Biofuel and sustainability

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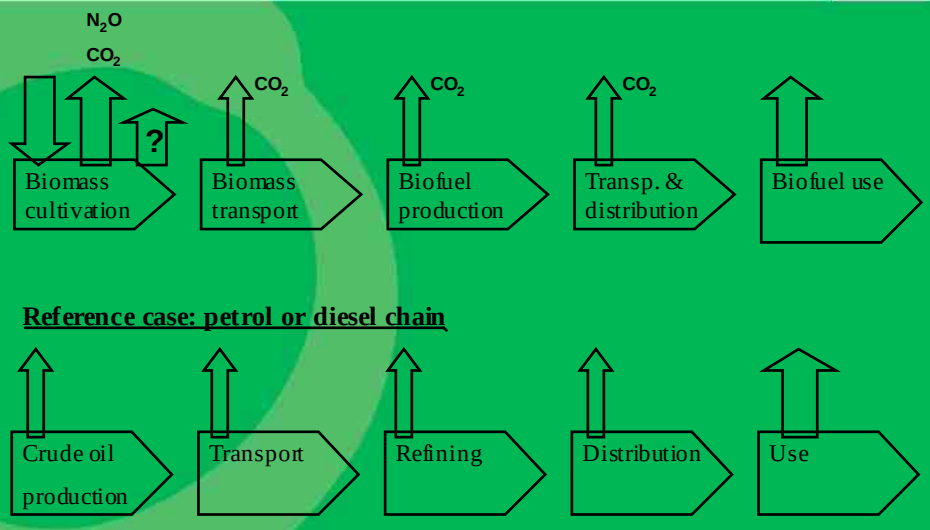
What biofuels?

- **Currently available biofuels:**
  - Biodiesel (from rapeseed, palmoil, etc)
  - Bio-ethanol (from grain, sugar beet, sugar cane)
- **Biofuels under development:**
  - Bio-ethanol (from cellulosic biomass)
  - Fischer-Trposch diesel (from cellulosic biomass)
  - HTU (Hydrothermal upgrading) diesel (from wet biomass)

Two central questions of liquid biofuel efficiency

1. Consideration of **whether it takes more energy (and GHG)** to produce (to grow, process, transport and delivery) the ethanol or biodiesel than we can get out ethanol or biodiesel when we burn it

GHG emissions in the biofuels chain



GHG reduction

- GHG reduction differs significantly between biofuels (Biomass cultivation/fertilizer use, energy efficiency biofuel production, carbon emissions from the land i.e. deforestation)
- Many of the current biofuels only achieve 30-40% GHG reduction on average
- Biofuels from cellulosic biomass look very promising but not yet commercially available (CE Delft, 2006)

Two central questions of liquid biofuel efficiency

2. Evaluation of weather the production of such energy crops presents a significantly **lower direct and indirect environmental and social costs** than fossil fuel production



Hidden ecological and social costs of biodiesel

- Intensive liquid biofuel production, especially for transport will develop a competition in land use of between **land for food security and conservation** puposes and **land for fuel**
- Producing biofuel with the current demand level for industrialised countries will certainly have a catastrophic social impact, aggravating existing land conflicts, irrational land-use patterns, etc.
- Also other consequences for ecosystem health and biodiversity, such as: forest destructions, forest fires, soil erosion, agro-chemical, palm oil mill effluent (POME), etc.

Indonesia case

Indonesian forest

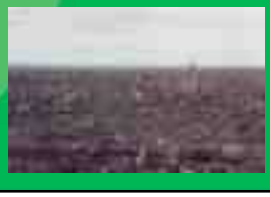
- The 3rd world's largest tropical forest
- World mega biological-diversity ecosystem
- Home of 30-40 millions of indigenous peoples

Oilpalm expansion in Indonesia

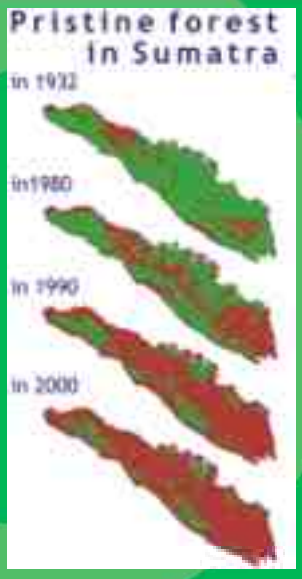
- Intensify land rights violations of indigenous and local communities
- The large-scale monoculture scheme is often generating more severe poverty and turns rural landowner communities into labourers
- Plantations workers (especially women) are regularly exposed to toxic substance
- Violence and conflict between local communities with the company
- Loss of biodiversity and those species that are able to survive in the new environment of the plantation frequently come into conflict with humans

Oilpalm plantation and GHGs

- 26% of all Indonesian oilpalm concessions are on peatlands
- It is estimated that production of 1 tonne of palm oil will result 20 tonnes CO2 from peat decomposition alone (**Wetland International, 2006**)
- Indonesia emits 6.5 times as much CO2 from degraded peatlands as it does by burning fossil fuels yearly (No. 21 if peatland emission are excluded but no. 3 if peatland emissions are included) **(Wetland International, 2006)**
- Importing biofuel from oilpalm actually would increase GHG emission


Loss of biodiversity




The rapidly increase demand of biofuel will lead to:

- Increased land competition leading to further land concentration, the marginalization of small-scale agriculture and the widespread conversion of forests and other ecosystems;
- Arable land that is currently used to grow food being used to grow fuel, leading to staggering food prices and causing hunger, malnutrition and impoverishment amongst the poorest sectors of society;



The rapidly increase demand of biofuel will lead to:

- Rural unemployment and depopulation;
- The destruction of the traditions, cultures, languages and spiritual values of Indigenous Peoples and rural communities;
- The extensive use of agro-chemicals, which deteriorate human health and ecosystems
- The destruction of watersheds and the pollution of rivers, lakes and streams;
- Droughts and other local and regional climatic extremes; and
- The extensive use of genetically modified organisms leading to unprecedented risks

Concerns and issues

1. 'Energy plantation' will directly put the land in the competition between the food production and conservation with the demands of consumers in wealthy countries (the economy system has ensured the global increase in crop production for animal feed, when there are 800 million people who are permanently malnourished all over the globe today)
2. Devoting a significant part of cropland to satisfy the non-sustainable lifestyle of developed countries is certainly shifting the problem to the developing countries

Concerns and issues

3. Much of bio-liquid fuel will be used in the transport sector, diverting the available fund resources available which can be used to improve technical adaptations in the vehicles including in hybrid vehicles, the efficiency of fuel as well as installing structural changes to reduce energy consumption levels

Conclusion

The question of sustainability of biofuels is **contentious**, and it must be considered from a comprehensive perspective:

- Energy and land resource utilisation (where and whose land?)
- Associated ecological and social costs incurred in its production, distribution and consumption