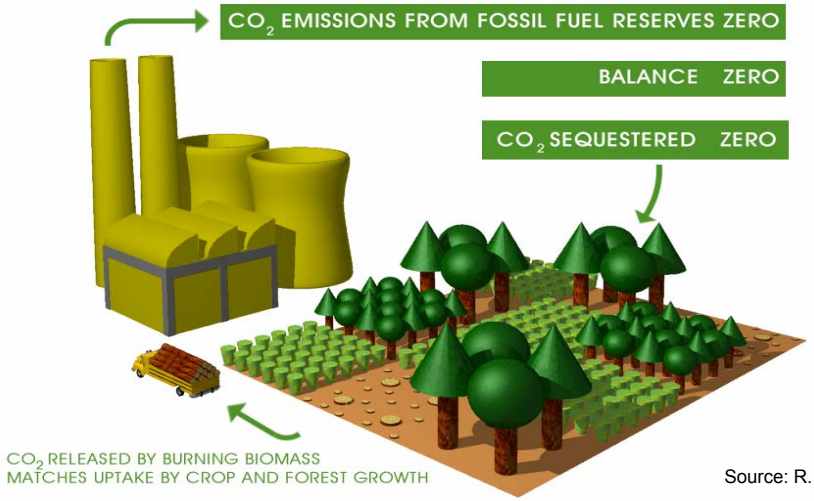
LULUCF and bioenergy in the context of Kyoto and post 2012 agreements

JOANNEUM RESEARCH

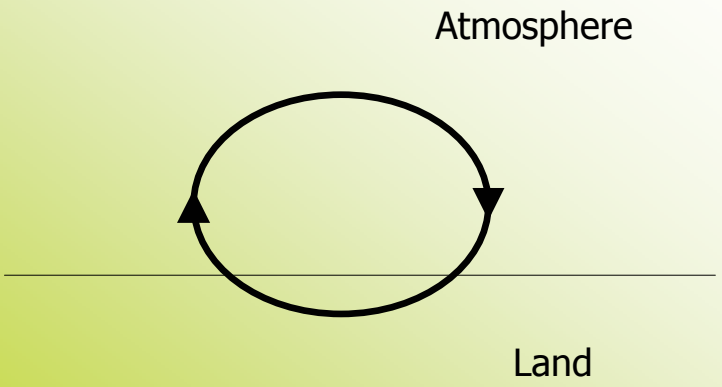
Bernhard Schlamadinger
Joanneum Research
Austria

Madrid, 19 April 2006

National inventories: Bioenergy is CO2 neutral in energy sector (net C emissions reported in AFOLU)



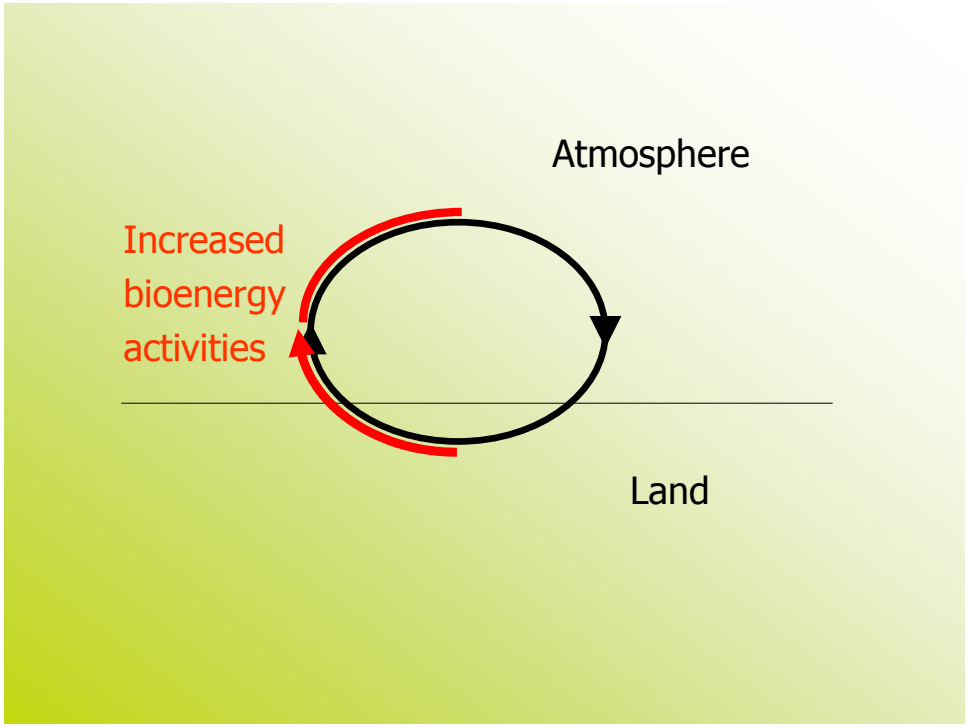
Source: R. Matthews

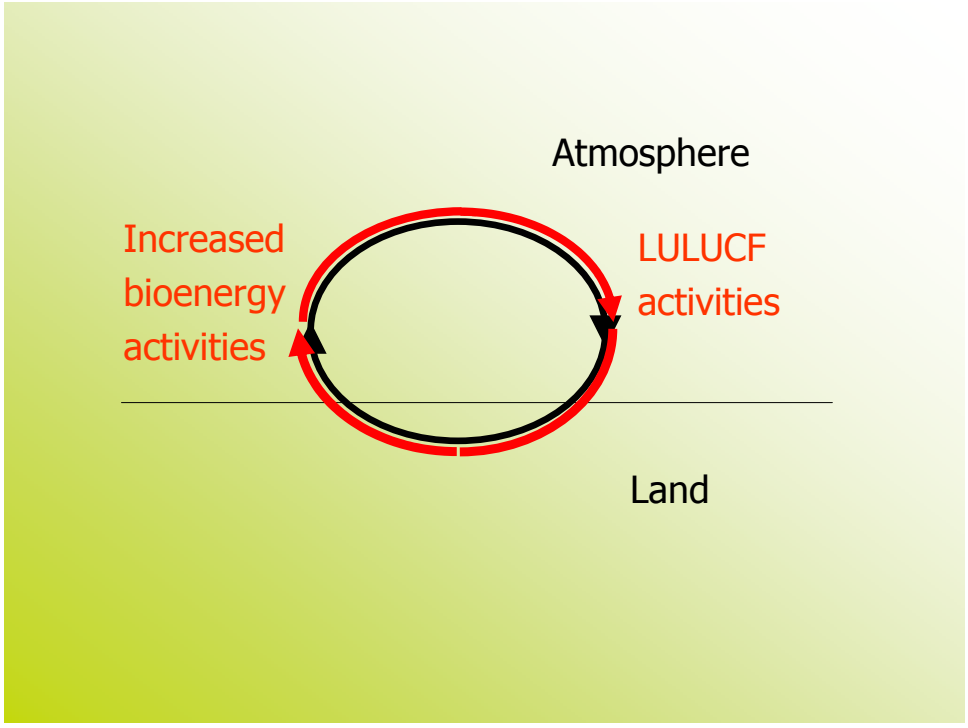


Bioenergy is CO2 neutral only if

1. it results in lower rates of natural decay (residues)
2. Agric. crops are used that do not deplete soil carbon and cause no leakage
3. Increased harvest is accompanied by higher growth (afforestation, reforestation, revegetation, …)

- Simply increasing the use of biomass may lead to net depletion of C stocks ("non-renewable biomass")
- The photosynthesis part is what makes bioenergy CO2 neutral

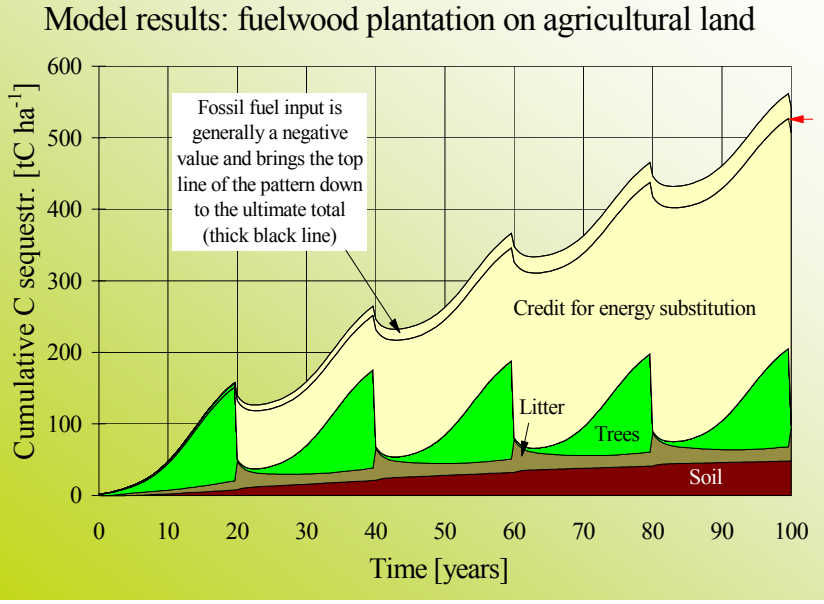

Atmosphere
Increased
bioenergy
activities
Land

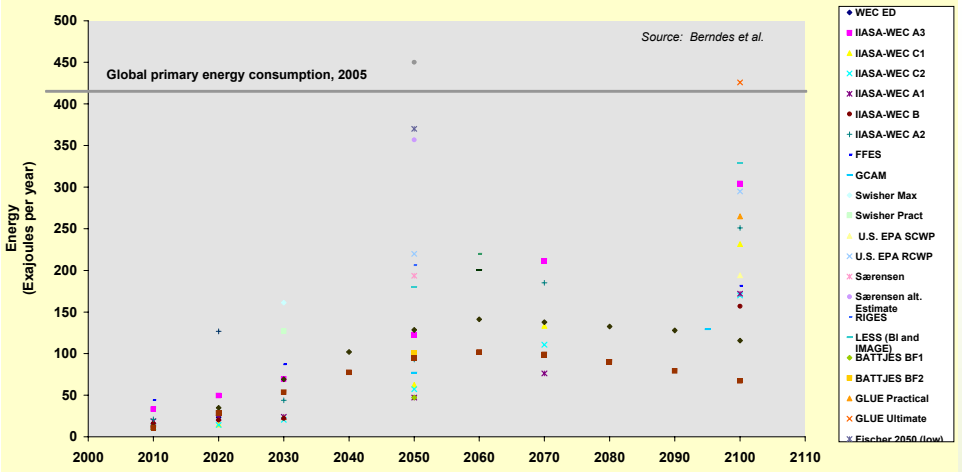

Atmosphere
Increased
bioenergy
activities
LULUCF
activities
Land

First theme

New and additional bioenergy
requires active enhancement of removals

Sequestration and substitution





A Review of 13 Studies on Biomass Potential, 2010–2100 from Goran Berndes et al., 2003

Two ways to achieve this

- Increase harvest levels, reduce rotation length, deplete carbon stocks
  - More deforestation
  - More forest degradation
  - More devegetation
- Reforestation / revegetation combined with more efficient land use (agriculture) and biomass use
  - More fuelwood and timber
  - Less pressure on existing forests where wood demand is main pressure

Second theme

Existing and often non-renewable bioenergy requires incentives to reduce LULUCF emissions

Non-renewable biomass in the CDM

- CDM excludes LULUCF (except AR)
- > 80% of global bioenergy is traditional biomass
  - Improvements result in GHG benefits in LULUCF sector
- 10% of world primary energy, 25% of non-Annex I primary energy excluded from CDM
- CDM asymmetry:
  - Reducing C stock depletion in new bioenergy projects increases credits
  - Reducing C stock depletion in existing biomass use: no credits

Non-renewable biomass in the CDM

- change fuelwood source to renewable
- technology switch → biogas, solar stoves
- efficient cooking stoves, charcoal making

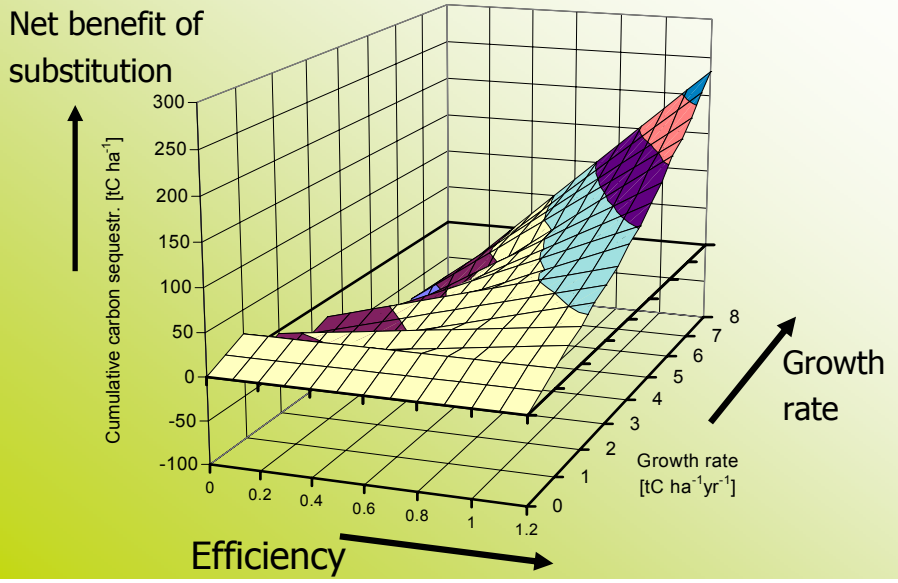
- short-term SSC fix: assume hypothetical baseline of kerosene / LPG
- projects are assessed against low-carbon, high efficiency baseline

Third theme

Existing forests: to harvest or not to harvest?

Depends on rates of regrowth and substitution efficiency

Relative benefits of substitution management over sequestration management



Substitution management more effective if …

- Initial carbon stocks are low
- Growth rates are high
- Biomass is used efficiently
- A long-term view is taken

Marland and Marland: Should we store carbon in trees? (Water, Air and Soil Poll. 1992)

Marland, and Schlamadinger 1997: Forests for Carbon Sequestration or Fossil Fuel Substitution? A Sensitivity Analysis (Biomass and Bioenergy 1997)

- Optimizing in 5-year intervals unduly favors LULUCF
- Look for synergies: where C is enhanced and biomass produced

Conclusions

- Bioenergy helps:
  - Overcome saturation constraint
  - Address non-permanence
- Incentives for C enhancing activities needed to
  - build the resource for modern biomass energy
  - reduce pressure on existing forests
- Incentives for reduction of C depleting activities to
  - improve traditional biomass use (fuelwood and charcoal)
- HWP: one possible outcome is different treatment of woody vs. non-woody biomass fuels

Reducing Emissions from Deforestation in Developing Countries

A workshop to discuss methodological and policy issues

Bad Blumau / Austria
10-12 May 2006

JOANNEUM RESEARCH

Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

CIFOR
CENTER FOR INTERNATIONAL FORESTRY RESEARCH

INSEA

Global Carbon Project