



Energy research Centre of the Netherlands

TASK 2G – Transportation fuels
4th ThermalNET meeting, Glasgow, 22 September 2006

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Final question

- Suggestions for presentation/topics for future workshops
 - Please let me know

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Objectives

- Present an overview of what's happening in the field of liquid biofuels
 - From the workplan:
 - Define rules-of-thumb and guidelines for selection of biofuel production systems based on
 - the location
 - available biomass
 - preferred bio-fuel to be produced
 - and scale
- AND create consensus among the experts about these rules-of-thumb and guidelines.

The so-called **“Biofuel Vision”**.

EU biofuels directive

- Indicative targets for biofuels:
 - 2005 : 2%
 - 2010 : 5.75%
- Actual consumption¹:
 - 2003 : 0.5%
 - 2004 : 0.6%
 - 2005 : 1.4% (based on targets defined by member states)
 - Actual share is expected to be lower
 - Two member states passed the indicative target of 2% in 2005: Germany (3.75%) and Sweden (2.2%)²

¹ Source: *Review of EU Biofuels directive, Public consultation exercise, Energy and Transport Directorate-General, European Commission, April 2006*

² See member states reports 2006 at:

http://ec.europa.eu/energy/res/legislation/biofuels_members_states_en.htm

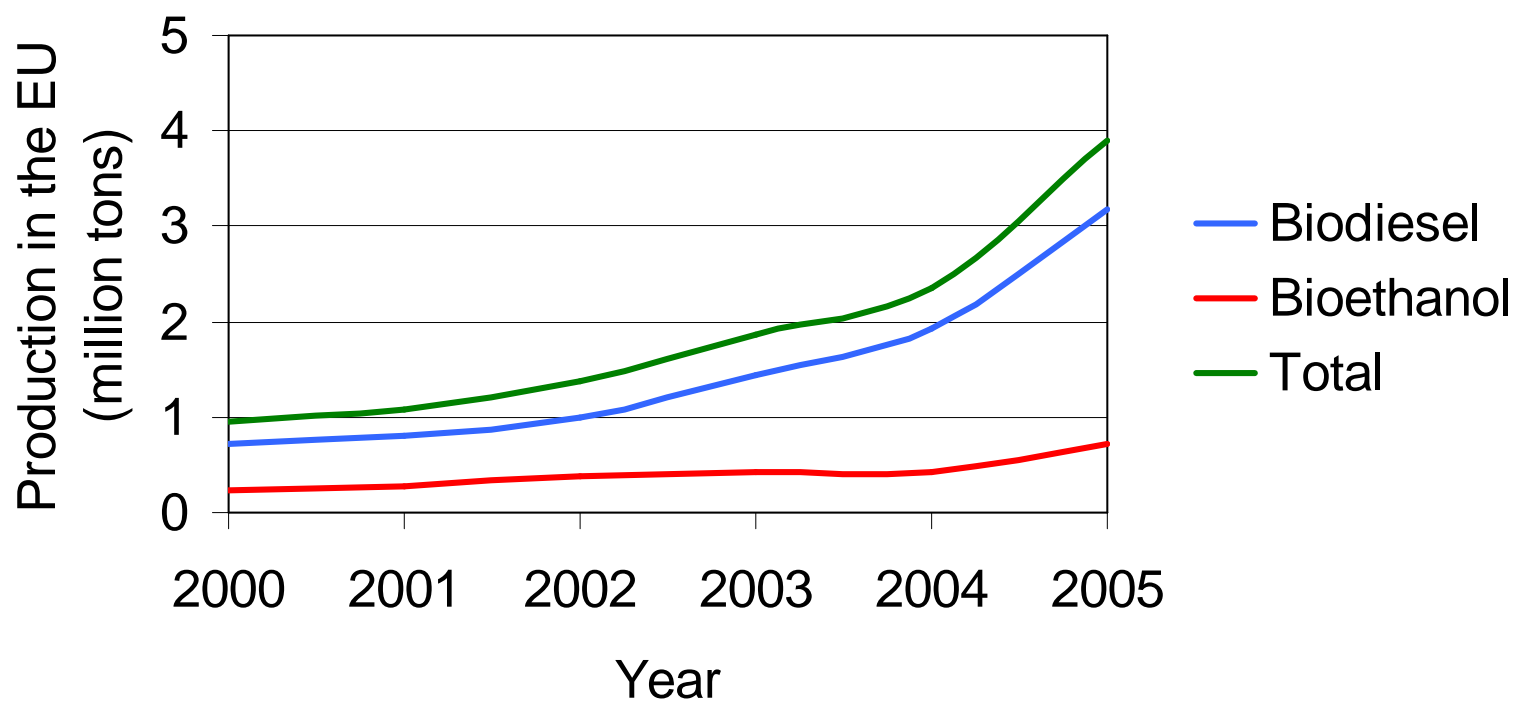
Future of the EU biofuel directive

- Report on evaluation of the EU biofuel directive by the commission 2006:
 - Topics to be addressed:
 - Cost effectiveness of measures by Member States
 - Economic and environmental impact of a further increase in biofuels use
 - Life cycle aspects; possible measures to promote competitive and cost-effective fuels
 - Sustainability of crop production
 - Assessment of use and effects on climate change and GHG emissions, review of long-term options
 - Review of more long-term options
 - Might result in mandatory targets/obligations

Future of the EU biofuel directive

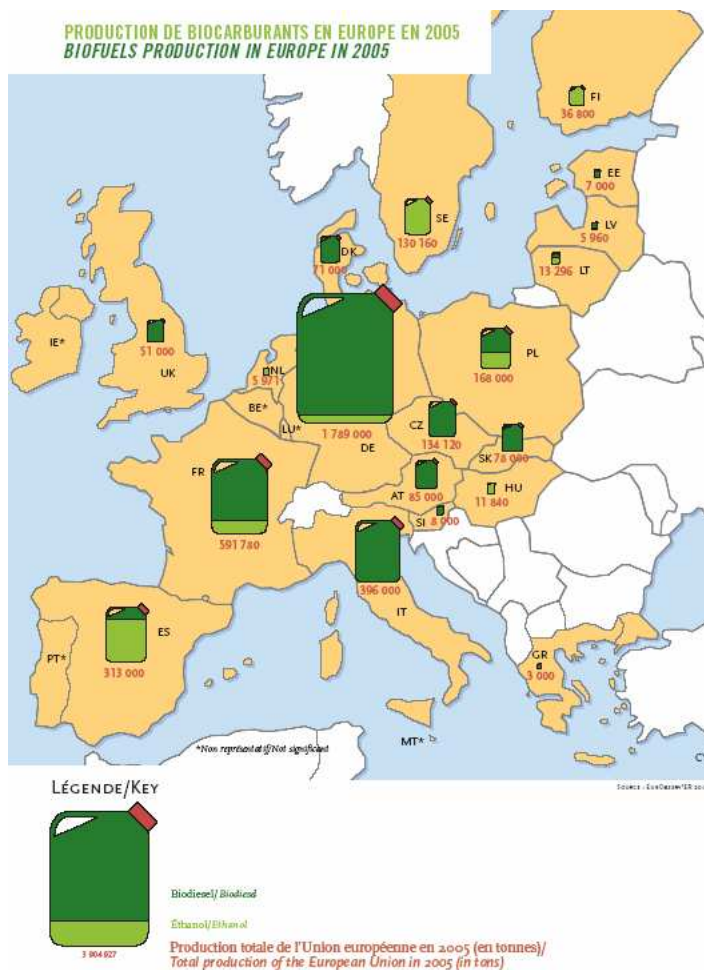
- Possible future targets:
 - Proposal for directive 2001:
 - 2015 : 7%
 - 2020 : 8%
 - Statement by EU Heads of State spring 2006:
 - 2015 : 8%
 - Public consultation exercise for EU bio-fuel directive
 - 2015 : 8-15%
 - 2020 : 15-20% (12-25%)
 - BIOFRAC (Biofuels Research Advisory Board)
 - 2030 : 25%

Current production of biofuels in the EU



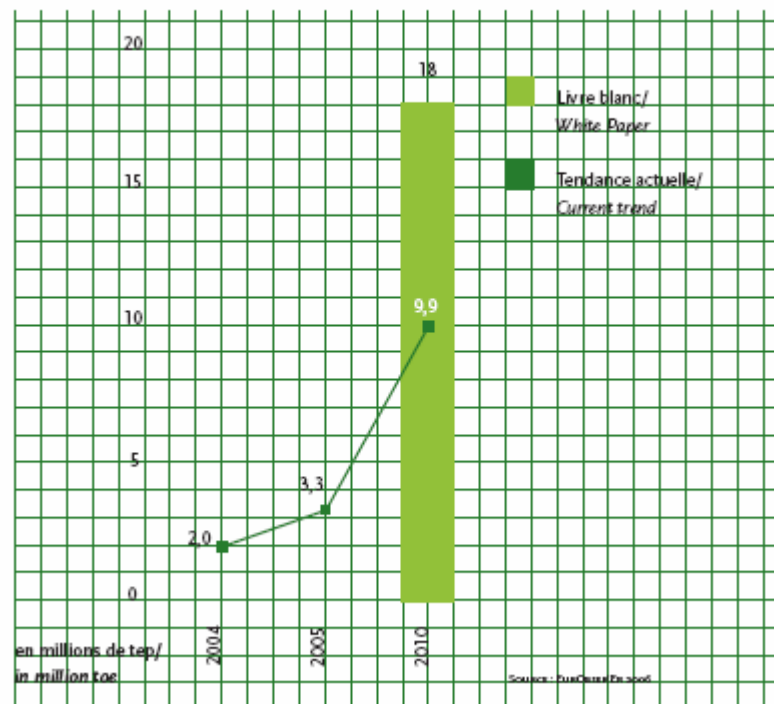
Based on data from Biofuels barometer - May 2006 EurObserv'ER

Current production of biofuels in the EU

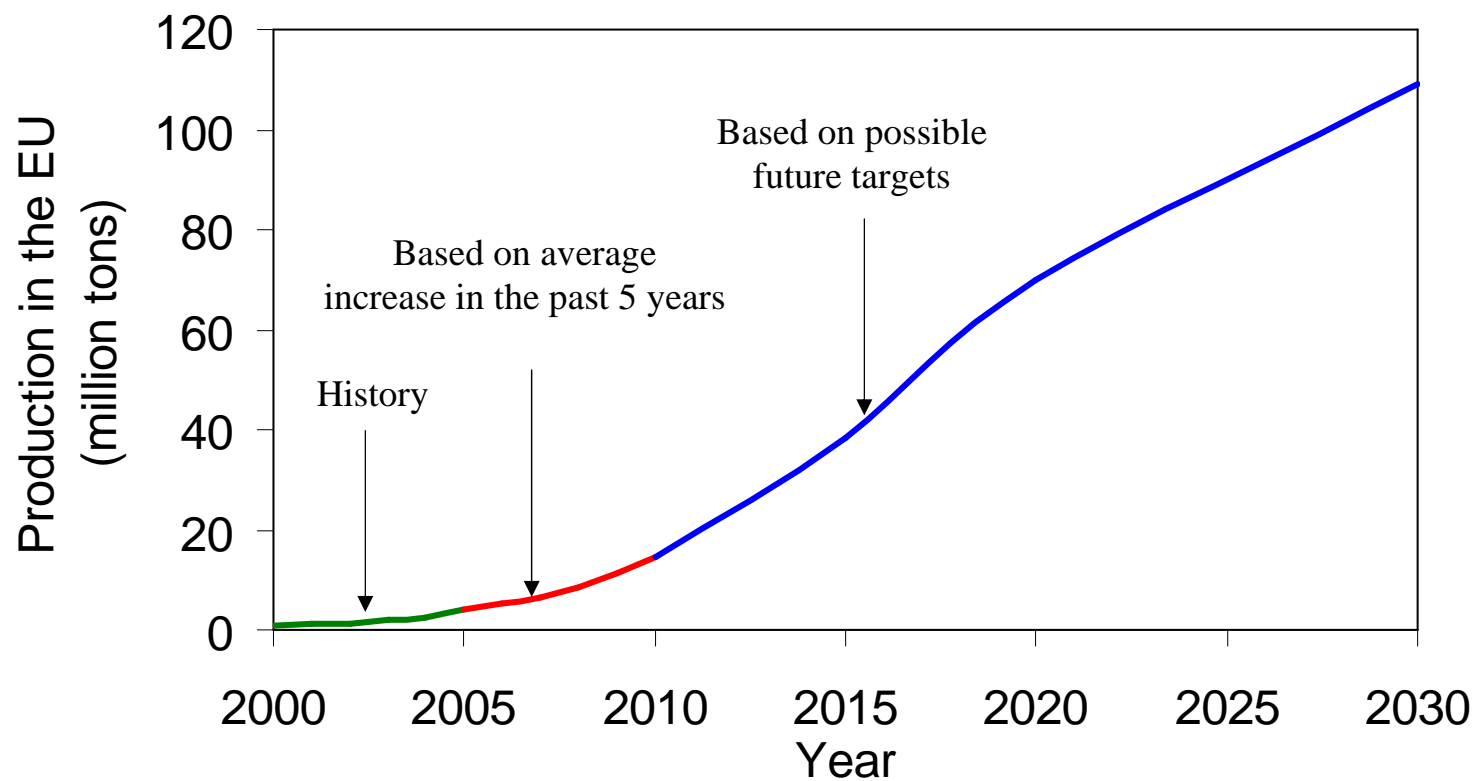


Source: Biofuels barometer - May 2006
EurObserv'ER

G4 COMPARAISON DE LA TENDANCE ACTUELLE AVEC LES OBJECTIFS DU LIVRE BLANC COMPARISON OF CURRENT TREND WITH WHITE PAPER TARGETS



Future production of biofuels in the EU



Expected expansion of production capacity

- Analysis of implementation of biofuel directive in NoE Bioenergy project:
 - Rapid development of production capacity to be expected:
 - Germany:
 - Average increase in biodiesel production over the past 5 years of 50% per year, another 50% is expected for 2006
 - In 2005 production capacity for 0.9 million liters of ethanol build
 - Netherlands:
 - All plans under consideration enough to meet the 2010 target
 - Finland
 - All plans under consideration enough to 74% of the 2010 target

Policy development

- 3 groups of countries
 - Successful introduction of biofuels:
 - E.g. Germany, Sweden, France and Spain
 - History in biofuels but no stable market:
 - E.g. Czech Republic, Slovakia and Poland
 - (Almost) no history on biofuels
 - E.g. United Kingdom, the Netherlands and Malta

Source: Van Thuijl and Deurwaarder: European biofuel policies in retrospect, ECN-C-06-016, May 2006

Policy development

- Common factors successful introduction of biofuels:
 - Political commitment
 - Active market actors and/or lobbying groups
 - Financial incentives to bridge gap with fossil fuels
 - End user market
- No stable market because of:
 - Changing or abolishing of financial support
 - Delays in legislation, bureaucracy, lack of quality standards and control
- No history in biofuels
 - Biofuels not considered to be cost-effective
 - Policy development takes off

Source: Van Thuijl and Deurwaarder: European biofuel policies in retrospect, ECN-C-06-016, May 2006

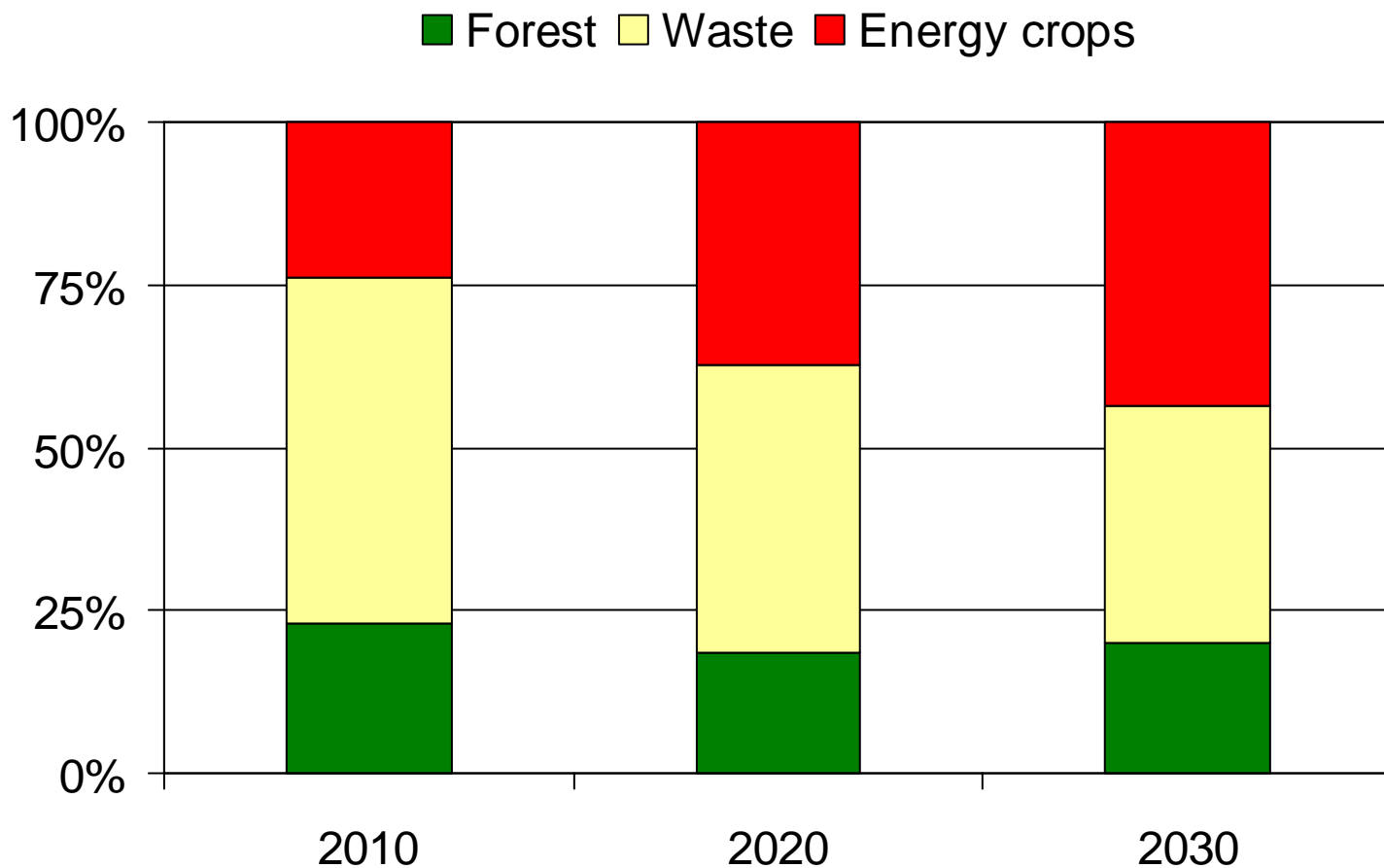
Feedstock (for the future)

Resource type	Biomass consumption, 2003 (Mtoe)	Potential, 2010 (Mtoe)	Potential, 2020 (Mtoe)	Potential, 2030 (Mtoe)
Wood direct from forest (increment and residues)		43	39-45	39-72
Organic wastes, wood industry residues, agricultural and food processing residues, manure	67	100	100	102
Energy crops from agriculture	2	43-46	76-94	102-142
TOTAL	69	186-189	215-239	243-316

Source: Final report of the BIOFRAC

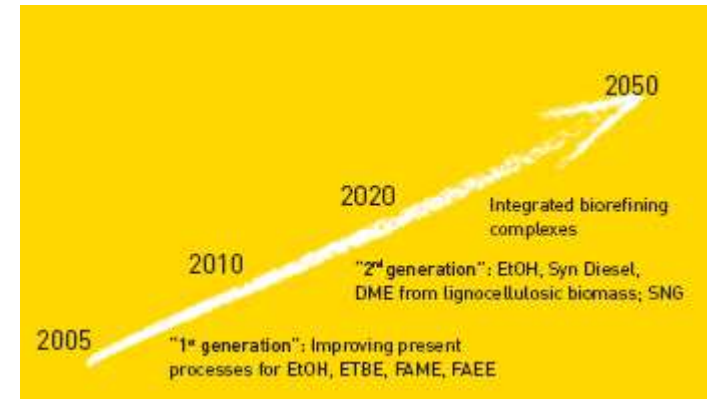
- Road transport in 2030 : 360 Mtoe
- 25% biofuels : 90 Mtoe
- 50% domestic production : 45 Mtoe
- 50% conversion efficiency : 90 Mtoe feedstock (or about 30% of the available biomass feedstock)

Feedstock



Biofuel vision: BIOFRAC

- Phase I Short term (until 2010)
 - Improving existing technologies
 - R&D into 2nd generation
 - First 2nd generation demonstration
 - R&D into the biorefinery concept.
- Phase II Medium term (2010 - 2020)
 - Deployment of 2nd generation
 - Demonstration of biorefinery concept
 - Continued R&D to improve lignocellulosic biofuel and integrated biorefinery processes;
 - Development of options for energy crops and sustainable agriculture.
- Phase III Long term (beyond 2020)
 - Large-scale production of 2nd generation biofuels
 - Deployment of integrated biorefining complexes



2nd generation biofuels created expectations

- Biomass action plan:
 - 2nd generation biofuels can widen the range of raw materials used and improve the environmental profile
- An EU strategy for biofuels
 - 2nd generation biofuels can improve the cost-effectiveness
 - Advocate favorable treatment of 2nd generation biofuels in obligations
- BIOFRAC report:
 - Promote the transition to 2nd generation biofuels, which will be produced from a wider range of feedstock, do not compete with the food chain and will help to reduce the costs of saved CO₂
- Public consultation exercise:
 - 2nd generation biofuels:
 - Favorable GHG balance
 - (More) cost-competitive
 - Wider range of feedstock
 - Do not compete with food production
 - Offer a better fuel quality

Objective in the work plan

- Define rules-of-thumb and guidelines for selection of biofuel production systems based on
 - the location
 - available biomass
 - preferred biofuel to be produced
 - and scale

AND create consensus among the experts about these rules-of-thumb and guidelines.

The so-called “**Biofuel Vision**”.

Variables

- Location:
 - At existing site/new site, inland/at the coast, close to biomass source/close to end user
- Available biomass
 - Residues:
 - Primary/secondary/tertiary, distributed/centralized, woody/herbaceous/mixed (even with fossil originated)
 - Cultivated crops
 - Woody/herbaceous
- Preferred biofuel:
 - Ethanol, FT-diesel, DME, methanol, pyrolysis diesel
- Conversion system:
 - Single output/co-production/multiple output

Guideline requirements

- Should be robust
- Should consider all variables involved
- Should incorporate the changing of the variables involved with time
- Should acknowledge that there is no-single-solution
- Should be valid for a maturing and mature industry

Conclusion

Only rough guidelines are possible

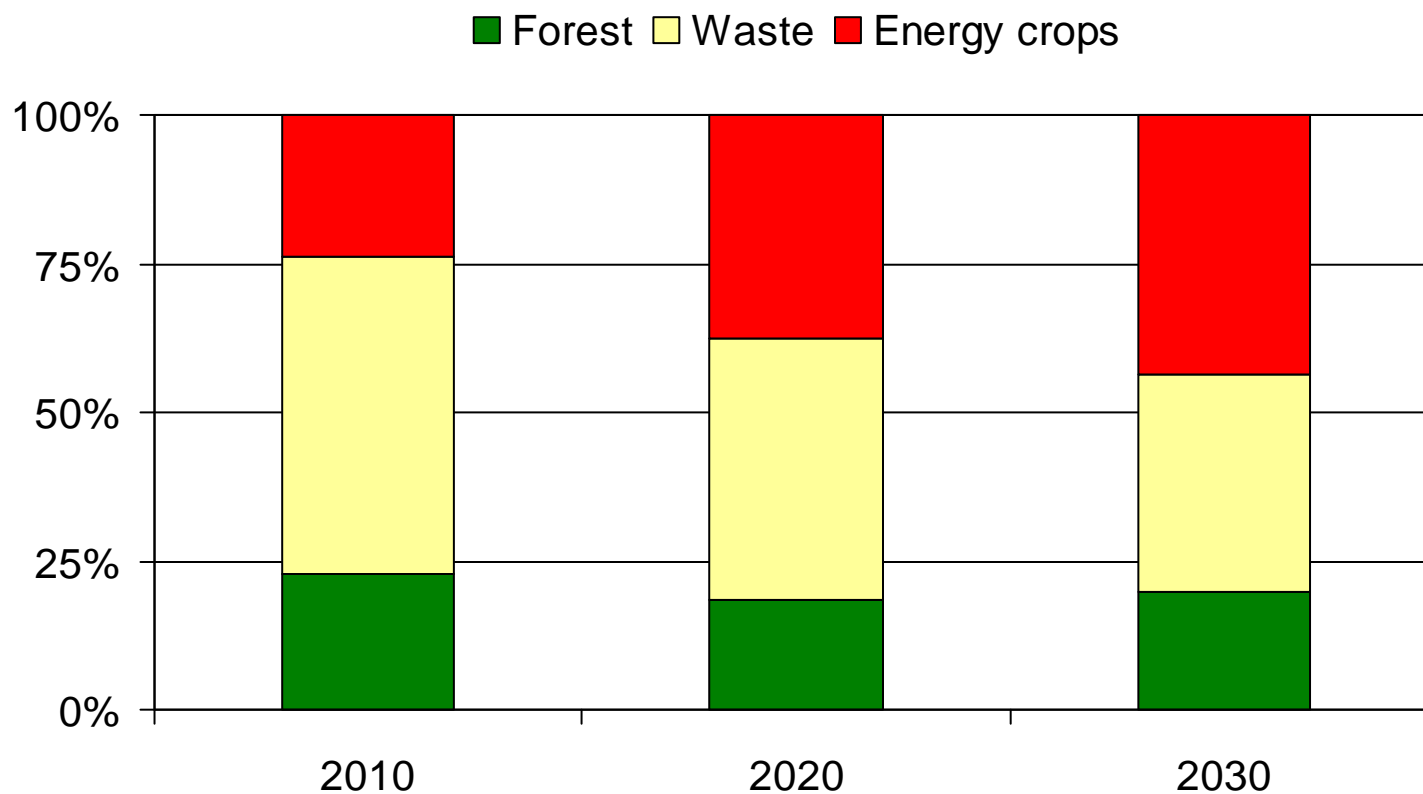
- General character
- Describing a development path

Some general guidelines

- Focus:
 - Advanced/innovative/2nd generation biofuels produced via thermochemical conversion (Heidelberg meeting)
 - Nevertheless biochemical routes have to be considered
 - New options have to be considered
 - NextBTL, Porvoo, Finland: 170 000 tons/year
 - Methanol, Delfzijl, Netherlands: large (original capacity 900 000 ton/year)

Some general guidelines

- Feedstock will gradually shift from residues to energy crops

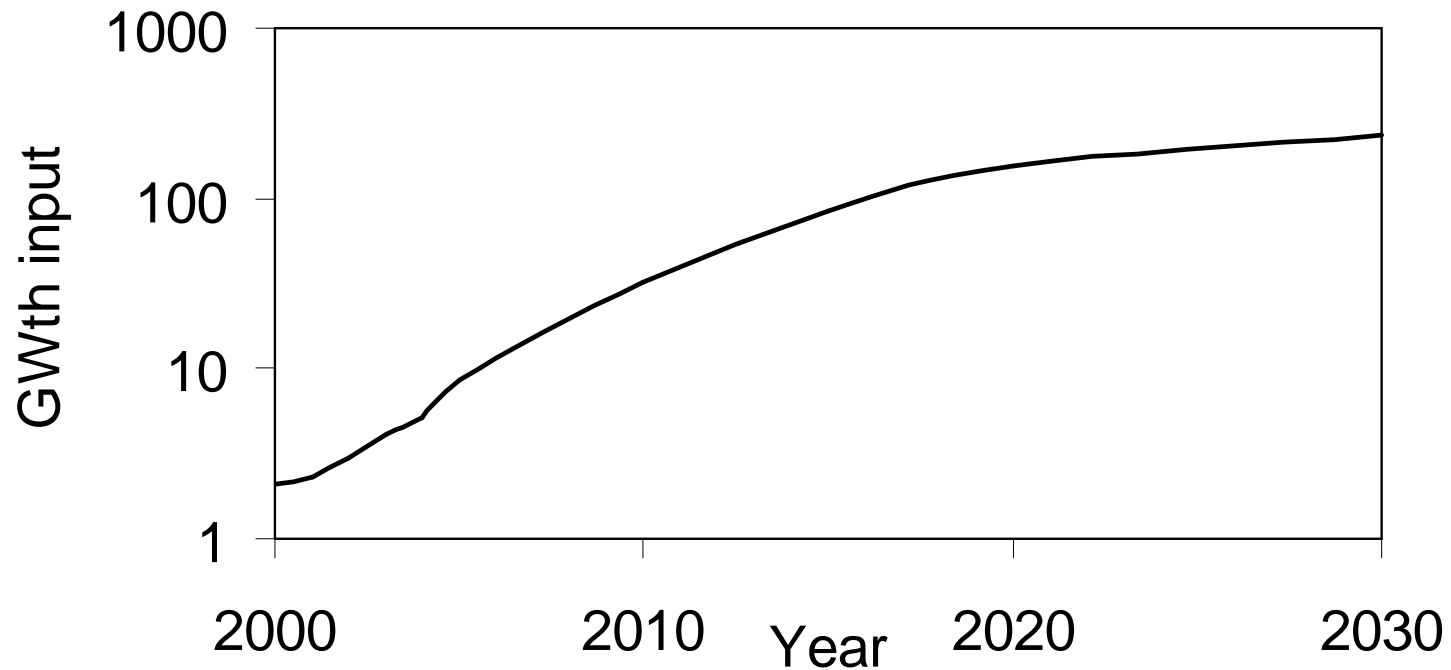


Some general guidelines

- Location will shift from close to the source to centralized
 - On the short/medium term residues important
 - Preferably residues that are available centrally
 - In a later phase more dispersed residues and energy crops

Some general guidelines

- Scale should match development of European feedstock and biofuel market



Some general guidelines

- No overkill in gas cleaning
 - Gas conditioning and cleaning is expensive: gas tailored for synthesis should be used for synthesis
- Conversion should be sustainable
 - Not only with respect to the cultivation step, also considering the generation of waste streams
- Opportunities on the short/medium term are needed and will be used
 - 2nd generation fuels created expectations, we have to fulfill them
 - Also suboptimal systems have to and will enter the market

Final question

- Suggestions for presentation/topics for future workshops
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