BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Introduction to the project BioGrace

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Agentschap NL
Public workshop Utrecht
March 21, 2011

Contents

Introduction

GHG calculations under Renewable Energy Directive (RED) and Fuel Quality Directive (FQD)

- RED and FQD: same sustainability criteria including GHG
- RED article 19:
  - Economic operators may use
    - default values (19.1.a)
    - actual values calculated according to Annex V.C (19.1.b)
    - sum of actual value and disaggregated default value (19.1.c)
  - In Europe default values only when feedstock is produced in area on list (19.2) or from waste/residue
- RED article 18:
  - Independent auditors must check information (18.3)
  - Can be part of voluntary certification schemes (18.4)

Introduction

- o Input data
- o Standard values ("conversion factors")

Cultivation of rapeseed			Calculated emissions			
Yield			**Emissions per MJ FAME**			
			g CO_2	g CH_4	g N_2O	g $CO_{2,\,eq}$
Rapeseed	3.113	kg ha^{-1} $year^{-1}$				
Moisture content	10,0%					
By-product Straw	n/a	kg ha^{-1} $year^{-1}$				
Energy consumption						
Diesel	2.963	MJ ha^{-1} $year^{-1}$	6,07	0,00	0,00	6,07
Agro chemicals						
N-fertiliser	137,4	kg N ha^{-1} $year^{-1}$	9,08	0,03	0,03	18,89
CaO-fertiliser	19,0	kg CaO ha^{-1} $year^{-1}$	0,05	0,00	0,00	0,06
K_2O-fe						
P_2O_5-						
Pestic						
Seeding material						
Seeds- rapeseed	6	kg ha^{-1} $year^{-1}$	0,06	0,00	0,00	0,10

STANDARD VALUES		GHG emission coefficient			
	parameter: unit:	gCO_2/kg	gCH_4/kg	gN_2O/kg	$gCO_{2\text{-}eq}/kg$
N-fertiliser		2827,0	8,68	9,6418	5880,6

Contents

Why harmonisation of biofuel GHG calculations?

1. Significant variation possible in actual GHG values (RED 19.1.b) following RED Annex V.C
   - Using same input values
   - Caused by variation in standard values (or "conversion factors" / "background processes") to convert kg, MJ or m^3 into $CO_{2,eq}$
2. This causes a problem using actual GHG values
   - Auditors can not check if standard values are correct
   - Economic operations can enhance the GHG performance of their biofuel without decreasing actual GHG emissions
3. Three possible solutions were discussed
4. Several GHG experts and MS policy makers…
   - …agree that harmonisation of standard values is best solution
   - …intend to implement this solution

Why harmonisation of biofuel GHG calculations?

EXAMPLE 1: Different results from same biofuel (same input values but different standard values)

Production of FAME from Rapeseed

Overview Results

Parameter

Nitrogen Fertilizer

P fertilizer

K fertilizer

CaO fertilizer (85%CaCO3+15%CaO,Ca(O

Pesticides

Diesel (direct plus indirect emissions)

Natural gas (direct plus indirect emissions)

Methanol (direct plus indirect emissions)

Production of FAME from Rapeseed

Overview Results

All results in g $CO_{2,eq}$ / MJ $_{FAME}$	Total	Default values RED Annex V.D
Cultivation e_{ec}	**27,7**	**29**
Cultivation of rapeseed	**27,29**	28,51
Rapeseed drying	**0,42**	0,42
Processing e_p	**16,5**	**22**
Extraction of oil	**3,29**	3,82
Refining of vegetable oil	**0,85**	17,88
Esterification	**12,39**	
Transport e_{td}	**1,3**	**1**
Transport of rapeseed	**0,15**	0,17
Transport of FAME	**0,73**	0,82
Filling station	**0,44**	0,44
Land use change e_l	**0,0**	0
$e_{sca} + e_{ccr} + e_{ccs}$	**0,0**	0
Totals	**45,6**	**52**

Emission reduction
Fossil fuel reference (diesel)
83,8 g $CO_{2,eq}$/MJ
GHG emission reduction
46%

Why harmonisation of biofuel GHG calculations?

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2. This causes a problem using actual GHG values
   - Auditors can not check if standard values are correct
   - Economic operations can enhance the GHG performance of their biofuel without decreasing actual GHG emissions
3. Three possible solutions were discussed, of which two theoretical
4. Several GHG experts and MS policy makers…
   - …agree that harmonisation of standard values is best solution
   - …intend to implement this solution

Formulation of project BioGrace

1. Dresden workshop (June 2, 2009) led to project
   - based on finding that harmonisation is needed
   - initiated by advisors to governments with expertise on GHG calculations (IFEU, RFA, SenterNovem = NL Agency)
2. Project received letters of support from governments
   - France, Germany, Netherlands, Spain, UK
3. Proposal for subsidy from “Intelligent Energy Europe”
   - Advantage: funding from EC
   - Disadvantage: long lead time (submission end of June 2009, start project in April 2010)
4. Work was already started 2nd half of 2009
   - Because of tight timeline implementation RED
5. Final preparation of project
   - Contract negotiation Dec. 2009 – March 2010

Contents

Project BioGrace

Biofuel **Gr**eenhouse Gas emissions:
alignment of **c**alculations in **E**urope

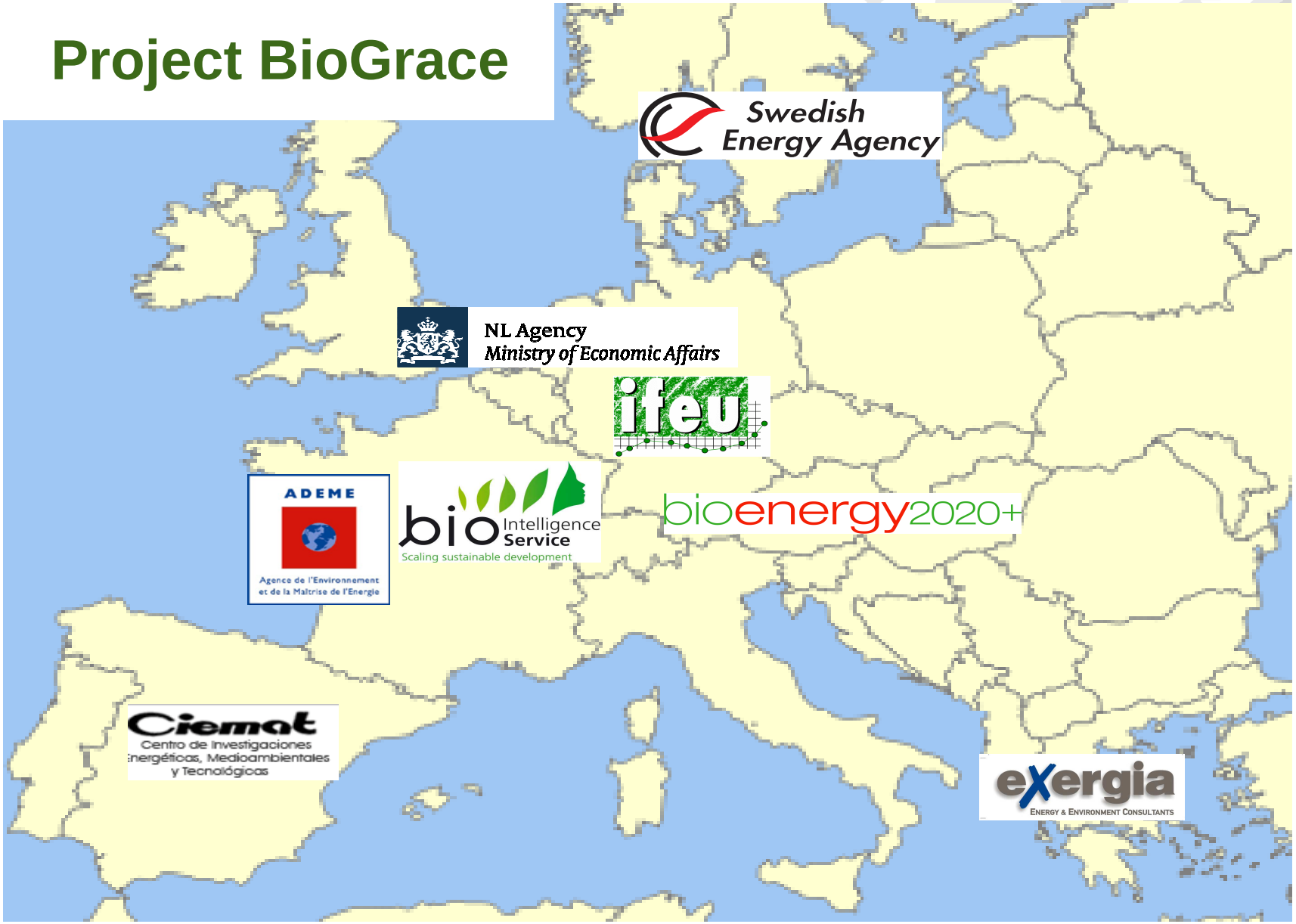
Aim of project:

- Harmonise calculations of biofuel greenhouse gas (GHG) emissions performed in EU-27 under legislation implementing the Renewable Energy and Fuel Quality directives

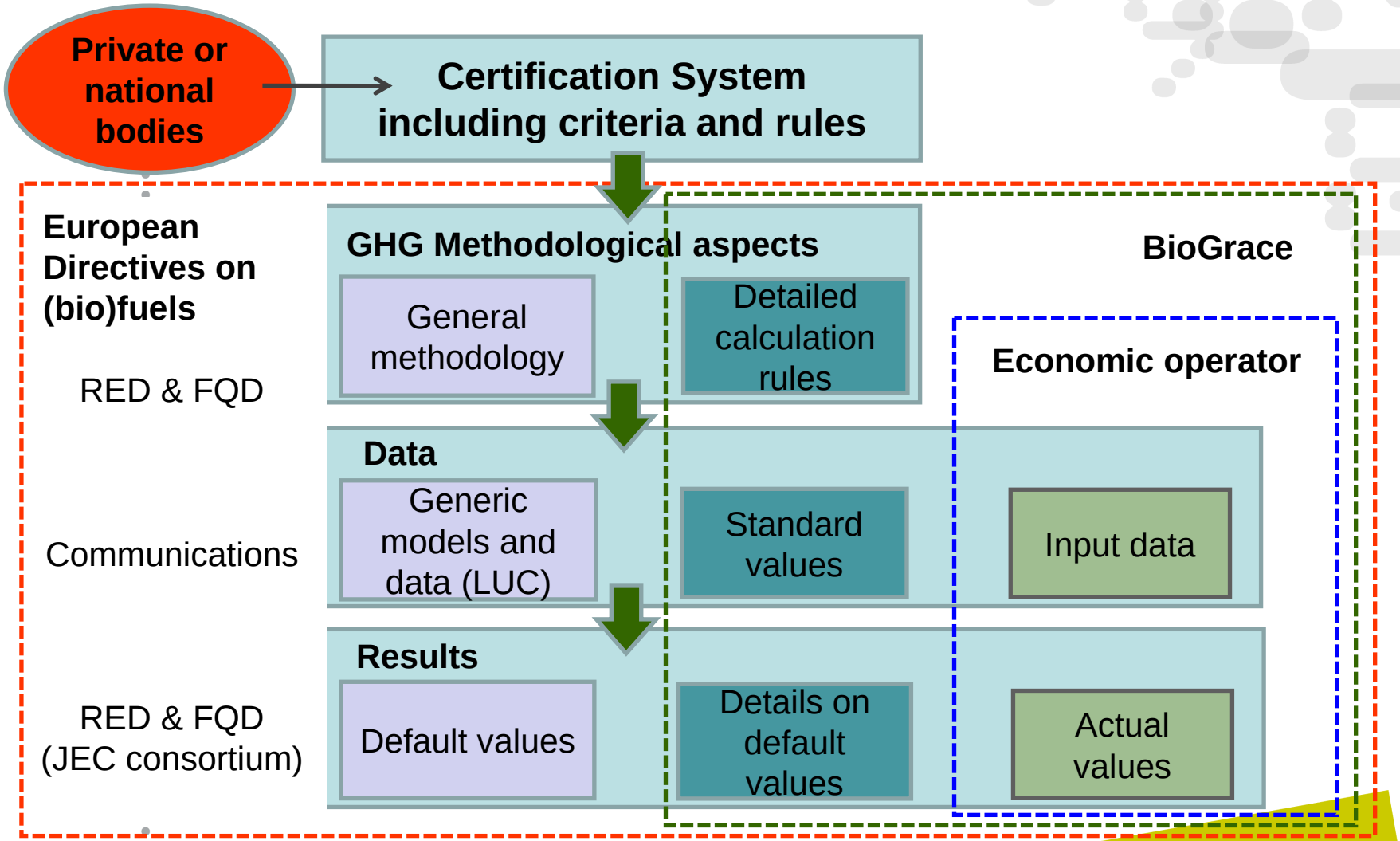
Consortium

- Agencies/organisations close to national governments and experts in GHG calculations
  - Coordinator: Agentschap NL (formerly SenterNovem)
  - Partners: ADEME, BE2020, BIO-IS, CIEMAT, IFEU, EXERGIA, STEM

Project BioGrace



General view of BioGrace



Project BioGrace

Key objectives are:

1. Cause transparency
2. Cause harmonisation
3. Facilitate stakeholders
4. Disseminate results

Project BioGrace

Key objectives are:

1. **Cause transparency**
   Reproduce biofuel default GHG values (Annex V RED)
   - Has not been done by the Commission or JEC
   - Is a recurrent exercise
2. **Cause harmonisation**
   Cause that GHG calculation tools give the same results
3. **Facilitate stakeholders**
   Allow relevant stakeholders to calculate actual values
4. **Disseminate results**
   Make our results public to all relevant stakeholders

Project BioGrace

Key objectives are:

1. **Cause transparency**
   Reproduce biofuel default GHG values (Annex V RED)
2. **Cause harmonisation**
   Cause that GHG calculation tools give the same results
   - All tools that are linked to our project
   - Note: this is a policy effort, not a scientific effort
3. **Facilitate stakeholders**
   Allow relevant stakeholders to calculate actual values
4. **Disseminate results**
   Make our results public to all relevant stakeholders

Project BioGrace

Key objectives are:

1. **Cause transparency**
   Reproduce biofuel default GHG values (Annex V RED)
2. **Cause harmonisation**
   Cause that GHG calculation tools give the same results
3. **Facilitate stakeholders**
   Allow relevant stakeholders to calculate actual values
   - By providing them calculation tools
   - By improving tools following stakeholder input
4. **Disseminate results**
   Make our results public to all relevant stakeholders

Project BioGrace

Key objectives are:

1. **Cause transparency**
   Reproduce biofuel default GHG values (Annex V RED)
2. **Cause harmonisation**
   Cause that GHG calculation tools give the same results
3. **Facilitate stakeholders**
   Allow relevant stakeholders to calculate actual values
4. **Disseminate results**
   Make our results public to all relevant stakeholders
   - All information is available through www.BioGrace.net
   - All information is for free !
   - Public stakeholder workshops
     14 April: Heidelberg 19 May: Paris
     26 May: Athens 31 May: Madrid
     1 June: Stockholm

Project BioGrace

- BioGrace will also:
  - make a list of àdditional standard values
  - list rules for making actual calculations
  - add 'sophisticated' support sheets for calculation of
    - ✓ direct land use change (based on Commission Decision)
    - ✓ N_2O emissions (based on IPCC Tier 1)
- BioGrace will not:
  - add pathways to the Excel file with GHG calculations that are not listed in RED Annex V
  - help stakeholders make actual calculations
  - check actual calculations at the request of stakeholders
- Feedback by stakeholders is warmly welcomed

Project BioGrace

- Project coordinator: Agentschap NL (NL Agency)
  Dr. John P.A. Neeft
  e-mail: john.neeft@agentschapnl.nl
- Project partners:
  - ADEME, France (Bruno Gagnepain)
  - BE2020, Austria (Dina Bacovsky)
  - BIO IS, France (Remy Lauranson)
  - CIEMAT, Spain (Yolanda Lechon)
  - EXERGIA, Greece (Konstantinos Georgakopoulos)
  - IFEU, Germany (Horst Fehrenbach)
  - STEM, Sweden (Matti Parikka)
- Project duration: 2 years (April 2010 – March 2012)
- Project website: www.BioGrace.net

Contents

One list of standard values

- o Input data
- o Standard values ("conversion factors")

Cultivation of rapeseed			Calculated emissions			
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STANDARD VALUES

parameter:	GHG emission coefficient			
unit:	gCO_2/kg	gCH_4/kg	gN_2O/kg	$gCO_{2\text{-}eq}/kg$
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One list of standard values

List of standard values

- is publicly available
- to be used by everyone that makes GHG calculations under RED/FQD based legislation

  We are achieving this by:
  - Including values in all software tools
  - Causing that list is known by all GHG calculation experts
  - Showing that these (and only these) standard values lead to RED defaults
  - Requesting policy makers to make reference from national legislation (implementing RED / FQD)

One list of

Version 3 - Public

Condensed list of standard values, version 3 - Public

This file gives the standard values as published on www.biograce.net in Word format.

Two Word versions of this list exist:

1. A complete list of standard values, containing all the values as listed in the Excel version
2. A condensed list showing the most important standard values

This file contains the condensed list.

Abbreviations and definitions used can be found in the Excel file on the web page http://www.biograce.net/content/ghgcalculationtools/standardvalues.

1 Global Warming potentials

CO_2	1	g $CO_{2,eq}$ / g CO_2
CH_4	23	g $CO_{2,eq}$ / g CH_4
N_2O	296	g $CO_{2,eq}$ / g N_2O

2 GHG emission coefficients

N-fertiliser	5880,6	g $CO_{2,eq}$/kg N
P_2O_5-fertiliser	1010,7	g $CO_{2,eq}$/kg P_2O_5
K_2O-fertiliser	576,1	g $CO_{2,eq}$/kg K_2O
CaO-fertiliser	129,5	g $CO_{2,eq}$/kg CaO

STANDARD VALUES

parameter: / unit:	gCO														
Global Warming Potentials (GWP's)															
CO_2															
CH_4															
N_2O															
Agro inputs															
N-fertiliser	282														
P_2O_5-fertiliser	964														
K_2O-fertiliser	536														
CaO-fertiliser	119														
Pesticides	988														
Seeds- corn															
Seeds- rapeseed	412														
Seeds- soy bean															
Seeds- sugarbeet	218														
Seeds- sugarcane	1,														
Seeds- sunflower	412														
Seeds- wheat	151														
EFB compost (palm oil)	0,														
Fuels- gasses															
Natural gas (4000 km, Russian NG quality)															
Natural gas (4000 km, EU Mix quality)															
Fuels- liquids															
Diesel					87,64	-	-	87,64		1,16	832	43,1			
Gasoline											745	43,2			
HFO					84,98	-	-	84,98		1,088	970	40,5			
Ethanol											794	26,81			
Methanol					92,80	0,2900	0,0003	99,57		1,6594	793	19,9			
FAME											890	37,2			
Syn diesel (BtL)											780	44,0			
HVO											780	44,0			
Fuels / feedstock / byproducts - solids															
Hard coal												26,5			
Lignite												9,2			
Corn												18,5			
FFB												24,0			
Rapeseed												26,4			
Soybeans												23,5			
Sugar beet												16,3			
Sugar cane												19,6			
Sunflowerseed												26,4			
Wheat												17,0			
Animal fat												37,1			
BioOil (byproduct FAME from waste oil)												21,8			
Crude vegetable oil												36,0			
DDGS												16,0			
Glycerol												16,0			
Palm kernel meal												17,0			

Both Excel and Word versions available at **www.BioGrace.net**

One list of standard values

List of standard values

- European Commission makes reference to list

Transparency & harmonisation

Energy: Biofuels: Sustainability Criteria - European commission - Mozilla Firefox

http://ec.europa.eu/energy/renewables/biofuels/sustainability_criteria_en.htm

European Commission
Energy

European Commission > Energy > Renewable Energy > Biofuels

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- Transparency Platform
- Target of 20% by

Renewable Energy

Biofuels: Sustainability Criteria

Commission sets up system for certifying sustainable biofuels

The Commission decided on 10 June 2010 to encourage industry, governments and NGOs to set up certification schemes for all types of biofuels, including those imported into the EU. It laid down what the schemes must do to be recognised by the Commission. This will help implement the EU's requirements that biofuels must deliver substantial reductions in greenhouse gas emissions and should not come from forests, wetlands and nature protection areas. The rules for certification schemes are part of a set of guidelines explaining how the Renewable Energy Directive, coming into effect in December 2010, should be implemented.

- Press release [IP/10/711, 10/06/2010]
- Memo [MEMO/10/247, 10/06/2010]

Related documents

- **Communications and Decision**
  - Communication on the practical implementation of the EU biofuels and bioliquids sustainability scheme and on counting rules for biofuels [OJ C160, page 8]
  - Standard values, derived from the datasets used to establish the default values
  - Annotated example for the calculation of an actual greenhouse gas value [90 KB]
  - Annotated example for the calculation of emissions from carbon stock changes due to land use change [3 MB]

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One list of standard values

List of standard values

- European Commission makes reference to list
- Member States include list in Technical Guidance:
  - Austria, Sweden, UK are preparing to do
  - Germany, Ireland, Netherlands are about to decide to do so
- Example (from UK consultation on C&S Technical Guidance)
  - *The RFA therefore proposes the following approach to which standard values should be used:*
    1. For the reporting period 2011/2012, the RFA proposes to ***align its current standard emission factors with the ones proposed by the BioGrace project****.*

One list of standard values

List of standard values

- When motivated, other standard values can be used
- BioGrace will publish a calculation rule for this, stating that

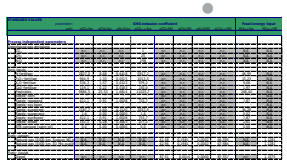
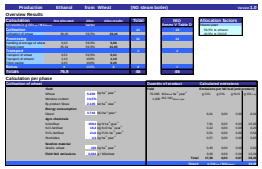
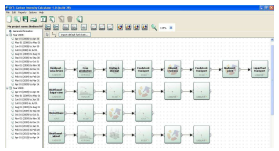
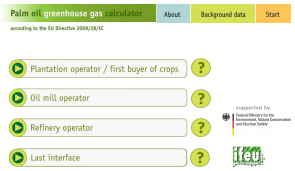
  – For standard values not yet on the list
    - a reliable source (literature, database) should be given
    - auditors can verify this information conform RED Article 18.3

  – For standard values that are already listed:
    - reliable information is submitted showing how these values were determined
    - auditors can verify this information conform RED Article 18.3.
    - it is shown that this input was used in the production of the biofuel
    - the use of this alternative standard value does not contradict any other calculation rule

Contents

Concluding summary

- One biofuel, different GHG calculations => different results
- IEE funded project BioGrace will:
  1. Cause transparency
     in how RED default values were calculated
  2. Cause harmonisation
     - Excel tool and GHG calculators give same result
     - All GHG calculations based on one set of standard values
  3. Facilitate stakeholders
     - Tools that allow own input and/or modifications to pathways
  4. Broadly disseminate results

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