Sustainable Biomass in the EU

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Sacramento, CA
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Targets

- EU until 2020
  - 10% share of bio fuels on the total EU-fuel consumption
  - 20% share of renewable energy of total energy consumption
- German government until 2020 (Meseberg):
  - 25-30% of electricity from renewables (today ~13%)
  - 6% of today natural gas consumption from bio gas
  - 14% of heat from renewables
  - 10% Net – climate gas reduction by bio fuels
    ~ 20 Vol. - % share
- Bio fuel quota law:
  - 6,75% bio fuels until 2010,
  - 15% until 2020
CLIMATE CHANGE –
Council conclusions from 20.2.2007

REAFFIRMS the Community's long-term commitment to the EU-wide development of renewable energies beyond 2010, UNDERLINES that all types of renewable energies, when used in a cost-efficient way, contribute simultaneously to security of supply, competitiveness and sustainability, and IS CONVINCED of the paramount importance of giving a clear signal to industry, investors, innovators and researchers. For these reasons, taking into consideration different individual circumstances, starting points and potentials, it ENDORSES the following targets:
– a target of a 20% share of renewable energies in overall EU energy consumption by 2020;
– a 10% binding minimum target to be achieved by all Member States for the share of biofuels in overall EU transport petrol and diesel consumption by 2020, to be introduced in a cost-efficient way. The binding character of this target is appropriate subject to production being sustainable, second-generation biofuels becoming commercially available and the Fuel Quality Directive being amended accordingly to allow for adequate levels of blending.
Biofuel Sustainability Issues

• **Biofuels could have positive impacts:**
  - GHG reduction (through fossil-fuel substitution);
  - rural employment/income; more **agrobiodiversity**; soil carbon increase, less erosion …

• **But impacts could also be negative:**
  - GHG from cultivation, soil carbon, indirect land use changes…
  - **Loss of biodiversity** from land-use changes *(leakage)*, water use, agrochemicals, erosion…
  - Food price feedbacks
19. Council approves amended common position
   (i) by a qualified majority if the Commission has delivered a positive opinion
   (ii) unanimously if the Commission has delivered a negative opinion

20. Act adopted as amended

21. Council does not approve the amendments to the common position

22. Conciliation Committee is convened

23. Conciliation procedure

24. Conciliation Committee agrees on a joint text

25. Parliament and Council adopt the act concerned in accordance with the joint text

26. Act is adopted

27. Parliament and Council do not approve the joint text

28. Act is not adopted

29. Conciliation Committee does not agree on a joint text

30. Act is not adopted

- amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions from the use of road transport fuels and amending Council Directive 1999/32/EC, as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC

- Proposal for a Directive of the European Parliament and of the Council on the promotion of the use of energy from renewable sources

= Presidency suggestions for a common sustainability scheme

Source: COUNCIL OF THE EUROPEAN UNION 8847/08 Brussels, 5 May 2008
What happened until now?

On 22 February 2008, Coreper decided to establish an ad hoc Working Party with the task of drawing up a common sustainability scheme for biofuels for the purposes of the two above-mentioned directives. Since then, the ad hoc Working Party has met on several occasions, most recently on 5 May 2008. In accordance with its mandate, it took as the basis for its work the relevant provisions of the proposed directive on renewable energy, while also taking account of relevant discussions on the fuel quality directive within the Working Party on the Environment and the European Parliament.
In addition to a number of more technical points, there are four key outstanding issues:

- the level and date of application of the second stage for the minimum greenhouse gas saving requirement in Article 15(2);
- the definition of highly biodiverse forests (Article 15(3)(a));
- whether to have binding criteria, reporting requirements or monitoring for the environmental and social impact of biofuel production in third countries (Article 15(5a), (5b) and (5c)); and
- elements of the methodology for calculating the greenhouse gas saving obtained by using biofuels (Annex VII), particularly as regards the calculation of default values and the treatment of co-products.
Greenhouse Gas Reduction

The greenhouse gas emission saving from the use of biofuels and other bioliquids taken into account for the purposes referred to in paragraph 1 shall be at least 35%.

With effect from 1 January 2015, the greenhouse gas emission saving from the use of biofuels and other bioliquids taken into account for the purposes referred to in paragraph 1 shall be at least 50%. There is agreement on the Presidency's suggestion of a two-step approach.

Most delegations support or could accept the 35% figure for the first step while DK/NL/UK consider it too low and ES considers it too high.

IE/AT/PL/RO are concerned that the 50% figure for the second step is too high. FR requests a start date of 2018 for the second step. BE/BG/CZ/EE/ES/LT/HU/AT/PT/SK argue that the figure for the second step should be left to a subsequent review. DK/NL/UK call for a higher figure for the second step.
Greenhouse Emissions from Land Use Change

Annualised emissions from carbon stock changes caused by land use change, shall be calculated by dividing total emissions equally over 20 years. For the calculation of these emissions the following rule shall be applied:

\[ el = (CS_R - CS_A) \times 3.664 \times 1/20 \times 1/P \]

\( el \) = annualised greenhouse gas emissions from carbon stock change due to land use change (measured as mass of CO2-equivalent per unit biofuel energy);

\( CS_R \) = the carbon stock per unit area associated with the reference land use (measured as mass of carbon per unit area, including both soil and vegetation). The reference land use shall be the land use in January 2008 or 20 years before the raw material was obtained, whichever was the later;

\( CS_A \) = the carbon stock per unit area associated with the actual land use (measured as mass of carbon per unit area, including both soil and vegetation);

\( P \) = the productivity of the crop (measured as biofuel or other bioliquid energy per unit area per year);
Restoration of degraded Land

eB = bonus of [x] gCO2eq/MJ biofuel or other bioliquid energy if biomass is obtained from restored degraded land; i.e., land formerly used for agricultural production that was, in January 2008, unsuitable for agricultural production (e.g., salinated land and abandoned rubber plantations) and which, before restoration, was not land as mentioned in Article 15(3) or (4)].

DE suggests a bonus of 70g/CO2eq/MJ biofuel.
FR considers that the bonus should not exceed 29g/CO2eq/MJ biofuel.
DK/SE/UK expressed doubts about the principle of a bonus for the use of degraded land.
<table>
<thead>
<tr>
<th>land use</th>
<th>carbon stock (tons of carbon per hectare)</th>
</tr>
</thead>
<tbody>
<tr>
<td>oil palm plantation</td>
<td>189</td>
</tr>
<tr>
<td>permanent grassland, that is to say, rangelands and pasture land which have been under grassland vegetation and pasture use for at least 5 years and are not forested</td>
<td>181</td>
</tr>
<tr>
<td>lightly forested area (forest that is not continuously forested area)</td>
<td>181</td>
</tr>
<tr>
<td>arable (including grassland not considered as permanent; plantation of tree borne oil seeds; land that has been set aside in accordance with Article 2(1) of Commission Regulation (EC) No 796/2004* and land that was tropical forest, was cleared before January 2008, and had the status of abandoned land in January 2008)</td>
<td>82</td>
</tr>
<tr>
<td>desert and semidesert</td>
<td>44</td>
</tr>
</tbody>
</table>

Alternatively, actual values may be used for both $CS_R$ and $CS_A$. 
Typical and default values for biofuels- no net carbon emissions from land use change (1)

<table>
<thead>
<tr>
<th>biofuel production pathway</th>
<th>typical greenhouse gas emission saving</th>
<th>default greenhouse gas emission saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>sugar beet ethanol</td>
<td>48%</td>
<td>35%</td>
</tr>
<tr>
<td>wheat ethanol (process fuel not specified)</td>
<td>21%</td>
<td>0%</td>
</tr>
<tr>
<td>wheat ethanol (lignite as process fuel in CHP plant)</td>
<td>21%</td>
<td>0%</td>
</tr>
<tr>
<td>wheat ethanol (natural gas as process fuel in conventional boiler)</td>
<td>45%</td>
<td>33%</td>
</tr>
<tr>
<td>wheat ethanol (natural gas as process fuel in CHP plant)</td>
<td>54%</td>
<td>45%</td>
</tr>
<tr>
<td>wheat ethanol (straw as process fuel in CHP plant)</td>
<td>69%</td>
<td>67%</td>
</tr>
<tr>
<td>corn (maize) ethanol, Community produced (natural gas as process fuel in CHP plant)</td>
<td>56%</td>
<td>49%</td>
</tr>
<tr>
<td>sugar cane ethanol</td>
<td>74%</td>
<td>74%</td>
</tr>
<tr>
<td>the part from renewable sources of ETBE (ethyl-tertio-butyl-ether)</td>
<td>Equal to that of the ethanol production pathway used</td>
<td>Equal to that of the ethanol production pathway used</td>
</tr>
<tr>
<td>the part from renewable sources of TAEE (tertiary-amyl-ethyl-ether)</td>
<td>Equal to that of the ethanol production pathway used</td>
<td>Equal to that of the ethanol production pathway used</td>
</tr>
</tbody>
</table>
## Typical and default values for biofuels- no net carbon emissions from land use change (2)

<table>
<thead>
<tr>
<th>biofuel production pathway</th>
<th>typical greenhouse gas emission saving</th>
<th>default greenhouse gas emission saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>rape seed biodiesel</td>
<td>44%</td>
<td>36%</td>
</tr>
<tr>
<td>sunflower biodiesel</td>
<td>58%</td>
<td>51%</td>
</tr>
<tr>
<td>palm oil biodiesel (process not specified)</td>
<td>32%</td>
<td>16%</td>
</tr>
<tr>
<td>palm oil biodiesel (process with no methane emissions to air at oil mill)</td>
<td>57%</td>
<td>51%</td>
</tr>
<tr>
<td>waste vegetable or animal oil biodiesel</td>
<td>83%</td>
<td>77%</td>
</tr>
<tr>
<td>Hydrotreated vegetable oil from rape seed</td>
<td>49%</td>
<td>45%</td>
</tr>
<tr>
<td>Hydrotreated vegetable oil from sunflower</td>
<td>65%</td>
<td>60%</td>
</tr>
<tr>
<td>Hydrotreated vegetable oil from palm oil (process not specified)</td>
<td>38%</td>
<td>24%</td>
</tr>
<tr>
<td>Hydrotreated vegetable oil from palm oil (process with no methane emissions to air at oil mill)</td>
<td>63%</td>
<td>60%</td>
</tr>
<tr>
<td>pure vegetable oil from rape seed</td>
<td>57%</td>
<td>55%</td>
</tr>
<tr>
<td>biogas from municipal organic waste as compressed natural gas</td>
<td>81%</td>
<td>75%</td>
</tr>
<tr>
<td>biogas from wet manure as compressed natural gas</td>
<td>86%</td>
<td>83%</td>
</tr>
<tr>
<td>biogas from dry manure as compressed natural gas</td>
<td>88%</td>
<td>85%</td>
</tr>
</tbody>
</table>
Allocation of Co-Products

In the calculation of greenhouse gas emissions from the production and use of fuels, co-products should be accounted for. For policy analysis purposes the substitution method is appropriate. For regulatory purposes of transport fuels, the substitution method is not appropriate.

The energy allocation method is the most appropriate method to use, because it is easy to apply, predictable over time, minimizes counter-productive incentives and gives results that are generally comparable with the range of results given by the substitution method.

Greenhouse gas emissions shall be divided between the fuel or its intermediate product and the co-products in proportion to their energy content (determined by lower heating value in the case of co-products other than electricity).
Draft report Claude Turmes, Rapporteur of the EU Parliament to the EU Commission Proposal for a EU Directive on the promotion of the use of energy from renewable sources

**Note: Recitals will be adapted according to the decisions related to the Articles and Annexes of the Directive. In this context, only the recitals which are related to the Rapporteur's proposal to scrap the 10% "biofuels" target are covered here below**

...Article 3

 Targets for the use of energy from renewable sources

 ...*[Deletion of the 10% target for biofuels]*
Mariann Fischer Boel, EU Commissioner for Agriculture and Rural Development:
Our transport sector is a heavy polluter. It's responsible for more than 20 per cent of greenhouse gas emissions that contribute to climate change in the European Union. And emissions are climbing faster in this sector than in any other. Using more biofuels can help bring this destructive growth under control – in combination with policies on car emissions and transport logistics...
...the Commission has proposed a safeguard: a given biofuel would count towards a Member State's target only if it made a greenhouse gas saving of at least 35 per cent compared to fossil fuels...

Source: Mariann Fischer Boel, EU Commissioner for Agriculture and Rural Development, CPC Policy dialogue on biofuels, Brussels, 6 May 2008;
Potential of Fuel Saving by low rolling Resistance Tires

30% reduction of the rolling resistance reduces the fuel consumption:

city driving: 4-6%
extra urban driving (70 to 89 km/h): 3-5%
autobahn driving (120 km/h): 2-3%

Proposal for a EU tires Regulation: Car tires rolling resistance limit:
13.5 kg/t from October 2014, 12.0 kg/t in October 2016;

State of the art 2008: 7kg/t
Mariann Fischer Boel, EU Commissioner for Agriculture and Rural Development:

…It's important to understand how our greenhouse gas calculations take land conversion into account. They don't try to factor in greenhouse gas emissions supposedly caused by indirect land conversion. This is because there are no reliable studies to show that biofuel production causes indirect conversion…

Source: Mariann Fischer Boel, EU Commissioner for Agriculture and Rural Development, CPC Policy dialogue on biofuels, Brussels, 6 May 2008;
Fundamentals

LAND IS LIMITED!

- Other area: 4,100 M ha (31%)
- Other forests: 2,496 M ha (19%)
- Primary forests: 1,404 M ha (11%)
- Pasture + permanent crops: 3,600 M ha (28%)
- Arable land (irrigated): 280 M ha (2%)
- Arable land (not irrigated): 1,120 M ha (9%)

Source: FAOSTAT; IIASA
There is a tremendous and continuous loss of forests.

**Fundamentals**

**Annual net change in forest area by region 1990 – 2005 (million ha per year)**

- **South America**
- **Africa**
- **Asia**
- **Europe**
- **North + Central America**
- **Oceania**

Source: FAO
Global Forest Resources Assessment 2005
Predicted Conversion of Natural Land into Agriculture Land for the Cultivation of Soya Beans in South America (2004-2020)

ca. 20 Mio. ha

- Bush Savannas
- Wetland Savannas
- Rain Forest
- Costal Forest
- Dry Forest

DROS (2004)
“Leakage” from Biofuels?

Source: based on Girard (GEF-STAP Biofuels Workshop, New Delhi 2005)
GHG from indirect Land Use Change

• Displacement is a generic problem arising from restricted system boundaries
  – Accounting problem of partial analysis („just“ biofuels, no explicite modelling of agro + forestry sectors)
  – All incremental land-uses imply indirect effects

• Analytical and political implications
  – Analysis: which displacement when & where?
  – Policy: which instruments? Partial certification schemes do not help, but have „spill-over“ effects
Greenhouse Gas Default Values

![Graph showing greenhouse gas emissions for different biofuels.](image)

- **Ethanol from wheat**
- **Ethanol from maize/corn**
- **Ethanol from sugar cane**
- **Methylester from rapeseed oil**
- **Methylester from soybean oil**
- **Methylester from palm oil**

**kg CO2-Eq. per GJ Biofuel**

- **Direct land use change**
- **Production of biomass**
- **Transport of biomass**
- **Conversion step I**
- **Transport between conversion steps**
- **Conversion step II**
- **Transport to fuel storage for fossil reference systems** (gasoline: 85 kg/GJ, Diesel: 86.2 kg/GJ)

**30% saving**

**322 kg CO2-Eq./GJ**
Biodiversity and Biofuels

Land-use not only relevant for GHG, but also biodiversity impacts:

→ Pressure on areas of high biological diversity

→ Direct impacts on rare, threatened or endangered species and ecosystems

→ Indirect impacts through impaired / reduced ecosystem functions
Biodiversity in the German Bio Fuel Sustainability Ordinance

§ 3 – Protection of natural habitats

Addressed are protected areas (PA) and high nature value areas (HNV)

→ Areas of high biological diversity
→ Areas of rare, threatened or endangered species/ ecosystems
→ Basic protection functions

§ 2 – Sustainable biomass production

Addressed are standards for biomass production (best practice)

... 

→ No substantial decline of species/ ecosystem diversity 
...
Definitions

Biological diversity (=biodiversity) (CBD, article 2)

- variability among living organisms from all sources
- including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part
- this includes diversity within species, between species and of ecosystems.

Agricultural biodiversity (=agrobiodiversity) (FAO/CBD Workshop 1998)

- variety and variability of animals, plants and micro-organisms which are necessary to sustain key functions of the agro-ecosystem its structure and processes for, and in support of, food production and food security.
- The term agricultural biodiversity encompasses within-species, species and ecosystem diversity.
Global Land Categories

Protected Areas

- Instrument to protect natural resources including biodiversity (IUCN, WCMC, CBD)
- Cornerstones of regional conservation strategies
- Represent the biodiversity of each region
- Separate this biodiversity from processes that threaten its persistence
- International Databases: World Database on Protected Areas (WDPA), UN List of Protected Areas

**BUT:**

- Strategies for managing whole landscapes (production + protection) are needed for the protection of biodiversity.
- Large number of these species, ecosystems and ecological processes are not yet adequately protected (gap analysis)

**Definition of Protected Areas**

**IUCN:**
Protected Areas are areas “of land and/or sea especially dedicated to the protection and maintenance of biodiversity, and of natural and associated cultural resources, and managed through legal or other effective means”.

**CBD:**
Protected Area as “a geographically defined area that is designated or regulated and managed to achieve specific conservation objectives”.

- Unused land
- Used land
- High nature value area (HNV)
- Degraded land and waste land
- Protected area
Certification – the Solution?

Goal:

• Production and use of bio mass is made sustainable
• Main points:
  • Green house gas balance
  • Ecological consequences of land use
  • Social – economical effects

A certification scheme has to be installed world wide - not only in one country!
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www.umweltbundesamt.de
Oil palm plantation through cutting of tropical forests