

Future bioenergy production and trade flows in Europe

- an energy-economy model based assessment

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Aim: To gain insights into e.g.

- The relative importance of biomass as an energy source in different sectors.
- Cost-effective bioenergy production, trade and use.
- The importance of domestic bioenergy demand vs. export demand for a bioenergy expansion in Central and Eastern European Countries (CEEC).
- The prospective size of biomass trade flows from CEEC to EU15, compared to logistic capacities.

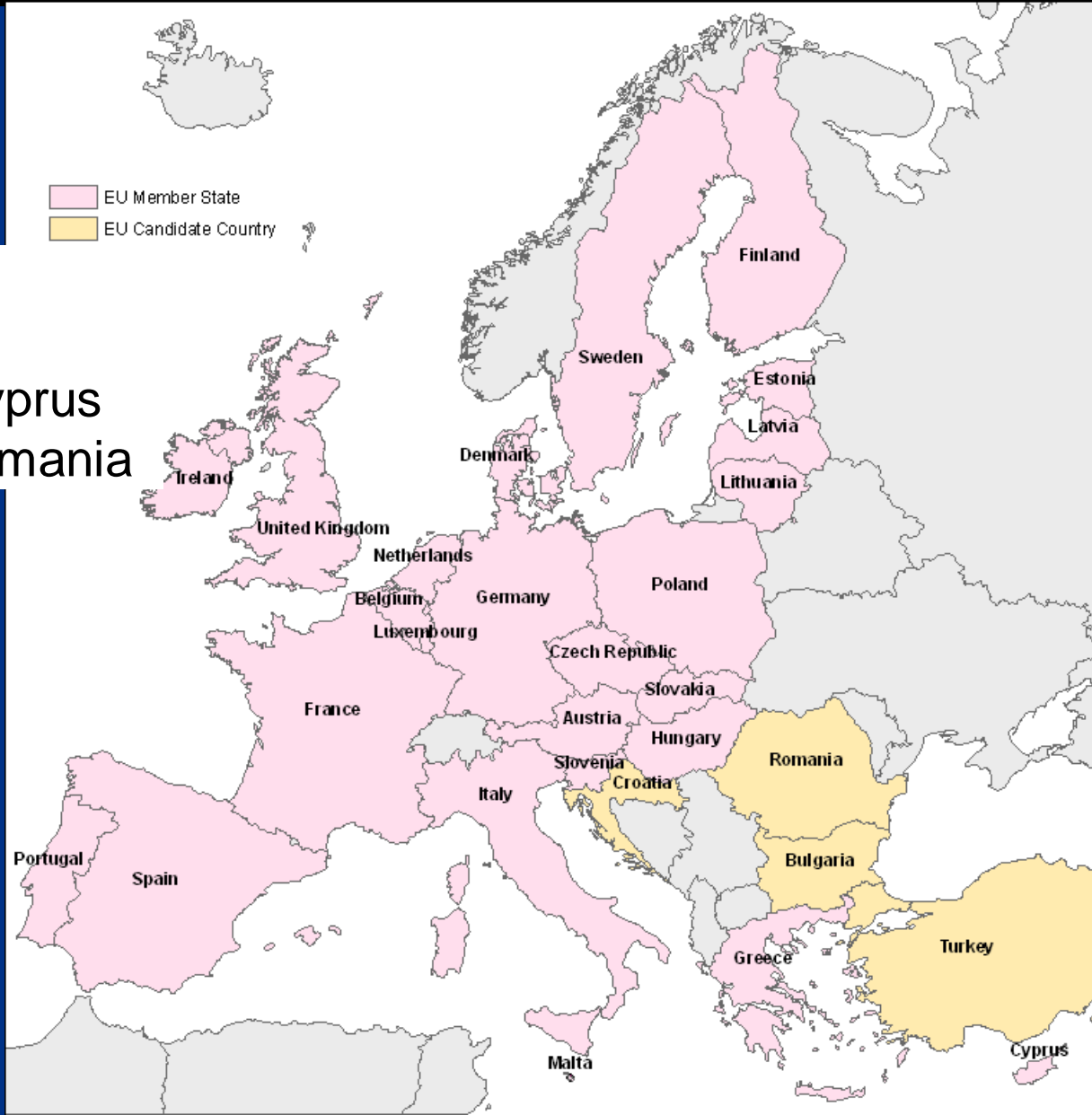


A study of future bioenergy use in Europe

- Supply oriented within the specific context of an enlarged EU
- Including a CO₂ emission cap (corresponding to an approximate 35% emission decrease in 2030 compared to base case)
- Including policies promoting the use of biofuels for transport (initially in accordance to the EC directive on the promotion of biofuels or other renewable fuels for transport i.e., 5.75% of total transport energy use in 2010 followed by 12% and 17% in 2020 and 2030)
- Based on energy system modelling



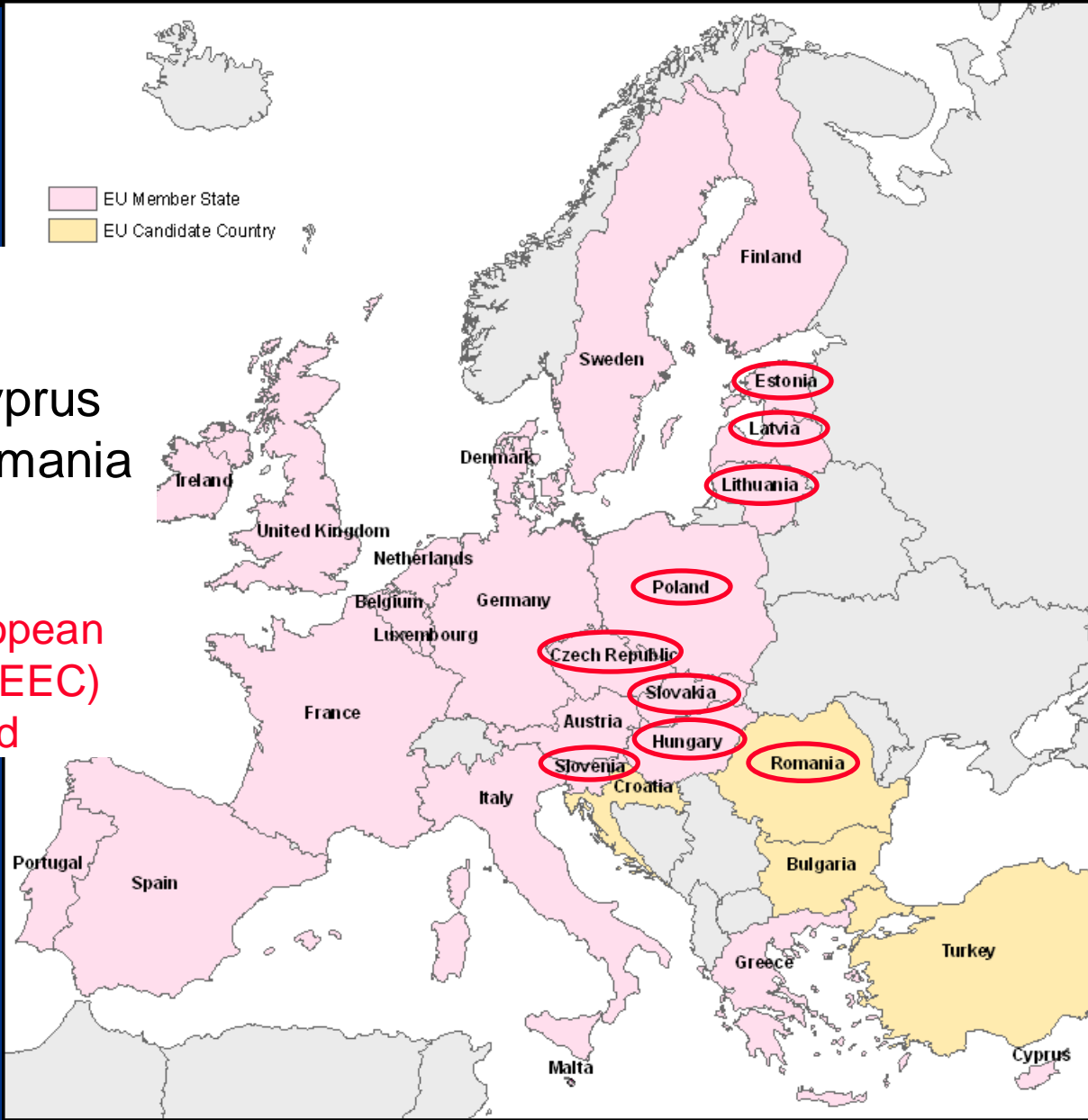
Europe:
EU25 excl.
Malta & Cyprus
but incl. Romania





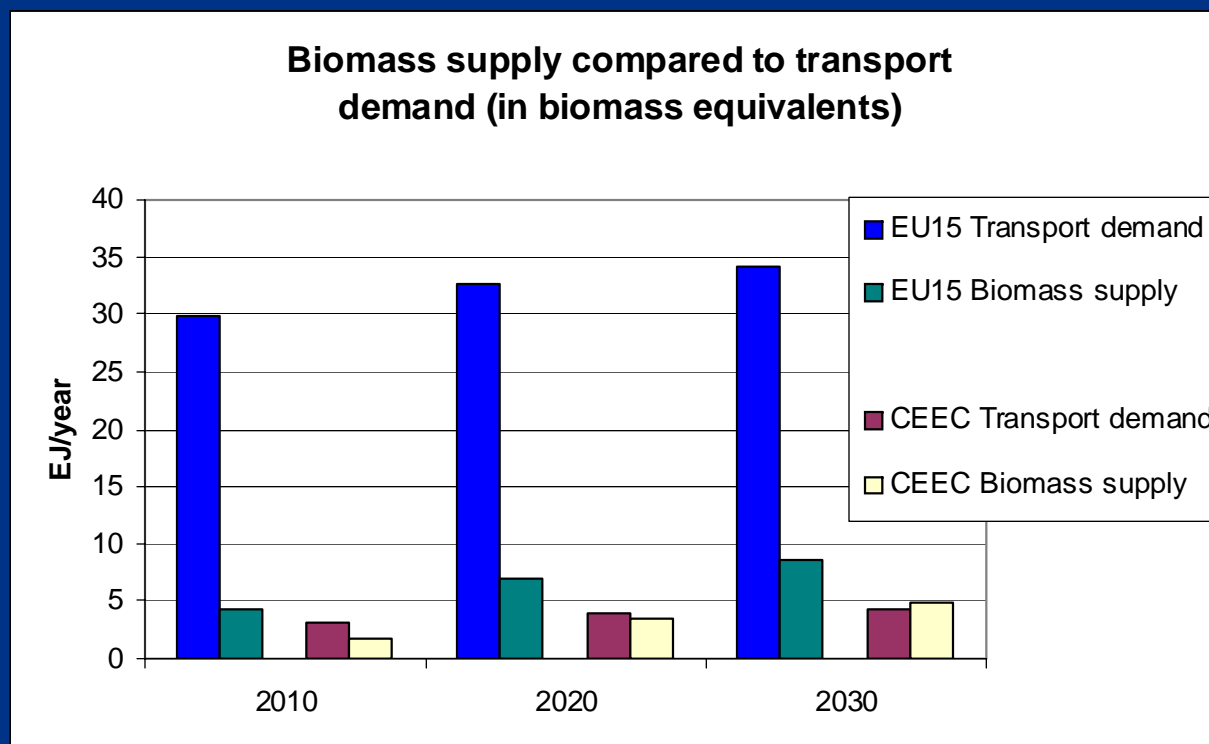
Europe:
EU25 excl.
Malta & Cyprus
but incl. Romania

Central and
Eastern European
Countries (CEEC)
marked in red





The relative importance of biomass as an energy source in the transport sector



Transport demand: European Commission 2003, European energy and transport trends to 2030.
 Biomass supply: Estimation based on J. Dam van, A. Faaij, and I. Lewandowski 2005, WP3, VIEWLS.



Conclusions – biomass potential

- The domestic biomass potential seems sufficient to meet the proposed demand for biofuels for transport in Europe 2010 to 2030.
- Competition for available bioenergy resources is likely to arise.
- Inter-European trade may become an attractive option due to low cost biomass resources in CEEC.



Main methodology

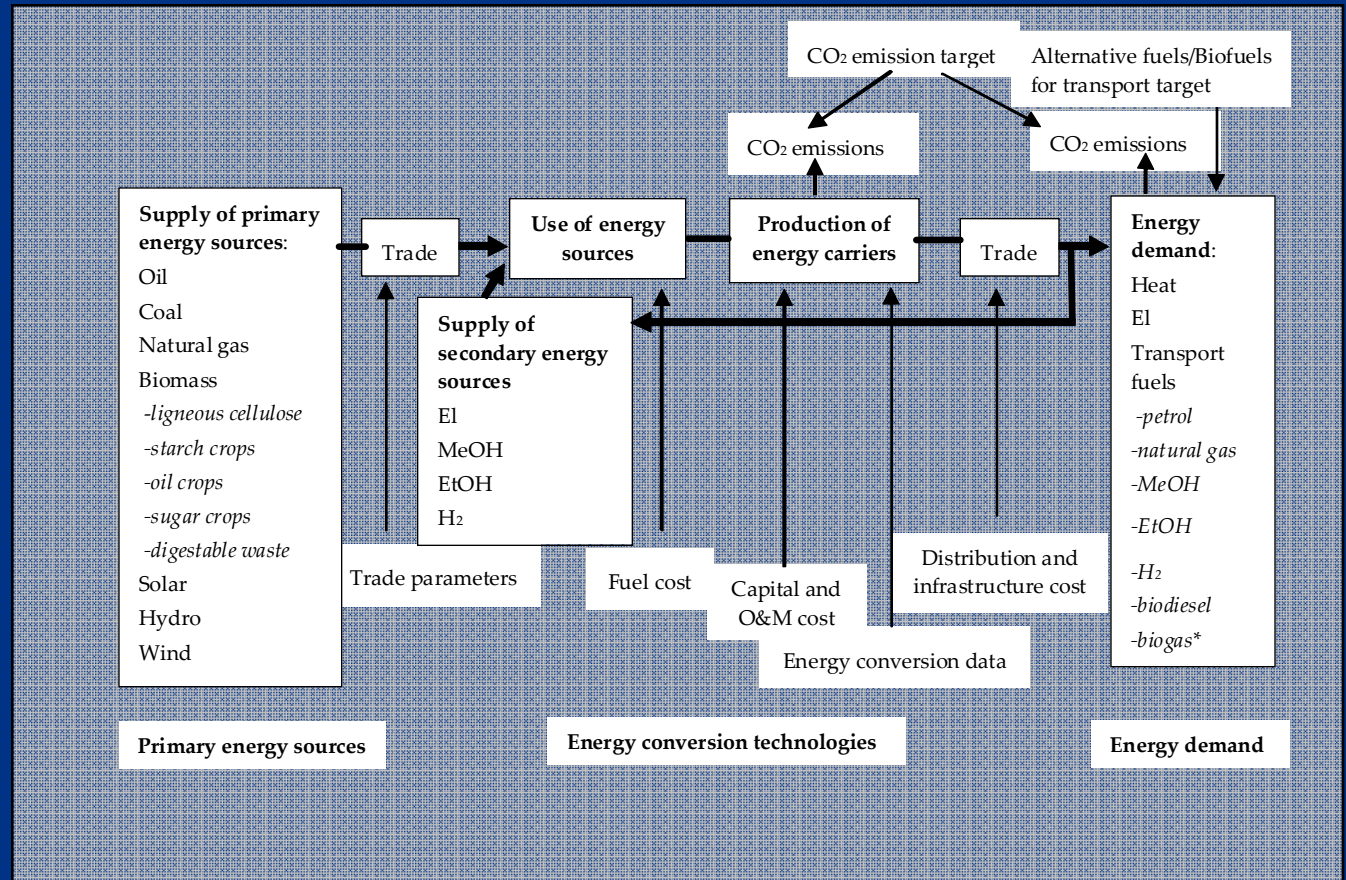
Cost-minimization country-level energy and transport system model –

Perspectives on European Energy Pathways model

Financial support from the European Commission (VIEWLS project) and the Swedish Energy Agency is gratefully acknowledged.



Perspectives on European Energy Pathways model



MeOH denotes biofuels based on biomass gasification with subsequent synthesis in general.
 Petrol includes both diesel and gasoline.



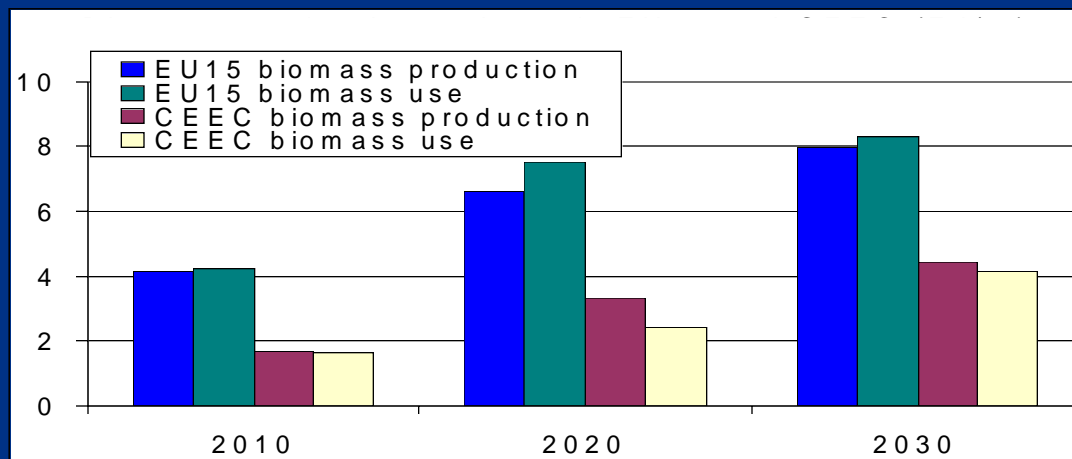
Note: The following result

- represent future bioenergy flows assuming the use of EU biomass only. Thus, large-scale global trade of bioenergy has not yet been included in the study.
- comes from a scenario with CO₂ caps and policies forcing the use of biofuels for transport.

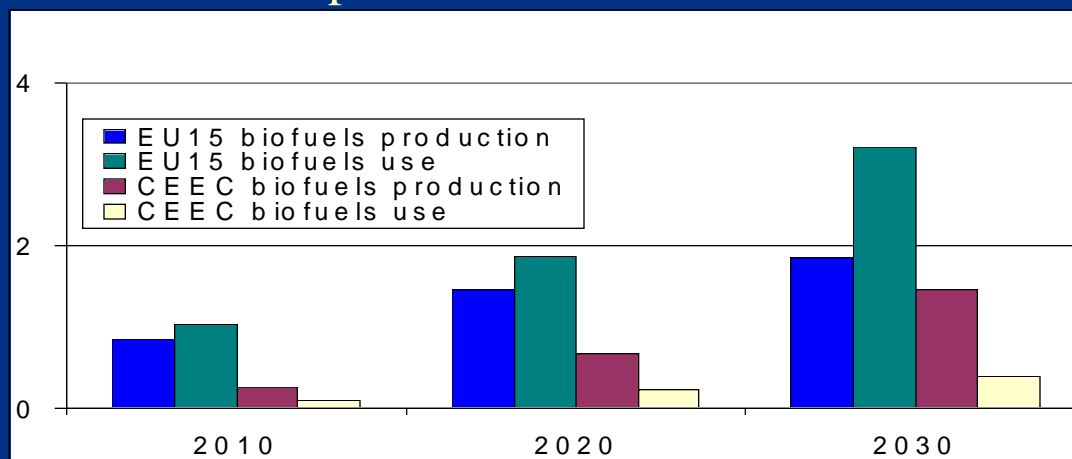


Production and use

Biomass

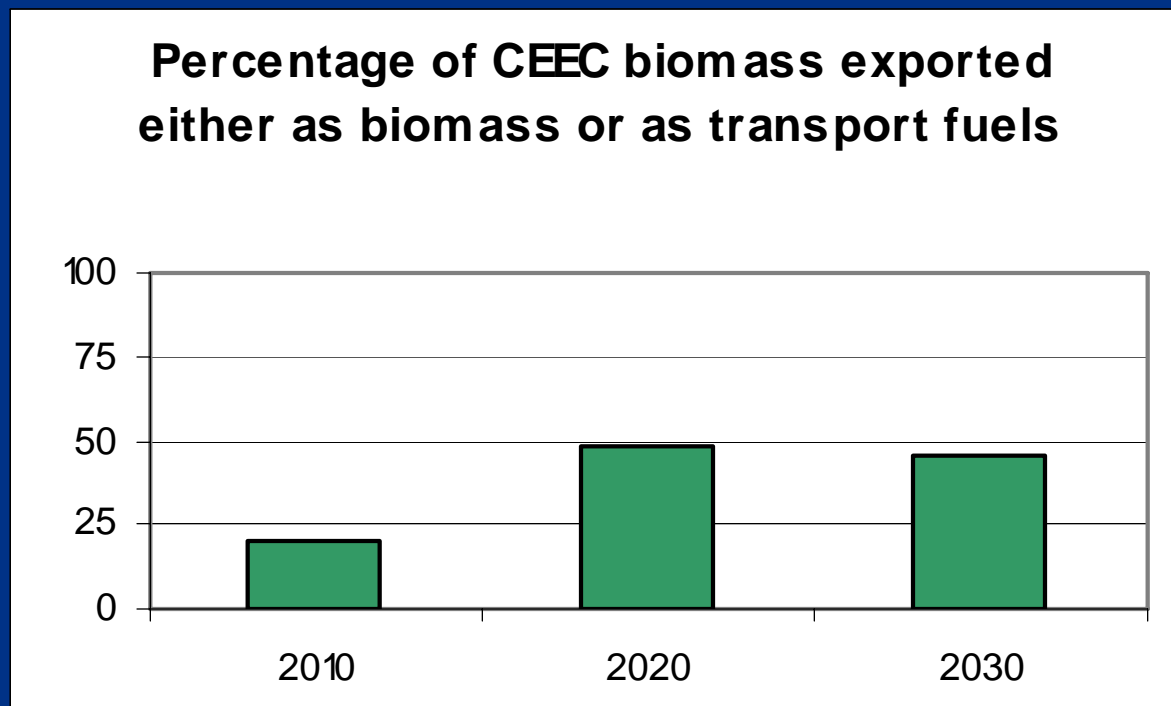


Biofuels for transport





Export of biomass and biofuels for transport from CEEC to EU15





Conclusions – bioenergy flows

- In the presence of ambitious climate policies and assuming inter-European biomass trade only, the use of bioenergy in EU 15, in particular biofuels for transport, stimulates biomass production in CEEC.
- However, the domestic biomass use in CEEC seems to be the major driver behind increased biomass production for energy in CEEC.
- The major part of the biofuels for transport demand in EU-15 is met domestically.



Conclusions – bioenergy trade vs. logistic capacity (1)

- The capacity in EU15 ports seems sufficient to accommodate a substantial biomass import flow from CEEC.
- The capacity of CEEC ports may constrain the future biomass export from CEEC to EU15.



Conclusions – bioenergy trade vs. logistic capacity (2)

- Liquid biofuels are more likely to be managed in the present freight system.
- A closer examination of the logistic capacity is required before any firm conclusion regarding the prospects for large scale bioenergy trade flows from CEEC to EU15 can be made.



Future work

- Further assessment of the logistic capacity to handle increased bioenergy flows (in Europe and globally)
- Broader analysis on future bioenergy trade flows (including global competition for biomass resources and environmental consequences)

The prospects for large scale import of biomass and biofuels to Sweden

– a review of critical issues



Julia Hansson & Göran Berndes, Chalmers University of Technology
Pål Börjesson, Lunds University



Context

Swedish bioenergy initiatives that already today is partly met by import (despite the large Swedish forest area).

“The shipment of ethanol through Rotterdam has tripled from 200 000 ton in 2001 to 600 000 ton in 2004. The ethanol is intended for the German and UK markets and, in particular, the Swedish market, where ethanol is already being mixed with fuels in order to reduce emissions from fossil fuels. “

From: F.O.Lichts World Ethanol & Biofuels Report, Vol 3, No 23, Aug 2005



Swedish use and import of biofuels for the last 5 years

PJ	2000	2001	2002	2003	2004
Biofuel use					
Total	349	349	353	371	396
Transport fuels		1.2	2.1	3.8	6.5
Biofuel import					
Direct import, excl. transport fuels	16.4				
Indirect import	9.2				
Transport fuels			0.5	1.9	



Considered aspects

- Future potentials of Swedish and global biofuel supply and demand
- Cost of long distance biofuel transport
- Global freight capacity
- Capacity in Swedish ports to handle increased biofuel flows



Biofuel Transport cost

- The cost (including the transport cost) for biomass from certain regions is estimated to be low.
- But the cost will depend on future competition for the resource, transport and port capacity.



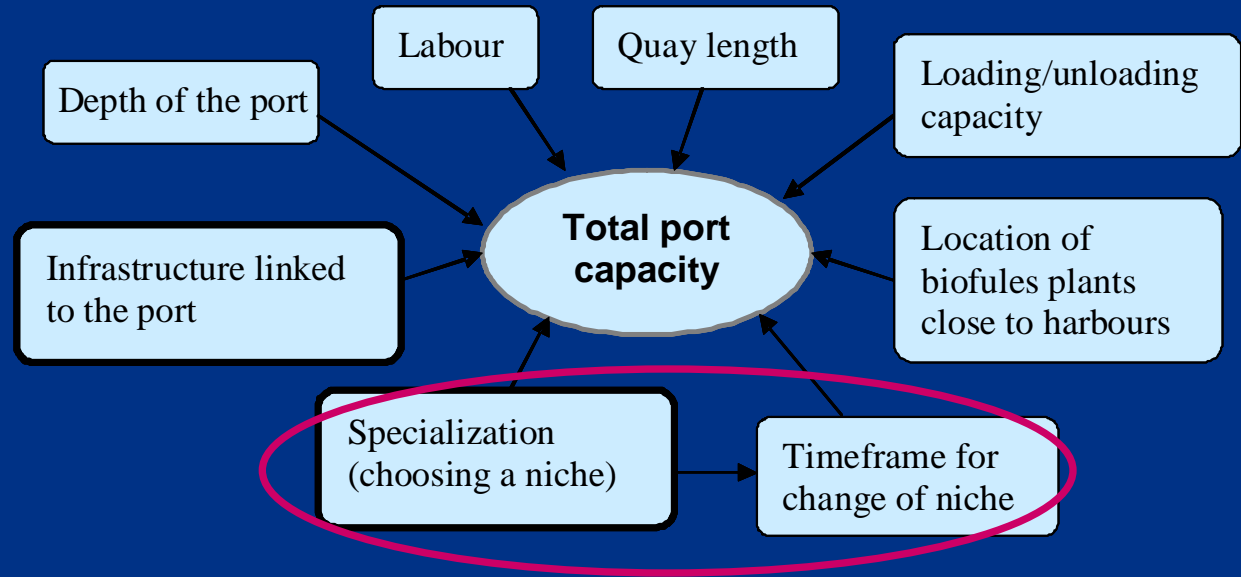
Global freight capacity

- The expected raise in the international biofuel trade may require an increase in the global freight capacity which could lead to an increase in transportation price. But this has to be investigated further.





The capacity in Swedish ports to handle increased biofuel flows



Factors that influence the capacity in Swedish ports

Environmental impact

- The energy input in long distance biofuel transport and corresponding environmental impact is estimated to be low.
- However, to make large scale biofuel trade flows acceptable special attention needs to be paid on biodiversity and socio-economic conditions.





Thank you for your attention

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