

Technology and Economic of Energy Production with GHG stabilization

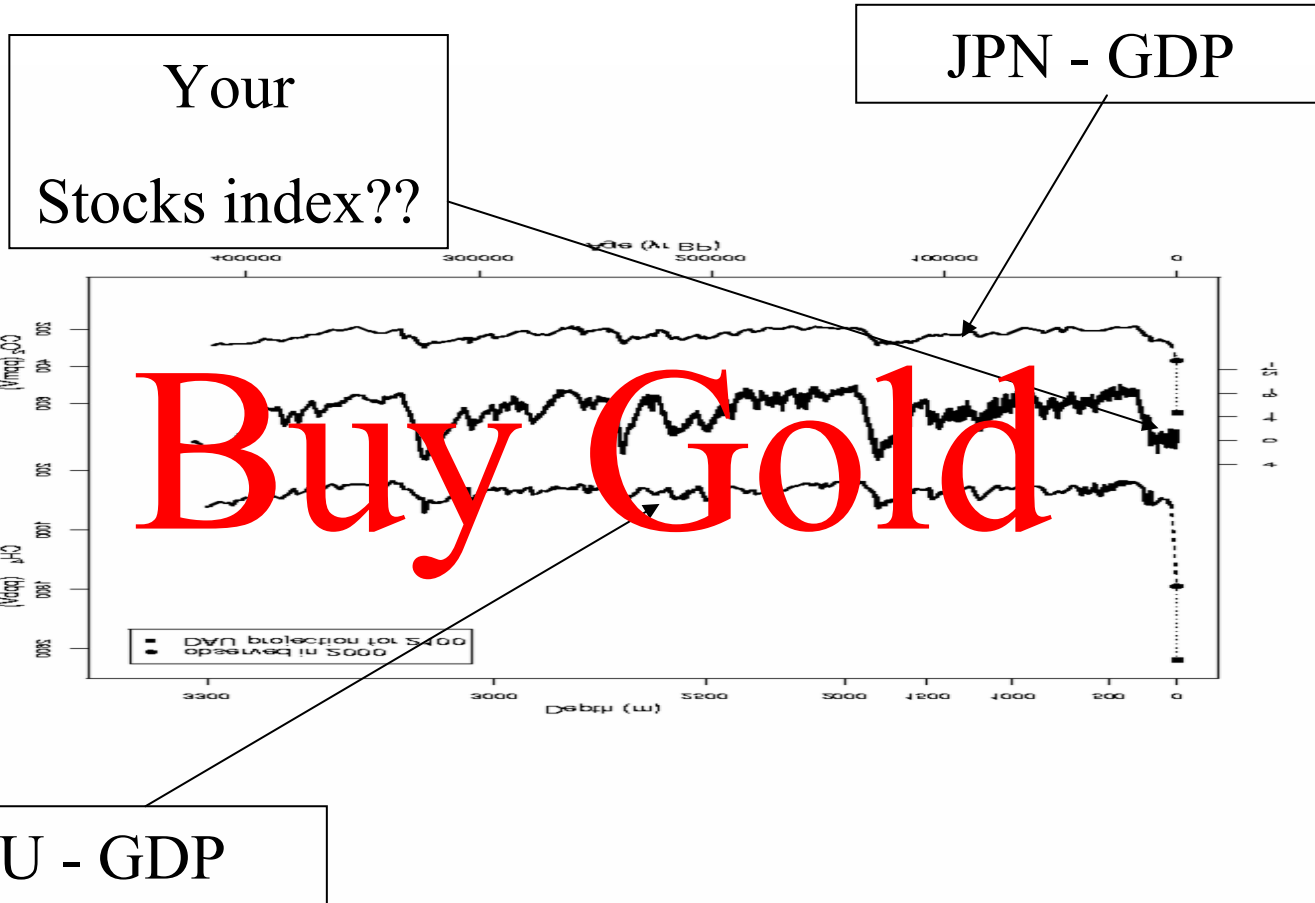
Michael Obersteiner

IHS - IIASA

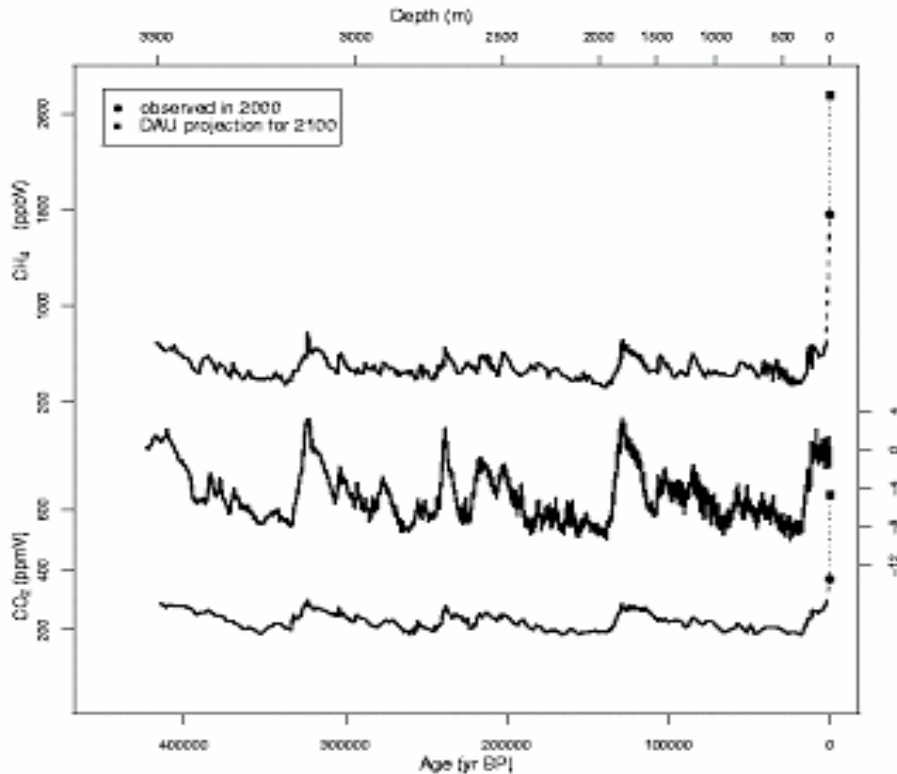
Overview

- Motivate low GHG concentration targets
- Review the role of Biomass based technologies in the global carbon cycle
- Role of BECS in stabilization scenarios
- Propose a Tool-box to analyse biomass based technologies
- Conclude

...if you are a Chartist



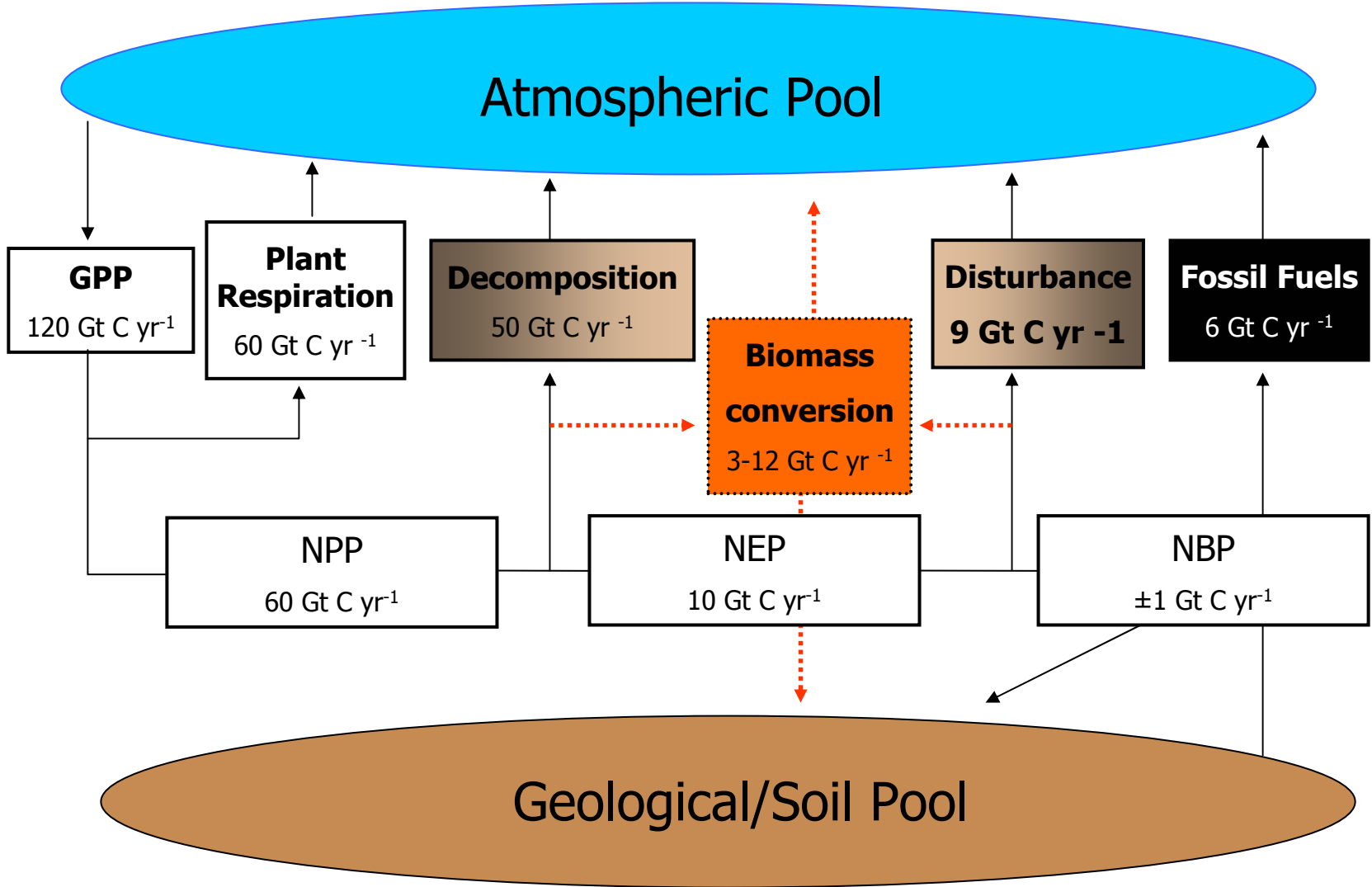
Crucial facts



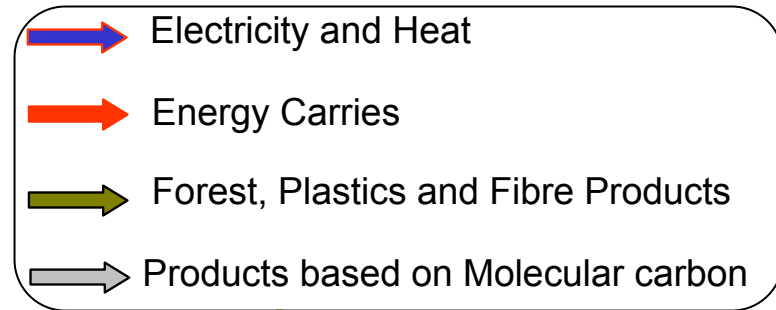
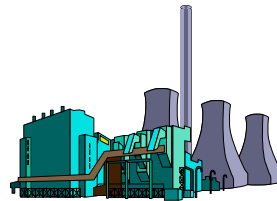
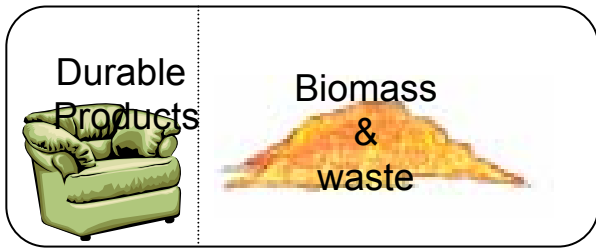
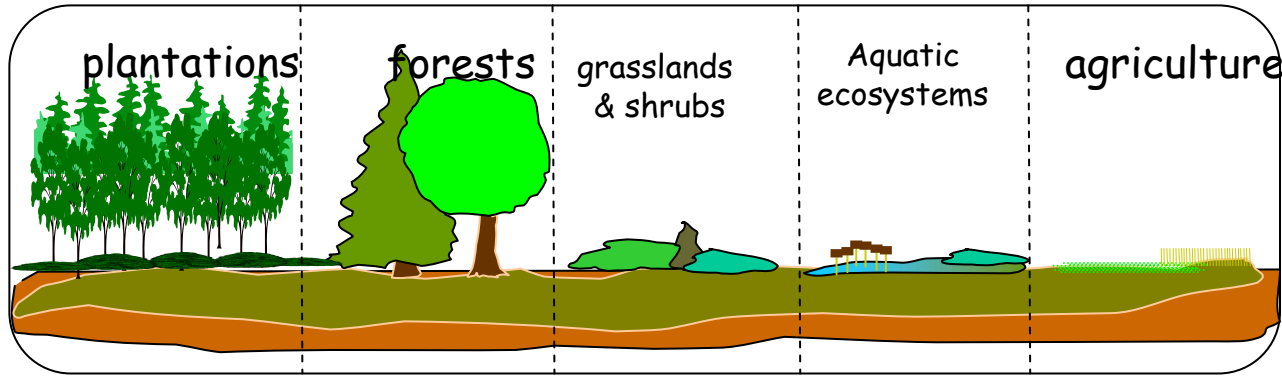
- Climate has been abrupt
- The GHGs are out of bounds
- Highly correlated

Source: Petit et al. 1998

Based on IPCC (2001) and Steffen et al. (1998)

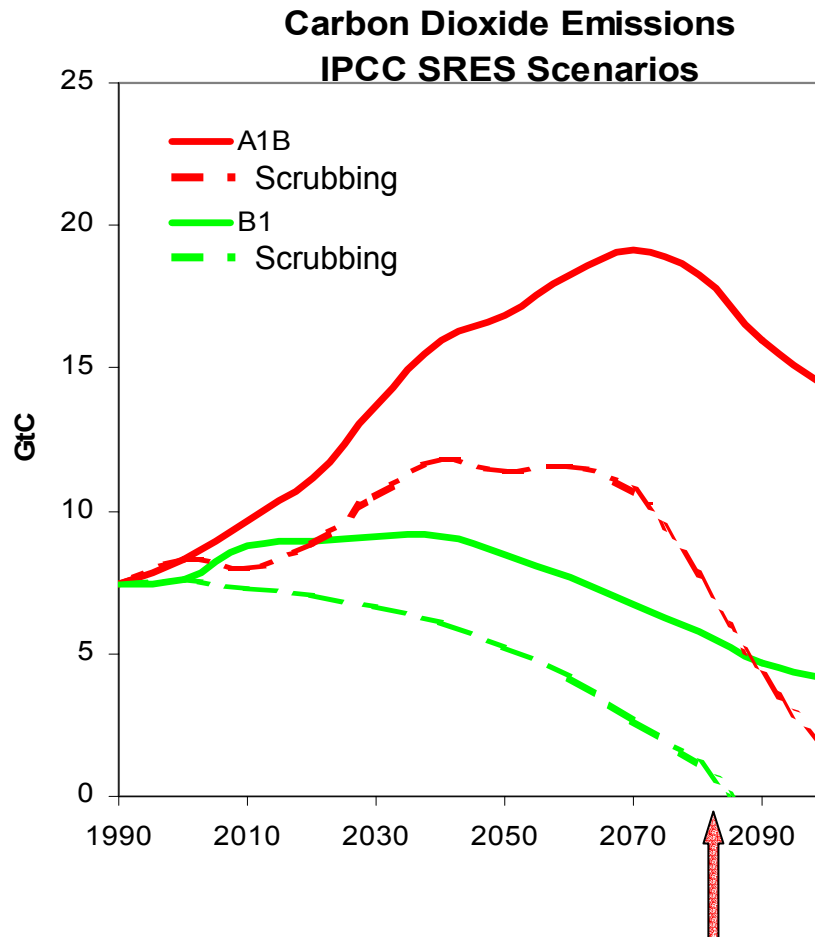


Carbon Dioxide

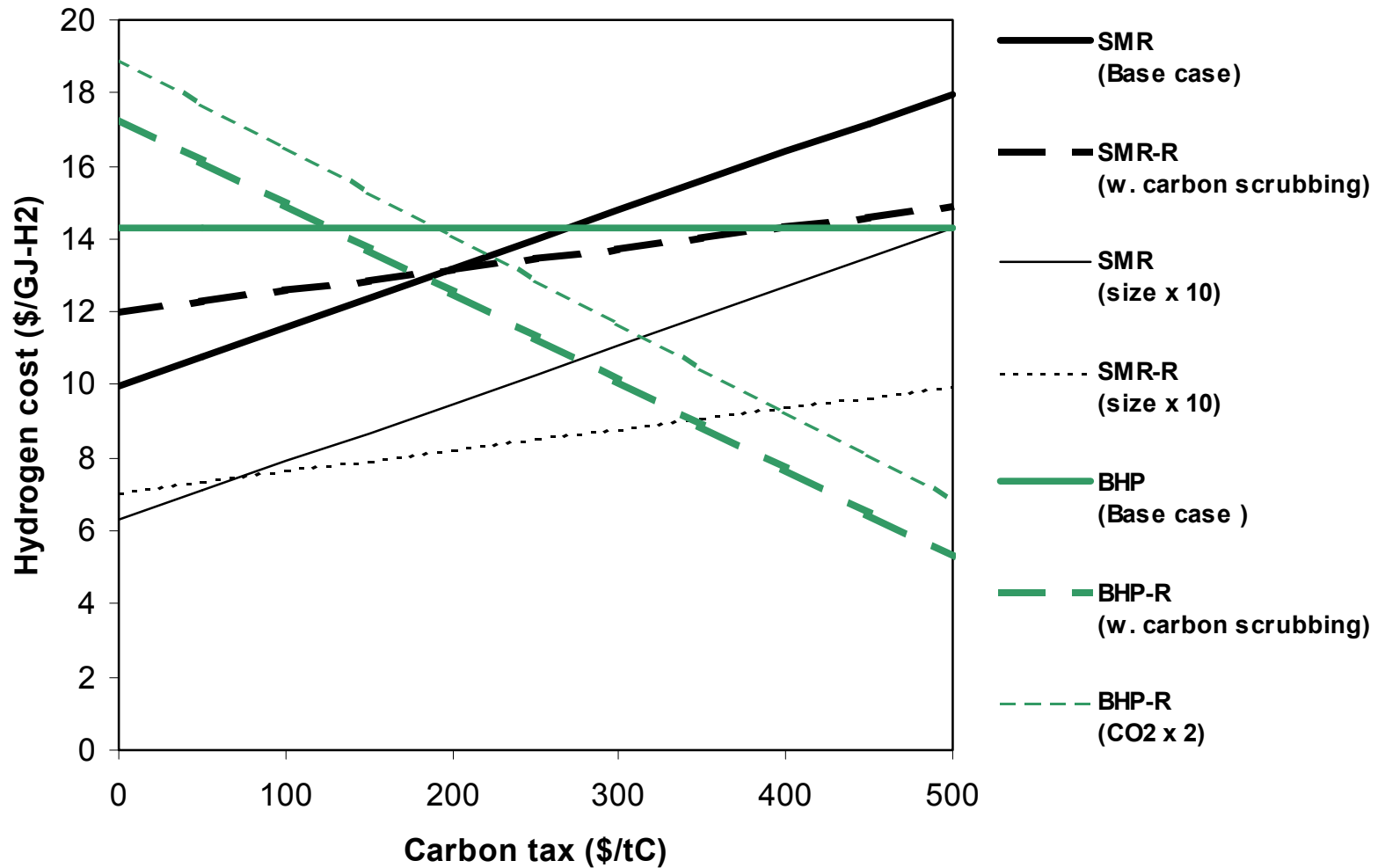


**Carbon to
Permanent Storage**

Bioenergy/Scrubbing/Storage as a Mitigation Technology



Hydrogen Costs and CO₂ Taxes



Present Situation

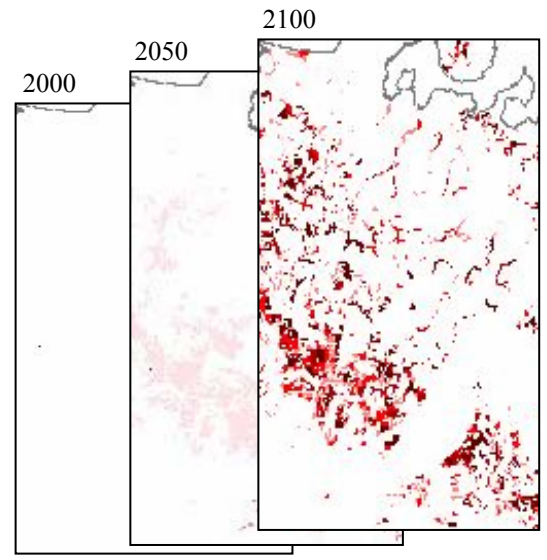
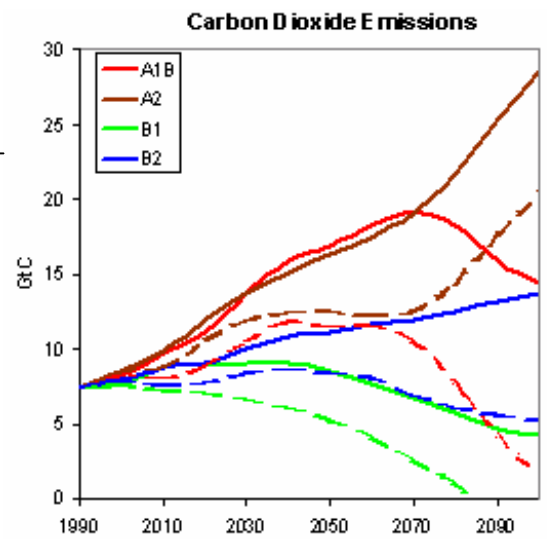
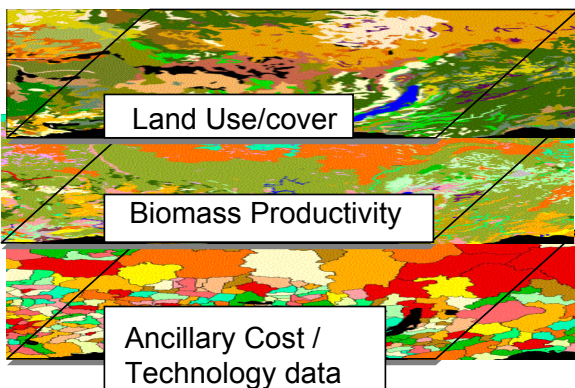
- Biomass-based hydrogen production is more costly than steam-reforming of natural gas (at present costs)
- Main reasons:
 - Limitation of plant sizes for BHP
 - Lack of experience with the BHP technology

Long-term Perspectives

- BHP with (and without) carbon sequestration could play a major role in the decarbonization of the energy-system
- BHP with carbon seq. is a powerful technology to hedge against uncertainty of climate change (due to its negative emissions)
- BHP is one option in a diversified portfolio of many possible mitigation measures
- Short-term action needed to “buy down” costs (technology policies):
 - Investments in demonstration plants
 - Targeted R&D
 - Capacity building

BECS-toolbox

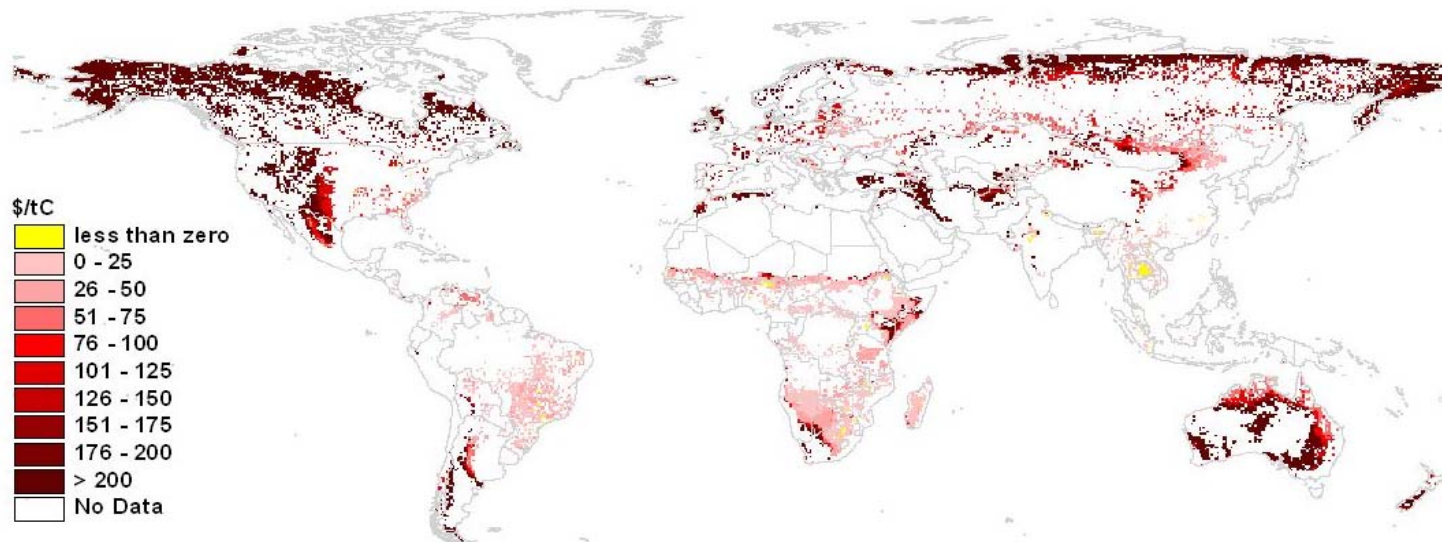
Global Carbon Cycle



- Electricity and Heat
- Hydrogen
- Biomass Products
- Sequestered carbon

Geography of Re- & Afforestation

**Carbon Price
GLC Scenario**



Conclusion

- BECS is just a cluster with many other technologies (e.g. wind, Natural Gas, solar etc)
- Within BECS there is already today a large variety of different technologies and many more are expected to be introduced in the future.

Continued...

- Biomass based Negative Emission Technologies are instrumental for robust climate policy – Attainability of low emission targets
- BECS reduces substantially total system costs
- “Terra Preta Systems” (with advanced biomass conversion) MUST have a great future.....