

The BioGrace-II project

Harmonised GHG calculations for electricity, heating
and cooling from biomass

Project aims, outline, first results

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1. Introduction
2. Focus on policy implementation
3. Build tool and involve stakeholders
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6. Concluding summary

Introduction

- o BioGrace started as IEE project in 2010
- o In 2010-2012, BioGrace-I has
 - Produced a user-friendly tool for biofuels
 - Harmonised calculations
 - Send in tool for recognition as “voluntary scheme”
 - Excel tool
 - Calculation rules
 - User manual
- o Since April 2012: BioGrace-II
 - (mainly) GHG calculations for electricity and heat from solid, gaseous and liquid biomass

BIOGRACE
Harmonised Calculations of
Biofuel Greenhouse Gas Emissions in Europe

www.biograce.net | Intelligent Energy Europe

Production of Ethanol from Wheat (steam from natural gas CHP)

Version 4b - Public

Overview Results

All results in g CO ₂ eq / MJ _{biofuel}	Non-allocated results	Allocation factor	Allocated results	Total	Actual Default	Default values RED Annex V D
Cultivation e _{fuel}	39.37	59.5%	23.43	23.4	A	23
Processing e _{fuel}	31.92	59.5%	19.00	19.0	A	19
Transport e _{fuel}	0.10	59.5%	0.06	0.1	A	2
Handling & storage	0.52	59.5%	0.31	0.5	A	0.38
Transport of wheat	1.10	100.0%	1.10	1.1	A	1.10
Transport of ethanol	0.44	100.0%	0.44	0.4	A	0.44
Filling station	0.0	59.5%	0.0	0.0	A	0
Land use change e _{fuel}	0.0	100.0%	0.0	0.0	A	0
Bonus produced e _{fuel}	0.0	100.0%	0.0	0.0	A	0
Bonus e _{fuel} = e _{fuel} * e _{fuel}	0.0	100.0%	0.0	0.0	A	0
Totals	73.5		44.3	44.3		44

Allocation factors

Ethanol plant	Fossil fuel reference (petrol)
59.5% to ethanol	83.8 g CO ₂ eq/MJ
40.5% to COGS	GHG emission reduction: 42%

Emission reduction

Calculations in this Excel sheet.....

When using this GHG calculation tool, the BioGrace calculation rules must be respected. The rules are included in the zip file in which you downloaded this tool. The rules are also available at www.biograce.net

Calculation per phase

Track changes: OFF

Cultivation of wheat

Quantity of product	Calculated emissions	Info
Yield	76.587 t/ha _{crop} ha ⁻¹ year ⁻¹	per ha, year
Moisture content	1.000 MJ / MJ _{biofuel, crop}	per kg wheat
Co-product Straw	0.120 kg straw/MJ _{biofuel, crop}	per kg CO ₂ eq
Energy consumption	3.707 MJ ha ⁻¹ year ⁻¹	per ha, year
Agro chemicals		
Nitrogen (kg N)	109.3 kg N ha ⁻¹ year ⁻¹	124.19
Manure	0.00 kg N ha ⁻¹ year ⁻¹	0.00
K ₂ O-fertiliser (kg K ₂ O)	16.4 kg K ₂ O ha ⁻¹ year ⁻¹	1.82
P ₂ O ₅ -fertiliser (kg P ₂ O ₅)	21.6 kg P ₂ O ₅ ha ⁻¹ year ⁻¹	4.21
Pesticides	2.3 kg ha ⁻¹ year ⁻¹	4.94
Seeding material		
Seeds: wheat	170 kg ha ⁻¹ year ⁻¹	6.39
Field N ₂ O emissions	1.81 kg ha ⁻¹ year ⁻¹	103.47
Field N ₂ O emissions can be calculated in the sheet		539.9
N ₂ O emissions IPCC		1601.9
Total	17.34	307.55
Result	g CO₂eq / MJ_{biofuel}	39.37

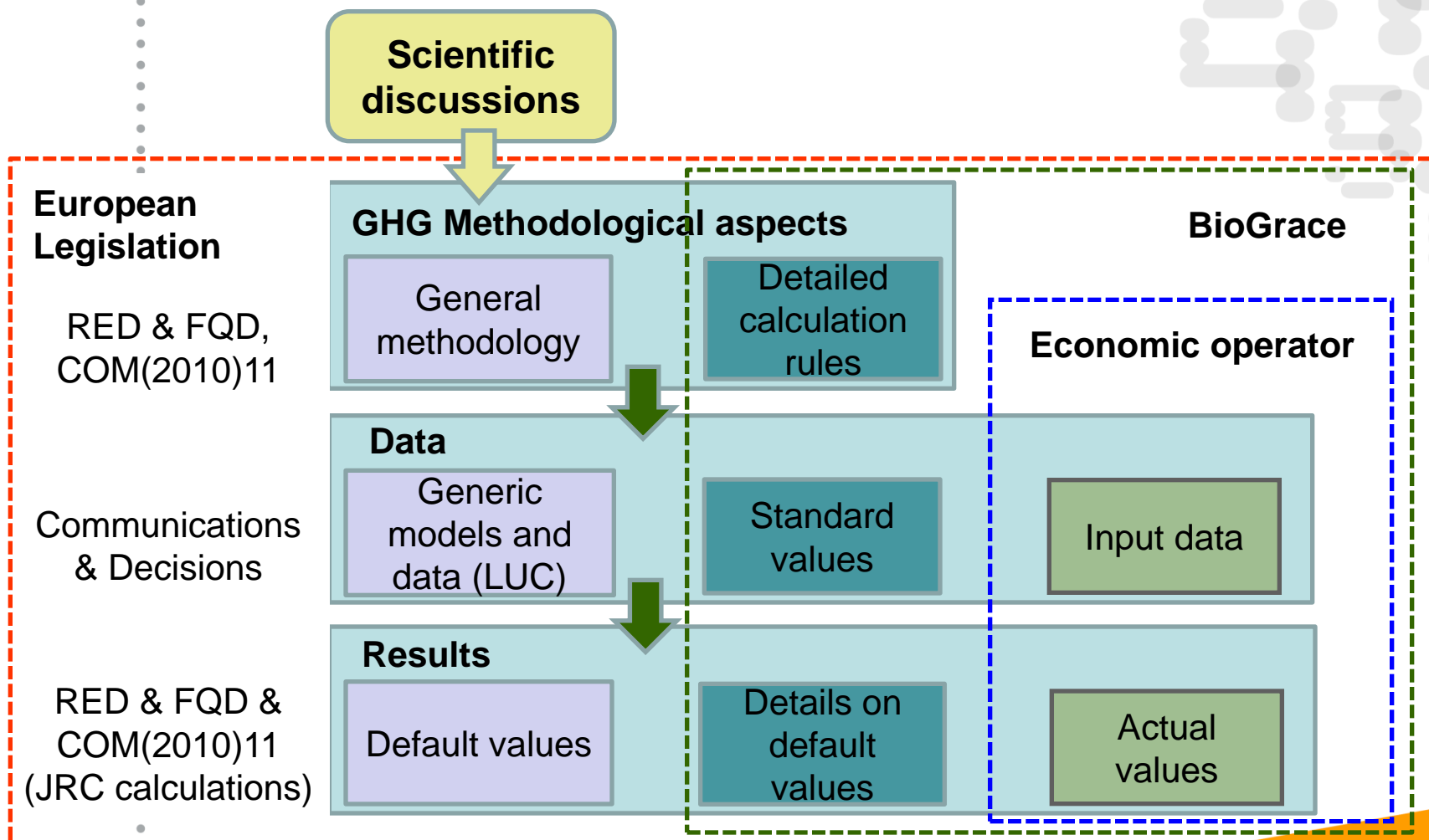
Handling & storage of wheat

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Focus on policy implementation



How companies comply to the criteria

- o By using voluntary or national schemes
- o By providing information to the national authorities

Biofuel supply chain



Company X
Claim: biofuel
is sustainable



Independent
audit



Independent
audit



Independent
audit



Independent
audit

National or voluntary sustainability scheme

Focus on policy implementation

- o Some current discussions are so far only scientific
 - Forest carbon stock changes
 - Indirect land use change (*up to last week*)
- o BioGrace will not include such topics in tools before policy makers have decided (based on scientific input)
 - To include the issues into legislation
 - To amend the GHG calculation methodology

BioGrace follows Commission and JRC and makes decisions implementable for stakeholders

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Build tool and involve stakeholders

- o BioGrace-II will
 - Explain methodology and add calculation rules
e.g. National or EU electricity mix
 - Build GHG calculation tool for electricity, heat and cooling
 - Organise stakeholder feedback and workshops
 - Train verifiers to verify actual GHG calculations
- o Small part of work is still on biofuels
 - Verifier trainings
 - Update of biofuel tool after update of RED Annex V
- o Some details of work depend on new biomass sustainability report - follow-up of COM(2010)11

BioGrace-II activities

Discuss with policy makers on harmonisation

BioGrace-II will

- Organise policy maker workshops
- Come with clear proposals

Build tool and involve stakeholders

- o Build a GHG calculation tool to:
 - make transparent the default values from COM(2010)11
 - allow stakeholders to make actual calculations

ANNEX II – Typical and default values for solid and gaseous biomass if produced with no net carbon emissions from land use change

Primary solid and gaseous biomass pathways	Typical greenhouse gas emissions (gCO _{2eq} /MJ)	Default greenhouse gas emissions (gCO _{2eq} /MJ)
Wood chips from forest residues (European temperate continental forest)	1	1
Wood chips from forest residues (tropical and subtropical forest)	21	25
Wood chips from short rotation forestry (European temperate continental forest)	3	4

BioGrace-II activities

Build GHG calculation tool for electricity, heat and cooling

About

Directory

Production of electricity and/or heat, or cooling from wood pellets/briquettes from forestry residues

Version 1 - First DRAFT (input Heidelberg)

General settings

Main output

☒ Electricity ☐ Cooling
☐ Heat ☐ Electricity and heat

Conversion efficiencies

Electrical efficiency	25,0%
Thermal efficiency	85,0%
Cooling efficiency	56,0%
Temp of useful heat (°C)	150,0

Pathway configuration

Heat provision in pellet production:	Natural gas boiler
Transport distance (pellets):	above 10 000 km

Overview Results

Energy carrier

All results in g CO _{2,eq} / MJ Wood pellets	Non- allocated results	Total (allocated results)	Actual/ Default
Cultivation e_{ec}		0,00	
Feedstock is a residue	0,00	0,00	
Processing e_p		23,3	
Forestry residues collection includ	1,39	1,39	
Wood pellet/briquette production	21,92	21,92	
Transport e_{td}		11,9	
Transport of wood chips	0,66	0,66	
Transport of wood pellets	11,27	11,27	
Land use change e_l	0,0	0,0	
Bonus (restored degraded land)	0,0	0,0	
e_{sca} + e_{ccr} + e_{ccs}	0,0	0,0	
Totals	35.2	35.2	

Track changes: OFF

When using this GHG calculation tool, the **BioGrace calculation rules must be respected**. The rules are included in the zip file (containing the complete tool) and also at www.BioGrace.net

Overview Results

Final energy

Electricity		Heat	
All results in g CO _{2,eq} per MJ as indicated			
Allocation factor	Allocated results	Allocation factor	Allocated results
100,0%	35,2	100,0%	35,2
	per MJ pellets		per MJ pellets
	141,0		41,5
	per MJ electr.		per MJ heat

GHG emission reduction

Electricity		Heat	
	23%		46%

Allocation factors & references

Allocation factors

Production chain

100,0% to energy carrier
0,0% to co-product(s)

CHP

100,0% to electricity
100,0% to heat

Fossil fuel references

184	$\text{g CO}_{2,\text{eq}}/\text{MJ}_{\text{electricity}}$
77	$\text{g CO}_{2,\text{eq}}/\text{MJ}_{\text{heat}}$
57	$\text{g CO}_{2,\text{eq}}/\text{MJ}_{\text{cooling}}$

Calculation per phase

Feedstock is a residue			Quantity of product		Calculated emissions			
Yield					Emissions per MJ wood pellets			
Forestry residues	1,0	MJ	1,00 MJ _{Forestry residues} / MJ _{Forestry residues}		g CO ₂	g CH ₄	g N ₂ O	g CO _{2, eq}

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European harmonisation

Harmonisation means:

- o Same result for same calculation in different countries

Efforts needed depend on coming EC report

- o Binding criteria: methodology will be harmonised
- o Items to be harmonised anyhow:
 - Calculation rules (e.g. national or EU electricity mix)
 - List of conversion factors

Other tools: ensure that they give same result

- o Cooperation from owner of tool is required
- o Track record: most biofuel tools were aligned

European harmonisation

Why discuss with policy makers on harmonisation?

- o Stakeholders request for harmonisation
 - On sustainability criteria in general
 - Including detailed issues like details in GHG calculations
- o BioGrace-II has intermediary role
 - Between JRC, national governments and stakeholders
 - Build tool and formulate detailed calculation rules
- o Policy makers will finally decide
 - Experience from BioGrace-I: policy makers prefer clear proposals for harmonised implementation

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More information?

- o Project coordinator
 - Agentschap NL (Agency NL)
 - John Neeft
 - e-mail: john.neeft@agentschapnl.nl
- o Project partners
 - AEBIOM, Europe (Jean-Marc Jossart)
 - BE2020, Austria (Nikolaus Ludwiczek)
 - BIO IS, France (Perrine Lavelle)
 - IFEU, Germany (Horst Fehrenbach)
 - STEM, Sweden (Anders Dahlberg)
 - VREG, Belgium (Jimmy Loodts)
- o Involvement from
 - JRC & LBST, EURELECTRIC, DECC, CWAPE

More information?

- o All information is available:
 - on www.BioGrace.net
 - and is for free

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Concluding summary

- o BioGrace is about implementation of policies
 - Practical tools helping stakeholders to make actual calculations
 - Strictly following European legislation
 - Strongly aiming to create a harmonised European market
- o BioGrace-I on biofuels has been finalised
 - GHG calculations for liquid biofuels only
 - Tool has been send in for recognition as a voluntary tool
- o BioGrace-II on electricity and heat from biomass just started
 - Harmonise GHG calculations for bio-electricity and bioheat
 - Strong parallels with BioGrace-I but also differences
 - Important role for policy makers

Thank you for your attention



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