Bioenergy’s CO$_2$ emissions
Accounting: today & tomorrow

AUSCEW Forums,
December, 2010
How to count the emissions

Options discussed:
1. Current approach (KP):
   ✓ Carbon stock changes
2. POUR (Point Of Uptake and Release):
   ✓ Combustion emissions & uptake by plants and soils

Evaluation:
- Coverage of CO₂ emissions
- Responsibility for emissions
## Overview of Accounting Options

<table>
<thead>
<tr>
<th>System</th>
<th>Coverage</th>
<th>Simplicity</th>
<th>Forest Preservation</th>
<th>Stimulate Rural Economies</th>
<th>Control of GHG Emissions</th>
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</thead>
<tbody>
<tr>
<td><strong>“0” Combustion Factor Systems</strong></td>
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<tr>
<td>Current</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
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<tr>
<td>Add emission factor/tax</td>
<td>Depends on level</td>
<td>Low</td>
<td>Depends on Mandates</td>
<td>Lower than Current</td>
<td>Depends on Mandates</td>
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<tr>
<td>Define Acceptable lands</td>
<td>Medium</td>
<td>Depends on definitions</td>
<td>Depends on program details</td>
<td>Selectively</td>
<td>Depends on program details</td>
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<tr>
<td><strong>“1” Combustion Factor Systems</strong></td>
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<tr>
<td>Tailpipe</td>
<td>Medium</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
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<tr>
<td>POUR</td>
<td><strong>High</strong></td>
<td>Medium</td>
<td>Low in short term (due to credit transfer)</td>
<td>High</td>
<td>Low in short term (due to credit transfer)</td>
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<tr>
<td><strong>End-user/Value chain Approaches</strong></td>
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<tr>
<td>EU-Renewable Energy Directive</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
<td>Mandate dependent</td>
<td>Medium</td>
</tr>
<tr>
<td>US-Renewable Fuels Standard 2</td>
<td>Very High</td>
<td>Medium</td>
<td>High</td>
<td>Mandate dependent</td>
<td>High</td>
</tr>
<tr>
<td>“1” factor reduced by GHG emissions along value chain</td>
<td><strong>Very High</strong></td>
<td>Medium</td>
<td>Probably High</td>
<td>Cap-and-trade dependent</td>
<td>High</td>
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<tr>
<td><strong>BEST GUESS: Some form of POUR</strong></td>
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<tr>
<td>US Clean Air Act</td>
<td><strong>High</strong></td>
<td>Medium?</td>
<td>?</td>
<td>?</td>
<td>High</td>
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</tbody>
</table>

Source: Adapted from EuropeAid/E NV/2007/1439 36/TPS WP2.3
What is wrong with low coverage?

- Tons GHGs
- 1990 emissions
- Target
- Atmosphere does not see intended reduction
- Uncounted bioenergy emissions
- Counted emissions, bioenergy used
Low coverage under KP

No all stock losses counted

✓ Developing countries

✓ EU Nations:
  Deforestation generally not reporting
  Loss of carbon stocks within forestland

More bioenergy used = more uncounted emissions
KP responsibility

1. No emissions counted at point of combustion (POC)

   More bioenergy used than if user pays the bill

2. Under cap-and-trade bioenergy producer doesn’t need allowances
Sink in Target Calculation

400t CO2 emissions from fossil fuels and industry

Target = 300tCO2

100t CO2 removed from atmosphere by plants and soils (sink)
Measuring carbon stock changes

Imaginary national forest growing at steady pace

Actual & measured sink = 100tC/5yrs
Harvest of 50tC/5 years

Forest grows at same rate: actual sink = 100tC/5yr

Stock level lower by 50tC

Harvest wood not measured

Measured Sink = 50tC
Under EU cap-and-trade:
(EU-ETS)*

Weaker land-sector sink

Increased bioenergy demand

Reduced allowance allocation to energy & industry sectors

* GHG obligation & allowances only for energy & industrial emitters. Land sector not in cap-and-trade (no allowances given or required)
Total uptake from atmosphere

Bioenergy producer account:
+10tC (to atmosphere)
-10tC credits

stock change (-10tC)

+ biomass removed (-50tC)

= 60tC credit available for transfer

Bioenergy user account: 0
POUR: more harvested than grows

Bioenergy producer account:
+10 tC (to atmosphere)
0 tC credits

Bioenergy user account:
+10 tC

stock change (+50tC)

biomass removed (-50tC)

0 Credits available for Transfer
Sink options under POUR

1. Nation gives/sells credits to selected groups

2. Nation transfers credits

Private entities sell credits on market or to wood purchasers

Bioenergy producers

Other industries

Groups hard hit by climate change

National sink credit
PROS:
✓ All losses embodied in combusted biomass included in accounting system*
✓ Developing countries can receive credits

Cons
✓ Must measure stock changes & removals, all purposes

Unknown:
✓ Incentive for short term increase in harvests?

* Losses in soil and litter carbon not included
POUR vs. KP system

KP approach
✓ Many losses not measured
✓ User doesn’t pay
✓ Increasing use of bioenergy driven by system
✓ Sink automatically used to “zero-out” bioenergy emissions

POUR
✓ User pays
✓ Greater flexibility in use of sink
✓ Most losses accounted for
Take home message

“0” at POC

> 1

“1” at POC

“0” at POC
Value chain systems

CO2 emissions from all steps may be included

Cultivation + Harvesting + Transportation + Processing + Production of energy

Many versions: Use with “0” or “1”
Value Chain Pros & Cons

**PROS**
- Captures emissions in nations without GHG caps
- Capped nations responsible for GHG emissions caused by their use of bioenergy

**CONS**
- Need to a lot of track Information
- Need to ensure no double counting

Unknown: Feasibility of value-chain approaches for biomass from forests
Removing trees does not create a sink.

Harvest goal: high-value timber, not wood chips.
Causes of net sink: EU & US forests

Primary reasons

- Abandonment of farmland
- Post war afforestation drive (EU)
- Recovery from previous heavier harvesting (changed global timber market conditions)
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Timber Companies (& small holders)

1. Sales prices*:
   a. Pine sawn timber - $40-60 per (delivered, green) ton;
   b. Pine pulpwood - $24-27 per ton;
   c. Energy chips - $18-20 per ton.

2. Cutting and hauling costs $20 per ton

*U.S. Data: Source: Neil Sampson, personal communication