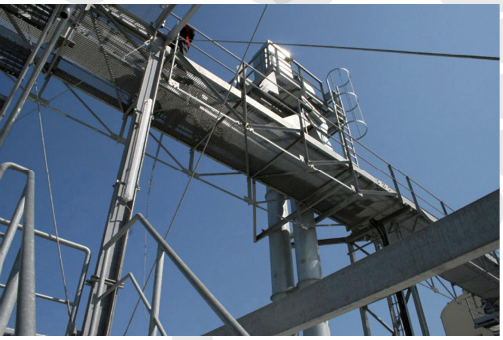
BIOGRACE

Harmonised Calculations of
Biofuel Greenhouse Gas Emissions in Europe



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BioGrace calculation rules

Version 1b

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Content

1 Introduction

The BioGrace GHG calculation tool allows reproduction of the calculation of the Annex V default values of the Renewable Energy Directive (2009/28/EC) (RED) for biofuel production pathways as well as to perform individually adapted calculations. The calculations use the BioGrace list of standard values and follow the methodology laid down in the RED.

The calculation rules that are listed below in this document apply for adapted calculations in the BioGrace tool, when calculating new pathways, new processes or for new inputs in the tool. The calculation rules form integral part of this calculation tool: when using the tool the calculation rules must be respected.

The BioGrace GHG calculation rules are fully in line with the methodology as given in Annex V.C of the RED and in the communication from the European Commission: Communication on the practical implementation of the EU biofuels and bioliquids sustainability scheme and on counting rules for biofuels [OJ C160, page 8]

In general, the BioGrace GHG calculation rules are in line with the standard that is prepared under CEN TC 383 "Sustainably produced biomass for energy use" – Working Group 2 "Calculation for the GHG emission balance, fossil fuel balance and respective calculations, using a life cycle approach". As this standard will not be published before end of 2011, in this document no reference will be made to the CEN TC383 draft standard on GHG calculation. Quite a number of the topics addressed in the BioGrace calculation rules are also addressed in the CEN TC 383 draft standard.

1.1 Updates of this document

For the few items where the BioGrace calculation rules differ from the CEN standard under preparation, additional work on harmonising these rules will take place. This might cause that the BioGrace GHG calculation rules will be updated in the future. Another cause for update might be the process of having the BioGrace GHG calculation tool accepted as a voluntary tool by the European Commission, or when the methodology in Annex V is updated, according to the RED article 19.7 .

2 General

2.1 BioGrace calculation rules in relation to calculation rules in other voluntary schemes

The following two rules apply when the BioGrace GHG tool is used to show compliance with sustainability criteria as defined in national legislation implementing the RED and FQD sustainability criteria:

2.1.1 BioGrace calculation rules prevail above rules in other (voluntary/national) schemes

If the BioGrace GHG tool is used in combination with another voluntary scheme or national scheme, then the BioGrace calculation rules prevail above calculation rules that are formulated in the voluntary scheme or the national scheme.

2.1.2 Actual calculations shall be made using "track changes"

When actual calculations are made to show compliance with the RED/FQD GHG criteria[1], then the calculations shall be made with the "track changes" option of the BioGrace GHG calculation tool turned on. This will allow an auditor that will check the calculations to easily find the actual input numbers that were used for the calculation.

2.2 Standard Values

2.2.1 BioGrace harmonised list of standard values

Standard values are values needed to convert input data into GHG emissions[2]. Standard values shall be taken from the harmonised list of standard values[3] unless:

1. For inputs, (by-/co-)products, process related emissions and transport modes not listed on the harmonised list of standard values,
    - reliable information (literature, database) is given showing where these standard values were obtained; and auditors are allowed and are able to verify this information conform RED Article 18.3.

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[1]: Show compliance with the GHG reduction targets of national legislation implementing RED article 17(2) and FQD article 7b(2)

[2]: Examples are Lower Heating Values and values to convert 1 kg N-fertiliser or 1 MJ of natural gas into CO_2, CH_4 and N_2O emissions. Some of the standard values have also been calculated using LCA analysis of both the processes that supply the inputs (like N-fertiliser and natural gas) and their emissions at combustion

[3]: The list of standard values is available on the sheet "Standard values" in the BioGrace GHG Excel tool and is also available on-line both in Excel and Word versions at http://www.biograce.net/content/ghgcalculationtools/standardvalues.

2. For inputs, (by-/co-)products, process related emissions and transport modes that are listed[4] on the harmonised list of standard values

   - these standard values are explicitly named together with the result of the calculation; and reliable information is documented[5], conform RED article 18.3, showing how these values were determined; and it is shown that this input was used in the production of the biofuels for which the GHG calculation was made[6]; and auditors are allowed and are able to verify this information conform RED Article 18.3.

   - the use of this alternative standard value does not contradict any other calculation rule. In case of contradiction the other calculation rule prevails over this rule on use of alternative standard values. This can for instance be the case for electricity (see chapter 6.1), and for heat (see chapter 4.5)

2.2.2 BioGrace list of additional standard values

BioGrace has developed a list of additional standard values. When using a standard value that does not come from the BioGrace list of standard values, it is recommended to take a number from this list of additional standard values - if available on this list - and to include the reference that is given in this list as reliable information on how the value was determined. Doing so, still the rules above (under points 1 and 2) shall be respected.

2.2.3 Standard value for fertilizer

The standard value for a fertilizer in the list of BioGrace standard values can only be used when making a calculation **using regional averaged input data** for cultivation.

When making an actual calculation for cultivation with **input data at the farm-level** and the **fertilizer type is *known*** the standard value for this specific type of fertilizer shall be applied (for instance by using a value from the BioGrace list of additional standard values).

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[4]: "listed" means "listed as such" or "listed as a similar input". Example 1: using another value for "N-fertiliser" equals taking another value for a standard value from the list of harmonised standard values (as N-fertiliser is listed), so the rules under point 2 have to be followed. Example 2: if a farmer uses urea as a fertiliser, then there is a "similar input" on the list of standard values, which is "N-fertiliser". Therefore, also in this example "urea as a fertiliser" the rules under point 2 shall be followed.

[5]: (Reference to) an LCA analysis on the provision of the input is provided. In case of reference, the study shall be public. The LCA study must be scientifically sound and shall give the actual emission per MJ or kg of input material or per km and ton of goods transported.

[6]: For instance: when a specific type of N-fertiliser is used, then this shall be demonstrated by evidence that an auditor can check. For instance, a farmer must be able to show the purchase bills mentioning the specific fertiliser, or a farmer's association must be able to show the contracts for delivery of the specific fertiliser to a group of farmers.

When making an actual calculation for cultivation with **input data at the farm-level** and the **fertilizer type is *unknown*** the **highest standard value for that fertilizer shall be applied**. The highest values from the BioGrace list of standard values or additional standard values are:

N-fertilizer	2581 g CO_2/(kg N)	5,6 g CH_4/(kg N)	23,1 g N_2O/(kg N)	9606 g CO_{2eq}/(kg N)
P-fertilizer	1457 g CO_2/(kg P_2O_5)	2,8 g CH_4/(kg P_2O_5)	0,0 g N_2O/(kg P_2O_5)	1527 g CO_{2eq}/(kg P_2O_5)
K-fertilizer	536,3 g CO_2/(kg K_2O)	1,6 g CH_4/(kg K_2O)	0,012 g N_2O/(kg K_2O)	579,2 g CO_{2eq}/(kg K_2O)

Table 1: highest values for N-, P- and K-fertiliser from the BioGrace list of standard values or the BioGrace additional standard values

2.3 Cut-off criteria

[RED, Annex V, point 1], Emissions from the manufacture of machinery and equipment shall not be taken into account.

[OJ C160, page 8], page 11: It would not seem necessary to include in the calculation inputs which will have little or no effect on the result, such as chemicals used in low amounts in processing.

All emissions from processes and products used and associated with the system the economic operator has defined must be included in the GHG calculation. However, if the contribution of that input or process to the total emissions of the biofuel pathway is lower than 0.1 g $CO_{2,eq}$/MJ biofuel, it may be excluded.

As to avoid that a calculation, including finding a standard value, would be needed to show that the contribution is lower than 0.1 g $CO_{2,eq}$/MJ biofuel, this calculation rule can be complied with in the following way :

1. If an input is smaller than the mass or energy threshold[7] in table 1 below (in the same units as to be inputted in the BioGrace GHG excel tool), than the contribution of the input may be excluded;
2. If there are several inputs that are relatively small, the sum of the inputs shall be below the mass or energy threshold to allow exclusion of the contribution of the inputs.
3. If the input is larger than the mass or energy threshold but it can be argued - for instance using standard values for similar inputs or using standard values that can be argued to be higher than

[7]: The mass and energy thresholds were determined using the BioGrace tool in combination with the highest standard values from the list of standard values, expressed in g $CO_{2,eq}$/kg input and in g $CO_{2,eq}$/MJ input (pesticides and electricity from lignite, respectively). In combination with these standard values, an input which is smaller than the mass or energy threshold gives an emission lower than 0.1 g $CO_{2,eq}$/MJbiofuel

the standard values for the input - that the emission of the input is below the 0.1 g $CO_{2,eq}$/MJ biofuel, then the contribution of the input may be excluded.

4. If there are several small inputs this shall be demonstrated for the sum of the inputs for which the contribution is to be excluded.

Mass or energy threshold		
0,000005	kg/MJ	(this is equal to 0,005 g/MJ)
0,0002	MJ/MJ	(this is equal to 0,2 kJ/MJ)
10	MJ ha^{-1} $year^{-1}$	
0,3	kg ha^{-1} $year^{-1}$	

Table 2: mass or energy threshold

2.4 Combining disaggregated default values and actual values

[RED, Article 19.1]

For the purposes of Article 17(2), the greenhouse gas emission saving from the use of biofuel and bioliquids shall be calculated as follows:

(a) where a default value for greenhouse gas emission saving for the production pathway is laid down in part A or B of Annex V and where the el value for those biofuels or bioliquids calculated in accordance with point 7 of part C of Annex V is equal to or less than zero, by using that default value;

(b) by using an actual value calculated in accordance with the methodology laid down in part C of Annex V; or

(c) by using a value calculated as the sum of the factors of the formula referred to in point 1 of part C of Annex V, where disaggregated default values in part D or E of Annex V may be used for some factors, and actual values, calculated in accordance with the methodology laid down in part C of Annex V, for all other factors.

A user may calculate greenhouse gas emissions of his biofuels by using disaggregated default values for cultivation, processing and/or transport. In the BioGrace GHG calculation tool, this can be done by choosing “A” or “D” in the box next to the calculation result for cultivation, processing and transport.

2.5 Use of starting values in the BioGrace GHG calculation tool

When the BioGrace GHG calculation tool is downloaded, it contains starting values in the white boxes. These starting values are the values that have been used to calculate the RED default values, as is demonstrated by the tool. Actual GHG values can be calculated by replacing the starting values with actual input vales.

When changing a starting value into an actual value, all other starting values in that step shall be changed into actual values as well.

Example: when a user gives an actual value for the yield, also actual input values must be given for all the other input values in the cultivation of the feedstock, which are (amongst others) the moisture content of the crop, the amount of diesel used, the amount of (N-, P-, K- and Ca-) fertiliser used, the amount of seed material and pesticides used, and the field N2O emission. If the next step is related to feedstock production but is defined as a separate step (eg. "Feedstock drying" in the production of FAME from rapeseed) then the starting values of this step might be kept when changing the starting values in the step "Cultivation of feedstock".

In the following cases it is allowed to keep starting values when calculating actual GHG values:

- When using a disaggregated default value for the step in which the input value is used. In this case, the disaggregated default value overwrites the part of the calculation result in which the starting values are used.

  Example: A producer of FAME from rapeseed may use the disaggregated default value for the cultivation step of rape seed and actual values for the processing steps. In this case the starting values in the cultivation step can be left unchanged as the result for the cultivation part is not used as it is replaced by the disaggregated default value for cultivation.

- When the disaggregated default value is the result of the calculation of multiple steps in the biofuel production pathway. In this case, all starting values for at least one of the steps shall be replaced by actual values. For the other steps it is allowed to keep all starting values. Within a step it is not allowed to replace only some of the starting values by actual input values.

  Example: A user can give actual input values for the step "oil mill" as part of FAME production process, but keep the starting values for the steps "refining" and "esterification". He may also take actual input values for the first transport step (e.g. "transport of fresh fruit bunches") but keep the starting values for the following transport steps (e.g. "transport of palm oil via ship to Europe").

- In case the BioGrace calculation tool is used to make calculations for new biofuel production pathways (so pathways for which no default values are given in RED Annex V), starting values may be kept for:
  - the cultivation, handling & storage and the transport of the feedstock in case the feedstock is identical as in a biofuel production pathway for which a default value is given;
  - transport of the biofuel to and from depot; and filling station.

2.5.1 Starting value for Grain losses

The starting values for grain losses may be kept for all production chains when making actual calculations in all cases.

3 Cultivation

3.1 Field N_2O emissions

[OJ C160, page 8], page 15: An appropriate way to take into account N_2O emissions from soils is the IPCC methodology, including what are described there as both 'direct' and 'indirect' N_2O emissions . All three IPCC tiers could be used by economic operators.

When calculating emissions of N_2O from cultivation, both direct and indirect emissions shall be included.

For this calculation one of the methods laid down in the IPCC guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 11 (2006) tier one, two or three shall be used. The data established in this methodology is to be used when calculating field N_2O emissions.

A tool for this is included in the BioGrace Excel sheet.

3.2 Use of average values

[OJ C160, page 8], page 15: The methodology for 'cultivation' allows — as an alternative to actual values — for the use of averages for smaller geographical areas than those used in the calculation of the default values. The default values were (with one exception) calculated for a global level. However, within the EU, the Directive places restrictions on their use. These restrictions operate at the level of NUTS 2 areas. It seems to follow that within the EU, the averages shall be for NUTS 2 areas or for a more fine-grained level. A similar level would logically also be appropriate outside the EU.

For cultivation, it is allowed to use average values for geographical areas at the level of NUTS-2 areas or more fine-grained level. In the reports that had to be prepared in accordance with RED article 19.2, member states have listed average GHG emission values at such levels. These values are, however, calculated in different member states and the calculation of some values might not have been done in accordance with the BioGrace calculation rules. It is therefore not allowed in the BioGrace calculations to use the GHG emission results from these reports directly. However, the input data, for example yield and amount of N-fertilizer, may be used if they are complete. In the calculation, the appropriate standard value from the BioGrace list shall be applied. The studies according to article 19.2 can be found on the EC Transparency platform.

If different feedstocks or feedstocks with different sustainability characteristics are used together in a biofuel process it is not allowed to make calculations based on averages of their different sustainability characteristics. For each feedstock with different sustainability characteristics a separate calculation has to be made.

3.3 Non artificial fertilizer

[RED, Annex V, point 18] Wastes, agricultural crop residues, including straw, bagasse, husks, cobs and nut shells, and residues from processing, including crude glycerine (glycerine that is not refined), shall be considered to have zero life-cycle greenhouse gas emissions up to the process of collection of those materials.

[OJ C160, page 8]

- Page 16: No emissions shall be allocated to agricultural crop residues and processing residues, since they are considered to have zero emissions until the point of their collection. Similarly, when these materials are used as feedstock they start with zero emissions at the point of collection.
- Page 13: Examples of residues include crude glycerine, tall oil pitch and manure.

GHG emissions from a non-artificial fertiliser consist of emissions from its production and from its use. No emissions are allocated to the production of manure until the point of collection. However when field N_2O emissions are calculated, the contribution from manure is to be included according to IPCC tier 1 (see 3.1 above). The CH_4 emission from unfermented manure shall also be considered.

3.4 Actual input data for use of fertilizers

If a GHG calculation is made using actual input data for mineral and/or organic fertilizers, then all mineral and organic fertilizers shall be taken into account that were used between the harvest of the previous crop and the harvest of the crop that is input for the calculation.

4 Processing

4.1 Allocation

4.1.1 Energy allocation

[RED, Annex V, point 17] Where a fuel production process produces, in combination, the fuel for which emissions are being calculated and one or more other products (co-products), greenhouse gas emissions shall be divided between the fuel or its intermediate product and the co-products in proportion to their energy content (determined by lower heating value in the case of co-products other than electricity).

[OJ C160, page 8], page 16:

- The lower heating value used in applying this rule shall be that of the entire (co-)product, not of only the dry fraction of it. In many cases, however, notably in relation to nearly-dry products, the latter could give a result that is an adequate approximation.
- Since heat does not have a lower heating value no emissions can be allocated to it on that basis.

If a production process produces both the biofuel for which total emissions are calculated and one or more co-products, the emissions have to be allocated between the fuel and its co-products in relation the lower heating value (LHV) of the products.

The lower heating value to be used is the LHV for the whole product and not just the dry part of it. The wet content of the product shall be included. For products with a moisture content of 10 % or lower, an approximation to dry product is allowed.

No emissions can be allocated to heat.

For calculating the allocated emissions for each of the products, the lower heating values included in the BioGrace list of standard values shall be used.

For calculating the LHV for the wet content of the stream, the following formula shall be used:

$$LHV = LHV_{dry}\left(\frac{100-\%W}{100}\right) - \left(\frac{\%W \cdot 2{,}44}{100}\right)$$

LHV_{dry} is the LHV of the dry matter expressed in MJ/kg (as listed in the list of standard values)

$2{,}44$ is the latent heat of vaporisation of water at 25°C expressed in MJ/kg

$\%W$ is the mass percentage of water in the stream (material)

4.1.2 Allocation between co-products and the fuel

[RED, Annex V, point 18]: In the case of fuels produced in refineries, the unit of analysis for the purposes of the calculation [allocation][shall be the refinery.

[OJ C160, page 8], page 16: Allocation should be applied directly after a co-product (a substance that would normally be storable or tradable) and biofuel/bioliquid/intermediate product are produced at a process step. This can be a process step within a plant after which further 'downstream' processing takes place, for either product. However, if downstream processing of the (co-) products concerned is interlinked (by material or energy feedback loops) with any upstream part of the processing, the system is considered a 'refinery' and allocation is applied at the points where each product has no further downstream processing that is interlinked by material or energy feedback-loops with any upstream part of the processing.

When allocating emissions between co-products and the fuel, the emissions to be allocated are the emissions that arise up and until the process step where a co-product is formed. The allocation takes place after the process step directly after the forming of a co-product. When leaving a process, the co-product takes the allocated emissions with it, see figure 1 below.

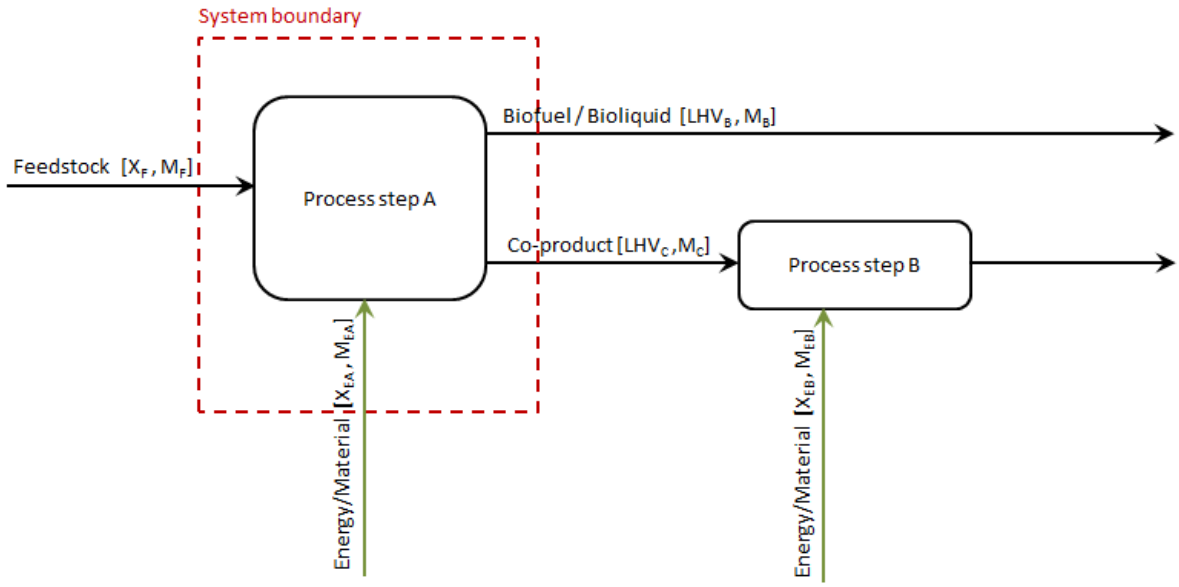

Figure 1 - Allocation takes place after the process step where the biofuel and the co-product are separated.

The following acronyms refer to Figure 1 as well as to the equations below:

E: energy

M: material

X: the emissions connected to respectively stream expressed per mass (CO_{2eq}/kg)

M: the quantity of respectively stream (kg)

LHV: the lower heating value expressed per mass (MJ/kg)

GHG emissions allocated to the biofuel when leaving the process:

$$X_B = \frac{LHV_B \cdot M_B}{((LHV_B \cdot M_B) + (LHV_C \cdot M_C))} \cdot \left((X_F \cdot M_F) + (X_{EA} \cdot M_{EA})\right)$$

GHG emissions allocated to the co-product:

$$X_C = \frac{LHV_C \cdot M_C}{((LHV_B \cdot M_B) + (LHV_C \cdot M_C))} \cdot \left((X_F \cdot M_F) + (X_{EA} \cdot M_{EA})\right) + (X_{EB} \cdot M_{EB})$$

If processing of co-products and/or the fuel is interlinked with feedback loops with earlier steps in the production process, the production process is defined as a refinery. Allocation from the emissions then takes place after the step where no more feedback loops interlink with earlier parts in the process, see figure 2 below.

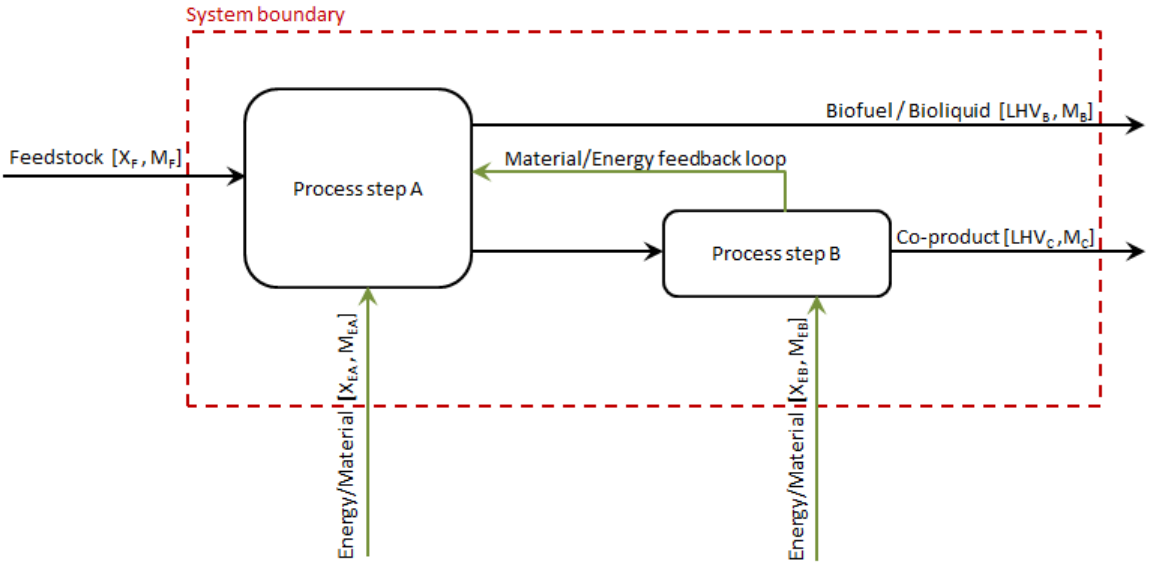

Figure 2: Feedback loop of energy or material in the biofuel production system, considered a "refinery". Allocation takes place where no more feedback loops occur.

The following acronyms refer to Figure 2 as well as to the equations below:

E: energy

M: material

X: the emissions connected to respective stream expressed per mass (CO_{2eq}/kg)

M: the quantity of respective stream (kg)

LHV: the lower heating value expressed per mass (MJ/kg)

GHG emissions allocated to the biofuel when leaving the process:

$$X_B = \frac{LHV_B \cdot M_B}{\left((LHV_B \cdot M_B) + (LHV_C \cdot M_C)\right)} \cdot \left((X_F \cdot M_F) + (X_{EA} \cdot M_{EA}) + (X_{EB} \cdot M_{EB})\right)$$

GHG emissions allocated to the co-product:

$$X_C = \frac{LHV_C \cdot M_C}{\left((LHV_B \cdot M_B) + (LHV_C \cdot M_C)\right)} \cdot \left((X_F \cdot M_F) + (X_{EA} \cdot M_{EA}) + (X_{EB} \cdot M_{EB})\right)$$

4.2 Electricity Use

[RED, Annex V, point 11]: In accounting for the consumption of electricity not produced within the fuel production plant, the greenhouse gas emission intensity of the production and distribution of that electricity shall be assumed to be equal to the average emission intensity of the production and distribution of electricity in a defined region. By derogation from this rule, producers may use an average value for an individual electricity production plant for electricity produced by that plant, if that plant is not connected to the electricity grid.

[OJ C160, page 8], page 16: The Directive requires the use of the average emission intensity for a 'defined region'. In the case of the EU the most logical choice is the whole EU. In the case of third countries, where grids are often less linked-up across borders, the national average could be the appropriate choice.

Emissions calculated from grid electricity in Europe shall be an average for the EU. For a third country, the average for that country shall be used. These values can be taken from the BioGrace list of additional standard values.

For third countries: only in case the BioGrace list of additional standard values does not contain an average value for the national grid and such a value cannot be obtained from other sources, it is allowed to use the average for the regional electricity mix in the BioGrace list of additional standard values.

Average emissions from a power plant can be applied only if the power plant is not connected with the grid.

It is not allowed to decrease the GHG emissions of electricity used by buying green certificates from a Green certificate scheme.

4.3 Emissions of N_2O, CH_4 and CO_2 from the production unit

[RED, Annex V, C],

- Point 1: Greenhouse gas emissions from the production and use of transport fuels, biofuels and bioliquids shall be calculated as:$E = e_{ec} + el + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr} - e_{ee}$,
- Point 5: The greenhouse gases taken into account for the purposes of point 1 shall be CO_2, N_2O and CH_4.

The GHG emissions include emissions from combustion of fossil fuels as well as any venting of methane and nitrous oxide to the atmosphere occurring during the process.

4.4 Handling of residues and waste

[RED, Annex V, point 18: Wastes, agricultural crop residues, including straw, bagasse, husks, cobs and nut shells, and residues from processing, including crude glycerine (glycerine that is not refined), shall be considered to have zero life-cycle greenhouse gas emissions up to the process of collection of those materials.

[OJ C160, page 8], page 13

- a processing residue is a substance that is not the end product that a production process directly seeks to produce. It is not a primary aim of the production process and the process has not been deliberately modified to produce it.
- waste can be understood as any substance or object which the holder discards or intends or is required to discard . Raw materials that have been intentionally modified to count as waste (e.g. by adding waste material to a material that was not waste) should not be considered as qualifying.

All operations that need to be carried out in order to dispose all waste and residues are included in the allocation between the biofuel and the co-products. Waste and residues leave the system without any GHG emissions.

Waste and residues used for biofuel production have zero GHG emissions up and until the point of collection. If the waste or residue need further processing before it can be used in the biofuel process, the emissions from that processing are to be allocated to that waste or residue.

4.5 Emissions from process heat

Waste heat is considered to have an emission factor of zero. This is because this energy – if not used in the biofuel production – will in most cases not be used elsewhere.

When calculating emissions from energy input from solid biomass or biomass derived fuels, the standard value for “average biomass“ in the BioGrace list of additional standard values is recommended to be applied (see chapter 2.2).

5 Land use change

[RED, Annex V, C]:

- Point 7Annualised emissions from carbon stock changes caused by land-use change, el, shall be calculated by dividing total emissions equally over 20 years.
- Point 10: The Commission guidelines shall serve as the basis for the calculation of land carbon stocks for the purposes of this Directive.

[OJ C160, page 8], page 13Land-use change should be understood as referring to changes in terms of land cover between the six land categories used by the IPCC (forest land, grassland, cropland, wetlands, settlements and other land) plus a seventh category of perennial crops, i.e. multi-annual crops whose stem is usually not annually harvested such as short rotation coppice and oil palm.

For determining if the bonus for restored degraded land 29 g CO_{2eq}/MJ shall apply, the definitions laid down by the COM of degraded land and heavily contaminated land must be considered[8]. For the calculation of carbon stock emissions from land use change, the rules lain down in Commission decision on guidelines for the calculation of land carbon stocks for the purpose of Annex V of Directive 2009/28/EC [OJ L151, page 19] shall be used. A template for this is included in the BioGrace Excel sheet.

[8] The Commission has not yet defined degraded land or heavily contaminated land (March 2011)

6 Emission savings

6.1 Excess electricity

[RED, Annex V, point 16,]: Emission saving from excess electricity from cogeneration, eee, shall be taken into account in relation to the excess electricity produced by fuel production systems that use cogeneration except where the fuel used for the cogeneration is a co-product other than an agricultural crop residue. In accounting for that excess electricity, the size of the cogeneration unit shall be assumed to be the minimum necessary for the cogeneration unit to supply the heat that is needed to produce the fuel. The greenhouse gas emission saving associated with that excess electricity shall be taken to be equal to the amount of greenhouse gas that would be emitted when an equal amount of electricity was generated in a power plant using the same fuel as the cogeneration unit.

[OJ C160, page 8], page 16

The general allocation rule in point 17 [in RED]does not apply for electricity from CHP when the CHP runs on (i) fossil fuels; (ii) bioenergy, where this is not a co-product from the same process; or (iii) agricultural crop residues, even if they are a co-product from the same process. Instead, the rule in point 16[in RED] applies as follows:

(a) Where the CHP supplies heat not only to the biofuel/bioliquid process but also for other purposes, the size of the CHP should be notionally reduced for the calculation to the size that is necessary to supply only the heat necessary for the biofuel/bioliquid process. The primary electricity output of the CHP should be notionally reduced in proportion.

(b) To the amount of electricity that remains after this notional adjustment and after covering any actual internal electricity needs a greenhouse gas credit should be assigned that should be subtracted from the processing emissions.

(c) The amount of this benefit is equal to the life cycle emissions attributable to the production of an equal amount of electricity from the same type of fuel in a power plant.

If the process heat used in the biofuel/bioliquid facility is produced by a CHP process, emissions from excess electricity shall be subtracted from the total emissions of the biofuel, for all fuels to the CHP process except from co-products from the biofuel production process.

Excess electricity produced in a cogeneration plant (producing both heat and electricity) is considered to be the electricity produced in proportion to the heat needed in the biofuel production process. The size of the emissions saving shall be the same as the life cycle emissions that would arise if the same amount of electricity was produced in a power plant with the same fuel.

For any electricity produced in the biofuel production plant but not produced by co-generation, the allocation rule given in chapter 4.1 shall apply.

6.2 Soil carbon accumulation via improved agricultural methods

[OJ C160, page 8], page 15 The emission savings in terms of g $CO_{2,eq}$/MJ can be calculated by using a formula as indicated in point 7 of the method, replacing the divisor '20' by the period (in years) of cultivation of the crops concerned.

When calculating soil carbon accumulation due to improved agricultural methods, the method in chapter 6 for land use change shall be applied. The emissions shall be divided over 20 years.

BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Align biofuel GHG emission calculations in Europe (BioGrace)

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