



Biobased economy (& cane ethanol); quo vadis?

Ethanol Summit 2013
Sao Paulo – Brazil, 28th June 2013

André Faaij

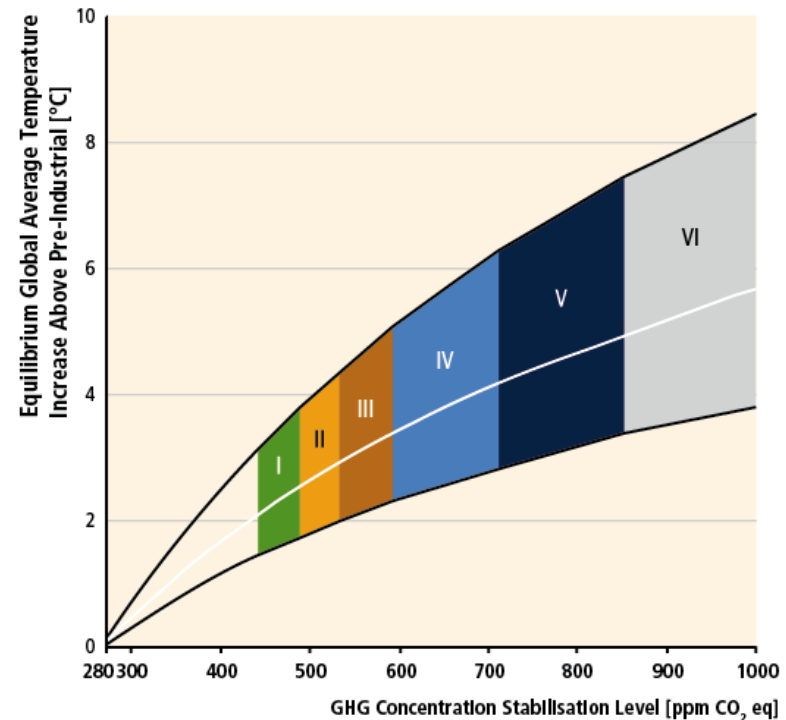
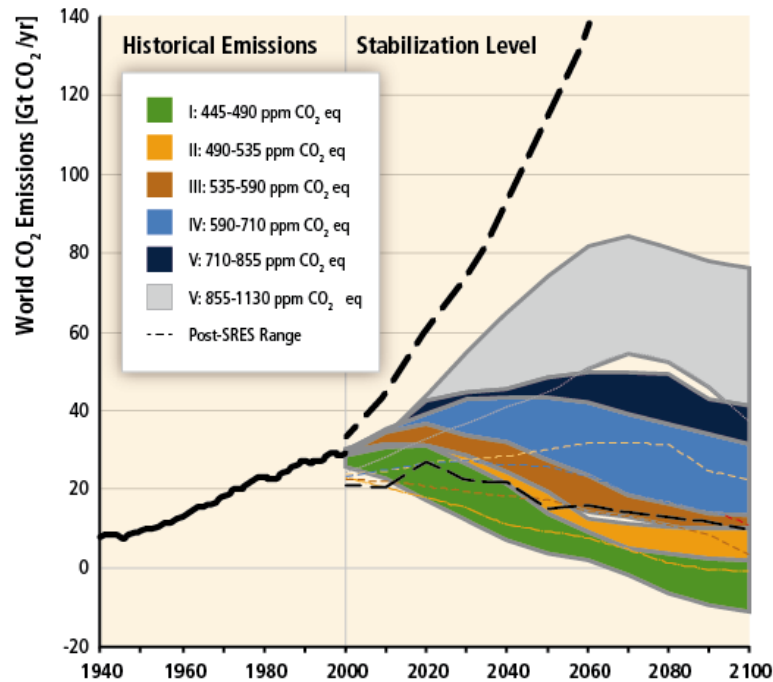
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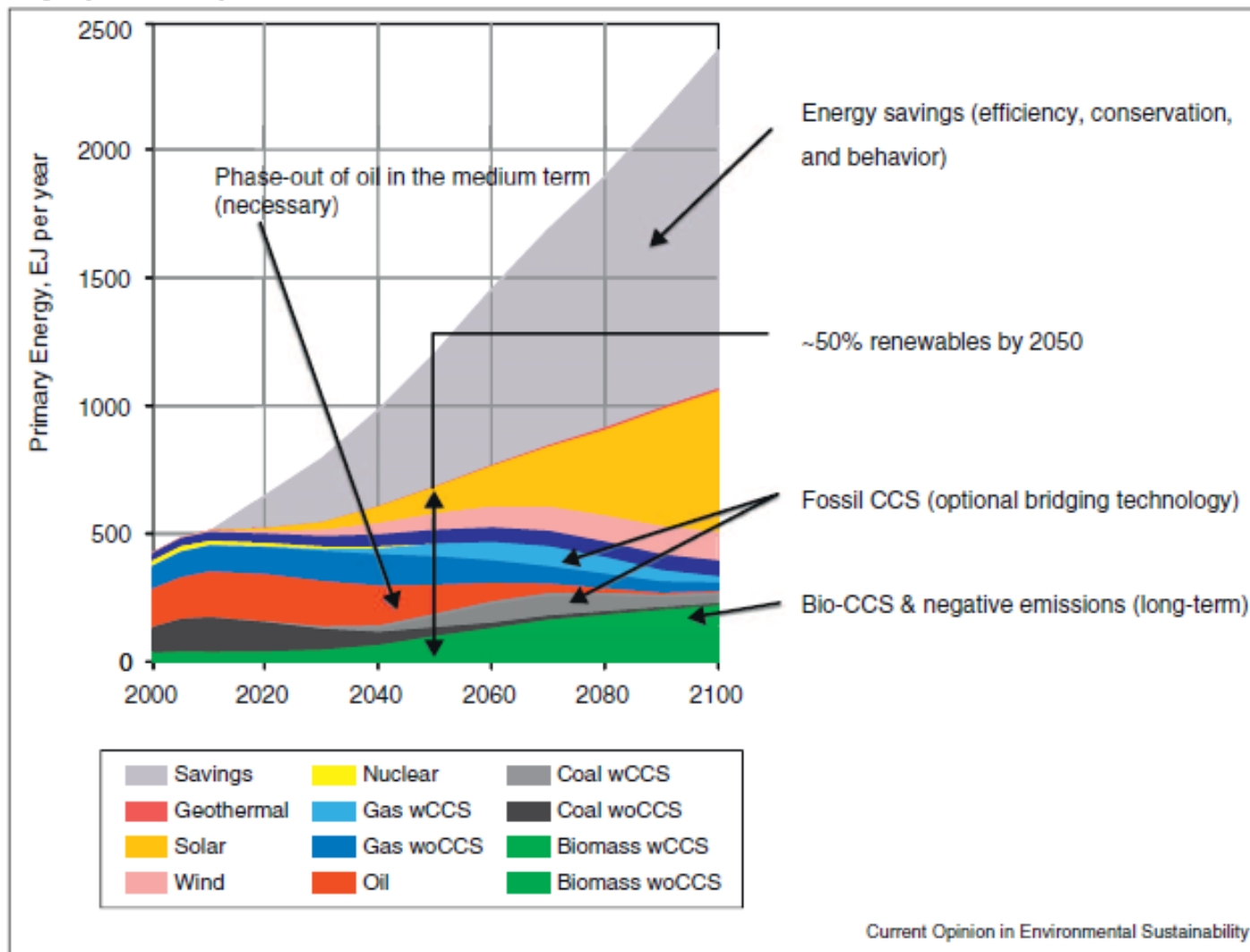
Energy demand, GHG emissions and climate change...



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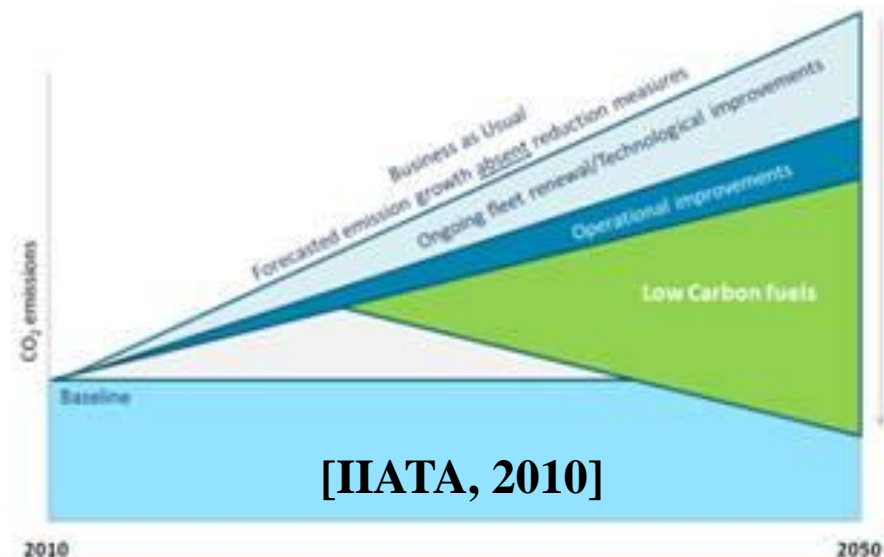
Energy system transformation...





Advancing markets...pushed by technological progress and pulled by high oil prices

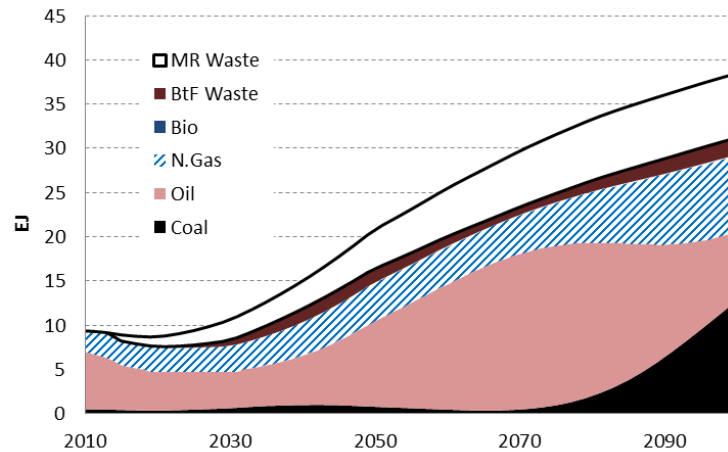
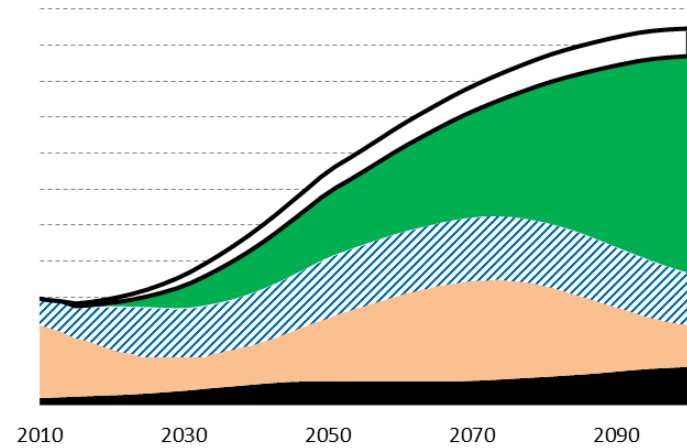
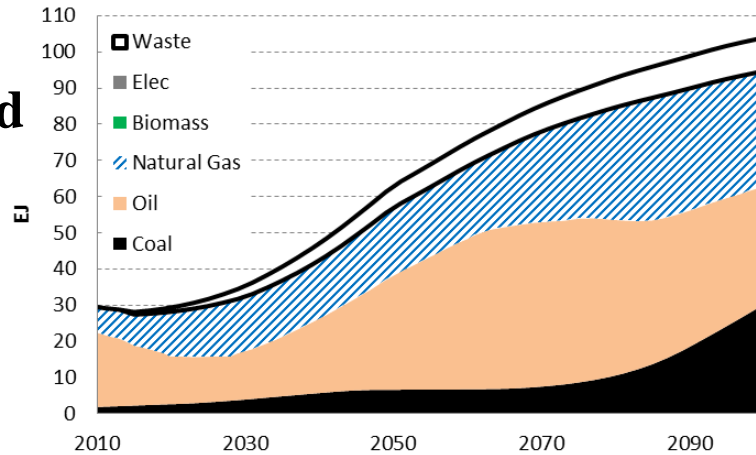
- Advanced biofuels...(strong economic perspective)
- Biorefining, biochemicals, biomaterials...
- Aviation and shipping..



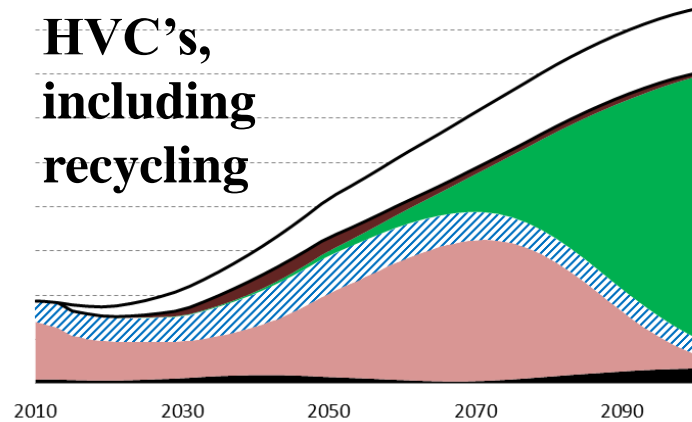
Biobased chemicals; not covered in current global scenario's (to date...!)



Energy demand for major Chemicals towards 2100 with and without Biomass deployment



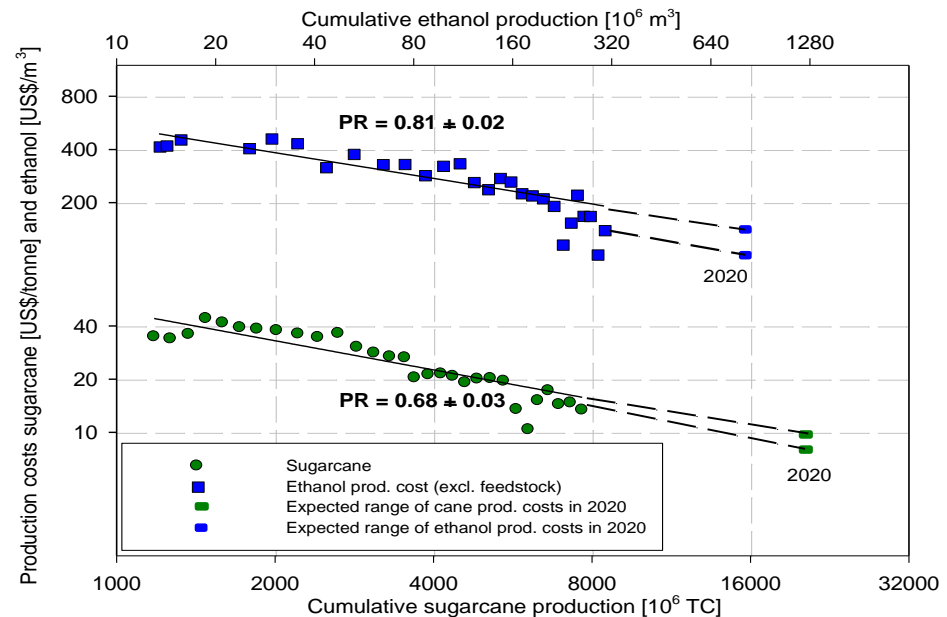
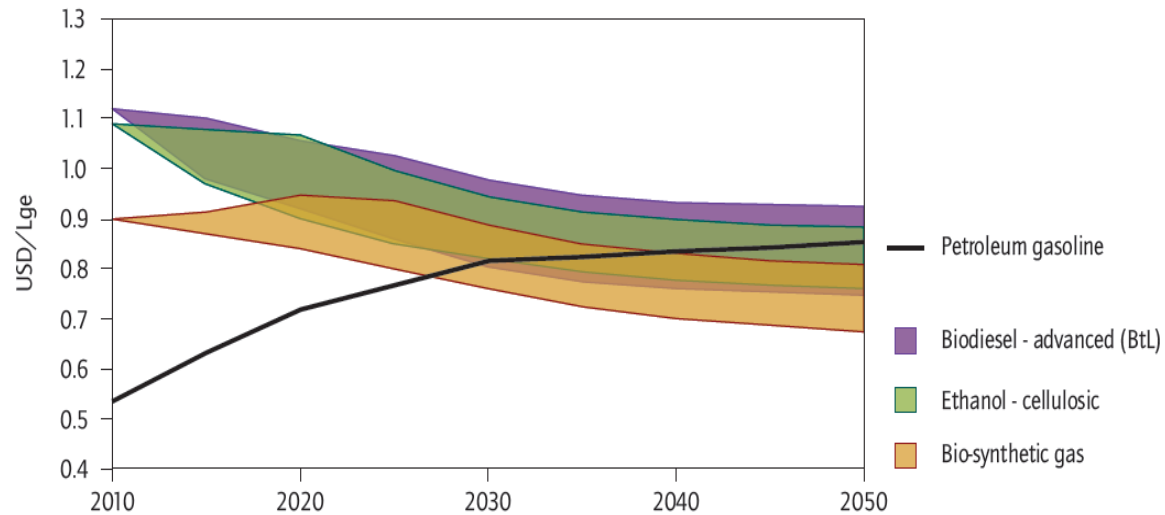
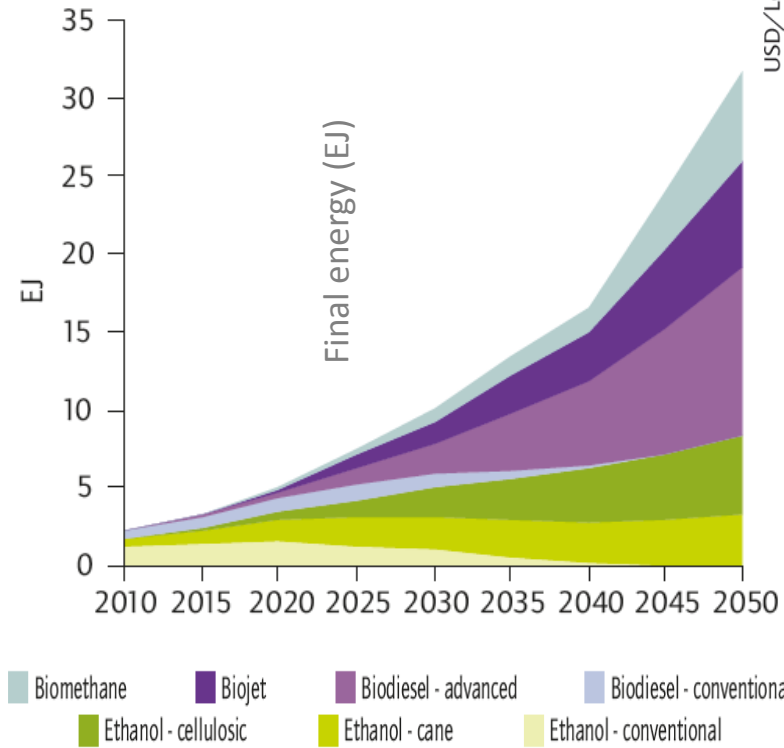
HVC's, including recycling



Perspective for Biofuels



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[IEA Biofuels Roadmap + Wall Bake et al., biom. & Bioen. 2008]

Key options for Bio-CCS



Key opportunities

- Flexfuel power and synfuel production.
 - (B)IGCC/FT/MeOH/DME
 - Co-firing: coal AND natural gas (CC's)
- CO2 capture at biorefineries (ethanol in particular)...
- Steel industry...

Conditions:

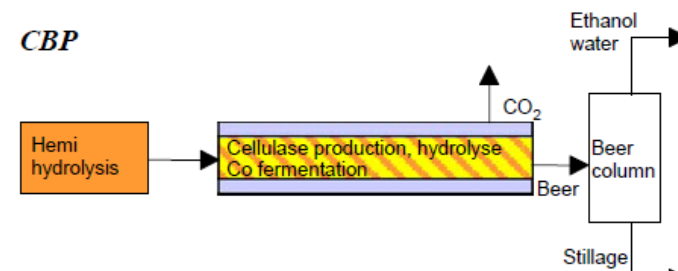
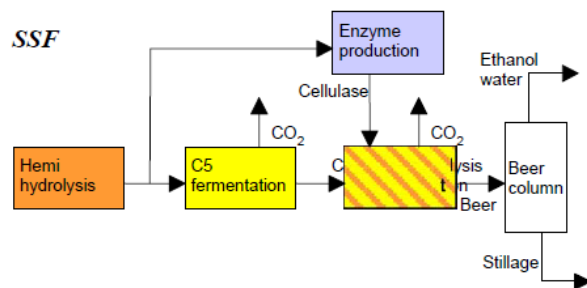
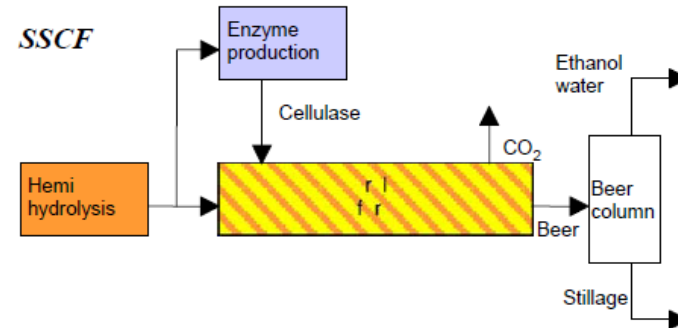
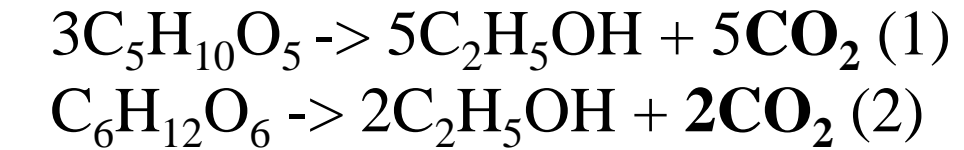
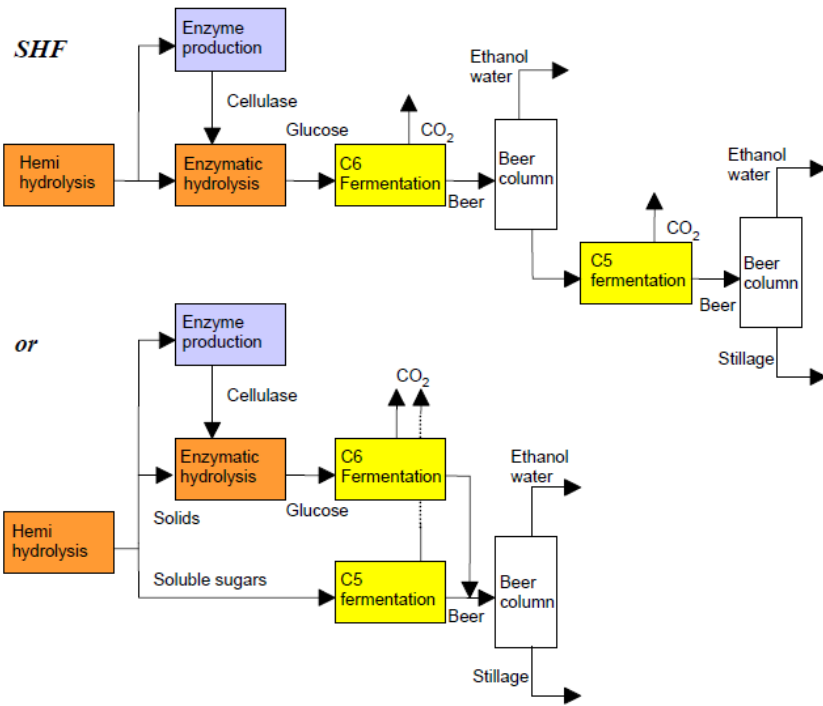
- Suited energy infrastructure
- CO2 storage options.
- Access to biomass

Potential regions:

Great Plains US, SE Brazil, East Australia, Central China, Sea harbors NW Europe (imported biomass).



Bioethanol from lignocellulosic biomass



[Hamelinck et al., Biomass & bioenergy, 2005]



Strategic issues (investigated in collaboration between Brazil and the Netherlands (CTBE – Utrecht University))

- Expansion of sugar cane reaches less suited areas (water, soils).
- Increased biomass availability especially via lignocelulose: bagasse, trash, energy cane, grasses, residues, wood plantations and forest residues.
- Availability of advanced conversion can facilitate use of (more) lignocellulose (1st -> 1.5th -> 2nd gen. fuels).
- Additional chemicals next to biofuels (and power) offer business opportunities (+ more complex operations).
- Carbon prices and mitigation targets can make bio-CCS a top GHG mitigation option





Thanks for your attention

For more information, see:

- **Sciencedirect/Scopus (scientific)**
- **Google scholar citations (personal)**
- **<http://srren.ipcc-wg3.de/report> (IPCC)**
- **www.bioenergytrade.org (IEA)**

