



# Bioenergy expansion in the EU: cost-effective climate change mitigation, employment creation and reduced dependency on imported fuels

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## Background:

Presently, the European Union is promoting bioenergy. See e.g.,

- Directive 2003/30/EC on the promotion of the use of biofuels or other renewable fuels for transport
- Biomass action plan (2005)
- An EU strategy for biofuels (2006)



# Production of biofuel for transport in EU

In 2006, biofuels was less than 2% of the total fuel use in the transport sector, Vision: 25% in 2030

...and then the aim is to increase the bioenergy use in other sectors as well

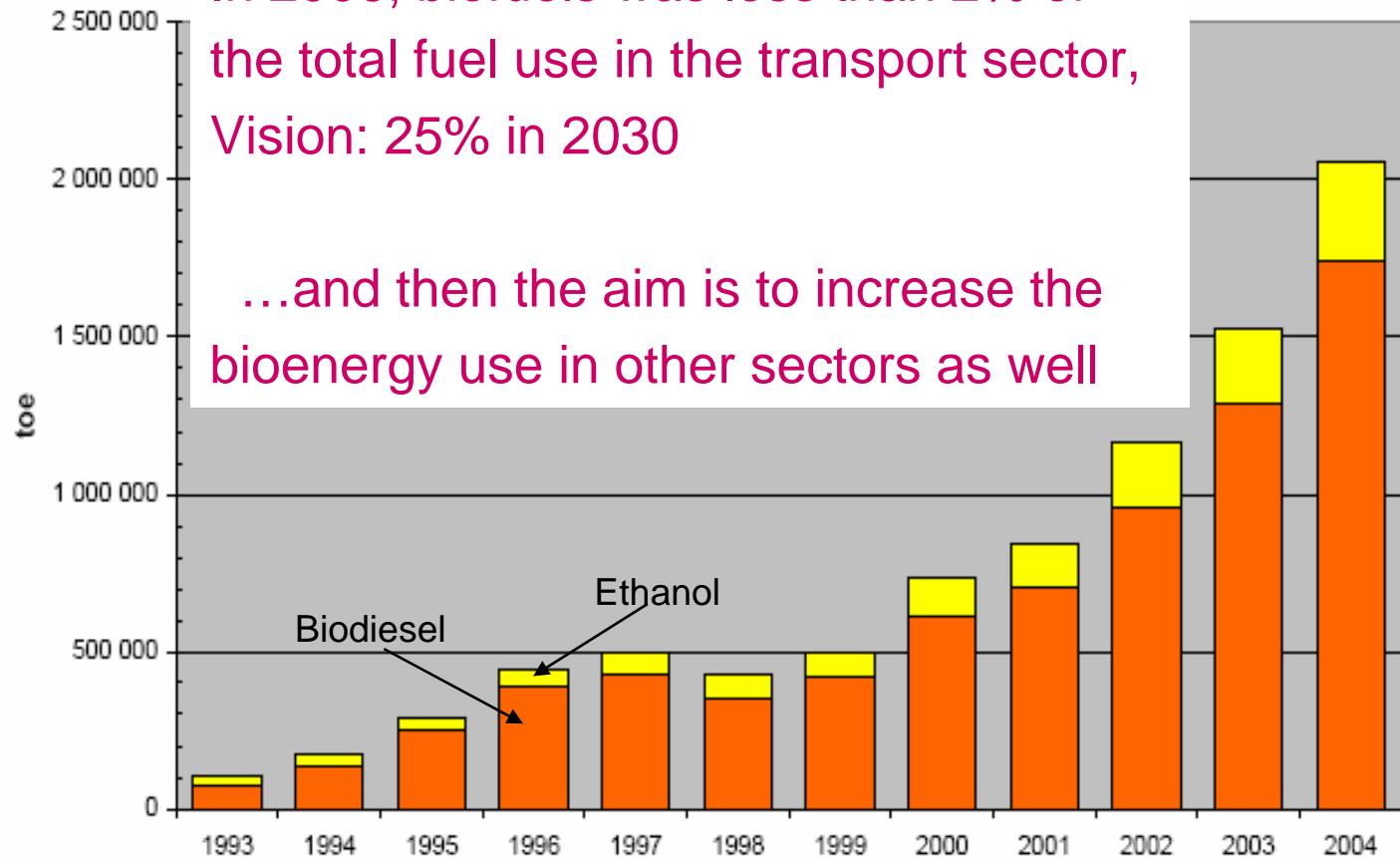


Figure from *Biofuels in the European Union*, Biofuels Research Advisory Council, 2006



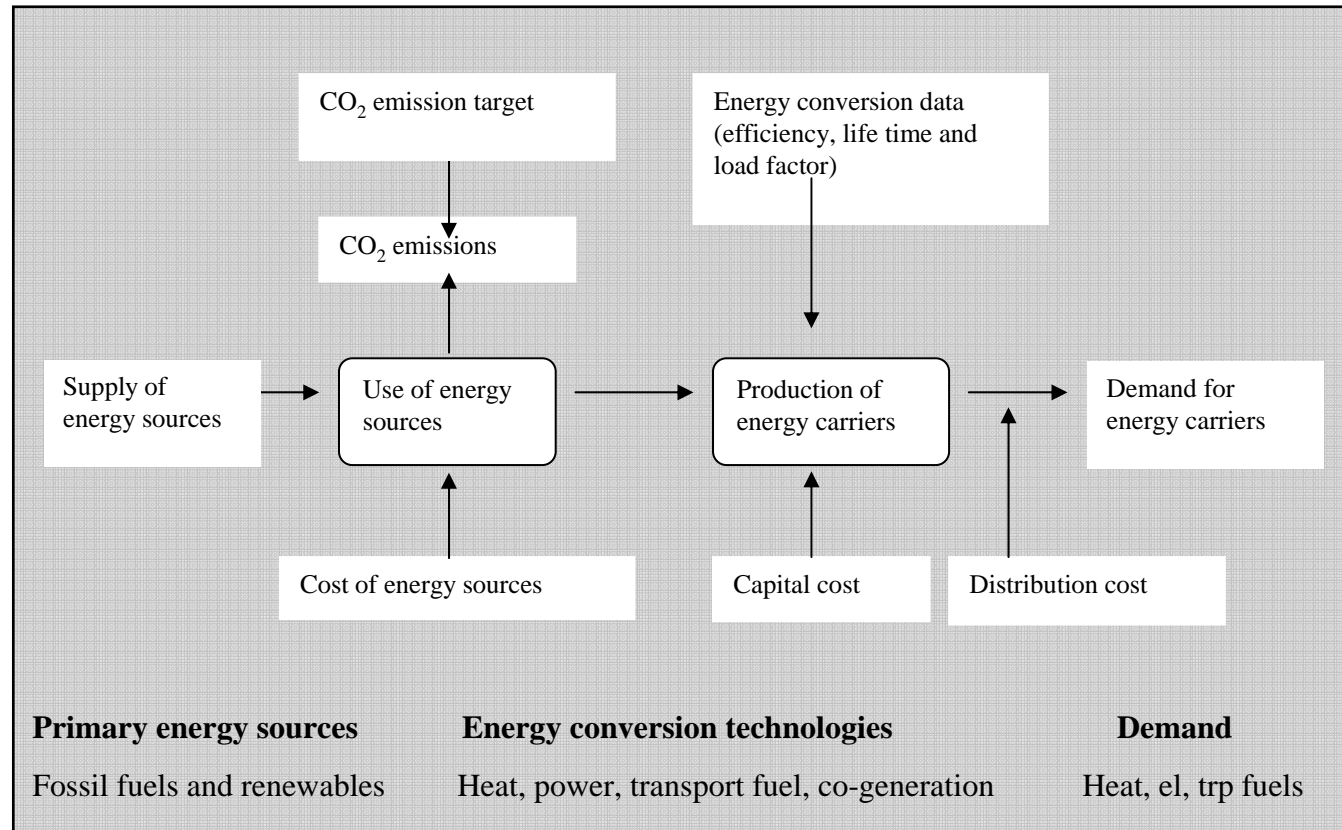
## Purpose:

- The aim of this paper is to investigate whether different policy objectives underlying the promotion of bioenergy agree on which bioenergy options that should be used

## Policy objectives:

- cost-effective climate change mitigation
- reduced dependency on imported fuels
- employment creation

# Perspectives on European Energy Pathways (PEEP) model and supplementary analysis



The PEEP model studies the prospects for using domestic biomass resources in EU25



## Bioenergy options:

- Heat based on lignocellulose
- Electricity based on lignocellulose
- Biofuels for transport based on sugar crops, starch crops, oil crops and lignocellulose
- Hydrogen based on lignocellulose



## Main findings:

- Under a policy regime involving both targets for biofuels for transport and ambitious climate targets, competition for domestic biomass resources may arise.
  - Biomass is (given the assumptions made) most cost-effectively used in stationary sector (primarily for heat). The promotion of biofuels for transport induces a redirection of biomass from stationary uses to the production of transport fuels.



## Main findings:

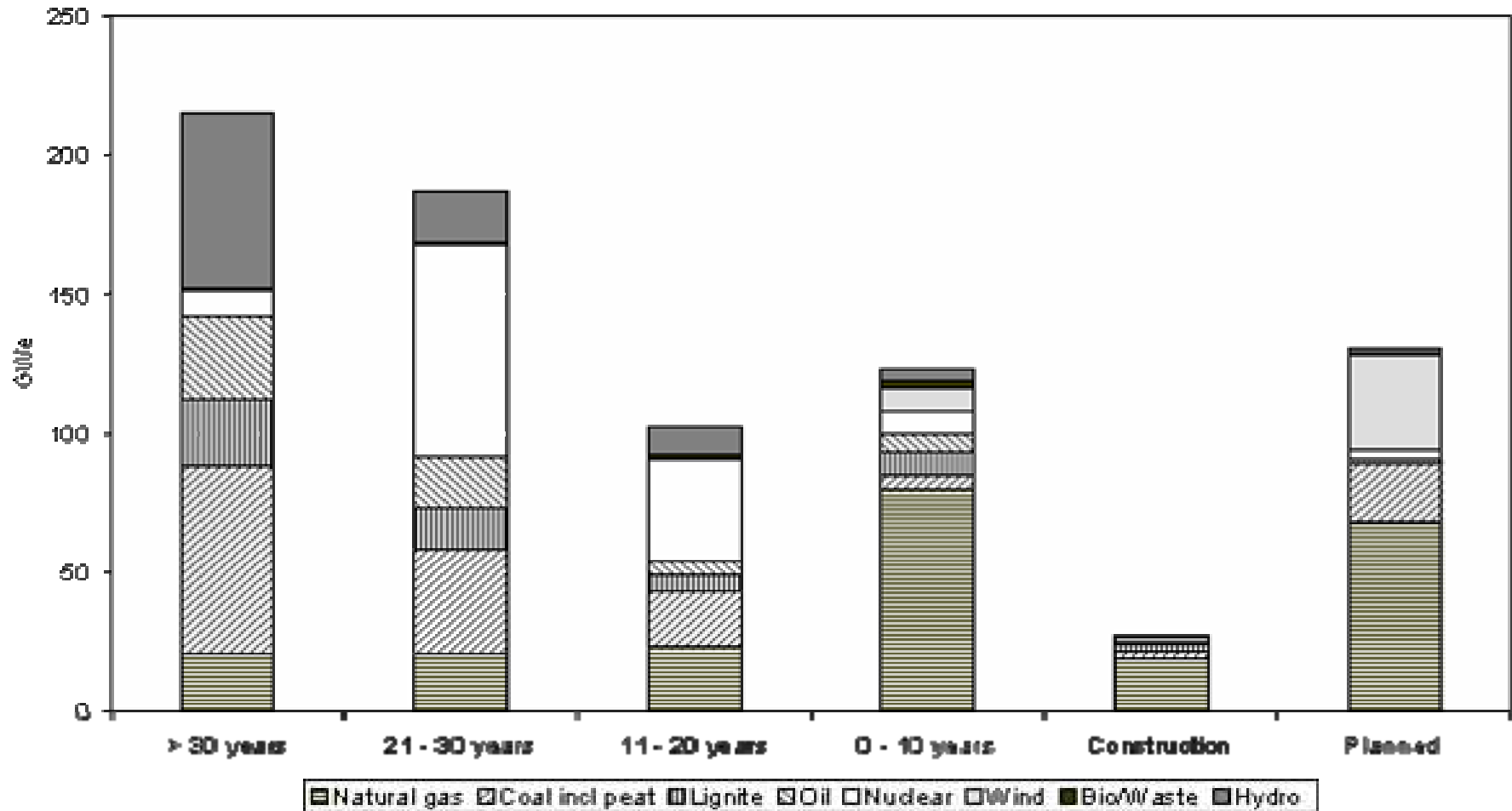
- Bioenergy options that use lignocellulosic resources are preferred from the perspective of cost effectiveness in climate change mitigation (both in the stationary sector and when biofuels are promoted in the transport sector).



## Main findings:

- Using biofuels for transport reduces the dependency on imported oil.
- The use of biomass in stationary applications may reduce the dependency on imported natural gas.

# Energy security in the power sector – Increased gas dependency?



Characteristics of the power sector in EU25 with respect to fuel use and age structure of existing plants and plants under construction and planning



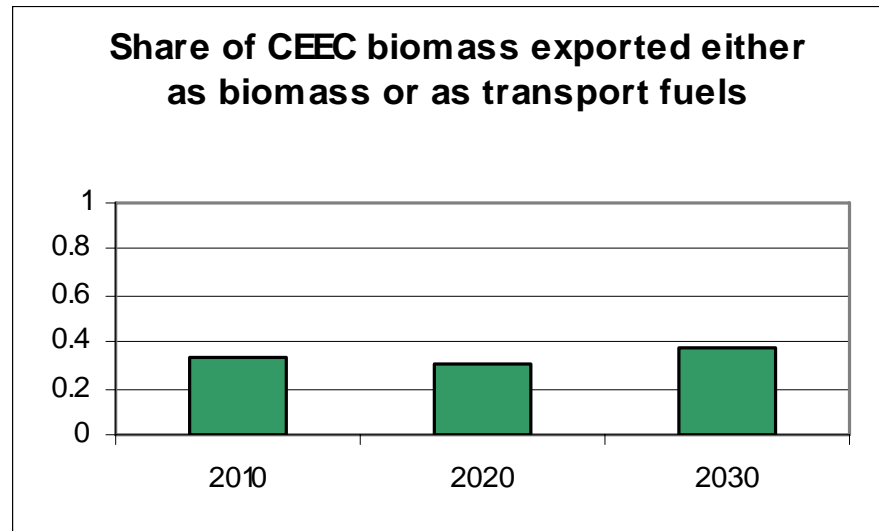
## Main findings:

- Estimates of the employment creation potential for various bioenergy options differ substantially. However, liquid biofuels based on traditional agricultural crops seem to be the most employment-intensive option.



## Main findings:

- Bioenergy trade between countries in EU25 can be expected. CEEC has the prerequisites for becoming a net exporter of bioenergy for both transport and stationary uses to EU15



Bioenergy trade in EU25 in a scenario with carbon dioxide and biofuels for transport targets.



## Key findings:

- The analysis show that the different policy objectives do not seem to agree on the order of priority among bioenergy options.



## Key findings:

- The maximization of climate benefits cost-effectively prescribes the use of lignocellulosic biomass in the stationary sector, while maximization of employment creation requires biofuels for transport based on traditional agricultural crops.
- From a security-of-supply perspective the relative appeal of the different bioenergy options depends on how oil and gas import dependencies are weighed relative to each other.



## Key findings:

- Thus, there are tradeoffs that need to be addressed by policymakers promoting the use of bioenergy.
- The importance of bioenergy in relation to employment creation and fuel import dependency reduction needs to be further addressed.



Thank you for your attention

Questions?

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