

Cost-effective use of biomass - A comparison between two model based studies

Maria Grahn

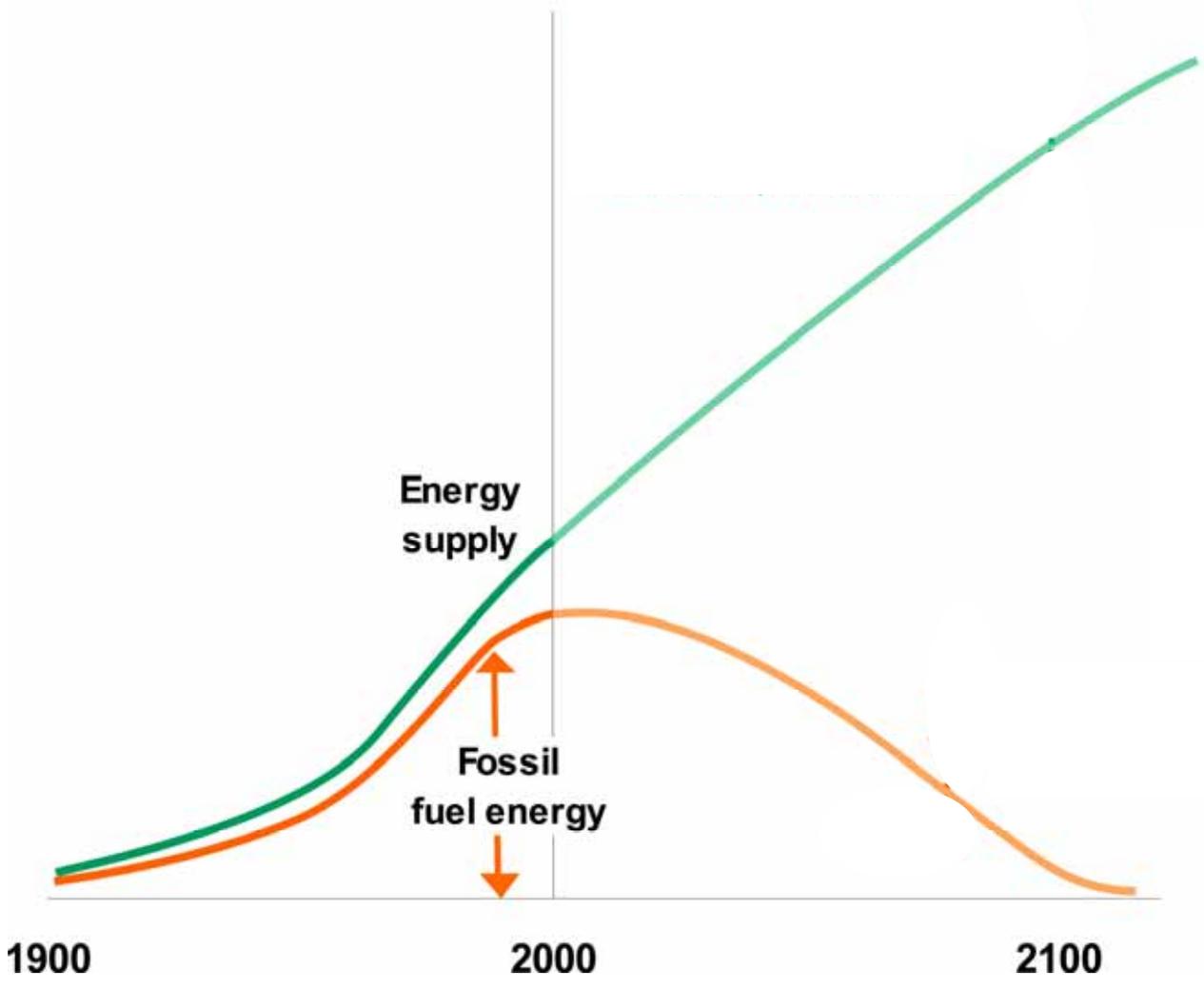
Christian Azar, Kristian Lindgren, Göran Berndes,
Dolf Gielen (IEA Paris)

Chalmers University of Technology, Energy & Environment,
Physical Resource Theory, Göteborg, Sweden

CHALMERS

Chalmers University of Technology, Sweden





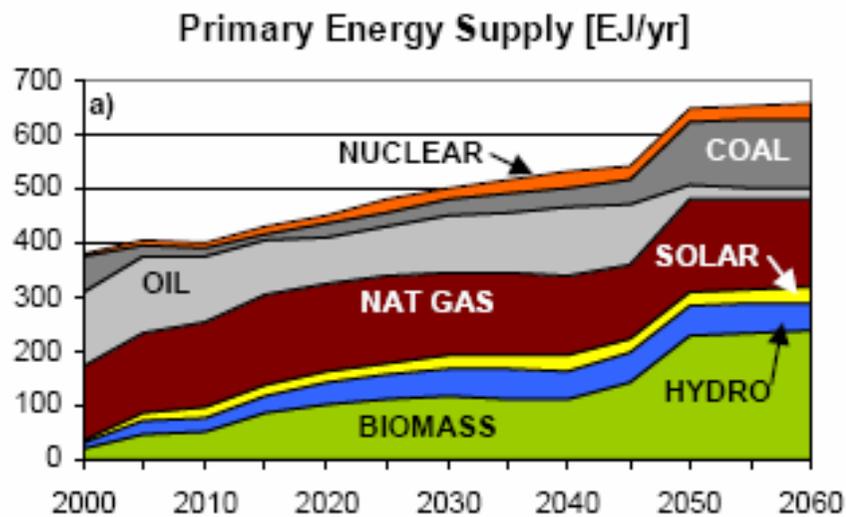
Two different research groups have developed their own global energy economy model to analyze how CO₂ emissions can be reduced at lowest cost

BEAP – Dolf Gielen, International Energy Agency (IEA), Paris

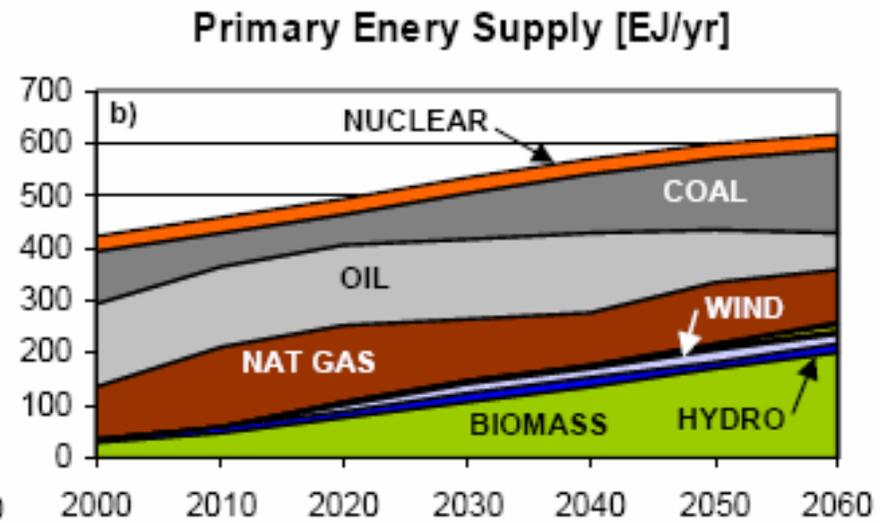
GET – Azar & Lindgren, Chalmers, Göteborg



BEAP and GET 400 ppm scenarios



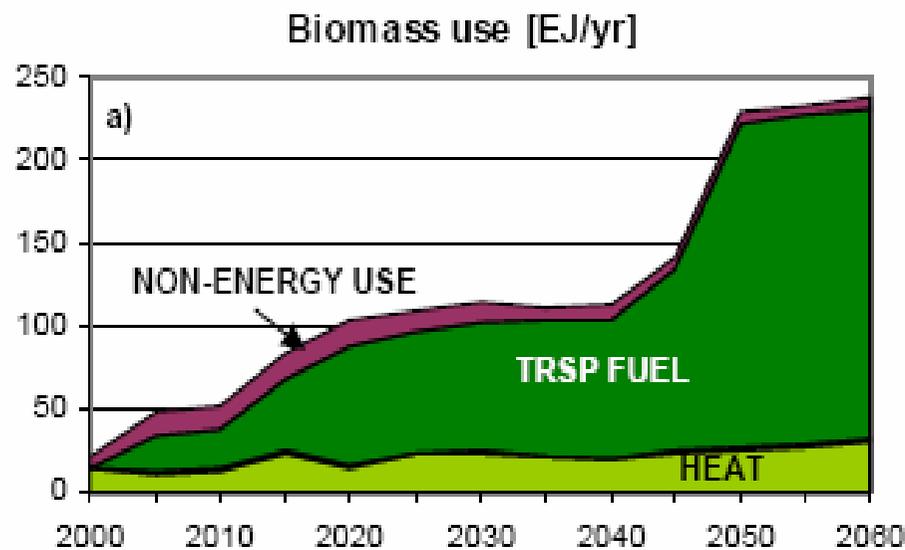
BEAP



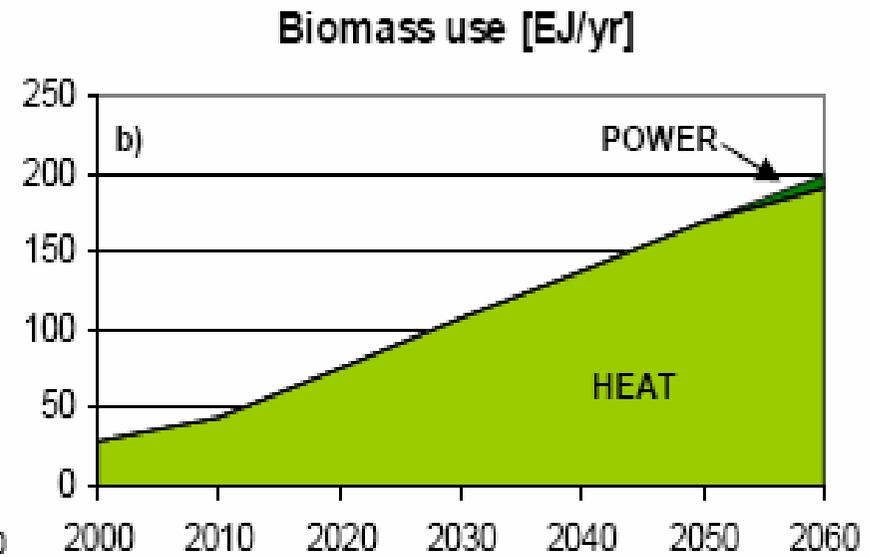
GET



BEAP and GET 400 ppm scenarios



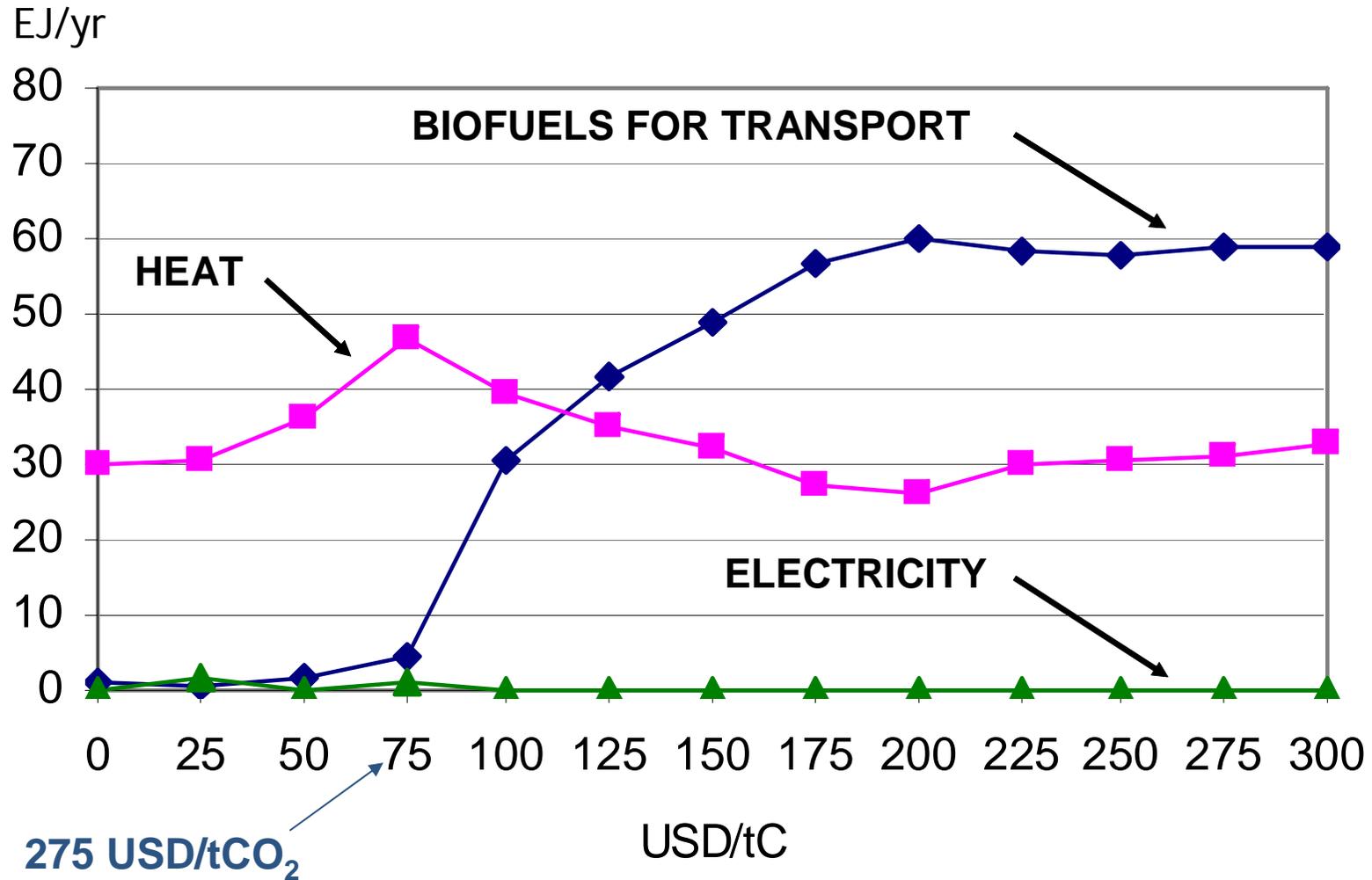
BEAP



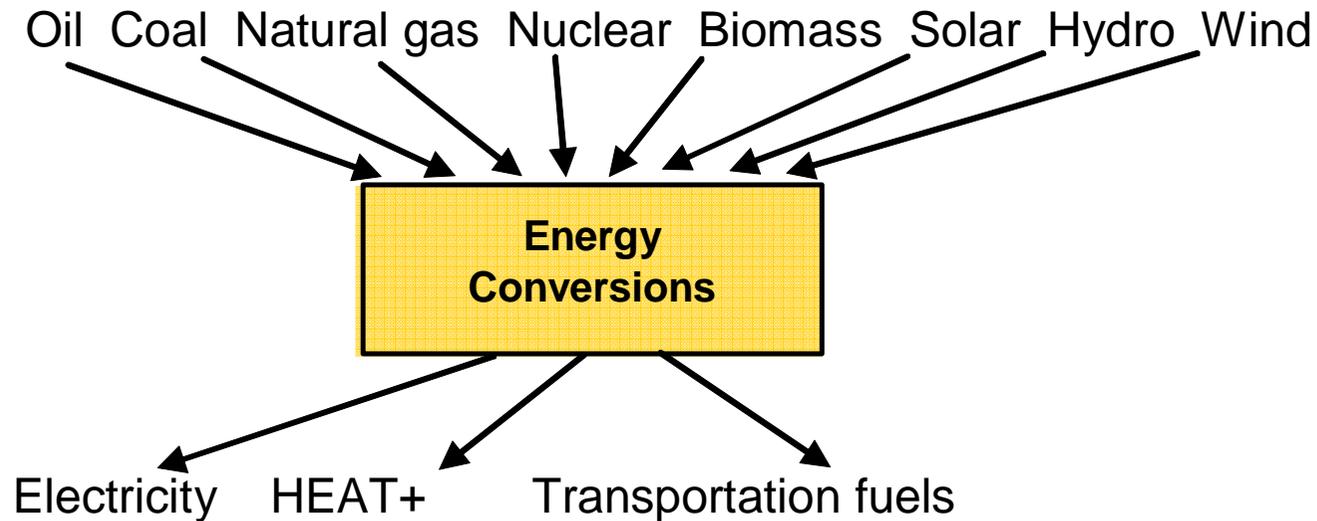
GET



The biomass use (primary energy) in the BEAP model for various CO₂ taxes, year 2020



Basic flow chart of supply and fuel choices in both energy system models.



	BEAP	GET
Gasoline/diesel	X	X
Gasoline/diesel via HTU-oil (biomass based)	X	-
Methanol	X	X
Ethanol	X	-
Fischer-Tropsch diesel	X	-
Hydrogen (fossil fuel based)	X	X
Hydrogen (CO ₂ -neutral)	-	X
Natural gas	-	X

Conclusions

- Biomass is most cost-effectively used for heat productions at "low" CO₂ taxes, up to about 75 USD/tC in both models (depends on year analyzed).
- The sector in which biomass is most cost-effectively used at higher CO₂ taxes depends on assumed possible energy carriers and technologies and cost assumptions on them.
- It is currently too early to determine the cost-effective long run fuel choice, in the transportation sector. If hydrogen/electricity options do not become available at sufficiently low costs, then biomass will have to enter in order to bring down overall energy and transport related emissions to low levels.



Policy implications

Since it still is an open question if hydrogen/electricity options will become available at sufficiently low costs, policies at present should primarily aim at trying to bring down costs for both the biofuels option and the hydrogen/electricity option.

