BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

# Introduction to the project BioGrace

**John Neeft**
**Coordinator**

John Neeft
NL Agency
Public workshop Vienna
February 16, 2011

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# Introduction

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

- RED and FQD: same sustainability criteria including GHG
- RED article 19:
  - o 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)
  - o In Europe default values only when feedstock is produced in area on list (19.2) or from waste/residue
- RED article 18:
  - o Independent auditors must check information (18.3)
  - o 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**

| parameter: / unit: | GHG emission coefficient gCO₂/kg | gCH₄/kg | gN₂O/kg | gCO₂-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?

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, 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

**Bio**fuel **Gr**eenhouse Gas emissions:
**a**lignment of **c**alculations in **E**urope

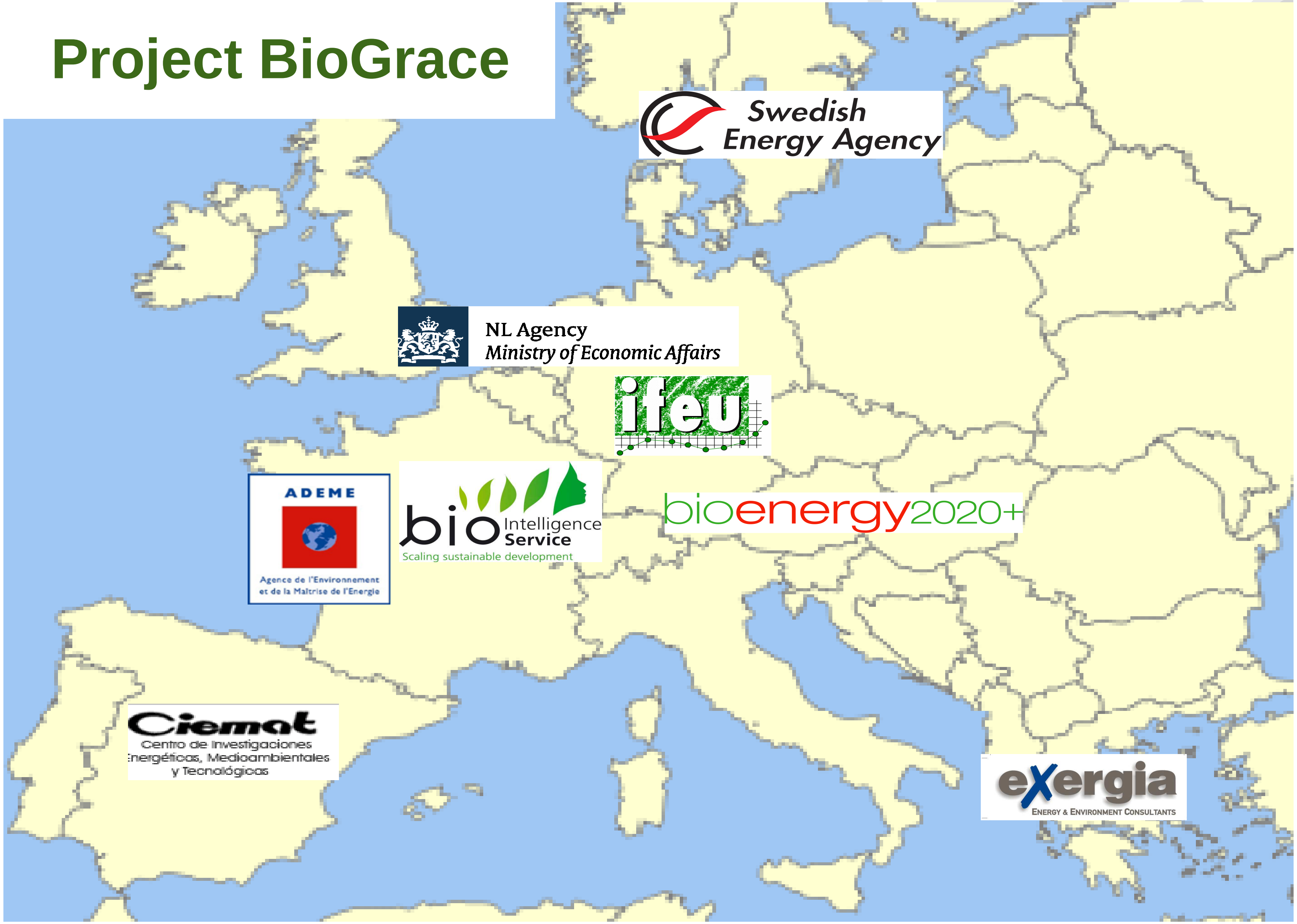
## Aim of project:

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

## Consortium

- o 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



# 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 !

# Project BioGrace

- o BioGrace will also:
  - make a list of recommended 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)
- o 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
- o 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 | | | |
|---|---|---|---|---|---|---|
| | | | Emissions per MJ FAME | | | |
| **Yield** | | | $g\ CO_2$ | $g\ CH_4$ | $g\ N_2O$ | $g\ CO_{2,\ eq}$ |
| 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: | $gCO_2/kg$ | $gCH_4/kg$ | $gN_2O/kg$ | $gCO_{2-eq}/kg$ |
| N-fertiliser | 2827,0 | 8,68 | 9,6418 | 5880,6 |

# One list of standard values

## List of standard values

- o is publicly available
- o 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)

BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

# One list of

## Version 3 - Public

| 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 | | | |

## 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

## List of standard values

- o European Commission makes reference to list

# Transparency & harmonisation

# One list of standard values

## List of standard values

- o European Commission makes reference to list
- o Member States include list in Technical Guidance:
  - – Austria, Sweden, UK are preparing to do
  - – Germany, Ireland, Netherlands are about to decide to do so
- o 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

- o When motivated, other standard values can be used
- o 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

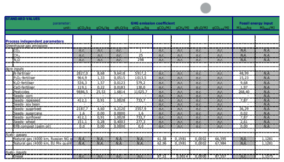
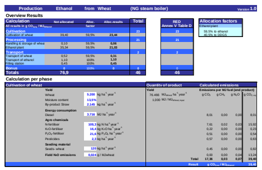
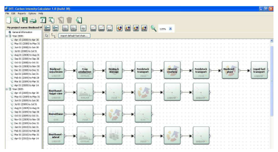
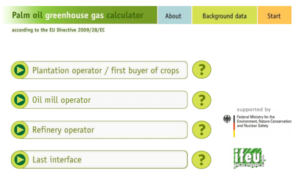
  – For standard values that are already listed:
    - reliable information is submitted showing how these values were determined
    - auditors can verify this information conform RED Article 18.3.
    - it is shown that this input was used in the production of the biofuel
    - the use of this alternative 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 harmonisation
   - Excel tool and GHG calculators give same result
   - All GHG calculations based on one set of standard values
2. Cause transparency
   in how RED default values were calculated
3. Facilitate stakeholders
   - Tools that allow own input and/or modifications to pathways
4. Broadly disseminate results

*Thank you for your attention*

Intelligent Energy Europe

BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

# How to use the BioGrace Excel greenhouse gas calculation tool part I

Horst Fehrenbach
IFEU
Public workshop Vienna
February 16, 2011

# How to use the BioGrace Excel greenhouse gas calculation tool – part I

**Content**

- steps from cultivation to filling station
- use individual input numbers

- define own standard values
- add process steps
- set up completely new biofuel production chains

**Demonstrated in Excel Spreadsheet vs.3**

# Steps from cultivation to filling station

$$E = e_{ec} + e_l + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr} - e_{ee}$$

**$e_{ee}$**: combined with **$e_p$**

**$ee_{ccs/ccr}$**: technology not in place

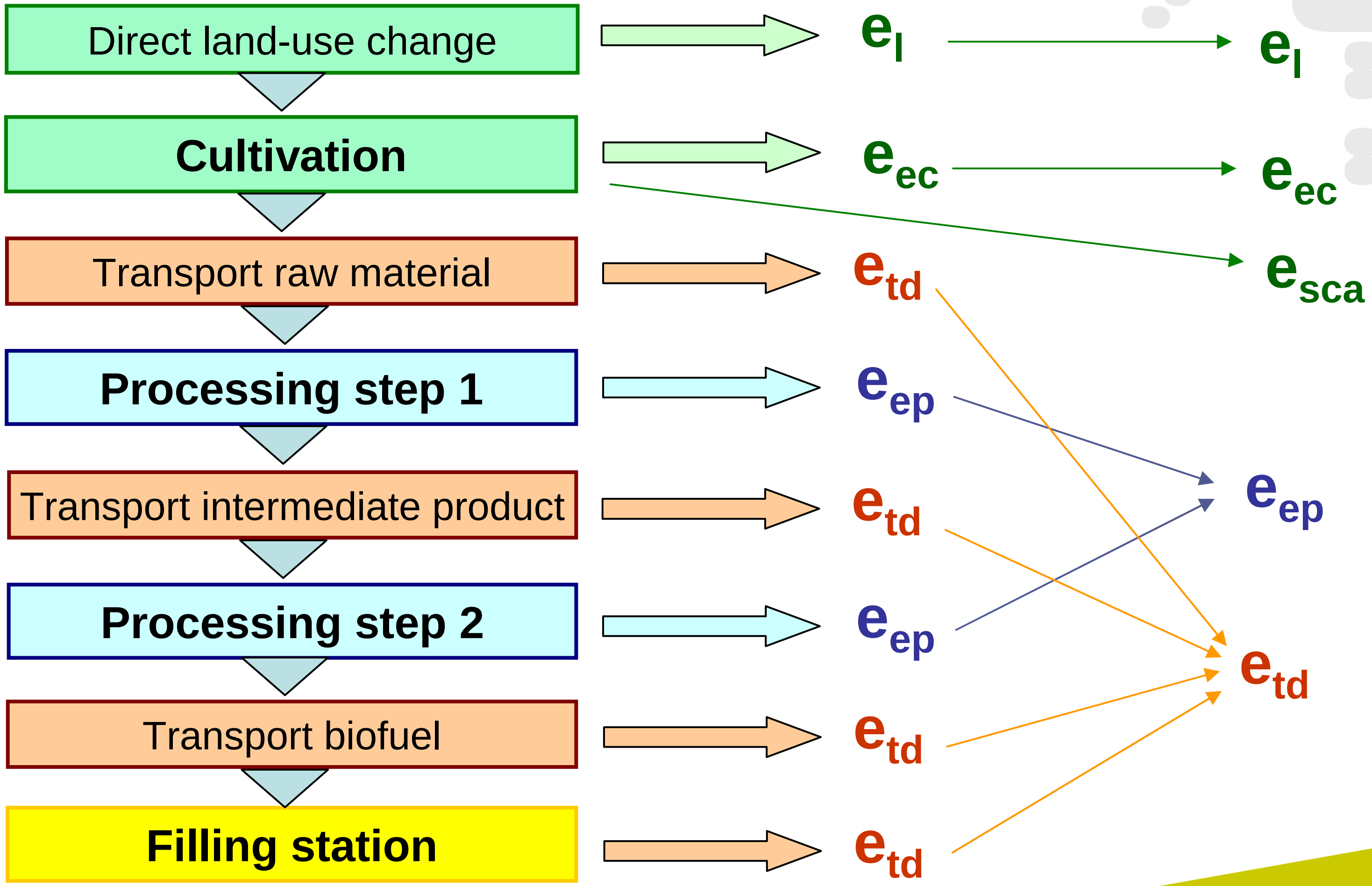
**$e_{sca}$**: methodology still under discussion

**$e_u$**: maybe relevant for biogas pathways

**$e_l$**: following the decision 2010/335/EU

**$e_{ec}$, $e_p$, $e_{td}$ = basical „diaggregated default values“**

# Steps from cultivation to filling station



# Steps from cultivation to filling station

## The aggregation on top

**Production of FAME from Rapeseed (steam from natural gas boiler)**

**Overview Results**

| *All results in g $CO_{2,eq}$ / $MJ_{FAME}$* | Non- allocated results | Allocation factor | Allocated results | Total | Default values RED Annex V.D |
|---|---|---|---|---|---|
| **Cultivation $e_{ec}$** | | | | 28,9 | 29 |
| Cultivation of rapeseed | 48,63 | 58,6% | **28,49** | | 28,51 |
| Rapeseed drying | 0,72 | 58,6% | **0,42** | | 0,42 |
| **Processing $e_p$** | | | | 21,7 | 22 |
| Extraction of oil | 6,53 | 58,6% | **3,83** | | 3,82 |
| Refining of vegetable oil | 1,06 | 95,7% | **1,02** | | 17,88 |
| Esterification | 17,61 | 95,7% | **16,84** | | |
| **Transport $e_{td}$** | | | | 1,4 | 1 |
| Transport of rapeseed | 0,30 | 58,6% | **0,17** | | 0,17 |
| Transport of FAME | 0,82 | 100% | **0,82** | | 0,82 |
| Filling station | 0,44 | 100% | **0,44** | | 0,44 |
| **Land use change $e_l$** | 0,0 | 58,6% | 0,0 | 0,0 | 0 |
| **$e_{sca} + e_{ccr} + e_{ccs}$** | 0,0 | 100% | 0,0 | 0,0 | 0 |
| **Totals** | **76,1** | | | **52,0** | **52** |

# Cultivation $e_{ec}$

| Cultivation of rapeseed | | | Quantity of product | Calculated emissions | | | |
|---|---|---|---|---|---|---|---|
| **Yield** | | | **Yield** | **Emissions per MJ FAME** | | | |
| Rapeseed | 3.113 | kg $ha^{-1}$ $year^{-1}$ | 73.975 $MJ_{Rapeseed}$ $ha^{-1}$ $year^{-1}$ | g $CO_2$ | g $CH_4$ | g $N_2O$ | g $CO_{2,eq}$ |
| Moisture content | 10,0% | | 1,000 MJ / $MJ_{Rapeseed, input}$ | | | | |
| By-product Straw | n/a | kg $ha^{-1}$ $year^{-1}$ | 0,073 $kg_{Rapeseed}/MJ_{FAME}$ | | | | |
| **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** |

**fill in actual data**

## fill in actual data

| | | |
|---|---|---|
| **Yield** | | |
| 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 $ha^{-1}$ $year^{-1}$ |
| **Agro chemicals** | | |
| N-fertiliser (kg N) | 137,4 | kg N $ha^{-1}$ $year^{-1}$ |
| CaO-fertiliser (kg CaO) | 19,0 | kg CaO $ha^{-1}$ $year^{-1}$ |
| $K_2O$-fertiliser (kg $K_2O$) | 49,5 | kg $K_2O$ $ha^{-1}$ $year^{-1}$ |
| $P_2O_5$-fertiliser (kg $P_2O_5$) | 33,7 | kg $P_2O_5$ $ha^{-1}$ $year^{-1}$ |
| Pesticides | 1,2 | kg $ha^{-1}$ $year^{-1}$ |
| **Seeding material** | | |
| Seeds- rapeseed | 6 | kg $ha^{-1}$ $year^{-1}$ |
| **Field $N_2O$ emissions** | 3,10 | kg $ha^{-1}$ $year^{-1}$ |

in version 3:
still fixed value,
calc. mode in vs. 4

# Cultivation $e_{ec}$

| Cultivation of rapeseed | | | Quantity of product | Calculated emissions | | | |
|---|---|---|---|---|---|---|---|
| **Yield** | | | **Yield** | **Emissions per MJ FAME** | | | |
| | | | | g $CO_2$ | g $CH_4$ | g $N_2O$ | g $CO_{2,eq}$ |
| Rapeseed | 3.113 | kg $ha^{-1}$ $year^{-1}$ | 73.975 $MJ_{Rapeseed}$ $ha^{-1}$ $year^{-1}$ | | | | |
| Moisture content | 10,0% | | 1,000 MJ / $MJ_{Rapeseed, input}$ | | | | |
| By-product Straw | n/a | kg $ha^{-1}$ $year^{-1}$ | 0,073 $kg_{Rapeseed}/MJ_{FAME}$ | | | | |
| **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**

| Quantity of product | |
|---|---|
| **Yield** | |
| 73.975 | $MJ_{Rapeseed}$ $ha^{-1}$ $year^{-1}$ |
| 1,000 | MJ / $MJ_{Rapeseed, input}$ |
| 0,073 | $kg_{Rapeseed}/MJ_{FAME}$ |

**yield related conversion factors**
**raw material per final biofuel**

**values as a function of input values**
**and/or of the chain**

# Cultivation $e_{ec}$

**multiplying input values with “standard values“**

| Cultivation of rapeseed | | | Quantity of product | Calculated emissions | | | |
|---|---|---|---|---|---|---|---|
| | | | | Emissions per MJ FAME | | | |
| **Yield** | | | **Yield** | g $CO_2$ | g $CH_4$ | g $N_2O$ | g $CO_{2,eq}$ |
| Rapeseed | 3.113 | kg $ha^{-1}$ $year^{-1}$ | 73.975 $MJ_{Rapeseed}$ $ha^{-1}$ $year^{-1}$ | | | | |
| Moisture content | 10,0% | | 1,000 MJ / $MJ_{Rapeseed, input}$ | | | | |
| By-product Straw | n/a | kg $ha^{-1}$ $year^{-1}$ | 0,073 $kg_{Rapeseed}/MJ_{FAME}$ | | | | |
| **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**

# Cultivation $e_{ec}$

## Results related to raw material or acreage

| Cultivation of rapeseed | | Info per kg rapeseed | Info per ha, year |
|---|---|---|---|
| | $g\ CO_{2,\ eq}$ | $g\ CO_{2,\ eq}$ | $kg\ CO_{2,\ eq}$ |
| **Yield** | | | |
| Rapeseed | | | |
| Moisture content | | | |
| By-product Straw | | | |
| **Energy consumption** | | | |
| Diesel | 6,07 | 83,40 | 259,7 |
| **Agro chemicals** | | | |
| N-fertiliser (kg N) | 19,00 | 261,19 | 813,2 |
| CaO-fertiliser (kg CaO) | 0,06 | 0,79 | 2,5 |
| $K_2O$-fertiliser (kg $K_2O$) | 0,67 | 9,20 | 28,6 |
| $P_2O_5$-fertiliser (kg $P_2O_5$) | 0,80 | 10,96 | 34,1 |
| Pesticides | 0,32 | 4,36 | 13,6 |
| **Seeding material** | | | |
| Seeds- rapeseed | 0,10 | 1,41 | 4,4 |
| **Field $N_2O$ emissions** | 21,61 | 296,99 | 924,7 |
| | **48,63** | **668,31** | **2080,7** |
| | **48,63** | | |

# Processing $e_p$ Step 1, oil extraction

| Extraction of oil | | | Quantity of product | | Calculated emissions | | | |
|---|---|---|---|---|---|---|---|---|
| **Yield** | | | | | **Emissions per MJ FAME** | | | |
| | | | | | g $CO_2$ | g $CH_4$ | g $N_2O$ | g $CO_{2,eq}$ |
| Crude vegetable oil | 0,6125 | $MJ_{Oil}$ / $MJ_{Rapeseed}$ | 44.861 | $MJ_{Oil}$ $ha^{-1}$ $year^{-1}$ | | | | |
| By-product Rapeseed cake | 0,3875 | $MJ_{Rapeseed\ cake}$ / $MJ_{Rapeseed}$ | 0,606 | MJ / $MJ_{Rapeseed,\ input}$ | | | | |
| | | | 0,029 | $kg_{Oil}$ / $MJ_{FAME}$ | | | | |
| **Energy consumption** | | | | | | | | |
| Electricity EU mix MV | 0,0118 | MJ / $MJ_{Oil}$ | | | 1,47 | 0,00 | 0,00 | 1,58 |
| Steam (from NG boiler) | 0,0557 | MJ / $MJ_{Oil}$ | | | | | | |
| NG Boiler | | | | | Emissions from NG boiler | | | |
| $CH_4$ and $N_2O$ emissions from NG boiler | | | | | 0,00 | 0,00 | 0,00 | 0,02 |
| Natural gas input / MJ steam | 1,111 | MJ / $MJ_{Steam}$ | | | | | | |
| Natural gas (4000 km, EU Mix | 0,062 | MJ / $MJ_{Oil}$ | | | 4,08 | 0,01 | 0,00 | 4,41 |
| Electricity input / MJ steam | 0,020 | MJ / $MJ_{Steam}$ | | | | | | |
| Electricity EU mix MV | 0,001 | MJ / $MJ_{Oil}$ | | | 0,14 | 0,00 | 0,00 | 0,15 |
| **Chemicals** | | | | | | | | |
| n-Hexane | 0,0043 | MJ / $MJ_{Oil}$ | | | 0,36 | 0,00 | 0,00 | 0,37 |
| | | | | **Total** | **6,06** | **0,02** | **0,00** | **6,53** |
| | | | | **Result** | g $CO_{2,eq}$ / $MJ_{FAME}$ | | | 6,53 |

**fill in actual data**

# Transport $e_{td}$ of FAME

| Transport of FAME | to and from depot | | | Quantity of product | Calculated emissions | | | |
|---|---|---|---|---|---|---|---|---|
| | FAME | 1,000 | $MJ_{FAME}$ / $MJ_{FAME}$ | 42790,9 $MJ_{FAME}$ $ha^{-1}$ $year^{-1}$ | Emissions per MJ FAME | | | |
| | | | | 0,578 MJ / $MJ_{Rapeseed, input}$ | g $CO_2$ | g $CH_4$ | g $N_2O$ | g $CO_{2, eq}$ |
| | Transport per | | | | | | | |
| | Truck for liquids (Diesel) | 300 | km | 0,0047 ton km / $MJ_{Rapeseed, input}$ | 0,71 | 0,00 | 0,00 | **0,71** |
| | Fuel | Diesel | | | | | | |
| | Energy cons. depot | | | | | | | |
| | Electricity EU mix LV | 0,00084 | MJ / $MJ_{FAME}$ | | 0,10 | 0,00 | 0,00 | **0,11** |
| | | | | **Result** | g $CO_{2,eq}$ / $MJ_{FAME}$ | | | **0,8225** |

**fill in actual data**

| Filling station | | | | Quantity of product | | | | |
|---|---|---|---|---|---|---|---|---|
| | Yield | 1,000 | $MJ_{FAME}$ / $MJ_{FAME}$ | 42790,9 $MJ_{FAME}$ $ha^{-1}$ $year^{-1}$ | Emissions per MJ FAME | | | |
| | | | | 0,578 MJ / $MJ_{Rapeseed, input}$ | g $CO_2$ | g $CH_4$ | g $N_2O$ | g $CO_{2, eq}$ |
| | Energy consumption | | | | | | | |
| | Electricity EU mix LV | 0,0034 | MJ / $MJ_{FAME}$ | | 0,41 | 0,00 | 0,00 | **0,44** |
| | | | | **Result** | g $CO_{2,eq}$ / $MJ_{FAME}$ | | | **0,44** |

**Define own standard values**

**Include new process steps**

**set up completely new biofuel production chains**

BioGrace_GHG_calculations_-_version_3_-_Public.xls

BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

# How to use the BioGrace Excel greenhouse gas calculation tool part II : LUC – Esca – $CO_2$ capture


**Remy LAURANSON**
*BIO Intelligence Service*


Public workshop Vienna
February 16, 2011

# Steps from cultivation to filling station

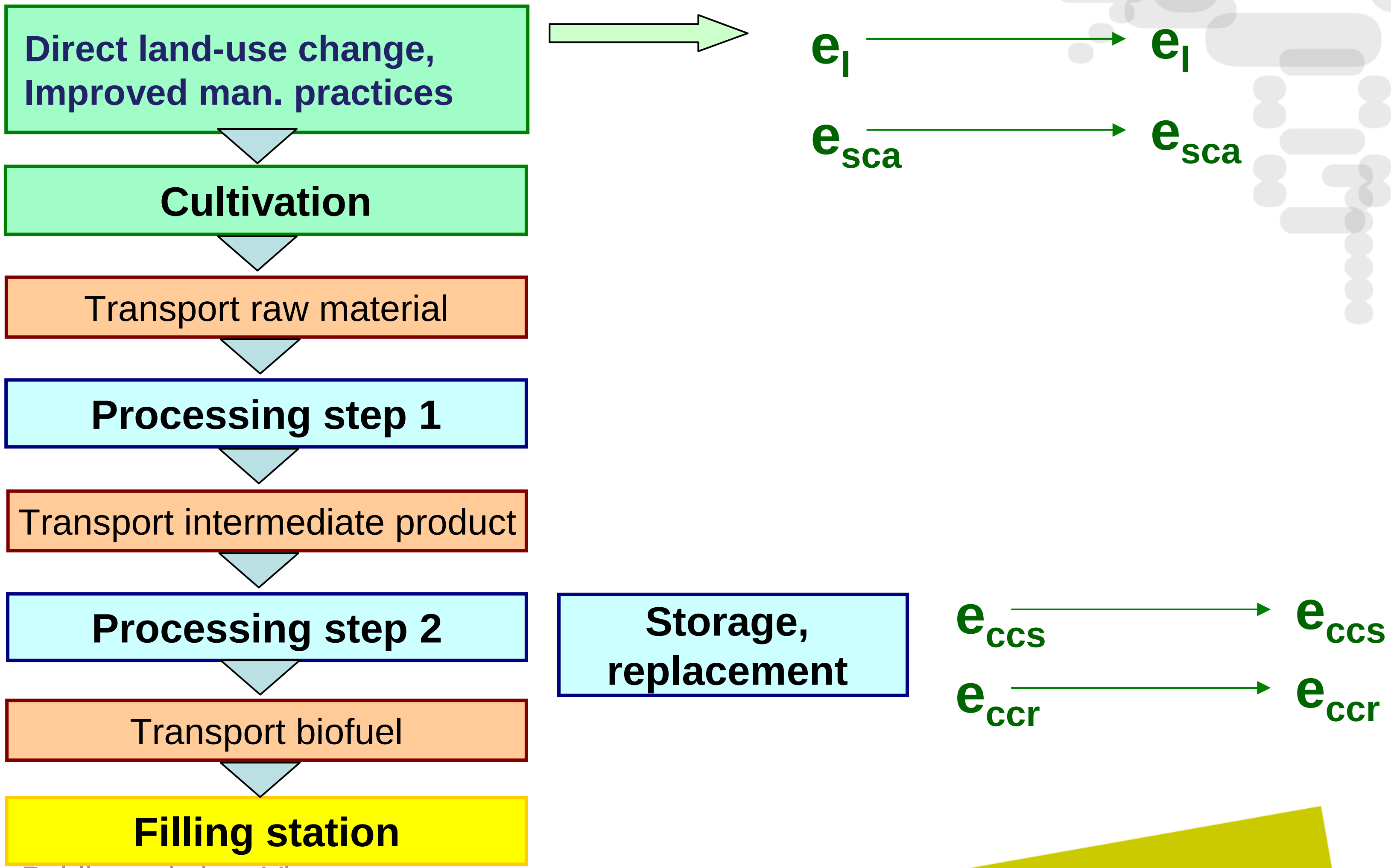
$$E = e_{ec} + e_l + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr} - e_{ee},$$

**$ee_{ccs/ccr}$:** $CO_2$ capture, storage or replacement

**$e_{sca}$:** Carbone storage from improved agri practices

**$e_l$:** following the decision 2010/335/EU

# Steps from cultivation to filling station



# Land Use Changes

**General principles :**

1. Annex V of the RED gives the general calculation guidelines (part C, point 7):

$$e_l = (CS_R - CS_A) \times 3{,}664 \times 1/20 \times 1/P - e_B \ (^1)$$

2. Calculation rules are explained in the following the decision 2010/335/EU : *Commission Decision of 10 June 2010 on guidelines for the <u>calculation of land use carbon stocks</u> for the purpose of Annex V of Directive 2009/28/EC.*

*This communication gives:*

*-Consitent representation of land carbon stocks,*

*-Calculation rules*

*-Default data for applying this formula (tables)*

# Land Use Changes

**General principles :**

*Two types of calculation are possible :*

*-Calculation using default value*

$$CS_i = C_{VEG} + SOC_{ST} * F_{LU} * F_{MG} * F_I$$

*-Calculation using actual value for Cveg and Soil Organic Carbon (SOC).*

$$CS_i = C_{VEG} + SOC_i$$

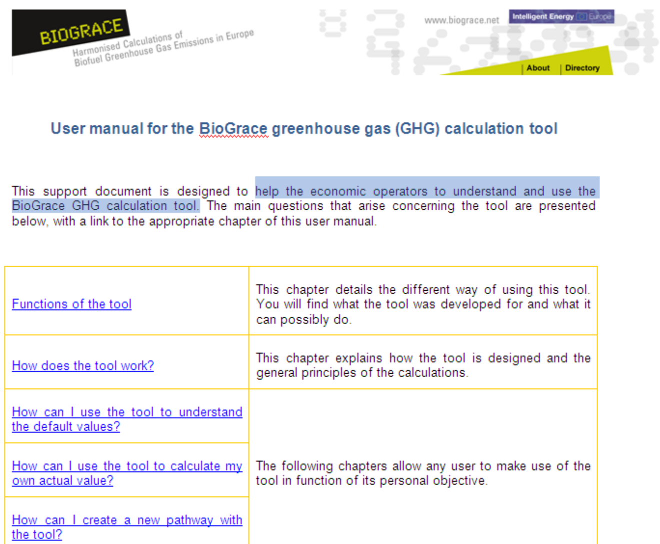
# A document to help the tool user:

## The User Manual (or tutorial) :

A detailed tutorial will be provide with the BIOGRACE tool.

It aims at helping the economic operators to understand and use the BioGrace GHG calculation tool.

It provides step by step example for LUC calculations.

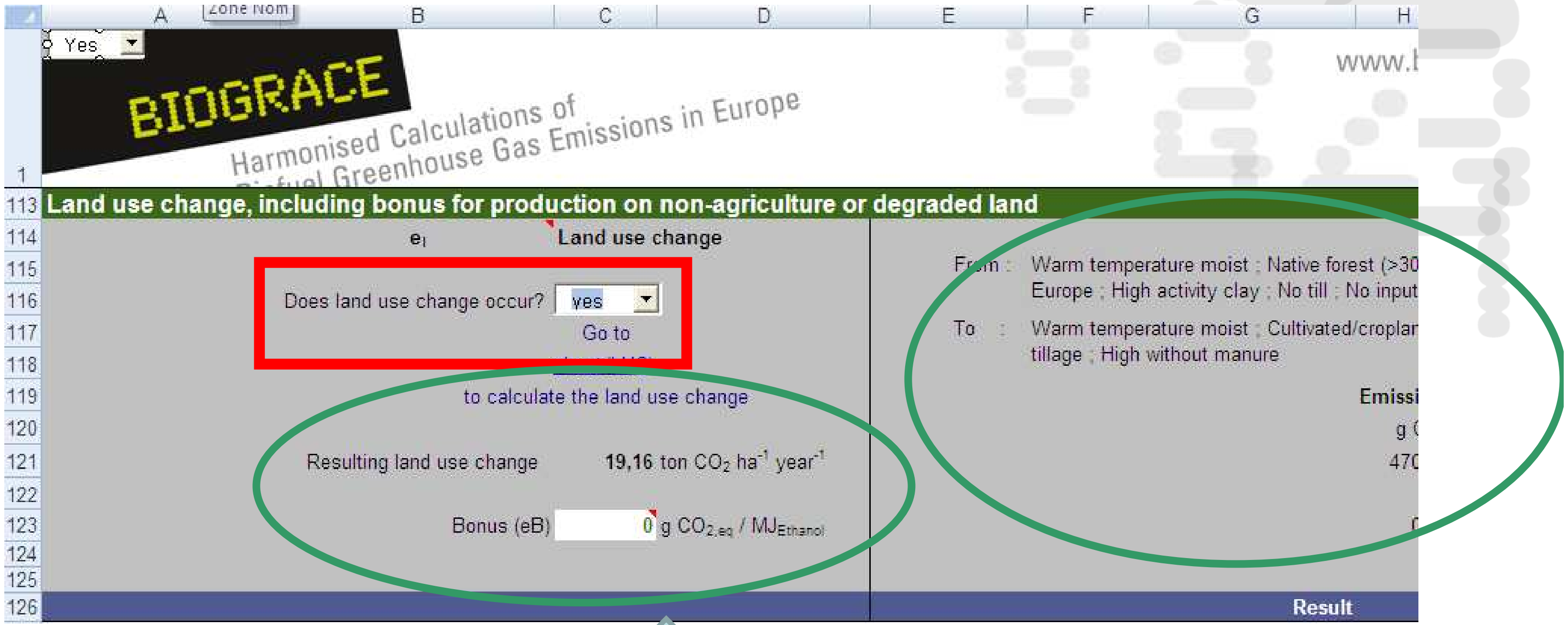

BIOGRACE Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe
www.biograce.net | Intelligent Energy Europe | About | Directory

User manual for the BioGrace greenhouse gas (GHG) calculation tool

This support document is designed to help the economic operators to understand and use the BioGrace GHG calculation tool. The main questions that arise concerning the tool are presented below, with a link to the appropriate chapter of this user manual.

| | |
|---|---|
| Functions of the tool | This chapter details the different way of using this tool. You will find what the tool was developed for and what it can possibly do. |
| How does the tool work? | This chapter explains how the tool is designed and the general principles of the calculations. |
| How can I use the tool to understand the default values? | The following chapters allow any user to make use of the tool in function of its personal objective. |
| How can I use the tool to calculate my own actual value? | |
| How can I create a new pathway with the tool? | |

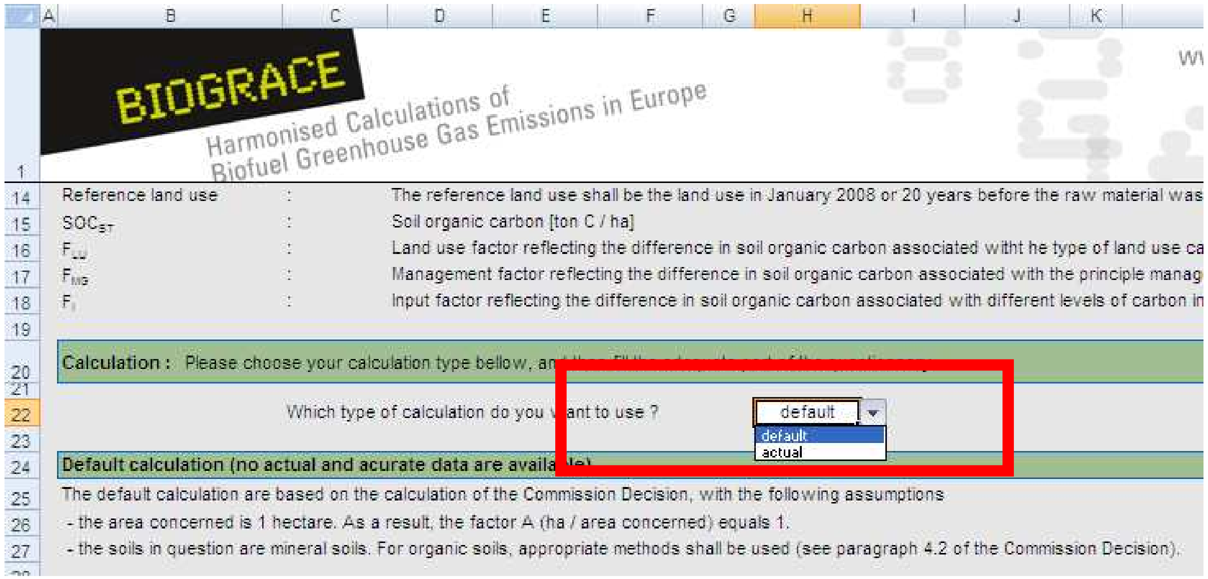
# Step 1 : declare LUC in your pathway




Text appear

**Step 2 : Go to the LUC excel sheet and read through this sheet. Get the Commission Decision 2010/335/EU with you.**

**Step 3 : Choose the type of calculation : default or actual and fill the appropriate white cells.**



BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

| | | | |
|---|---|---|---|
| 17.6.2010 | EN | Official Journal of the European Union | L 151/27 |

7.1. **Cropland**

*Table 2*

**Factors for cropland**

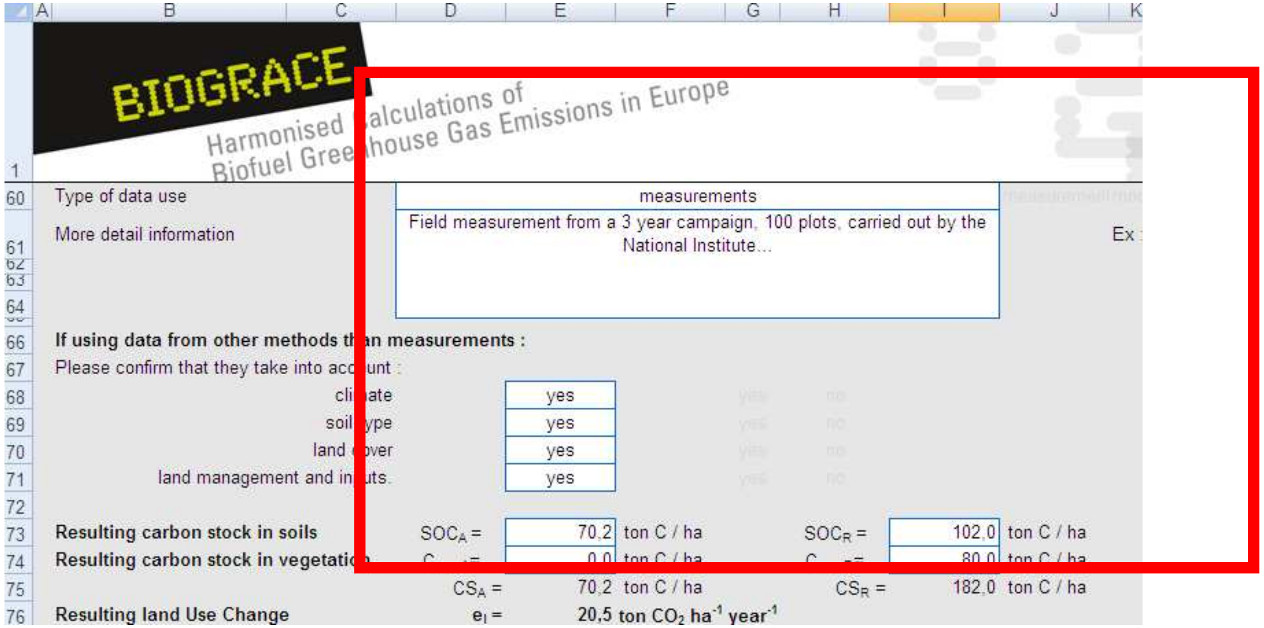
| Climate region | Land use ($F_{LU}$) | Management ($F_{MG}$) | Input ($F_I$) | $F_{LU}$ | $F_{MG}$ | $F_I$ |
|---|---|---|---|---|---|---|
| Temperate/Boreal, dry | Cultivated | Full-tillage | Low | 0,8 | 1 | 0,95 |
| | | | Medium | 0,8 | 1 | 1 |
| | | | High with manure | 0,8 | 1 | 1,37 |
| | | | High without manure | 0,8 | 1 | 1,04 |
| | | Reduced tillage | Low | 0,8 | 1,02 | 0,95 |
| | | | Medium | 0,8 | 1,02 | 1 |

29 $CS_A$ and $CS_R$ are calculated with the following equation: $CS_i = C_{VEG} + SOC_{ST} * F_{LU} * F_{MG} * F_I$

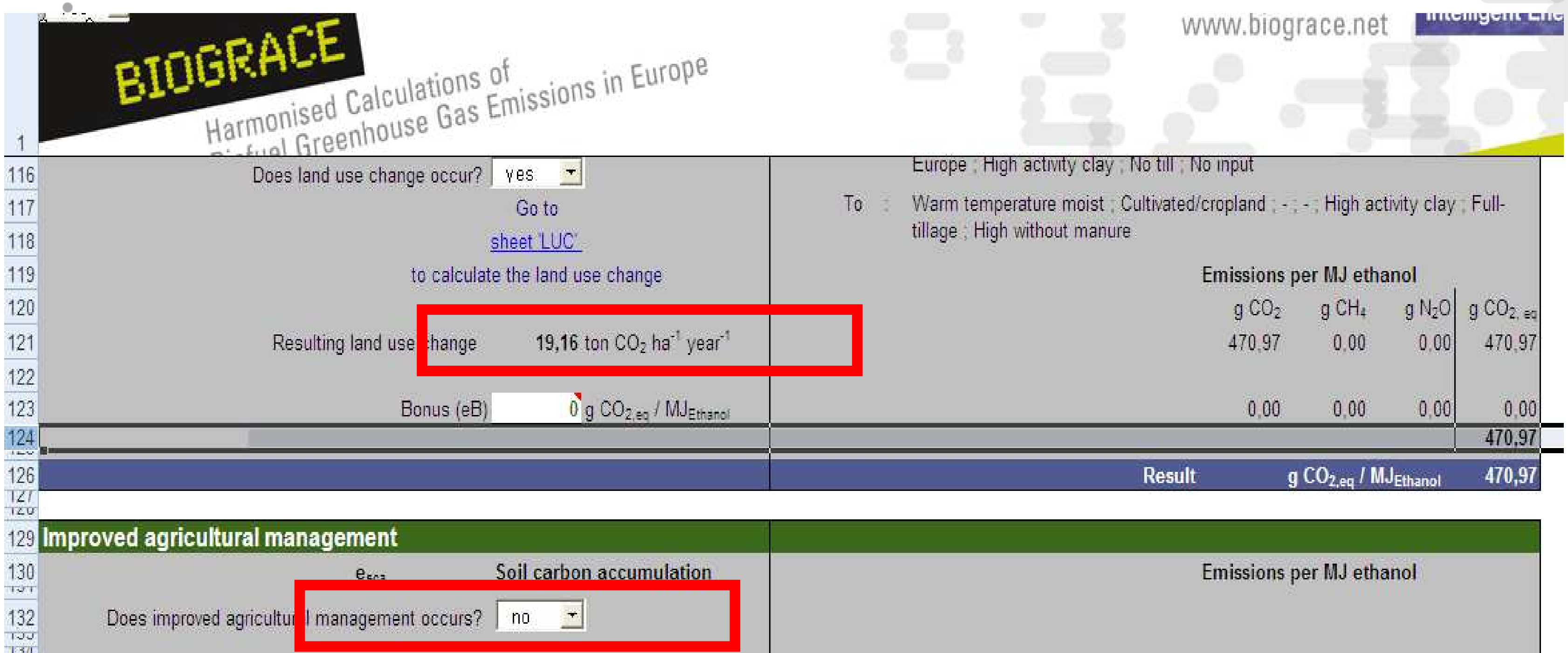
| | | Actual land use | | Reference land use | | |
|---|---|---|---|---|---|---|
| 30 | | | | | | |
| 31 | | **Actual land use** | | **Reference land use** | | |
| 32 | | | | | | |
| 33 | Climate region | Warm temperature moist | | Warm temperature moist | | |
| 34 | Vegetation/crop (land use) | Cultivated/cropland | | Native forest (>30% canopy cover) | | |
| 35 | | | | | | |
| 36 | Above and below ground vegetation | | | | | |
| 37 | Ecological zone (if relevant) | - | | Oceanic forest | | |
| 38 | Continent (if relevant) | - | | Europe | | |
| 39 | $C_{VEG}$ | 0 | ton C / ha | 84 | ton C / ha | Calculate value according to Chapter 5, or look up valu |
| 40 | | | | | | |
| 41 | Carbon stock in mineral soil | | | | | |
| 42 | Climate region | Warm temperature moist | | Warm temperature moist | | Determine using paragraph 6.1 of Commission Decisio |
| 43 | Soil type | High activity clay | | High activity clay | | Determine using paragraph 6.2 of Commission Decisio |
| 44 | Soil management | Full-tillage | | No till | | Determine using table 3 of Commission Decision |
| 45 | Input | High without manure | | No input | | Determine using table 3 of Commission Decision |
| 46 | | | | | | |
| 47 | $SOC_{ST}$ | 88 | ton C / ha | 88 | ton C / ha | Look up in Table 1 of Commission Decision, using clim |
| 48 | $F_{LU}$ | 0,69 | | 1 | | Look up in Tables 2 - 8 of Commission Decision |
| 49 | $F_{MG}$ | 1 | | n/a | | Look up in Tables 2 - 8 of Commission Decision |
| 50 | $F_I$ | 1,11 | | n/a | | Look up in Tables 2 - 8 of Commission Decision |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 52 | | | | | | | |
| 53 | **Resulting carbon stock** | $CS_A$ = | 67,4 | ton C / ha | $CS_R$ = | 172,0 | ton C / ha |
| 54 | **Resulting LUC** | $e_l$ = | 19,16 | ton eq. $CO_2$ / ha / an | | | |

# Step 3 (actual calculation) : mind filling detailed information on the sources of the SOC data used.



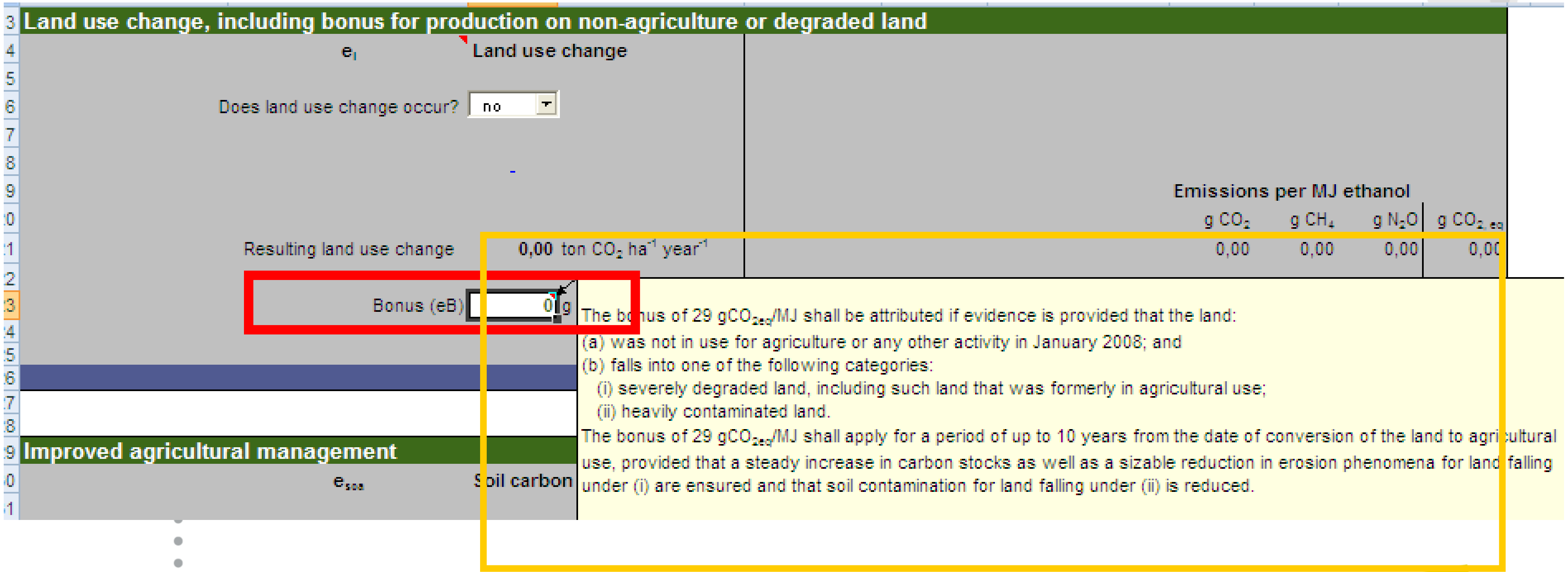
# Step 4 : Check in the biofuel pathway that the LUC value is there. Please, also check that no Improved agricultural management is declared.



# $e_b$ bonus for degraded and contaminated lands :

-A specific line exits within the LUC module of each pathway.

-Explanations on how to use are to be taken from the RED



# Improved Agricultural Management

1. Annex V of the RED has a specific term for carbon stock accumulation thanks to improved practices, but don't give much more explanations on how to calculate it.

2. Calculation rules from the Commission Decision can serve as guidelines for making first level calculations.

3. As for LUC, actual data can be used to assess them.

4. In the BIOGRACE tool, an $e_{sca}$ sheet exist to carry out the calculation.

5. This sheet is build on the same frame than the LUC sheet.

6. Don't declare $e_{sca}$ when LUC are already declared (double counting)

# $CO_2$ storage or replacement

## General principles :

1. Annex V of the RED has specific terms for carbon stock accumulation thanks to improved practices, but don't give much more explanations

2. In the BIOGRACE tool, two modules exist to declare these technological solutions. The value in g $CO_2$/MJ has to be added.

3. Please, keep track of your calculations for any certification requirements

| | | | | | |
|---|---|---|---|---|---|
| 43 | $CO_2$ capture and replacement | | | | |
| 44 | $e_{ccr}$ | | Emissions per MJ ethanol | | |
| 45 | 0 | $g\ CO_{2,eq}$ / $MJ_{Ethanol}$ | | | 0,00 |
| 46 | | | Result | $g\ CO_{2,eq}$ / $MJ_{Ethanol}$ | 0,00 |
| 47 | | | | | |
| 48 | | | | | |
| 49 | $CO_2$ capture and geological storage | | | | |
| 50 | $e_{ccs}$ | | Emissions per MJ ethanol | | |
| 51 | 0 | $g\ CO_{2,eq}$ / $MJ_{Ethanol}$ | | | 0,00 |
| 52 | | | Result | $g\ CO_{2,eq}$ / $MJ_{Ethanol}$ | 0,00 |

# $CO_2$ storage or replacement

## General principles :

3. Replacement : "*Emission saving from carbon capture and replacement, $e_{ccr}$, shall be limited to emissions avoided through the capture of $CO_2$ of which the carbon originates from biomass and which is used to replace fossil-derived $CO_2$ used in commercial products and services.*"

4. Storage : "*Emission saving from carbon capture and geological storage $e_{ccs}$, that have not already been accounted for in ep, shall be limited to emissions avoided through the capture and sequestration of emitted $CO_2$ directly related to the extraction, transport, processing and distribution of fuel.*"

# $N_2O$ emissions

## General principles :

1. A major contributors to GHG emissions of most of the pathways
2. Default value : $N_2O$ emissions calculated from a model (DNDC, average EU), except some pathways (IPCC Tier 1 for soybeans, palm trees, sugarcane)
3. For new pathways or when modifying the cultivation data from an existing pathways : BIOGRACE recommends to use IPCC Tier 1 estimation for this emission.
4. The BIOGRACE tool provides an excel sheet carrying these calculations out.

# $N_2O$ emissions : fill in few input data

| A | B | C | D | E | F |
|---|---|---|---|---|---|
| **Calculation of N2O emissions using the IPCC methodology** | | | | | |
| This sheet calculates the emissions of N2O from the cultivation of the crop | | | | | |
| The calculations make use of IPCC methodology Tier 1 on the estimation of $N_2O$ emissions from managed soils (1). | | | | | |
| For some crops (soybeans, sugarcane and palm trees) the additional hypothesis used in JEC calculations have been incorpo | | | | | |
| In the case of soybeans, the nitrogen content of below ground biomass was considered to be 0.074 kg N/(kg dry matter) ins | | | | | |
| In the case of sugar cane, N of above ground residues are not calculated using the IPCC methods. Alternatively additions of | | | | | |
| In the case of palm trees, N of above ground residues are calculated by the JEC considering that 0.22 t dry residues are retu | | | | | |
| (1) IPCC 2006, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inv | | | | | |
| | | | | | |
| **Crop data.** | | | | | |
| Please enter the data for your crop in the blue cell | | | | | |
| Crop name | Sugar cane | | | | |
| Crop yield (fresh matter) | 1000 | kg $_{fm}$/ha | | | |
| Humidity(%) | 45,0% | | | | |
| Crop yield (dry matter) | 550 | kg $_{dm}$/ha | | | |
| Straw yield (removed from the field) | | kg dm/ha | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Amount of vignasse applied to the field (by defaul 0.94 | | kg of vignasse dr / kg sucar cane fm | | | |
| Amount of filter cake applied to the field (by defau 0.01) | | kg of filter cake d /kg sugar cane fm | | | |
| N content of vignasse applied to the field (by defa lt 0.36) | | kg N / t vignasse | | | |
| N content of filter cake applied to the field (by def ult 12.5) | | kg N / t filter cake | | | |
| | | | | | |
| Carbon loss due to land use change | 0 | t/ha | | | |
| Is the crop irrigated OR is rainfall in rainy season minus potencial evaporation higher than soil water holding capacit ? | 1 | yes=1; no=0 | | | |

# $N_2O$ emissions

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 29 | | | | | | | |
| 30 | **Direct N2O emissions from managed soils (Tier1).** | | | | | | |
| 31 | Please enter the N additions in the form of synthetic or organic fertilizer in the blue cells | | | | | | |
| 32 | **$N_2O$ emissions from N inputs: $N_2O$_N** | | | | | | |
| 33 | | | | | | | |
| 34 | $F_{SN}$ | | kg N/ha | N in synthetic fertilizer | | | |
| 35 | $F_{ON}$ | | kg N/ha | N in organic fertilizer | | | |
| 36 | $F_{CR}$ | 0 | kg N/ha | N in crop residues | | | |
| 37 | $F_{SOM}$ | 0,00 | kg N/ha | N mineralized | | | |
| 38 | | | | | | | |
| 39 | $EF_1$ | 0,01 | 0,003 | 0,03 | | | |
| 40 | | | | | | | |
| 41 | | | | | | | |
| 42 | | | | | | | |
| 43 | | | | | | | |
| 44 | | | | | | | |
| 45 | | kg $N_2O$_N/ha | | | kg $N_2O$/ha | | |
| 46 | $N_2O$_N $_{N\ inputs}$ | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | |
| 47 | | | | | | | |

| $F_{CR}$ | N in crop residues | |
|---|---|---|
| $AG_{DM(T)}$ | 0 | kg/ha |
| Frac $_{Renew(T)}$ | 1 | |
| $R_{AG(T)}$ | 0,000 | |
| $N_{AG(T)}$ | 0 | |
| Frac $_{Remove(T)}$ | #DIV/0! | |
| $R_{BG(T)}$ | 0,00 | |
| $N_{BG(T)}$ | 0,000 | |
| $F_{CR}$ | 0 | kg N/ha Eq 11.6 |
| | 0 | kg N/ha Eq 11.7A |

| | $N_{AG}$ | slope | intercept | $AG_{DM(T)}$ | ($AG_{DM(T)}$*100! | $R_{AG(T)}$ | $R_{BG-BIO(T)}$ | $N_{BG}$ |
|---|---|---|---|---|---|---|---|---|
| Sugar beet | 0,016 | 1,07 | 1,54 | 2,13 | 4,87 | 3,87 | 0,2 | |
| Wheat | 0,006 | 1,51 | 0,52 | 1,35 | 3,46 | 2,46 | 0,24 | |
| Corn | 0,006 | 1,03 | 0,61 | 1,18 | 3,14 | 2,14 | 0,22 | |
| Sugar cane | | | | 0,00 | 1,00 | 0,00 | | |
| Rapeseed | 0,006 | 1,09 | 0,88 | 1,48 | 3,69 | 2,69 | 0,22 | |
| Sunflower | 0,006 | 1,09 | 0,88 | 1,48 | 3,69 | 2,69 | 0,22 | |
| Soybeans | 0,008 | 0,93 | 1,35 | 1,86 | 4,38 | 3,38 | 0,19 | |
| Palm | 0,011 | | | 0,00 | 1,00 | 0,00 | | |

# $N_2O$ emissions : direct and indirect emissions calculation

| $N_2O_{(L)}$-N | Leaching | |
|---|---|---|
| $F_{SN}$ | 0 kg N/ha | N in synthetic fertilizer |
| $F_{ON}$ | | |
| $F_{CR}$ | | |
| $F_{SOM}$ | | |
| Frac LE | | |
| $EF_5$ | | |

| $N_2O_{(ATD)}$-N | Volatilization | | | |
|---|---|---|---|---|
| $F_{SN}$ | 0 | kg N/ha | N in synthetic fertilizer | |
| $F_{ON}$ | 0 | kg N/ha | N in organic fertilizer | |
| Frac GASM | 0,2 | 0,05 | 0,5 | |
| Frac GASF | 0,1 | 0,03 | 0,3 | |
| $EF_4$ | 0,01 | 0,002 | 0,05 | |
| | kg N2O_N/ha | | | |
| $N2O_{(ATD)}$-N | 0,00 | 0,000 | 0,000 | |

| | | | | | |
|---|---|---|---|---|---|
| 4 | Indirect $N_2O$ emissions from managed soils (Tier1) | | | | |
| 5 | | kg $N_2O$_N/ha | | | kg $N_2O$/ha |
| 6 | $N_2O$ from atmospheric deposition of N | 0,00 | 0,00 | 0,00 | 0,00 |
| 7 | $N_2O_{(L)}$-N | 0,00 | 0,00 | 0,00 | 0,00 |
| 8 | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5 | Direct + Indirect $N_2O$ emissions from managed soils (Tier1) | | | | | | | |
| 6 | | | | | | | | |
| 7 | | kg $N_2O$_N | | | kg $N_2O$ | | | |
| 8 | Total $N_2O$ emissions | 0,01 | 0,00 | 0,00 | 0,01 | 0,00 | 0,00 | per ha |
| 9 | | 0,01 | 0,00 | 0,00 | 0,02 | 0,00 | 0,00 | per kg |
| 0 | | 0,0005 | 0,0000 | 0,0000 | 0,00 | 0,00 | 0,00 | per MJ |

# Mode detailed test

BioGrace_GHG_calculations_-_version_3_-_Public.xls

BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

# National GHG calculators – harmonized in co-operation with Biograce

Carmen Lago & Yolanda Lechón
CIEMAT
Public workshop
16 February 2011, Vienna

# Contents

# Introduction

## Rules and methodology for GHG calculations

- RED article 19: Economic operators may use
  - o default values (19.1.a)
  - o actual values calculated according to Annex V.C (19.1.b)
  - o sum of actual value and disaggregated default value (19.1.c)
- RED Annex V.C + June communications: Methodology

## Making actual calculations not straightforward

- Some kind of tool or software is needed
  - o Some companies will develop own tools
  - o Many others will use publicly available tools

## Several GHG calculators available

## Project BioGrace will ensure that all calculators will give the same result

# Contents

# Dutch tool - General information

## Background

- Dutch government prepared a reporting obligation on sustainability for biofuels to start per 1-1-2009
- This was abandoned after the publication of the draft Renewable Energy Directive (RED).

## The Dutch GHG calculator

- was developed in 2007/2008 by consultants EcoFys and CE
- has been available for (Dutch) stakeholders to make GHG calculation on biofuels
- has not been used extensively due to lack of legal framework in 2008 – 2010
- was recently updated and made “RED”- proof by Agency NL

BIOGRACE
Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

# Dutch GHG tool

**Reference:** Diesel
**Biofuel:** Biodiesel
**Feedstock:** Rapeseed

Load Default Values | Calculate Results | Adapt Chain | Chain management | Disclaimer

D = Default; U = User input

Version 3.1 - aug

**Current chain: Biodiesel from Rapeseed (not saved by user)**

| | | | | | |
|---|---|---|---|---|---|
| **Feedstock production** | | | | | |
| Yield main product | Raw rapeseed | | 3113 | kg / (ha*yr) | D |
| Main product | Moisture content | | 0,10 | kg / kg | D |
| Material & energy use | Diesel | | 2963 | MJ / (ha*yr) | D |
| Material & energy use | N fertilizer | | 137,4 | kg N / (ha*yr) | D |
| Material & energy use | CaO fertilizer | | 19,00 | kg CaO / (ha*yr) | D |
| Material & energy use | K2O fertilizer | | 49,46 | kg K2O / (ha*yr) | D |
| Material & energy use | P2O5 fertilizer | | 33,67 | kg P2O5 / (ha*yr) | D |
| Material & energy use | Pesticides | | 1,230 | kg / (ha*yr) | D |
| Material & energy use | Seeding material - rapeseed | | 6,000 | kg / (ha*yr) | D |
| Field emissions | Field N2O emissions | | 3,103 | kg / (ha*yr) | D |
| Field emissions | Direct Land Use Change | No | | g CO2/MJbiofuel | D |
| **Feedstock drying** | | | | | |
| Yield main product | Dried rapeseed | | 1,000 | MJdried rapeseed / (MJraw rapeseed) | D |
| Main product | Moisture content | | 0,10 | kg / kg | D |
| Material & energy use | Diesel | | 0,181 | MJ / (GJdried rapeseed) | D |
| Material & energy use | Electricity (EU-mix, LV) | | 3,079 | MJ / (GJdried rapeseed) | D |
| **Transport feedstock** | | | | | |
| Yield main product | Dried rapeseed | | 0,990 | MJdried rapeseed / (MJdried rapeseed) | D |
| Main product | Moisture content | | 0,10 | kg / kg | D |
| Transport | Truck for dry product (Diesel) | | 50 | km | D |
| **Extraction in oil mill** | | | | | |
| Yield main product | Crude vegetable oil | | 0,613 | MJcrude oil / (MJdried rapeseed) | D |
| Yield by-product | Rapeseed cake | | 0,387 | MJrapeseed cake / (MJdried rapeseed) | D |

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Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

# Dutch GHG tool

| | | | | | |
|---|---|---|---|---|---|
| **Refining of vegetable oil** | | | | | |
| | Yield main product | Refined rapeseed oil | 0.960 | MJrefined oil / (MJcrude oil) | D |
| | Material & energy use | Electricity (EU-mix, MV) | 0.840 | MJ / (GJrefined oil) | D |
| | Material & energy use | Fuller's earth | 0.233 | MJ / (GJrefined oil) | D |
| | Material & energy use | Steam (NG boiler) | 11.511 | MJ / (GJrefined oil) | D |
| | | | | | |
| **Esterification** | | | | | |
| | Yield main product | Biodiesel | 0.994 | MJbiodiesel / (MJrefined oil) | D |
| | Yield by-product | Refined glycerol | 0.045 | MJglycerol / (MJrefined oil) | D |
| | Material & energy use | Electricity (EU-mix, MV) | 4.065 | MJ / GJbiodiesel | D |
| | Material & energy use | Phosporic acid (H3PO4) | 0.064 | kg / GJbiodiesel | D |
| | Material & energy use | Hydrocloric acid (HCl) | 0.753 | kg / GJbiodiesel | D |
| | Material & energy use | Methanol | 81.838 | MJ / GJbiodiesel | D |
| | Material & energy use | Sodium carbonate (Na2CO3) | 0.094 | kg / GJbiodiesel | D |
| | Material & energy use | Sodium Hydroxide (NaOH) | 0.253 | kg / GJbiodiesel | D |
| | Material & energy use | Steam (NG boiler) | 100.587 | MJ / GJbiodiesel | D |
| | | | | | |
| **Transport biofuel, depot, transport biofuel** | | | | | |
| | Yield main product | Biodiesel | 1.000 | MJbiodiesel / MJbiodiesel | D |
| | Transport | Truck for liquids (Diesel) | 150 | km | D |
| | Material & energy use | Electricity (EU-mix, LV) | 0.840 | MJ / GJbiodiesel | D |
| | Transport | Truck for liquids (Diesel) | 150 | km | D |
| | | | | | |
| | | | | | |
| **Biofuel filling station** | | | | | |
| | Yield main product | Biodiesel | 1.000 | MJbiodiesel / MJbiodiesel | D |
| | Material & energy use | Electricity (EU-mix, LV) | 3.400 | MJ / GJbiodiesel | D |

BIOGRACE
Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

# Dutch GHG tool

**Summary Input**

| | |
|---|---|
| Biofuel | Biodiesel |
| Feedstock | Rapeseed |
| Process | - |
| Reference | Diesel |

Print summary results

Show detailed results

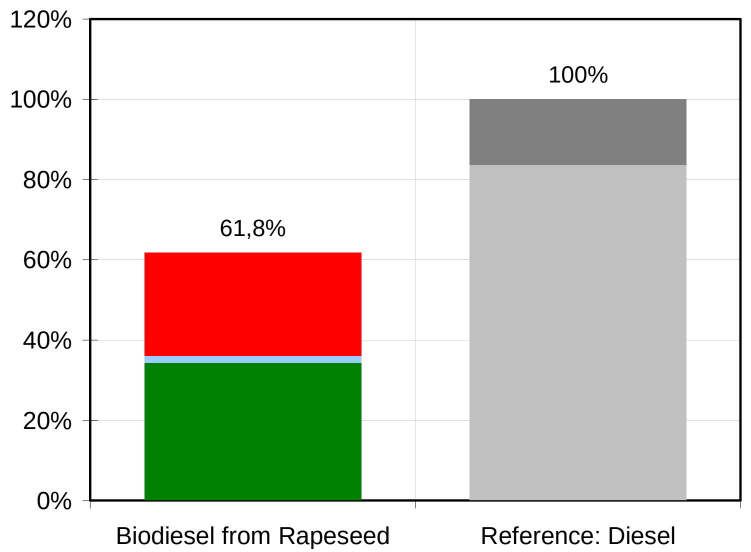
Return to input

| **Summary output** | Biodiesel from Rapeseed | | | | Reference: Diesel | | | |
|---|---|---|---|---|---|---|---|---|
| | Energy use (per MJ) | | GHG emissions (kg/MJ) | | Energy use (per MJ) | | GHG emissions (kg/MJ) | |
| | (MJ) | (% of ref.) | (g CO2-eq.) | (% of ref.) | (MJ) | (%) | (g CO2-eq.) | (%) |
| Feedstock production | 0,1672 | 14% | 28,7496 | 34% | | | | |
| Transport actions | 0,0233 | 2% | 1,4345 | 2% | | | | |
| Conversion operations | 0,3677 | 32% | 21,5636 | 26% | | | | |
| End use | | | | | 1,0000 | 87% | 70,1047 | 84% |
| Fossil indirect | | | | | 0,1550 | 13% | 13,6953 | 16% |
| Total | 0,5582 | 48,3% | 51,7477 | 61,8% | 1,1550 | 100% | 83,8000 | 100% |
| **% Reduction** | | **51,7%** | | **38,2%** | | | | **0%** |
| **Avoided emission (tonne $CO_2$/ha/yr)** | | | **1371,5** | | | | | |

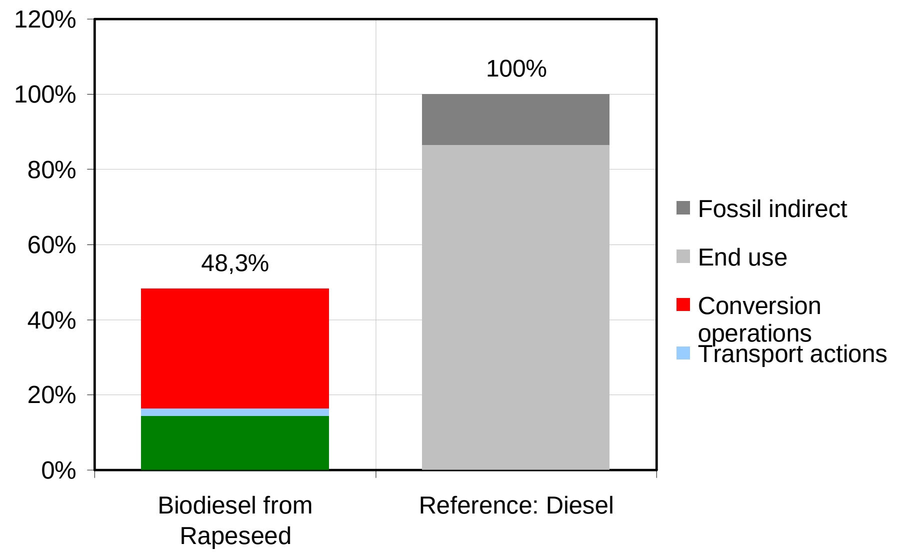
Biofuels greenhouse gas calculator

NL Agency
Ministry of Economic Affairs

**GHG emissions [% of reference]**




**Energy use [% of reference]**



# Dutch GHG tool

| | |
|---|---|
| Biofuel | Biodiesel |
| Feedstock | Rapeseed |
| Process | - |
| Reference | Diesel |

Return to overview results

Return to input

| | Absolute Numbers (including allocation) | | | | | Relative contribution (including allocation) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Energy use [MJ fossil fuel/ MJ biofuel] | Emission CO2 [kg CO2/ MJ biofuel] | Emission N2O [kg CO2-eq/ MJ biofuel] | Emission CH4 [kg CO2-eq/ MJ biofuel] | Emission GHG [kg CO2-eq/ MJ biofuel] | Energy use [%] | Emission CO2 [%] | Emission N2O [%] | Emission CH4 [%] |
| **Feedstock production** | | | | | | | | | |
| Diesel | 0,047 | 3,555 | 0,00E+00 | 0,00E+00 | 3,555 | 8,4% | 6,9% | 0,0% | 0,0% |
| N fertilizer | 0,092 | 5,319 | 5,370 | 0,376 | 11,065 | 16,5% | 10,3% | 10,4% | 0,7% |
| CaO fertilizer | 5,13E-04 | 0,031 | 1,41E-03 | 1,29E-03 | 0,034 | 0,1% | 0,1% | 0,0% | 0,0% |
| K2O fertilizer | 6,55E-03 | 0,363 | 2,47E-03 | 0,024 | 0,390 | 1,2% | 0,7% | 0,0% | 0,0% |
| P2O5 fertilizer | 7,02E-03 | 0,445 | 7,03E-03 | 0,014 | 0,466 | 1,3% | 0,9% | 0,0% | 0,0% |
| Pesticides | 4,52E-03 | 0,166 | 8,38E-03 | 9,89E-03 | 0,185 | 0,8% | 0,3% | 0,0% | 0,0% |
| Seeding material - rapeseed | 6,46E-04 | 0,034 | 0,024 | 1,72E-03 | 0,060 | 0,1% | 0,1% | 0,0% | 0,0% |
| Field N2O emissions | 0,00E+00 | 0,00E+00 | 12,575 | 0,00E+00 | 12,575 | 0,0% | 0,0% | 24,3% | 0,0% |
| Direct Land Use Change | - | 0,00E+00 | - | - | 0,00E+00 | - | 0,0% | - | - |
| **Total Feedstock production** | **0,159** | **9,914** | **17,989** | **0,427** | **28,331** | **28,4%** | **19,2%** | **34,8%** | **0,8%** |

| | |
|---|---|
| Allocation burden of this and previous steps to main product Raw rapeseed | 100,0% |
| Allocation burden of this and previous steps to by-product Raw rapeseed | 0,0% |
| Allocation burden of this step to Biodiesel at end-of-chain | 58,6% |

| | Energy use | Emission CO2 | Emission N2O | Emission CH4 | Emission GHG | Energy use | Emission CO2 | Emission N2O | Emission CH4 |
|---|---|---|---|---|---|---|---|---|---|
| **Feedstock drying** | | | | | | | | | |
| Diesel | 2,13E-04 | 0,016 | 0,00E+00 | 0,00E+00 | 0,016 | 0,0% | 0,0% | 0,0% | 0,0% |
| Electricity (EU-mix, LV) | 8,51E-03 | 0,377 | 5,05E-03 | 0,021 | 0,403 | 1,5% | 0,7% | 0,0% | 0,0% |
| **Total Feedstock drying** | **8,72E-03** | **0,393** | **5,05E-03** | **0,021** | **0,419** | **1,6%** | **0,8%** | **0,0%** | **0,0%** |

| | |
|---|---|
| Allocation burden of this and previous steps to main product Dried rapeseed | 100,0% |
| Allocation burden of this and previous steps to by-product Dried rapeseed | 0,0% |
| Allocation burden of this step to Biodiesel at end-of-chain | 58,6% |

| | Energy use | Emission CO2 | Emission N2O | Emission CH4 | Emission GHG | Energy use | Emission CO2 | Emission N2O | Emission CH4 |
|---|---|---|---|---|---|---|---|---|---|
| **Transport feedstock** | | | | | | | | | |
| Truck for dry product (Diesel) | 2,29E-03 | 0,173 | 0,00E+00 | 2,43E-04 | 0,173 | 0,4% | 0,3% | 0,0% | 0,0% |
| **Total Transport feedstock** | **2,29E-03** | **0,173** | **0,00E+00** | **2,43E-04** | **0,173** | **0,4%** | **0,3%** | **0,0%** | **0,0%** |

BIOGRACE
Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

# Dutch GHG tool

## DIRECT LAND USE CHANGE CALCULATION

Return to input

### 1. Standard Soil Carbon stock in mineral soil ($SOC_{ST}$)

| | | | |
|---|---|---|---|
| **Climate region** | Boreal | See figure 1 | The blue fields are drop down boxes. |
| **Soil type** | High activity clay soils | See figure 3 & 2 | |
| | **Result** | $SOC_{ST}$ 68 | ton C / ha |

### 2. Factors reflecting the difference in Soil Organic Carbon (SOC) compared to the Standard Soil Organic Carbon ($SOC_{ST}$)

**Actual land use**

Default=Calculate with standard values: Default
User = Own calculation incl. measured value

| | | |
|---|---|---|
| **Type of land** | Cropland | See tables 3, 6 and 8 |
| **Climate region** | Temperate/Boreal, dry | |
| **Land use $F_{LU}$** | Cultivated | 0,8 |
| **Management $F_{MG}$** | Full-tillage | 1 |
| **Input $F_I$** | Low | 0,95 |
| **Result** | $SOC_A$ | 51,68 ton C / ha |

**Reference land use**

Default=Calculate with standard values: Default
User = Own calculation incl. measured value

| | | |
|---|---|---|
| **Type of land** | Cropland | See tables 3, 6 and 8 |
| **Climate region** | Temperate/Boreal, dry | |
| **Land use $F_{LU}$** | Cultivated | 0,8 |
| **Management $F_{MG}$** | Full-tillage | 1 |
| **Input $F_I$** | Low | 0,95 |
| **Result** | $SOC_{ref}$ | 51,68 g C / ha |

### 3. Above and below ground vegetation (Cveg)

**Actual land use**

Default=Calculate with standard values: Default
User = Own calculation incl. measured value

| | |
|---|---|
| **Type of land** | Cropland (General) |
| **Domain** | |
| **Climate region** | |
| **Ecological zone** | |
| **Continent** | |
| **Crop type** | |
| **Result** | $C_{VEG,A}$ 0 ton C / ha |

**Reference land use**

Default=Calculate with standard values: Default
User = Own calculation incl. measured value

| | |
|---|---|
| **Type of land** | Forest 10-30% canopy cover, excl plantations |
| **Domain** | Temperate |
| **Climate region** | |
| **Ecological zone** | Temperate continental forest |
| **Continent** | Asia, Europe (<= 20 y) |
| **Crop type** | |
| **Result** | $C_{VEG, ref}$ 2 ton C / ha |

### 4. Bonus (eb) for cultivation on restored degraded land under the conditions provided for in point 8 of Annex V of directive.

Bonus: No

No = 0 g $CO_2$/MJ
Yes = -29 g $CO_2$/MJ

### Total results

**Result: $CO_2$ emission caused by direct land use change** 8,5625592 **g $CO_2$/MJ biofuel**

Calculate Results — Re-calculate the results if you changed the values here or at the input page.

# Dutch tool - Summary

## Contents

- Excel-based tool
- Tool is rather similar to BioGrace Excel sheets, but
  - It is more user-friendly:
    no calculations details, results in graphs
  - DLUC calculations are user-friendly
- The software programming makes it less flexible
  - More difficult to modify pathways or build new ones

## Status

- Tool is available on-line via
  www.senternovem.nl/gave_english/ghg_tool
- All 22 chains (BioGrace) are included
- Updates follow updates of BioGrace Excel sheet

# Contents

# German tool - general information

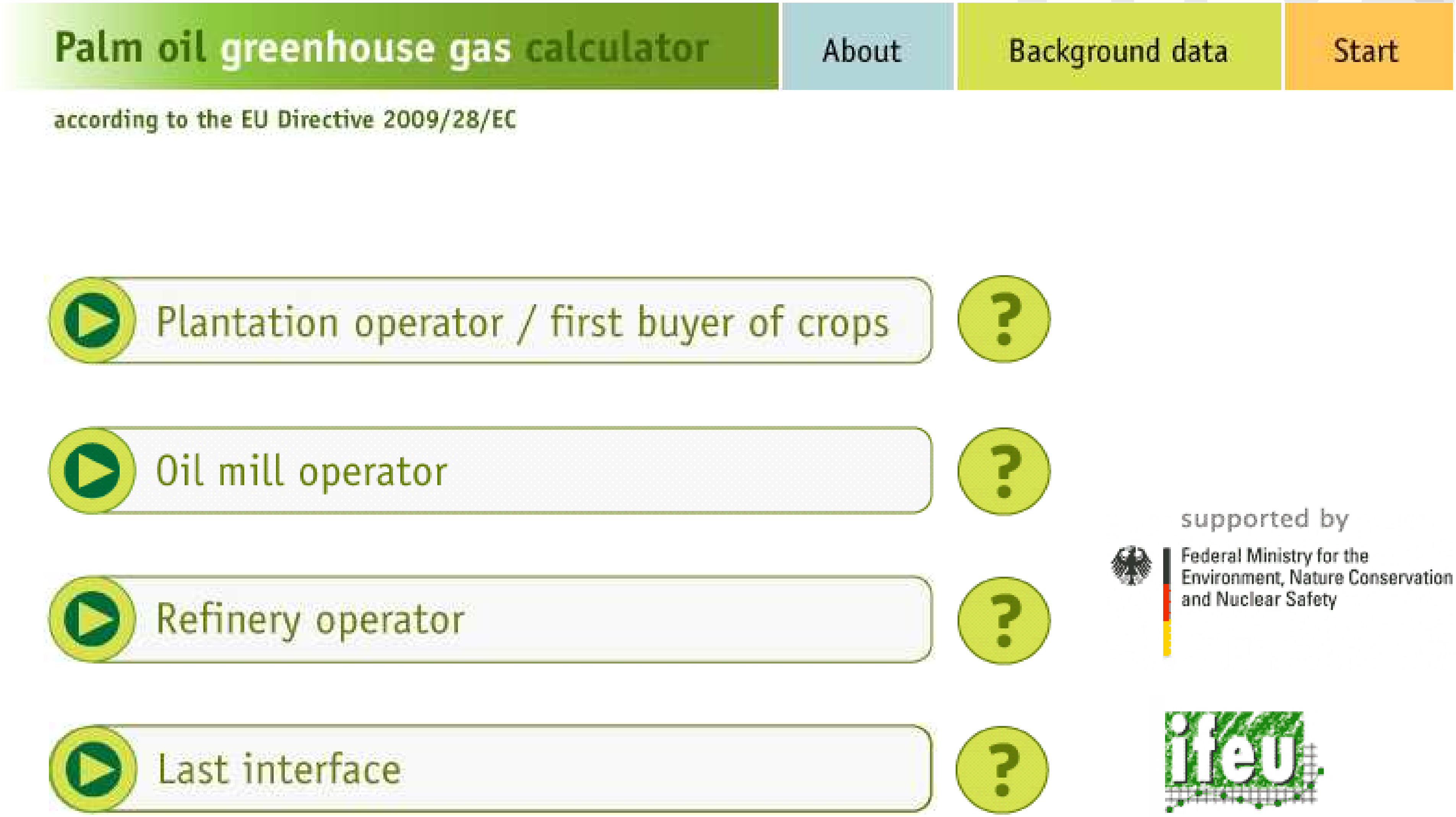
## Background

- No public tool has been available so far in Germany
- Aim: to facilitate stakeholders calculating actual values (combination of actual values and disaggregated default values)

## The German GHG calculator

- is made by IFEU, contracted by BMU
- should be finalised mid 2011
- should be in line with BLE Guidance
- is strongly linked to economic operators: 1 sheet dedicated for cultivators, mill operators, refinery operators, etc.

# German GHG tool



# German GHG tool

Palm oil greenhouse gas calculator | About | Background data | Start

according to the EU Directive 2009/28/EC

ifeu

**Version 1**

**About this calculation tool**

This Excel tool is designed to help stakeholders in the palm oil production chain by facilitating their greenhouse gas (GHG) calculations according to the Renewable Energy Directive (RED) (*2009/28/EC*) and the Fuel Quality Directive (*2009/30/EC* ). From 2011 onwards, biofuels and bioliquids need to prove a GHG reduction of at least 35 % compared to fossil fuels in order to qualify for state incentive programs or the renewable energy targets of the European Member States. Germany has implemented the European sustainability criteria in two ordinances; the biomass electricity sustainability ordinance and the biofuels sustainability ordinance.

This tool complements the "Guidance on Sustainable Biomass Production' published by the Federal Agency for Food and Agriculture (BLE) and is the tool-version of chapter IX. "Concrete calculation of greenhouse gas reductions".
http://www.ble.de/cln_099/nn_417472/DE/06__Aktuelles/03__Pressemitteilungen/2010/100205__BroschuereNachhaltigeBiomasse.html?__nnn=true

**Calculation of GHG emissions**

This tool facilitates GHG calculations according to RED Art. 19 (1) (b) and (c)
- to calculate actual values in accordance with the methodology laid down in part C of Annex V" ;
- to combine actual values with disaggregated default values in part D or E of Annex V.

With this calculator you can calculate your GHG emissions for the whole production chain or just a part of it. For each part of the production chain there is one calculation sheet with a step-by-step manual:

# German GHG tool

## Palm oil greenhouse gas calculator

About | Background data | Start

according to the EU Directive 2009/28/EC

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|
| **BACKGROUND DATA** parameter: | **GHG emission coefficient** | | | | | | | | **Fossil energy input** | |
| unit: | $gCO_2/kg$ | $gCH_4/kg$ | $gN_2O/kg$ | $gCO_{2-eq}/kg$ | $gCO_2/MJ$ | $gCH_4/MJ$ | $gN_2O/MJ$ | $gCO_{2-eq}/MJ$ | $MJ_{fossil}/kg$ | $MJ_{fossil}/MJ$ |
| *Global Warming Potentials (GWP's)* | | | | | | | | | | |
| $CO_2$ | | | | 1 | | | | | | |
| $CH_4$ | | | | 25 | | | | | | |
| $N_2O$ | | | | 298 | | | | | | |
| *Agro inputs* | | | | | | | | | | |
| N-fertiliser | 2827,0 | 8,68 | 9,6418 | 5917,2 | | | | | 48,99 | |
| $P_2O_5$-fertiliser | 964,9 | 1,33 | 0,0515 | 1013,5 | | | | | 15,23 | |
| $K_2O$-fertiliser | 536,3 | 1,57 | 0,0123 | 579,2 | | | | | 9,68 | |
| CaO-fertiliser | 119,1 | 0,22 | 0,0183 | 130,0 | | | | | 1,97 | |
| Pesticides | 9886,5 | 25,53 | 1,6814 | 11025,7 | | | | | 268,40 | |
| Seeds- corn | - | - | - | - | | | | | - | |
| Seeds- rapeseed | 412,1 | 0,91 | 1,0028 | 733,7 | | | | | 7,87 | |
| Seeds- soy bean | - | - | - | - | | | | | - | |
| Seeds- sugarbeet | 2187,7 | 4,60 | 4,2120 | 3557,9 | | | | | 36,29 | |
| Seeds- sugarcane | 1,6 | 0,00 | 0,0000 | 1,6 | | | | | 0,02 | |
| Seeds- sunflower | 412,1 | 0,91 | 1,0028 | 733,7 | | | | | 7,87 | |
| Seeds- wheat | 151,1 | 0,28 | 0,4003 | 277,3 | | | | | 2,61 | |
| EFB compost (palm oil) | 0,0 | 0,00 | 0,0000 | 0,0 | | | | | 0,00 | |
| *Fuels- gasses* | | | | | | | | | | |
| Natural gas (4000 km, Russian NG quality) | | | | | 61,58 | 0,1981 | 0,0002 | 66,59 | | 1,1281 |
| Natural gas (4000 km, EU Mix qualilty) | | | | | 62,96 | 0,1981 | 0,0002 | 67,98 | | 1,1281 |
| *Fuels- liquids* | | | | | | | | | | |
| Diesel | | | | | 87,64 | - | - | 87,64 | | 1,16 |
| Gasoline | | | | | | | | | | |
| HFO | | | | | 84,98 | - | - | 84,98 | | 1,088 |
| Ethanol | | | | | | | | | | |
| Methanol | | | | | 92,80 | 0,2900 | 0,0003 | 100,15 | | 1,6594 |
| FAME | | | | | | | | | | |
| Syn diesel (BtL) | | | | | | | | | | |

BIOGRACE
Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

# German GHG tool

Palm oil greenhouse gas calculator | About | Background data | Start

according to the EU Directive 2009/28/EC

Plantation operator / first buyer of crops ?

Oil mill operator ?

Refinery operator ?

Last interface ?

supported by
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

ifeu

# German GHG tool

Palm oil greenhouse gas calculator | About | Background data | Start

according to the EU Directive 2009/28/EC

## I. Market actor: Plantation operator, first purchaser

**Step-by-step manual for calculating GHG emissions of oil palm cultivation**

**Final Result**
Please provide this info together with your batch to oil miller.

Please note: When combining FFB batches and averaging GHG emissions, GHG value for each batch may not exceed **280g $CO_2$eq/kg FFB**

**The $CO_2$ emissions from oil palm cultivation amount to**

**123,7** g $CO_2$eq/kg FFB ?

**Size of the FFB batch**

**0** kg

**Enter your operating data in step 1-4 to calculate $CO_2$ emissions of your FFB batch**

## STEP 1 - GHG emissions from land use changes

**Do FFB´s originate from plantation areas that were plantation areas before january 1st 2008?**

yes ▶ Emissions from land use change are zero.

no ▶ Click here to calculate emissions in sheet "land use changes"

**Which emissions arose from land use changes?**

0 kg $CO_2$eq per ha per year

## STEP 2 - GHG emissions from cultivation

# German GHG tool

## Palm oil greenhouse gas calculator

About | Background data | Start

according to the EU Directive 2009/28/EC

### I. Market actor: Plantation operator, first purchaser

**Step-by-step manual for calculating $CO_2$ emissions from land use change**

The European Commission has published *guidelines for the calculation of land carbon stocks* (notified under document C (2010) 3751). These consist of tables with values for carbon stock in soils, above and below ground biomass for different soil types, climate regions, vegetation types etc.

**Result**
value will be added in sheet »actor cultivator« step 1

**#WAARDE!**
kg $CO_2$eq per ha per year

confirm value and back

**Specify the parameters in step 1-4 to calculate CO2 emissions from land use changes**

| STEP 1 - Carbon stock in above and below ground biomass on 01.01.2008 ($CS_R$) | | |
|---|---|---|
| **Please select:** | | |
| Vegetation type | Forest (10-30% canopy cover) | ? |
| Domain | | |
| Climate region | | |
| Ecological zone | | |
| Continent | | |
| **Above and below ground carbon on 01.01.08** | **Please make a valid selection** | **t C/ha** |

| STEP 2 - Soil carbon on 01.01.2008 ($CS_R$) | | |
|---|---|---|
| Climate region | Tropical, moist | ? |
| **Please select:** | | |
| Soil type | Low activity clay soils | |
| Standard soil carbon t C/ha | 47 | |

BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

# German GHG tool

Palm oil greenhouse gas calculator | About | Background data | Start

according to the EU Directive 2009/28/EC

## I. Market actor: Plantation operator, first purchaser

Step-by-step manual for calculating GHG emissions of oil palm cultivation

**Final Result**
Please provide this info together with your batch to oil miller.

Please note: When combining FFB batches and averaging GHG emissions, GHG value for each batch may not exceed **280g $CO_2$eq/kg FFB**

The $CO_2$ emissions from oil palm cultivation amount to

**123,7** g $CO_2$eq/kg FFB ?

Size of the FFB batch

**0** kg

Enter your operating data in step 1-4 to calculate $CO_2$ emissions of your FFB batch

## STEP 2 - GHG emissions from cultivation

**What is your FFB yield per ha per year?**

19.000 kg FFBs per ha per year ?

**What is the size of your cultivation area?**

28 ha

**How much fertilizer did you apply per ha per year? Please enter the amount for each of the following fertilizers.**

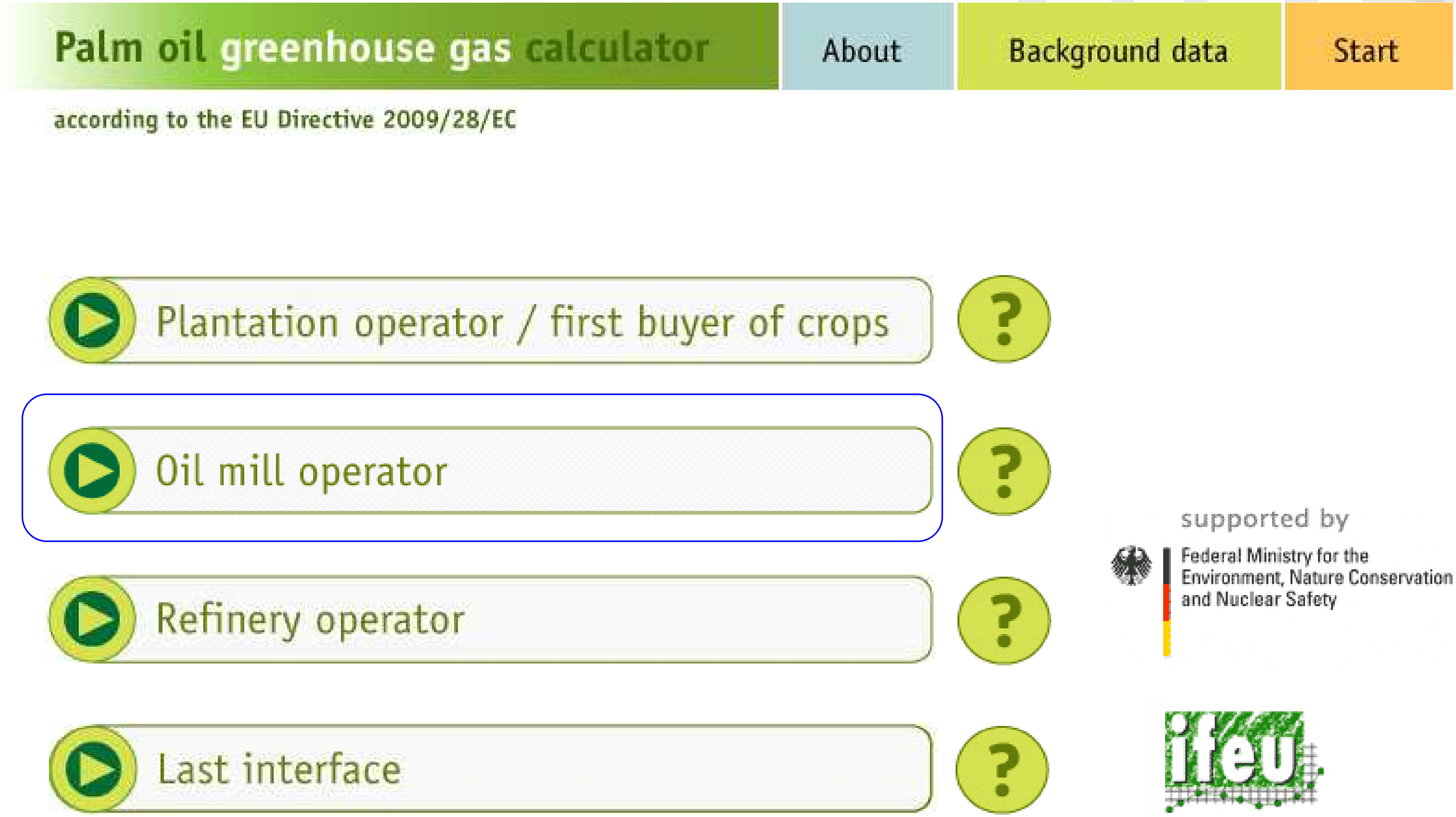
| | | |
|---|---|---|
| N-fertiliser | 128,0 | kg N per ha per year |
| $P_2O_5$-fertiliser | 144,0 | kg $P_2O_5$ per ha per year |
| $K_2O$-fertiliser | 200,0 | kg $K_2O$ per ha per year |

# German GHG tool

| STEP 2 - GHG emissions from cultivation | | |
|---|---|---|
| **What is your FFB yield per ha per year?** | | |
| | 19,000 | kg FFBs per ha per year |
| **What is the size of your cultivation area?** | | |
| | 28 | ha |
| **How much fertilizer did you apply per ha per year? Please enter the amount for each of the following fertilizers.** | | |
| N-fertiliser | 128.0 | kg N per ha per year |
| $P_2O_5$-fertiliser | 144.0 | kg $P_2O_5$ per ha per year |
| $K_2O$-fertiliser | 200.0 | kg $K_2O$ per ha per year |
| CaO-fertiliser | 0.0 | kg CaO per ha per year |
| **How much pesticides did you apply per ha per year?** | | |
| Pesticides | 8.4 | kg active ingredient per ha per year |
| **How much diesel did you use per ha per year? Please include** | | |
| Diesel | 57.4 | l per ha per year |
| **What is the size of your batch (consignment)?** | | |
| | 0 | kg |
| **Emissions fertilizer** | **2,077** | **kg $CO_2$eq per ha per year** |
| N-fertilizer production | 757 | kg $CO_2$eq per ha per year |
| $N_2O$ field emissions | 1,058 | kg $CO_2$eq per ha per year |
| $P_2O_5$-fertilizer production | 146 | kg $CO_2$eq per ha per year |
| $K_2O$-fertilizer production | 116 | kg $CO_2$eq per ha per year |
| Ca-fertilizer production | 0 | kg $CO_2$eq per ha per year |
| **Emissions pesticide production** | **93** | **kg $CO_2$eq per ha per year** |
| **Emissions diesel** | **180** | **kg $CO_2$eq per ha per year** |

| | | |
|---|---|---|
| **Emissions (cultivation)** | **2,350** | **kg $CO_2$eq per ha per year** |
| **Emissions (land use changes)** | **0** | **kg $CO_2$eq per ha per year** |
| **Total emissions** | **2,350** | **kg $CO_2$eq per ha per year** |

# German GHG tool



# German GHG tool

Palm oil greenhouse gas calculator | About | Background data | Start

according to the EU Directive 2009/28/EC

## II. Market actor: Oil mill operator

**Step-by-step manual for calculating $CO_2$ emissions of CPO production**

**Final Result**
Please provide this info together with your batch to refinery.

Please note: When combining CPO batches and averaging GHG emissions, GHG value for each batch may not exceed **1190g $CO_2$eq/kg CPO**

**The $CO_2$ emissions from palm oil mill amount to**
1517 g $CO_2$eq/kg CPO ?

**Size of the CPO batch**
**30000** kg

**Enter your operating data in step 1-4 to calculate $CO_2$ emissions of your CPO batch**

**STEP 1 - GHG emissions of pre-products**

**What GHG emissions arose from the production of the FFBs? Indicate whether you want to use the default value or a calculated value.**

default value — Click here to use default value "126" g $CO_2$eq/kg FFB in the field below

calculate value — Click here to calculate your emissions in g $CO_2$eq/kg FFB.

126 g $CO_2$eq/kg FFB

**STEP 2 - GHG emissions from oil mill operation**

**How many tons of FFB´s did you process per year?**

10.000 t FFB/year ?

# German GHG tool

| | | |
|---|---|---|
| **How many tons of FFB´s did you process per year?** | | |
| | 10,000 | t FFB/year |
| **How much CPO was produced per year?** | | |
| CPO | 3437 | t/year |
| **Which amounts of by-products were produced per year?** | | |
| palm kernel o | 0 | t/year |
| palm kernel m | 378 | t/year |
| entire palm ke | 0 | t/year |
| **How much energy did the oil mill consume per year?** | | |
| Fuel oil | 0 | l per year |
| Natural gas | 0 | kWh per year |
| Electricity (ex | 0 | kWh per year |
| Electricity mi | Electricity Malaysia | |
| **How much n-Hexane was applied per year?** | | |
| n-Hexane | 0 | t/year |
| **Was methane from POME captured? yes (0), no (1)** | | |
| | 1 | |
| **Which technology was used for methane capture?** | | |
| **NOT YET AVAILABLE** | | |
| **STEP 3 - Calculation of emissions** | | |
| Fuel oil | Fill in Step 1- | g $CO_2$eq per kg oil |
| natural gas | Fill in Step 1- | g $CO_2$eq per kg oil |
| Electricity | Fill in Step 1- | g $CO_2$eq per kg oil |
| n-Hexane | Fill in Step 1- | g $CO_2$eq per kg oil |
| POME emiss | 1,222.6 | g $CO_2$eq per kg oil |
| **Emission oil** | **1,222.6** | **g $CO_2$eq per kg oil** |

| | | |
|---|---|---|
| **STEP 4 - GHG emissions from FFB transport** | | |
| **What is the average distance from the oil palm plantation to oil mill?** | | |
| | 20 | km |
| **Which vehicle was used to transport FFBs?** | | |
| | Truck for dry | |
| **Which fuel did this vehicle use?** | | |
| | Diesel | |
| **Emission tra** | **Fill in Step 1** | **g $CO_2$eq per kg oil** |
| **What is the size of your batch (consignment)?** | | |
| | 30,000 | kg |
| **STEP 5 -Combination of values** | | |
| Pre-products | 367 | g $CO_2$eq per kg oil |
| Transport | 5 | g $CO_2$eq per kg oil |
| Oil mill | 1,223 | g $CO_2$eq per kg oil |
| **Total emissi** | **1,595** | **g $CO_2$eq per kg oil** |
| **STEP 6 - Allocation** | | |
| Heat content | 127,169 | GJ |
| Heat content | 6,462 | GJ |
| Allocation fac | 0.952 | |
| **Total emissi** | **1,518** | **g $CO_2$eq per kg oil** |

# German GHG tool

Palm oil greenhouse gas calculator | About | Background data | Start

according to the EU Directive 2009/28/EC

**Mixing CPO batches from several suppliers and averaging GHG emissions**

| *Overall quantity metric tonnes* | *Overall GHG value g $CO_2$eq/kg FFB* |
|---|---|
| 0 | 0 |

confirm value and back

| Supplier# | Plantation name | FFB quantitity metric tonnes | GHG value g $CO_2$eq/kg FFB |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |
| 11 | | | |
| 12 | | | |
| 13 | | | |
| 14 | | | |
| 15 | | | |
| 16 | | | |
| 17 | | | |
| 18 | | | |
| 19 | | | |
| 20 | | | |

fill in the information delivered by your suppliers

# German GHG tool

## Palm oil greenhouse gas calculator

About | Background data | Start

according to the EU Directive 2009/28/EC

### IV. Market actor: Last Interface

**Step-by-step manual for calculating greenhouse gas savings:**

**Final Result**
Greenhouse gas savings

**44%** compared to fossil comparator ?

**STEP 1**

**What are the GHG emissions of the final product?**

1747 g $CO_2$eq/kg refined palm oil ?

Calculation of heat content: 47 g $CO_2$eq/MJ

**Is the biofuel used for electricity production or for cogeneration?**

Electricity from Cogeneration: **85** g $CO_2$eq/MJ

# German tool - Summary

## Contents

- Excel-based tool
- Tool differs from BioGrace Excel sheets:
  - Pathways are split in partial calculations
  - DLUC calculations are user-friendly
- The software programming makes it inflexible
  - Not possible to modify pathways or build new ones

## Status

- Tool is available on-line via www.ifeu.de/english
- Currently one chain available: palm oil
- Cereals-to-ethanol and oil_seeds-to-biodiesel chains are ready but not available on line

# Contents

# Spanish tool - general information

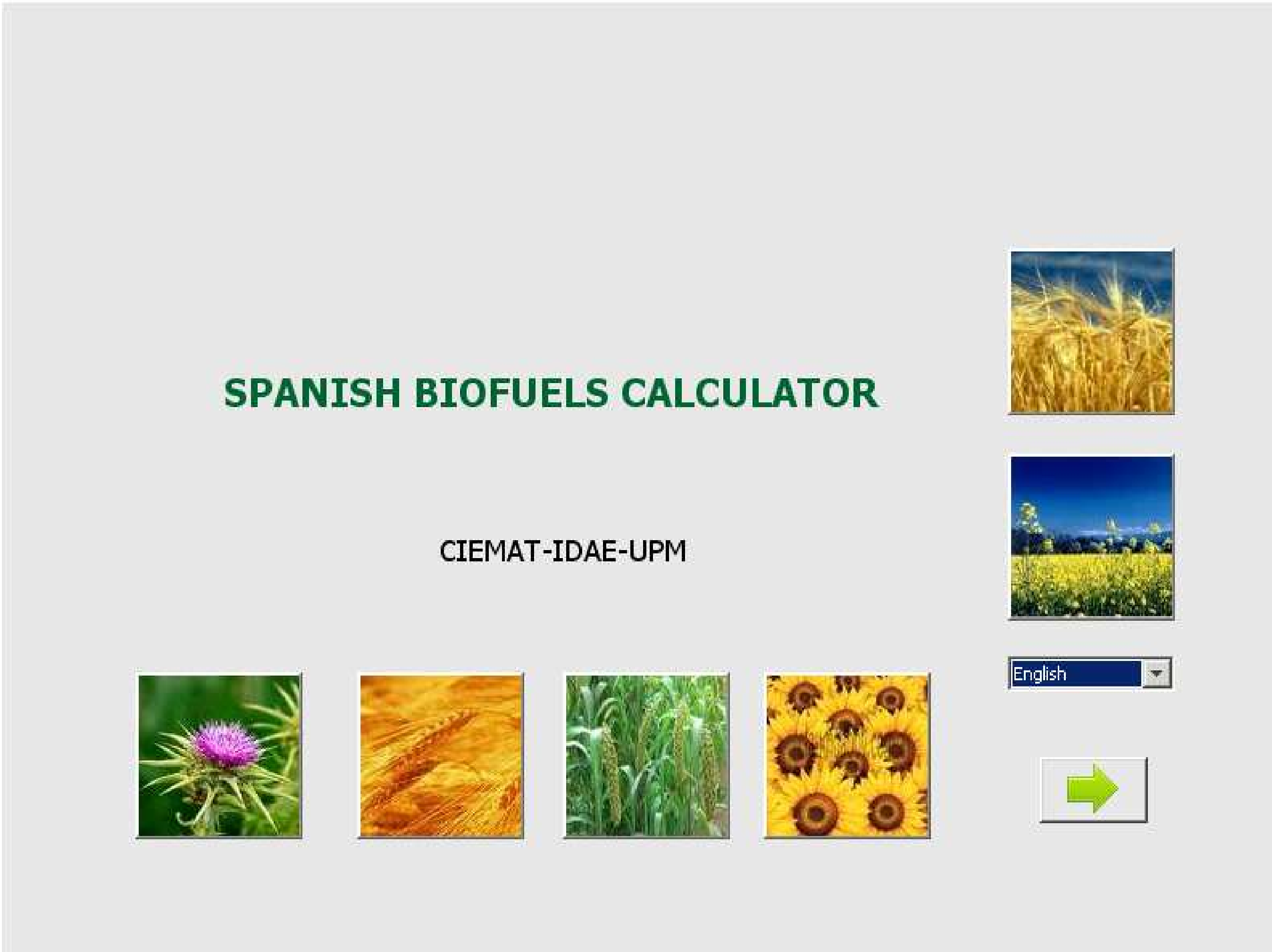
## Background

- No public tool has been available so far in Spain
- Aim: to provide stakeholders (especially farmers and small biofuel companies) with a tool to calculate the GHG emissions required by the RED

## The Spanish GHG calculator

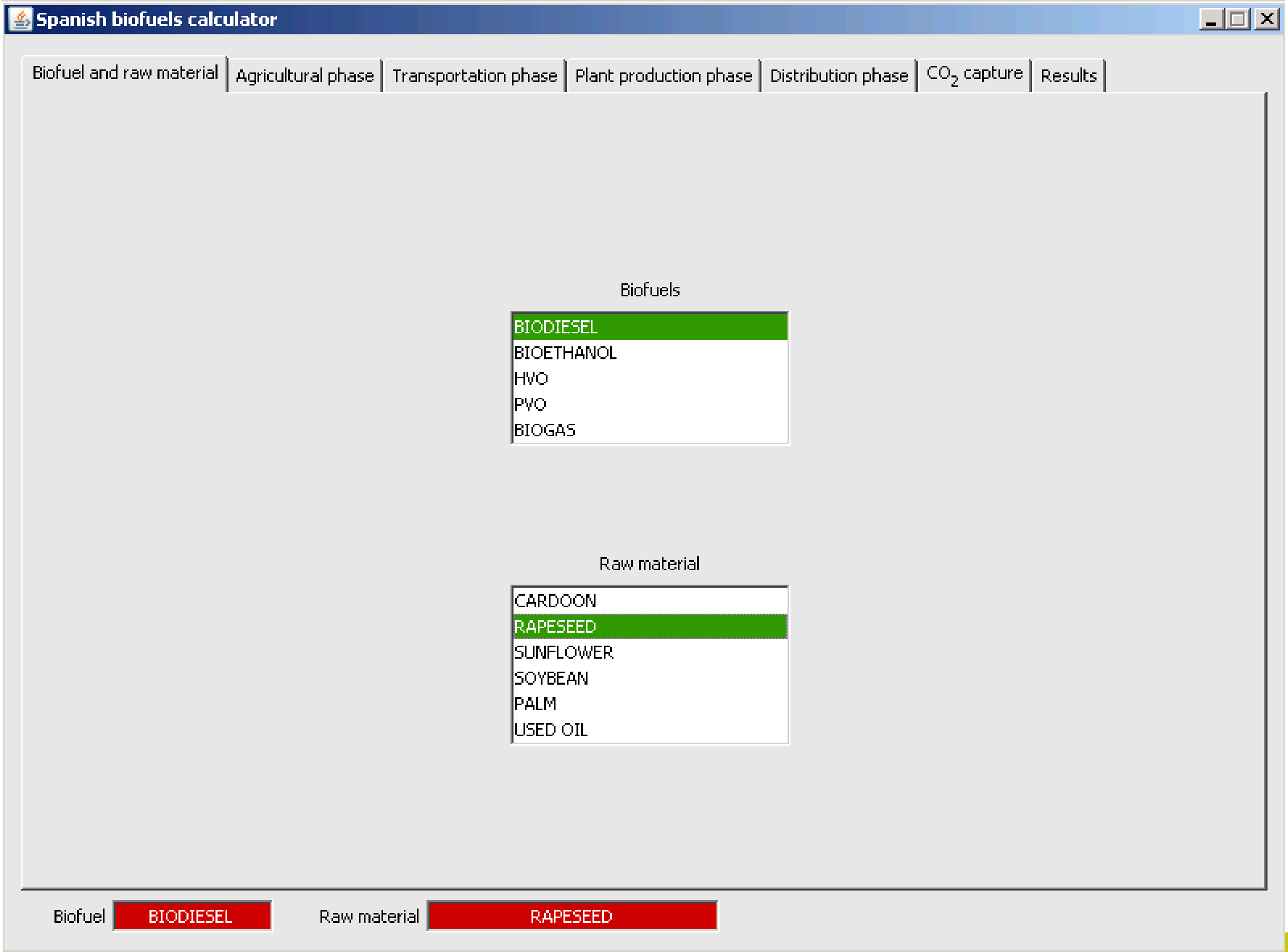
- being developed by CIEMAT, contracted by IDAE
- focuses on agricultural stages
- uses data from NUTS study (actual values or averages calculated for smaller geographical areas)

# Spanish GHG tool



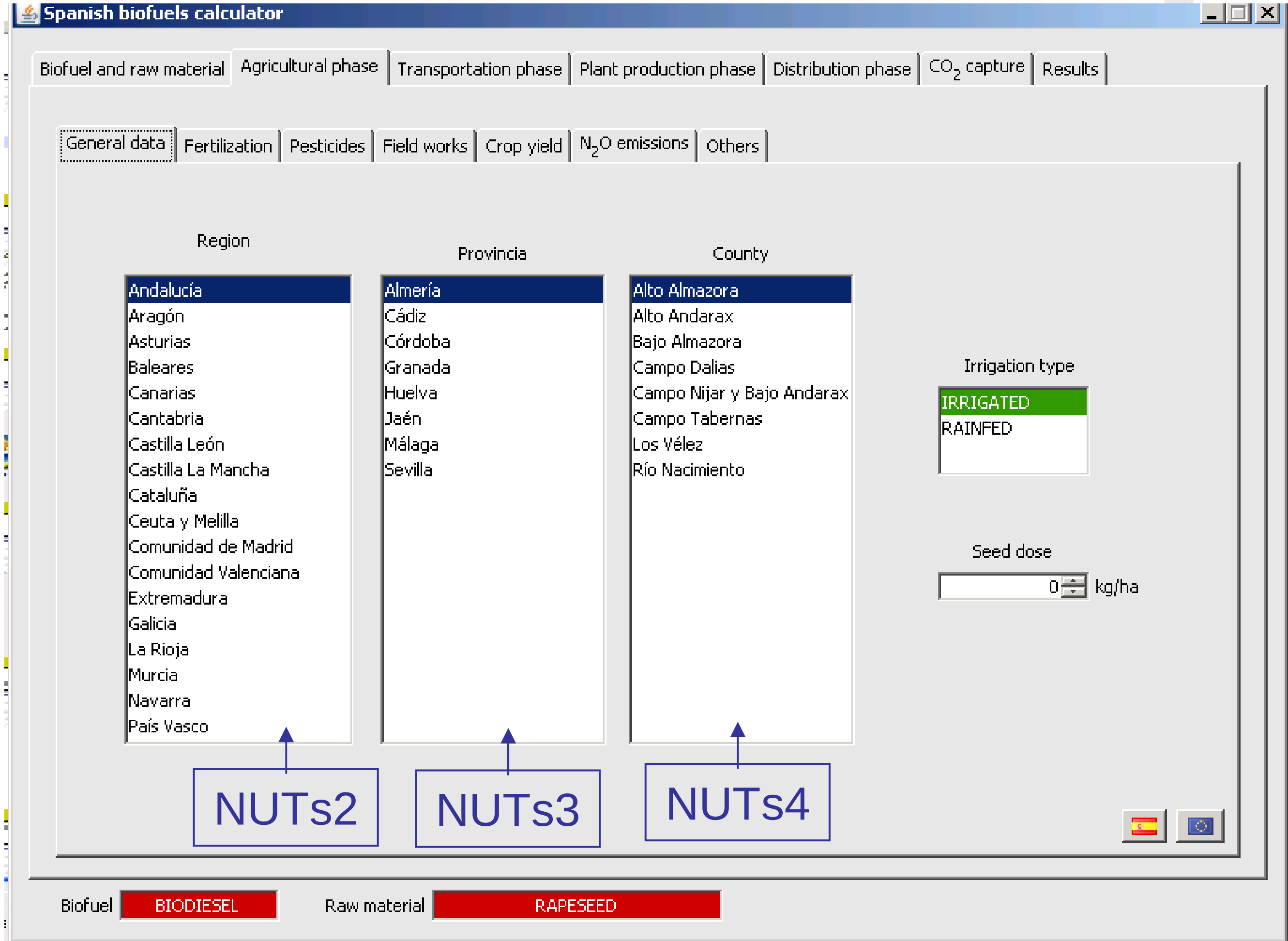
# Spanish GHG tool

## Biofuel and raw material selection screen



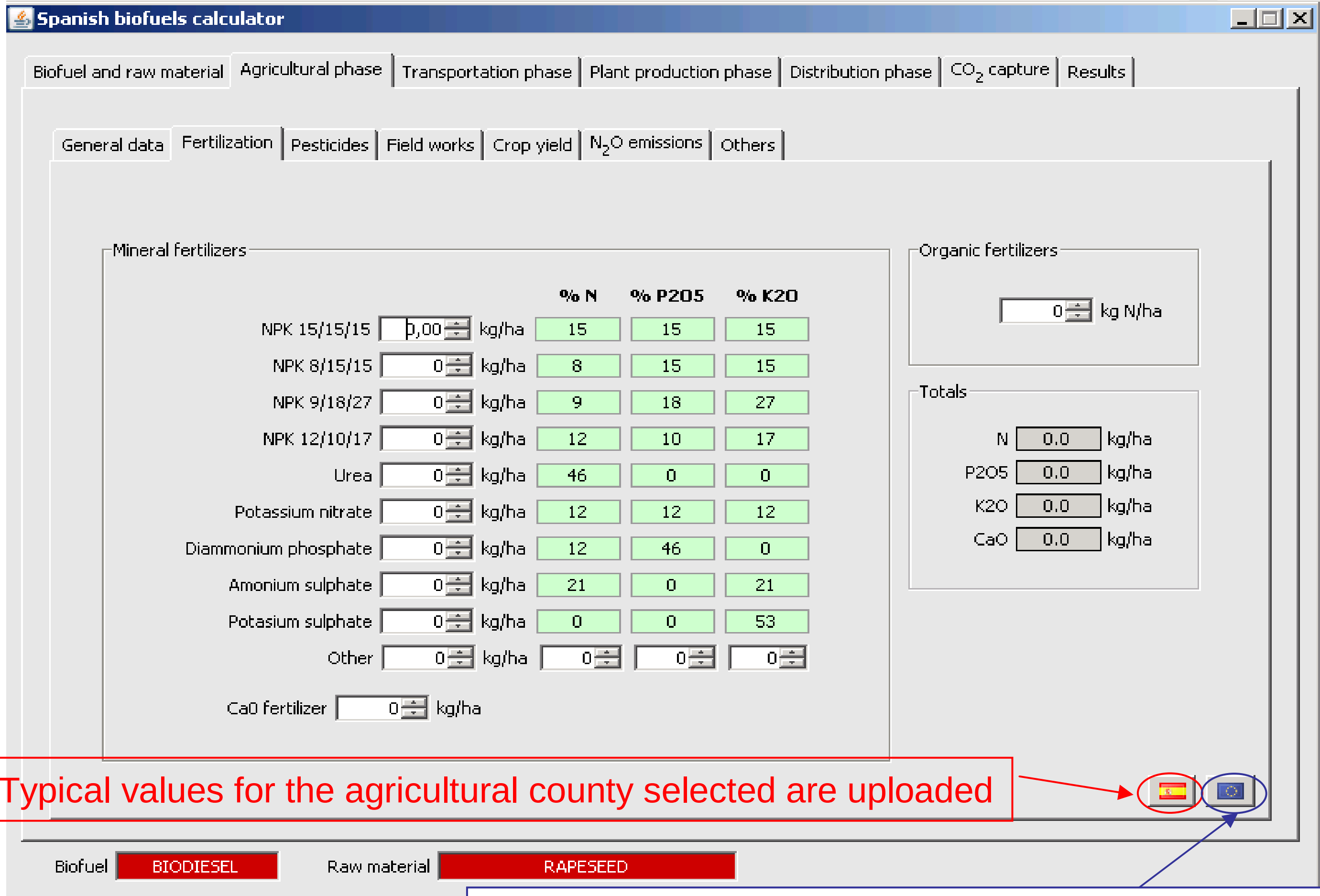
# Spanish GHG tool

## Agricultural county selection screen



# Spanish GHG tool

## Fertilization data input screen

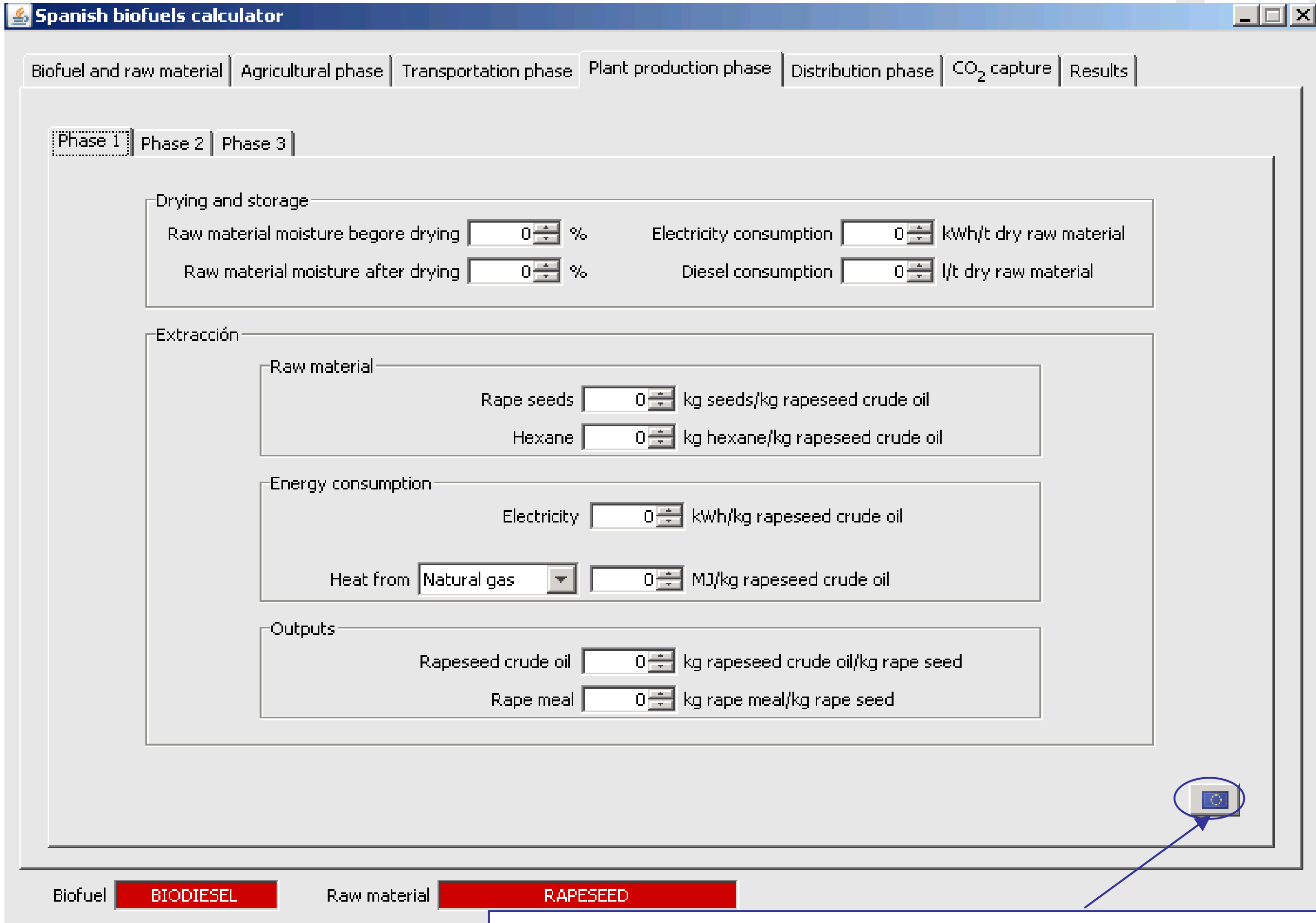



Typical values for the agricultural county selected are uploaded

Values to reproduce the default values of the RED are uploaded

# Spanish GHG tool

## Transformation data input screen




Values to reproduce the default values of the RED are uploaded

# Spanish GHG tool

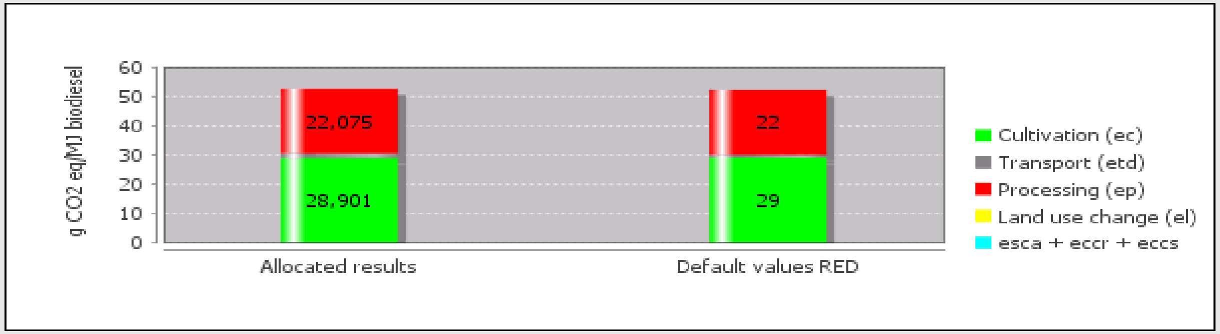
## Results screen

**Spanish biofuels calculator**

Biofuel and raw material | Agricultural phase | Transportation phase | Plant production phase | Distribution phase | $CO_2$ capture | Results

Cultivation of raw materials $e_{ec}$ | Transport and distribution phases $e_{td}$ | Transformation phase $e_p - e_{ee}$ | Totals

| **All results in $CO_2$ eq g/MJ biodiesel** | Non-allocated results | Allocation factor (%) | Allocated results | Emission reduction (%) | Deafault values RED Annex V.D |
|---|---|---|---|---|---|
| Cultivation $e_c$ | 49,33 | 58,59 | 28,9 | | 29 |
| Transport $e_{td}$ | 1,64 | | 1,53 | | 1 |
| Processing $e_p$ | 25,5 | | 22,08 | | 22 |
| Land use change $e_l$ | 0 | 58,59 | 0 | | 0 |
| $e_{sca} + e_{ccr} + e_{ccs}$ | 0 | 100 | 0 | | 0 |
| **TOTALS** | 76,47 | | 52,51 | 37,34 | 52 |




Biofuel BIODIESEL Raw material RAPESEED

# Spanish tool - Summary

## Contents

- Tool build in Java
- Focus on Spain:
  - Contains data on agricultural inputs and yields for 6 crops used to produce biofuels in Spain at the level of agrarian county (NUTs4)
  - Any farmer in the country can select his/her county and crop and the corresponding values regarding agricultural inputs and yields will appear in the tool.
- For processing and transport: RED default values
- Standard values from BioGrace

## Status

- Biodiesel from rapeseed, rapeseed HVO and ethanol from wheat CHP chains ready
- Final version expected mid-2011

# Contents

# UK tool - general information

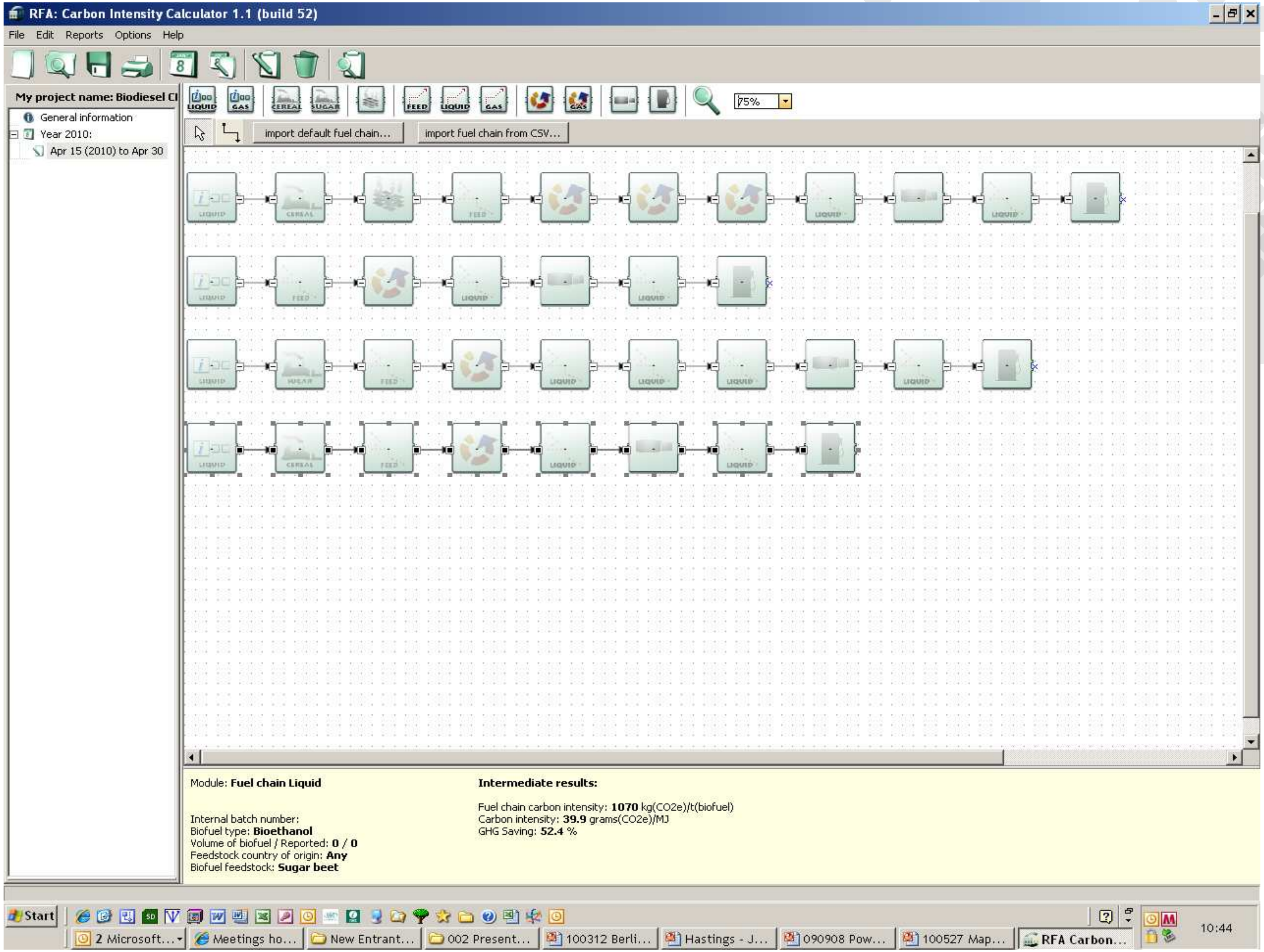
## Background

- UK GHG calculator was developed under RTFO reporting scheme
- Calculator existing since 2008, regularly updated
- Aim is to facilitate stakeholders calculating actual values under RTFO reporting

## The UK GHG calculator

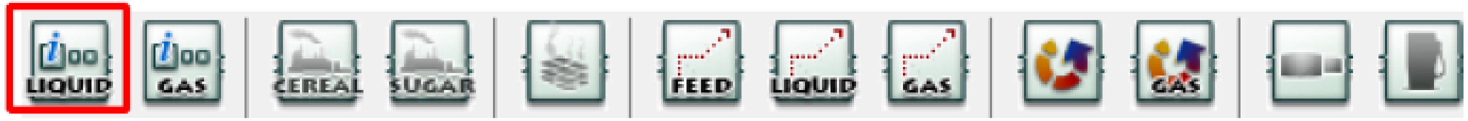
- was made and is regularly updated by consultant E4Tech, contracted by RFA
- has recently been made “RED-proof”
- strongly linked to RTFO reporting scheme
- Provides more “standard values” as compared to BioGrace

# UK GHG tool


RFA: Carbon Intensity Calculator 1.1 (build 52)
File Edit Reports Options Help
My project name: Biodiesel Cl
General information
Year 2010:
Apr 15 (2010) to Apr 30
import default fuel chain...
import fuel chain from CSV...
75%
Module: Fuel chain Liquid
Internal batch number:
Biofuel type: Bioethanol
Volume of biofuel / Reported: 0 / 0
Feedstock country of origin: Any
Biofuel feedstock: Sugar beet
Intermediate results:
Fuel chain carbon intensity: 1070 kg(CO2e)/t(biofuel)
Carbon intensity: 39.9 grams(CO2e)/MJ
GHG Saving: 52.4 %
Start
10:44

# UK GHG tool

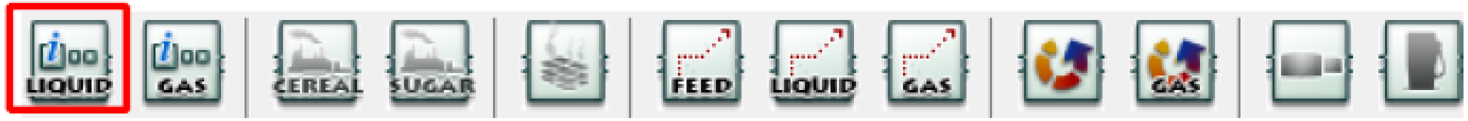
## 7.2 Fuel chain – Liquid




| Basic data | |
|---|---|
| Module description | A brief description of the module.<br>This field is optional. |
| Details and links to verification evidence | Any further details can be added here, including, for example links to any evidence which supports the actual data used within this module.<br>This field is optional. |
| Internal batch number | A batch number for your own reference can be entered here.<br>This field is optional. |
| Fuel type produced | The biofuel type of this batch / fuel chain.<br>This field is compulsory. This field can only be changed if no modules follow the 'Fuel chain – Liquid' module. |
| Country | The country in which the feedstock was produced (NOT necessarily the country in which the biofuel was produced).<br>This field is compulsory ('Unknown' can be selected if relevant). This field can only be changed if no modules follow the 'Fuel chain – Liquid' module. |
| Biofuel feedstock | The type of feedstock from which the biofuel was produced.<br>This field is compulsory ('Unknown' can be selected if relevant). This field can only be changed if no modules follow the 'Fuel chain – Liquid' module. |

# UK GHG tool

## 7.2 Fuel chain – Liquid




| | |
|---|---|
| Quantity of fuel | The quantity of biofuel in this batch (measured in litres) – this is the quantity of fuel the software enters into the monthly CSV report which can be uploaded to the RFA Operating System. |
| Quantity of fuel recorded in the RFA Operating System | If you make any adjustments to fuel quantities recorded on the RFA Operating System after uploading a monthly CSV report, the new quantities can be recorded in this field (measured in litres).<br>Annual reports can only be prepared if fuel quantities are recorded in this field. |
| Fuel chain default value | This field shows the appropriate fuel chain default value, based on the data you supplied on fuel type, feedstock and country of origin. |
| Social and Environmental | |
| Land use on 01 Jan 2008 | The land use, on 1st January 2008, for the land on which the biofuel feedstock was grown. Definitions of the land use are given in the Technical Guidance for RTFO year 3 Part 1 Annex H. |
| Standard | The sustainability standard to which the reported feedstock was produced – see Section 3.3 of the Technical Guidance for RTFO year 3 Part 1 for further details. |
| Social level | The 'Social level' achieved by the sustainability standard selected. This field will generally not need to be changed. |

# UK tool - Summary

## Contents

- Tool build in LCA-software package
- Tool can produce supplier monthly and annual C&S reports
- Tool differs from BioGrace Excel sheets:
  - More than 250 biofuel production pathways included
  - DLUC calculations not included
- The software programming makes it flexible
  - Rather easy to modify pathways or build new ones

## Status

- Tool on-line via www.renewablefuelsagency.gov.uk including a user manual
- All chains available (and more) but not all chains give same result (yet) as compared to RED defaults

# Contents

BIOGRACE
Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

# Comparison of results

| Check list Version 3.0 February 2011 | Default greenhouse gas emissions | | | | | | |
|---|---|---|---|---|---|---|---|
| | Table A RED Annex V/FQD Annex IV | BIOGRACE W3 | | BIOGRACE WP4 National GHG Calculators | | | |
| Biofuel production pathways | Default value | 1/25/298 | 1/23/296 | The Netherlands ANL | Germany IFEU | Spain CIEMAT | UK |
| Ethanol wheat lignite | 70 | 69.9 | 69.8 | 69.9 | 67.9 | | 70 |
| Ethanol wheat (proces fuel not specified) | 70 | 69.9 | 69.8 | 69.8 | 67.9 | | 70 |
| Ethanol wheat (natural gas - steam boiler) | 55 | 54.9 | 54.6 | 54.6 | 52.8 | 55.61 | 55 |
| Ethanol wheat (natural gas - CHP) | 44 | 44.3 | 44.1 | 44.1 | 42.2 | | 44 |
| Ethanol wheat (straw) | 26 | 26.1 | 26.0 | 26.0 | 24.0 | | 26 |
| Ethanol corn | 43 | 43.6 | 43.4 | 43.4 | 42.6 | | 43 |
| Ethanol sugarbeet | 40 | 40.3 | 40.1 | 40.1 | | | 40 |
| Ethanol from sugarcane | 24 | 24.3 | 24.0 | 24.0 | | | 24 |
| Biodiesel rape seed | 52 | 52.0 | 51.7 | 51.8 | | 52.51 | 52 |
| Biodiesel palm oil | 68 | 68.7 | 66.0 | 66.0 | 68.9 | | 68 |
| Biodiesel palm oil (methane capture) | 37 | 37.1 | 36.9 | 37.0 | 36.3 | | 37 |
| Biodiesel soy | 58 | 57.2 | 56.9 | 57.0 | | | 58 |
| Biodiesel sunflower | 41 | 40.8 | 40.6 | 40.6 | | | 41 |
| Biodiesel UCO | 14 | 21.4 | 21.3 | 21.3 | | | 14 |
| PVO rape seed | 36 | 36.1 | 35.9 | 31.2 | | | 36 |
| HVO rape seed | 44 | 44.5 | 44.2 | 44.2 | | 44.57 | 44 |
| HVO palm oil | 62 | 61.6 | 58.9 | 58.9 | | | 62 |
| HVO palm oil (methane capture) | 29 | 29.1 | 29.0 | 29.0 | | | 29 |
| HVO sunflower | 32 | 32.9 | 32.7 | 32.7 | | | 32 |
| Biogas - dry manure | 15 | 14.3 | 13.0 | 12.9 | | | 15 |
| Biogas - wet manure | 16 | 15.8 | 14.5 | 14.4 | | | 16 |
| Biogas - MSW. | 23 | 22.7 | 21.4 | 21.4 | | | 23 |
| | 1/25/298 | 1/25/298 | 1/23/296 | 1/23/296 | 1/25/298 | 1/23/296 | |

# Contents

# Conclusions

## Several GHG calculators available

- Two exist since 2008, three (including BioGrace Excel sheets) are newly developed
- Project BioGrace will ensure that all calculators will give the same result
- Some allow to modify or build new pathways, others don't

## National GHG calculators have different aims

- Some are more focussed on national data or national reporting, others are more international oriented
- Focus on different aspects
  - Agricultural stages (Spain)
  - Supply of data through the chain of custody (Germany)

BIOGRACE
Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

*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.*

BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

# Steps towards further harmonisation of biofuel GHG calculations

**John Neeft**
**Coordinator BioGrace**

John Neeft
NL Agency
Public workshop Vienna
February 16, 2011

# Contents

1. Introduction
2. Recognition as a voluntary certification scheme
3. Making actual calculation requires some rules
4. Future actions

# Introduction

- Objectives of project will be met:
  - Current GHG tool makes transparent how RED Annex V default values were calculated
  - BioGrace list of standard values is important step towards harmonisation of European biofuel GHG calculations
  - The BioGrace tool plus national tools facilitate stakeholders to make actual calculations
  - BioGrace results are widely disseminated

- Next ambition of BioGrace is to:
  1. Support stakeholders in meeting (RED & FQD) biofuels sustainability criteria
  2. Clarify role of BioGrace compared to other (existing/under development) voluntary certification schemes

# Contents

1. Introduction
2. Recognition as a voluntary certification scheme
3. Making actual calculation requires some rules
4. Future actions

# Recognition as a voluntary cert. scheme

Observations:

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

BioGrace action:

- Submit BioGrace GHG tool to EC for recognition as a voluntary scheme
- This requires some further actions

# Recognition as a voluntary cert. scheme

Actions needed

- Define calculation rules and link them to tool
  - From Commission we understand that calculation rules need to be part of GHG tool
  - BioGrace opinion: rules should also be harmonised
- Discussion on requirements for audits and mass balance
  - Check assumption that these are not needed as part of BioGrace (as they are set in “parent scheme”)
- Make changes to GHG calculation tool

Time schedule

- One to two months to take actions
- Send in BioGrace tool to EC for recognition in March or April
- Recognition period lasts … ?

# Contents

# Making actual calculation requires rules

- Making actual calculations under the RED/FQD requires rules
  - Which input data and standard values are allowed?
  - Cut-off criterion
  - Combination of actual and disaggregated values
- Many of these rules not yet defined
  - More detailed than methodology in RED Annex V.C
  - Some rules given in communications, several topics are not yet covered
- BioGrace will make document “calculation rules”
  - To be published as a separate document
  - To be linked to GHG Excel tool
- European Commission will be evaluating rules…
  - … when assessing a voluntary certification scheme after a request for recognition
  - We expect some coordination of Commission

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# Future actions

1. Update in 2011
- RED Annex V default values might change
  - When Commission updates Annex V in 2011
- BioGrace will update tool and will update standard values

2. Apply BioGrace approach to electricity/heat from biomass
- Harmonise GHG calculations for bio-energy
- Different to biofuels: sustainability not mandated by directive

3. Ensure continuation of work after March 2012

# *Thank you for your attention*

Intelligent Energy Europe

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