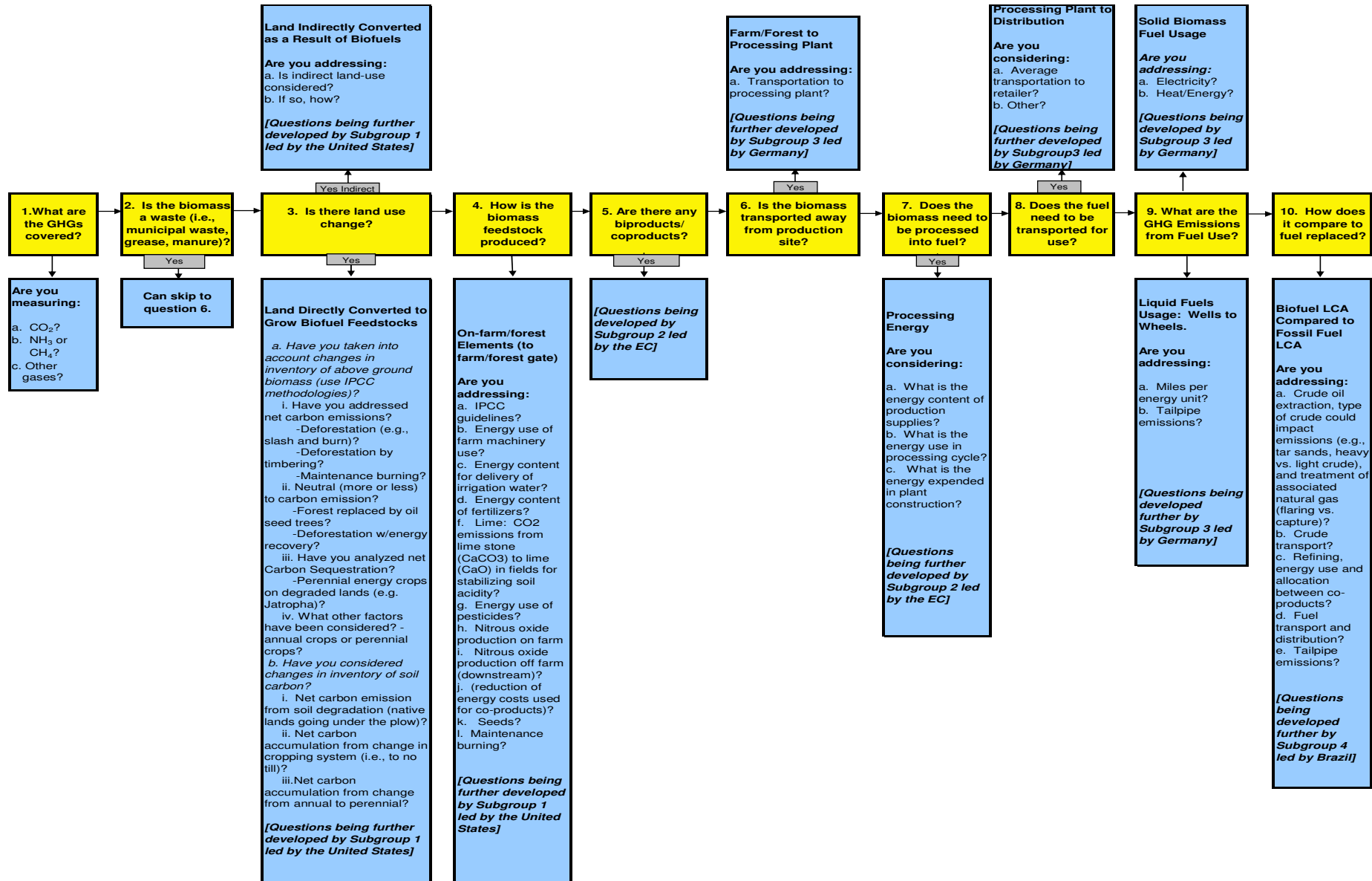
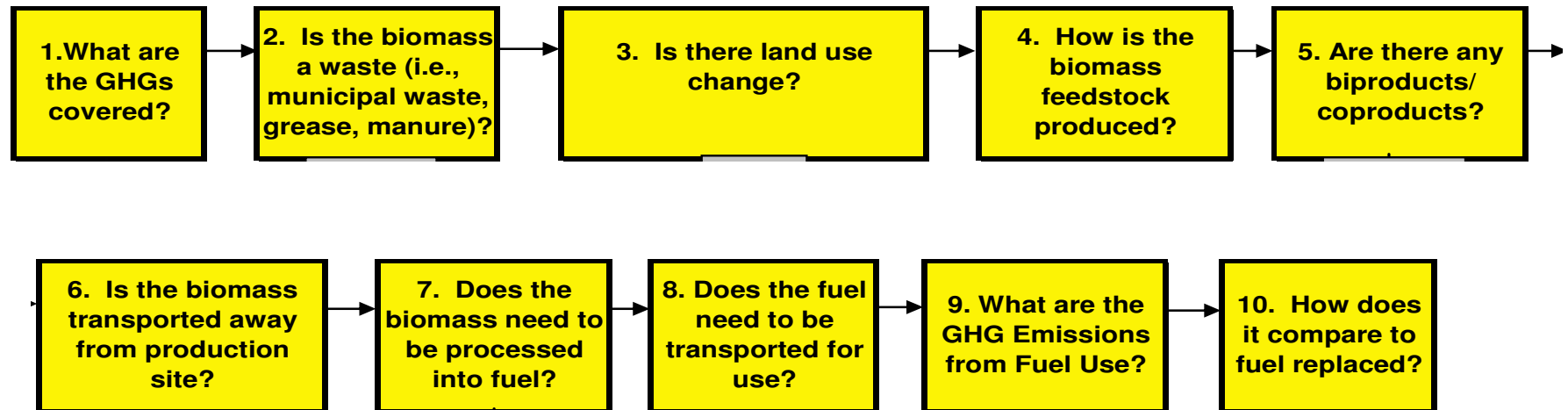


Original Flowchart



Original Flowchart



Updated Flowchart

1	1. GHGs covered
	<input type="checkbox"/> PFCs <input type="checkbox"/> SF ₆ <input type="checkbox"/> Other <input type="checkbox"/> HFCs
2	Biomass
	<input type="checkbox"/> (begin at Box 6) <input type="checkbox"/> (begin at Box 3)

3
3. Land use changes due to bioenergy production
<p>Direct land use changes have occurred (Y or N)</p> <p>1. If yes, briefly describe the paragraphs that have occurred. (2-3 paragraphs)</p> <p>2. The following impacts of direct land use changes are accounted for:</p> <ul style="list-style-type: none"> Net changes in above ground carbon Changes in soil carbon stocks Changes in carbon sequestration in products (such as harvested wood products) <p>3. Analysis methodology is described and publicly available</p> <p>Indirect land use changes have occurred (Y or N)</p> <p>1. If yes, briefly describe the type of domestic indirect land-use changes that have occurred. (2-3 paragraphs)</p> <p>2. The following impacts of indirect domestic land use change are accounted for:</p> <ul style="list-style-type: none"> Net changes in above ground carbon Changes in soil carbon stocks Changes in carbon sequestration in products (such as harvested wood products) <p>3. Analysis methodology is described and publicly available</p> <p>4. International indirect land-use changes accounted for.</p> <p>5. If yes, briefly describe the indirect land-use changes that have occurred (2-3 paragraphs).</p> <p>6. The following impacts of indirect international land use change are accounted for:</p> <ul style="list-style-type: none"> Net changes in above ground carbon Changes in soil carbon stocks Changes in carbon sequestration in products (such as harvested wood products) <p>7. Analysis methodology is described and publicly available</p>

4
4. Biomass feedstock production on farms and in forests
<p>Focus on Direct Emissions:</p> <p>Sources of GHG emissions reported for:</p> <ul style="list-style-type: none"> Energy (drying, etc.) Grains, debris (chips, etc.) CO₂ CH₄ Fertilizers Volatilized N CH₄ emissions from lands (especially wetlands) Other (please specify) <p>Focus on Embodied Emissions:</p> <p>Sources of GHG emissions embodied in inputs accounted for:</p> <ul style="list-style-type: none"> Emissions embodied in the manufacture of farm machinery Emissions embodied in the farm buildings Emissions embodied in the manufacture of fertilizer inputs. Emissions embodied in the manufacture of pesticide inputs Emissions embodied in purchased electricity Other (please specify)

5
5. Biproducs and co-products
<p>Biproducs or co-products are produced (Y or N)</p> <p>If yes:</p> <ol style="list-style-type: none"> List all identified co-products. List any co-products that are not directly accounted for (e.g., gypsum). For each co-product, specify the end-use. For each co-product, specify the economic value of the co-product is reported. Physical properties and/or the economic value of the co-products are reported. Specific end-uses of the co-products are known, and the products that they replace have been identified. For each co-product, an emissions comparison has been performed to compare co-products to the products they replace. For each co-product, a publicly-available accounting methodology is provided.

6
6. Transport of biomass
<p>Biomass is transported from the production site to the processing plant</p> <p>If yes:</p> <ol style="list-style-type: none"> The biomass commodity type, transport mode, and processing steps is available. <ol style="list-style-type: none"> Transport emissions are accounted for late processing used for There is a truck to ship to truck or train. <ol style="list-style-type: none"> List all stages in the transport chain. Specify the stages for which stages emissions are accounted. Transport from the production site to the use processing plant is dedicated to this purpose. (Y or N) <p>If Yes:</p> <ol style="list-style-type: none"> All transport emissions are included A portion of transport emissions are allocated, and the allocation methodology is described. Return run of transport equipment is accounted for. <ol style="list-style-type: none"> During the return run, transport equipment is: <ul style="list-style-type: none"> empty otherwise utilized

7
7. Processing into fuel
<p>The biomass requires processing to produce fuel (Y or N)</p> <p>If yes:</p> <ol style="list-style-type: none"> Material processing is accounted for. Energy consumption is accounted for. Electricity consumption is accounted for. Specific grid-related emissions (e.g. average/marginal, national/regional, actual/future): <ol style="list-style-type: none"> Other GHG emissions from the process, such as GHG emissions from wastes and leakages (including waste disposal) are accounted for. GHG emissions associated with the plant construction are accounted for. <p>If yes:</p> <ol style="list-style-type: none"> Estimates of emissions associated with plant construction have been pro-rated to account for: <ul style="list-style-type: none"> Design life of the plant No pro-rating; all construction emissions are included in the analysis.

8
8. Transport of fuel
<p>Fuel is transported from processing plant to use site (Y or N)</p> <p>If yes:</p> <ol style="list-style-type: none"> Transport mode and route is available. <ol style="list-style-type: none"> List all stages in the transport chain. <ol style="list-style-type: none"> List all stages in the transport chain. (Y or N) Specify the stages for which emissions are accounted. Transport from the processing plant to the use site is dedicated to this purpose. (Y or N) <p>If Yes:</p> <ol style="list-style-type: none"> All transport emissions are accounted for. <p>If No:</p> <ol style="list-style-type: none"> Transport emissions are pro-rated, and the methodology for pro-rating is described. Return run of transport equipment is accounted for. <ol style="list-style-type: none"> During the return run, transport equipment is: <ul style="list-style-type: none"> empty otherwise utilized

9
9. Fuel use
<p>For solid biomass fuel:</p> <p>Emissions from usage:</p> <ol style="list-style-type: none"> Identify the conversion/combustion technology used. List significant GHG emissions known to be specifically associated with the applied conversion/combustion technology (e.g., small-scale techniques, boilers, CH₄ in low level or high level, etc.). <ol style="list-style-type: none"> If 2a was left blank, estimate the occurrence of such specific GHG emissions. The biomass is tainted (e.g., waste sources) is available. Analyses of degradation are available. <p>For use occurring in a CHP facility:</p> <ol style="list-style-type: none"> The GHG assessment address electricity, heat, and steam. The electric efficiency is reported. The electricity is sent to a general grid. The reference system for GHG comparisons with other sources of electricity is reported. (e.g., national average grid, typical fossil fuel mix, etc.) <p>If heat is included:</p> <ol style="list-style-type: none"> The thermal efficiency of the use process is reported. The reference system for GHG comparisons with other sources of heat is reported. <p>For use associated with a technology upgrade (e.g. pile burning to modern energy technology):</p> <ol style="list-style-type: none"> Data on the replaced technology are available. <p>For biomass derived from waste products:</p> <ol style="list-style-type: none"> Waste treatment processes are accounted for. An alternative waste treatment exists. Emissions comparisons are provided. Waste is allowed to decay. <ol style="list-style-type: none"> Emissions from biomass decay (CH₄, N₂O) are accounted for. <p>For liquid fuel:</p> <ol style="list-style-type: none"> Kilometers per energy unit. Tail pipe emissions are accounted for.

Subgroup Note: need to add a blue box for gaseous fuels

Subgroup Note: need to add a blue box for solid fuels

10
10. Comparison with replaced fuel
<p>1. Identify Methodology.</p> <p>2. This methodology is publicly available (Y or N)</p> <p>3. Are you addressing the LCA of fossil fuel? (Y or N)</p> <p>For crude oil:</p> <ol style="list-style-type: none"> Specify type of oil (e.g., diesel, kerosene, etc.). There are no emissions from the production/transport system involved in liquefied natural gas. <ol style="list-style-type: none"> Treatment of emissions is available. The emissions from the production/transport system are accounted for. Emissions from the production/transport system are accounted for. Emissions from the production/transport system are accounted for. Transport emissions are accounted for: <ol style="list-style-type: none"> domestic international Fugitive emissions during transport are accounted for Country-specific parameters are included in emission calculations for domestic transport. <ol style="list-style-type: none"> Return journeys of transport fleet are accounted for, when appropriate. The production/transport system involves liquefied natural gas. <ol style="list-style-type: none"> Emissions from the regasification plant are accounted for Fuel production includes a refining process Direct refinery emissions are accounted for Embodied refinery emissions (plant, machinery) are accounted for Energy embodied in chemical products (catalyzers, solvents, etc.) are accounted for Fugitive emissions are accounted for Emissions for hydrogen production are accounted for There are significant co-products produced Emissions associated with co-products are accounted for These accounting methodologies are publicly available

Boxes 1 & 2: Introductory Information

Introductory Information

1. GHGs covered

CO₂ ___
CH₄ ___
N₂O ___
HFCs ___
PFCs ___
SF₆ ___
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: ___

Box 3

3. 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

3. Land use changes due to bioenergy production

Domestic indirect land use change is taken into account OR
 International indirect land use change is taken 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

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

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)

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 determine 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

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

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: _____

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

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 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

1. Identify Methodology.
2. This methodology is publicly available (Y or N)
3. Are you addressing the LCA of fossil fuel? (Y or N)

For crude oil:

1. Specify type of crude (e.g. tar sands, heavy oil, pre-salt):

2. ___ There is an associated natural gas
 - 2a. Treatment of associated natural gas:
___ flaring ___ reinjection ___ processing/direct use
 - 2b. ___ There is a natural gas processing point to remove liquids
 - 2c. ___ Emissions from extracted liquids are accounted for
 - 2d. ___ Emissions for electricity production are accounted for
3. ___ The crude/natural gas is transported
 - 3a. Transportation is: ___ domestic ___ international ___ both
 - 3b. Emissions are accounted for:
___ domestic ___ international
 - 3c. ___ Fugitive emissions during transport are accounted for
 - 3d. ___ Country-specific parameters are included in emission calculations for domestic transport.
 - 3e. ___ Return journeys of transport fleet are accounted for, when appropriate.
4. ___ The production/transport system involves liquified natural gas
 - 4a. ___ Emissions from the regasification plant are accounted for
5. ___ Fuel production includes a refining process
 - 5a. ___ Direct refinery emissions are accounted for
 - 5b. ___ Embodied refinery emissions (plant, machinery) are accounted for
 - 5c. ___ Energy embodied in chemical products (catalizers, solvents, etc.) are accounted for
 - 5d. ___ Fugitive emissions are accounted for
 - 5e. ___ Emissions for hydrogen production are accounted for
6. ___ There are significant co-products produced
 - 6a. ___ Emissions associated with co-products are accounted for
 - 6b. ___ These accounting methodologies are publicly available

Subgroup Note: need to add a blue box for solid fuels