combustion.

Quality properties and requirement levels for wood chips are identical to ISO 17225-4, Class A1 and A2. This is to ensure that the wood chips has a high quality so that it also can be used in smaller boilers.

Background to the O14 quality specification requirement for firewood

Firewood is split, dry wood that is primarily used in wood-burning stoves, fireplaces, masonry stoves or solid fuel boilers. The quality of the firewood depends on parameters such as the size and diameter of the log, rot and dust, moisture content and tree species.

The requirement for information on wood species, diameter, moisture content, heating value and rot, mold and dust corresponds to class A1 / A2 in standard EN ISO 17225-5: 2014. Diameter classes D2 and D5 is designed for firewood intended for kitchen stoves. Diameter Class D15 is intended for stoves, inserts, fireplaces and the like. In order to have a clean and efficient combustion, it is recommended that the wood has a maximum diameter of 15 cm. Wood with a diameter of more than 15 cm is intended for use in boilers or the like. If the Nordic ecolabeled wood has a diameter above 15 cm, the actual value is to be stated. To ensure that the consumer receives the same wood quality, a minimum of 85% of the wood has to be within the specific diameter class. The wood must also not contain visible rot, mold, dust or fungus.

Factors affecting the calorific value of firewood are 1) moisture content, and 2) how much the individual wood types fill the volume referred to as density.

Moisture content: It is important that the firewood is dry before using it. The drier the firewood, the better it is, as dry firewood burns better and produces less pollutant than wet firewood. Wet firewood produces more steam during combustion, which means the combustion takes place at a lower temperature. When the temperature is low, the wood smoke contains more soot and harmful particles and thus a higher level of pollution. Wet firewood also creates a build-up of soot in the chimney, which can, in the worst case, form deposits of creosote, which is a sticky, tarry condensate. This is formed when the flue gases that are formed during combustion react with the steam from the wet firewood.

Creosote increases the risk of the chimney catching fire and can also give off odours and cause discolouration of the walls next to the chimney.

Nordic Ecolabelling requires that the water content of delivered firewood does not exceed 20%, which is identical with the requirement in EN ISO 17225-5:2014. The moisture content of firewood shall be tested a suitable number of times to ensure that the water content of the delivered firewood (crates/boxes or loose loads) does not exceed 20%.

The water content shall be determined using the weighing/drying method, whereby a log is weighed on accurate scales, after which it is placed inside an oven at a temperature of just above 100 degrees (103 degrees Celsius is the standard temperature used). Drying the wood at a temperature just above 100 degrees ensures that all the water is vaporised.

When all the water has been removed after 24 hours or more, the log is weighed again. The weight loss is equivalent to the original water content of the log.

The fact is that 1 kilo of completely dry wood contains more or less the same amount of energy regardless of what type of wood it is. The calorific value of 1 kg of dry wood (18% moisture) is about 19 MJ/kg (approx. 4.2 kWh/kg). This is equivalent to about 0.5 litres of fuel oil. The calculation of calorific value is thus about how much space the firewood takes up. What this means is that a kilo of dry beech wood will take up less space than a kilo of dry spruce wood. The energy content is thus calculated in relation to the solid mass of wood. In other words, the amount of energy in one cubic metre (measurement of volume) of completely dry wood mass without any air in the container. The amount of firewood that the container can hold does not weigh as much since the densest types of wood with the higher energy content will be much heavier than the lightest, such as spruce. The table below shows the density of the most common types of wood. The density is specified as kg per m^3 (completely dry wood)[118].

Table 4: Density of the most common tree species specified as kg per m3

Tree species	Density in kg per m^3 (dry wood)
Hornbeam	640
Beech	580
Ash	570
Oak	570
Birch	540
Alder	440
Scots pine	430
Spruce	370

Nordic Ecolabelling requires that the calorific value of the delivered quantity of firewood be disclosed to the purchaser.

Naturally dried/seasoned firewood: To reduce the moisture in the wood to below 18-20% before it is burned, the newly felled firewood must be dried for at least 1½ years in a dry (covered) and well-ventilated place. It can take longer to get heavier wood types like beech, oak and birch sufficiently dry. The moisture content of firewood can be measured using a moisture meter which many builder's merchants sell.

Oven-dried firewood: Oven-drying is a process that uses energy to rapidly reduce the moisture content of the wood. The wet firewood is stacked in containers through which hot air is blown to dry the wood. The firewood is usually stacked in firewood crates. Gas, coal or biofuels are often used to dry the wood. The drying time depends on the type of wood, how the firewood is stacked and the amount of wood inside the container. Firewood is often marketed as “Oven-dried firewood” or similar, but this is not always accurate.

For example, sometimes only the outer layer of oven-dried firewood is dry, while the core is still too wet for it to be used as firewood[119].

[118] http://www.skovforeningen.dk/site/traearternes_egenskaber/ viewed 6 March 2015
[119] http://politiken.dk/forbrugogliv/boligogdesign/energi/ECE2445216/kvalitetsmaerkning-af-braende-skal-goere-faerre-syge-af-braendeovnsroeg/ viewed 6 March 2015

The licensee must have quality procedure, which show how the requirements for quality specification is checked regularly.

Background to the O15 quality specification requirement for barbecue charcoal and briquettes

Quality specifications for barbecue charcoal and barbecue briquettes:

Barbecue charcoal and barbecue briquettes must be tested for compliance with EN 1860-2:2005. The quality of barbecue charcoal/briquettes depends on a number of parameters, such as the ash, water and fixed carbon content. The requirements for quality specifications for barbecue charcoal and briquettes in different standards are set out in Appendix 2.

The requirements for fixed carbon say something about the ability of the charcoal/briquette to emit heat, so the higher the percentage of fixed carbon, the better the quality. In the case of barbecue charcoal, the Nordic Ecolabel requires a fixed carbon content of at least 83%, which is the same requirement level as that specified by Norske Veritas (DNV (SBC 184)) in its certification standard. However, the requirement is stricter than EN 1860-2:2005, Danske Varefakta (DVN) and DINplus, where the requirement is a minimum of 75%, a minimum of 75% and a minimum of 80% respectively. In the case of barbecue briquettes, the Nordic Ecolabel requires a fixed carbon content of at least 68%, which is stricter than DNV (min. 65%), EN 1860-2:2005 (min. 60%), DVN (min. 65%) and DINplus (min. 65%). The difference in requirements for fixed carbon content in barbecue charcoal and barbecue briquettes respectively is primarily due to the use of binding agents in the briquettes.

The requirements for ash content say something about how “pure” the materials are from which barbecue charcoal or barbecue briquettes are made. A high ash content after combustion indicates that the products probably contain other materials than wood, e.g. sand, minerals (lignite or stone coal) and others. Consumer tests showed that the ash content could fluctuate between 4 and 40%[120]. Thus, the lower the ash content, the better the quality.

The ash content of barbecue briquettes is higher than barbecue charcoal due to the content of binding agents. In the case of barbecue charcoal, the Nordic Ecolabel requires that the ash content shall not exceed 4%, which is the same requirement level as that specified by DNV (SBC 184) and DINplus in their certification standards. However, the requirement is stricter than EN 1860-2:2005 and DVN, where the requirement specifies a maximum ash content of 8%.

In the case of barbecue briquettes, the Nordic Ecolabel requires that the ash content shall not exceed 15%, which is the same level as that specified by DNV (SBC 184) and DIN plus, but is stricter than EN 1860-2:2005 and DVN, which permits 18%.

The requirement for moisture content says something about the quality of the barbecue charcoal/briquettes. The higher the moisture content, the lower the burning properties. In the case of barbecue charcoal and barbecue briquettes, the Nordic Ecolabel requires that the moisture content shall not exceed 8%, which is the same level as in the previously mentioned standards and certification schemes.

[120] http://forcetechnology.com/~/media/force-technology-media/div-6-metrology-chemical-analysis-and-managemetn-systems/datasheets/a163/2705-3-da, viewed 4 July 2016

In order to be able to light barbecue charcoal/briquettes, they must contain small amounts of volatile components. However, if the content of volatile components is high, flames will be produced instead of the steady glow that you want from the coals/briquettes[121]. The requirement is most relevant for barbecue briquettes due to their composition and size. In the case of briquettes, the Nordic Ecolabel requires that the volatile component content shall not exceed 20%, which is the same requirement level as that specified by DNV (SBC 184). EN 1860-2:2005, Danske Varefakta (DVN) and DINplus have no requirements for the content of volatile components.

Requirements for granulation of barbecue charcoal and briquettes follows requirement levels in DNV (SBC 184). The requirement ensures that the barbecue charcoal have a uniform size and that the carbon is not easily crumble or break during transportation and handling.

Barbecue briquettes are made by compressing pulverised charcoal or heat-treated mineral coal, and adding a binding agent such as corn starch or potato starch. The quality of briquettes is thus determined by the quality of the charcoal that is used and what is added at the compression stage. The Nordic Ecolabel requires that binding agents shall not pose any risk to health when the gases that are emitted from the binding agents when burned come into contact with food. The binder must meet food quality standards. At the same time, a number of organic fossil materials and inorganic materials are not permitted for use in barbecue briquettes. These are organic fossil materials, e.g. stone coal, brown coal and petroleum coke, and inorganic materials, e.g. stone, sand, glass, slag and metal splinters. The requirement is consistent with EN1860-2:2005.

Nordic Ecolabel has gain information during the hearing that the test for foreign substances in accordance with EN 1860-2: 2005, clause 6.5, is not particularly useful. Nordic Ecolabelling will therefor also accept that this be documented through requirements O1 and O2, together with a statement from the test lab.

The requirement for quality specifications must be documented with a complete test report according to EN 1860-2:2005 and comply with all quality specifications stated in Table 12. The report shall be conducted by an independent testing laboratory.

To ensure that the Nordic Ecolabelled barbecue charcoal/briquettes maintain a high level of quality, Nordic Ecolabelling requires quality control inspections of the Nordic Ecolabelled products to be conducted annually. They shall be tested for compliance with all quality specifications stated in Table 12, and shall be conducted by an independent testing laboratory. A test sample must be taken from the manufacturer's warehouse. All reports must be available to Nordic Ecolabelling. If the annual report shows that the requirement is not met, the licensee should contact Nordic Ecolabelling.

Background to requirement O16 Production facilities for barbecue charcoal and barbecue briquettes

Trade in charcoal from illegally harvested forests is taking place on a large scale, mainly in regions of the African continent and also in South America[122]. In a report

[121] http://gryfskand.pl/en/business-areas/charcoal-products/terminology/, viewed 4 July 2016
[122] http://www.naturskyddsforeningen.se/nyheter/grillkol-kan-komma-fran-olagliga-avverkningar, 27 May 2016

published in 2014, the WWF estimates[123] that an area the size of a football pitch is lost every second as a result of illegal logging.

Moreover, the illegal trade in charcoal is helping finance terrorist groups[124], such as al-Shabaab in Nigeria, Somalia, etc.

The United Nations and the USA have therefore together banned the import of charcoal from several African countries[125]. Barbecue charcoal and briquettes from illegally harvested timber is also sold in the Scandinavian market. There are "traders" in Europe that repackage barbecue charcoal and briquettes and then sell them as European-produced products (greenwashing)[126].

To ensure that the wood raw materials used in Nordic Ecolabelled barbecue charcoal/briquettes are legal and sustainably produced, Nordic Ecolabelling (as mentioned previously in Section 7.3 (Resources)) has stringent requirements for the use of certified wood and traceability.

Nordic Ecolabelling has a number of requirements for production facilities, for both barbecue charcoal and barbecue briquettes, to ensure that the products are manufactured under controlled conditions and in an environmentally-responsible and energy-efficient manner. The requirement that the production of barbecue charcoal and briquettes must take place at a permanent production facility with the infrastructure to support the operations ensures that mobile production facilities cannot be used in a Nordic Ecolabelled production. The use of transportable metal vessels/drums or primitive earth/clay kilns for charcoal production is very common in Africa and South America, for example. The mobility of these production facilities makes it simple to transport them to wherever the raw material (wood) is and thus, potentially, use timber that has been harvested illegally. Moreover, this form of production is linked to serious health impacts for the workers (emissions of unburned gases in the distillation process and particulate matter/coal dust), and the use of safety and protection equipment is very limited[127].

The requirement saying that the distillation process must take place in an automatic production system where the flue gasses from drying and distillation processes is collected and reused in the drying/distillation processes, before they are released into the air, ensure that only "modern" methods of producing barbecue charcoal/briquettes (retort technologies) meet the Nordic Ecolabel requirements. The requirement also ensures that air emissions are reduced significantly compared to the primitive production technologies (metal vessels or earth/clay miler), where the flue gas is discharged directly into the air[128].

All defined production facilities must be inspected at least once a year by an independent, qualified third party to ensure compliance with requirements O3, O4, O6 and O8 for raw materials/working conditions, requirements O11 and O12 for energy consumption and above requirements to production facilities in O16.

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[123] *WWF report "Illegal timber trade 6 August 2014",http://www.wwf.eu/?226851/EU-countries-failing-to-halt-illegal-timber-trade*
[124] *Dagens Industri newspaper 11 October 2014 http://www.di.se/artiklar/2014/10/11/terrorgrupp-tjanar-miljarder/*
[125] UN Resolution 2036; p.22; http://www.un.org/ga/search/view_doc.asp?symbol=S/RES/2036(2012)) (source attached: SvD newspaper 28 September 2013).
[126] Interview with Alexander Brömer, Gruvskand, Stockholm. 31 October 2014
[127] FERN Report (August 2015): "Playing with fire – Human misery, environmental destruction and summer BBQs"
[128] FAO TCP/CRO/3101 (2008: Development of a sustainable charcoal industry, p. 20-21

The requirement therefore covers all sites where barbecue charcoal and barbecue briquettes that are included in a Nordic Ecolabel licence are manufactured. If an applicant only manufactures barbecue briquettes, then the requirement covers subcontractors of barbecue charcoal/residues from barbecue charcoal production. All reports must be available to Nordic Ecolabelling. If the annual report shows that the requirement is not met, the licensee should contact Nordic Ecolabelling.

Background to requirement O17 Quality for firelighting products

Firelighting products must be tested for compliance with EN 1860-3:2003. The quality of firelighting products mainly depends on how efficiently and effectively a firelighting product transfers its energy in the form of fire/heat to the product (for example, firewood or barbecue charcoal/briquettes) that you wish to light. At the same time, the product must be safe to use for lighting (i.e. in its packaging) and when the product is lit. The EN 1860-3:2003 standard has requirements for the safety of firelighting products, how effectively they perform and for their packaging.

The requirement in terms of quality is that the firelighting product must be easy to light and the fire must spread quickly across the surface of the whole firelighting product to ensure high heat generation. The results of a Norwegian test[129] of solid firelighting products show that the products burn (from lighting until the flame goes out) between 8 and 10 minutes. This is in line with the information provided on products in the Nordic market, where the burning time is specified to be 8 to 12 minutes on average.

The requirement must be documented with a complete test report to show that the firelighting product complies with the EN 1860-3:2003 standard.

Background to the requirements O18 Information to consumers about pellets, wood briquettes, wood chips and firewood, O19 Information to consumers about barbecue charcoal and barbecue briquettes, and O20 Information to consumers about firelighting products

Requirements for information to consumers are also set out in version 2 of the criteria for pellets. The requirement has now been slightly amended and extended to include briquettes, wood chips, firewood, barbecue charcoal/briquettes and firelighting products. The requirement shall ensure that consumers are provided with relevant information about the products at the time of purchase, with regard to relevant quality parameters and information about raw materials and place of production. The information may also be used to compare the requirements of the Nordic Ecolabel with other similar types of products.

7.7 Quality and official requirements

The following procedures must be implemented to ensure that the Nordic Ecolabel requirements are met.

If the manufacturer has a certified environmental management system in accordance with ISO 14 001 or EMAS in which the following procedures are implemented, it is sufficient for the accredited auditor to confirm that the requirements are being implemented.

[129] http://www.hyttemag.no/vi-tester/i-fyr-og-flamme, viewed 13 July 2016

Background to requirement O27 Take-back system

Requirements for return systems have now been incorporated into the Norwegian Waste Regulations, which means that the Nordic Ecolabelling requirement for membership in a return company will be out of date and therefore no longer need to be managed by Nordic Ecolabelling in a separate requirement.

Background to the requirements O21 Person responsible for the Nordic Ecolabel, O22 Documentation, O23 Products quality, O24 Planned changes, O25 Unforseen non-conformities, O26 Traceability, and O28 Laws and regulations

are general quality assurance requirements for ensuring that the ecolabelled products fulfil the requirements and comply with legislation and regulations such that the products maintain the environmental quality which is the purpose of the requirements. Most of these requirements are general and apply to all production of ecolabelled products. Individual requirements are not justified in detail here.

7.8 Areas without requirements

The following proposal for requirements has been discussed and analysed during the review process. However, for the reasons explained below, Nordic Ecolabelling has decided that it will not be included in the criteria generation 3.

Carbon footprint

In our communications during the review process, the Swedish Pellet Association expressed a wish[130] that a Carbon Footprint requirement be included in the Nordic Ecolabel's criteria for pellets. The Swedish Pellet Association wishes it to be included as there is a requirement for it to be calculated in the ENplus and Sustainable Biomass Partnership (SBP) certification schemes. These two certification schemes dominate the European market today.

In 2010, the European Commission issued the non-binding recommendations for sustainability criteria for solid biofuels[131] which if developed by the Member States would be, in almost every respect, the same as those laid down in the Renewable Energy Directive (RED) (2009/30/EC). The European Commission's recommendations included a requirement that biofuels must achieve greenhouse gas savings of at least 35% in their life cycle (cultivation, processing, transport, etc.) in comparison with fossil fuels. Nordic Ecolabelling has decided not to propose, in the consultation document, an equivalent requirement as it considers that a requirement for maximum greenhouse gas emissions during the life cycle (carbon footprint) would not result in any substantial environmental effect because the data used for the calculation would largely be based on the default values.

The requirement for the use of fossil energy sources (O10) severely limits the use of fossil energy sources and thus also emissions of greenhouse gases.

Individual, primary and transport packaging

In the current criteria, generation 2 is a requirement that ban the use of chlorine-based plastics in packaging. This requirement is removed in the new generation 3 of

[130] http://www.pelletsforbundet.se/ (17 June 2016)
[131] The European Commission. 2010. Report from the Commission to the Council and the European Parliament on sustainability requirements for the use of solid and gaseous biomass sources in electricity, heating and cooling SEC(2010) 65 final SEC(2010) 66 final.

the criteria for solid fuels. A review of solid fuel products that are sold in the Nordic market shows that the manufacturers are aware of the packaging (type and quantities) in relation to the products. None of the examined products uses chlorine-based plastics, such as PVC (polyvinyl chloride) and PVDC (polyvinyl dichloride), in the individual, primary and transport packaging. Nordic Ecolabelling believes there is very little potential (P) to extend the requirements for packaging.

Use of individual packaging in firelighting products are covered by the requirements O7 for paper, cardboard and mass in those cases where single packaging and solid fuels constitute a whole.

The primary packaging for pellets, briquettes, barbecue charcoal and briquettes for private customers is usually paper, cardboard and plastic film. This is used for transportation purposes, to protect the products from moisture, to display the products and to provide space for consumer information. Pellets or wood chips for businesses are usually transported as loose loads by weight or in big-bags (polyethylene/polypropylene).

Some types of firelighting products may be packaged in individual packaging, often made of polyethylene (e.g. firelighting sachets), but primary packaging is generally cardboard, paper and plastic. Firewood is mainly sold as loose loads by weight or in wooden crates.

8 Amendments compared with the previous version 2

The following are the key amendments compared with the previous version 2.

Table 5: Overview of amendments to requirements following the version 2 to version 3 revision.

Requirements version 3	Requirements version 2	Same req.	Amendment	New requirement	Comment
Products that may be Nordic Ecolabelled	Products that may be Nordic Ecolabelled		*		The product group has been expanded to include the product types: briquettes, wood chips, firewood, barbecue charcoal/briquettes and firelighting products. The name of the product group has been changed from pellets to solid fuels and firelighting products.
O1				*	New requirement. Description of the product, materials used in the product, production site, subcontractors and the manufacturing process.
O2	K9		*		The requirement for raw materials has been expanded to include the product types: briquettes, wood chips, firewood, barbecue charcoal/briquettes and firelighting products.
O3	K10		*		The requirement has been amended to include a list of tree species that may not be used in Nordic Ecolabelled solid fuels.

O4	K11		*		The requirement has been amended so that suppliers of wood raw materials must be Chain of Custody (CoC) certified under the FSC or PEFC schemes. For barbecue charcoal/briquettes, both the manufacturer of barbecue charcoal and the manufacturer of briquettes must have CoC certification. The requirement for pellets and briquettes has been amended so that at least 95% of the wood raw materials must be wood residues from the wood processing industry. The minimum certified percentage for wood chips, firewood and firelighting products is 70%. The requirement for barbecue charcoal/briquettes has been raised to 100%.
O5				*	New requirement. Applies to barbecue charcoal/briquettes and firelighting products. Renewable raw materials from soy- and palm oil, palm kernel oil and their derivatives and sugar cane must not be used in Nordic ecolabelled products
O6				*	New requirement. Applies to barbecue charcoal/briquettes and firelighting products. If other renewable raw materials than wood and palm oil are used, there must be procedures in place to ensure that they are legal and sustainable.
O7				*	New requirement. Cellulose-based pulp and fluff used in firelighting products has to comply with the Nordic Ecolabel's Basic Module for paper and hygiene products.
O8				*	New requirement. Barbecue charcoal/briquettes producers must have a written procedure (a code of conduct) that shows how the license holder works to ensure that the following UN conventions and the UN Global Compact are complied with by all producers/suppliers of barbecue charcoal and briquettes
O9				*	New requirement that chemical products used in the production of solid fuels may not be classified according to a number of hazard classifications in accordance with the CLP Regulation.
O10				*	New requirement that chemical products may not contain CMR substances.

O11	K15		*		The requirement has been amended. Energy from fossil sources* shall only be used for starting the process of drying/boiling/distilling of raw materials for the production of pellets, wood briquettes, wood chips, firewood and barbeque charcoal/briquettes.
O12	K14		*		The requirement for energy consumption has been amended so that it now only includes the following processes; drying/boiling and distillation (barbecue charcoal) of raw materials in the production of pellets, briquettes and barbecue charcoal and briquettes.
O13	K21 and K13		*		The requirement for quality specifications for pellets has been tightened for a number of properties. Requirements for additives have been added to the requirement. New requirement for quality specifications for briquettes and wood chips.
O14				*	The requirement for quality specifications for firewood.
O15				*	The requirement for quality specifications for barbecue charcoal and briquettes.
O16				*	The requirement for production facilities.
O17				*	The requirement for quality specifications for firelighting products.
O18	K22		*		The requirement has been amended to also include briquettes, wood chips and firewood.
O19				*	New requirement for information to consumers about barbecue charcoal and briquettes.
O20				*	New requirement for information to consumers about firelighting products.
O21-O28	K1-K8	*			Quality and official requirements.
Requirements that have been removed					
	K12				Management of wood shavings.
	K16				Annual documentation for energy requirement compliance.
	K17				Annual verification of pellet quality specifications by an external agency.
	K18				Daily control/test of selected pellet quality specifications.
	K19				Requirements for delivery of pellets to consumers.
	K20				Ban on use of chlorinated plastics in product and transport packaging.
	K23				Requirements for pellet storage space at the consumer's site.

9 New criteria

As part of any future evaluation of the criteria, it will be relevant to consider the following:

- Requirements concerning renewable raw materials
- Requirements for energy consumption in the production of solid fuels
- Requirements for quality aspects

10 Terms and definitions

Term	Explanation or definition
Wood residues	Wood residues from the wood processing industry classified as 1.2.1 (chemically untreated wood residues) according to EN ISO 17225-1:2014. For example residues from debarking, sawing, size reduction, shaping and pressing.
CMR substances	CMR substances are substances that are known to be Carcinogenic, Mutagenic and/or Reprotoxic.
CO	Carbon monoxide.
Individual packaging	Individual packaging refers to packaging around each individual solid fuel, e.g. plastic cover around each separate firelighting product. The individual packaging and the solid fuel constitute a unit.
Renewable oil material	Renewable raw materials are biological materials that are constantly replenished by natural processes. This includes the degradable part of products, waste and residues from agriculture (both vegetable and animal), sustainable forestry operations and similar industries and the biodegradable fraction of industrial waste and municipal waste.
Fossil raw materials	Fossil raw materials were originally organic matter (primarily plants) that has been buried under the ground or beneath the ocean for many millions of years. They therefore contain large amounts of CO_2 that is released when burned.
NOx	Nitrogen oxides.
OGC	Organic gaseous carbon.
PAH	Polycyclic aromatic hydrocarbons.
Primary packaging	Cardboard, paper and plastic foil are typical examples of primary packaging. Its purpose is to protect the products, display them (visual design) and provide space for consumer information.
PVC	Polyvinyl chloride.
Residual products/waste	Residues are products that do not constitute the main product and which the manufacturer is not intentionally trying to produce. Waste is any substance or object which the holder discards or intends or is required to discard. Raw materials that have been intentionally changed to enable them to be counted as waste (e.g. a waste material mixed with a non-waste material) do not comply with the requirement.
RPS	Relevance, Potential and Steerability: Tool used by Nordic Ecolabelling to analyse whether environmental problems are relevant, whether there is potential for improvement, and whether the licensee has the steerability to be able to achieve these environmental improvements.
VOC	Volatile organic compounds.
Transport packaging	Transport packaging refers to packaging for the handling and transport of a number of sales units or multipack consignments, e.g. pallets, boxes and bags made from paperboard and corrugated board.

Classification of origin and sources of raw materials that can be used I Nordic ecolabelled solid fuels and firelighting products (from EN ISO 17225-1:2014)

1. Woody biomass	1.1 Forest, plantations and other virgin wood	1.1.1 Whole trees without roots	1.1.1.1 Broadleaf
			1.1.1.2 Coniferous
			1.1.1.3 Short rotation coppice
			1.1.1.4 Bushes
			1.1.1.5 Blends and mixtures
		1.1.3 Stemwood	1.1.3.1 Broadleaft with bark
			1.1.3.2 Coniferous with bark
			1.1.3.3 Broadleaft without bark
			1.1.3.4 Coniferous without bark
			1.1.3.5 Blends and mixtures
		1.1.4 Logging residues	1.1.4.1 Fresh/Green, Broadleaf (including leaves) 1.1.4.2 Fresh/green, Coniferous (including needles) 1.1.4.3 Stored, Broadleaf 1.1.4.4 Stored, Coniferous 1.1.4.5 Blends and mixtures
	1.2 By-products and residues from wood processing industries	1.2.1 Chemically untreated wood by-products and residues	1.2.1.1 Broadleaft with bark
			1.2.1.2 Coniferous with bark
			1.2.1.3 Broadleaft without bark
			1.2.1.4 Coniferous without bark
			1.2.1.5 Blends and mixtures
2. Herbaceous biomass	2.1 Herbaceous biomass from agriculture and horticulture	2.1.1 Cereal crops	2.1.1.1 Whole plants
			2.1.1.2 Straw parts
			2.1.1.3 Grains or seeds
			2.1.1.4 Husks or shells
			2.1.1.5 Blends and mixtures
		2.1.2 Grasses	2.1.2.1 Whole plant
			2.1.2.2 Straw parts
			2.1.2.3 Seeds
			2.1.2.4 Shells
			2.1.2.5 Bamboo
			2.1.2.6 Blends and mixtures
		2.1.3 Oil seed crops	2.1.3.1 Whole plant
			2.1.3.2 Stalks and leaved
			2.1.3.3 Seeds
			2.1.3.4 Husks and shells
			2.1.3.5 Blends and mixtures
		2.1.4 Root crops	2.1.4.1 Whole plant
			2.1.4.2 Stalks and leaves
			2.1.4.3 Root
			2.1.4.4 Blends and mixtures
		2.1.5 Legume crops	2.1.5.1 Whole plant
			2.1.5.2 Stalks and leaves
			2.1.5.3 Fruit
			2.1.5.4 Pods
			2.1.5.5 Blends and mixtures
		2.1.6 Flowers	2.1.6.1 Whole plant
			2.1.6.2 Stalks and leaves
			2.1.6.3 Seeds

			2.1.6.4 Blends and mixtures
		2.1.7 Segregated herbaceous biomass from gardens, parks, roadside maintenance, vineyards and fruit orchards	
		2.1.8 Blends and mixtures	
	2.2 By-products and residues from food and herbaceous processing industry	2.2.1 Chemically untreated herbaceous residues	2.2.1.1 Cereal crops and grasses
			2.2.1.2 Oil seed crops
			2.2.1.3 Root crops
			2.2.1.4 Legume crops
			2.2.1.5 Flowers
			2.2.1.6 Blends and mixtures
3. Fruit biomass	3.1 Orchard and horticulture fruit	3.1.1 Berries	3.1.1.1 Whole berries
			3.1.1.2 Flesh
			3.1.1.3 Seeds
			3.1.1.4 Blends and mixtures
		3.1.2 Stone/kernel fruits	3.1.2.1 Whole fruit
			3.1.2.2 Flesh
			3.1.2.3 Stone/kernel/fruit fibre
			3.1.2.4 Blends and mixtures
		3.1.3 Nuts and acorns	3.1.3.1 Whole nuts
			3.1.3.2 Shells/husks
			3.1.3.3 Kernels
			3.1.3.4 Blends and mixtures
		3.1.4 Blends and mixtures	
	3.2 By-products and residues from food and fruit processing industry	3.2.1 Chemically untreated fruit residues	3.1.2.1 Berries
			3.2.1.2 Stone/kernel fruit/fruit fibre
			3.2.1.3 Crude olive cake
			Blends and mixtures

Appendix 1 Overview of quality standards and requirements levels in different quality standards for pellets

Table 6: Overview of quality standards and requirements levels of different quality (Nordic Ecolabel generation 3, ISO EN17225, ENplus and DINplus) for pellets

		Swan proposal generation 3	ISO EN17225	ENplus	DINplus
	Unit	**A1**	**A1**	**A1**	
Diameter, D	mm	6 ± 1 or 8 ± 1	6 (±1) or 8 (±1)	6 (±1) or 8 (±1)	6 (±1) or 8 (±1)
Length, L	mm	3,15 ≤ L ≤ 40	3,15 ≤ L ≤ 40	3,15 ≤ L ≤ 40	3,15 ≤ L ≤ 40
Moisture, M	w-% as received, wet basis	≤ 10,0	≤ 10,0	≤ 10,0	≤ 10,0
Ash, A	w-% dry	≤ 0,7	≤ 1,0	≤ 0,7	≤ 0,7
Mechanical durability, DU	w-% as received	> 98.0	≥ 97,5	≥ 98,0	≥ 97,5
Fines, F	w-% as received	Bulk ≤ 1.0 Big bags ≤ 0,5	≤ 1.0	≤ 1.0 Big bags ≤ 0,5	≤ 1.0 Big bags ≤ 0,5
Additives,	w-% as received	≤ 2 Type and amount to be stated	≤ 2,0	≤ 2,0	≤ 2,0
Net calorific value, Q	MJ/kg or kWh/kg as received	≥ 16,5 or ≥ 4,6	≥ 16,5 or ≥ 4,6	≥ 16,5 or ≥ 4,6	16,5 ≤ Q ≤ 19,0
Bulk density	Kg/m^3 as received	600 ≤ BD ≤ 750	≥ 600	600 ≤ BD ≤ 750	600 ≤ BD ≤ 750
Ash melting point temperature	C°	> 1200	to be stated	> 1200	> 1200
Temperature	C°	≤ 40	-	≤ 40	≤ 40
Nitrogen, N	w-% dry	≤ 0,3	≤ 0,3	≤ 0,3	≤ 0,3
Sulphur, S	w-% dry	≤ 0,04	≤ 0,04	≤ 0,04	≤ 0,04
Chlorine, Cl	w-% dry	≤ 0,02	≤ 0,02	≤ 0,02	≤ 0,02
Arsenic, As	mg/kg dry	≤ 1	≤ 1	≤ 1	≤ 1
Cadmium, Cd	mg/kg dry	≤ 0,5	≤ 0,5	≤ 0,5	≤ 0,5
Chromium, Cr	mg/kg dry	≤ 10	≤ 10	≤ 10	≤ 10
Copper, Cu	mg/kg dry	≤ 10	≤ 10	≤ 10	≤ 10
Lead, Pb	mg/kg dry	≤ 10	≤ 10	≤ 10	≤ 10
Mercury, Hg	mg/kg dry	≤ 0,1	≤ 0,1	≤ 0,1	≤ 0,1
Nickel, Ni	mg/kg dry	≤ 10	≤ 10	≤ 10	≤ 10
Zinc, Zn	mg/kg dry	≤ 100	≤ 100	≤ 100	≤ 100

Appendix 2 Overview of quality standards and requirements levels in different quality standards for barbeque charcoal/-briquettes

Characteristic	**Specified requirements**				
	Swan generation 3	**DNV-SBC 184**	**DINplus**	**EN1860-2:2005**	**DVN5180: 2009**
Fixed carbon					
Barbeque charcoal:	≥83%	≥83%	≥80%	≥75%	≥75%
Barbeque briquettes:	≥68%	≥65%	≥65%	≥60%	≥60%
Ash content					
Barbeque charcoal:	Max 4%	Max 4%	Max 4%	Max 4%	Max 8%
Barbeque briquettes:	Max 15%	Max 15%	Max 15%	Max 18%	Max 18%
Moisture content:					
Barbeque charcoal:	Max 8%	Max 8%	Max 8%	Max 8%	Max 8%
Barbeque briquettes:	Max 8%	Max 8%	Max 8%	Max 8%	Max 8%
Volatile components (dry barbecue briquettes):					
Barbecue charcoal:	-	-	-	-	Max 13%
Barbeque briquettes:	Max 20%	Max 20%	-	-	Max 20%
Granulation:					
Barbeque charcoal:	Max 10% > 80 mm Min. 80% > 20 mm Max 7% ml. 0-10 mm	Max 10% > 80 mm Min. 70% > 20 mm Max 20% ml. 10-20 mm Max 7% mel. 0-10 mm	Min. 80% ml. 20-80 mm Max 20% ml. 0-20 mm Max 6% ml. 0-10 mm	Max 10% > 80 mm Min. 80% > 20 mm Max 7% ml 0-10 mm	Max 10% > 80 mm Min. 80% > 20 mm Max 7% ml. 0-10 mm
Barbeque briquettes:	< 20 mm max 10%	< 20 mm max 10%	< 20 mm max 10%	< 20 mm max 10%	< 20 mm max 10%
Binder					
Barbeque charcoal:	-	-	-	-	-
Barbeque briquettes:	See*	See*	See*	See*	See*
Foreign substances					
Barbeque charcoal:	-	-	-	-	-
Barbeque briquettes:	See**	See**	See**	See**	See**
Effective brændværdi	Stated on pack	Stated on pack	Stated on pack	Stated on pack	Max 5% negative deviation from the declared value
Net Weight	Stated on pack	Stated on pack	Stated on pack	Stated on pack	Max 5% negative deviation from the declared value

*The gases that are emitted from binding agents when burned must not pose any risk to health when they come into contact with food. The binder must meet food quality standards.

**Tests conducted in accordance with 6.5 (EN1860-2:2005) must show that a maximum of 0.4% of the volume is a substance that does not normally occur after the distillation process in the production of barbecue charcoal.

Barbecue briquettes must not contain:

Organic fossil material, e.g. stone coal, brown coal and petroleum coke, and inorganic materials, e.g. stone, sand, glass, slag and metal splinters.

Appendix 3 Relevance, Potential and Steerability (RPS analysis)

The complete analysis is in Danish, but can be demanded at Nordic Ecolabel.

Appendix 4 EU directives, legislation and regulations

The product group solid biofuels are opposite liquid and gaseous biofuels not yet regulated by the EU. Common binding sustainability criteria for solid biofuels is expected no earlier adopted in 2020.

Directives and Regulations

The EU has as part of the Renewable Energy Directive (2009/28/EC) sets out sustainability criteria for liquid biofuels, but not for solid biofuels. On the basis of a public consultation process in February 2010 the commission presented its report on sustainability requirements for biomass fuels for electricity, heating and cooling COM (2010)[132]. The repport concludes that EU will not (for the moment) set of common sustainability criteria for solid biomass. By contrast, it is proposed that Member States introduce their own national schemes for common guidelines similar to those that apply to liquid biofuels. Overall, the report recommends that the following criteria:

- Banning the use of biomass from land converted from native forests, areas with significant carbon stores and from areas of high biodiversity.
- Use of a common greenhouse gas calculation methodology which should ensure that the CO_2 saving meets the minimum requirements. The minimum requirement is 35%, rising to 60% for new installations in 2018. Reference is made in the report annexed to a common methodology and displays standard figures.
- Differentiation of national support schemes in favor of installations that have high energy efficiency, and
- Close monitoring of the used biomass origin.

EU Commission presented in October 2012 a proposal for a revision of the directive on renewable energy, so that, inter alia, ILUC (Indirect Land Use Change) is partially counted in regaring liquid biofuels. The proposal is designed primarily to counter criticism compared to the 1st generation biofuels. The proposal introduces CO_2-emission factors for various agricultural crops used for biofuels. Since there no introduced factors for residues or forest products, the proposal has no immediate impact on the calculation of CO_2 emissions from wood chips and wood pellets. The EU proposal can be seen as an expression of an ever-increasing focus on sustainable bioenergy from the EU side.

The Commission "Standing Forestry Committee" released in January 2013, a position paper (EU, 2013)[133], where it was recommended that uniform criteria for solid biomass should:

- Strive for sustainable wood regardless of end use.
- Find inspiration in the criteria of the Forest Europe Agreement.
- Find inspiration in national public procurement policies for sustainable wood.
- Building on the experience of liquid biofuels in the Renewable Energy Directive.

[132] http://ec.europa.eu/energy/renewables/bioenergy/doc/2014_biomas s_state_of_play_.pdf
[133] Standing Forestry Committee, European Commission. 2013. Opinion of the Standing Forestry Committee on sustainability criteria for solid and gaseous biomass in electricity, heating and cooling. Standing Forestry Committee, European Commission

The EU Commission has in a working paper dated July 31, 2014 “State of play on the sustainability of solid and gaseous biomass overused for electricity, heating and cooling in the EU” announced, that common binding sustainability criteria (EU, 2014)[134] can be expected the earliest in 2020. One reason is that it is estimated that the existing national criteria is consistent with each other and therefore only have a very limited market-distorting effect.

Among the EU Member States there is different views on the need for criteria for solid biofuels[135]. In general, the member state countries expecting to import large quantities of biomass is in favor of a proposal on sustainability criteria at EU level, while primarily the forest producing Member States is opposed to the introduction of such criteria. Belgium and the UK, have already established national sustainability criteria.

EU Timber Regulation:

Regulation (EU) No 995/2010 of the European Parliament and of the Council of 20 October 2010[136] laying down the obligations of operators who place timber and timber products on the market – also known as the (Illegal) Timber Regulation counters the trade in illegally harvested timber and timber products through three key obligations:

1. It prohibits the placing on the EU market for the first time of illegally harvested timber and products derived from such timber;
2. It requires EU traders who place timber products on the EU market for the first time to exercise “due diligence”.

Once on the market, the timber and timber products may be sold on and/or transformed before they reach the final consumer. To facilitate the traceability of timber products economic operators in this part of the supply chain (referred to as traders in the regulation) have an obligation to

3. Keep records of their suppliers and customers.

The Regulation covers a wide range of timber products listed in its Annex using EU Custom’s code nomenclature.

The Regulation entered into application on 3 March 2013.

[134] State of play on the sustainability of solid and gaseous biomass used for electricity, heating and cooling in the EU. EU Kommissionen. Hentet fra http://ec.europa.eu/energy/renewables/bioenergy/doc/2014_biomas s_state_of_play_.pdf
[135] Energistyrelsen 2014. Analyse af bioenergi i Danmark, ISBN: 978-87-93071-68-1.
[136] http://ec.europa.eu/environment/forests/timber_regulation.htm

Appendix 5 Standards

Relevant standards for pellets, briquettes, wood chips and firewood:
EN ISO 16559:2014 (determines the terming and definitions for solid biofuels)
EN ISO 13065:2015 (Sustainability criteria for bioenergy)
ISO 17225:2014 (solid biofuels)

- Del 1 General requirements
- Del 2 Graded wood pellets
- Del 3 Graded wood briquettes
- Del 4 Graded wood chips
- Del 5 Graded firewood
- Del 6 Graded non-woody pellets
- Del 7 Graded nod-woody briquettes

EN 14778:2011 – Solid biofuels sampling
EN 14780:2011 – Solid biofuels sample preparation
ISO 16559 - Terminology, definitions and descriptions
ISO 16948 – Determination of total content and carbon, hydrogen and nitrogen
ISO 16967 – Determination of major elements
ISO 16968 – Determination of minor elements
ISO 19993 – Conversion of analytical results from one basis to another
ISO 19994 – Determination of total content of sulphur and chlorine
ISO 17828 – Determination of bulk density
ISO 17829 – Determination of length and diameter for pellets
ISO 17831 – Determination of mechanical durability of pellets and briquettes
ISO 18122 – Determination of ash content
ISO 18123 – Determination of the content of volatile matter
ISO 18125 – Determination of calorific value
ISO 18134 – Determination of moisture content
ISO 18847 – Determination of particle density
ISO 18846 – Determination of fines
CEN/TS 15370 – Method for the determination of ash melting behaviour

Relevant standards for barbeque charcoal and barbeque briquettes:
EN 1860:2005 – Solid fuels and firelighters for barbecuing
EN 1860-2:2005 – Barbecue charcoal and barbecue charcoal briquettes

Relevant standards for firelighters:
EN 1860-3:2003 – Fireligthers for igniting solid fuels for use in barbeque appliances