GBEP's GHG Methodologies Taskforce

GBEP Side-Event
COP-14
December 11, 2008

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Background

- GHG methodologies taskforce established by GBEP steering committee in May 2007.
- Desired end result is flexible methodology for policy makers in all countries.
- Four meetings thus far with result of a final draft methodological framework

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Taskforce Work Plan

GBEP set forth 5 key elements of taskforce:

1. Review existing methodologies (**completed**);
2. Develop a harmonised approach so GHG lifecycle assessments can be compared on an equivalent basis (**Draft completed with changes**);
3. Encompass the full well-to-wheel lifecycle of transport biofuels (**Draft completed**);
4. Not indicate a preference for any particular existing methodology or feedstock, or to limit parameters (**Completed**); and
5. Define parameters and inputs to be considered when conducting a LCA and develop a good practice document (**Draft completed**).

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Approach

- The taskforce determined that the best approach was a flexible methodological framework that can be applied to the LCA of bioenergy production and use.
- What is a common methodological framework?
- LCA covers ten components.
- For each component, a set of checkboxes were developed to allow for complete, transparent, and flexible reporting of greenhouse gas emissions.

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Boxes 1 & 2: Introductory Information

Introductory Information

1. GHGs covered
CO_2 __
CH_4 __
N_2O __
HFCs __
PFCs __
SF_6 __
Other _____

2. Source of biomass	
Waste __	(begin at Box 6)
Non-waste __	(begin at Box 3)

* Please explain definition of waste:
1. ____ Substance that the holder intended to discard.
2. ____ Substance that had zero or negative economic value.
3. ____ Substance for which the use was uncertain.
4. ____ Substance that was not deliberately produced and was not ready for use without further processing
5. ____ Substance that could have adversely affected the environment
6. Other: ____

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Box 3a

3a. Land use changes due to bioenergy production

Accounting for land use change in a lifecycle framework for estimating emissions for bioenergy is a complicated matter. Many institutions around the world are developing their methodologies. Some account for land use change in a single, holistic assessment while others sub-divide bioenergy-associated land use change into direct and indirect changes. Some further distinguish between indirect land use changes that are domestic versus those that are international. The reporting framework presented below is intended to be flexible in order to clarify which of these multiple approaches is taken by the methodology being described.

Added introductory question:
___ Direct land use changes are taken into account
OR
___ Indirect land use changes are taken into account
OR
___ A combination of both is included

Explain the choice.

I. Direct land use changes are accounted for (Y or N). If yes:

1. Identify the reference period or scenario
   _____ Historic (identify year or period)
   _____ Business-as-Usual (BAU) scenario (identify time frame: _____)
   _____ Other (explain)

Describe how the methodology attributes this type of land use change to biofuels

Explain key reference assumptions and characteristics relevant to estimating GHG emissions from direct land use change. Examples include (but are not limited to) identifying or describing:
- System boundaries (such as sector, activity, and geographic coverage)
- For BAU scenarios, assumed trends in key variables and land uses
- Omitted emissions sources
- Time period over which land use change emissions are allocated

2. Briefly describe the type of direct land-use changes accounted for (2 – 3 paragraphs). Examples include (but are not limited to) identifying or describing:
- Areas of land that change land use by type (such as forest, grassland, peat lands, pasture, to feedstock production)
- Carbon stocks, before shift to feedstock production, on lands that change land use by type

3. The following impacts of direct land use change are accounted for:
   Accounted for net changes of carbon stocks in:
   ___ living biomes, ___ dead organic matter, ___ soil
   _____ Changes in carbon sequestration in products (such as harvested wood products)

4. The methodology and data used are publicly available: Methodology (Y/N), Data (Y/N)

Box 3b

3b. Land use changes due to bioenergy production

___ Domestic indirect land use change is taken into account OR
___ International indirect land use change istaken into account OR
___ Both are taken into account OR ___ No distinction is made
Explain decision

IIa. Domestic indirect land use changes are accounted for (Y or N). If yes:

1 . Identify the reference period or scenario
_____ Historic (identify year or period)
_____ Business-as-Usual scenario (identify time frame: _____)
_____ Other (explain)

Describe how the methodology attributes this type of land use change to biofuels

Explain key reference assumptions and characteristics relevant to estimating GHG emissions from domestic indirect land use change. Examples include (but are not limited to) identifying or describing:
 System boundaries
 For BAU scenarios, assumed trend in key variables and land uses
 Rules or methods used to assign indirect land use changes to biofuels (Such as, whether emissions allocated to products using a marginal, average, or other approach)
 Time period over which land use change emissions are allocated

2. Briefly describe the type of domestic indirect land-use changes accounted for (2 – 3 paragraphs). Examples include (but are not limited to) identifying or describing:
 Areas of land that change land use by type (such as forest, grassland, peat lands, pasture, to commodity production)
 Carbon stocks, before shift to feedstock production, on lands that change land use by type

3. The following impacts of indirect domestic land use change are accounted for:
Accounted for net changes of carbon stocks in:
___ living biomes, ___ dead organic matter, ___ soil
_____ Changes in carbon sequestration in products (such as harvested wood products)

4. The methodology and data used are publicly available: Methodology (Y/N), Data (Y/N)

IIb. International indirect land-use changes are accounted for (Y or N). If yes:

1 . Identify the reference period or scenario
_____ Historic (identify year or period)
_____ Business-as-Usual scenario (identify time frame: _____)
_____ Other (explain)

Describe how the methodology attributes this type of land use change to biofuels

Explain key reference assumptions and characteristics relevant to estimating GHG emissions from international indirect land use change. Examples include (but are not limited to) identifying or describing:
 System boundaries (such as sector, activity, and geographic coverage)
 For BAU scenarios, assumed trend in key variables and land uses
 Rules or methods used to assign international indirect land use changes to domestic biofuels (Such as, whether emissions allocated to products using a marginal, average, or other approach)
 Time period over which land use change emissions are allocated

2. Briefly describe the type of international indirect land-use changes accounted for (2 – 3 paragraphs). Examples include (but are not limited to) identifying or describing:
 Areas of land that change land use by type (such as forest, grassland, peat lands, pasture, to commodity production)
 Carbon stocks, before shift to feedstock production, on lands that change land use by type

3. The following impacts of international indirect land use change are accounted for:
Accounted for net changes of carbon stocks in:
___ living biomes, ___ dead organic matter, ___ soil
_____ Changes in carbon sequestration in products (such as harvested wood products)

4. The methodology and data used are publicly available: Methodology (Y/N), Data (Y/N)

Box 4: Biomass feedstock production

4. Biomass feedstock production on farms and in forests

Focus on Direct Emissions:

Sources of direct GHG emissions are accounted for:

_____ Emissions from operating farm/forestry machinery
_____ Emissions from energy used in irrigation
_____ Emissions from energy used in preparing feedstocks (drying grains, densification of cellulosic biomass, etc.)
_____ Emissions from energy used in transport of feedstocks
_____ CO2 emissions from lime/dolomite applications
_____ On-farm N2O emissions from nitrogen fertilizers (direct, volatilization, runoff/leaching)
_____ CH4 emissions from lands (especially wetlands)
_____ Other (please specify)

For all checked, clarify assumptions

The methodology and data used are publicly available: Methodology (Y/N), Data (Y/N)

Focus on Embodied Emissions:

Sources of GHG emissions embodied in inputs accounted for:

_____ Emissions embodied in the manufacture of farm/forestry machinery
_____ Emissions embodied in buildings
_____ Emissions embodied in the manufacture of fertilizer inputs.
_____ Emissions embodied in the manufacture of pesticide inputs
_____ Emissions embodied in purchased electricity
_____ Emissions embodied in the production of seeds
_____ Other (please specify)

For all checked, clarify assumptions

The methodology and data used are publicly available: Methodology (Y/N), Data (Y/N)

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Box 5: By-products and Co-products

5. By-products and co-products

By-products or co-products are produced (Y or N)

1. ____ By/Co-products from the biomass are accounted for.

2. ____ By/Co-products from non-biomass feedstocks are accounted for.

3. Explain definition of by/co-products: ____

4. ____ An allocation method is used
   - 4a. ____ Allocation by mass
   - 4b. ____ Allocation by energy content
     - Method to determine energy content: ____
   - 4c. ____ Allocation by economic value
     - Method to determine economic value: ____
   - 4d. ____ Other allocation method
     - Specify method: ____
     - Method to determine parameters needed: ____

5. ____ A substitution method is used

Method to determine the exact type of use/application of a co-product: ____

Method to determined what product the co-product would substitute for and what the associated GHG emissions are of that product: ____

6. ____ Another method or combination of methods is used
   - Specify method: ____
   - Method to determine parameters needed: ____

For relevant sections, clarify assumptions

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Box 6: Transport of Biomass

6. Transport of biomass

Biomass is transported from farm/plantation/forest to processing plant (Y or N)

If yes:

1. ____ The biomass transported in a different commodity type.
   1a. ____ A description of intermediate processing steps is available.
   1b. ____ Emissions associated with intermediate processing are accounted for (including, e.g., electricity used for processing).

2. ____ There is a multi-stage transport chain (e.g. truck to ship to truck or train).
   2a. List all stages in the transport chain.
   2b. Specify the stages for which stages emissions are accounted.

3. Transport from the production site to the use processing plant is dedicated to this purpose. (Y or N)
   If Yes:
   3a. ____ All transport emissions are included
   If No:
   3b. ____ A portion of transport emissions are allocated, and the allocation methodology is described.

4. ____ Return run of transport equipment is accounted for.
   4a. During the return run, transport equipment is:
   ____ empty ____ otherwise utilized

For relevant sections, clarify assumptions

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Box 7: Biomass Processing

7. Processing into fuel

The biomass requires processing to produce fuel (Y or N)

1. _____ GHG emissions associated with material inputs used in the conversion process (e.g. chemicals, water) are accounted for.

2. _____ GHG emissions associated with the energy used in the conversion process are accounted for.
2a. Specify the method used to account for grid-related emissions (e.g. average/marginal, national/regional, actual/future): _____

3. _____ GHG emissions from wastes and leakages (including waste disposal) are accounted for.

4. _____ Other GHG emissions from the process are accounted for.
    4a. List which ones: ____

5. _____ GHG emissions associated with the plant construction are accounted for.
5a. Estimates of emissions associated with plant construction have been pro-rated to account for:
    _____ Other uses of the plant
    _____ Design life of the plant
    _____ Other parameters; specify which ones: _____

For relevant sections, clarify assumptions

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Box 8: Transport of Fuel

8. Transport of fuel

Fuel is transported from processing plant to use site (Y or N)

If yes:
1. ____ The fuel transported in a different commodity type.
1a. ____ A description of intermediate processing steps is available.
1b. ____ Emissions associated with intermediate processing are accounted for (including, e.g., electricity used for processing).

2. ____ There is a multi-stage transport chain (e.g. truck to ship to truck or train).
2a. List all stages in the transport chain.
2b. Specify the stages for which emissions are accounted.

3. Transport from the processing plant to the use site is dedicated to this purpose. (Y or N)
If Yes:
3a. ____ All transport emissions are accounted for.
If No:
3b. ____ Transport emissions are pro-rated, and the methodology for pro-rating is described.

4. ____ Return run of transport equipment is accounted for.
4a. During the return run, transport equipment is:
____ empty ____ otherwise utilized

For relevant sections, clarify assumptions

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Box 9: Fuel Use

9. Fuel use

For solid biomass and liquid and gaseous fuels used in stationary applications:
Are you addressing electricity and/or heat (thermal energy)?

If yes:
- **Is it a CHP plant? (Y/N)**
- **electric efficiency of the use process ____**
- **thermal efficiency of the use process ____**
- **Electricity sent to a general grid (Y/N)**

(Following questions interfere with the scope of Subgroup 2 "co-products" and sub-group 4 "replaced comparators")

In case of CHP;
- **Indicate which method is used to account for both – electricity and heat – vis-à-vis box 5**

Remark 1: the method for accounting electricity and heat is connected with the question concerning the "replaced comparator" (Box 10). The subgroup discussed the diverse options and tended to treat electricity and heat like equal co-products with specific benefits.

Are you addressing specific emissions by the usage?
- **Which conversion/combustion technology is applied?**

Is the technique specifically causing significant emissions of
N2O (e.g. CFB-type boilers)
CH4, (e.g. low level technique or small-scale)?
If presumed to do not; is there enough evidence to exclude the occurrence of such specific GHG emissions?
- **Is the biomass tainted with fossil material? (e.g. in case of waste sources)**

If yes; Do you have analysis concerning the degree of fossil content?

(Following questions also partly interfere with the scope of Subgroup 4, Box 10 "replaced comparators")
Are you addressing a technology upgrade (e.g. pile burning to modern energy technology)?
If yes;
-Do you have emission data on the replaced way of biomass burning?

For relevant sections, clarify assumptions

For transport fuels:

1. Are you addressing miles (km) per energy unit?

If yes, ask …

…describe how energy efficiency is factored into fuel use analysis.

2. Are you addressing tailpipe gas?

If yes, ask …
how does method account for tail pipe emissions?
e.g.: are CO2 emissions associated with combustion source and CO2 associated with feedstock sink netted out.
e.g.: are CH4 and N2O emissions from combustion accounted?

Box 10: Comparison with Replaced Fuel

10. Comparison with replaced fuel

Identify Methodology.
Is this methodology publicly available?
Provide references
What sources of emissions are accounted for?
Sources associated with energy? (combustion and fugitive emissions)
Sources associated with industrial process? (like CO2 from calcination in clinker production)
Other sources?
What gases are accounted for?
CO2 __
CH4 __
N2O __
HFCs __
PFCs __
SF6 __
Other _____

Are GHGs embodied accounted for? Specify which sources of GHG emissions embodied in inputs are accounted for and clarify assumptions:

Emissions embodied in infrastructures for fossil fuel, focusing on energy-intensive materials such as steel and cement
Emissions embodied in the manufacture of machinery
Emissions embodied in buildings
Emissions embodied in the chemicals inputs (catalyzers, solvents, etc)
Emissions embodied in purchased electricity
Emissions embodied in the production of by-products
GHGs associated with pre-production phase?
Other (please specify)

Are the fugitive emissions considered (CO2, methane, N2O)?

Emissions Prior to Crude Oil Production
Account for emissions in which parts of the cycle?
Geophysics?
Prospecting?
Define geographic and time frame coverage
Distribution of these emissions across bbls produced.

Crude Oil Production / Extraction
Specify Type of crude oil
tar sands ?
heavy oil ?
pre-salt ?
Specify the origin of fuel (region, refinery, etc) or other important fuel characteristic
Specify the applicability conditions of the fuel characteristics
Is the reference fuel a world average world gasoline or diesel or crude or gas or coal or applicable only to one region (Europe, North America, China, Asia) or other specific condition?
Specify which direct emission from production are accounted:
Drilling: fuel combustion;
If natural gas is available in a suitable pressure, it can be injected or can be used in other ways and CH4 emissions occur;
Venting and/or Flaring due to associated gas;
Flaring;
CH4 fugitive emissions from equipments;
Turbines and compressors: Fuel combustion;
Gas Processing: CH4 emissions and low level of CO2 and N2O emissions from combustion equipments;
Offshore operations can include emissions from equipments and personal transportations (helicopters and supply vessels).
Use of electricity: usually gasoil or fuel oil generators.
Is there associated natural gas?

(CONTINUED . . .)

Next Steps

- Goal is to finalize Methodological Framework by March 2009.
  - Final draft of checklist to be approved by GBEP Steering Committee 12/15.
  - Draft will be made available for comment.
  - After comments GBEP will develop a template and good practice guidance on what the methodology should be as well as guidance for policy makers.
  - Need to determine if (and how) framework will be tested.

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