BIOGRACE II

Harmonised Greenhouse Gas Calculations for Electricity, Heating and Cooling from Biomass

Co-funded by the Intelligent Energy Europe Programme of the European Union

BioGrace & Implementation of GHG accounting into national legislation

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BioGrace-II policy maker workshop
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Introduction – What is BioGrace?

- BioGrace: both a **project** and a **GHG calculation tool**
- BioGrace-I versus BioGrace-II

BioGrace-I:

- **Biofuels**
- Calculations up to liquid fuel ("Well-to-tank")

BioGrace-II:

- **Electricity, heat and cooling** from solid, gaseous and liquid biomass
- Calculations including conversion to electricity, heat and cooling

www.BioGrace.net

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Introduction: Relation to EC and JRC

- EC and JRC:
  - Defined the methodology
  - Performed GHG calculations
  - Published default and disaggregated default values

- BioGrace:
  - Follows the EC/JRC methodology, calculations and default values
  - Makes three additions to the work by EC/JRC:
    1. Make JRC calculations transparent
    2. Develop a user-friendly tool for making actual calculations
    3. Contribute to harmonisation within Europe

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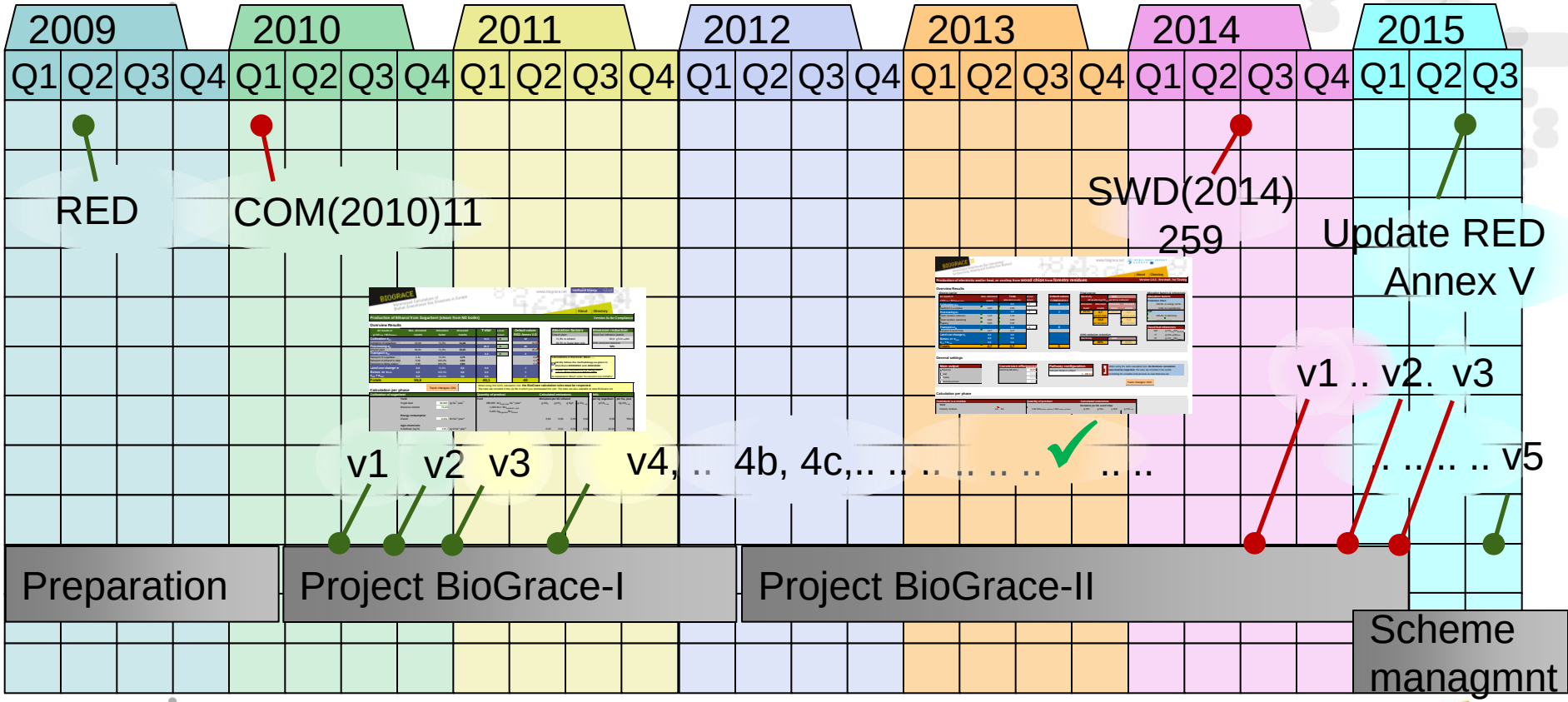
The BioGrace projects



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BioGrace project organisation

- BioGrace tools are developed from EU projects
  - Funded by Intelligent Energy for Europe
  - Two projects: 2010-2012 and 2012-2015

- Partners (BioGrace-II)
  - RVO (formerly Agency NL), Netherlands (John Neeft, José Muisers)
  - AEBIOM, Europe (Cristina Calderon and Jean-Marc Jossart)
  - BE2020, Austria (Nikolaus Ludwiczek and Dina Bacowski)
  - BIO IS, France (Grégoire Thonier and Perrine Lavelle)
  - IFEU, Germany (Susanne Köppen and Horst Fehrenbach)
  - STEM, Sweden (Alesia Israilava and Maria Forsberg)
  - VREG/VEA, Belgium (Jimmy Loodts and Caroline Vermeulen)
  - ADEME, France
  - CIEMAT, Spain
  - EXERGIA, Greece

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The BioGrace-II GHG calculation tool

Production of electricity and/or heat, or cooling from wood pellets/briquettes from Eucalyptus short rotation coppice Version 2

Overview Results

Energy carrier (including emissions from the fuel in use)

All results in g $CO_{2,eq}$ / MJ $_{Wood\ pellets}$	Non- allocated results	Total (allocated results)	Actual/ Default
Cultivation e_{ec}		12,1	A
Cultivation of eucalyptus	12,07	12,07	
Processing e_p		30,7	A
Wood pellet/briquette production	30,73	30,73	
Transport e_{td}		5,1	A
Transport of wood chips	0,51	0,51	
Transport of wood pellets	4,60	4,60	
Emissions from the fuel in use e_u		0,3	A
CH_4 and N_2O emissions at final conversic	0,30	0,30	
Land use change e_l	0,0	0,0	
Bonus or e_{sca}	0,0	0,0	
e_{ccr} + e_{ccs}	0,0	0,0	
Totals	48,2	48,2	

Default values JRC report
12,2
12,07
30,7
30,72
5,1
0,51
4,60
0,3
0,30
48

Final energy

Electricity		Heat	
All results in g $CO_{2,eq}$ per MJ as indicated			
Allocation factor	Allocated results	Allocation factor	Allocated results
0,0%	0,0 per MJ pellets	0,0%	0,0 per MJ pellets
	0,0 per MJ electr.		0,0 per MJ heat
		Cooling	0,0 per MJ cooling

GHG emission reduction

Electricity	Heat	
100%		100%
	Cooling	
		100%

Allocation fact

Allocation fa
Production chai
100,0%
0,0%
CHP
0,0%
0,0%

Fossil fuel re
186
80
47

I. Overview results

General settings

Main output
- ☐ Electricity
- ☐ Heat
- ☐ Cooling (including heat and / or electricity)
- ☐ Electricity and heat

Conversion efficiencies

Pathway configuration
Heat provision in pellet production: Natural gas boiler
Transport distance (pellets): 2 500 - 10 000 km

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

Track changes: ON

II. General settings

Calculation per phase

Values calculated from complete pathway

Overall yield per (hectare cropland, year)	243.300	$MJ_{Wood\ pellets}\ ha^{-1}\ year^{-1}$
Overall yield per MJ input	0,9901	$MJ_{Wood\ pellets}$ / $MJ_{SRC,\ input}$

These values are used in the calculations below to convert MJfeedstock into MJwood pellets. The purpose of this box is to facilitate copying rows or steps from one pathway to another, because these values are included in all pathways in cells C37 and C38.

Cultivation of eucalyptus			Quantity of product	Calculated emissions			
Yield				Emissions per MJ wood pellets			
Eucalyptus (SRC)	25.867	kg ha^{-1} $year^{-1}$	2,5E+05 MJ_{SRC} ha^{-1} $year^{-1}$	g CO_2	g CH_4	g N_2O	g $CO_{2,eq}$
Moisture content	50%		1,000 $MJ / MJ_{SRC,\ input}$				
			0,1063 $kg_{Wood\ chips,\ wet}$ / $MJ_{Wood\ pellets}$				
Energy consumption							
Diesel	1.469	MJ ha^{-1} $year^{-1}$		0,57	0,00	0,00	0,57
CH_4 and N_2O emissions from use of diesel (agriculture)		(harvesting and chipping)		0,00	0,00	0,00	0,01

Info per kg eucalypt g $CO_{2,eq}$
5,34
0,06

III. Calculation per phase

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Video instructions

- Video instructions to help understand basics and details of BioGrace GHG calculation tools

BioGrace-II on-line video instructions

Below you will find links to the BioGrace-II video instructions on YouTube. You can watch the YouTube video instructions by clicking on the links. Please note that (1) not all video instructions are yet available (last updated January 31, 2015) and (2) the quality of some video's need to be improved, which will be done on the short term.

0 General

- 0.1 Introduction
- 0.2 Playing instructions

1 Start-up

- 1.1 What is the BioGrace GHG calculation tool
- 1.2 Technical requirements
- 1.3 Adjust macro security level when starting the Excel tool
- 1.4 Navigation through the BioGrace Excel tool

2 Basic

- 2.1 Methodology of GHG calculations
- 2.2 Calculation rules
- 2.3 Standard values and list of additional standard values
- 2.4 How to make actual calculations and apply user-defined standard values
- 2.5 Use of disaggregated default values
- 2.6 Use of previous and partial calculation results
- 2.7 Use of sheet "user defined calculations"
- 2.8 Calculation of field N_2O emissions
- 2.9 Calculation of Land use change and improved agricultural management
- 2.10 Use of the "Final conversion only" sheet
- 2.11 Use of the "Co-digestion" sheet
- 2.12 Use of the "Calculate efficiencies" sheet
- 2.13 Track changes - 'for testing' versus 'for compliance'
- 2.14 Difference between typical and default values
- 2.15 CHP

3 Advanced

- 3.1 Actual calculations - insert a new step
- 3.2 Actual calculations - adjust complete pathway

4 Background

- 4.1 Relation between BioGrace and EC & JRC's work on GHG calculations
- 4.2 Project and organisations behind BioGrace

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Ownership/management of tools

BioGrace-I GHG calculation tool:

- Developed by the BioGrace-I consortium (2010-2012)
- Recognised by the European Commission as a voluntary scheme (in June 2013)
- Ownership/management by BIO IS, IFEU and RVO from June 2013 – March 2015
- Ownership/management by IFEU from April 1, 2015

BioGrace-II GHG calculation tool

- Developed by the BioGrace-II consortium (2012-2015)
- No decision yet on who will “own” or “manage” the tool per April 2015
- Tool will stay available on www.BioGrace.net

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Implementation into national legislation

What is required to implement GHG accounting in national legislation?

These are also harmonisation issues !

1. Do not include carbon debt and iLUC into GHG calculations !
2. Should methodological choices for biofuels/bioliquids and solid/gaseous biomass be the same?
3. Is the use of (disaggregated) default values allowed?
4. How to classify materials as (co-)product or waste/residue?
5. Which GHG calculation tool to use? If several: should these tools give the same result?
6. Which fossil fuel comparators?
7. Do actual calculations need to be verified?

Implementation into national legislation

Wood pellet producer

Delivery note A
…..
…..
…..
14.6 g $CO_{2,eq}$/MJ

Delivery note B
…..
…..
…..
16,2 g $CO_{2,eq}$/MJ

Danish GHG legislation

≠

Dutch GHG legislation

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Implementation into national legislation

1. No carbon debt and iLUC in GHG calculations !

- Do not include carbon debt and iLUC into GHG calculations, as:
  1. It will become very hard / impossible to make actual calculations
  2. Including carbon debt / iLUC might well lead to disharmonisation of methodologies and of GHG calculation tools

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Implementation into national legislation

2. Methodological choices

A. Point of attention for national implementation

- SWD (2014)259 and COM(2010)11 are not binding, so methodology is not defined until included in national legislation

B. "Biofuels" versus "solid biomass" to be solved by EC

- Methodology in SWD(2014)259 and COM(2010)11 is not exactly the same as methodology in RED
  - RED: no allocation to heat
  - SWD(2014)259: Improved manure management
  - SWD(2014)259: Mass balance rule does not apply for codigestion
- Important for feedstocks that can produce both biofuels ánd e/h/c
  - Wood chips to e/h/c and to methanol or FT liquids (via gasification)
  - Straw or bagasse to a/h/c and to ethanol (in future also woody biomass)
  - Bioliquids and biomethane

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Implementation into national legislation

3. Use of (disaggregated) default values

- This is allowed for biofuels (in RED article 19.1) but undecided for “solid biomass”. So a **national decision is needed** when implementing solid biomass sustainability criteria.
- Unharmonised choices can lead to trade difficulties:

Wood pellet producer

Delivery note

…..

Wood pellets from foresty residues

……

Wood chip CHP

…..

Virginia, US

…..

…..

8 g $CO_{2,eq}$/MJ

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Implementation into national legislation

4. Classify as (co-)product or waste/residue

- Materials that are classified as waste or residue do not bring any GHG emissions with them, whereas emissions are allocated to materials classified as (co-)products
- For some materials this is evident, for some not (e.g. wood from storm damage)
- This classification does not follow from GHG calculations
- So **national policy makers** will need to reflect on who will make this choice (in case stakeholders or verifiers request to make a choice)
- Should choices be harmonised?
  We have experience from implementation of biofuel legislation !

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Implementation into national legislation

5. Which GHG calculation tool?

- This also requires a decision by **national policy makers**
- There can be two choices:
  1. Only one GHG calculation tool is allowed
  2. Several GHG calculation tools are allowed
- Harmonisation issue: should different tools give the same result?
  - This can be done (as shown in BioGrace-I project)
  - Requires commitment of owners of the tools and of their policy makers
  - Currently there are three Eur. solid biomass GHG calculation tools:
    1. UK Solid and Gaseous Biomass Carbon Calculator
    2. “Logiciel de calcul des certificats verts” in Wallonia (Belgium)
    3. BioGrace-II GHG calculation tool

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Implementation into national legislation

6. Which fossil fuel comparators

- Take FFC's from SWD(2014)259 or re-discuss?
- Final choice is to be made nationally
- In the end, it does not matter!
  - The % emission saving required should be discussed together with the FFC's
  - Higher FFC's can lead to higher mandated % emission savings !
  - But why not all choose the same FFC's from SWD(2014)259 (then emission savings can also be compared one country to another)

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Implementation into national legislation

7. Verification of actual calculations

- Several stakeholders in the bioenergy production chain can (and will!) make actual calculations:
  1. Wood chip / wood pellet producers
  2. Traders
  3. Owners of (combined) heat and power plants
- Shall actual calculations be verified?
  This is a policy decision (a) to be taken nationally and (b) preferably to be harmonised
- There is experience with such verifications (biofuels)
- BioGrace tools contain “track changes” to facilitate verifiers

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Thank you for your attention

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