BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

BioGrace – Harmonising calculations of biofuel GHG emissions in Europe

Nikolaus Ludwiczek
BIOENERGY 2020+
Highlights der Bioenergieforschung, Wieselburg
March 31, 2011

Renewable Energy Directive (RED)

Sustainability criteria for biofuels

- Minimum GHG emission savings (Art. 17.2)
  - 35%
  - for installations that were in operation on 23 January 2008: binding from 1 April 2013
  - 2017 50%
  - 2018 60% for new installations
- Economic operators may use (Art. 19.1)
  - default values
  - actual values calculated according to Annex V.C
  - sum of actual value and disaggregated default value
- Independent auditors must check information (Art. 18.3)
- European Commission approves voluntary certification schemes (Art. 18.4)

RED Annex V.a

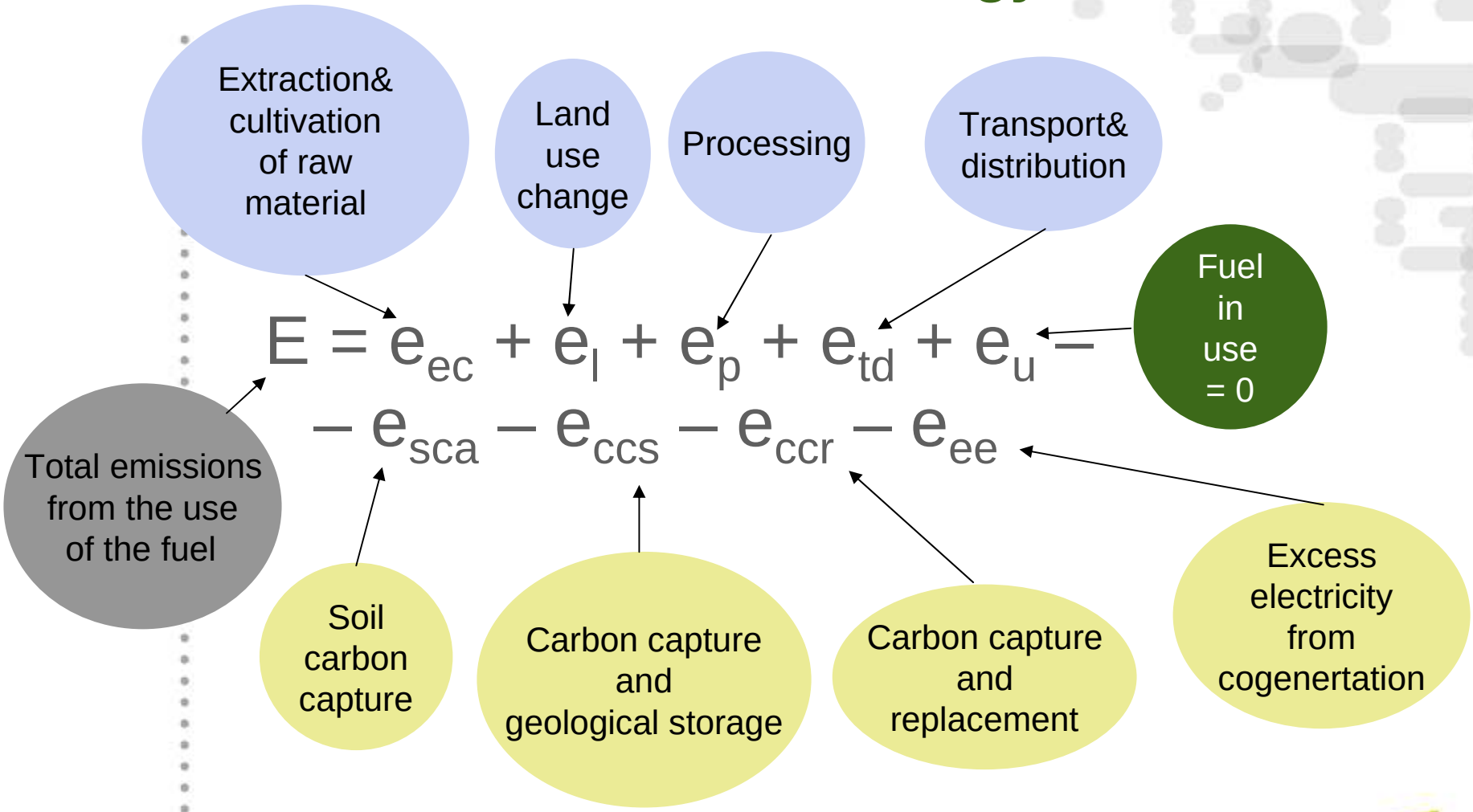
A. *Typical and default values for biofuels if produced with no net carbon emissions from land-use change*

Biofuel production pathway	Typical greenhouse gas emission saving	Default greenhouse gas emission saving
sugar beet ethanol	61 %	52 %
wheat ethanol (process fuel not specified)	32 %	16 %
wheat [illegible] (CHP plant)	32 %	16 %
[illegible] conventional	45 %	34 %
[illegible]	53 %	47 %
[illegible]	69 %	69 %
[illegible] as	56 %	49 %
[illegible]	71 %	71 %
the part [illegible] ethyl-tertio-butyl-ether (ETBE)	Equal to that of the ethanol production pathway used	
the part from renewable sources of tertiary-amyl-ethyl-ether (TAEE)	Equal to that of the ethanol production pathway used	
rape seed biodiesel	45 %	38 %
sunflower biodiesel	58 %	51 %
soybean biodiesel		31 %
palm oil biodiesel (process not specified)		19 %
palm oil biodiesel (process with me[illegible]		36 %
waste vegetable or animal (*) oil b[illegible]		%
hydrotreated vegetable oil from r[illegible]		%
hydrotreated vegetable oil from sun[illegible]		32 %
hydrotreated vegetable oil from palm oil [illegible]		26 %
hydrotreated vegetable oil from palm oil (proces[illegible] ana capture at oil mill)		65 %
pure vegetable oil from rape seed	58 %	57 %
biogas from municipal organic waste as compressed natural gas	80 %	73 %
biogas from wet manure as compressed natural gas	84 %	81 %
biogas from dry manure as compressed natural gas	86 %	82 %

Ethanol form sugar beet
Typical savings: 61%
Default value: 52%

Rape seed biodiesel
Typical savings: 45%
Default value: 38%

RED Annex V.c: Methodology



BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

Why harmonisation of biofuel GHG calculations?

- 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	parameter:	GHG emission coefficient			
	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

Why harmonisation of biofuel GHG calculations?

EXAMPLE: Different results from same biofuel
("cherry picking" of the most beneficial standard values)

Parameter	Unit	Source			
		EC (RED Annex V)	**Netherlands** (Ecofys / CE)	**UK** RFA	**Germany** IFEU
Nitrogen Fertilizer	g CO_{2eq}/kg	5917,2	6367,0	6800,0	6410
P fertilizer	g CO_{2eq}/kg	1013,5	700,0	354 for TSP, **95** for rock phosphate, 596 for MAP	1180
K fertilizer	g CO_{2eq}/kg	579,2	453,0	333,0	663
CaO fertilizer (85%CaCO3+15%CaO,Ca(OH)2)	g CO_{2eq}/kg	130,0	179,0	124,0	297
Pesticides	g CO_{2eq}/kg	11025,7	17256,8	17300,0	1240
Diesel (direct plus indirect emissions)	g CO_{2eq}/MJ	87,6	76,7	86,4	89,1
Natural gas (direct plus indirect emissions)	g CO_{2eq}/MJ	68,0	53,9	62,0	62,8
Methanol (direct plus indirect emissions)	g CO_{2eq}/MJ	98,1	137,5	138,5	62,5

Why harmonisation of biofuel GHG calculations?

EXAMPLE: 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%

Project BioGrace

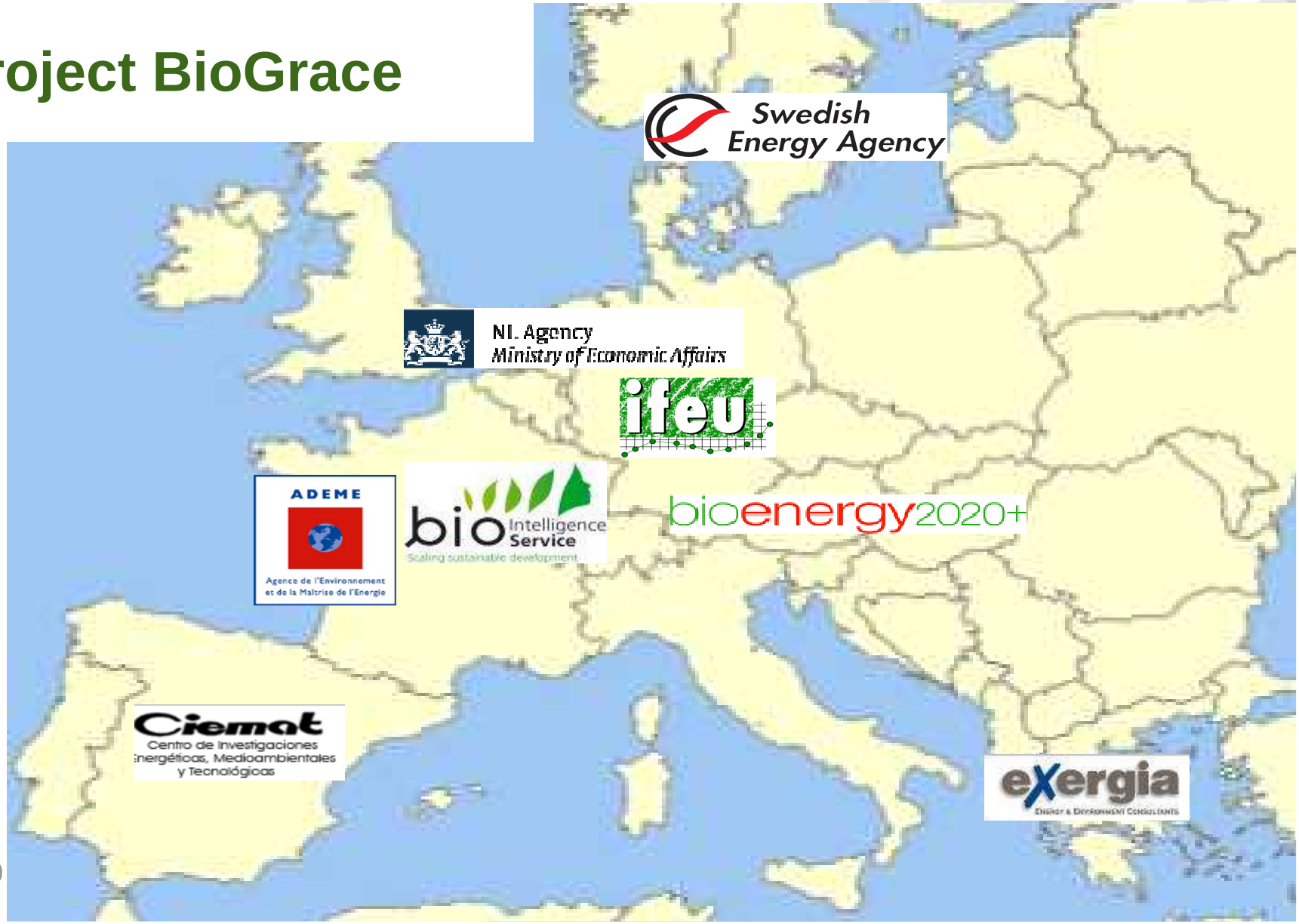
- **BIO**fuel **GR**eenhouse gas emissions: **A**lignment of **C**alculations in **E**urope
- Key objectives are
  1. Cause transparency
  2. Cause harmonisation
  3. Facilitate stakeholders
  4. Disseminate results
- Products
  1. One list of standard value
  2. Excel GHG calculation tool (-> voluntary certification scheme)
  3. Harmonised national GHG calculators

BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

Project BioGrace



One list of standard values

Version 3 - Public

STANDARD VALUES (parameter: / unit:)	gCO$_2$/kg	gCH…		
Global Warming Potentials (GWP's)				
CO_2				
CH_4				
N_2O				
Agro inputs				
N-fertiliser	2827,0	8,68		
P_2O_5-fertiliser	964,9	1,3		
K_2O-fertiliser	536,3	1,5		
CaO-fertiliser	119,1	0,2		
Pesticides	9886,5	25,5		
Seeds- corn	-			
Seeds- rapeseed	412,1	0,9		
Seeds- soy bean	-			
Seeds- sugarbeet	2187,7	4,60		
Seeds- sugarcane	1,6	0,00		
Seeds- sunflower	412,1	0,9		
Seeds- wheat	151,1	0,28		
EFB compost (palm oil)	0,0	0,00		
Fuels- gasses				
Natural gas (4000 km, Russian NG quality)				
Natural gas (4000 km, EU Mix qualilty)				
Fuels- liquids				
Diesel				
Gasoline				
HFO				
Ethanol				
Methanol				
FAME				
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

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

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

One 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****.*

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

Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe

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

Meistbesuchte Seiten | Google Kalender | Wikipedia | LEO Deutsch-Englisch... | BIOGRACE | Adminusers | Google Analytics | Offi... | EU | Zertifizierung | Willkommen bei biokra... | Flüge und Billigflüge g...

Referring Site: - Google Analytics | LEO Forum | Energy: Biofuels: Sustainability Cr...

Search | About this site | Contact | Legal notice | English (en)

European Commission
Energy

Transparency & harmonisation

European Commission > Energy > Renewable Energy > Biofuels

• Citizen's corner

Renewable Energy

- Bioenergy
- Biofuels
  - Members states reports
  - Standards
  - Sustainability Criteria
  - Projects
- Wind Energy
- Solar Electricity
- Solar Heating and Cooling
- Geothermal Energy
- Ocean Energy
- Grid
- Hydrogen for Transport
- CONCERTO
- Thematic Promotion Dissemination
- Electricity
- European Technology Platforms (ETPs)
- Transparency Platform
- Target of 20% by

Renewable Energy

RSS

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]

Search OK

Günther Oettinger Commissioner for Energy

Philip Lowe Director-General for Energy

Multimedia
• Video portal

figures
.PDF
• Publications

Agencies

- ACER
- EACI
- ESA

Climate Action
Energy for a Changing World

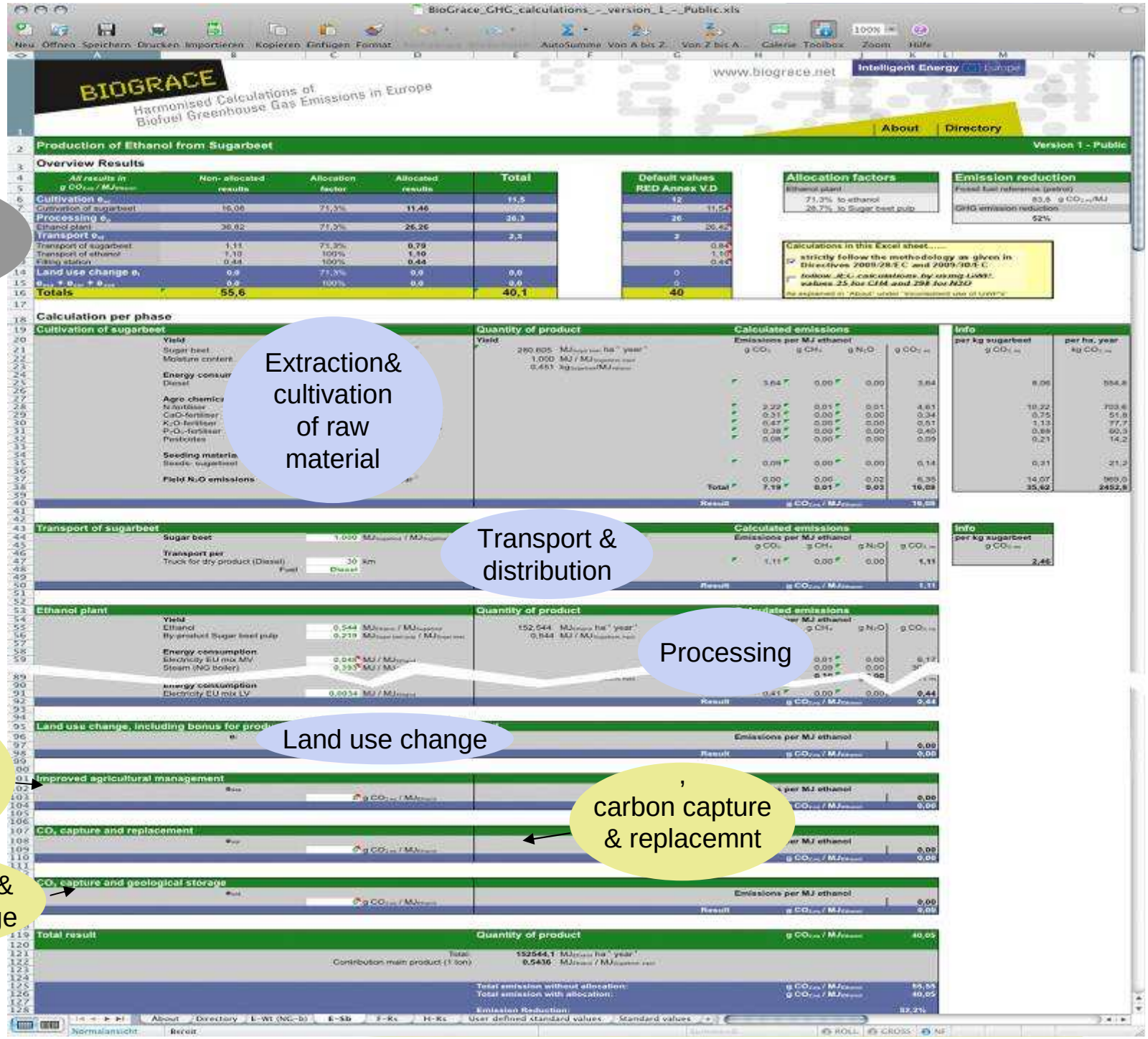
How much do you know about energy?

EU Calendar

europe

http://ec.europa.eu/energy/publications/index_en.htm

The Excel tool



The cultivation box

multiplying input values with "standard values"

Cultivation of rapeseed			Quantity of product	Calculated emissions			
			Yield	Emissions per MJ FAME			
				g CO_2	g CH_4	g N_2O	g $CO_{2,eq}$
Yield			73.975 $MJ_{Rapeseed}$ ha^{-1} $year^{-1}$				
Rapeseed	3.113	kg ha^{-1} $year^{-1}$	1,000 MJ / $MJ_{Rapeseed, input}$				
Moisture content	10,0%		0,073 $kg_{Rapeseed}/MJ_{FAME}$				
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 (kg N)	137,4	kg N ha^{-1} $year^{-1}$		9,08	0,03	0,03	19,00
CaO-fertiliser (kg CaO)	19,0	kg CaO ha^{-1} $year^{-1}$		0,05	0,00	0,00	0,06
K_2O-fertiliser (kg K_2O)	49,5	kg K_2O ha^{-1} $year^{-1}$		0,62	0,00	0,00	0,67
P_2O_5-fertiliser (kg P_2O_5)	33,7	kg P_2O_5 ha^{-1} $year^{-1}$		0,76	0,00	0,00	0,80
Pesticides	1,2	kg ha^{-1} $year^{-1}$		0,28	0,00	0,00	0,32
Seeding material							
Seeds- rapeseed	6	kg ha^{-1} $year^{-1}$		0,06	0,00	0,00	0,10
Field N_2O emissions	3,10	kg ha^{-1} $year^{-1}$		0,00	0,00	0,07	21,61
				Total	**16,92**	**0,03**	**0,10**	**48,63**
				Result		**g $CO_{2,eq}$ / MJ_{FAME}**		**48,63**

conversion factors yield related

fill in actual data

Additional tools

- User manual
- Calculations rules
- Extra sheets for calculation of
  - direct land use change (based on Commission Decision)
  - carbon stock accumulation thanks to improved agricultural management (based on Commission Decision)
  - N_2O emissions (based on IPCC Tier 1)
- List of additional standard values

➢ **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

Recognition as a voluntary certification scheme

- Current voluntary cert. schemes do not include GHG tool
  - ISSC, REDcert, NTA8080, RSPO, RTRS, Bonsucro (BSI)
- European Commission only allows use of BioGrace GHG tool if it is recognised as a voluntary cert. scheme
- To our knowledge no GHG tools have been sent to EC for recognition
  - Some schemes will be send in, eg. National GHG tools
  - Information on actual developments is scarce
- BioGrace GHG tool can be used as "add-on" to existing schemes

Time schedule

- Submit BioGrace tool and BioGrace calculation rules to EC for recognition in April 2011
- Recognition period of 5 years probably

Thank you for your attention

INTELLIGENT ENERGY EUROPE

The sole responsibility for the content of this presentation lies with the authors. It does not necessarily reflect the opinion of the European Union. The European Commission is not responsible for any use that may be made of the information contained therein.

Nikolaus LUDWICZEK
nikolaus.ludwiczek@bioenergy2020.eu
info@biograce.net