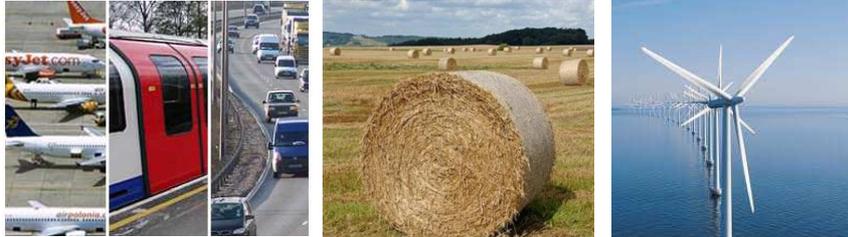


# Transportation and the future energy supply



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Ea Energy Analyses

*Copenhagen, 3 November 2010  
EPTA Conference: "Routes to Sustainable Transport"*



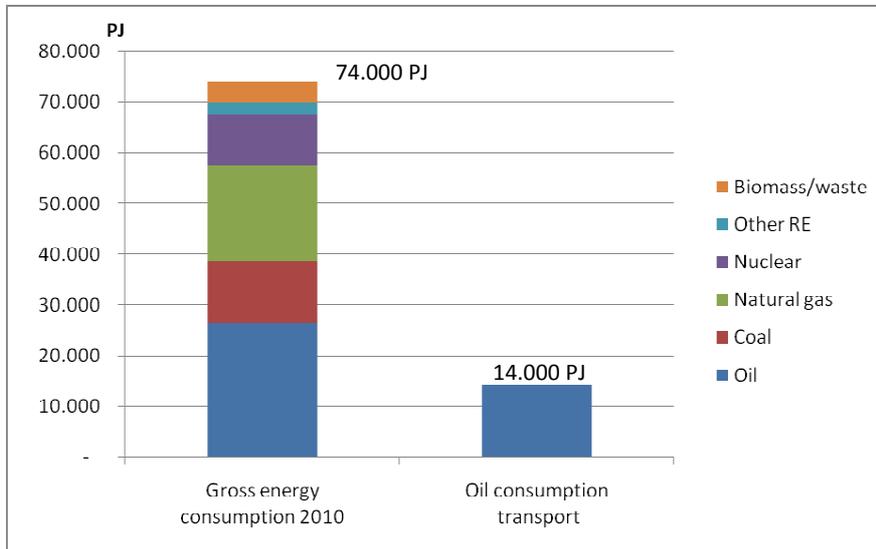
## Questions

- How much energy does the EU transport sector consume?
- How much biomasse is available?
- How much biomass will be consumed competing sectors, e.g. power sector and industry in 2050?
- Implications for solutions in the transport sector

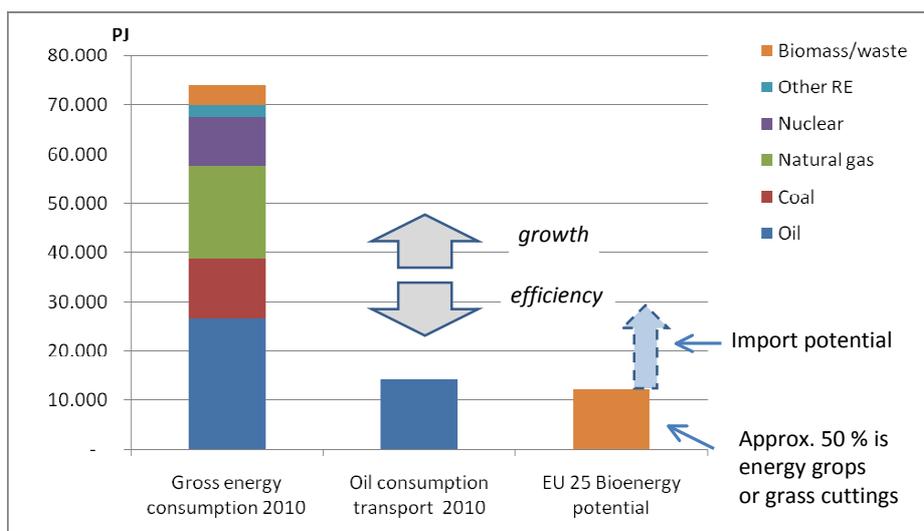
*EU target  
Reduction of GHG by 80-95 % in 2050*



## Statistics for EU-27



## Today's energy consumption compared to the long-term sustainable bio energy resources



## Competing use of biomass

- Electricity production
  - Today less than 5 % from bioenergy
  - In the future perhaps 20 % (= 6,000 PJ biomass)
  - ++++ Wind/solar, hydro, (nuclear/CCS)
- Manufacturing industry
  - Today 6%
  - In the future perhaps 40 % (=6,000 PJ biomass)
  - ++++ Electric boilers, heat pumps, district heating
- Heating
  - Today 10 %
  - In future perhaps still 10 % (=1,500 PJ biomasse)
  - ++++ Heat pumps, district heating
- Total
  - 13,500 PJ biomass

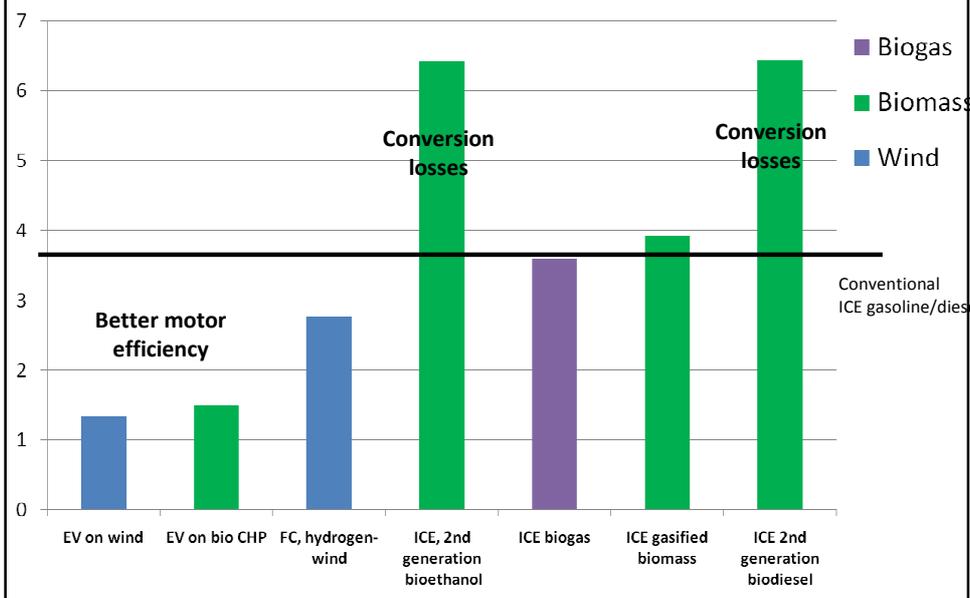
*Biomass is the easy solution*

*Wind, solar, heat pump, district heating are more capital intensive and call for more planning and coordination*



## Transport sector

Energy required for 1 unit of mechanical energy



## Considerations

- Substituting today's oil consumption with 2nd generation biofuels would require approx. 25,000 PJ of biomass. Hardly realistic...
- A long-term scenario could involve 2/3 of transport demand covered by electric vehicles and 1/3 from biofuels (liquid, gasoues) and perhaps hydrogen. Biomass demand approx. 6000 PJ.

## Conclusion

Bank stocks have become cheap according to one measure calculated by Kenneth Froot:

	Jan 15, 2008	Jan 15, 2009
Citygroup		
Price	\$20.60	\$7.71
Single book value per share	9.36	8.05
Price/single book value	2.20	0.96

*(Note: 0.96 is circled in red in the original image)*

- Biomass back-of-an-envelope calculations:
  - Energy: 13,500 PJ
  - Transport: 6,000 PJ
  - Total 19,500 PJ
  
  - Resource 12,000 PJ (->29.000 PJ)
- Key-question in a post-2020 EU energy policy:  
*Where will the limited biomass resource have highest value for the energy and transport systems?*