

About Nordic Swan Ecolabelled
Liquid and gaseous fuels



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Contact information

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

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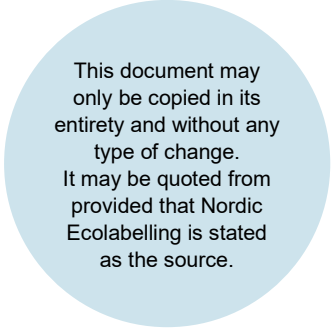
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1 Summary

The overall aim of this revision of Nordic Swan Ecolabel's criteria is to ensure that the criteria continue to secure a positive environmental benefit via ecolabelling. The revision has mainly considered the areas of raw materials and climate gas reduction. Focus has also been on clarifying the product group definition, i.e., which fuel products are included.

Humanity faces the challenge of feeding a growing population and supplying its energy needs without exhausting the biological and physical resources of the planet. Achieving food and nutrition security as well as clean and renewable energy is central to the Sustainable Development Goals (SDGs) of the United Nations¹. The challenge is, therefore, the competition between food, feed, and fuel for biomass. As in any agricultural activity, biofuel production can have negative impacts on the environment, biodiversity, indirect land use changes, climate, local communities, or the local labour force.

Nordic Ecolabelling sets strict requirements to reduce greenhouse gas emissions and at the same time proposes to ban the use of food- and feed crops in the production of Ecolabelled liquid and gaseous fuels, generation 4. The requirement for share of renewable raw materials has been tightened to 100% for all types of Nordic Swan Ecolabelled fuels. In addition, Nordic Swan Ecolabelled gaseous fuels must be made from biogenic residue and waste. The Nordic Swan Ecolabelled liquid fuel must reduce greenhouse gas emissions in the entire production chain by proposed 75% (70% in today's generation 3) for liquid compared with the corresponding fossil fuels. In case of gaseous fuels, the proposed greenhouse gas emissions vary from 90%-75% depending on the Nordic country. Nordic Ecolabelling consider the criteria to be in alignment with the EU Taxonomy.

The use of residues and waste fractions from problematic feedstocks, such as palm oil and soy oil as well as genetically modified plants is not permitted in Nordic Swan Ecolabelled fuels. Nordic Swan Ecolabelled liquid and gaseous fuels live up to recognised fuel standards in order to guarantee good combustion characteristic.

Changes in the revised version

The main changes in the revision focus on:

- Expanding the criteria to include bio-LPG (Liquid Petroleum Gas, aka. Bio-propane) used in bottles/tanks for transport, heating, and industrial purposes.
- Tightening the requirement for share of renewable raw materials to 100% for all types of fuels.
- Excluding the possibility to use food- and feed crops in the production of liquid and gaseous fuels.
- Excluding the possibility to use primary feedstocks in the production of gaseous fuels - only allowed to use biogenic residue and waste.

¹ <https://www.un.org/sustainabledevelopment/sustainable-development-goals/> (visited April 2022)

- Strengthening the level of requirements for greenhouse gas emissions, so that they are more stringent than the revised EU's Renewable Energy Directive, (EU) 2018/2001, REDII.
- Updating requirements for quality of the liquid and gaseous fuels.

All changes and amendments to the requirements are listed in Chapter 6. Further details about the changes to requirements and new requirements can be found in Chapter 4.

2 Environmental impact of liquid and gaseous fuels

2.1 Reason for Nordic Swan Ecolabel

Following the Paris Agreement on climate change, the EU target is a 55% reduction in greenhouse gas emissions by 2030 and to becoming climate neutral by 2050².

Transport represents almost a quarter of Europe's greenhouse gas emissions and is the main cause of air pollution in cities. Greenhouse gas emissions from the EU's transport sector increased steadily between 2013 and 2019, a trend that diverges significantly from those in other sectors during that period, see graph below³. Preliminary estimates for 2020 indicate a substantial drop in transport emissions, due to decreased activity during the Covid-19 pandemic. It is anticipated that transport emissions will rebound after 2020. Road transport constitutes the highest proportion of overall transport emissions (in 2019 it emitted 72% of all domestic and international transport GHG).

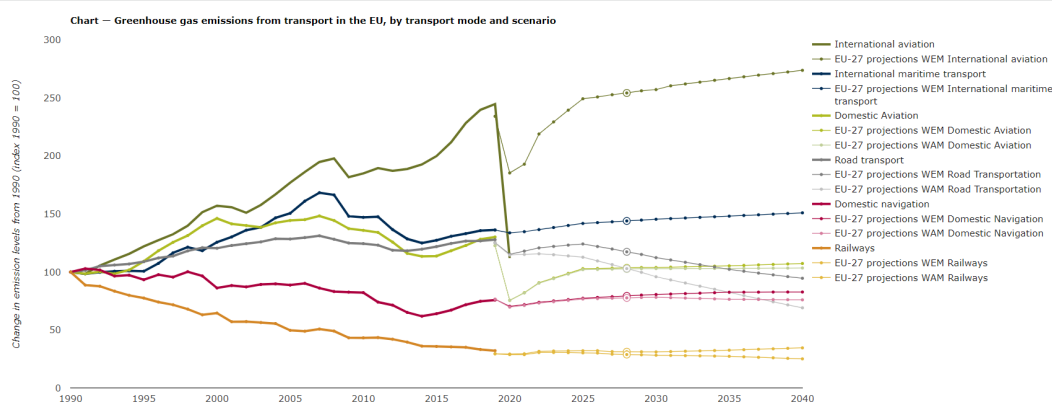


Figure 1: Greenhouse gas emissions from transport in the EU, by transport mode and scenario towards 2040.

By 2030, the EU aims to increase the share of renewable energy in transport to at least 14%, including a minimum share of 3.5% of advanced biofuels. EU

² https://ec.europa.eu/clima/eu-action/european-green-deal/2030-climate-target-plan_en (visited January 2022)

³ <https://www.eea.europa.eu/ims/greenhouse-gas-emissions-from-transport> (visited January 2022)

countries are required to set out an obligation on fuel suppliers that ensures the achievement of this target.

In the EU in 2017, direct emissions from aviation accounted for 3.8% of total CO₂ emissions. The aviation sector creates 13.9% of the emissions from transport, making it the second biggest source of transport GHG emissions after road transport⁴. Aviation also has an impact on the climate through the release of nitrogen oxides, water vapour, and sulphate and soot particles at high altitudes, which could have a significant climate effect.

International shipping is a large and growing source of greenhouse gas emissions. Maritime transport emits around 940 million tonnes of CO₂ annually and is responsible for about 2.5% of global greenhouse gas (GHG) emissions⁵. EU has adopted a regulation⁶ for the monitoring, reporting and verification of greenhouse gas emissions from maritime transport based on the ships' fuel consumption. The European Union's Sulphur Directive⁷ regulates sulphur emissions from combustion of certain types of fossil-based liquid fuels.

Nordic Ecolabelling supports the European Commission's Strategy by identifying the best environmental alternative energies/fuels with low emissions for transport, heating and industrial purposes. The focus is therefore on ensuring the sustainable and efficient use of renewable resources.

Biomass is a limited resource that cannot meet all our energy requirements. The capacity of the planet to produce biomass is limited by its biophysical boundaries. The challenge is, therefore, the competition between food, feed, and fuel for biomass. About 40% of all global cropland is currently used to produce high quality feeds, some of which are cereals which humans could also consume resulting in feed-food competition⁸. Around 30% of the global cropland dedicated to cereals is used to grow livestock feed⁹. Currently, about 13% of global cropland is used to produce biofuels and textiles¹⁰. Nordic Ecolabelling would like to limit the use of biofuels from food- and feed crops and are therefore proposing to ban the use of food- and feed crops in the production of Ecolabelled liquid and gaseous fuels.

By setting criteria for the Nordic Swan Ecolabel of liquid and gaseous fuels for transport, heating and industrial purposes, Nordic Ecolabelling wishes to play a role in the development of more environmental and climate-friendly fuels. The requirements are stricter than the EU legislation for greenhouse gas emission savings from the renewable share of the fuel blend.

⁴ https://ec.europa.eu/clima/eu-action/transport-emissions/reducing-emissions-aviation_en (visited March 2022)

⁵ https://ec.europa.eu/clima/eu-action/transport-emissions/reducing-emissions-shipping-sector_en (visited March 2022)

⁶ Directive 2009/16/EC

⁷ Directive 1999/32/EC

⁸ A. Mottet, C. de Haan, A. Falcucci, G. Tempio, C. Opio, P. Gerber. Livestock: on our plates or eating at our table? A new analysis of the feed/food debate, 2017

⁹ <https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/livestock-feeds> (visited April 2022)

¹⁰ J. Porre, T. Nemecek: Reducing food's environmental impacts through producers and consumers, 2018

2.2 Environmental impact of liquid and gaseous fuels

The product group liquid and gaseous fuels comprises liquid and gaseous fuels for transport (road, air, and sea), heating and industrial purposes, with very different materials and types of production, but with a uniform function: namely to produce energy through combustion in engines or boilers.

A so-called MECO analysis was performed in conjunction with Nordic Ecolabelling's evaluation of the criteria (gen.2) in 2015/2016¹¹. The analysis is still relevant and therefore used as basis in this revision. 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 (R), potential (P) and steerability (S) of the various environmental aspects of liquid and gaseous fuels.

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 environmental improvements. This section describes the key findings of the RPS analysis.

The RPS analysis for liquid and gaseous fuels shows that the largest RPS has been found in a life cycle for the following areas:

- Feedstocks used in liquid and gaseous fuels
- Energy consumption and impact on the climate
- The quality of the liquid and gaseous fuels

Feedstocks used in liquid and gaseous fuels

Liquid and gaseous biofuels are predominantly derived from agricultural and forest materials (virgin or by-products/waste) and therefore, renewable resources, as well as waste and by-products from agriculture, households, retail chains, food industries, etc. are used in production of biofuels. They are usually divided into so-called first-generation biofuels which are produced from high-value parts of plants such as sugar, maize, grains and grass, and advanced biofuels based on the by-products from a primary production process such as straw, bagasse, other fibrous materials, or livestock waste. Advanced biofuels are defined in the Renewable Energy Directive (RED) (2018/2001/EC). Requirements concerning sustainable production of renewable feedstocks 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 feedstocks and traceability standards/schemes will also strengthen the traceability (S) of renewable feedstocks that are used in the Nordic Swan Ecolabelled liquid and gaseous fuels.

¹¹ The separate MECO analysis for liquid and gaseous fuels is written in Danish and is available upon request from Nordic Ecolabelling: tc@ecolabel.dk

Requirements to exclude food- and feed crops¹², such as corn or grains are relevant (R) and can be ensured by not including them in the Nordic Swan Ecolabelled liquid and gaseous fuels (P). Residues of these such as waste or ligno-cellulosic material and intermediate crops, are however not excluded. Requirement for the use of traceable feedstock strengthen the steerability (S) of renewable feedstocks that are used in the Nordic Swan Ecolabelled liquid and gaseous fuels.

The requirement concerning use of 100% biogenic residue and waste in biogas is relevant (R) from a climate and circular economy perspective. Turning waste into a valuable resource, is the core principle of an efficient circular economy. Residues and waste from municipalities, animal farming or agriculture can be optimised and converted into energy, while digestate can be used as an organic fertiliser. There is a great potential (P) to move the biogas production away from crops that can be used for food. Requirement for the use of traceable feedstock (biogenic residue and waste) strengthen the traceability (S) of renewable feedstocks that are used in the Nordic Swan Ecolabelled gaseous fuels.

Energy consumption and impact on the climate

There is both a high relevance (R) and potential (P) for limiting the energy consumption for production of renewable liquid and gaseous fuels. The steerability (S) is assessed to be limited, however, as a specific requirement on energy consumption is not part of the European Union's Renewable Energy Directive.

Both renewable resources and fossil fuels release CO₂ during combustion and thus contribute to the greenhouse effect. The benefit of burning renewables is that they do not contribute additional CO₂ to the atmosphere, as is the case with fossil fuels. CO₂ in new biomass is absorbed much more quickly than fossil sources. Biomass therefore has a relatively short impact on the climate compared with fossil CO₂, where the effect lasts for thousands of years¹³. However, this is provided that the biomass comes from sustainable sources.

There is great potential (P) in following the guidelines of the European Union's Renewable Energy Directive and selecting renewable biofuels with high greenhouse gas emission savings for Nordic Swan Ecolabelled liquid and gaseous fuels. Requirements for the use of certification schemes for the verification of compliance with the Renewable Energy Directive also strengthen the traceability and thereby the steerability (S).

All the Nordic countries have legislation that steers towards increased share of renewables in fuels for transportation. The legislation regulates, in slightly different ways, an increasing proportion of renewable fuels, see section 2.1 and appendix 1. Common to the legislation is the fuel companies' possibility to buy and sell credits to comply with binding targets. This means that the climate benefit of a Nordic Swan Ecolabelled fuel may be questionable in some cases, if the fuel is part of a zero-sum game. However, the Nordic Ecolabelling assesses that there is a real potential to reduce climate emissions when the fuel is not

¹² "Food and feed crops according to the Renewable Energy Directive (2018/2001/EC) - means starch-rich crops, sugar crops or oil crops produced on agricultural land as a main crop excluding residues, waste or ligno-cellulosic material and intermediate crops, such as catch crops and cover crops, provided that the use of such intermediate crops does not trigger demand for additional land

¹³ Cheebini F. et al: "CO₂ emissions from biomass combustion for bioenergy: atmospheric decay and contribution to global warming," March 2011

covered by the above-mentioned legislations, or when the quota obligation is not expressed as a CO₂-reduction.

The conclusion is that Nordic Swan Ecolabelled fuels has the largest potential for climate benefit for following segments: Gaseous fuels for heating and industrial purposes in Denmark. Pure liquid biofuels and gas in Sweden. All biofuels in Norway and Finland.

The quality of the liquid and gaseous fuels

Material composition and production methods vary greatly for the individual product types of liquid and gaseous fuels. This has a major impact on the quality of the products. It is therefore highly relevant (R) to ensure that the quality of the fuels is good. This can be ensured through requirements for relevant quality standards (P). Steerability (S) of the liquid and gaseous fuels' quality is increased by requiring relevant quality standards to be tested for compliance by independent third parties.

2.3 UN's Sustainable Development Goals

The UN Sustainable Development Goals are a universal call to action to fight poverty and inequalities, protect the planet and tackle climate change by 2030.



Nordic Swan Ecolabel liquid and gaseous fuels contribute to fulfilling Goal 12: Ensure sustainable consumption and production patterns.

This is done through requirements that promote sustainable management and efficient use of natural resources in fuels, for example:

- Materials must consist of 100% renewable raw materials and exceed the greenhouse gas emission saving criteria in EU's revised Renewable Energy Directive (REDII).
- No use of food and feed crops.
- No use of problematic feedstocks such as palm oil and soy and genetically modified plants.
- Raw materials in gaseous fuels must be made from biogenic residues and waste.
- Strict requirements for reduction of greenhouse gas emissions.

This is how the Nordic Ecolabel contribute to other UN sustainability Development Goals:



Goal 7: Promote renewable energy and energy efficiency:

- 100% of the raw material must be renewable.



Goal 13: Requires efficient energy use and reduces climate gas emissions:

- Requirements for reduction of greenhouse gas emissions that are stricter than the limits stipulated by EU regulations.

3 Regulatory requirements and other labelling schemes

This chapter summarises the main regulatory requirements, controls, and labelling schemes for liquid and gaseous fuels. Liquid and gaseous fuels for transportation and heating are largely governed by EU directives and regulations and the most important of these are briefly described below. Appendix 1 provides a summary of national targets and controls, including implementation of the EU directives, in the Nordic countries.

3.1 Directives and Regulations

3.1.1 Renewable Energy Directive II (RED II)

The EU Renewable Energy Directive sets criteria for biofuels to be considered sustainable¹⁴. The directive also establishes detailed calculation rules for greenhouse gas emissions over the life cycle of biofuels (well-to-wheel). Compliance with the sustainability criteria and calculations of greenhouse gas emissions must, according to the directive, be checked by an independent third-party auditor. A revised edition of the directive (REDII) was issued in December 2018 and implemented in national law by latest June 2021. The most important changes related to fuels are listed below.¹⁵

- Sustainability criteria also for solid biomass and biogas for heat & power are added.
- Requirement for fuel suppliers to achieve a renewable share of at least 14% by 2030 in the transport sector.
- Requirement for a certain proportion of so-called advanced biofuels. This proportion of the total energy consumption in the transport sector must amount to at least 0.2% by 2022, 1% by 2025, and 3.5% by 2030. Advanced biofuels are defined in the directive as biofuel produced from certain specific listed raw materials (mainly residual products and waste).
- Stricter sustainability criteria and criteria for greenhouse gas reduction.
- New fuels have been included for use towards the 14% target, e.g., electro-fuels from electricity and carbon dioxide.

¹⁴ https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-andrules/renewable-energy-directive_en

¹⁵ <https://www.eea.europa.eu/data-and-maps/indicators/transport-emissions-of-greenhouse-gases/transport-emissions-of-greenhouse-gases-12> (visited March 2022)

- REDII presents a new approach for handling ILUC (Indirect Land Use Change) from biofuel.

The RED II defines a series of sustainability and GHG emission criteria that biofuels used in transport must comply with to be counted towards the overall 14% target and to be eligible for financial support by public authorities. The table below shows the greenhouse gas savings thresholds in EU RED II.

Table 1: Greenhouse gas savings thresholds in RED II.

Greenhouse gas savings thresholds in RED II			
Plant operation start date	Transport biofuels	Transport renewable fuels of non-biological origin	Electricity, heating, and cooling
Before October 2015	50%	-	-
After October 2015	60%	-	-
After January 2021	65%	70%	70%
After January 2026	65%	70%	80%

3.1.2 COMMISSION DELEGATED REGULATION (EU) 2019/807

REDII introduces a new approach to handle indirect land use change (iLUC) from cultivation of feedstocks. Biofuels considered high-ILUC risk “for which a significant expansion of the production area into land with high-carbon stock is observed” will be first frozen at 2019 shares and, as of 2023, gradually phased down to be completely phased out in 2030.

High ILUC-risk fuels are fuels that are produced from food and feed crops that have a significant global expansion into land with high carbon stock such as forests, wetlands, and peatlands. This expansion releases a considerable amount of GHG emissions and therefore negates emission savings from the use of biofuels instead of fossil fuels.¹⁶

A delegated act ((EU) 2019/807) sets out the criteria for determining high ILUC-risk feedstock for biofuels and the criteria for certifying low indirect land-use change (ILUC)–risk biofuels, bioliquids and biomass fuels.

Based on the criteria, palm oil is the only feedstock considered high-ILUC risk today. Soy is now close to be classified as a feedstock with high iLUC risk.

3.1.3 Fuel Quality Directive

The Fuel Quality Directive¹⁷ requires a reduction of the greenhouse gas intensity of transport fuels by a minimum of 6% by 2020. Member States are obliged to ensure that suppliers respect the target of 6% after the year 2020. The monitoring and reporting obligations relating to greenhouse gas emissions intensity also remain applicable after that date. Together with the Renewable Energy Directive it also regulates the sustainability of biofuels.

¹⁶ [Sustainability criteria for biofuels specified \(europa.eu\)](https://european-council.europa.eu/media/en/press-communications/infographic/infographic_sustainability_criteria_for_biofuels_specified.pdf)

¹⁷ [EUR-Lex - 32009L0030 - EN - EUR-Lex \(europa.eu\) \(Visited January 2022\)](https://eur-lex.europa.eu/eli/reg/2018/1003/oj)

3.2 Other labelling schemes and controls

This section summarises the main labelling schemes for liquid and gaseous fuels.

Bra Miljöval

The "Bra Miljöval" (Good Environmental Choice) is like the Nordic Swan Ecolabel, a Type 1 ecolabel, i.e., that Bra Miljöval meets the requirements of the international standard for type-1 ecolabels (ISO 14024), which included is a demand for transparent and open processes. Bra Miljöval provides a set of criteria for biofuels (2013:2¹⁸) which include many types of renewable solid, liquid- and gaseous fuels.

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 energy sources and chemical products and constituent substances classified as CMR.

EKO energy

EKO energy is an international label with criteria for "Renewable heat and cold" and "Renewable biogas"¹⁹. It is also a network of international non-governmental organizations with the aim to promote the use of sustainable energy. The secretariat is in Helsinki and managed by the Finnish Association for Nature Conservation²⁰. Renewable heat/cold and biogas is 100% renewable made from waste and biomass.

Naturemade certification

Naturemade is the Swiss quality label for energy from 100% renewable sources. Certification is available at two levels – Naturemade star and Naturemade basic. Naturemade has developed criteria for biogas²¹ produced from organic residue such as organic waste, green waste, manure, and sewage sludge. No energy crops are used. The certification process also includes a review of additional criteria, including high standards of production plants in terms of methane leakage, noise and odour, the exclusion of genetically modified organisms and the licensee's demonstrably sustainable corporate policies.

Industry labels

In Denmark, there is a certification scheme managed by Energinet²² that can be used to certify upgraded biogas that is injected into the natural gas grid. It is stated on the bio-natural gas certificates that biogas has replaced a similar volume of natural gas. The guarantees of origin are traded in Denmark and in cross borders in Europe. The purchaser of certificates can thus prove that they have bought bio-natural gas corresponding to the quantity of purchased certificates. Energinet.dk's certificates do not specify which feedstocks were used to produce the bio-natural gas and there are no specific sustainability requirements.

¹⁸ <https://www.bramiljoval.se/omraden/biobranslen-markta-med-bra-miljoval/> (visited January 2022)

¹⁹ <https://www.ekoenergy.org/sv/ecolabel/criteria/> (visited January 2022)

²⁰ <http://www.ekoenergy.org/sv/about-us/> (visited January 2022)

²¹ <https://www.naturemade.ch/en/biogas-certification.html> (visited March 2022)

²² <https://en.energinet.dk/Gas/Biomethane#Info> (visited January 2022)

4 Justification of the requirements

This chapter presents proposals for new and revised requirements, and explains the background to the requirements, the chosen requirement levels and any changes compared with generation 3. The appendices referred to are those that appear in the criteria document "Nordic Ecolabelling for liquid and gaseous fuels".

4.1 Definition of the product group

The product group comprises liquid and gaseous fuels for transport (road, sea, and air), heating and industrial purposes. The fuels are based on 100% renewable raw materials of which no food- and feed crops must be used. Gaseous fuels are in addition made from 100% biogenic residue and waste. Gaseous fuels also include liquefied biogas (LBG) and bio-LPG (also called renewable propane or bio-propane).

Solid fuels cannot be Nordic Swan Ecolabelled according to these criteria but can be Nordic Swan Ecolabelled according to criteria for solid fuels. Nor does the product group include electricity, electro fuels such as hydrogen, methanol, lubricating oils, or fire lighting products.

Background to the product group definition

The product group includes, as in the criteria generation 3, liquid and gaseous fuels for road transportation and biogas for heating and industrial purposes which are included by (EU) 2018/2001 (REDII)²³. It has been clarified that liquefied biogas (LBG) is part of the definition.

In generation 4 of the criteria it is now possible to ecolabel Bio-LPG. Bio-LPG i.e., propane/butane typically produced from the production of renewable (or HVO) biodiesel and is sold in both bottles/cylinders. Bio-LPG can also be called renewable propane and bio-propane.

To have a clear product definition the product group includes only liquid and gaseous fuels for transport, heating, and industrial production in the product definition. Solid fuels cannot be Nordic Swan Ecolabelled according to these criteria but can be Nordic Swan Ecolabelled according to criteria for solid fuels. Electricity cannot, as in the previous criteria generation, be Nordic Swan Ecolabelled. Electricity is not a physical sales product in the same way as other fuels, and the Nordic Ecolabel do not want to be a certification body for electricity.

Hydrogen is not included in this criteria version. Hydrogen is expected to play a key role in a future climate-neutral economy, enabling emission-free transport, heating, and industrial processes as well as inter-seasonal energy storage. However, the legal framework is not yet ready. On 15 December 2021, the European Commission published its legislative Package on Hydrogen and Decarbonized Markets²⁴, which proposes new rules aiming to develop a hydrogen market in the EU. The framework includes e.g. the preparatory work on the

²³ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001&from=EN> (visited January 2022)

²⁴ [New EU framework to decarbonise gas markets \(europa.eu\)](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021L2001&from=EN) (visited February 2022)

specific methodologies and definitions needed for the certification of renewable and low-carbon hydrogen. Nordic Ecolabelling is following the process closely. Once the framework is ready and approved Nordic Ecolabelling will look at the possibility to include hydrogen in the product group definition.

Energy consumption to produce hydrogen is generally high, particularly via electrolysis, but also via thermal processes²⁵. As RED (2009/28/EC) now allows the use of the national electricity mix factors, the controllability (S) is low in order to label the least energy-consuming hydrogen products. It is important to point out that Nordic Ecolabelling is positive to the use of hydrogen for transport. The technology is considered to be immature at the moment, with very limited distribution sites in the Nordic countries.

Electro-fuels are not included in this criteria version 4, due to many of the same arguments as stated above regarding hydrogen. Electro-fuels are a form of microbial electrosynthesis technology, which uses electricity to convert carbon dioxide emissions into fuels and other useful products. Electro-fuels are very flexible fuels, which is currently mainly made from natural gas, but in many places also of a wide range of renewables such as biomass/biogas, waste, or wind- / solar energy. In the latter way, you can store excess wind energy in e.g., the form of liquid methanol and save electricity for future use. However, this is as for hydrogen associated with high energy consumption, which often includes electrolysis and carbon capture. Using national electricity mix factors means that the controllability (S) is low to select the most energy-efficient methanol products. In order to ensure a clear product definition, Nordic Ecolabelling has therefore chosen to completely exclude electro-fuels in this criteria generation 4. As for hydrogen, we continue to investigate the possibility of involving electro-fuels in the next review of the product group.

Lubricating oils are not included in the product group since their function is not to provide energy by burning. Liquid fire lighting products and lamp oils are also not covered by the product group, as these are covered by other quality and safety standards that lie outside this product group.

Finished commercial Ecolabelled products can be labelled with the Swan logo if all the requirements are met. Normally marketing is directed at consumers, and the Nordic Swan logo could be used e.g., at fuel pumps/supply point and in advertising campaigns. In other cases, producers of Ecolabelled labelled fuels could marked its product at other fuel producers.

4.2 Definitions

The first time a term is used in the document, it is written in **bold font** or with a reference to this definition list.

Biofuels	Biofuels are liquid and gaseous fuels made from biomass/bio waste and consumed in transport, heating, and industrial purposes.
Biogas	Gaseous fuels produced from biomass such as biomethane, compressed biogas (CBG), liquified biogas (LBG) or bio-LPG etc..

²⁵ European Commission-Joint Research Centre (JRC). 2014. Well-to-Wheels analysis of future automotive fuels and powertrains in the European context. WELL-TO-TANK (WTT) Report. Appendix 4 - Version 4a. Hydrogene (electrolysis), (thermal). April 2014

Bioliqids	Bioliqids are liquid fuels made from biomass and used to produce electricity, heating, or cooling.
Biomass	Biodegradable fraction of products, waste, and residues from biological origin from agriculture, including vegetal and animal substances, from forestry and related industries, including fisheries and aquaculture, as well as the biodegradable fraction of waste, including industrial and municipal waste of biological origin.
Bio-LPG	Bio-LPG is propane produced from renewable feedstocks; it is also called renewable propane and bio-propane.
Biomass fuels	Biomass fuels are solid or gaseous fuels made from biomass.
Biomethane	Biomethane is a biogas from which the carbon dioxide, hydrogen sulphide and water have been removed. As a result of the purification process, the biomethane has the same characteristics as natural gas and can be injected into the grid.
CBG	Compressed biogas.
Electro fuels	Electro fuels, also known as e-fuels or synthetic fuels, are a type of drop-in replacement fuel. They are manufactured using captured carbon dioxide or carbon monoxide, together with hydrogen obtained from sustainable electricity sources such as wind, solar and nuclear power.
FAME	A type of biodiesel. FAME=fatty acid methyl ester.
Food and feed crops	Food and feed crops according to the Renewable Energy Directive (2018/2001/EC) - means starch-rich crops, sugar crops or oil crops produced on agricultural land as a main crop excluding residues, waste or ligno-cellulosic material and intermediate crops, such as catch crops and cover crops, provided that the use of such intermediate crops does not trigger demand for additional land.
HVO	Hydrotreated vegetable oil is a synthetic diesel that can be produced from vegetable oils, such as rapeseed, forest processing by-products, and animal waste products.
ILUC (indirect land use change)	ILUC can occur when pasture or agricultural land previously destined for food and feed markets is diverted to biofuel production. In this case, food and feed demand still needs to be satisfied, which may lead to the extension of agriculture land into areas with high carbon stock such as forests, wetlands, and peatlands. This implies land use change (by changing such areas into agricultural land) and may cause the release of greenhouse gas emissions (CO ₂ stored in trees and soil) that negates emission savings from the use of biofuels instead of fossil fuels.
LBG	Liquefied biogas.
Non-food cellulosic material	Non-food cellulosic material according to the Renewable Energy Directive (2018/2001/EC) - means feedstock mainly composed of cellulose and hemicellulose, and having a lower lignin content than ligno-cellulosic material, including food and feed crop residues, such as straw, stover, husks and shells; grassy energy crops with a low starch content, such as ryegrass, switchgrass, miscanthus, giant cane; cover crops before and after main crops; ley crops; industrial residues, including from food and feed crops after vegetal oils, sugars, starches and protein have been extracted; and material from biowaste, where ley and cover crops are understood to be temporary, short-term sown pastures comprising grass-legume mixture with a low starch content to obtain fodder for livestock and improve soil fertility for obtaining higher yields of arable main crops.
REDII	Renewable Energy Directive (EU)2018/2001
Renewable raw materials	Renewable raw materials are in these criteria the same as Biomass, see definition above.
Residues and waste	Residues and waste according to the Renewable Energy Directive (2018/2001/EC).

4.3 Production and product description

O1 Description of the product(s)

The applicant must submit the following information about the product(s):

- Brand/trading name(s).
- Description of product(s) included in the application, and what kind of transport/heating/industrial purposes the fuel is intended for.
- A description of the technology and the manufacturing process for the production of the renewable fuels (the description must include the entire production chain, from renewable feedstocks to the end product).

Subcontractors must be described with company name, production location, contact person and the production processes used.

- A description of the supply chain for the fuel all the way to the filling station or point of delivery in the case of heating/industrial use. Any joint depot usage or collaboration with regard to deliveries of fuels to filling stations must also be described.
- If an applicant is a reseller of Nordic Swan Ecolabelled fuels, all filling stations and resellers that sell the Nordic Swan Ecolabelled products must be stated.

- ☒ Description of the points above. A flow chart is recommended to explain the production process.

Background to requirement O1

The requirement has not changed, compared with version 3 of the criteria. The purpose of the requirement is to provide a satisfactory picture of the life cycle of the fuel: what feedstocks and technology/production processes are used, a description of the supply chain, what kind of transport/heating/industrial purposes the fuel is intended for etc.

Liquid and gaseous fuels can be produced at multiple sites, e.g., refineries or biogas plants. and other similar production facilities. To provide traceability for the Nordic Swan Ecolabelled fuel, all activities must be described. The requirement must thus provide an insight into which product(s) the application is submitted for, in order to ensure correct processing. The requirement for disclosure of all filling stations/resellers that sell the Nordic Swan Ecolabelled fuels makes it possible to test (audit) compliance with renewable fuel volume requirements.

4.4 Resources

This chapter contains requirements for raw materials and composition of raw materials in liquid and gaseous fuels.

O2 Material composition

Liquid fuels

Liquid fuels for transport (road, air, and sea), heat and industrial use must physically be based on 100 % renewable raw materials.

However, any additives of non-renewable origin, that are added only for technical reasons, are allowed up to 10% by volume annually in the total amount of solid fuel.

This means that fuels such as HVO100 and ED95 can fulfil the criteria, since the necessary additives do not exceed 10%. E85 does not fulfil the requirement since there may be more than 10% non-renewable additives. A product such as HVO97 (97% HVO and 3% diesel), would not fulfil the requirement since the fossil diesel is not necessary for technical reasons.

Gaseous fuels

Gaseous fuels used for transport, heating and industrial purpose must be made from 100% renewable raw materials defined as residues or waste. Maximum 10% crops are allowed if they are defined as intermediate crops such as catch crops and cover crops.

However, any additives and gases that are added to the total amount up to 10% by volume to increase the calorific value of the biogas are allowed.

Examples of gaseous fuels that are produced from renewable raw material are biomethane, compressed biogas (CBG), liquified biogas (LBG) or bio-LPG.

Biomethane: For biogas/biomethane distributed through existing gas grids, it must be documented that the quantity of biogas injected into the gas grid is equal to the quantity of gas extracted from the grid on an annual basis. This is annually validated through a documented traceability scheme reviewed by an external auditor, for details see appendix 1.

Bio-LPG: When bio-LPG is mixed with fossil LPG, it must be documented that the quantity of bio-LPG sold, is equal to the quantity of bio-LPG injected in the system. A mass balance-based traceability method is accepted²⁶, see appendix 1. Trade in certificates, so called Book and claim²⁷ is not accepted.

- ☒ Liquid fuels: Calculation and documentation showing compliance with material composition.
- ☒ Biogas: A copy of a certificate or statement from an external auditor showing compliance with traceability requirements.

Background to requirement O2

The requirement has been tightened for liquid fuels for transport in generation 4. Liquid fuels for transport must physically be based on 100% renewable raw materials compared to 50% on an annual basis in generation 3.

Any additives of non-renewable origin, that are added only for technical reasons, are allowed up to 10% by volume annually in the total amount of solid fuel. A product such as HVO97 (97% HVO and 3% diesel), would not fulfil the requirement since the diesel is not necessary for technical reasons. See requirement O6 regarding raw materials not allowed to use in ecolabelled liquid fuels.

As in generation 3 of the criteria the gaseous fuels must be produced from 100% renewable raw materials. As in generation 3 it is also permitted to include any additives and gases added in total amount up to 10% by volume to increase the calorific value of the biogas. This is to ensure that the biogas can be upgraded (known as biomethane) and transported on existing gas networks.

The requirement to types of renewable raw materials in the production of gaseous fuels has been tightened. Now it is only allowed to use raw materials defined as residues and waste according to EU REDII. Food- or energy crops are used in varying amounts in the production of biogas in Scandinavia/Europe, but the volumes are declining due to a wish to move biogas production away from crops that can be used for food to processing waste. Energy crops also require fertiliser (typically produced from fossil fuels), which needs to be considered when assessing the life-cycle emissions from different biogas production pathways. Using waste and residues as feedstocks can capture methane that could otherwise escape to the atmosphere as they decompose. Several European countries such as Denmark, Germany, and France have introduced strict

²⁶ According to the mass balance method of verifying compliance, there is a physical link between the production and the consumption of biofuels.

²⁷ Book and claim imply that there is no physical connection between the sustainability claim (biological origin) and the product (gas)

subsidies legislation regarding use of energy crops²⁸. Crops affected mainly include food varieties such as corn and beets. Nature made in Switzerland²⁹ does also forbid the use of energy crops in the production of biogas. See also requirement O6 regarding raw materials not allowed to use in ecolabelled gaseous fuels.

Using waste and residues as feedstocks avoids the land-use issues associated with food-, feed- and energy crops.

From Nordic Ecolabelling's point of view, it is important to focus on feedstocks which do not compete with food or feed crops for land use. The primary function of catch- or cover crops is not food or feed production but can potentially trigger demand for additional land if not grown in between the main crop. However, "grown in between the main crops" is normal practice and therefore a maximum 10% limit is allowed in the criteria. Based on information from stakeholders this is in accordance with EU taxonomy.

It has been clarified that all gaseous fuel qualities made from renewable raw material can be Ecolabelled. Compressed biogas (CBG), liquified biogas (LBG) and Bio-LPG are examples of such products.

In the upgrade operation, the raw biogas is cleaned for CO₂, water, sulphur, etc., while adding propane to increase the calorific value of the biogas. The propane content of the biogas typically varies between 4-9%.

It is permitted to use mass balances for the traceability on the Nordic Swan Ecolabelled biogas. Certified traceability is required for gaseous fuels distributed through existing gas grids. It must be documented that the quantity of gas injected into the gas grid is equal to the quantity of gas extracted from the grid on an annual basis. A documented traceability scheme reviewed by an external auditor is alternatively acceptable. An external audit must also be conducted annually to verify that the total purchased quantity of biogas is equal to the quantity of biogas in the Nordic Swan Ecolabelled gas that is sold, see requirement O14.

4.4.1 Requirements concerning vegetable and animal feedstocks

O3 Traceability and control of vegetable and animal feedstocks

According to EU REDII the licensee must:

- ensure that primary vegetable and animal feedstocks are traceable to the area of feedstock production (cultivation).
- ensure that vegetable and animal feedstocks defined as waste or residues are traceable to the point where waste and residues occur.
- ensure that feedstocks comply with the sustainability criteria laid down in article 29, paragraphs 2 to 7 of the Renewable Energy Directive (2018/2001/EC)

If imported renewable feedstocks are used, they must be certified by one of the European Commission's approved voluntary certification schemes³⁰ for

²⁸ <https://www.europeanbiogas.eu/>, visited March 2022

²⁹ <https://www.naturemade.ch/en/biogas-certification.html>, visited March 2022

³⁰ https://energy.ec.europa.eu/topics/renewable-energy/biofuels/voluntary-schemes_en, accessed January 2022

documentation of the EU's sustainability criteria under the Renewable Energy Directive (2018/2001/EC).

If nationally produced renewable feedstocks are used, they must comply with the official regulations of each Nordic country for documentation of the EU's sustainability criteria under the Renewable Energy Directive (2018/2001/EC).

- ☒ Documentation/declaration from the body that has inspected and approved compliance with the Renewable Energy Directive (2018/2001/EC). Nordic Ecolabelling reserves the right to require the submission of further documentation in the event of uncertainty about whether the raw material originated in areas with a high biodiversity value or areas with a high carbon stock.

Background to requirement O3

The requirement has been adjusted to ensure compliance with Renewable Energy Directive (2018/2001/EC) known as RED II. The RED II defines a series of sustainability and GHG emission criteria that bioliquids used in transport, heating and cooling must comply with to be counted towards the overall EU target and to be eligible for financial support by public authorities. Some of these criteria are the same as in the original RED I, while others are new or reformulated. In particular, the RED II introduces sustainability for forestry feedstocks, feedstocks from indirect land use change (ILUC) as well as GHG criteria for solid and gaseous biomass fuels.

The European Commission recognises a number of voluntary certification schemes for the verification of compliance with the sustainability criteria in the Renewable Energy Directive³¹. All schemes cover the whole or parts of the biofuel supply chain. Parts of the supply chain can be feedstock standards for grain or oilseeds. By setting the requirement that imported feedstocks must be certified by one of the European Commission's approved certification schemes for documentation of the EU's sustainability criteria, Nordic Ecolabelling ensures that the applicant's production process is independently audited. Nationally produced renewable feedstocks must meet national legislation, i.e., national implementation of the Renewable Energy Directive.

The requirement regarding traceability and control of vegetable feedstocks is important to the credibility of the Nordic Swan Ecolabel. A chain of custody from the feedstock producer to the fuel supplier must be established for sustainability disclosures through the supply chain.

The chain of custody shall ensure that there is a link between information disclosed about the sustainability aspects of the feedstocks at the start of the supply chain (e.g., land criteria) and the claims that are made about the sustainability of the fuel at the end of the supply chain.

4.4.2 Wood

O4 Tree species with restricted use

Nordic Ecolabelling's list of restricted tree species* consist of virgin tree species listed on:

³¹ https://energy.ec.europa.eu/topics/renewable-energy/biofuels/voluntary-schemes_en, visited March 2022

- a) CITES (Appendices I, II and III)
- b) IUCN red list, categorized as CR, EN and VU
- c) Rainforest Foundation Norway's tree list
- d) Siberian larch (originated in forests outside the EU)

Tree species listed on a) CITES (Appendices I, II and III) **are not** permitted to be used.

Tree species listed on either b), c) or d) **may be used** if it meets all the following requirements:

- the tree species does not originate from an area/region where it is IUCN red listed, categorized as CR, EN or VU.
- the tree species does not originate from Intact Forest Landscape (IFL), defined in 2000: <http://www.intactforests.org/world.map.html>.
- the tree species must originate from FSC or PEFC certified forest/plantation and must be covered by a valid FSC/PEFC chain of custody certificate documented/controlled as FSC or PEFC 100% through the FSC transfer method or PEFC physical separation method.
- three species grown in plantation shall in addition originate from FSC or PEFC certified forest/plantation, established before 1994.

* *The list of restricted tree species is located on the website: <https://www.nordic-ecolabel.org/declare-items/pulp-and-paper/forestry-requirements/forestry-requirements-2020/>*

- Declaration from the applicant/manufacturer/supplier that tree species listed on a-d) are not used.
- If species from the lists b), c) or d) is used:
- The applicant/manufacturer/supplier are required to present a valid FSC/PEFC Chain of Custody certificate that covers the specific tree species and demonstrate that the tree is controlled as FSC or PEFC 100% through the FSC transfer method or PEFC physical separation method.
- The applicant/manufacturer/supplier are required to document full traceability back to the forest/certified forest unit thereby demonstrating that:
 - the tree does not originate from an area/region where it is IUCN red listed, categorized as CR, EN or VU.
 - the tree species does not originate from Intact Forest Landscape (IFL), defined in 2000 <https://intactforests.org/world.webmap.html>.
 - for plantations the applicant/manufacturer/supplier are required to document that the tree species does not originate from FSC or PEFC certified plantations established after 1994.

Background to requirement 04

The requirement has been updated according to Nordic Ecolabelling's 2020 forestry requirements. The requirement applies only to virgin tree species and not tree species defined as recycled material according to ISO 14021.

Several tree species are restricted or not permitted for use. The list of restricted tree species is based on tree species that are relevant to Nordic Ecolabelling's criteria, i.e., tree species that have the potential to be included in Nordic Swan Ecolabelled products. Listed tree species are indicated by the scientific name and the most common trade names. The scientific name/trade name is not always adequate, as there may be more than one scientific name/trade names for the listed tree species than the list indicates.

Criteria for tree species found on the list are:

- a) Tree species listed on CITES Appendices I, II and III
- b) IUCN red list, categorized as critically endangered (CR), endangered (EN) and vulnerable (VU)
- c) Regnskogsfondet1 (Rainforest Foundation Norway) tree list
- d) Siberian larch (originated in forests outside the EU)

Species on the CITES list are prohibited for use in Nordic Swan Ecolabelled liquid and gaseous fuels. CITES³² is an international convention for the control of trade (across borders) of wild fauna and flora. The tree species on CITES are, dependent on how threatened they are, listed in Appendix I, II or III. Species listed in Appendix I, are highly endangered and trade with these species is totally banned. For the remaining tree species, special permits for import and export are required (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 (EU Timber Regulation). Nordic Swan Ecolabel's ban on the use of tree species listed in CITES (Appendix I, II or III) goes beyond the EU legislation. CITES regulates trade in endangered species, and there are also challenges with corruption in the trade in wild animals and plants³³. Therefore, Nordic Ecolabelling does not want to approve species on any of the appendices.

IUCN Red Lists³⁴ are the world's most comprehensive inventory of the global conservation status of the planet's biological species, including trees. IUCN Red List has established clear criteria to assess the risk of extinction according to the origin of the tree species. These criteria cover all countries and all species in the world. Nordic Ecolabelling is aware that the IUCN's red list system only focuses on the extinction risk of species, and therefore is not designed for an overall assessment of whether a tree species can be provided with sustainable origin. However, the list is continually being updated and thereby is an important tool to estimate a specific tree species' conservation status on a global scale. Nordic Swan Ecolabel wishes to prohibit tree species listed as endangered (categories CR, EN and VU).

Regnskogsfondet³⁵ (Rainforest Foundation Norway) is an NGO in Norway that works to protect the world's remaining rainforests. Currently, Regnskogsfondet does not see any credible certification schemes working in the tropics, and therefore recommends full stop of buying tropical timber. Regnskogsfondet has developed a list of tropical tree species based on tree species found on the Norwegian market. This list works as a guide to comply with Norwegian guidelines regarding non-use of tropical wood in public construction. We consider this a pragmatic approach for handling tropical tree species on the Nordic market.

³² <https://cites.org/eng> (visited January 2022)

³³ Addressing corruption in CITES documentation processes Willow Outhwaite, Research and Analysis Senior Programme Officer, TRAFFIC, 2020: <https://www.traffic.org/site/assets/files/12675/topic-briefaddressing-corruption-in-cites-documentation-processes.pdf>

³⁴ <http://www.iucnredlist.org/> (visited January 2020)

³⁵ <https://www.regnskog.no/no/hva-du-kan-gjore/unnga-tropisk-tommer/tropiske-treslag> (visited January 2020)

In addition, Siberian larch (originated in forests outside the EU) is on the tree list. Siberian larch is a coveted tree species in the construction industry due to its high quality. The tree species is widespread in the Eurasian northern boreal climate zone, and particularly the species *Larix sibirica*, *Larix gmelinii*, *Larix cajanderi* and *Larix sukaczewii* are widespread in the large areas of intact forest landscapes (IFL) in Russia. Siberian larch is to be seen as an indicator species for boreal IFL-areas which are important to keep intact.

Exemption from the tree list

Nordic Ecolabelling is aware that tree species originating from b), c) or d) can originate from legal and sustainable forestry. Therefore, it is possible to use tree species listed on b), c) or d) if the applicant/manufacturer/supplier can demonstrate compliance with a number of strict requirements regarding certification and traceability.

Many of the tree species on the list are grown in countries which still have large areas of IFLs. These are important to protect due to biodiversity and climate. Many of these countries also have a high risk of corruption and the national legislation related to environment, human rights and ownership to land are weak and/or not controlled by the authorities. There are different views on whether certification is good enough to meet the challenges of forest management in land with a high risk of corruption and illegal logging. For instance, relevant challenges related to this have been published by Danwatch in a number of articles in 2018^{36, 37} and by redd-monitor.org in 2019³⁸. Greenpeace International has ended its memberships in FSC on the grounds that the certification body is no longer meeting its aims of protecting forests and human rights³⁹. Other environmental organisations like WWF support certification as an important tool for sustainable forestry in these countries. However, due to the uncertainty whether FSC and PEFC certification systems are good enough in protecting important areas of biodiversity and ethical aspects like human rights and land ownership in areas with a high risk of corruption, Nordic Ecolabelling have a precautionary approach and wants further documentation about the tree species and its origin.

To document full traceability of the tree species, the applicant/manufacturer/supplier must present a valid FSC/PEFC Chain of Custody certificate that covers the specific tree species and demonstrate that the tree is controlled as FSC or PEFC 100%, through the FSC transfer method or PEFC physical separation method. This means that Nordic Ecolabelling does not accept the FSC percentage or credit control system as well as PEFC percentage system. Full traceability of the tree species back to the forest/certified forest unit, enables the applicant/manufacturer/supplier to document that the tree species does not come from an area/region where it is IUCN red listed, categorized as CR, EN or VU. Full traceability also makes it possible to document that the tree species does not come from Intact Forest Landscape (IFL), defined by Intactforest.org in 2000⁴⁰.

³⁶ <https://danwatch.dk/undersogelse/dokumentfalsk-og-millionboeder-danske-byggemarkeder-saelgertrae-forbundet-til-ulovlig-hugst-i-amazonas/>

³⁷ <https://danwatch.dk/undersogelse/baeredygtighedsmaerke-er-ingen-garanti-for-baeredygtigt-trae/>

³⁸ <https://redd-monitor.org/2019/08/29/evicted-for-carbon-credits-new-oakland-institute-report-confirmsforced-evictions-for-green-resources-plantations-in-uganda/>

³⁹ <https://www.greenpeace.org/international/press-release/15589/greenpeace-international-to-notrenew-fsc-membership/>

⁴⁰ <http://www.intactforests.org/world.webmap.html>, visited January 2020

Intact forest has been monitoring IFL-areas since 2000 and has developed an online up to date mapping tool that shows the extent of IFL back to 2000. The monitoring results shows that the world's IFL are being degraded in an alarming speed, and that is the reason for Nordic Ecolabelling referring to 2000.

Plantation: Nordic Ecolabelling believes, that responsibly run forest plantations can play a role in preserving natural IFLs by reducing the pressure to harvest the world's remaining natural forests. In order to secure that plantation has not replaced native ecosystems (forest/grasslands) within the last 25 years, tree species has to come from FSC or PEFC certified plantations that were established before 1994. 1994 is in line with FSCs international forest management standard (version 5.2), whereas PEFC is working with 2010.

The list of restricted tree species is located on:

<http://www.nordicecolabel.org/certification/paper-pulp-printing/pulp--paper-producers/forestryrequirements-2020/>.

O5 Wood raw material

The applicant must state the name (species name) of the wood raw material used in the Nordic Swan Ecolabelled liquid and gaseous fuels.

Chain of Custody certification

The supplier of wood raw materials must be Chain of Custody certified by the FSC/PEFC schemes.

Suppliers who only supply recycled materials for the Nordic Swan Ecolabelled liquid and gaseous fuels are exempted from the requirement concerning Chain of Custody certification. The definition of recycled material, see glossary/below.*

Certified wood raw material

A minimum of 70% by weight of all wood raw material (virgin/recycled material) used to produce the Nordic Ecolabelled liquid and gaseous fuels, must origin from forest managed according to sustainable forestry management principles that meet the requirements set out by FSC or PEFC chain of custody schemes and/or originate from recycled material.

The remaining proportion of wood raw material must be covered by the FSC/PEFC control schemes or be recycled material.

The requirement must be documented as purchased amount of wood annually.

* Recycled material defined according to ISO 14021 in the following two categories:

Pre-consumer material: Material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.

Post-consumer material: Material generated by households or by commercial, industrial, and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

Nordic Ecolabelling includes by-products from primary wood processing industries (sawdust, wood chips, shavings, bark, etc.) in its definition of recycled material.

- Name (species name) of the wood raw materials that are used in Nordic Swan Ecolabelled liquid or gaseous fuels.

- ☒ Valid FSC/PEFC Chain of Custody certificate from all suppliers/link to certificate holders valid certificate information in FSC/PEFC certificate database covering all wood raw material used in the Nordic Swan Ecolabelled liquid and gaseous fuels. (Exempted from this requirement are suppliers who only deliver recycled material)
- ☒ Documentation showing that the quantity of certified wood raw material or recycled material is met. This should be specified in e.g., invoices or delivery notes. In case of recycled material (not certified by FSC or PEFC) evidence shall be covered by EN 643 delivery notes.

Background to requirement O5

The requirement has been updated according to Nordic Ecolabelling's 2020 forestry requirements.

Name of the wood raw material. Nordic Ecolabelling sets requirements to gain information about which tree species are used in Nordic Swan Ecolabelled products. The requirement makes it possible to control the Change of Custody certificates in the supply chain (check whether the stated tree species is covered by the Chain of Custody certificate) as well as provide information for future forest requirements. If recycled material is used in the Nordic Swan Ecolabelled liquid and gaseous fuels, and particularly in the form of recirculated fibre, it is not always possible to specify the name (species name) of all wood raw materials used. In this case, the requirement for documentation of recycled material is to be met.

FSC, PEFC and EUTR. Forest Stewardship Council (FSC) and Programme for the endorsement of Forest Certification schemes (PEFC) cover together 98% of the world total certified sustainable managed forest area⁴¹, and are predominant in the global market for certified sustainable wood. Both 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. Both systems are considered common among forest owners, forest industries, manufacturers and distributors of wood products, and public authorities as reliable systems for sustainable forestry.

FSC updated traceability standard from 2015⁴² and PEFCs traceability standard from 2013⁴³ fully meets the requirements of EU Timber Regulation (995/2010/EC)⁴⁴ prohibiting the marketing and sale of illegal timber in the EU. This applies to imported wood, as well as wood harvested in the EU. Nordic Ecolabelling recognizes both the FSC and PEFC as schemes that provide sufficient guarantees for legal and sustainable forestry.

Traceability Certification. Nordic Ecolabelling requires that the applicant's suppliers is Chain of Custody certified by the FSC/PEFCs schemes. The requirement for Chain of Custody certification contributes to traceability in the supply chain within the FSC and PEFCs guidance and control systems for traceability. The company's Chain of Custody certification proves how certified wood is kept separate from not certified wood in the production, administration and warehousing and is checked annually by independent certification bodies.

⁴¹ UN: Forest Products – Annual market review 2019-2020, ch.1

⁴² <https://fsc.org/en/document-centre/documents/resource/302>, visited January 2022

⁴³ <http://www.pefc.org/certification-services/eu-timber-regulation>, visited January 2022

⁴⁴ http://ec.europa.eu/environment/forests/timber_regulation.htm

There exist different types of Chain of Custody certifications, which varies according to the minimum content of certified wood and the way this is calculated. Both schemes allow, within specified circumstances and rules, to mix wood from certified forests with recycled material or legal wood from non-certified forests. Therefore, it is not certain that a specific batch of FSC or PEFC certified wood necessarily come from certified forest. In all cases, the remaining share of the wood shall comply with several minimum requirements to ensure that it can be considered as "legal timber". Both the FSC and PEFC schemes allow several methods to verify the traceability: Physical separation method, percentage-based method, and volume credit method. Nordic Ecolabelling accepts all FSC and PEFCs methods to verify traceability and the share of certified and controlled wood/sources. The applicant's suppliers must submit a valid FSC/PEFC Chain of Custody certificate, covering all wood raw materials used in the Nordic Swan Ecolabelled liquid and gaseous fuels, as documentation.

Nordic Ecolabelling equates recycled material with virgin wood material from sustainable forestry. Recycled materials not covered by an FSC/PEFCs Chain of Custody certification can also be used in Nordic Swan Ecolabelled products. Suppliers of recycled material are exempted from the requirement regarding FSC/PEFCs Chain of Custody certification. In case of recycled material evidence shall be covered by EN 643 delivery notes.

Recycled material

Definition of recycled material (pre-consumer and post-consumer) is based on ISO 14021.

"Pre-consumer material" is defined as material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.

"Post-consumer material" is defined as material generated by households or by commercial, industrial, and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

Nordic Ecolabelling includes by-products from primary wood processing industries (sawdust, wood chips, shavings, bark etc.) or residues from forestry operations (bark, branches, roots, etc.) in its definition of recycled material. Virgin material purchased by industries primarily to make wood chips, for example, is not counted as recycled material. Industries that process raw wood are counted as primary wood-using industries. A record must be kept showing that the wood in question has the status of recycled material according to the definitions above.

Certified wood raw materials

Applicants must document that at least 70% of all wood raw material (virgin/recycled material) used in the Nordic Swan Ecolabelled product/production line comes from forestry certified under the FSC or PEFC schemes or is recycled material. The remaining proportion of wood must meet the requirements of FSC controlled wood or PEFC controlled sources or be recycled. The requirement must be documented as purchased amount of wood annually. The requirement limit to a minimum of 70% of all wood raw material (virgin or

recycled), correspond to the FSC and PEFCs requirement limit for use of the respective labels on products, such as ("FSC Mix" and "PEFC certified"). FSC and PEFC has together five recognized official existing labels. Further information about the use of labels can be found on FSC⁴⁵ and PEFCs⁴⁶ websites. The requirement can make it easier for manufacturers of Nordic Swan Ecolabelled products to document the requirement, as they can demand labelled FSC/PEFC products.

Recycled material is explicitly highlighted in the requirement as both FSC and PEFCs schemes include certified recycled materials. Nordic Ecolabelling equates as previously mentioned recycled material with virgin wood material from sustainable forestry. Recycled materials not covered by FSC/PEFCs Chain of Custody certification, can also be used in the Nordic Swan Ecolabelled products. The share (% units) of recycled material must meet the requirement regarding the share of wood raw material certified as FSC or PEFC sustainable forestry.

The applicant/manufacture must demonstrate that the quantity of certified wood raw material or recycled material is met by invoice or delivery note (paper or via e-invoicing), which also indicates the company's certification codes from which the wood raw material is purchased from. It must be clear which parts of the packing slip or invoice delivery that is certified (e.g., claim/material category must appear, such as FSC MIX 70% and FSC 100%, associated with the product concerned on the invoice or delivery note). A valid FSC/PEFC labelling on the purchased wood product, or an unbroken packaging can also be used to document the requirement. The FSC/PEFC label often hold a certification number or a license code, which provides information on the authorized dealer that sold the product as certified. The certification schemes have different rules for labelling and logo use, and if in doubt, it is advisable to consult the individual schemes website for more precise information about the rules.

Certification and accreditation

The certification must be conducted by an independent, competent and accredited third party and follow the relevant international guidelines for the certification: ("ISO/IEC 17065:2012 Conformity assessment – Requirements for bodies certifying products, processes and services" or equivalent and accredited by an accreditation body operating in accordance with "ISO 17011:2004 Conformity assessment – General requirements for accreditation bodies accrediting conformity assessment bodies" or equivalent).

The accreditation (i.e., verification and approval of the certification firm is working properly) must be undertaken by a national or international body, systems and procedures are consistent with ISO 17011:2004 Conformity assessment – General requirements for accreditation bodies accrediting conformity assessment bodies or equivalent.

O6 Raw materials not allowed to use in Nordic Swan Ecolabelled liquid and gaseous fuels

The following raw materials **must not** be used in Nordic Swan Ecolabelled liquid and gaseous fuels:

- Food- and feed crops must not be used in the production of liquid and gaseous fuels, see requirement O2.

⁴⁵ <http://welcome.fsc.org/understanding-the-fsc-labels.27.htm>

⁴⁶ <http://www.pefc.co.uk/chain-of-custody-logo-use/pefc-label>

The requirement does not cover feedstock defined as non-food cellulosic material or residues and waste product generated from the cultivation of food- and feed crops.

- Palm oil and soybean oils, including by-products, residues and waste fractions from palm and soybean oil industries (e.g., Palm Fatty Acid Distillate: PFAD, Palm Effluent Sludge: PES and soybean meal).

The requirement does not cover residues and waste products generated by households or commercial, industrial- or institutional facilities in their role as end-users of a product that can no longer be used for its intended purpose.

- The applicant shall provide a declaration of compliance with the requirement concerning renewable feedstocks from palm oil and soybean oil. Appendix 3 may be used. Nordic Ecolabelling reserves the right to require further documentation in the event of uncertainty about fulfilment of the requirement.
- The applicant shall provide a declaration of compliance with the requirement concerning no use of food- or feed crops in the production of biofuels. Appendix 3 may be used.

Background to requirement 06

The requirement has been tightened regarding use of food- and feed crops in generation 4.

Biomass is a limited resource that cannot meet all our energy requirements. The capacity of the planet to produce biomass is limited by its biophysical boundaries. The challenge is, therefore, the competition of land between food, feed, and fuel. About 40% of all global cropland is currently used to produce high quality feeds, some of which are cereals which humans could also consume resulting in feed-food competition⁴⁷. Around 30% of the global cropland dedicated to cereals is used to grow livestock feed⁴⁸. Currently, about 13% of global cropland is used to produce biofuels and textiles⁴⁹.

Nordic Swan Ecolabelling would like to limit the use of biofuels from food- and feed crops and are therefore proposing to ban the use of food- and feed crops in the production of Ecolabelled liquid and gaseous fuels. This means that Ecolabelled liquid and gaseous fuels can be produced from e.g., ligno-cellulosic material, non-food cellulosic materials or residues and waste.

Palm oil and soy are regarded as food and feed crops and can therefore not be used in a Nordic Swan Ecolabelled fuel. However, the requirement also prohibits by-products, residues and waste fractions from palm and soybean oil industries (e.g., Palm Fatty Acid Distillate: PFAD, Palm Effluent Sludge: PES and soybean meal).

Oil palm- and soy plantations are often established at the cost of tropical rainforest and other areas of high conservation value⁵⁰. It is one of the greatest threats to biodiversity in South-East Asia and South America, causing loss of valuable species, habitats, ecosystems, and landscapes. The clearing of forests

⁴⁷ A. Mottet, C. de Haan, A. Falcucci, G. Tempio, C. Opio, P. Gerber. Livestock: on our plates or eating at our table? A new analysis of the feed/food debate, 2017

⁴⁸ <https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/livestock-feeds> (visited April 2022)

⁴⁹ J. Porre, T. Nemecek: Reducing food's environmental impacts through producers and consumers, 2018

⁵⁰ FAOSTAT 2019

also leads to emission of greenhouse gases. Local communities experience social consequences like land use conflicts, little or no compensation and loss of livelihood.

In general, the Nordic Swan Ecolabel supports substitution of fossil fuels with sustainable renewable raw materials. However, with increasing production and demand, the potential for producing all palm oil and soy sustainably is limited. For that reason, palm oil and soy should only be used in products where a sustainable alternative is difficult to find, and it should be certified with a credible standard.

Nordic Ecolabelling's team of renewable material experts has reviewed the standards for palm oil (RSPO⁵¹) and soy (RTRS⁵²). It has concluded that neither of the standards currently meet Nordic Ecolabelling's labelling scheme requirements. This is mainly due to a lack of absolute requirements for the protection of key biological areas, and a lack of requirements for compliance with the basic international conventions. This means that Nordic Ecolabelling prohibits the use of these feedstocks in Nordic Swan Ecolabelled liquid and gaseous fuels.

07 Genetically modified plants

Raw materials used in Nordic Swan Ecolabelled fuels must not be genetically modified*.

* *Genetically modified organisms are defined in EU Directive 2001/18.*

This requirement does not include residuals or waste defined according to the Renewable Energy Directive (2018/2001/EC), however not by-products, residues and waste fractions from palm and soybean oil industries (e.g., Palm Fatty Acid Distillate: PFAD, Palm Effluent Sludge: PES and soybean meal).

- Declaration from the raw material supplier of compliance with the requirement. Appendix 4 may be used.

Background to requirement 07

The requirement has been updated according to Nordic Ecolabelling's general requirement for GMO.

Genetically modified organisms (GMOs) are highly controversial. Topics that are discussed include food security, land use, lack of scientific knowledge about long-term effects and effects under local agricultural/forest conditions and risk of adverse effects on health and the environment.^{53,54,55,56} Four GM crops dominate: soybean, cotton, maize, and rapeseed. The dominating traits are resistance to one or several herbicides and production of one or several insecticidal proteins or a combination of the two. Research has not clearly shown that GMOs contribute to development towards sustainable agriculture with less use of pesticides.

⁵¹ <http://www.rspo.org/>

⁵² <http://www.responsiblesoy.org/en/>

⁵³ Catacora-Vargas G (2011): Genetically Modified Organisms – A Summary of Potential Adverse Effects Relevant to Sustainable Development. Biosafety Report 2011/02, GenØk – Centre for Biosafety

⁵⁴ Kolseth et al (2015) Influence of genetically modified organisms on agro-ecosystem processes. *Agriculture, Ecosystems and Environment*. 214 (2015) 96–106

⁵⁵ Fischer et al. (2015) Fischer et al. (2015): Social impacts of GM crops in agriculture: a systematic literature review. *Sustainability* 7:7

⁵⁶ Catacora-Vargas G et al. (2018): Socio-economic research on genetically modified crops: a study of the literature. *Agriculture and Human Values* 35:2

Problems include herbicide resistant weeds due to GM agricultural practises, resistance among target insect pests and gene flow from GM plants to agricultural or wild relatives. Research shows conflicting results on performance and environmental effects of GMOs, especially on yield and non-target organisms. There are knowledge gaps on effects on microorganisms in the soil and aquatic organisms, GMOs with combined traits, socioeconomic consequences, and risks in an ecosystem perspective.

Nordic Ecolabelling emphasizes the precautionary principle and discourage the use of GMOs that are commercially available today. Nordic Ecolabelling is concerned about the consequences when genetically modified plants, animals and microorganisms are propagated in nature. However, Nordic Ecolabelling is not against genetic engineering or GMOs as such, and we believe that GMOs should be assessed on a case-by-case basis. We promote a holistic approach to GMOs and assess sustainability, ethics, and benefit to society as well as possible risks to health and the environment. We believe that GMOs made with new gene editing techniques should be assessed according to the same guidelines as other GMOs, which is in line with EU regulations.

4.5 Requirements for greenhouse gas emission savings

This chapter contains requirements for greenhouse gas emission savings for gaseous and liquid fuels.

08 Reduction of greenhouse gases

Gaseous fuels

The Nordic Swan Ecolabelled gaseous fuel must reduce greenhouse gas emissions in the entire production chain, from the production of feedstocks to the point of sale (for example the filling station) according to the table below:

Table 2: Reduction of greenhouse gases from gaseous fuels compared with corresponding fossil fuel.

	Denmark	Finland	Iceland	Norway	Sweden
Reduction of greenhouse gases	85%	75%	85%	90%	90%
Liquefied biogas	80%	70%	80%	90%	90%

Liquid fuels

The Nordic Swan Ecolabelled liquid fuel must reduce greenhouse gas emissions in the entire production chain, from the production of feedstocks to the point of sale by 75% compared with the corresponding fossil fuel.

Calculations of greenhouse gas emission savings must follow the principles of Article 31 of the Renewable Energy Directive (2018/2001/EU) with specific guidelines given in Annex V. The fossil fuel comparator EF(t) shall be 94 g CO₂eq/MJ.

The calculations must be performed by a competent and independent third party or by the applicant. Calculations performed by the applicant must be verified and approved by a competent and independent third party.

Rules and default values for calculating the reduction of greenhouse gas emissions must comply with the official regulations of each Nordic country or, if a biofuel component is certified according to one of the European Commission's voluntary certification schemes, compliance is required with these rules and default values*.

* *Default value (conversion factors): data that is required to convert the input values (stated in kg, kWh, etc.) into greenhouse gas emissions.*

- ☒ Calculation and documentation showing that the requirement is met. Calculations must be based on data from at least 12 months at the time of application. The data and calculations must be reviewed and approved by an independent third party.

Background to requirement O8

A minimum requirement of 75% reduction of greenhouse gas emissions is more stringent than the European legislation (European Union’s Renewable Energy Directive II), which sets requirements of 50%, 60% or 65% reduction depending on the date the production plant started operating. The requirement for reduction of greenhouse gases has been tightened also compared to generation 3 of the criteria.

In the previous generation of the criteria (generation 3) the requirement of greenhouse gas savings for the renewable fuel was set to 70 , compared to the fossil fuel comparator set in RED. In the revised directive, REDII, the fossil fuel has been changed so the figures are not totally comparable. The table below, includes a comparison between RED and REDII and Nordic Swan Ecolabel criteria generation 3 and generation 4. The absolute emissions of greenhouse gases from biofuels are slightly strengthened in this criteria version compared to generation 3 (from 25,14 CO₂/MJ to 23,5 CO₂/MJ).

Table 3: Comparison between REDI and REDII and Nordic Swan Ecolabel criteria generation 3 and generation 4.

RED I; Fossil comparator 83,8 g CO ₂ /MJ			RED II; Fossil comparator 94 g CO ₂ /MJ		
Date	Required reduction %	Allowed emissions g CO ₂ /MJ	Plant operation date	Required reduction %	Allowed emissions gCO ₂ /MJ
Before 2017	35%	54,5	Before oct 2015	50%	47
1 Jan 2017-	50%	41,9	Oct 215 - dec 2020	60%	37,6
1 Jan 2018 (new plant)	60%	33,4	Jan 2021 -	65%	32,9
Nordic Swan generation 3			Nordic Swan generation 4		
	70%	25,14		75%	23,5

Data from biogas production show significant variations between the Nordic countries. This may depend on differences in national electricity mix factors, different use of EU reference values instead of own actual values, infrastructural conditions (transport of biogas on gas networks /trucks), composition of available raw materials etc. Nordic Ecolabelling aim at relevant requirements with an environmental effect in all the Nordic countries. Therefore, national requirement levels have been set based on dialogue with license holders and the biogas industry.

Nordic Ecolabelling are aware that especially wastewater treatments plants of an older date, may have difficulties in complying which the requirement. Production of biogas from wastewater is favourably both from an environmental and circular economy perspective. However, Nordic Ecolabelling encourages these plants to implement measures that decrease the overall climate impact.

Calculations of greenhouse gas emission savings must follow the principles of Article 31 of the Renewable Energy Directive (2018/2001/EU) with specific guidelines given in Annex V. The fossil fuel comparator EF(t) shall be 94 g CO₂eq/MJ. Calculations performed by the applicant must be verified and approved by a competent and independent third party. Rules and default values for calculating the reduction of greenhouse gas emissions must comply with the official regulations of each Nordic country or, if a biofuel is certified according to one of the European Commission's voluntary certification schemes, compliance is required with these rules and default values.

If the Nordic Swan Ecolabelled fuel is a blend of several components or components from different suppliers, the greenhouse gas emissions must be a weighted average of the constituent renewable components.

Calculation and documentation for the requirement must be based on data from at least 12 months at the time of application. The specific period is agreed upon individually at the time of application, as it may depend on ongoing certification under one of the EU certification systems. Nordic Ecolabelling, however, requires documentation to be submitted when data is available for a year. The data and calculations must be reviewed and approved by an independent third party.

4.6 Requirement for the biogas production plant

This chapter contains requirement for the biogas production plant regarding control of methane leakage.

O9 Control of methane leakage from biogas production plant

When producing biogas through anaerobic digestion of organic feedstock, the licensee must implement routines for measuring and reducing methane leakage from the biogas production plant and upgrading facility.

The routines must at least include:

- Systematic and regular leak detection at the facilities
- Quantification of methane leakage every third year

☒ Description of routines for detection, measuring and reduction of methane leakage.

Background to requirement O9

This is a new requirement in generation 4. Methane is a potent greenhouse gas with a global warming potential much higher than carbon dioxide. Methane leakage from the biogas plant, and from biogas upgrading, has great impact on the GHG reductions due to the large global warming potential of methane.

Requirement O8, Greenhouse gas emission reduction, sets a cap on total life cycle emissions, where methane leakage is included in the calculation. However, it is still possible to use average values for leakage in the required calculation. By this requirement Nordic Ecolabelling ensures that a biogas plant operator works systematically with methane leak detection and quantification.

A Danish study⁵⁷ from 2021 showed that the average methane loss from agricultural biogas plants was 2.1% and 7.5% from wastewater treatment biogas plants in Denmark.

Methane leakage can occur both in anaerobic digestion plants, and at upgrading facilities. Emissions occur from ventilation, overflow drain, biofertilizer storage etc. Usually, the biofertilizer storage contribute to highest leakage at the biogas plant. At the upgrading facility methane may occur in the outgoing residual gas⁵⁸. As a result of the EU Green deal and the EU Commission's communication of the methane strategy, the legislation regarding methane emissions from biogas plants will probably be tightened in the future.⁵⁹

There are different initiatives and programmes from national industry associations to monitor and reduce methane leakages, for example "EgMet" initiated by the Swedish association Avfall Sverige.

4.7 Requirements for working conditions

This chapter contains requirement for working conditions at feedstock- and fuel suppliers.

O10 Working conditions

The licensee must have a written Code of Conduct that explains how the licensee ensures compliance with the following UN conventions and the UN Global Compact at feedstock- and fuel suppliers:

- The UN Convention on the Rights of the Child, Article 32
- The UN Declaration (61/295) on the Rights of Indigenous Peoples UN's: Global Compact2, which comprises the following ten principles:
 - Principle 1: Businesses should support and respect the protection of internationally proclaimed human rights
 - Principle 2: make sure that they are not complicit in human rights abuses
 - Principle 3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining (ILO Convention 87 and 98)
 - Principle 4: the elimination of all forms of forced and compulsory labour; (ILO Convention 29 and 105)
 - Principle 5: the effective abolition of child labour (ILO Convention 138 and 182)
 - Principle 6: the elimination of discrimination in respect of employment and occupation (ILO Convention 100 and 111)
 - Principle 7: Businesses should support a precautionary approach to environmental challenges
 - Principle 8: undertake initiatives to promote greater environmental responsibility
 - Principle 9: encourage the development and diffusion of environmentally friendly technologies

⁵⁷ https://ens.dk/sites/ens.dk/files/Bioenergi/metantab_rapport.pdf

⁵⁸ 2016-17-handbok_metanmatning.pdf (svensktvatten.se)

⁵⁹ <https://www.svensktvatten.se/vattentjanster/avlopp-och-miljo/slam-och-biogas/egenkontroll-metanemissioner/>

- Principle 10: Businesses should work against corruption in all its forms, including extortion and bribery

The licensee must ensure that all feedstock- and fuel suppliers are familiar with and comply with the Code of Conduct.

If raw materials and fuels are produced in countries in which these conventions are incorporated as part of the requirements of the authorities, no further documentation will be required beyond the signed application form for a license for Nordic Ecolabelling.

- ☒ Licensees must submit a written Code of Conduct that explains how the licensee ensures that its feedstock- and fuel suppliers comply with the requirements of the UN conventions and the UN Global Compact.
- ☒ A description of how the licensee's Code of Conduct is communicated to all of its feedstock- and fuel suppliers.

Background to requirement O10

The requirement concerning working conditions are unchanged, compared with generation 3 of the criteria.

The licensee must have a written Code of Conduct explaining how the licensee ensures that its feedstock producers/supplier and fuel producers comply with UN and ILO Conventions. This Code of Conduct must be communicated to all feedstock- and fuel suppliers.

Nordic Ecolabelling is aware that it may be difficult to ensure that the working environment of all feedstock producers in the Nordic Swan Ecolabelled fuel's production chain is satisfactory. Nevertheless, Nordic Ecolabelling is convinced that the more producers/suppliers of feedstocks and fuel producers that are confronted with a requirement/signal from their customers that compliance with a Code of Conduct is required, the greater the possibility of its achievement. Licensees must inform their suppliers about their Code of Conduct. However, the licensee must not guarantee that it will be complied with by its suppliers.

The requirement concerning working conditions continues to apply to components in the Nordic Swan Ecolabelled fuel.

If raw materials and fuel are produced in countries in which these conventions are incorporated as part of the requirements of the authorities, no further documentation will be required beyond the signed application form for a license for Nordic Ecolabelling.

4.8 Quality requirements for liquid and gaseous fuels

This chapter covers the quality requirements for liquid and gaseous fuels for transport (road, sea, and air), heating and industrial purposes.

O11 Quality specifications for liquid and gaseous fuels

The requirement applies to the end product.

Liquid fuels for road transport* must meet a relevant fuel standard and the fuel quality Directive (2009/30/EC) established by the EU.

** The fuel quality standard (2009/30/EC) also covers off-road machinery, such as forestry and agricultural machinery.*

Fuels for maritime shipping must meet the requirements of:

- ISO 8217:2017 standard, or
- FAME: ASTM D6751 or EN 14214 or
- HVO: ASTM D975 or EN 15940
- All fuels for maritime shipping must comply with the European Union's Sulphur Directive (2012/33/EC).

Fuels for air transport must meet the requirements of:

- ASTM D7566 standard or ASTM D1655

Liquid fuels for heating and industrial purposes must meet the requirements of the EN14214 (biodiesel), the EN15376 (ethanol) or the EN 15940 (HVO) standards.

Liquified Petroleum Gases (Bio-LPG) must meet the requirements of ISO 9162:2013⁶⁰ or ASTM 1835. Bio-LPG used in vehicles must meet EN589:2018.

Biogas for transport/heating/industrial use distributed on existing gas networks must be upgraded and meet the quality criteria of the national inspection authority for the gas grid, or the equivalent quality requirements from the body responsible for operating the natural gas grid system.

If a licensee can demonstrate that the end user of the liquid or gaseous fuel accepts a different fuel quality than those specified in the requirement, the licensee may, following approval by Nordic Ecolabelling, be allowed to use the Nordic Swan Ecolabel without meeting specified fuel standards. Biogas must at least be purified from; water, hydrogen sulphide, nitrogen, oxygen, ammonia, and siloxane particles.

The requirements concerning test laboratories and test instructions are stated in Appendix 5.

Liquid and gaseous fuels:

- The applicant must indicate which standard the liquid or gaseous fuel is compliant with.
- An analysis report and a declaration from the test laboratory verifying compliance with the fuel standard. Alternatively, a written statement from the end user of the fuel in which it is clearly stated that the end user accepts that the fuel does not need to comply with the above standards. Biogas must at least be purified from; water, hydrogen sulphide, nitrogen, oxygen, ammonia, and siloxane particles.

Biogas distributed on existing gas networks

- A declaration from the national inspection authority for the gas grid stating that the biogas is compliant with the gas quality requirements for the gas grid or from the body responsible for operating the natural gas grid system.

Background to requirement O11

The requirement has been adjusted to relevant updated fuel quality standards.

Liquid fuels for road transport as well as off-road machinery, such as forest and agricultural machinery, must meet the fuel quality standard (2009/30/EC) established by the EU. The Fuel Quality Directive sets limits on the presence of sulphur, benzene, aromatics, and other substances in the petrol. The presence of these substances is capped to reduce emissions from motor vehicles. The automotive industry, oil

⁶⁰ Apply to international transfers of commercial propane and commercial butane.

companies and the European Commission have jointly established a number of additional requirements for petrol, namely the CEN standards EN228 and EN15736 (bio-ethanol) and for diesel with the EN590 (biodiesel), EN14214 (biodiesel, FAME) and EN 15940 (automotive fuels - paraffinic diesel fuel from synthesis or hydrotreatment) standards. If these are complied with, motorists can be sure that their car engine will not be damaged by running on the fuel, no matter where they are in Europe.

Biogas for transport/heating/industrial use distributed on existing gas networks must be upgraded and meet the quality criteria of the national inspection authority for the gas grid, or the equivalent quality requirements from the body responsible for operating the natural gas grid system.

Nordic Ecolabelling requires the Nordic Swan Ecolabelled liquid fuels to meet recognized fuel standards to guarantee the quality. However, if a licensee can demonstrate that the end user of the liquid or gaseous fuel accepts a different fuel quality than those specified in the requirement, the licensee may, following approval by Nordic Ecolabelling, be allowed to use the Nordic Swan Ecolabel without meeting specified fuel standards.

4.9 Licence maintenance

The purpose of the licence maintenance is to ensure that fundamental quality assurance is dealt with appropriately.

O12 Customer complaints

The licensee must guarantee that the quality of the Nordic Swan Ecolabelled fuel does not deteriorate during the validity period of the licence. Therefore, the licensee must keep an archive over customer complaints.

Note that the original routine must be in one Nordic language or in English.

- Upload your company's routine for handling and archiving customer complaints.

Background to requirement O12

Nordic Ecolabelling requires that your company has implemented a customer complaint handling system. To document your company's customer complaint handling, you must upload your company's routine describing these activities. The routine should be dated and signed and will normally be part of your company's quality management system.

If your company does not have a routine for customer complaint handling, it is possible to upload a description of how your company perform these activities. During the on-site visit, Nordic Ecolabelling will check that the customer complaint handling is implemented in your company as described. The customer complaints archive will also be checked during the visit.

O13 Traceability

The licensee must be able to trace the Nordic Swan Ecolabelled products in the production. A manufactured/sold product should be able to trace back to the occasion (time and date) and the location (specific factory) and, in relevant cases, also which machine/production line where it was produced. In addition, it should be possible to connect the product with the actual raw material used.

You can upload your company's routine or a description of the actions to ensure traceability in your company.

- Please upload your routine or a description.

Background to requirement O13

Nordic Ecolabelling requires that your company has implemented a traceability system. To document your company's product traceability, you must upload your company's routine describing these activities. The routine should be dated and signed and will normally be part of your company's quality management system.

If your company does not have a routine for product traceability, it is possible to upload a description of how your company perform these activities. During the on-site visit, Nordic Ecolabelling will check that the product traceability is implemented in your company as described.

O14 Follow-up of license

The licensee shall ensure that the requirements of the criteria are met during the validity period of the license. At least once a year (within 6 months of closing the books) a review of operations shall be made covering at least the following areas:

- Material composition, requirement O2
- Reduction of greenhouse gasses, requirement O8

The review (report) must be audited and approved by independent third parties.

Nordic Ecolabelling may request reports from the internal reviews and examine a selection, or all, of the requirements. Information on a compliance check is given in advance.

- Documentation, verified and approved by independent third party, which verifies that the Nordic Swan Ecolabelled fuel complies with the material composition (requirement O2) as well as requirements for greenhouse gas emissions reduction (O8) in the last year.

Background to requirement O14

The requirement concerning follow-up of license are unchanged, compared with generation 3 of the criteria. The possibility of changing the composition of feedstock in the Nordic Swan ecolabelled fuel underscores the need for annual documentation to meet the requirement for both use of raw materials and hence the calculation of emission of greenhouse gasses. The documentation must be audited and approved by independent third parties.

5 Areas without requirements

The following subjects has been discussed and analysed during the review process. However, for the reasons explained below, Nordic Ecolabelling has decided not to include them in criteria generation 4.

Energy consumption

One main objective in the revision of the criteria has been to update the Nordic Ecolabelling criteria with the EU RED II (2018/2001/EU)⁶¹ for inter alia to utilize

⁶¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001&from=EN> (visited January 2022)

the independent reporting system, reporting sustainability data (raw materials, traceability, and greenhouse gas data) in the supply chain. The EU RED directive's sustainability criteria are developed to show how much biofuel reduces greenhouse gas emissions. The calculation of greenhouse gas emissions includes energy consumption, but the energy data is not passed on in the supply chain (calculation models are locked and energy data is not available). Nordic Ecolabelling therefore considers that strict requirements for greenhouse gas reduction for both the renewable feedstocks and the entire fuel (which includes energy data), as well as utilization of the independent reporting system, will promote the environmentally and climatically best fuels. It has therefore been decided that an energy consumption requirement is no longer necessary.

6 Changes compared to previous generation

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

Table 4: Overview of changes to criteria for liquid and gaseous fuels generation 4 compared with previous generation 3.

Proposed requirement generation 4	Requirement generation 4	Same requirement	Change	New requirement	Comment
Definition of the product group	Definition of the product group		x		It has been clarified that compressed biogas (CBG) and liquid biogas (LBG) is part of the product group. New: Bio-LPG or renewable bio-propane is part of the definition.
O1	Description of the product(s)	x			Same requirement.
O2	Material composition		x		The requirement has been tightened - all types of fuels must be based on 100% renewable materials. New: Gaseous fuels must be made from residue and waste.
O3	Traceability and control of vegetable and animal feedstocks		x		Updated according to EU REDII directive.
O4	Tree species with restricted use		x		Updated according to Nordic Ecolabelling's new forestry (2020) requirements.
O5	Wood raw materials		x		Updated according to Nordic Ecolabelling's new forestry requirements.
O6	Renewable raw materials not allowed to use in Nordic Swan Ecolabelled liquid and gaseous fuels		x		The requirement has been tightened - no use of food and feed crops in ecolabelled fuels.

O7	Genetically modified plants		x		Updated according to Nordic Ecolabelling's new GMO requirements
O8	Reduction of greenhouse gases		x		The requirement has been tightened regarding reduction of greenhouse gas emissions.
O9	Control of methane leakage from biogas production plant			x	New requirement for control of methane leakage from biogas productions plant.
O10	Working conditions	x			
O11	Quality specifications for liquid and gaseous fuels		x		Updated to relevant updated fuels quality standards.
O12-O13	Licence maintenance	x			
O14	Annual report on material composition, mass balancing and greenhouse gas emission savings	x			
Requirements removed from the criteria					
	Unconventional fossil fuels				Fossil components in the Nordic Swan Ecolabelled liquid or gaseous fuel must not be based on tar sand, shale oil, shale gas or coal. The requirement does not cover gas that is distributed in existing gas grids.

Regulations for the Nordic Ecolabelling of products

When the Nordic Swan Ecolabel is used on products the licence number shall be included.

More information on graphical guidelines, regulations and fees can be found at www.nordic-ecolabel.org/regulations/

Criteria version history

Nordic Ecolabelling adopted generation 4 of the criteria for liquid and gaseous fuels 7 December 2022. The criteria are valid until 31 December 2027.

On 4 February 2025 Nordic Ecolabelling adopted an adjustment in the requirement for quality standards (O11) referring to updated standards. The new version is 4.1.

New criteria

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

- Product definition - new types of fuels such as hydrogen and P2X technologies
- Raw materials used in the production of liquid and gaseous fuels
- Greenhouse gas emission savings
- Quality of the fuels

Appendix 1 EU and national legislation

EU Renewable Energy Directive II, (EU) 2018/2001, (RED II)

The most important changes related to fuels in the updated renewable energy directive are:

- The RED II introduces sustainability criteria and greenhouse gas savings criteria that covers also solid biomass and biogas for heat & power. RED I covered all liquid biofuels and biogas for transport.
- The RED II introduces a new approach to handle indirect land use change (iLUC) from cultivation of feedstocks, which means that so-called "feedstock with high iLUC-risk" is to be phased out by 2030. For the implementation of this approach, as required by the directive, the Commission has adopted the Delegated Regulation (EU) 2019/807.
- Updated GHG saving thresholds. New thresholds for biofuels, biogas for transport and bioliquids are:
 - 50 % in installation in operation before 5 October 2015
 - 60 % in plants started 6 October 2015-31 dec 2020
 - 65 % in plants started 1 January 2021 or later
- The fossil comparator has been changed. The fossil comparator for biofuels has been raised to 94 g CO₂/MJ (compared to 83,8 g CO₂/MJ in REDI). A comparison of how the fossil comparator in REDI and RED II affects the allowed well-to-wheel emissions from biofuels is found in the table below.

Table 5: A comparison of how the fossil comparator in REDI and RED II affects the allowed emissions

RED I, Fossil comparator 83,8 g CO ₂ /MJ			RED II, Fossil comparator 94 gCO ₂ /MJ		
Date	Required reduction, %	Allowed emissions, g CO ₂ /MJ	Plant operation date	Required reduction, %	Allowed emission, gCO ₂ /MJ
Before 2017	35 %	54,5	before oct 2015	50 %	47
1 jan 2017-	50 %	41,9	Oct 2015-dec 2020	60 %	37,6
1 jan 2018 (new plants)	60 %	33,5	Jan 2021 -	65 %	32,9

National legislation that reduces climate impact

All the Nordic countries have introduced legislation that obliges towards increased use of renewables in fuels. The legislation regulates the increasing proportion of renewable fuel in slightly different ways. A summary is shown in the table below.

Table 6: Summary of the legislation that regulates the proportion of renewable fuels in the Nordic Countries.

	Legislation	Obligation calculated by:	Fuels covered
Denmark	CO ₂ displacement requirements for transport ⁶²	Greenhouse gas reduction, g CO ₂ /MJ	All fuels incl. electricity
Finland	Distribution Obligation Act ⁶³	Energy (MJ)	All fuels excl. electricity
Norway	Sales requirement for biofuels ⁶⁴	Volume (l)	All liquid fuels (not gas and electricity)
Sweden	Act on reduction of greenhouse gas emissions ⁶⁵	Greenhouse gas reduction, g CO ₂ /MJ	Liquid biofuel blended with petrol and diesel. Gas, electricity, and pure/ High-blend biofuels such as HVO100, FAME100 are not covered.

One issue that has been analysed during the revision of the criteria is whether the use of Ecolabelled liquid and gaseous fuels contributes to an overall reduction in the climate impact of the transport sector, in addition to the levels required by the legislation above. When a consumer purchases certain renewable fuels, the fuel companies can count this towards their obligation requirements. This enables the fuel companies to sell products with a higher share of fossil components to other consumers.

However, the Nordic Ecolabelling assesses that there is a potential for ecolabelled fuels to reduce overall climate emissions in cases where the fuel is not covered by the above-mentioned legislations, or when the quota obligation is not expressed as a CO₂-reduction. This means Nordic Swan Ecolabel has the largest potential of reducing overall climate impact from following segments:

- Gaseous fuels for heating and industrial purposes in Denmark.
- Pure liquid biofuels and gas in Sweden.
- All biofuels in Norway and Finland.

It is uncertain how the regulations will develop in the future. There is particular uncertainty about regulations for pure, high-blend liquid biofuels in Sweden, which are currently subject to a tax exemption. After 1 January 2023, either the tax exemption will remain, or the reduction obligation will include also high-blend biofuels. If the tax exemption remains, the ability of transport companies, municipalities, and individuals to contribute to additional climate benefits will increase.

⁶² <https://www.retsinformation.dk/eli/ta/2021/2536>

⁶³ Laki uusiutuvien polttoaineiden käytön edistämisestä liikenteessä 446/2007 – Updated legislation – FINLEX

⁶⁴ Forskrift om begrensning i bruk av helse- og miljøfarlige kjemikalier og andre produkter (produktforskriften) - Kapittel 3. Omsetningskrav for biodrivstoff og bærekraftskriterier for biodrivstoff og flytende b... – Lovdata

⁶⁵ Lag (2017:1201) om reduktion av växthusgasutsläpp från vissa fossila drivmedel Svensk författningssamling 2017:2017:1201 t.o.m. SFS 2021:747 – Riksdagen

Appendix 2 Guidelines for using mass balance

Documentation for compliance with requirement O2 material composition, O3 Traceability and control of vegetable and animal feedstocks and O8 Reduction of greenhouse gasses must be done on an annual basis using mass balance according to EU RED II (2018/2001/EU). Nordic Ecolabelling poses some additional requirements for mass balance:

- does not allow the use of trade in certificates, so called "Book and claim"⁶⁶, In addition, it is:
- not allowed to mix with a number of components that do not meet requirements O4 (tree species) and requirements O6 (renewable raw materials not allowed to use in Nordic Swan Ecolabelled liquid and gaseous fuels), i.e., use of renewable raw materials from palm oil, soya oil and sugar cane. The requirement also includes by-products, residual and waste fractions from the palm and soybean oil industry (e.g., Palm Fatty Acid Distillate: PFAD, Palm Effluent Sludge: PES and Soybean).

If certificates (voluntary certification schemes) are used in combination with mass balance accounting, Nordic Ecolabel reserves the right to assess these certificates in relation to traceability, biodiversity and guidelines for certification given in Annex 7 of the criteria.

The licensee must have a system to account all purchased renewable components used for the Nordic Swan Ecolabelled fuel. The accounting system must be part of and meet the EU RED requirements to verification of compliance with the sustainability criteria for biofuels and bioliquids. The accounting system shall clearly state which parties are accounted to the Nordic Swan Ecolabelled fuel. An independent competent third party shall control and verify that:

- the accounting system is accurate and reliable in accordance with EU RED
- the accounting of renewable components included in the Nordic Swan Ecolabelled fuel is correct
- the Nordic Swan Ecolabelled fuel meets requirement O2 (material composition) and requirement O9 (reduction of greenhouse gases) based on the accounting system and deliveries accounted to the Nordic Swan Ecolabelled fuel
- the licensee can document that the volumes of renewable components match the volume of Nordic Swan ecolabelled fuel sold together with other sold volumes to other customers/customers' commitments⁶⁷

⁶⁶ Biogas distributed on existing gas networks is exempted from this requirement, as this system uses a certified book and claim system.

⁶⁷ Customer commitments can be either customer agreement or promise to customers about a quantity and share of renewable raw materials or quantity of renewable raw materials with a promise for maximum value of climate gases (alternatively reduction of greenhouse gases).

Rules for use of the mass balance under the EU RED II (2018/2001/EU):

Article 30: Verification of compliance with the sustainability and greenhouse gas emissions saving criteria

Member States shall require economic operators to show that the sustainability and greenhouse gas emissions saving criteria laid down in Article 29(2) to (7) and (10) have been fulfilled. For those purposes, they shall require economic operators to use a mass balance system.

The mass balance system described in Article 30 (1) of Directive (EU) 2018/2001 describes a system in which the “sustainability characteristics” remain assigned to “physical consignments”. Sustainability characteristics are e.g.

- evidence showing compliance with the Directive’s sustainability criteria, and/or
- a statement that the raw materials used were obtained in a way that complies with the Directive’s land related sustainability criteria, and/or
- a greenhouse gas emission figure, and/or
- a description of the raw materials used while preserving product identity as well as their origin, and/or
- the statement “production has been awarded a certificate of type X from recognised voluntary scheme Y”, etc.
- where relevant, information on whether support has been provided for the production of that consignment, and if so, on the type of support scheme.

Sustainability characteristics would have to include information on the country of origin of the feedstock if several countries of origin can be specified for a specific consignment.

Please note that only actual GHG emission values are to be recorded/transmitted along the supply chain in the appropriate unit (i.e., dry matter basis for raw materials and intermediate products). Furthermore, actual values for each specific element must be reported (if appropriate). If (disaggregated) default values are applied, then it should simply be stated “(Disaggregated) default value applied” or similar.

Gas transmission and distribution infrastructure

Biogas is – if not consumed directly on-site for the purpose of electricity production – upgraded to biomethane (additional conversion step) and in some cases injected into the natural gas grid. The gas grid represents a ‘mean of transport’ and a ‘storage facility’ at the same time. Therefore, biomethane can be mixed in this transmission and distribution infrastructure (gas grid), provided the infrastructure is interconnected.

The physical input (injection) and output (withdrawal) of gas must be documented by economic operators as part of their mandatory mass balance records which are essential for the certification process.

Bio-LPG

Bio-LPG is mixed in the same infrastructure as fossil LPG. Requirement O2 (100 % renewable raw material) can be documented through a mass balance system. The mass balance system ensure that the bio-LPG do not exceed the renewable material injected in the system.

According to the mass balance method of verifying compliance, there is a physical link between the production and the consumption of bio-LPG. Trade in certificates, so called Book and claim is not accepted. Book and claim imply that there is no physical connection between the sustainability claim (biological origin) and the product (gas).