



Biomass as part of a strategy against climate change

Chances and perspectives for a new
energy future

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Climate change and greenhouse gas emissions



A successful strategy against climate change requires a strong reduction of the greenhouse gas emissions:
minus 833 Mt of CO₂ until 2020 to comply with the decisions of the council of 9.3.2007

CO₂ emissions, EU-25, Million tonnes CO₂

year	Mt CO ₂	change
1990	3775	
2003	3853	+2% (+78Mt)
2020	3020	-20% (-833Mt)

Fossil fuels: main source of CO₂ emissions



In 2003 the EU-25 consumed

1368,3 Mtoe

fossil fuels in the form of coal, oil and natural gas. This quantity has to be reduced by about **300 Mtoe**

until 2020 to reach the new community targets.

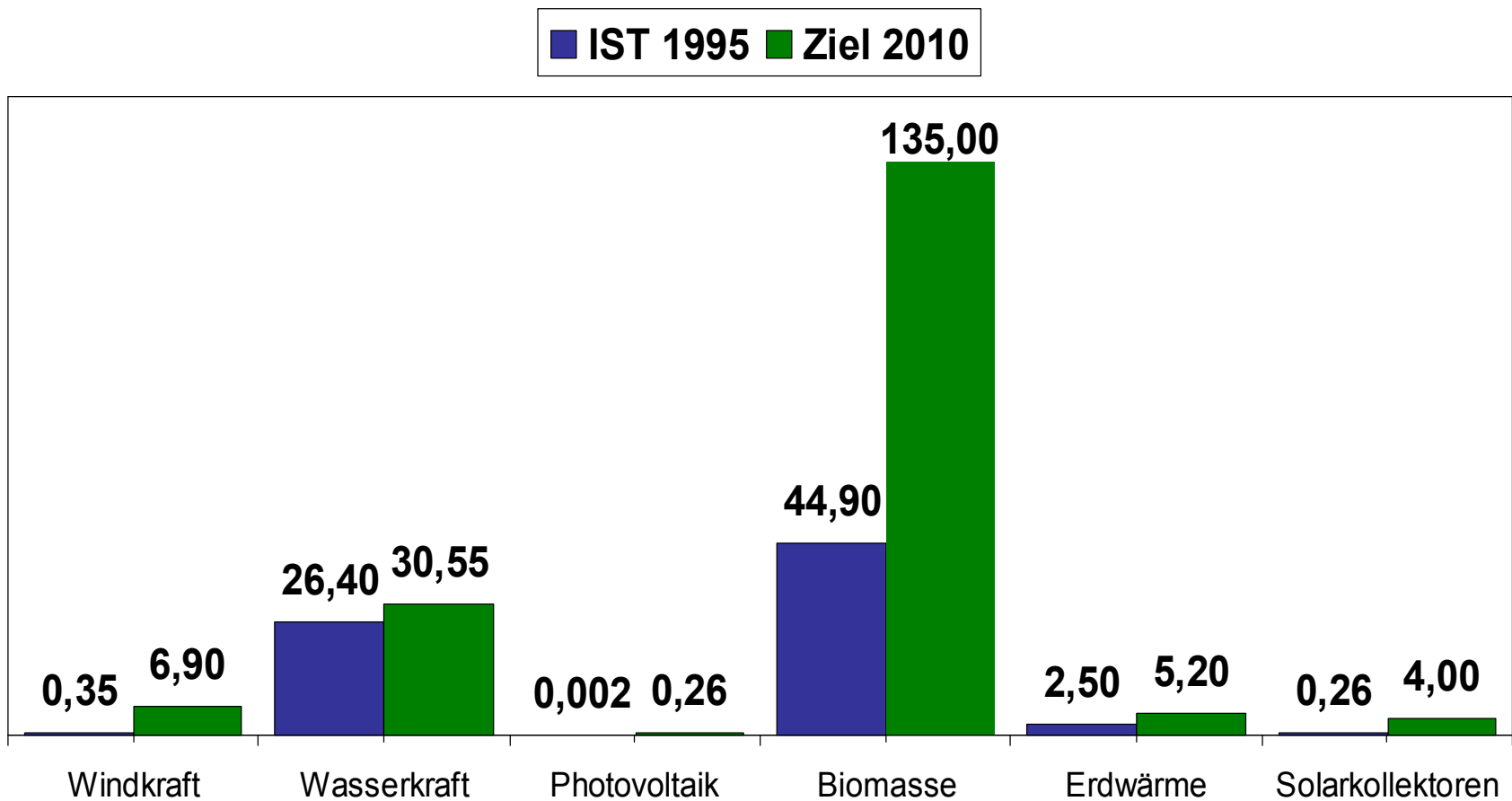
What can biomass contribute to reach these targets?

The basic differences between biomass and fossil fuels



- Biomass is renewable, it is permanently produced by green plants all over the world. Biomass is formed by carbohydrates, the carbon is taken from the air by photosynthesis and given back to the air within the natural carbon cycle.
- Whereas by using fossil fuels carbon is transported from the earth crust to the atmosphere, thus increasing the CO² content.!

Renewable energy targets according white paper 1997



Quelle: Weißbuch, EU-Kommission

Biomass for energy targets



EU 25, Mtoe

	1995	2004	2010 BAP	2020 Aebiom
Total	45	72	149	220
Heat		48	75	120
Electricity		22	55	60
Fuels		2	19	40



A first result

In the period 2003 to 2020 the contribution of biomass could be increased

by 150 Mtoe,

that is about 50% of the necessary reduction of fossil fuels to reach the agreed targets on CO₂ reduction.

The versatility of biomass

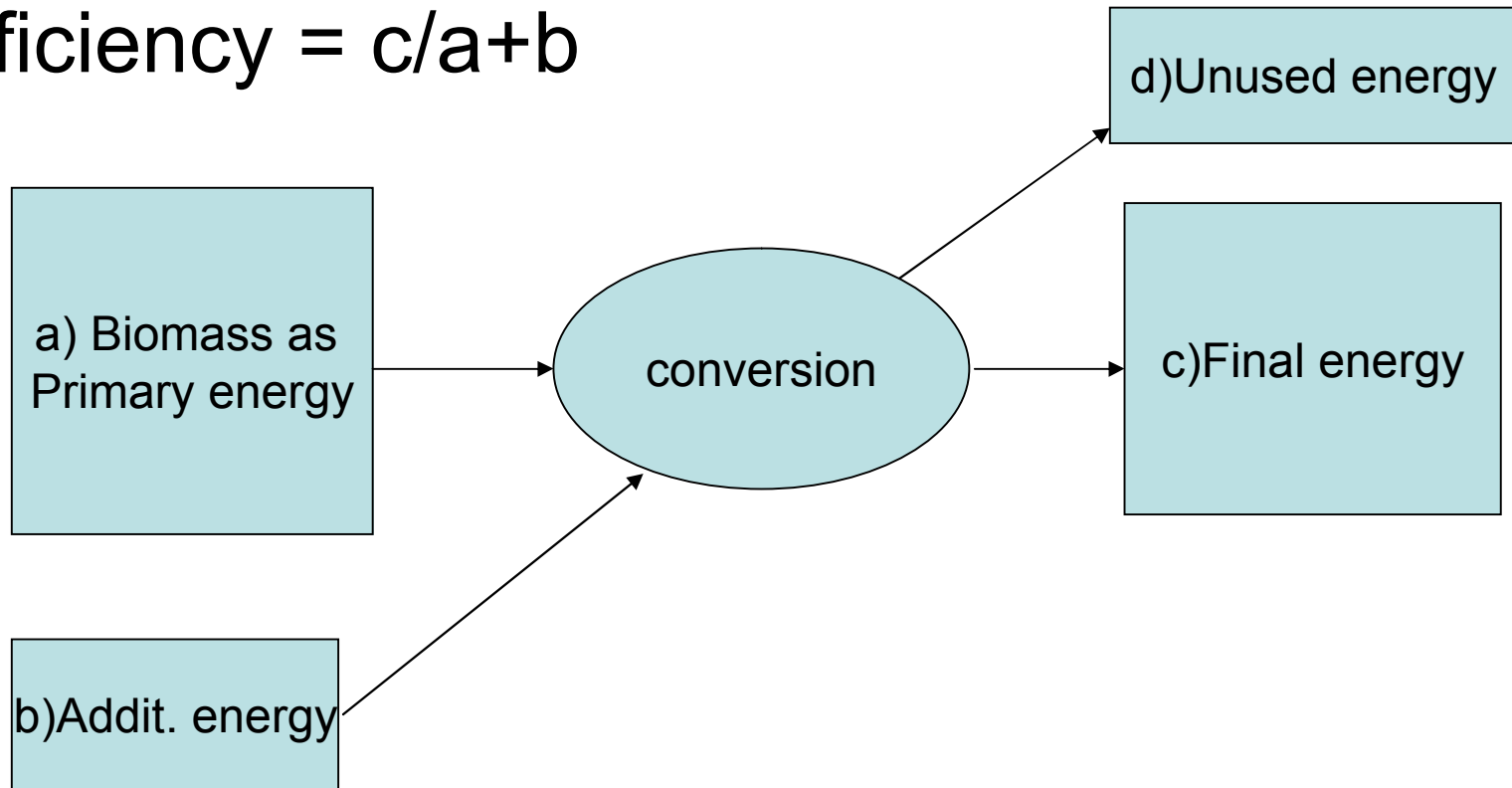


Primary energy	conversion	Final energy
Biomass >	Combustion	heat
Biomass >	Comb. + steamproc. Comb. + orc-proc. gasification	Electricity
Biomass >	Fermentation Esterification btl	Transport. fuels
Biomass >	Anaerobic ferm. biogas	Heat, electricity Transport. fuels

The efficiency of the conversion



$$\text{Efficiency} = c/a+b$$



Efficiency and conversion technology



technology	efficiency
combustion	85 – 90%
Combined heat and power (CHP)	40 – 90%
Fermentation to ethanol	40 – 50%
Electricity only	25 – 30 %

Some examples

- Final energy per hectare: 1toe – 5 toe
- CO₂ reduction per one Million ha land
 - solid biomass > heat : 10 – 12 Mt CO₂
 - cereals > ethanol : 2 – 3 Mt CO₂

150Mtoe additional biomass – possible CO² reduction



technology	CO ² saving Mt	CO ² saving Mt
70Mtoe biomass to heat Replaces heating oil	217	
70Mtoe biomass heat replaces electrical heating		350
40 Mtoe biomass to electricity without heat use	124	
40Mtoe biomass to electricity with heat use (CHP)		184
40 Mtoe biomass as transportation fuel	80	80
Total	421	614

The impact of biomass use on climate change



The CO² reduction using biomass as energy source

depends upon

- the energy crop cultivated
- the conversion technology chosen and
- the current energy source replaced.



Conclusion 2

Priorities for the use of biomass within a strategy against climate change:

- + biomass to heat replacing electrical heating, coal or oil
- + biomass to electricity and heat (CHP) using as much heat as possible (District heating, industry)
- + biogas as transportation fuel

Liquid fuels are important to improve the security of supply, their effect on CO² reduction is smaller than in other other bioenergy chains!

Supply of biomass 1 – potential Mtoe



Source: EEA, Eurostat 2003

	2003	2010	2020
Wastes and residues	67	100	100
Wood direct from forest	1	42	43
Energy crops from agriculture	1	45	85
Total	69	187	228



Supply of biomass 2

AEBIOM target for 2020: 220 Mtoe,
hereof 10 to 20% imports

Utilized agricultural area in the EU 27: 183Mha

needed ag land for energy crops in 2020: 20 -40 M ha
partly for liquid fuels, partly for solid biomass and
biogas,

no limitation for food production, but a more productive
use of agricultural land and new energy crops are
necessary!

Summary

- Biomass offers a big potential for a strategy against climate change!
- The range of CO² reduction can be estimated between 300 to 650Mt CO² until 2020
- **Important:** framework conditions that favor technology chains with a high CO² reduction potential such as biomass to heat, CHP or biogas are necessary!
- High Efficiency, high final energy/ha, high CO² reduction should be leading criteria in the upcoming national actions plans to reach 20% RES in 2020!
- In applying these principles Europe could become a global model in the development of the bioenergy sector!



Danke für die Aufmerksamkeit!

Thank you for your attention!