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International perspectives on the current sustainability debate on biomass energy use

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IEA Bioenergy



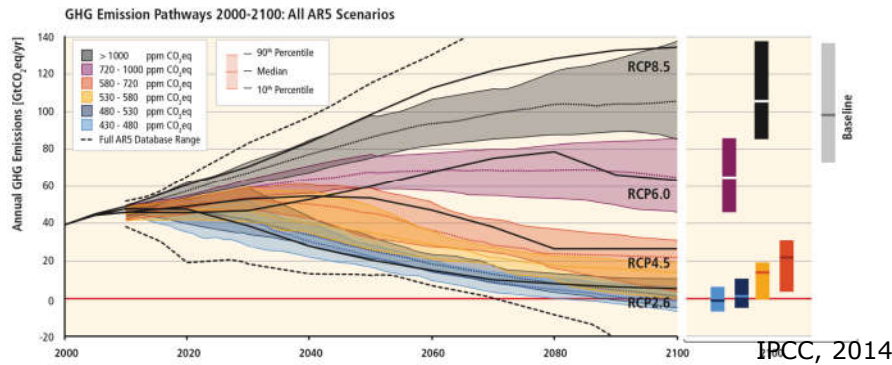


The need for bioenergy

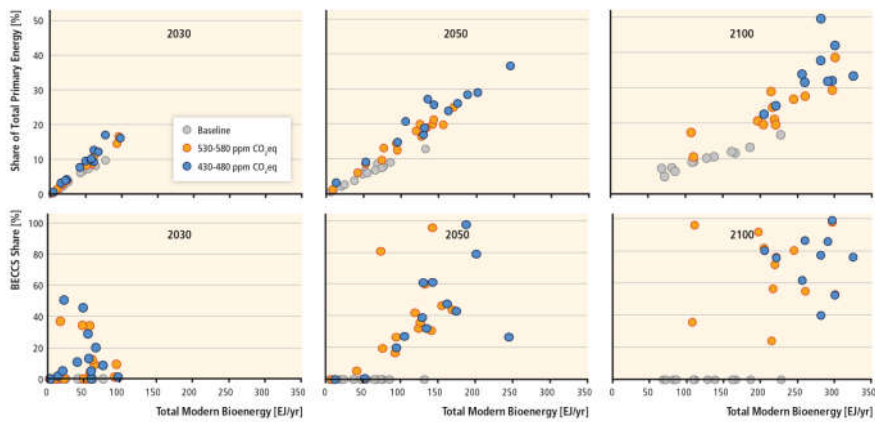
- Meet the Paris Agreement 1.5 – 2 degree targets
- Need for Bioenergy and BECCS



PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11



The need for bioenergy





Sustainability concerns

Large scale deployment of biomass for energy and materials could have implications:

- GHG emissions
- Loss of biodiversity
- Water depletion
- Impacts on soil quality
- Competition with food
- Rural development
- Etc.



At several levels sustainability criteria have been developed. General agreement about key areas of concerns.

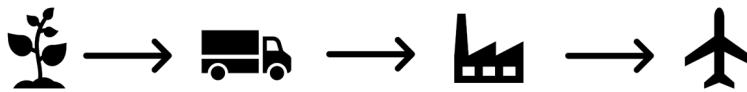
**Bioenergy is
'the silver bullet'**

**Bioenergy is 'the
root of all evil'**



Sustainability of bioenergy

- Depends on the:
 - Design of supply chain
 - Management of the supply chain
 - The environmental and socio-economic conditions of the production region



Sustainability concerns

Large scale deployment of biomass for energy and materials could have implications:

- GHG emissions
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- Etc.

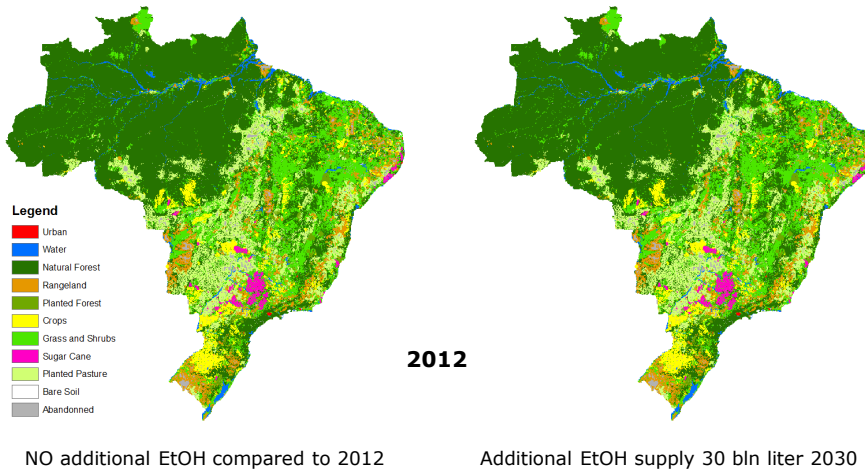


All impacts strongly related to land use change. → interplay of several land use functions. Have to assess this in an integrated way.

Integrated assessment



LUC Brazil

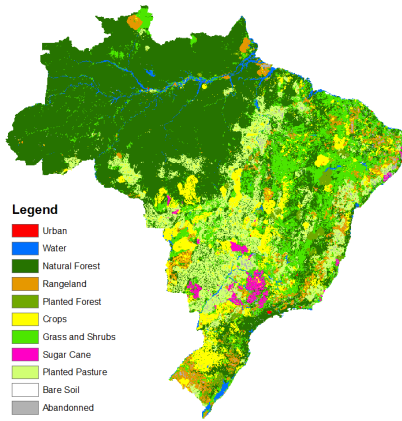


NO additional EtOH compared to 2012

Additional EtOH supply 30 bln liter 2030



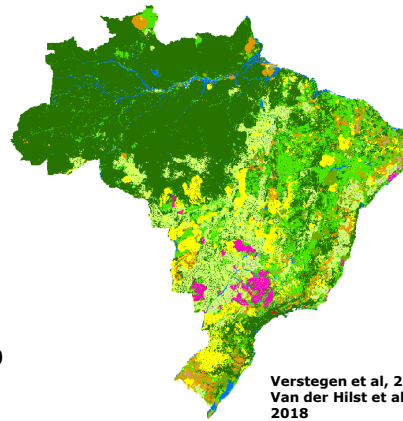
LUC Brazil 2012-2030



Legend

- Urban
- Water
- Natural Forest
- Rangeland
- Planted Forest
- Crops
- Grass and Shrubs
- Sugar Cane
- Planted Pasture
- Bare Soil
- Abandoned

2030



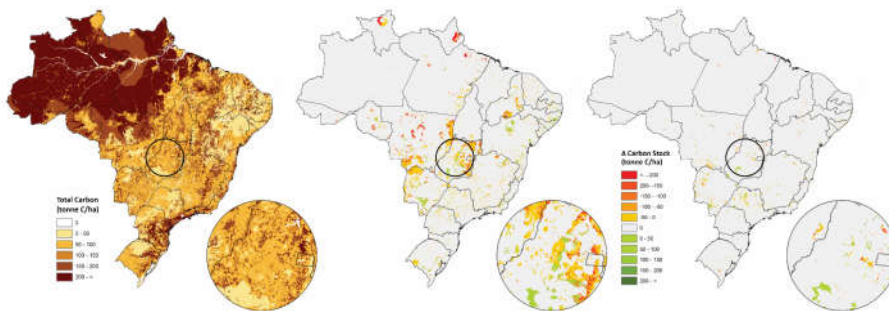
Verstegen et al, 2016
Van der Hilst et al, 2018

NO additional EtOH compared to 2012

Additional EtOH supply 30 bln liter 2030



Impact on GHG emissions



Total Carbon (t/ha)

- 0
- 0-100
- 101-200
- 201-300
- 301-400
- 401-500
- 501-600
- 601-700
- 701-800
- 801-900
- 901-1000
- 1000+

A Carbon Stock (t/ha)

- 0
- 100-150
- 151-200
- 201-250
- 251-300
- 301-350
- 351-400
- 401-450
- 451-500
- 501-550
- 551-600
- 601-650
- 651-700
- 701-750
- 751-800
- 801-850
- 851-900
- 901-950
- 951-1000
- 1000+

2012

2030 No EtOH

2030 with EtOH

Change in Carbon Stock 2012-2030

Van der Hilst et al, 2018



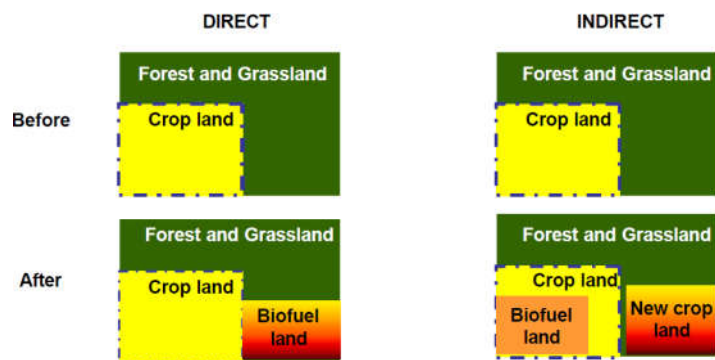
Quantification of Sustainability of bioenergy

- Depends on e.g.:
 - System boundaries
 - Selected indicator
 - Spatial and temporal scale
 - Counterfactuals



Quantification of Sustainability of bioenergy

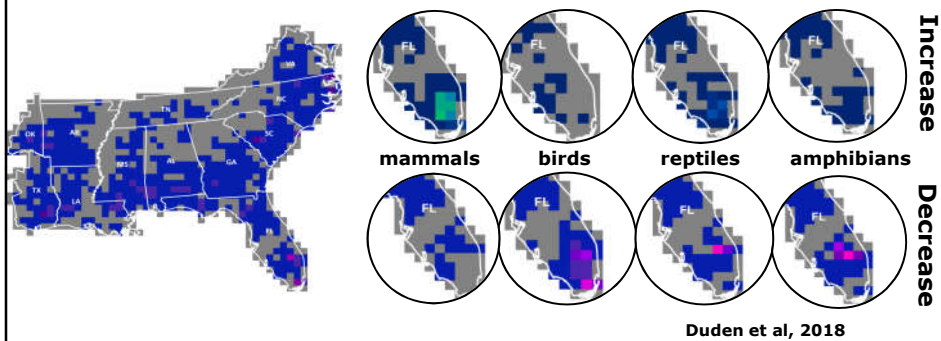
- Depends on e.g.:
 - System boundaries
 - E.g. classic LCA or also direct and indirect land use





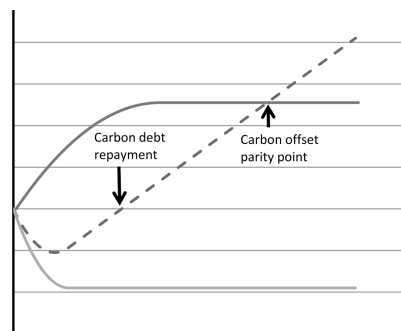
Quantification of Sustainability of bioenergy

- Depends on e.g.:
 - Selected indicator
 - E.g. total species richness or threatened species, or taxonomic groups



Quantification of Sustainability of bioenergy

- Depends on e.g.:
 - Spatial and temporal scale
 - Global / national averages?
 - Total carbon or direct climate change mitigation
 - Forest stand or landscape level



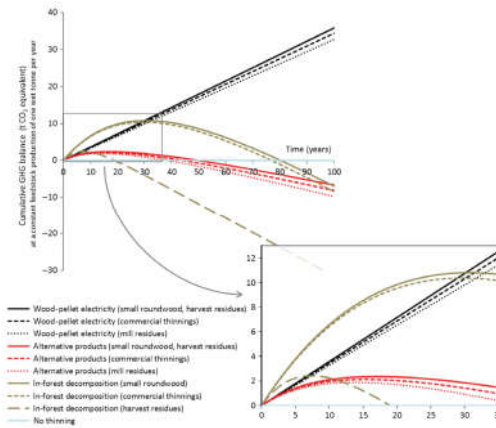
Mitchel, 2012
Jonker et al, 2014

— Unharvest forest carbon
 - - Carbon balance
 — Carbon debt



Quantification of Sustainability of bioenergy

- Depends on e.g.:
 - Counterfactuals
 - What would have happened with the land/ the feedstock if not used for bioenergy?



Hanssen et al, 2016



To summarize

- We need bioenergy to meet our climate change mitigation targets
- There is a general consensus that we need to do this sustainably
- There is agreement on the key areas of concern and sustainability criteria
- Less agreement on if bioenergy can comply
- Sustainability depends on design, management, location
- Quantification depends on: system boundaries, indicators, scale, counterfactual



Move forward

- We need to be very transparent about methodologies applied and should tailor methods to relevant policy questions
- We need to quantify synergies and trade offs for informed decision making
- Integrated approach on agriculture and sound land use planning is required for sustainable production
- Identify strategies to avoid negative impacts and optimize positive effects
- Important information for government: how to integrate biomass production in agricultural sector and sound land use planning
- Important information for business: how to comply with sustainability criteria
- Move away from controversy and towards agreements on sustainable biomass production



Thank you for your attention!

Questions:
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