Practical implementation of the sustainability criteria in Sweden

Lina Engström

Swedish Energy Agency

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Energimyndigheten

The use of biofuels and bioliquids in Sweden

- About 5 % of land transport fuels are biofuels (2008)
- 80 % of the bioethanol used is imported, mainly from Brazil
- The biogas used is mainly produced in Sweden
- The bioliquids for production of heat and electricity is to a large extent imported

National targets for 2020

- EU
  - 20 % renewable energy
  - 20 % less CO_2 emissions
  - 10 % biofuels in transports
- Sweden
  - 49 % renewable energy
  - 20 % less CO_2 emissions
  - 10 % biofuels in transport

Legal framework

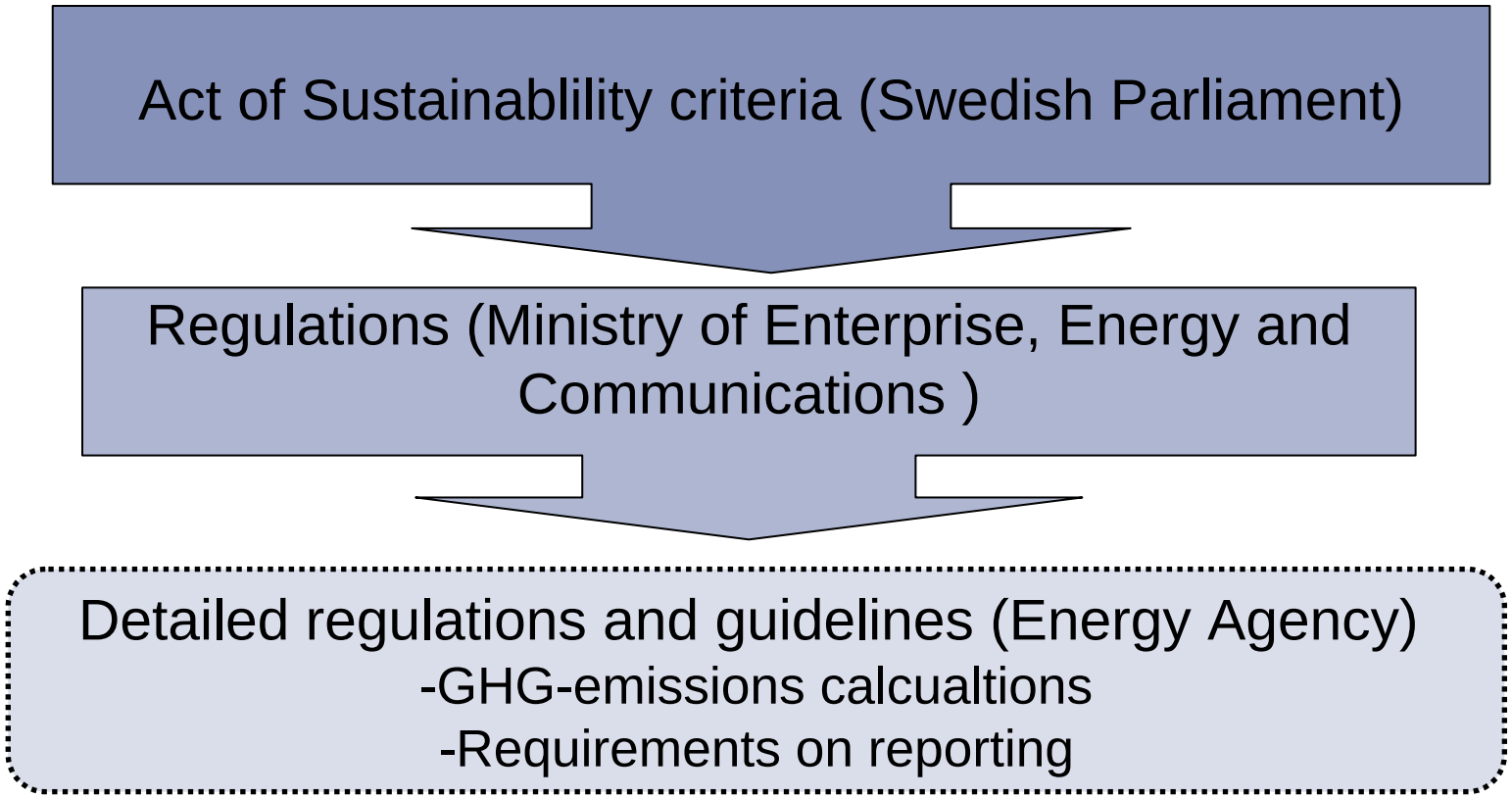
Article 17.1 purposes in Sweden

- National targets, statistics gathered annually
- Green electricity green certificates for quota obligation, issued continually per MWh
- Reduction of energy taxes for renewable energy sources, declaration and desicion each month, but sustainablility criteria not required until 2012.

The Swedish Act of sustainability criteria

- Economic operators, subject to energy tax or entitled to green electricity certificates are obliged to report delivered aounts of biofuels or used amounts of bioliquids and to fulfil the demands in art 18.3 from 2011
- How and when these oligaions are to be fulfileld is yet to be regulated before end of 2010

Implementation of RED in Sweden



Energimyndigheten

Options to meet the sustainability criteria

- National system
- Voluntary scheme
  - Certification according to one of the Commission recognised systems
- Bilateral or multilateral agreements
  - Recognised by the Commission for this purpose

Irrespective of the options above: Sustainable volumes are to be reported to the Energy Agency

The Swedish national system

- Control system to meet the sustainability criteria for reported volumes
- Independent auditing
- Reporting to the Swedish Energy agency

Control system approval

- Proposed solution for tax reduction: an economic operator applies for a approval that the control system fulfills its purpose
- The approval af the control system is valid for one year for all volumes of biofuel/bioliquids
- Annual reporting of sustainable volumes

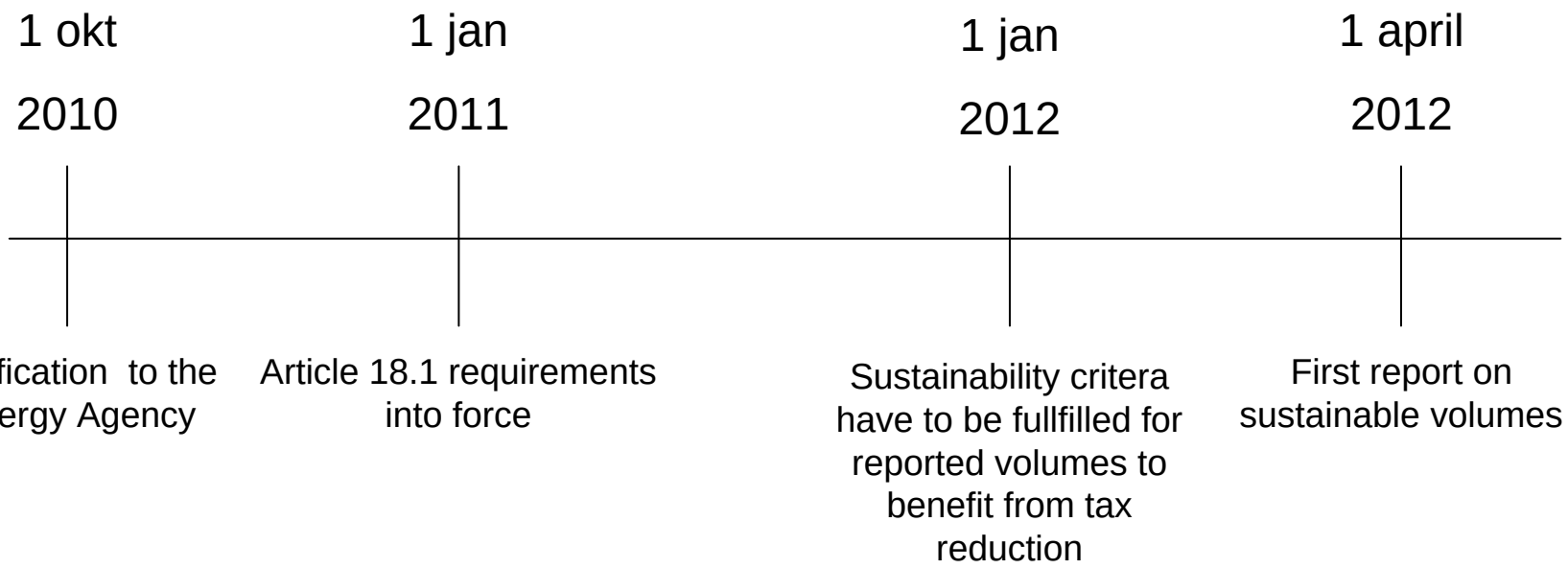
Control system requirements

- Show that the sustainability criteria are fulfilled for all volumes reported
- Reliable and protected against fraud
- Traceability
  - Mass balance system
- Possible to audit

Independent verifiers

- Generic competence
- Specific competence
- Can be verified with accreditation
- Competence requirements is varying depending on the complexity in the production chains

Implementation timeline for economic operators



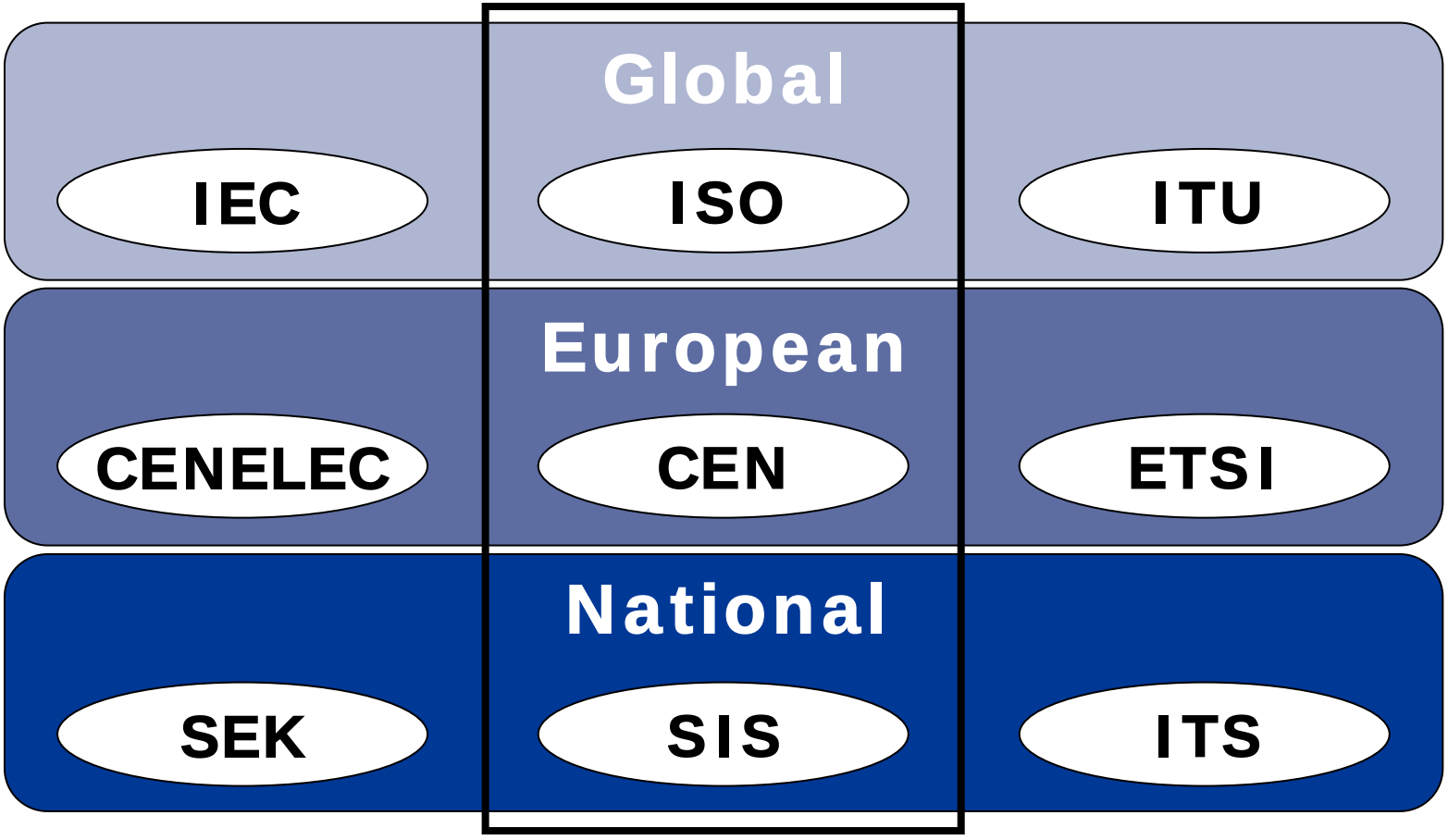
Energimyndigheten

Standardization

Biograce 2010-11-12

Swedish Energy Agency

Standards



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Standardization

- ISO standards do not have to be implemented
- CEN standards must be implemented as national standard
- Voting in ISO:
  - >66% pro voting members in TC
  - <25% against of ISO member bodies
- Voting in CEN:
  - >71% pro (weighed voting)

Weighed voting within CEN (EES)

Swedish Energy Agency

Standardization process

ISO		CEN	
• NP	New Work Item Proposal	• NP	New Work Item Proposal
• WD	Working Draft	• WD	Working Draft
• CD	Committee Draft	• -	Enquiry
• DIS	Draft International Std	• prEN	Formal Vote
• FDIS	Final Draft Intern. Std	• FprEN	European Standard
• ISO	International Standard	• EN	

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CEN TC 383

- Initial proposal by NEN
- First meeting May 2008
- EC did not mandate work
- Six WG under TC 383
  - WG1: Terminology & cross cutting issues
  - WG2: GHG emission balance
  - WG3: Biodiversity and environmental issues
  - WG4: Economic and social aspects
  - WG5: Verification and auditing
  - WG6: Indirect effects

CEN TC 383

- EC agreed with CEN work May 2009
- EC only regarded some issues needed to be standardized
- WG 1, WG 3 and WG 5 continued work
- WG 4 and WG 6 stopped work
- WG 2 continued, in spite of no EC request
- Scope: Sustainably produced biomass for energy applications – Principles, criteria, indicators and verifiers for biofuels and bioliquids

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CEN TC 383

- 5 Dec 2010 enquiry ballot of standard proposals
- May 2011 end of enquiry
- Nov 2011/Jan 2012 formal vote ballot
- March 2012/ May 2012 availability of final standards

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CEN TC 383

- prEN 16214-1 Part 1: Terminology
  - Relevant terms and definitions in RED
- prEN 16214-2 Part 2: Conformity assessment including chain of custody and mass balance
  - Mass balance boundaries, accredited conformity assessment, product declarations and management system requirements
- prEN 16214-3 Part 3: Biodiversity and environmental aspects
  - Areas with nature protection purposes, highly biodiverse non-natural grasslands and peat lands

ISO/PC 248

- Scope: Sustainability for bioenergy
- Project committee hosted by Germany and Brazil
- First meeting in Rio de Janeiro April 2010
- 40 delegates from 11 countries
- Brazil, USA, Germany, Columbia, Sweden, Belgium, France, Switzerland, Italy, UK, Netherlands and one NGO
- Next meeting planned in May 2011 UK

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ISO/PC 248

- Four WG approved
  - WG1: Cross cutting issues (incl. terminology and verification and auditing)
  - WG2: Greenhouse gases
  - WG3: Environmental, economic and social aspects
  - WG4: Indirect effects

Swedish Energy Agency

ISO/PC 248

- WG conveners
  - WG1: The Netherlands
  - WG2: United States
  - WG3: Sweden and Brazil
  - WG4: United Kingdom
- WG3 has its first meeting next week in Sthlm
- Other WG:s have not started yet

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ISO/PC 248

- ISO 13065 standard within the extended timeline (4 years)
- Registration of DIS: May 2012
- Registration of FDIS: Nov 2013
- Publication of ISO standard: May 2014

Swedish Energy Agency

Thank you!

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Swedish Energy Agency

BIOGRACE

Harmonised Calculations of
Biofuel Greenhouse Gas Emissions in Europe

Biofuel Greenhouse gas emissions

The Biograce GHG calculation tools

Lina Engström
Swedish Energy Agency
Biograce Policy Maker Workshop
12 Nov 2010, Stockholm

Renewable Energy Directive (RED)

- RED Annex V default GHG values
- Biograce aims to cause GHG calculations to be transparent by reproducing the 22 pathways with default values
  - > Biograce excel sheets

Excel sheets for calculation

The Excel sheets show:

- Input data used
- How to convert input data to GHG emissions
- Allocation (energy content)
- How to reproduce RED Annex V default GHG values

o Excel sheets allow for perform individually adapted calculations

Standard values

- Standard values are values needed to convert input data into GHG emissions
- The Biograce list of standard values contains the conversion factors that were used for calculating the default values in the Renewable Energy Directive (2009/28/EC) Annex V

Individually adapted calculations

For individually adapted calculations in particular the tool allows to

- use individual input numbers
- define own standard values
- add process steps to an existing biofuel production chain (e.g. add drying step, or extra transport step)
- set up completely new biofuel production chains

Demonstration of the excel sheet

1. About
2. Directory
3. Sheets:
   - Input numbers
   - Standard values
   - GHG-emissions
   - LUC and carbon capture
   - Overview results box
   - Global warming potentials inconsistency
4. Emissions reduction
5. Recalculation of default values

Avaliability

- The calculation tool and the list of standard values can be downloaded at www.biograce.net
- The list of standard values is now linked from the EC Transparency platform

BIOGRACE

Harmonised Calculations of
Biofuel Greenhouse Gas Emissions in Europe

Harmonised GHG-calculations

BioGrace work programme

Lina Engström
Swedish Energy Agency
Biograce Policy Maker Workshop
12 Nov 2010, Stockholm

December 2010

- Complete standard data set
- Complete 22 pathways
  - HVO sunflower
  - HVO palm oil
  - HVO palm oil (methane capture)
  - Biogas municipal organic waste
  - Biogas dry manure
  - Biogas wet manure

Distribute results

- Information to policy makers
- GHG calculation workshops
- Website
- Conferences

Further work

- Land use change and N_20 to be completed in the excel sheets
- User manual
- Calculation rules
- Adapt chains to amendment of Annex V

BIOGRACE

Harmonised Calculations of
Biofuel Greenhouse Gas Emissions in Europe

Examples of National GHG calculators

John Neeft
NL Agency (formerly SenterNovem)
Policy maker workshop
12 November 2010, Stockholm

Contents

Introduction

Rules and methodology for GHG calculations

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

Making actual calculations not straightforward

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

This presentation is about publicly available tools
BioGrace Excel tool has already been presented

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-f						
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

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

BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

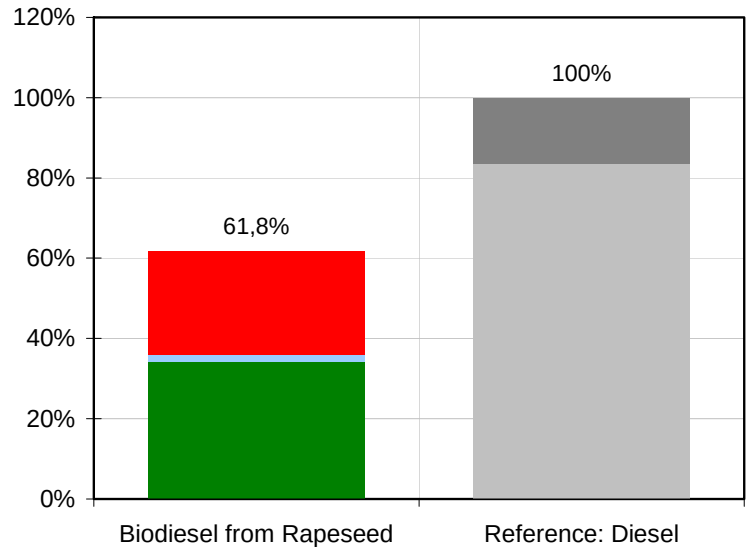
Dutch GHG tool

Summary 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.)	(%)
Biofuel	Biodiesel	Feedstock production	0,1672	14%	28,7496	34%				
Feedstock	Rapeseed	Transport actions	0,0233	2%	1,4345	2%				
Process	-	Conversion operations	0,3677	32%	21,5636	26%				
Reference	Diesel									
Print summary results		End use					1,0000	87%	70,1047	84%
Show detailed results		Fossil indirect					0,1550	13%	13,6953	16%
Return to input		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**					

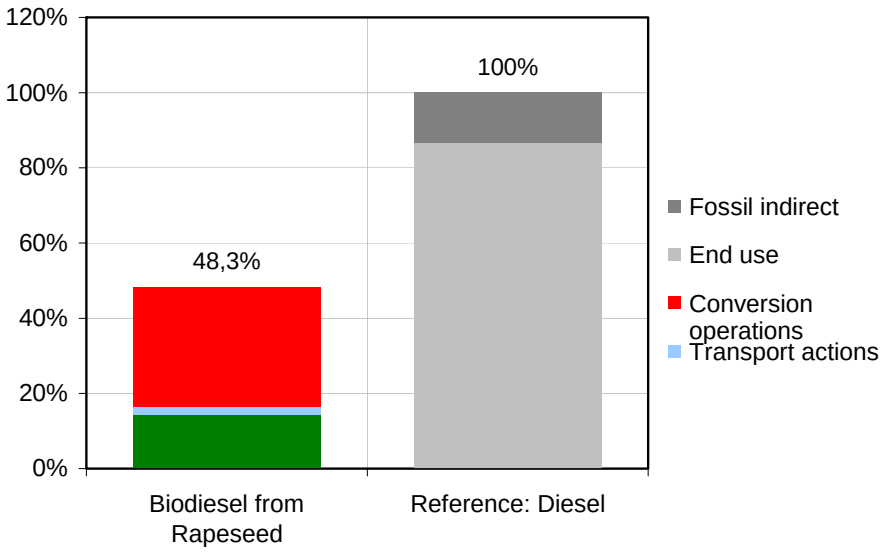
Biofuels greenhouse gas calculator

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%					
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%					
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

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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
Soil type	High activity clay soils	See figure 3 & 2

The blue fields are drop down boxes.

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 16 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

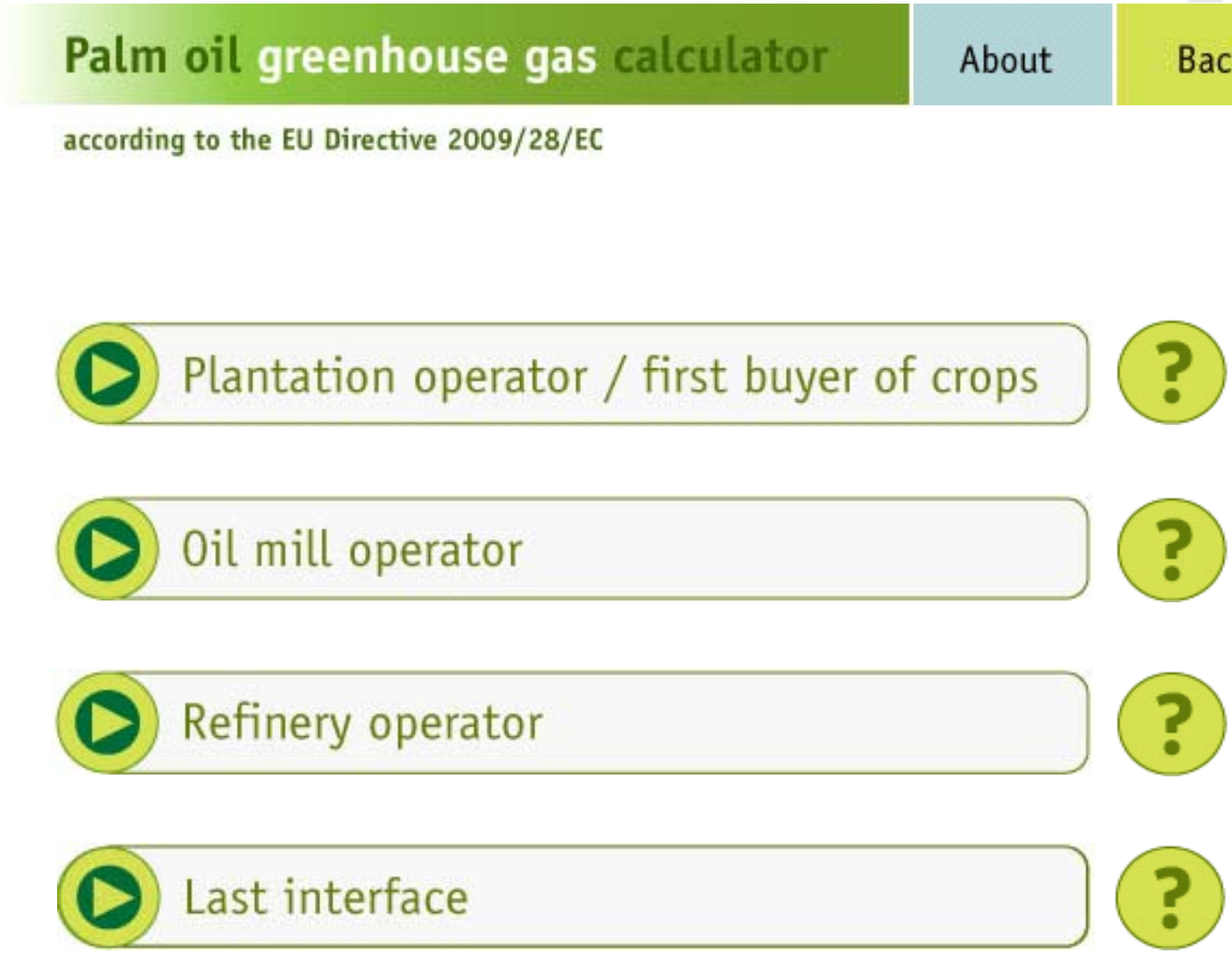
- is made by IFEU, contracted by BMU
- should be finalised mid 2011
- should be in line with BLE Guidance
- is strongly linked to economic operators: 1 sheet dedicated for cultivators, mill operators, refinery operators, etc.

BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

German GHG tool



supported by

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

ifeu

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

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:

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

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	$gCO_{2\text{-eq}}/kg$	gCO_2/MJ	gCH_4/MJ	gN_2O/MJ	$gCO_{2\text{-eq}}/MJ$	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

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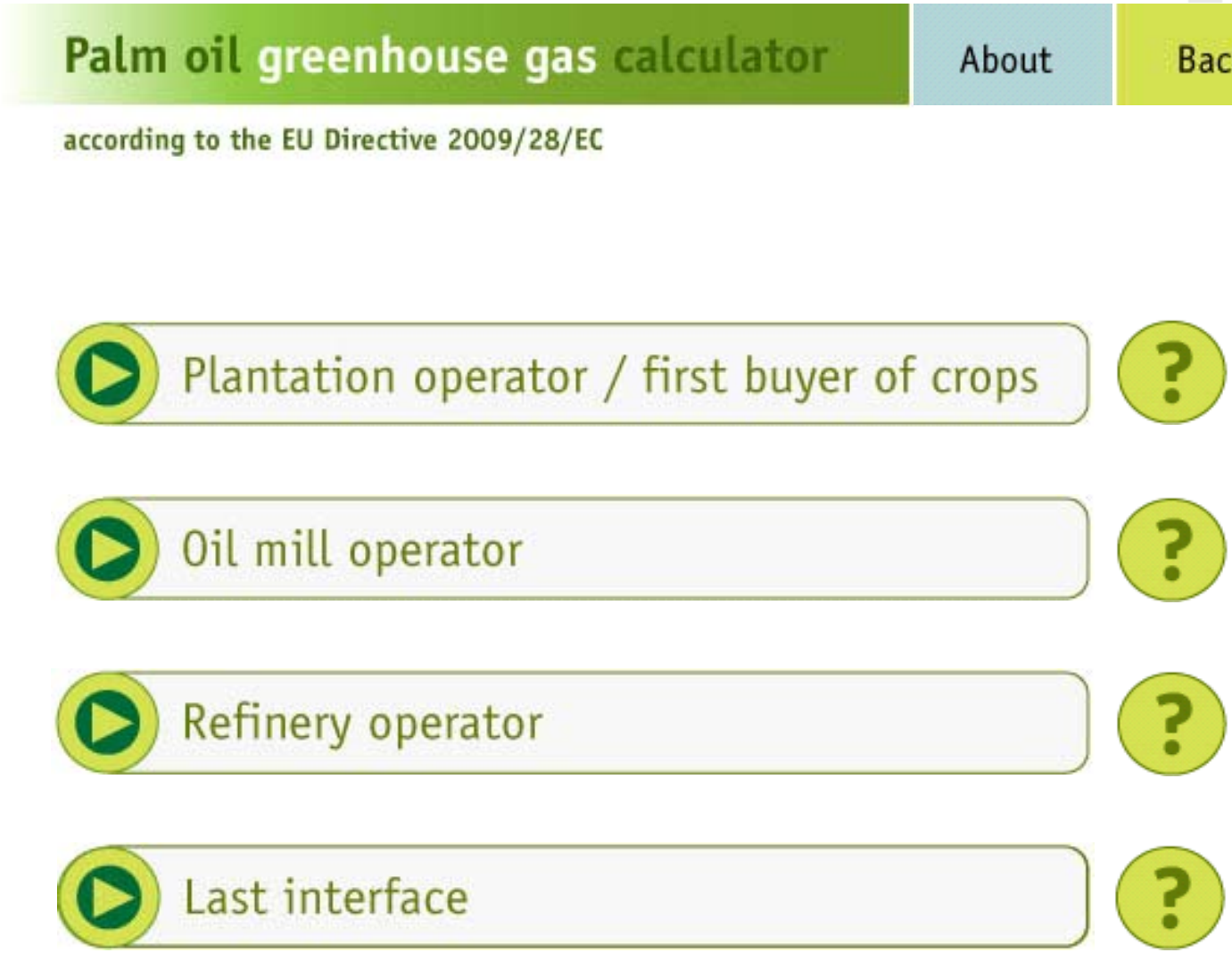
German GHG tool



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BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

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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_2eq/kg FFB**

The CO_2 emissions from oil palm cultivation amount to

123,7 g CO_2eq/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_2eq 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_2eq 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_2eq/kg FFB**

The CO_2 emissions from oil palm cultivation amount to

123,7 g CO_2eq/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

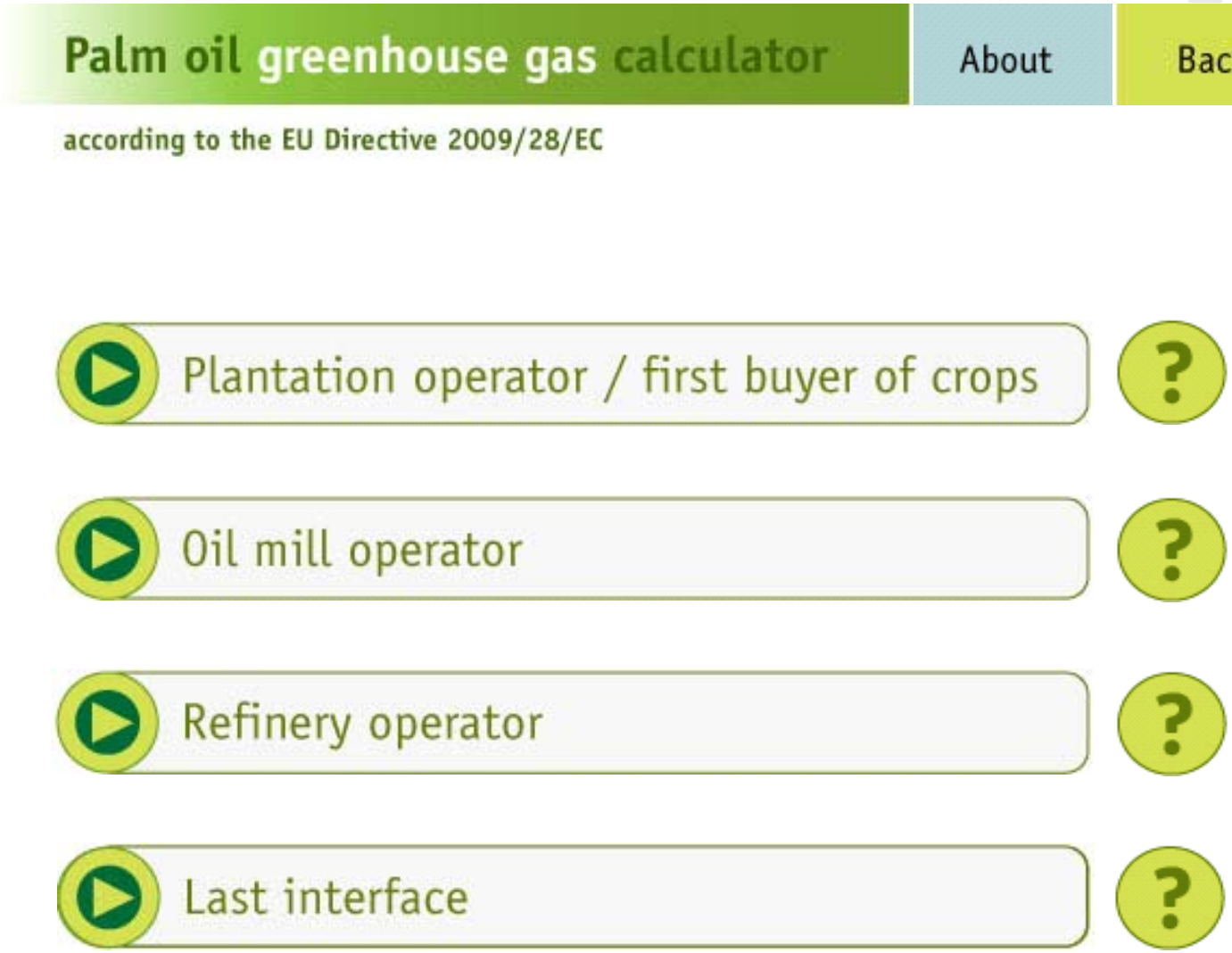
What is your FFB yield per ha per year?	
	19.000 kg FFBs per ha per year
What is the size of your cultivation area?	
	28 ha
How much fertilizer did you apply per ha per year? Please enter the amount for each of the following fertilizers.	
N-fertiliser	128,0 kg N per ha per year
P_2O_5-fertiliser	144,0 kg P_2O_5 per ha per year
K_2O-fertiliser	200,0 kg K_2O per ha per year

BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

German GHG tool



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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_2eq/kg CPO**

The CO_2 emissions from palm oil mill amount to

1517 g CO_2eq/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_2eq/kg FFB in the field below

calculate value — Click here to calculate your emissions in g CO_2eq/kg FFB.

126 g CO_2eq/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

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_2eq/kg FFB
0	0

confirm value and back

Supplier#	Plantation name	FFB quantitity metric tonnes	GHG value g CO_2eq/kg FFB
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

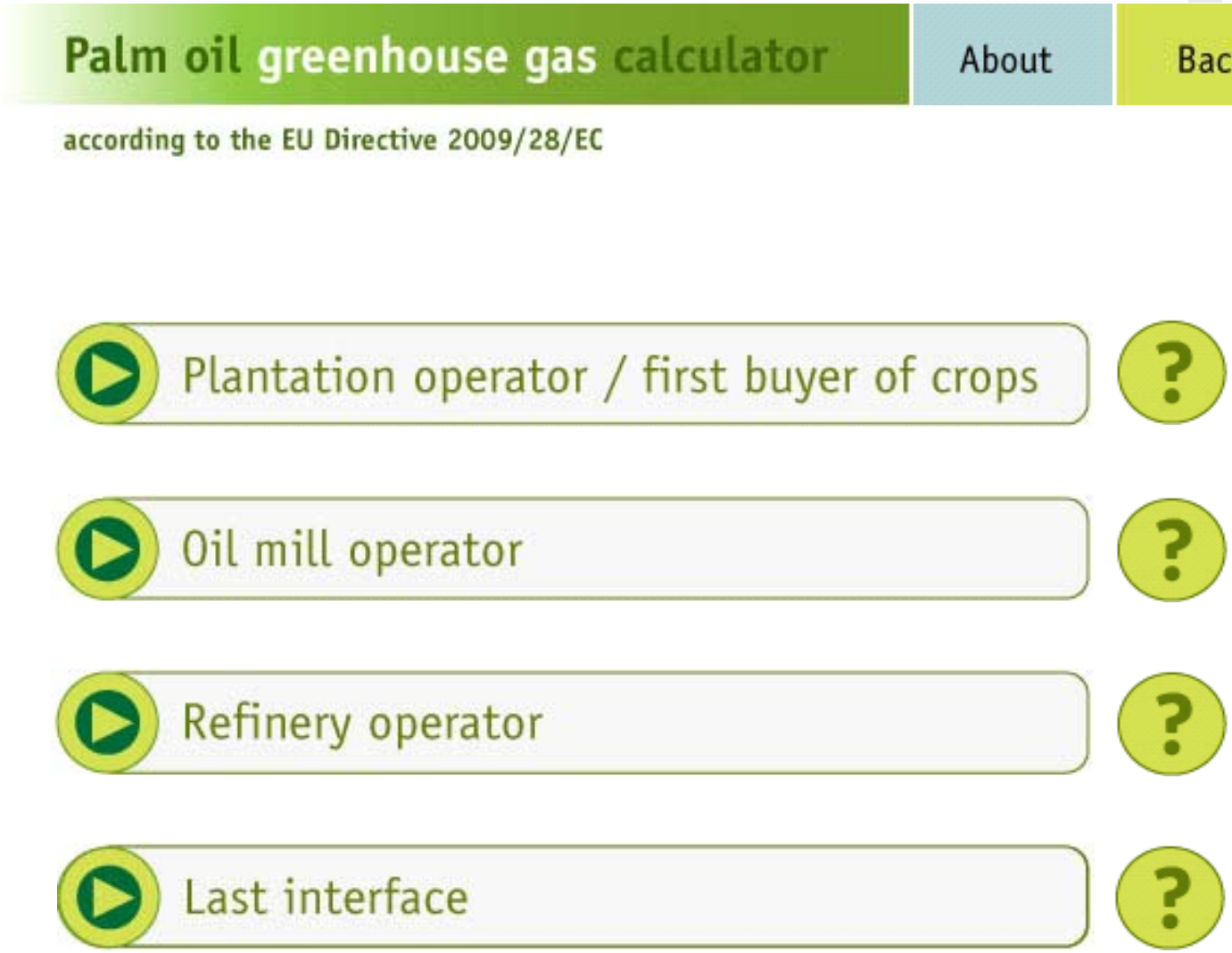
fill in the information delivered by your suppliers

BIOGRACE

Harmonised Calculations of Biofuel Greenhouse Gas Emissions in Europe

Intelligent Energy Europe

German GHG tool



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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 ready end of 2010

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

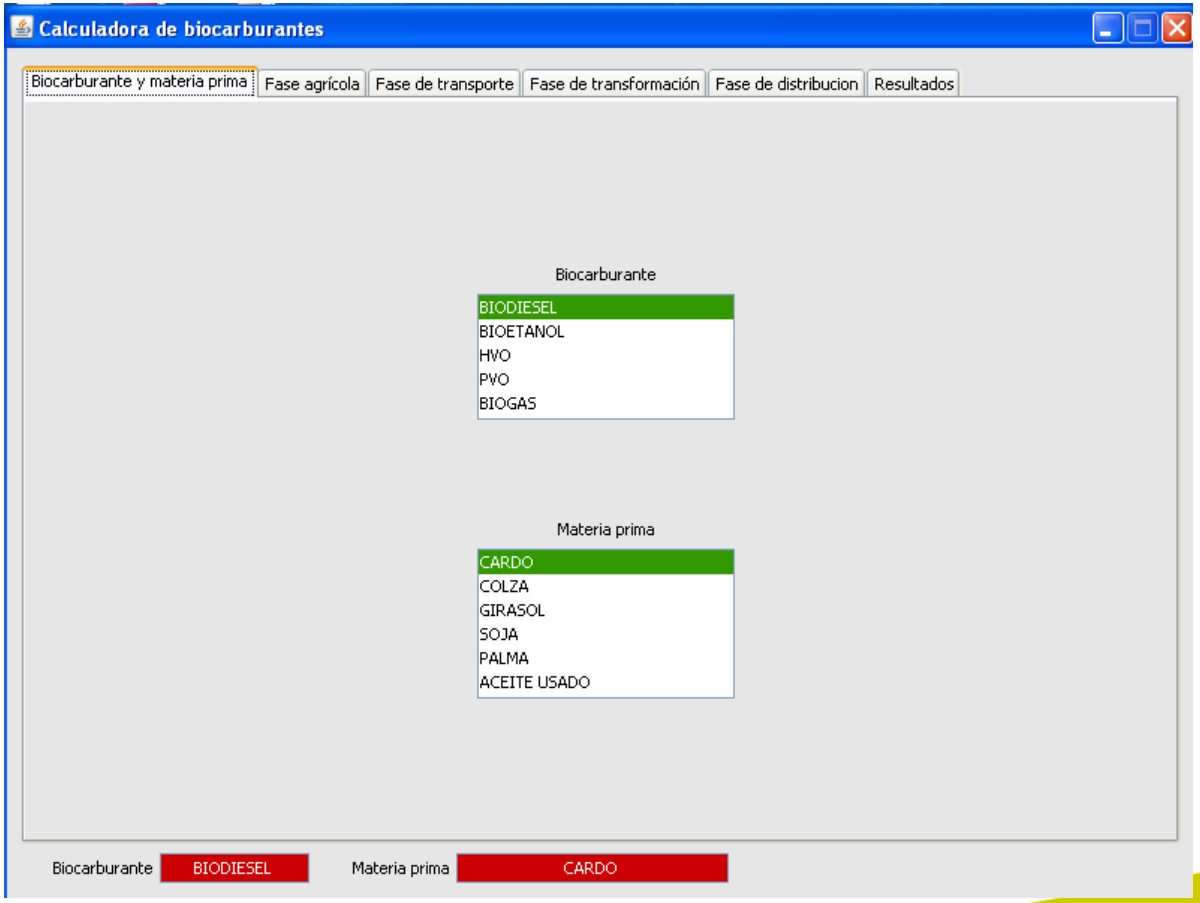
The Spanish GHG calculator

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

Spanish GHG tool

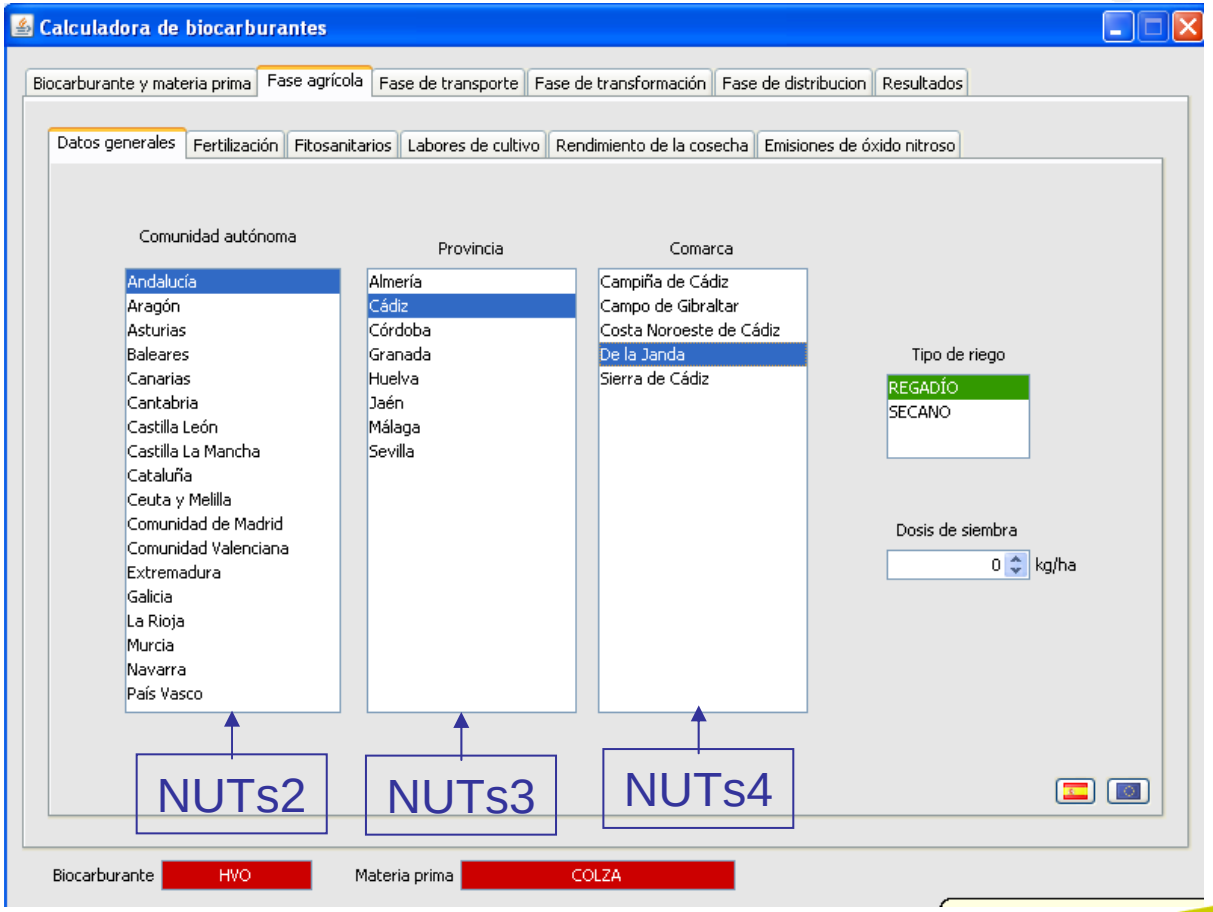
Spanish GHG tool

Biofuel and raw material selection screen



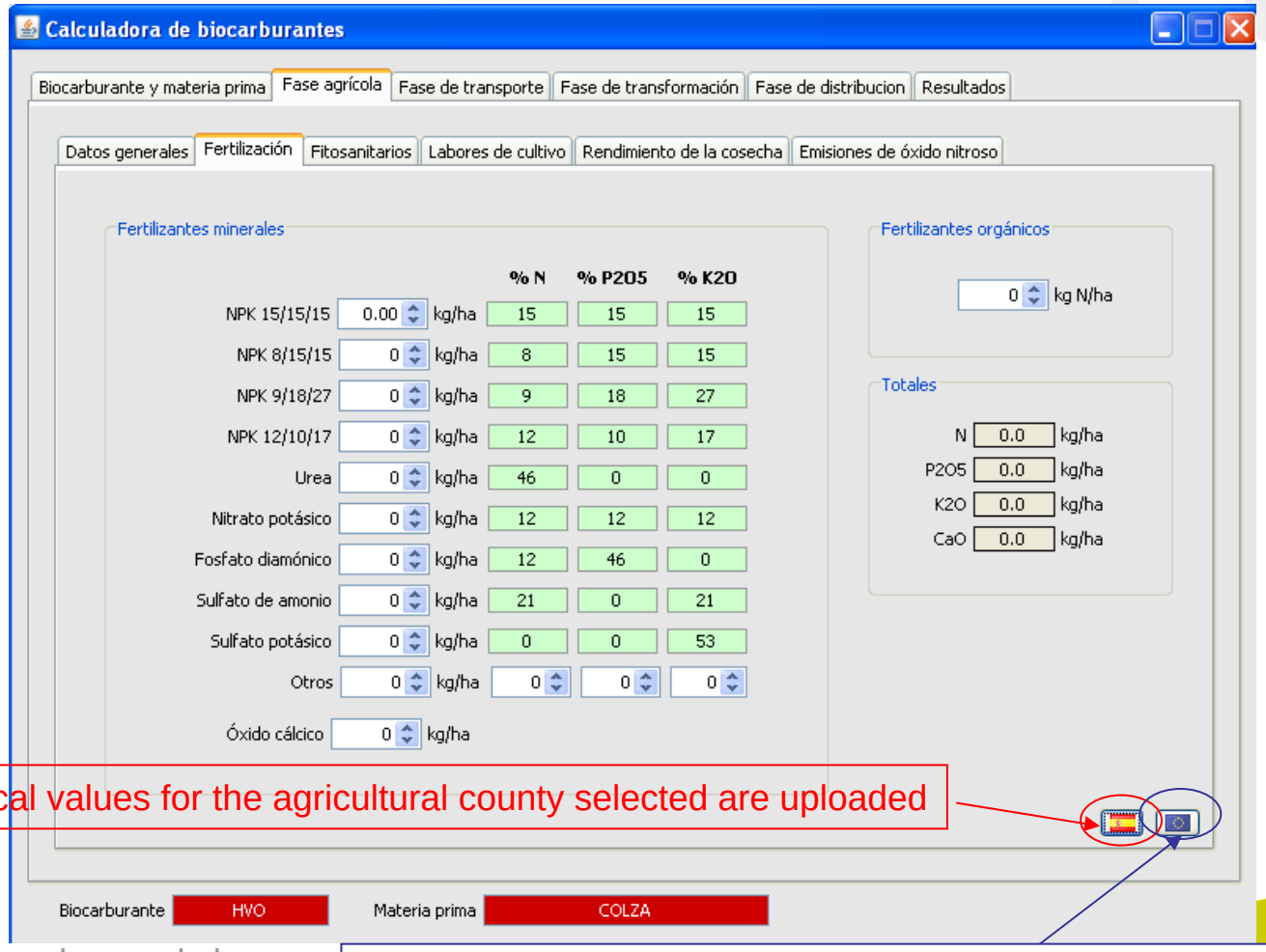
Spanish GHG tool

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 tool - Summary

Contents

- Tool build in Java
- Focus on Spain:
  - Will contain 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 default values regarding agricultural inputs and yields will appear in the tool.
- For processing and transport: RED default values
- Standard values from BioGrace

Status

- First draft version December 2010, final version expected mid-2011

Contents

UK tool - general information

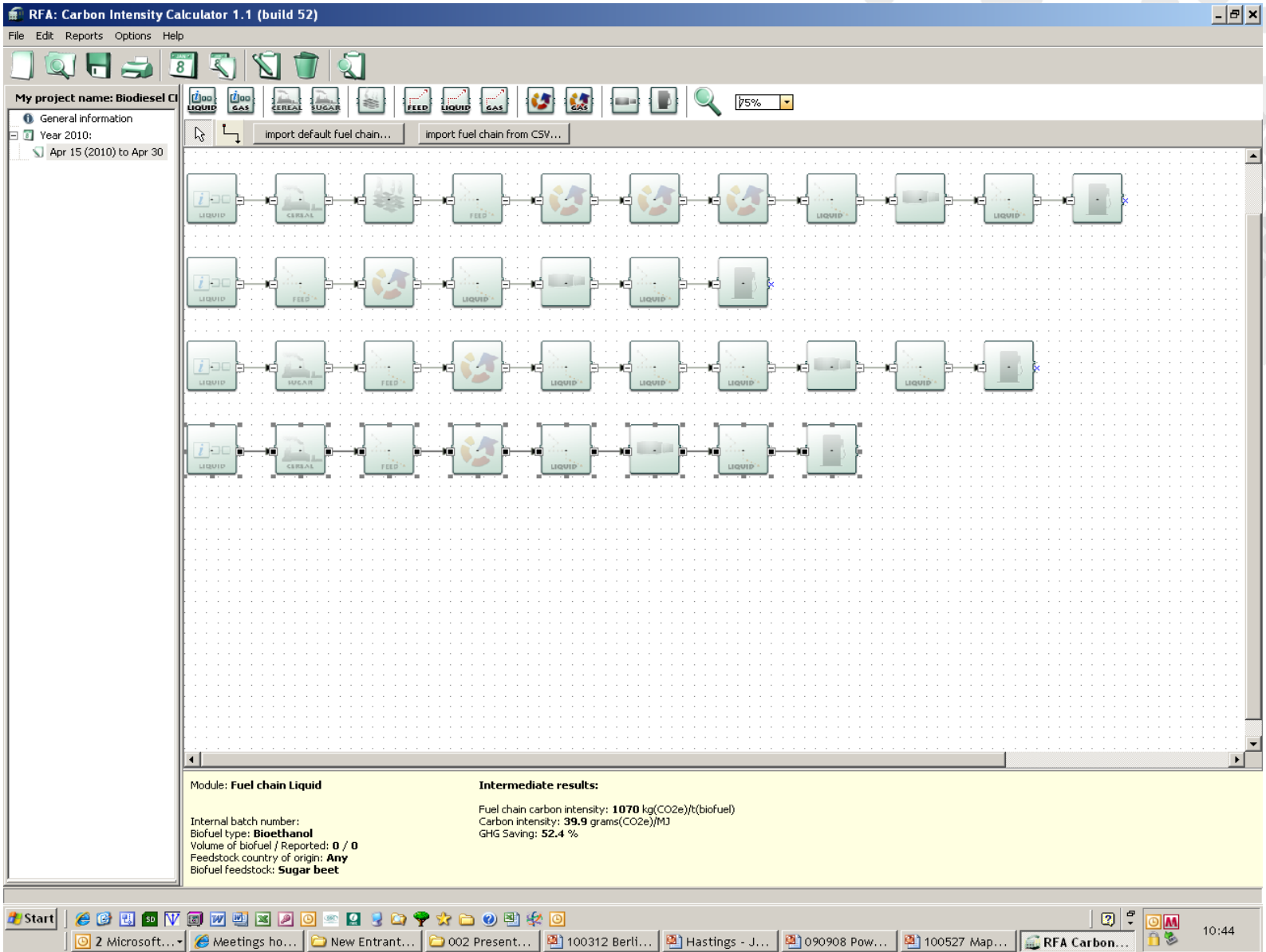
Background

- 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 CI
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. 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. This field is optional.
Internal batch number	A batch number for your own reference can be entered here. This field is optional.
Fuel type produced	The biofuel type of this batch / fuel chain. 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). 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. 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). 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 GHG tool

7.2 Fuel chain – Liquid

Basic data	
Module description	A brief description of the module. 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. This field is optional.
Internal batch number	A batch number for your own reference can be entered here. This field is optional.
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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. If supplementary checks have been performed to confirm that 'gap criteria' within the existing standard have been met, then it is possible to report the new 'Social level' achieved for the feedstock – see Section 3.4.2 of Part 1 of the Technical Guidance for RTFO year 3.

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

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)

Thank you for your attention

Intelligent Energy Europe