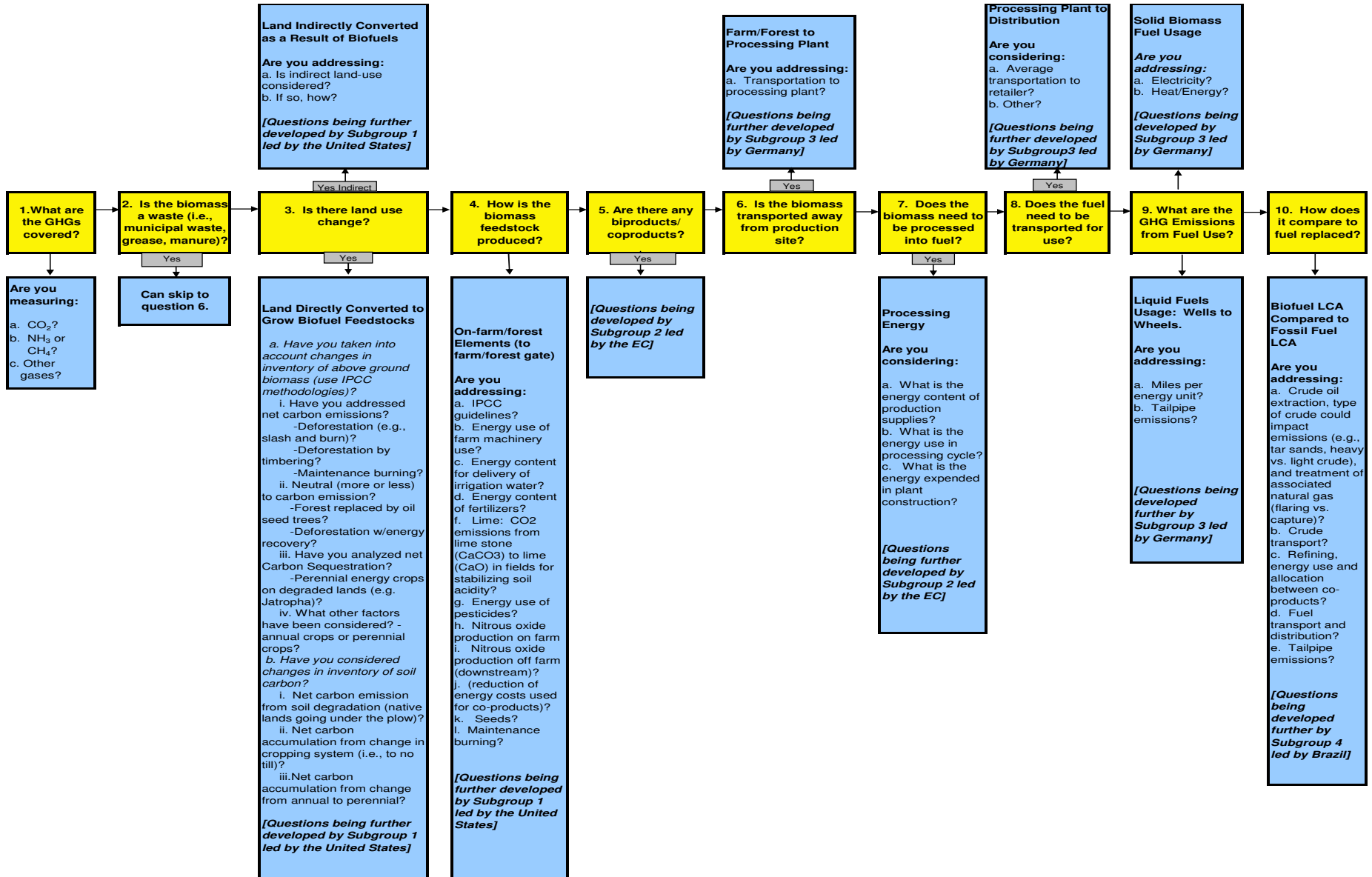
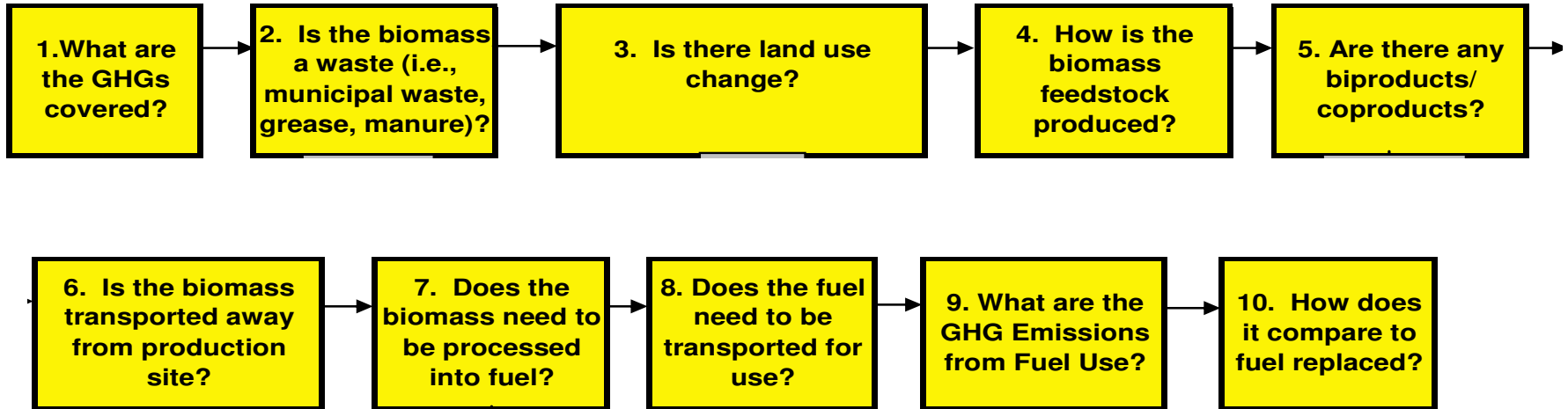


# Original Flowchart



# Original Flowchart



# Updated Flowchart

<b>1</b>	1. GHGs covered
	<input type="checkbox"/> PFCs <input type="checkbox"/> SF <sub>6</sub> <input type="checkbox"/> Other _____ <input type="checkbox"/> HFCs
<b>2</b>	Biomass
	<input type="checkbox"/> Begin at Box 6 <input type="checkbox"/> Begin at Box 3

<b>3</b>
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 _____ are accounted for:  <input type="checkbox"/> Net changes in above ground carbon  <input type="checkbox"/> Changes in soil carbon stocks  <input type="checkbox"/> Changes in carbon sequestration in products (such as harvested wood products)</p> <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:  <input type="checkbox"/> Net changes in above ground carbon  <input type="checkbox"/> Changes in soil carbon stocks  <input type="checkbox"/> Changes in carbon sequestration in products (such as harvested wood products)</p> <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:  <input type="checkbox"/> Net changes in above ground carbon  <input type="checkbox"/> Changes in soil carbon stocks  <input type="checkbox"/> Changes in carbon sequestration in products (such as harvested wood products)</p> <p>7. _____ Analysis methodology is described and publicly available</p>

<b>4</b>
4. Biomass feedstock production on farms and in forests
<p>Focus on Direct Emissions:</p> <p>Sources of GHG emissions embodied in inputs accounted for:  <input type="checkbox"/> _____ En _____ chinery  <input type="checkbox"/> _____ En _____ (drying etc.)  <input type="checkbox"/> _____ En _____ (grains, de _____ etc.)  <input type="checkbox"/> _____ CO _____ (blocks  <input type="checkbox"/> _____ En _____ ns  <input type="checkbox"/> _____ O _____ gen  <input type="checkbox"/> _____ fertilizers  <input type="checkbox"/> _____ volatil _____  <input type="checkbox"/> _____ CH<sub>4</sub> emissions from lands (especially wetlands)  <input type="checkbox"/> _____ Other (please specify)</p> <p>Focus on Embodied Emissions:</p> <p>Sources of GHG emissions embodied in inputs accounted for:  <input type="checkbox"/> _____ Emissions embodied in the manufacture of farm machinery  <input type="checkbox"/> _____ Emissions embodied in the farm buildings  <input type="checkbox"/> _____ Emissions embodied in the manufacture of fertilizer inputs.  <input type="checkbox"/> _____ Emissions embodied in the manufacture of pesticide inputs  <input type="checkbox"/> _____ Emissions embodied in purchased electricity  <input type="checkbox"/> _____ Other (please specify)</p>

<b>5</b>
5. Biproducts and co-products
<p>Biproducts or co-products are produced (Y or N)</p> <p>If yes:</p> <ol style="list-style-type: none"> <li>List all identified _____</li> <li>List any not directly _____</li> <li>_____ Tl _____ into _____</li> <li>_____ Tl _____ of _____</li> <li>_____ each co-product is reported.</li> <li>_____ Physical properties and/or the economic value of the co-products are reported.</li> <li>_____ Specific end-uses of the co-products are known, and the products that they replace have been identified.</li> <li>_____ An emissions comparison has been performed to compare co-products to the products they replace.</li> <li>_____ For each co-product taken into account, a publicly-available accounting methodology is provided.</li> </ol>

<b>6</b>
6. Transport of biomass
<p>Biomass is transported from _____ to processing plant</p> <p>If yes:</p> <ol style="list-style-type: none"> <li>_____ The biomass is available.              1a. _____ A de _____              1b. _____ Emi _____ late processing used for _____</li> <li>_____ There is a _____ 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.</li> <li>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.</li> <li>_____ Return run of transport equipment is accounted for.              4a. During the return run, transport equipment is: _____ empty _____ otherwise utilized</li> </ol>

<b>7</b>
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"> <li>_____ make _____ in _____              1a. _____ prod _____              1b. _____ acco _____              1c. _____ the _____ are _____</li> <li>_____ ener _____              2a. _____              2b. _____ The _____              2c. _____ Em _____              2d. _____ Em _____</li> <li>_____ elec _____              3a. _____              3b. _____ The cr _____              3c. _____ Transpo _____              3d. _____</li> <li>Specify _____ related emissions (e.g. average/marginal, national/regional, actual/future):              4a. _____              4b. _____</li> <li>_____ Other GHG emissions from the process, such as GHG emissions from wastes and leakages (including waste disposal) are accounted for.</li> <li>_____ GHG emissions associated with the plant construction are accounted for.              If Yes:              6a. Estimates of emissions associated with plant construction have been pro-rated to account for:  <input type="checkbox"/> _____ Other uses of the plant  <input type="checkbox"/> _____ Design life of the plant  <input type="checkbox"/> _____ No pro-rating; all construction emissions are included in the analysis.</li> </ol>

<b>8</b>
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"> <li>_____              1a. _____              1b. _____              1c. _____              1d. _____              1e. _____              1f. _____              1g. _____              1h. _____              1i. _____              1j. _____              1k. _____              1l. _____              1m. _____              1n. _____              1o. _____              1p. _____              1q. _____              1r. _____              1s. _____              1t. _____              1u. _____              1v. _____              1w. _____              1x. _____              1y. _____              1z. _____</li> <li>_____              2a. _____              2b. _____              2c. _____              2d. _____              2e. _____              2f. _____              2g. _____              2h. _____              2i. _____              2j. _____              2k. _____              2l. _____              2m. _____              2n. _____              2o. _____              2p. _____              2q. _____              2r. _____              2s. _____              2t. _____              2u. _____              2v. _____              2w. _____              2x. _____              2y. _____              2z. _____</li> <li>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.</li> <li>_____ Return run of transport equipment is accounted for.              4a. During the return run, transport equipment is: _____ empty _____ otherwise utilized</li> </ol>

<b>9</b>
9. Fuel use
<p>For solid biomass fuel:</p> <p>Emissions from usage:</p> <ol style="list-style-type: none"> <li>Identify the conversion/combustion technology used: _____</li> <li>List significant GHG emissions known to be specifically associated with the applied conversion/combustion technology (e.g. small-scale techniques) _____              2b. _____ If 2a was left blank, the occurrence of such specific GHG emissions _____              2c. _____ (e.g. waste sources) _____              2d. _____ available.</li> <li>_____ The biomass is taint _____              3a. _____ Analyses of degr _____</li> </ol> <p>For use occurring in a CHP facility:</p> <ol style="list-style-type: none"> <li>The GHG assessment address _____ electricity _____ heat              If electricity is included:              1. _____ The electric efficiency _____              2. _____ The electricity is sent to a general grid.              3. _____ The reference system for GHG comparisons with other sources of electricity is reported. (e.g., national average grid, typical fossil fuel mix, etc.)              If heat is included:              4. _____ The thermal efficiency of the use process is reported.              5. _____ The reference system for GHG comparisons with other sources of heat is reported.</li> </ol> <p>For use associated with a technology upgrade (e.g. pile burning to modern energy technology):</p> <ol style="list-style-type: none"> <li>_____ Data on the replaced technology are available.</li> </ol> <p>For biomass derived from waste products:</p> <ol style="list-style-type: none"> <li>_____ Waste treatment processes are accounted for.</li> <li>_____ An alternative waste treatment exists              2a. _____ Emissions comparisons are provided.</li> <li>_____ Waste is allowed to decay.              3a. _____ Emissions from biomass decay (CH<sub>4</sub>, N<sub>2</sub>O) are accounted for.</li> </ol> <p>For liquid fuel:</p> <ol style="list-style-type: none"> <li>Kilometers per energy unit: _____</li> <li>_____ Tail pipe emissions are accounted for.</li> </ol>

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

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

<b>10</b>
10. Comparison with replaced fuel
<ol style="list-style-type: none"> <li>Identify Methodology.</li> <li>This methodology is publicly available (Y or N)</li> <li>Are you addressing the LCA of fossil fuel? (Y or N)</li> </ol> <p>For crude oil:</p> <ol style="list-style-type: none"> <li>Specify type _____              1a. _____              1b. _____              1c. _____              1d. _____              1e. _____              1f. _____              1g. _____              1h. _____              1i. _____              1j. _____              1k. _____              1l. _____              1m. _____              1n. _____              1o. _____              1p. _____              1q. _____              1r. _____              1s. _____              1t. _____              1u. _____              1v. _____              1w. _____              1x. _____              1y. _____              1z. _____</li> <li>_____ There _____              2a. Treatme _____              2b. _____ fla _____              2c. _____ Em _____              2d. _____ Em _____              2e. _____              2f. _____              2g. _____              2h. _____              2i. _____              2j. _____              2k. _____              2l. _____              2m. _____              2n. _____              2o. _____              2p. _____              2q. _____              2r. _____              2s. _____              2t. _____              2u. _____              2v. _____              2w. _____              2x. _____              2y. _____              2z. _____</li> <li>_____ The cr _____              3a. Transpo _____              3b. Emissions are accounted for:  <input type="checkbox"/> _____ 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.</li> <li>_____ 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 (catalyzers, 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</li> </ol>

# Boxes 1 & 2: Introductory Information

Introductory Information	
<b>1. GHGs covered</b>	<b>2. Source of biomass</b>
CO <sub>2</sub> ____ PFCs ____	Waste __ (begin at Box 6)
NH <sub>4</sub> ____ SF <sub>6</sub> ____	Non-waste __ (begin at Box 3)
N <sub>2</sub> O ____ Other ____	
HFCs ____	

# Box 3: Land Use Change

## 3. Land use changes due to bioenergy production

Direct land use changes have occurred (Y or N )

- 1.If yes, briefly describe the type of direct land-use changes that have occurred. (2 – 3 paragraphs)
  2. The following impacts of direct land use change are accounted for:
    - \_\_\_\_\_ Net changes in above ground carbon
    - \_\_\_\_\_ Changes in soil carbon stocks
    - \_\_\_\_\_ Changes in carbon sequestration in products  
(such as harvested wood products)
  - 3.\_\_\_\_\_ Analysis methodology is described and publicly available
- 

Indirect land use changes have occurred (Y or N )

- 1.If yes, briefly describe the type of *domestic* indirect land-use changes that have occurred. (2-3 paragraphs)
- 2.The following impacts of indirect domestic land use change are accounted for:
  - \_\_\_\_\_ Net changes in above ground carbon
  - \_\_\_\_\_ Changes in soil carbon stocks
  - \_\_\_\_\_ Changes in carbon sequestration in products  
(such as harvested wood products)
- 3.\_\_\_\_\_ Analysis methodology is described and publicly available
  
- 4.\_\_\_\_\_ International indirect land-use changes are accounted for.
- 5.If yes, briefly describe the indirect land-use changes that have occurred (2-3 paragraphs).
- 6.The following impacts of indirect international land use change are accounted for:
  - \_\_\_\_\_ Net changes in above ground carbon
  - \_\_\_\_\_ Changes in soil carbon stocks
  - \_\_\_\_\_ Changes in carbon sequestration in products  
(such as harvested wood products)
- 7.\_\_\_\_\_ Analysis methodology is described and publicly available

# 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 machinery
- \_\_\_\_\_ Energy used in irrigation
- \_\_\_\_\_ Energy used in preparing feedstocks (drying grains, densification of cellulosic biomass, etc.)
- \_\_\_\_\_ Energy used in transport of feedstocks
- \_\_\_\_\_ CO<sub>2</sub> from lime/dolomite applications
- \_\_\_\_\_ On-farm N<sub>2</sub>O emissions from nitrogen fertilizers (direct, volatilization, runoff/leaching)
- \_\_\_\_\_ CH<sub>4</sub> emissions from lands (especially wetlands)
- \_\_\_\_\_ Other (please specify)

### Focus on Embodied Emissions:

Sources of GHG emissions embodied in inputs accounted for:

- \_\_\_\_\_ 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)

# Box 5: Co-products

## 5. Biproducts and co-products

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

If yes:

1. List all co-products from the biomass and identify their ultimate use/fate.
2. List any co-products from processing that are not directly derived from biomass (e.g., gypsum)
3. \_\_\_ The amount of biomass that goes into each co-product is reported.
4. \_\_\_ The amount and the characteristics of each co-product is reported.
5. \_\_\_ Physical properties and/or the economic value of the co-products are reported.
6. \_\_\_ Specific end-uses of the co-products are known, and the products that they replace have been identified.
  - 6a. \_\_\_ An emissions comparison has been performed to compare co-products to the products they replace.
7. \_\_\_ For each co-product taken into account, a publicly-available accounting methodology is provided.

# 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

# Box 7: Biomass Processing

## 7. Processing into fuel

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

If yes:

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
3. \_\_\_\_\_ GHG emissions associated with electricity taken from the grid are accounted for.
4. Specify the method used to account for grid-related emissions (e.g. average/marginal, national/regional, actual/future):  
\_\_\_\_\_
5. \_\_\_\_\_ Other GHG emissions from the process, such as GHG emissions from wastes and leakages (including waste disposal) are accounted for.
6. \_\_\_\_\_ GHG emissions associated with the plant construction are accounted for.

*If yes:*

6b. Estimates of emissions associated with plant construction have been pro-rated to account for:

- \_\_\_\_\_ Other uses of the plant
- \_\_\_\_\_ Design life of the plant
- \_\_\_\_\_ No pro-rating; all construction emissions are included in the analysis.

# 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

# Box 9: Fuel Use

## 9. Fuel use

For solid biomass fuel:

Emissions from usage:

1. Identify the conversion/combustion technology used:  
\_\_\_\_\_
- 2a. List significant GHG emissions known to be specifically associated with the applied conversion/combustion technology (e.g., N<sub>2</sub>O in CFB-type boilers, CH<sub>4</sub> in low level or small-scale techniques) \_\_\_\_\_
- 2b. \_\_\_ If 2a was left blank, evidence is provided to exclude the occurrence of such specific GHG emissions
3. \_\_\_ The biomass is tainted with fossil material (e.g. in case of waste sources)
  - 3a. \_\_\_ Analyses of degree and content of tainting are available.

For use occurring in a CHP facility:

1. The GHG assessment addresses:  
\_\_\_ electricity \_\_\_ heat (thermal energy) \_\_\_ both  
*If electricity is included:*
2. \_\_\_ The electric efficiency of the use process is reported.
3. \_\_\_ The electricity is sent to a general grid.
4. \_\_\_ The reference system for GHG comparisons with other sources of electricity is reported. (e.g., national average grid, typical fossil fuel mix, etc.)  
*If heat is included:*
5. \_\_\_ The thermal efficiency of the use process is reported.
6. \_\_\_ The reference system for GHG comparisons with other sources of heat is reported.

For use associated with a technology upgrade (e.g. pile burning to modern energy technology):

1. \_\_\_ Data on the replaced technology are available.

For biomass derived from waste products:

1. \_\_\_ Waste treatment processes are accounted for.
  2. \_\_\_ An alternative waste treatment exists
    - 2a. \_\_\_ Emissions comparisons are provided.
  3. \_\_\_ Waste is allowed to decay.
    - 3a. \_\_\_ Emissions from biomass decay (CH<sub>4</sub>, N<sub>2</sub>O) are accounted for.
- 

For liquid fuel:

1. Kilometers per energy unit: \_\_\_\_\_
2. \_\_\_ Tail pipe emissions are accounted for.

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

# 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