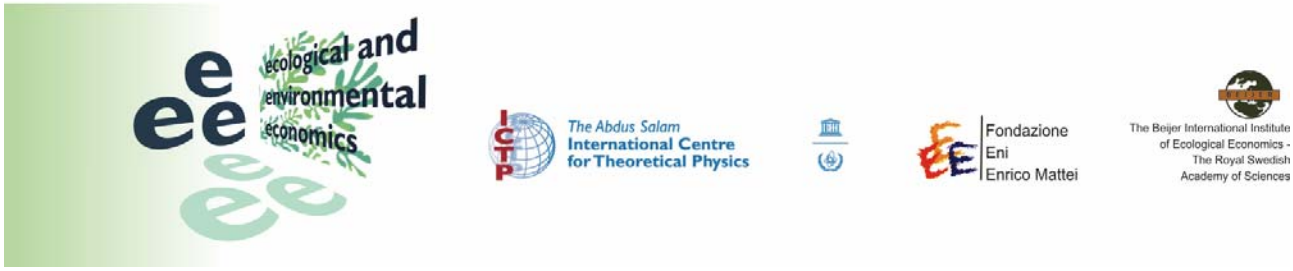


Climate Change Mitigation Measures in

the Agro-Forestry Sector and Biodiversity Futures

16 - 17 October 2006 - ICTP, Trieste, Italy

ASSESSING THE ENVIRONMENTAL IMPACTS OF AGRICULTURAL BIO-ENERGY PRODUCTION IN EUROPE

Jan-Erik Petersen

European Environment Agency

SMR 1811 - 4

Assessing the environmental impacts of agricultural bio-energy production in Europe

International conference on climate mitigation measures in the agro-forestry sector and biodiversity futures

Trieste, 16-17 Oktober 2006

Jan-Erik Petersen
Project manager for agriculture and environment
European Environment Agency

Introduction to the EEA

The EEA is an EU agency established in 1994 to:

- collect data and information on the environment in Europe
- report on main environmental trends and underlying (economic) driving forces
- by these means lay the basis for environmental decisions by policy makers
- The EEA has 32 member countries+180 staff, see: www.eea.europa.eu

The European Environment Agency

Member countries

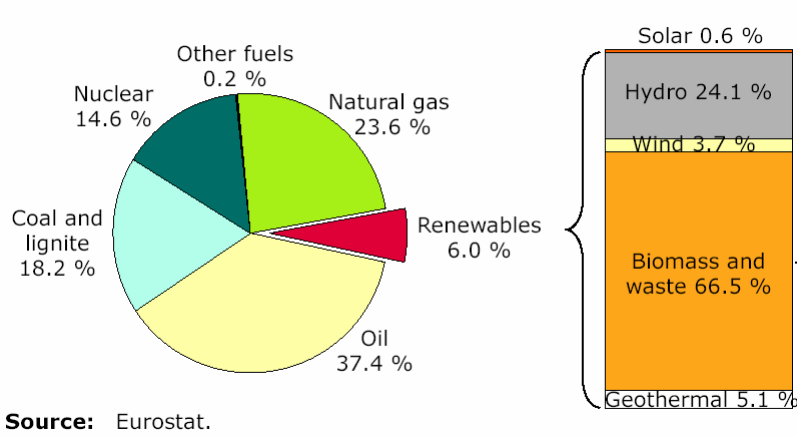
Collaborating countries

www.eea.europa.eu

European Environment Agency

EU policy context

Total energy consumption in the EU-25, 2003



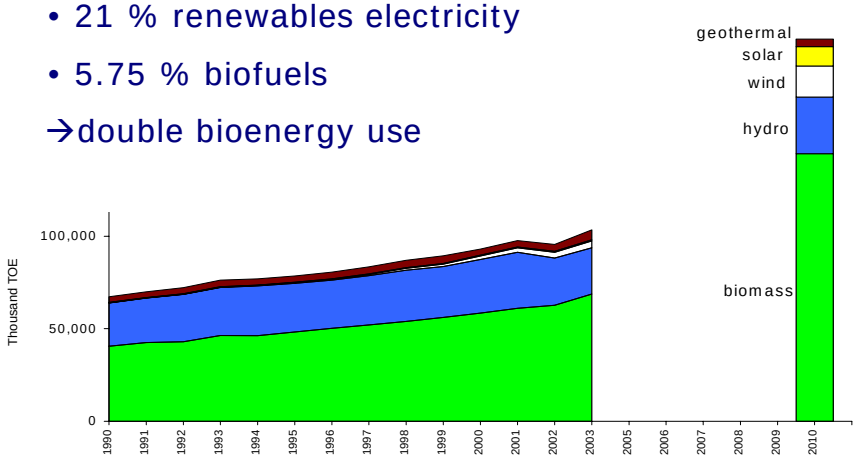
Source: Eurostat.

European Environment Agency

Relevant EU policy targets for 2010

- 12 % renewable energy
- 21 % renewables electricity
- 5.75 % biofuels

→double bioenergy use



5

Source: Eurostat for past data: EEA for projections
Please note: 2010 are modelled data, not policy targets!

European Environment Agency

Agricultural pressures on the environment

- Agriculture manages ca 50% of EU land area
- Ongoing specialisation and regional increase of input use (overall stabilisation at high level)
- ➢ Very important factor for soil erosion and nutrient pollution -> impact on drinking water, rivers and European seas
- ➢ Significant pressure on water resources, particularly in southern Europe
- ➢ Farmland biodiversity + landscapes under threat, but often dependent on agricultural management

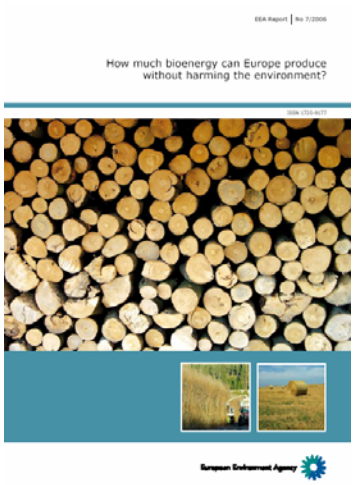
6

European Environment Agency

EEA project: How much biomass can Europe produce without harming the environment?

Objective: determine the bioenergy potential from agriculture, forestry, waste in 2010, 2020, 2030, which

- **Exerts no additional pressure** on farmland and forest biodiversity and soil and water resources
- **Respects other environmental objectives**



European Environment Agency

Agricultural bioenergy: risks

Intensification of the entire agricultural sector

→ Preserve environmentally-oriented farming (30 %) and ecological compensation areas (3 %) despite higher demand for agricultural outputs

Incentives to transform extensive high nature value farmland into arable land

→ No ploughing of extensive grasslands to avoid soil carbon release and loss of biodiversity value

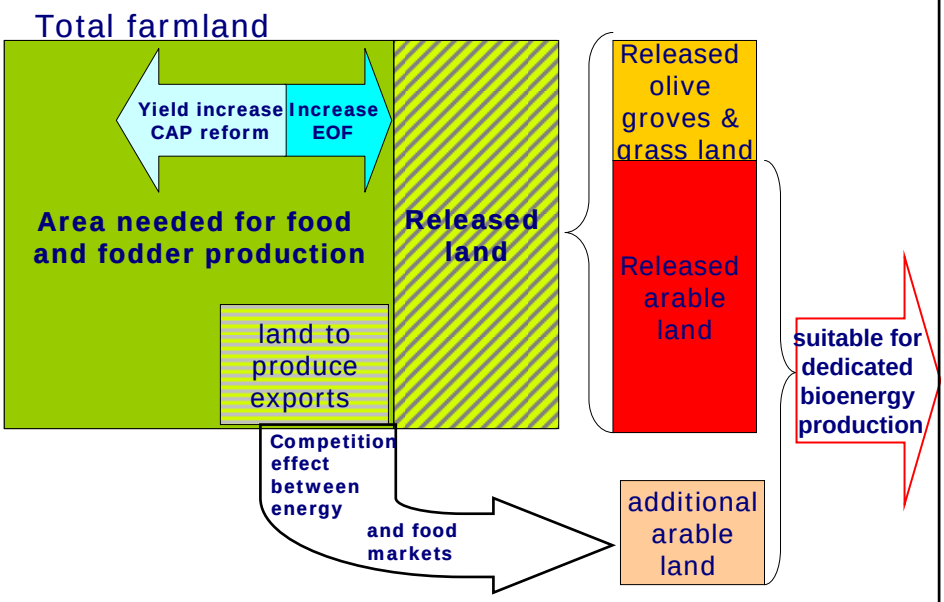
Monocultures of bioenergy crops without respecting environmental pressures

→ Environmentally compatible bioenergy crop mix

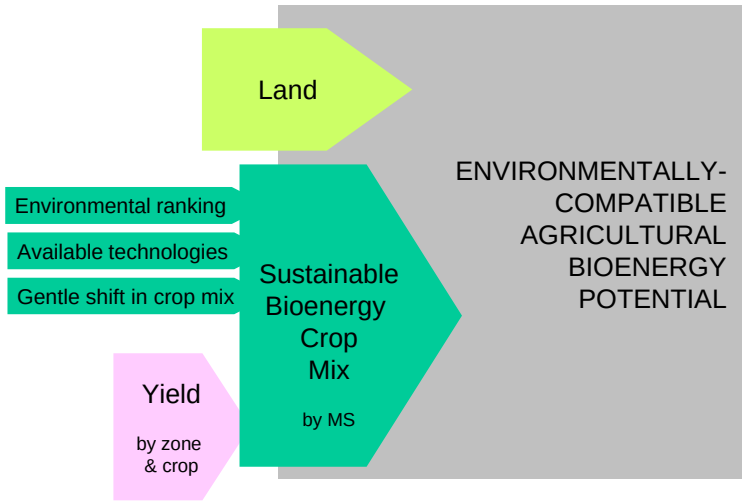
European Environment Agency

Drivers for agricultural bioenergy potential

- **Basic assumption**: no competition between bioenergy and production of food for domestic use (maintain food self sufficiency)
- Liberalisation of agricultural markets
- Yield increases
- Grow more productive bioenergy crops beyond 2010 (when shift from first to second generation biofuels is assumed)



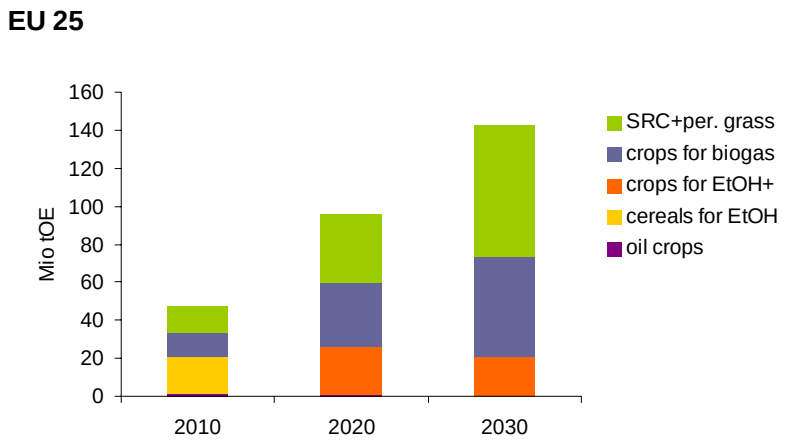
Determing the agricultural bioenergy potential



Annual crops
Broad range from low to high pressure risks

	'Innovative' double cropping	Wheat	Maize	Sugar beet	Poplar perennial - for comparison
Erosion	A	A	C	C	A
Soil compaction	A	A	B	C	A
Nutrient inputs into surface and groundwater	A	A	C	B/C	A
Pesticide pollution of soils and water	A	B	C	C	A
Water abstraction	A/B	B	A/B	A/C	B
Link to farmland biodiversity	B	B/C	B/C	B	A/B

Environmentally-compatible bioenergy potential from agriculture, EU-25



European Environment Agency

Forestry and waste potentials

Forestry:

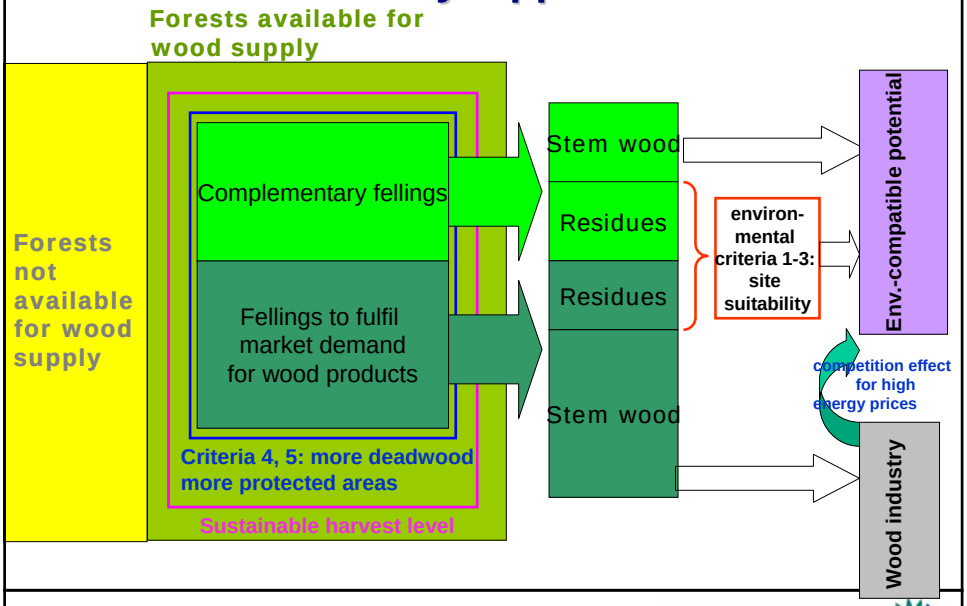
- → adapt the residue extraction rate to site suitability (to prevent soil erosion, safeguard water regulation)
- → no intensification of use in protected forests, increase share of deadwood and protected sites

Waste and residues:

- → aim at a reduction of waste produced per capita
- → compost: first anaerobic digesting, then composting
- → straw: first priority to animal bedding, remainder for bioenergy production

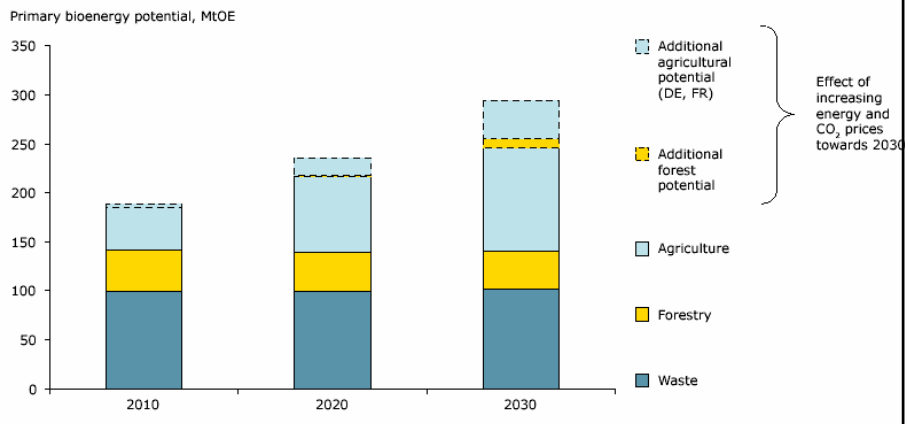
European Environment Agency

Forestry: approach



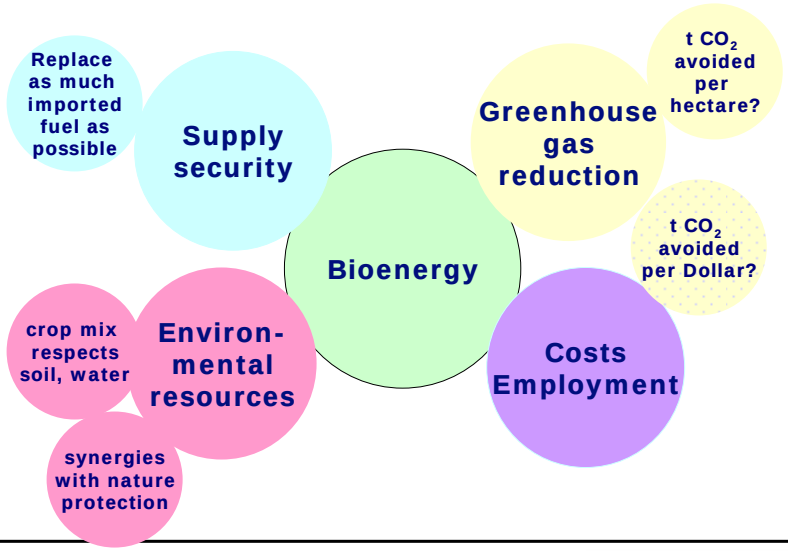
European Environment Agency

The environmentally compatible bioenergy potential, EU-25



European Environment Agency

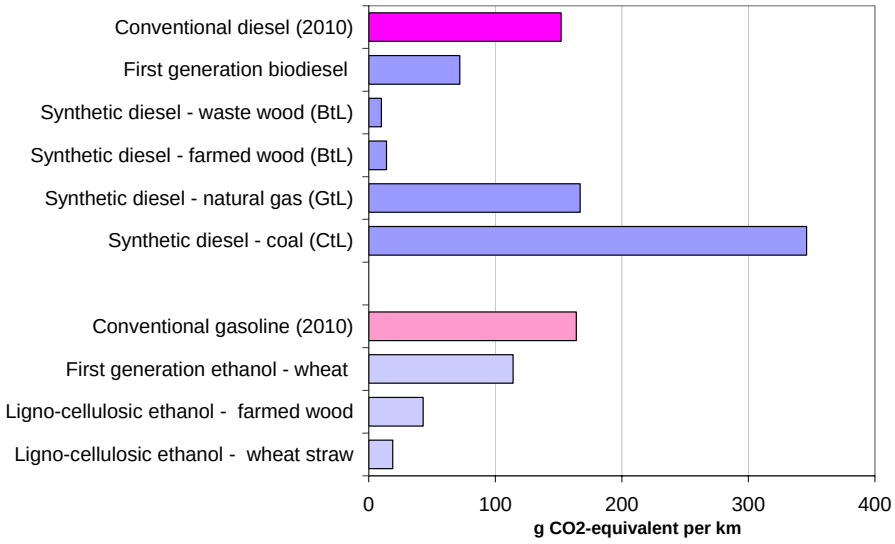
How best to use the potential?



17

European Environment Agency

Well-to-wheel greenhouse gas emissions



18 Based on Well-to-Wheel study version 2b, CONCAWE/EUCAR/JRC
Assumptions: Engines as in 2010; RME: glycerin as animal feed; Wheat conventional ethanol: straw for electricity

European Environment Agency

Conclusions 1/2

- Bioenergy policy should include an assessment of environmental impacts
- Bioenergy crops are different from food crops and open new possibilities
  - → Innovative bioenergy crops can combine high yields and low impacts
  - → Good planning can provide environmental synergies
- An important bioenergy potential comes from waste and residues and can in many cases be used at low cost

Conclusions 2/2

- Well-to-wheel emissions need to be analysed
- Bioheat and -electricity and second generation biofuel technologies are well suited
  - Relatively low emissions of greenhouse gases
  - Can make use of innovative crops and residues
  - Look for low-cost, high-efficiency options
- Bioenergy use in competing end-use sectors transport/heat/electricity depends on policy objectives
- The policy framework needs to provide incentives for environmentally optimal approaches

Co-benefits between energy use and nature protection

Use of innovative bioenergy cropping systems

- reduces environmental pressures compared to food cropping
  (e.g. less nutrient input, enhanced crop diversity, less use of heavy machines lower, structural elements)
- high energy yield

Use of forest residues

- can support fire prevention measures in otherwise unmanaged forests in Southern Europe

Use of cuttings from grassland

- necessary to maintain biodiversity-rich grassland and landscape diversity
- provide (limited) amount of bioenergy

Jan-Erik Petersen

European Environment Agency
Telephone : +45 3336 7133

Jan-Erik.Petersen@eea.europa.eu

www.eea.europa.eu