

# SVENSK STANDARD

## SS-EN 16214-4:2013



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### **Hållbarhetskriterier för produktion av biodrivmedel och flytande biobränslen för energiändamål – Principer, kriterier, indikatorer och verifiering – Del 4: Beräkningsmetoder för växthusgasbalanser ur ett livscykelperspektiv**

**Sustainability criteria for the production of biofuels and bioliquids for energy applications – Principles, criteria, indicators and verifiers –  
Part 4: Calculation methods of the greenhouse gas emission balance using a life cycle analysis approach**



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EUROPEAN STANDARD

**EN 16214-4**

NORME EUROPÉENNE

EUROPÄISCHE NORM

January 2013

ICS 75.160.20

English Version

**Sustainability criteria for the production of biofuels and bioliquids  
for energy applications - Principles, criteria, indicators and  
verifiers - Part 4: Calculation methods of the greenhouse gas  
emission balance using a life cycle analysis approach**

Critères de durabilité pour la production de biocarburants et  
de bioliquides pour des applications énergétiques -  
Principes, critères, indicateurs et vérificateurs - Partie 4:  
Méthodes de calcul du bilan des émissions de GES  
utilisant une approche d'analyse du cycle de vie

Nachhaltigkeitskriterien für die Herstellung von  
Biokraftstoffen und flüssigen Biobrennstoffen für  
Energieanwendungen - Grundsätze, Kriterien, Indikatoren  
und Prüfer - Teil 4: Berechnungsmethoden der  
Treibhausgasemissionsbilanz unter Verwendung einer  
Ökobilanz

This European Standard was approved by CEN on 15 September 2012.

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COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (EN 16214-4:2013) has been prepared by Technical Committee CEN/TC 383 “Sustainably produced biomass for energy applications”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2013, and conflicting national standards shall be withdrawn at the latest by July 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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## Introduction

Directive 2009/28/EC [1] of the European Commission on the promotion of the use of energy from renewable sources, referred to as the Renewable Energy Directive (RED), incorporates an advanced binding sustainability scheme for biofuels and bioliquids for the European market. The RED contains binding sustainability criteria to greenhouse gas savings, land with high biodiversity value, land with high carbon stock and agro-environmental practices. Several articles in the RED present requirements to European Member States and to economic operators in Europe. Non-EU countries may have different requirements and criteria on, for instance, the GHG emission reduction set-off.

The sustainability criteria for biofuels are also mandated in Directive 98/70/EC [2] relating to the quality of petrol and diesel fuels, via the amending Directive 2009/30/EC [3] (as regards the specification of petrol, diesel and gasoil and introducing a mechanism to monitor and reduce greenhouse gas emissions). Directive 98/70/EC is referred to as the Fuels Quality Directive (FQD).

In May 2009, the European Commission requested CEN to initiate work on standards on:

- the implementation, by economic operators, of the mass balance method of custody chain management;
- the provision, by economic operators, of evidence that the production of raw material has not interfered with nature protection purposes, that the harvesting of raw material is necessary to preserve grassland's grassland status, and that the cultivation and harvesting of raw material does not involve drainage of previously undrained soil;
- the auditing, by Member States and by voluntary schemes of information submitted by economic operators;

Both the EC and CEN agreed that these may play a role in the implementation of the EU biofuel and bioliquid sustainability scheme. In the Communication from the Commission on the practical implementation of the EU biofuels and bioliquids sustainability scheme and on counting rules for biofuels (2010/C 160/02, [4]), awareness of the CEN work is indicated.

It is widely accepted that sustainability at large encompasses environmental, social and economic aspects. The European Directives make mandatory the compliance of several sustainability criteria for biofuels and bioliquids. This European Standard has been developed with the aim to assist EU Member States and economic operators with the implementation of EU biofuel and bioliquids sustainability requirements mandated by the European Directives. This European Standard is limited to certain aspects relevant for a sustainability assessment of biomass produced for energy applications. Therefore compliance with this standard or parts thereof alone does not substantiate claims of the biomass being produced sustainably.

Where applicable, the parts of this standard contain at the end an annex that informs the user of the link between the requirements in the European Directive and the requirements in the CEN Standard.



## 1 Scope

This European Standard specifies a detailed methodology that will allow any economic operator in a biofuel or bioliquid chain to calculate the actual GHG emissions associated with its operations in a standardised and transparent manner, taking all materially relevant aspects into account. It includes all steps of the chain from biomass production to the end transport and distribution operations.

The methodology strictly follows the principles and rules stipulated in the RED and particularly its Annex V, the EC decision dated 10 June 2010 "Guideline for calculation of land carbon stocks" for the purpose of Annex V to Directive 2009/28/EC (2010/335/EU) [5] as well as any additional interpretation of the legislative text published by the EU Commission. Where appropriate these rules are clarified, explained and further elaborated. In the context of accounting for heat and electricity consumption and surpluses reference is also made to Directive 2004/8/EC [6] on "the promotion of cogeneration based on a useful heat demand in the internal energy market" and the associated EU Commission decision of 21/12/2006 "establishing harmonised efficiency reference values for separate production of electricity and heat" [7].

The main purpose of this standard is to specify a methodology to estimate GHG emissions at each step of the biofuel/bioliquid production and transport chain. The specific way in which these emissions have to be combined to establish the overall GHG balance of a biofuel or bioliquid depends on the chain of custody system in use and is not per se within the scope of this part 4 of the EN 16214 standard. Part 2 of the standard, addresses these issues in detail also in accordance with the stipulations of the RED. Nevertheless, Clause 6 of this part of the standard includes general indications and guidelines on how to integrate the different parts of the chain.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 16214-1:2012, *Sustainably produced biomass for energy applications — Principles, criteria, indicators and verifiers for biofuels and bioliquids — Part 1: Terminology*

prEN 16214-2, *Sustainably produced biomass for energy applications — Principles, criteria, indicators and verifiers for biofuels and bioliquids — Part 2: Conformity assessment including chain of custody and mass balance*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16214-1:2012 apply.

## 4 Common elements

### 4.1 General

A number of elements are relevant to several steps of the biofuel/bioliquid production and transport chain. They are described in this clause to which reference is made in subsequent clauses as appropriate.

## 4.2 Greenhouse gases and CO<sub>2</sub> equivalence

The general definition of a greenhouse gas is given in Part 1 of this standard. Total GHG emissions are expressed in CO<sub>2</sub> equivalent (CO<sub>2eq</sub>) calculated as:

$$\text{Mass}(\text{CO}_{2\text{eq}}) = \text{mass}(\text{CO}_2) + \text{GWP}_{\text{CH}_4} \times \text{mass}(\text{CH}_4) + \text{GWP}_{\text{N}_2\text{O}} \times \text{mass}(\text{N}_2\text{O}) \quad (1)$$

where

$\text{GWP}_{\text{CH}_4}$  and  $\text{GWP}_{\text{N}_2\text{O}}$  are the Global Warming Potentials of CH<sub>4</sub> and N<sub>2</sub>O respectively, as defined in the RED. Current values to be used are given in Annex A.

## 4.3 Data quality and sources

Estimating the GHG emissions associated with an activity requires numerical data, often from a variety of sources. This typically involves data generated by an economic operator (such as quantities of material or energy used or produced) and data acquired from external sources (such as the GHG balance of material or energy used or produced).

Data generated by the economic operator shall be supported by appropriate records so that they can be audited and verified.

Data associated with imported material and energy streams will often be obtained from the supplier. Care shall be taken that such data is fit for purpose, well documented and transparent.

Literature data shall be fit-for-purpose and obtained from well documented, transparent and publicly available sources. In particular it should be as recent as possible and, where relevant, be applicable to the geographical area where the activity takes place.

Generally, data is used for calculations covering a certain period of time as stipulated by the chain of custody scheme (see Clause 6). This may correspond to the production of a product consignment or, for continuous operations, to a given period of time. For data such as physical properties (e.g. heating value, carbon content etc.) the value used shall be close to the weighted average during the period i.e. the variability of such data within the time period shall be taken into account.

## 4.4 Units and symbols

This standard does not specify the units to be used by economic operators to perform calculations and express results. Different trades associated with different steps of biofuel/bioliquid production and transport chain commonly use specific units which are widely accepted and understood within that community and such units may be used.

The only mandated unit is for the overall GHG balance of the biofuel/bioliquid that shall be expressed in g CO<sub>2eq</sub> / MJ of the biofuel/bioliquid.

However, units used within a calculation algorithm shall in all cases be clearly stated and be mutually consistent. Table 1 gives the recommended units and symbols.

**Table 1 — Recommended units and symbols**

Item	Symbol	Recommended unit	Symbol
Land area	<i>A</i>	Hectare	ha
Material quantity (mass)	<i>Q<sub>m</sub></i>	Metric tonne, kilogram	t, kg
Material quantity (volume)	<i>Q<sub>v</sub></i>	Cubic metre, Litre	m <sup>3</sup> , l
Energy	<i>ε</i>	Mega- or Giga-Joule	MJ, GJ
Specific Energy	<i>ε<sub>s</sub></i>	Mega- or Giga-Joule per unit of the item to which the energy is attached	MJ, GJ / unit
GHG emissions	<i>C</i>	Gram/Kilogram/Tonne CO <sub>2eq</sub>	g/kg/t CO <sub>2eq</sub>
GHG emissions per unit of land area	<i>Cl</i>	Gram/Kilogram/Tonne CO <sub>2eq</sub> per hectare	g/kg/t CO <sub>2eq</sub> /ha
GHG specific emissions or emission factor	<i>F</i>	Any combination of GHG emissions per unit mass, volume of energy	g/kg/t CO <sub>2eq</sub> / unit
Lower heating value	<i>LHV</i>	Megajoule/ kilogram or Gigajoule/tonne	MJ/kg, GJ/t
Distance (land)	<i>D</i>	Kilometre	km
Distance (sea)	<i>D</i>	Nautical mile	nM

#### 4.5 Common basis for GHG emission terms

In Annex V of the RED, the total GHG emissions from the use of a biofuel/bioliquid *E*, expressed per MJ of the biofuel/bioliquid, is expressed by the following formula:

$$E = e_{ec} + e_l + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr} - e_{ee} \quad (2)$$

where

- e<sub>ec</sub>* are the emissions from the extraction or cultivation of raw materials;
- e<sub>l</sub>* are the annualised emissions from carbon stock changes caused by land-use change;
- e<sub>p</sub>* are the emissions from processing;
- e<sub>td</sub>* are the emissions from transport and distribution;
- e<sub>u</sub>* are the emissions from the fuel in use which shall be taken to be zero for biofuels and bioliquids
- e<sub>sca</sub>* are the emission saving from soil carbon accumulation via improved agricultural management;
- e<sub>ccs</sub>* are the emission saving from carbon capture and geological storage;
- e<sub>ccr</sub>* are the emission saving from carbon capture and replacement; and
- e<sub>ee</sub>* are the emission saving from excess electricity from cogeneration.

"e"- terms are emissions incurred at various steps of the chain (see also Clause 5). This formulation implies that all "e" terms are expressed per unit of the biofuel/bioliquid (e.g. in g CO<sub>2eq</sub> / MJ). In practice the GHG emissions associated with each individual step of the biofuel/bioliquid production and transport chain cannot be immediately expressed per unit of the biofuel/bioliquid inasmuch as the exact fate of the product from this particular step is not known at the point of production. In this standard the GHG emissions associated with