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The Upfront Carbon Debt of Bioenergy

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“Bio-energy and Bio-fuels: a carbon accounting time bomb”, Brussels, 29.06.2010

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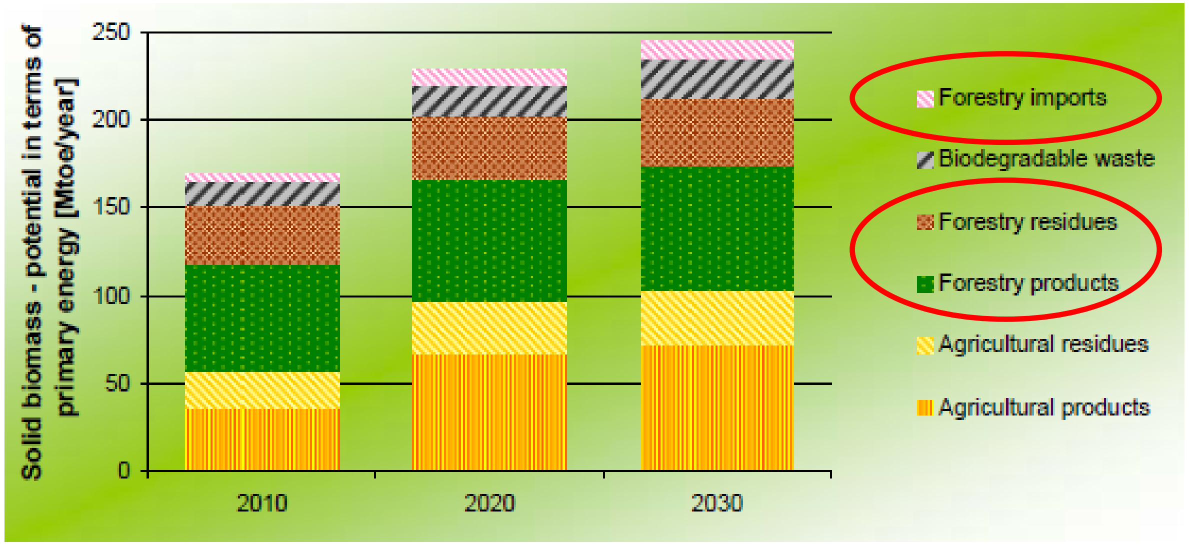
Bioenergy deployment (Ragwitz et al. 2009)

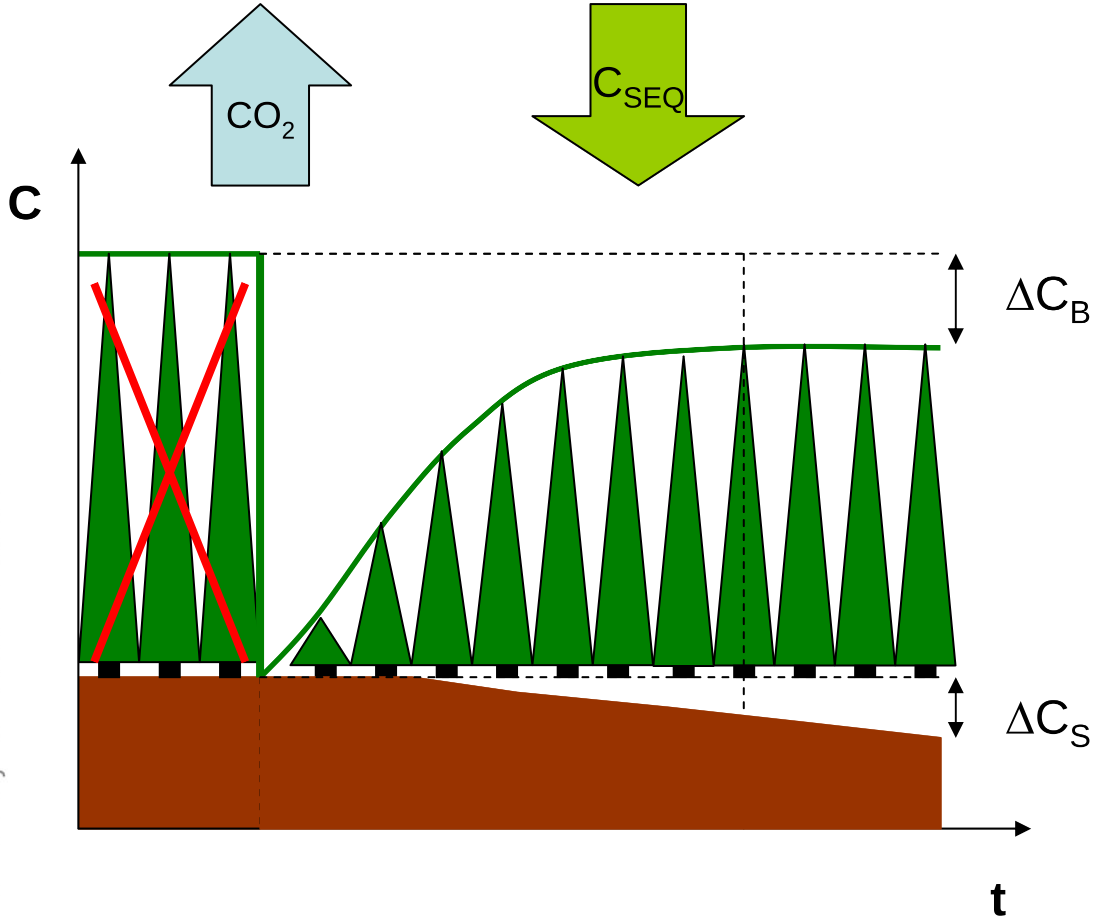
2020 RES projections to meet EU targets:

Solid biomass and biowaste = 58% of total RES generation (140 Mtoe of 240 Mtoe).

195 Mtoe of biomass potential



Bioenergy Carbon Stock Emissions

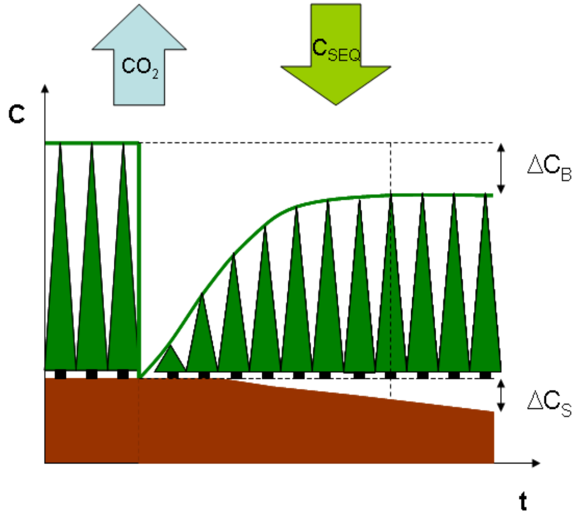


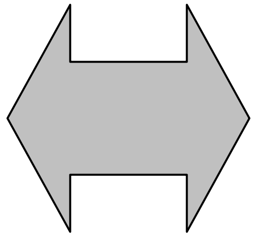
Temporary
+ Permanent
C loss

Accounting for bioenergy emissions

Bioenergy system

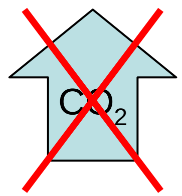
Fossil fuel system





In the current accounting systems burnt biomass is = ZERO emissions in the energy sector

Most C stock losses NOT accounted in the LULUCF sector (spatial and temporal gaps)



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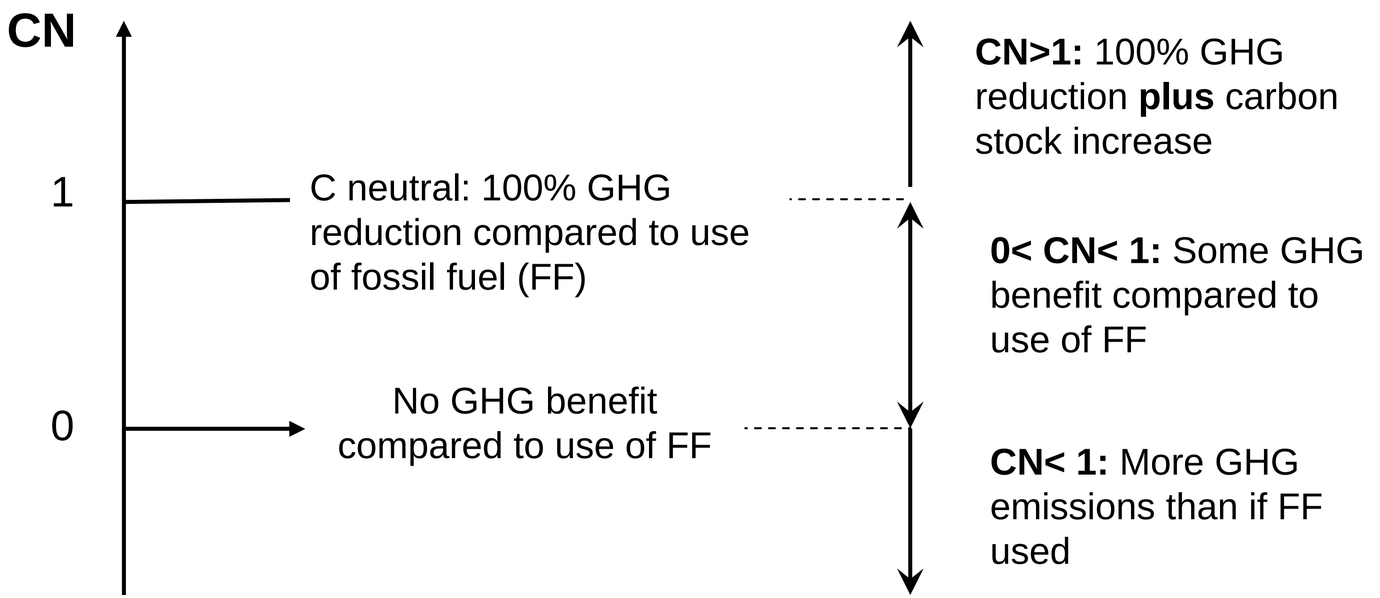
Carbon Neutrality factor (CN)

- The extent to which the use of bioenergy reduces GHG emission can be quantified with a CN factor (time dependent):

$$CN(t) = \frac{E_{FF}(t) - E_B(t)}{E_{FF}(t)} = 1 - \frac{E_B(t)}{E_{FF}(t)}$$

(Schlamadinger and Spitzer 1994)



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Case studies

The mitigation potential of bioenergy changes according to the source of biomass

Examples:

- Felling residues from managed forests
- New plantations
- Additional fellings from managed forests

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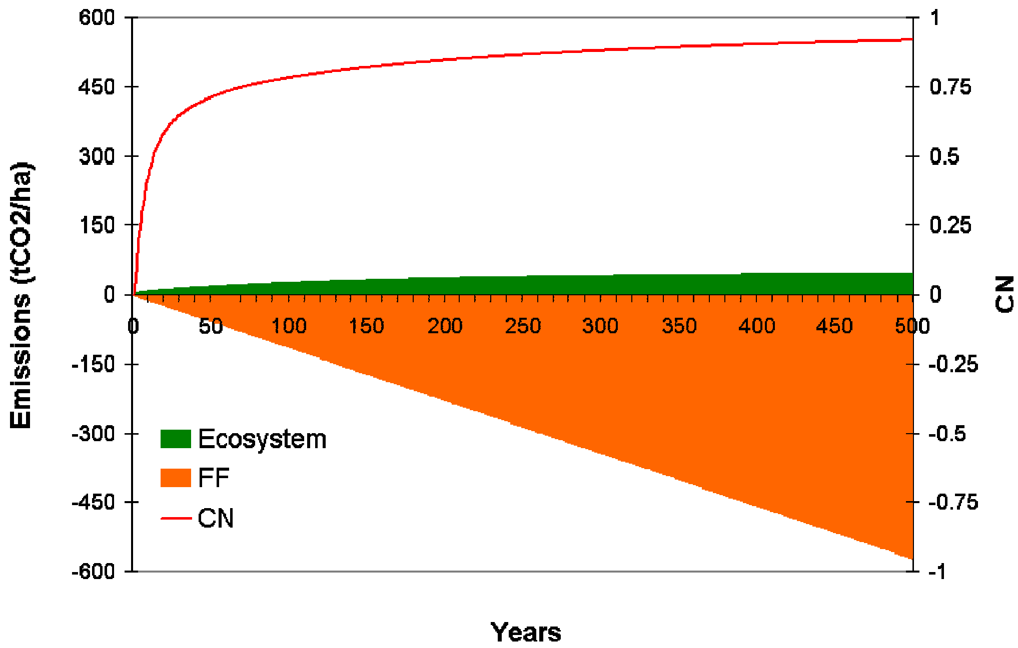
Felling Residues (fast decaying)

When harvest residues, previously left on the forest floor, are extracted for bioenergy, there is a carbon stock loss in dead wood, litter and soil pools. CN= 0.6 after 20 years

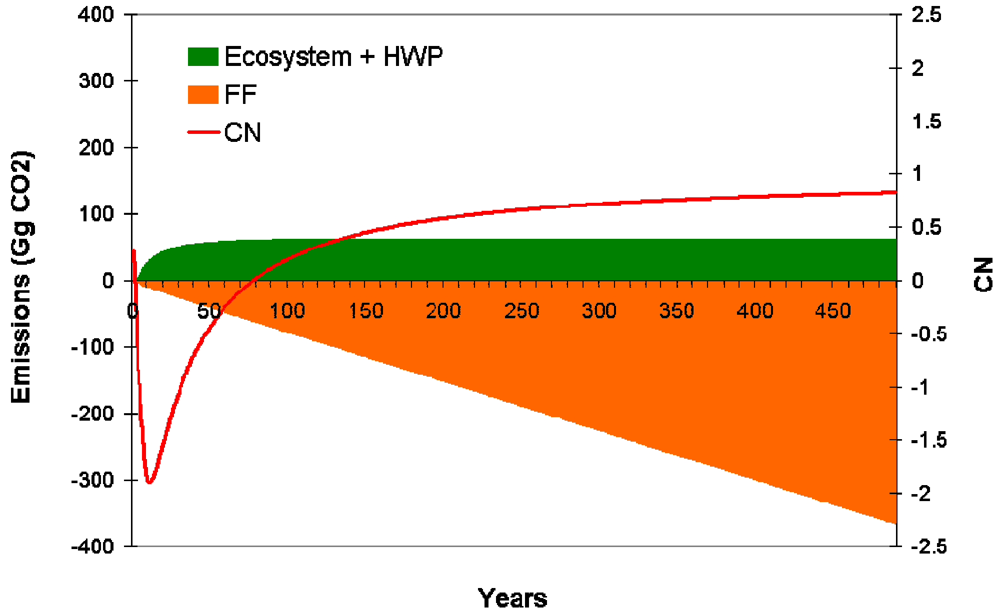


(Schlamadinger et al. 1995)

New plantations

a) Plantations on cropland or low C stock land: CN ≥ 1

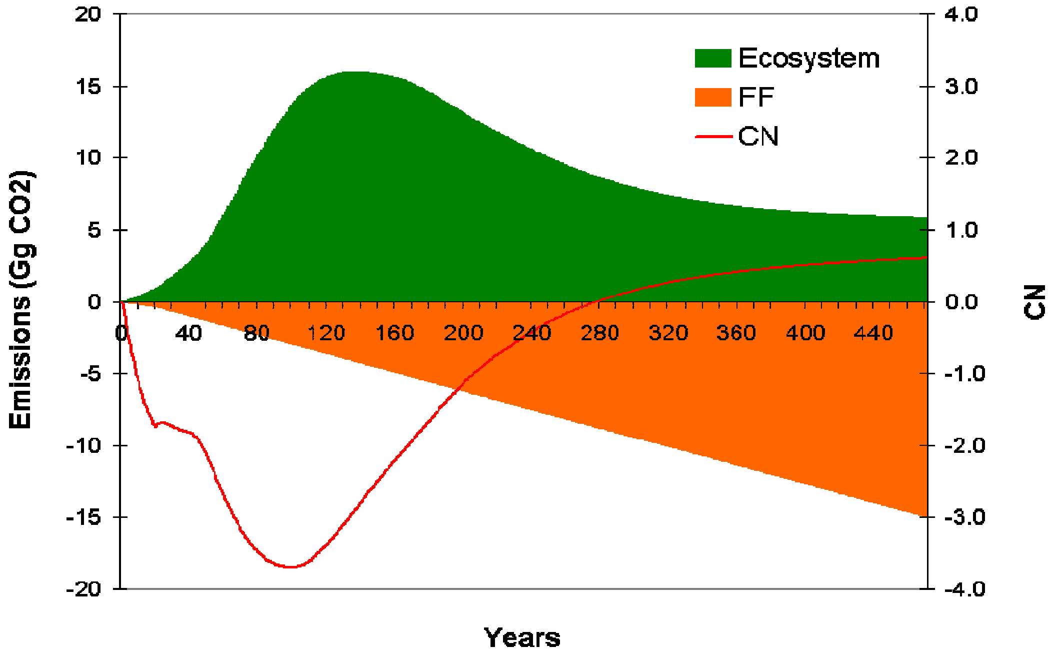
b) Forest replaced by fast growing plantations



Cumulative CO2 emissions of 70 ha of mature forest (160 MgC ha·') converted to a short-rotation forest compared to the FF emissions in the baseline. The SRF has a 7-year rotation period and 10 ha are cut each year.

Additional fellings from managed forests

In the short-medium term (20-50 years), additional fellings could produce more emissions in the atmosphere than a fossil fuel system (*CN*<*0*).



GHG profile of bioenergy when additional thinnings are introduced in a forest in Austria (60 hectares on rotation).

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a TRADITION of INNOVATION

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Conclusions and thoughts for the future

1. The accounting systems should be modified to account for the real GHG profile of bioenergy
2. Different biomass sources have different GHG profile

→ CN factors a possible solution

→ Support the right alternatives to fossil fuels

→ Implement integrated management practices

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