

## Status of EUROCLIMA Bioenergy activities

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## Terminology

### Bioenergy

Production of energy from material of biological origin (Plant biomass....)

### Bioenergy feedstock categories:

Agriculture + Forestry + Waste

### Bioenergy uses:

Transport + Heat + Electricity

From solid, liquid, gaseous biofuels

### Biofuels Generations:

First. Second ? Third ?



## Agriculture = 4 Fs = Food, Feed, Fuel, Fiber + Bio-materials and green chemistry

**Food, Feed** = Large quantities, low profit margins

**Green chemistry** = Low quantities, high profit margins but high technology

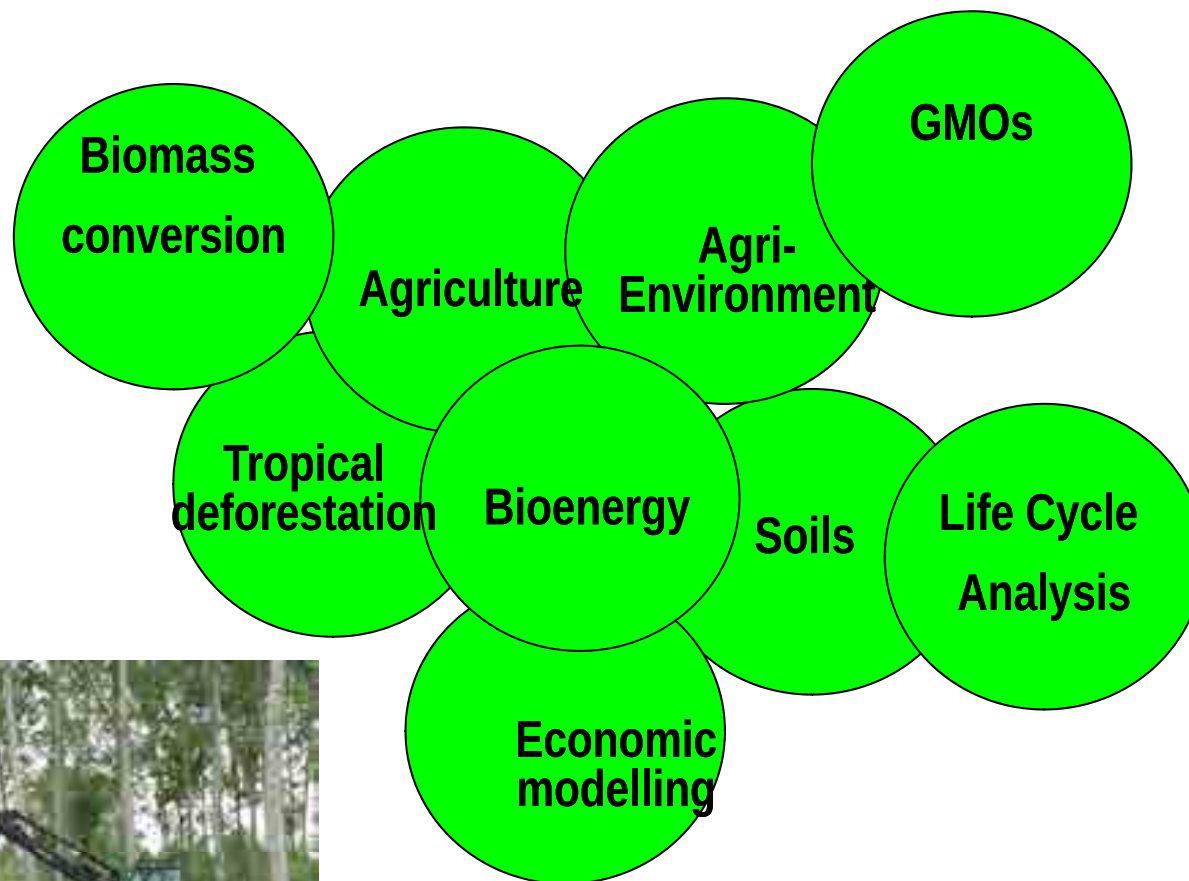
**Bioenergy** = Large quantities, low profit margins

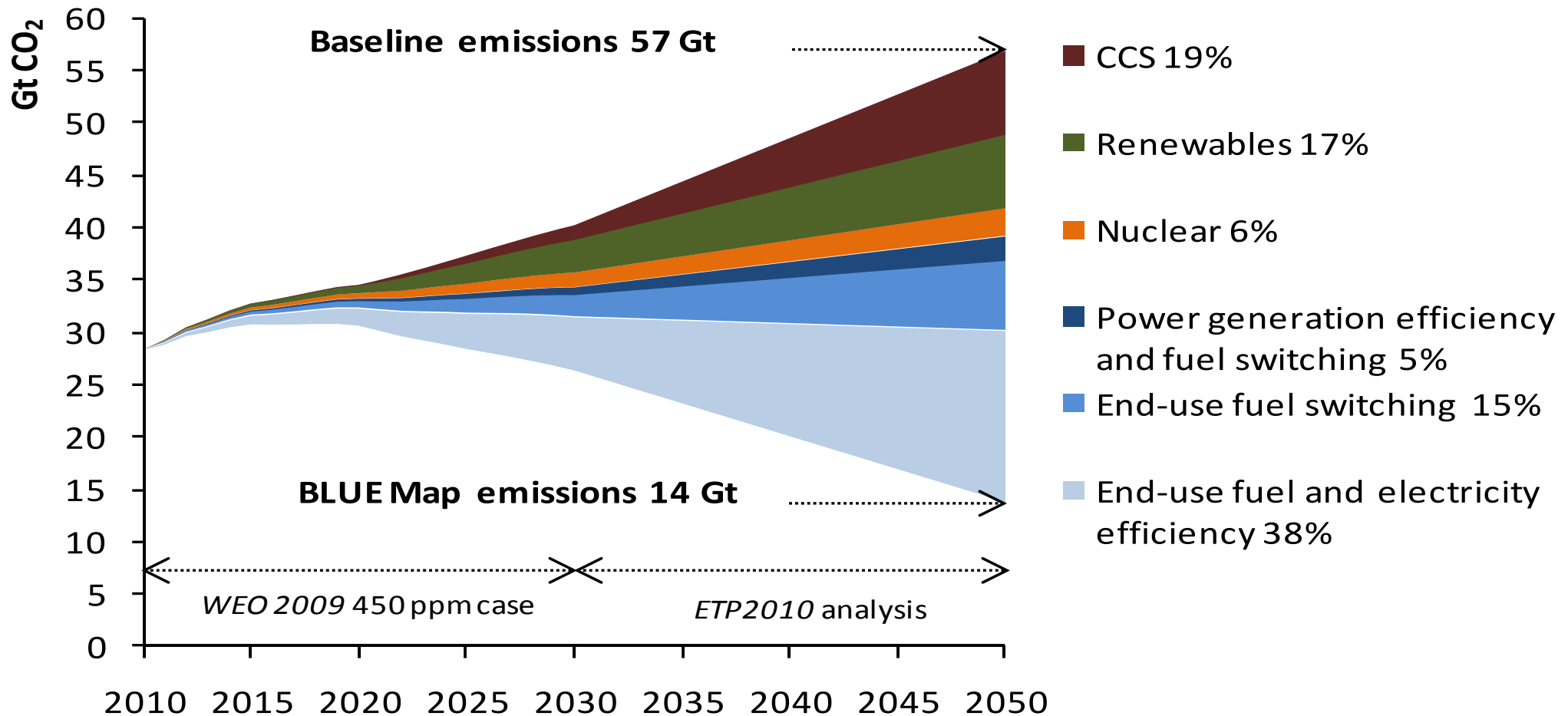
How much land do we need ?

Which land shall we use ?

Challenges and opportunities ?







Source: ETP 2010

**We need a global 50% CO<sub>2</sub> cut by 2050**

**A wide range of technologies will be necessary to reduce energy-related CO<sub>2</sub> emissions substantially**

## ■ 2009 releases

- Carbon capture & storage, Electric vehicles, Cement sector, Wind energy

## ■ 2010 releases

- Solar PV, Concentrating Solar Power – May
- Nuclear power – July
- Energy efficient buildings: heating and cooling – September
- Smart grids, Vehicle efficiency – December

## ■ 2011 releases

- **Biofuels; Bioenergy for heat & power;** Clean/high-efficiency coal; Energy efficiency in buildings: design & operation; Geothermal power; Hydrogen & fuel cell vehicles

## **Background: IEA Energy Technology Perspectives (ETP) projections as a foundation for roadmap development**

**IEA ETP 2010 provides detailed projections of global energy use to 2050, calibrated to WEO 2009**

**IEA ETP BLUE Map scenario depicts a set of pathways to reach a 50% reduction in global energy-related CO<sub>2</sub> by 2050**

Based on cost-minimization, up to USD 175/ton CO<sub>2</sub> by 2050

Uses a back-casting approach to identify pathways and ramp-up rates for different technologies and new fuels

**Use of bioenergy roughly triples by 2050,  
Biofuels demand in transport increases 10-fold**

**Biomass currently provides around 1100 Mtoe (50 EJ) of primary energy per year**

**190 Mtoe (8 EJ)/yr of commercial heat and power and 40 Mtoe (1.7 EJ)/yr of liquid transport fuels**

**Traditional biomass accounts for over 800 Mtoe (35 EJ) /yr**

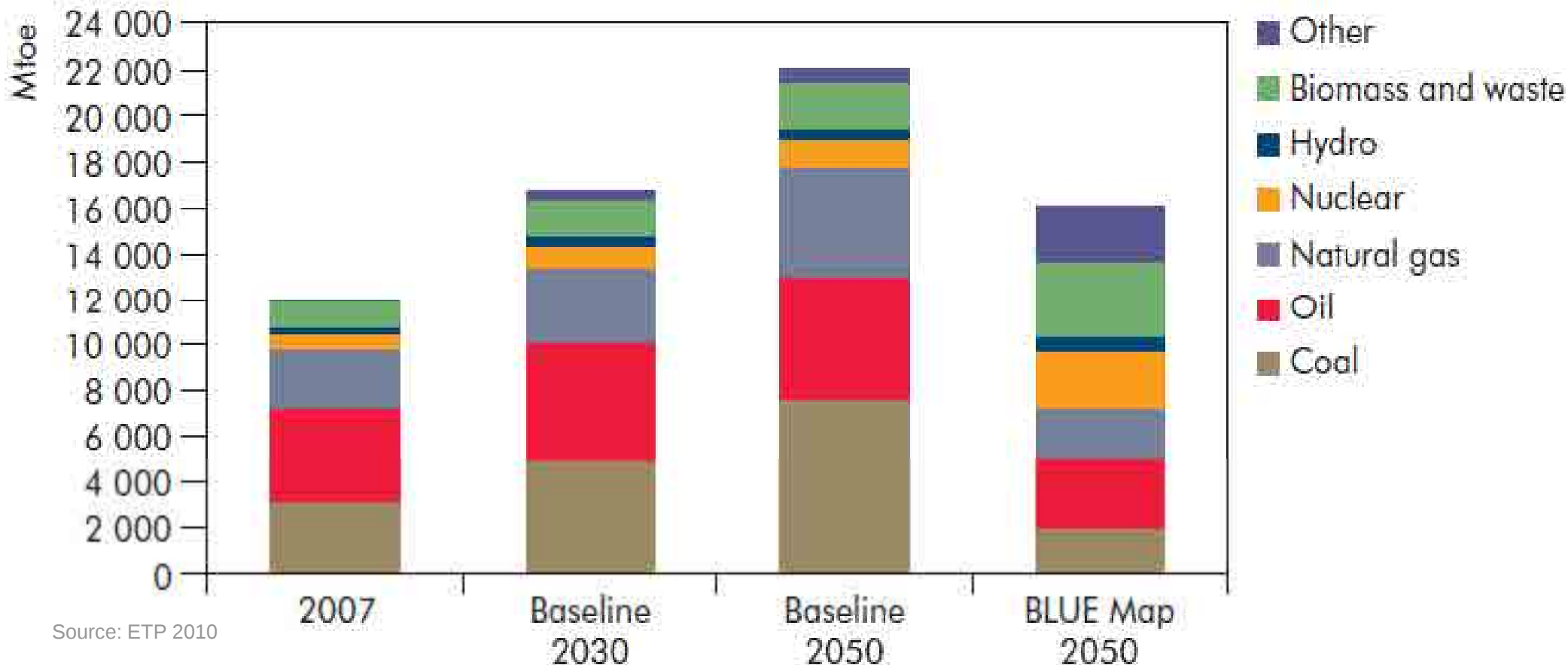
**In BLUE Map scenario biomass use increases to around 3400 Mtoe (140 EJ)/yr in 2050.**

**This will require roughly 7 000 Mt dry biomass (in total) between 375-750 Mha\* of land needed (in total), if 50% come from crop and forest residues and the rest from purpose grown energy crops**

\*assuming average yield of 5-10 tons (dry)/ha

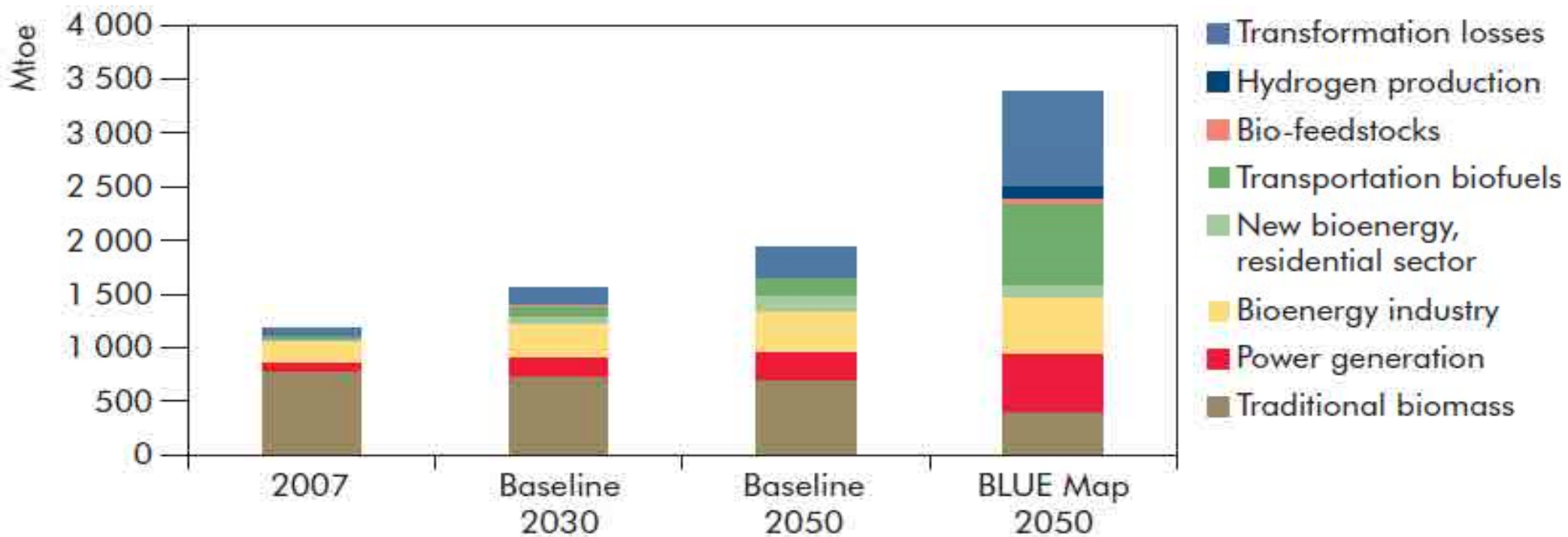
1Exa Joule =  $10^{18}$  Joule





- Use of biomass increases 3-fold in the BLUE Map scenario of IEA ETP (Energy Technology Perspectives) and provides 20% of TPES (Total Primary Energy Supply) (140 EJ) in 2050

- Bioenergy accounts for roughly 10% of energy related CO<sub>2</sub> emission reductions in 2050



Note: The chart includes transformation losses in the production of liquid biofuels from solid biomass.

Source: ETP 2010

- “Modern” bioenergy production increases significantly in Blue Map, whereas traditional biomass use is reduced by 2050
- Around 50% of biomass demand in the BLUE Map scenario is for production of biofuels for transport

## Intergovernmental Panel on Climate change IPCC

Working Group III-Mitigation of Climate Change

Special Report on Renewable Energy Sources and Climate Change Mitigation

Final Release Bioenergy, 2011

- *Technical potential (Sustainable potential considering competitive use...) of biomass for energy may be as large as 500 EJ/year by 2050*
- *Potential deployment levels by 2050 in the range of 100 to 300 EJ/Year*
- *Bioenergy has significant potential to mitigate GHGs if resources are sustainably developed and efficient technologies are applied*



## Why Bioenergy ?

Climate Change, Agriculture, Energy supply, Energy security,  
Rural Development

But Food versus Fuel ? Indirect Land Use Change (ILUC) ?  
And..... ?

## Why Latin America ?

- Brazil, bio-ethanol production = 12.8 Mtoe  
(USA = 21.5 Mtoe, Europe = 1.7 Mtoe)
- Argentina, 4th world largest producer of biodiesel,  
3rd soybean producer,  
20Mha of no tillage, out of 47 Mha in LA and 95 Mha worldwide
- Sugar, land, biomass, palm, jatropha (?) .....
- Controversy about tropical deforestation



## Some of our JRC activities (Bioenergy)

GIS

Resource assessment

GHG Emissions assessment (LCA)

Water

Assesment of National Renewable Energy Action Plans (NREAPs)

Networking: European Biomass Conference, EEA, UNEP, National institutions

IEA Bioenergy Task 43 on Biomass feedstocks for Energy Markets

ILUC comparison

Biorefineries

.....



## EU Renewable Energy Directive (RED, 2009)

**2020**

**20% Renewables + 20% Reduction of Emissions  
of GHG + 10% Renewable Energy in Transport**



**The Commission set up specific Sustainability Criteria (identical in the two Directives) for biofuels in use in EU (internal production or imported)**

|                                     |                                                                                                                                                                                    |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>GHG Impact</b>                   | <input type="checkbox"/> <i>Minimum 35% GHG Emissions saving (50% from 2017, 60% from 2018)</i>                                                                                    |
| <b>Biodiversity</b>                 | <input type="checkbox"/> <i>not be made from raw materials obtained from biodiverse areas (including primary forests)</i>                                                          |
| <b>Land use</b>                     | <input type="checkbox"/> <i>Not be made from land with high carbon stock (i.e. wetlands, forested areas...)</i><br><input type="checkbox"/> <i>Not be grown on peatlands</i>       |
| <b>Good agricultural conditions</b> | <input type="checkbox"/> <i>Requirement for good agricultural and environmental conditions (as defined in Annex III to Council Regulation 1782/2003) and social sustainability</i> |

**Place: Buenos Aires**

**Date: 29-30 March 2011**

**Workshop on GHG Emissions from Biofuels and bioenergy**

**Date: 31 March 2011**

***International Workshop on “The environmental impacts of  
biofuel production in Latin America”***

**+ Technical visit on 1 April**

- European Commission Joint Research Centre
- INTA: Instituto Nacional de Tecnología Agropecuaria (Argentina)
- Ministry of Agriculture, Livestock and Fisheries of Argentina

## **Session 1: Production of feedstocks for biofuels**

Soybean in the production systems of Argentina

The impact of biofuels production in Argentina. National Bioenergy Programme

EC JRC activities in the field of biofuels

Global activities towards sustainable bioenergy

Practical indicators on extensive agriculture production

## **Session 2: GreenHouse Gases (GHG) emissions from biofuels**

GHG emissions from biofuels and bioenergy

GHG emissions from biofuels. The Spanish perspective

Life Cycle Assessment and sustainability calculations for biofuels supply chains

GHG emissions from biofuels in the EU Renewable Energy Directive

## **Session 3: Issues related to the quantification of GHG Emissions from biofuels and bioenergy**

Quantification of N<sub>2</sub>O emissions from biofuel feedstock cultivation

Update information on N<sub>2</sub>O emissions from agricultural soils

Field measurements of agricultural emissions

Land use monitoring of biofuels development

GHG emissions from bioenergy: a longer term view

## **Session 4: Biofuels/bioenergy certification initiatives and GHG emissions**

GBEP's work in the areas of GHG Life Cycle Analysis and sustainability indicators for bioenergy

CSCS CARBIO certification scheme

The ISCC certification scheme

UK Renewable Transport Fuel Obligation and GreenHouse Gas emissions

Rural Land Use Planning Project (RULUPP)

Influence of international and national requirements in global trade

**Exchange expertise, collect/analyse/discuss data and information on the following topics:**

- 1) GHG emissions from biofuels for transport (bioethanol and biodiesel) produced in Latin America, with specific focus on the use of crops such as soya.**
- 2) GHG emissions from bioenergy pathways (for heat and electricity) based on Latin-American feedstock.**
- 3) GHG emissions from biofuels/bioenergy and role of standardisation (ISO, CEN) and environmental/sustainability certification initiatives (CARBIO, GBPEP, RTRS, RSB, ISCC...).**

**See [http://re.jrc.ec.europa.eu/biof/html/ghg\\_argentina.htm](http://re.jrc.ec.europa.eu/biof/html/ghg_argentina.htm)**



**Workshop on Agro-environmental impact of biofuels and bioenergy in tropical countries.** This will include possible links with tropical deforestation, land use change and area expansion, biodiversity monitoring, impact on water resources, comparison between the impact of first and second generation biofuels, impact of the use of waste and crop residues.

**Planned Campinas (Brazil), end of November 2011, cooperation UNICAMP-CTBE**

**Expert consultation on Technology transfer in the field of biofuels/bioenergy;** This will address more specifically the possible cooperation between Brazil/Argentina/Europe and other countries in the field of bioenergy: challenges and constraints. The possible transfer of experience in the field of Short Rotation Coppice/Short Rotation Forestry and eucalyptus will also be addressed.

