

# **“Bioenergy development: perspectives and barriers”**

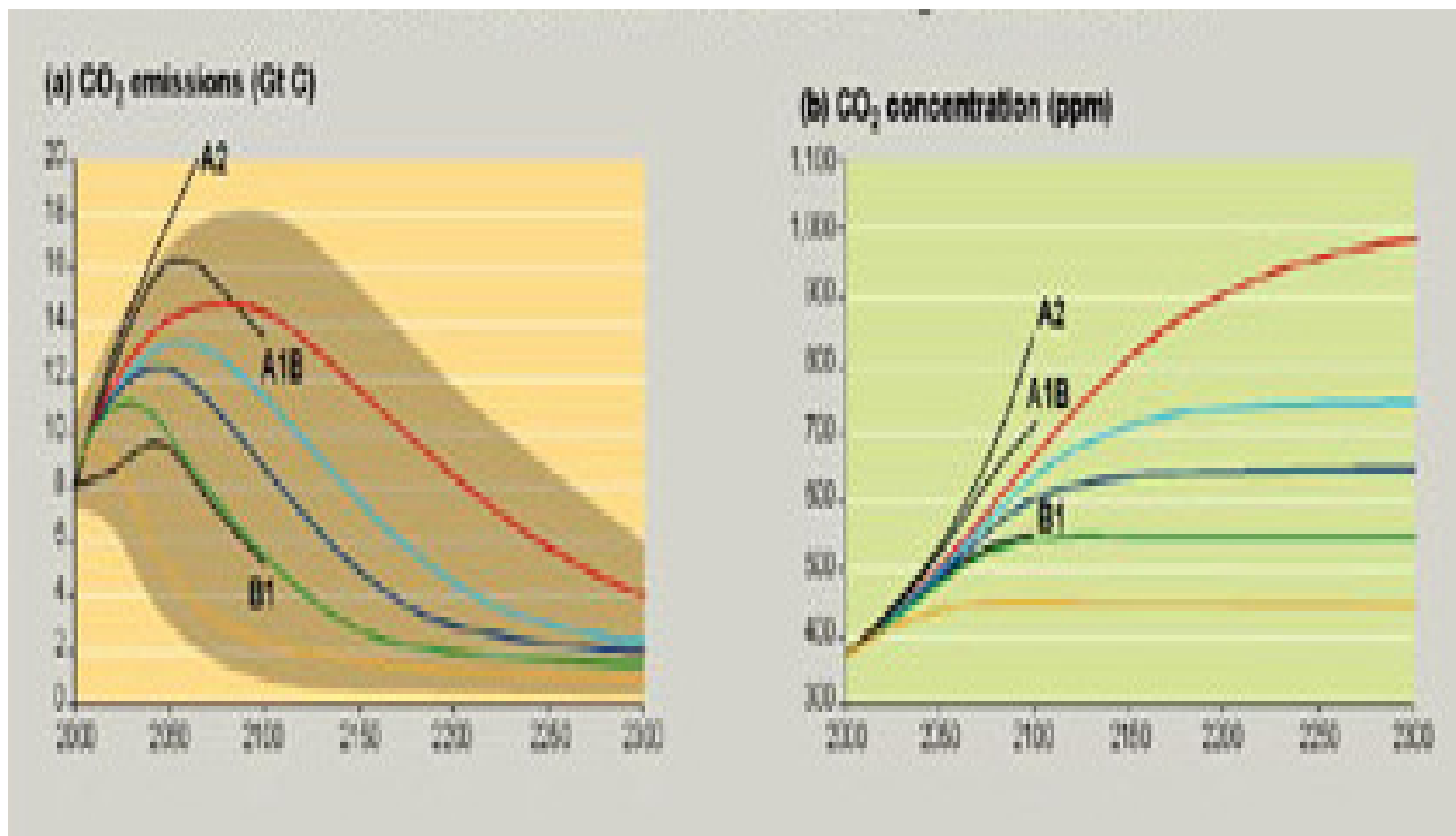
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**Padua, 20<sup>th</sup> April 2007**  
**SEP - Waste Technologies 2007**

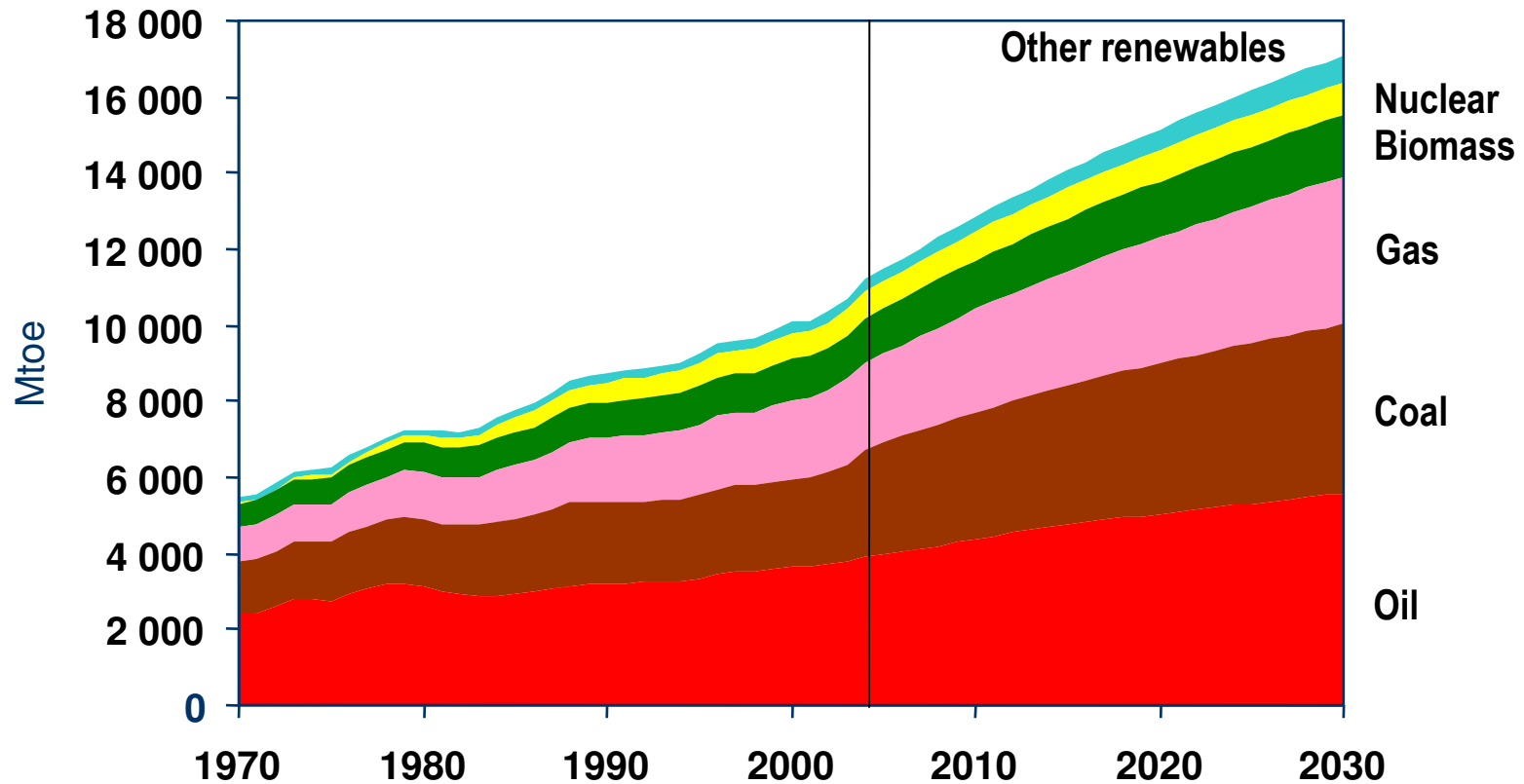
**Corrado Clini**  
Chair of GBEP



# The global challenge of stabilizing CO<sub>2</sub> (IPCC)



# World Primary Energy Demand (WEO 2006)



*Global demand grows by more than half over the next quarter of a century, with coal use rising most in absolute terms*

# *A Conflict of Interests*

## *Energy security and Climate security*

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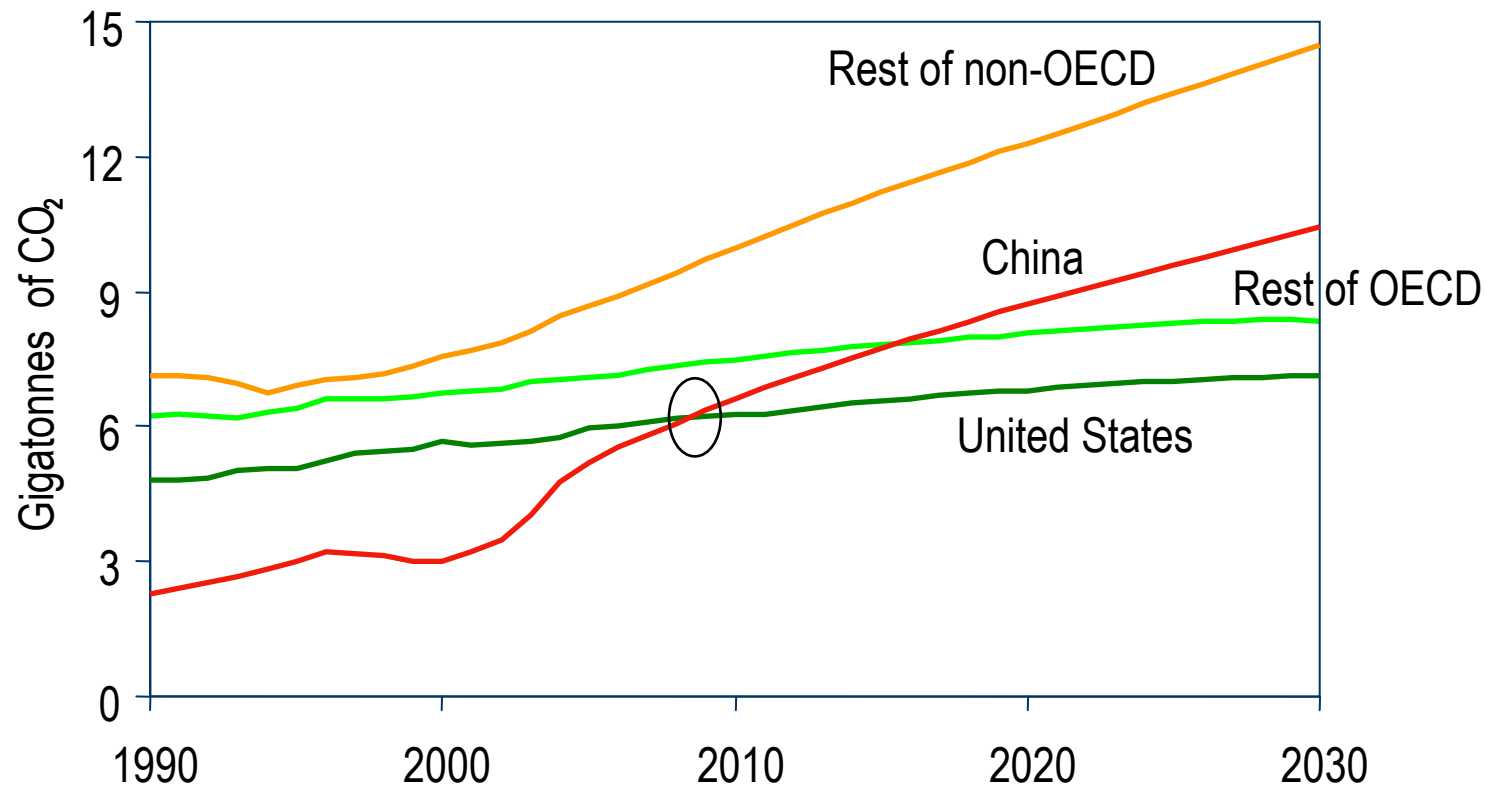
**According to the Intergovernmental Panel on Climate Change (IPCC) a global emissions reduction by 30%-50% should be reached in the timeframe 2030-2050, to drive the stabilization of CO<sub>2</sub> concentration at a safe level (450-550 ppmv) by the end of the century, to avoid irreversible changes in the climate system.**

**According to the Reference Scenario in the World Energy Outlook 2006, world energy consumption will increase about 55% in the next 25 years, driven by economic and population growth. In 2030, some 55% of the world energy demand is expected from developing countries, compared to 40% now.**

**The world energy system will continue to be dominated by fossil fuels.**

**The world's rising demand for energy will drive the increasing of the global CO<sub>2</sub> energy related emissions by 2030 of about 50%-60%**

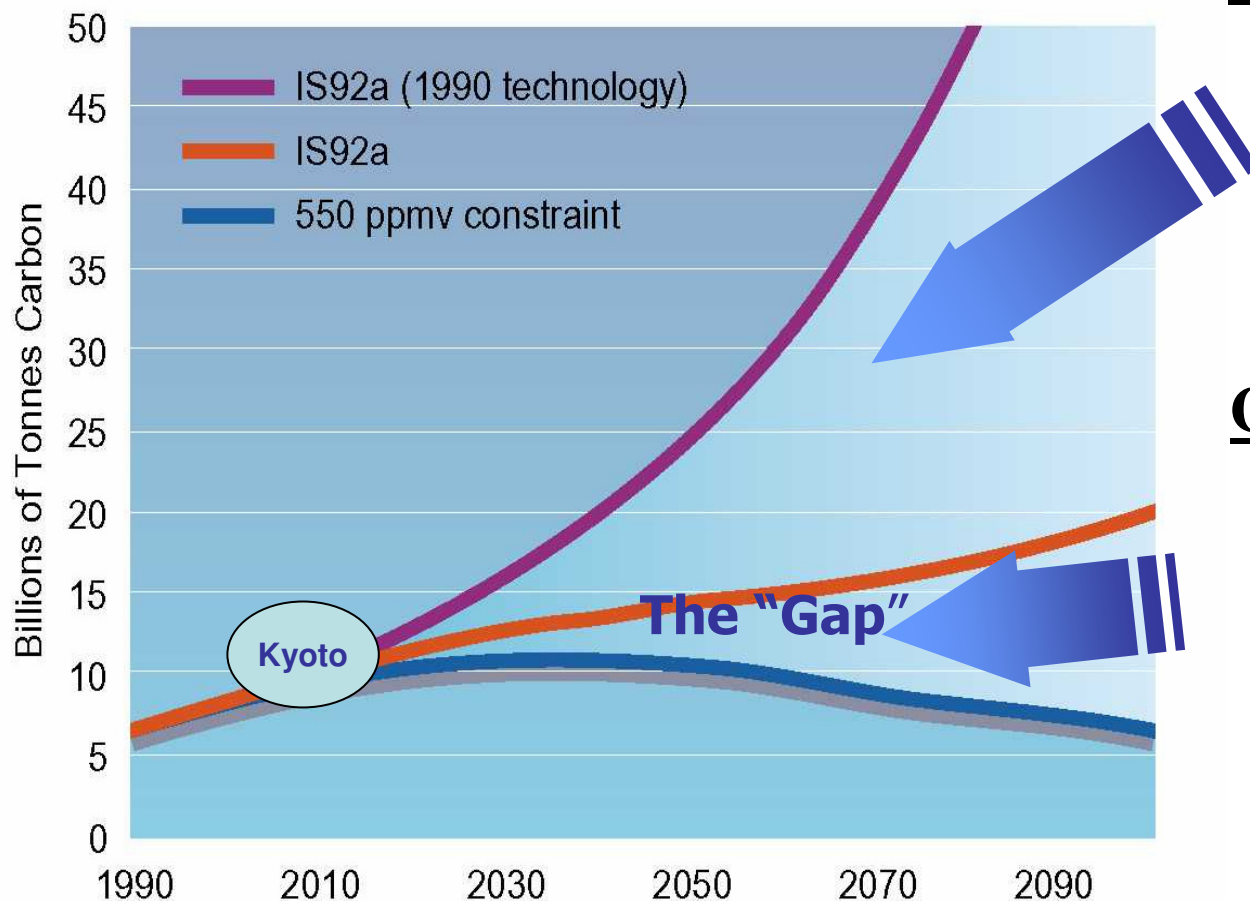
# Energy-Related CO<sub>2</sub> emissions (WEO 2006)



***Global emissions increase of about 60% in the next 25 years,  
and non OECD countries overtake OECD countries before 2010 .***

# Stabilizing CO<sub>2</sub> Base Case and “Gap” Technologies

## Carbon Emissions



## Assumed Advances In

- *Fossil Fuels*
- *Energy intensity*
- *Nuclear*
- *Renewables*
- *Biofuels*

## Gap technologies

- *Carbon Capture and Sequestration*
- *Hydrogen*
- *“New Nuclear”*
- *“New Renewables”*

Source: Jae Edmonds, PNNL/Univ MD

# **BIOENERGY**

## **a key role to meet the short term Kyoto targets and the long term stabilizing CO2**

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**To be effective in approaching CO2 stabilization, the long term global strategy and measures should be designed and should start immediately.**

**The challenge is to combine the short term measures to meet Kyoto targets with the long term strategy to develop radical changes in the global energy system, in order to avoid a “conflict of interests” between the short term investments for meeting the “administrative” obligations under Kyoto and the investments for the long-term emissions reduction.**

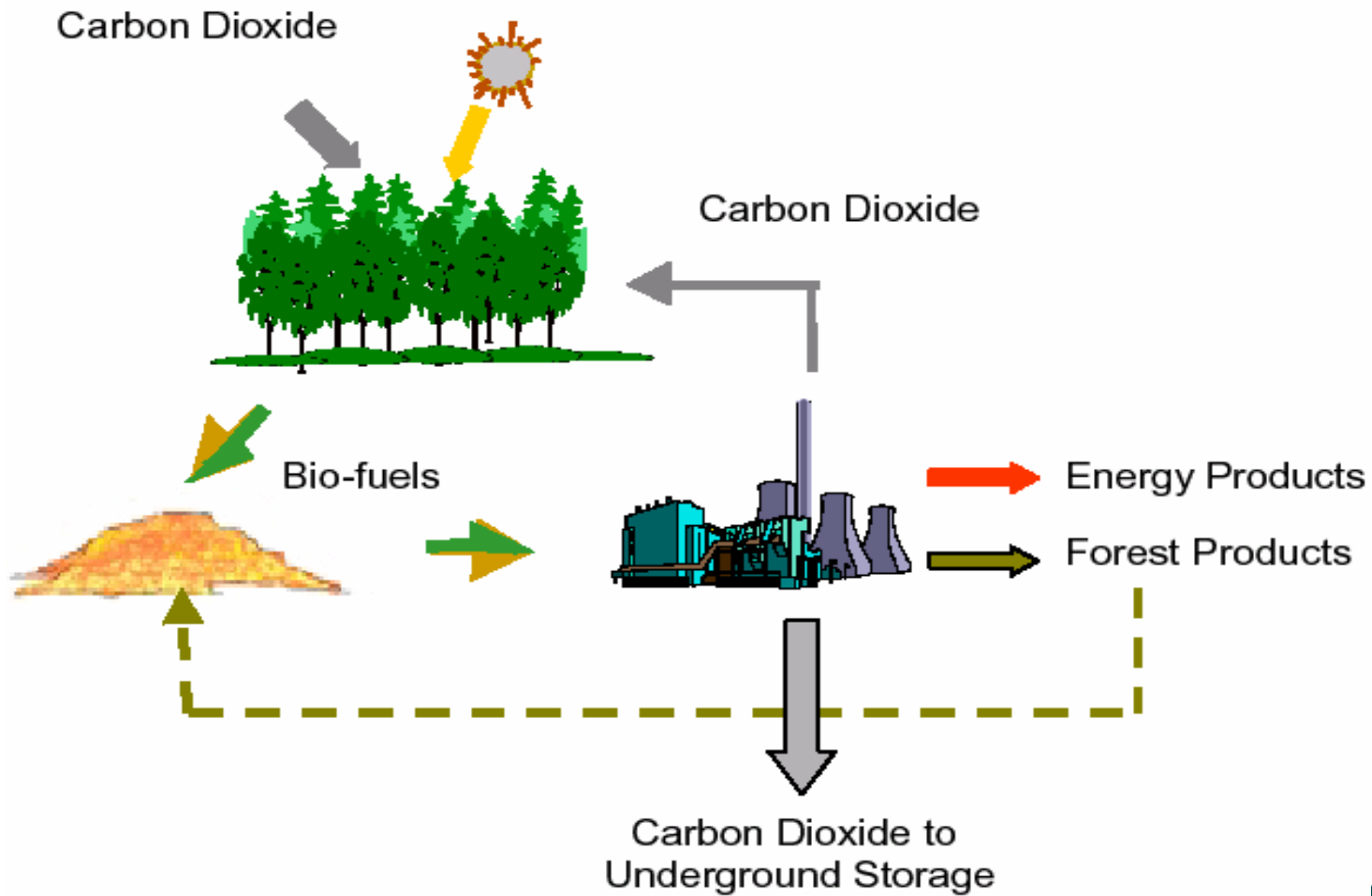
**The trade-off between the current and the future measures is a key issue in the complicate game of the post Kyoto regime.**

*Bioenergy is “carbon neutral”, effective to reduce the net carbon emissions.*

*Bioenergy can help to meet the increasing energy demand in the short term.*

*Bioenergy can play a key role in “decarbonizing” the future global energy system*

# THE CARBON CYCLE OF BIOENERGY



# GLOBAL BIOENERGY POTENTIAL

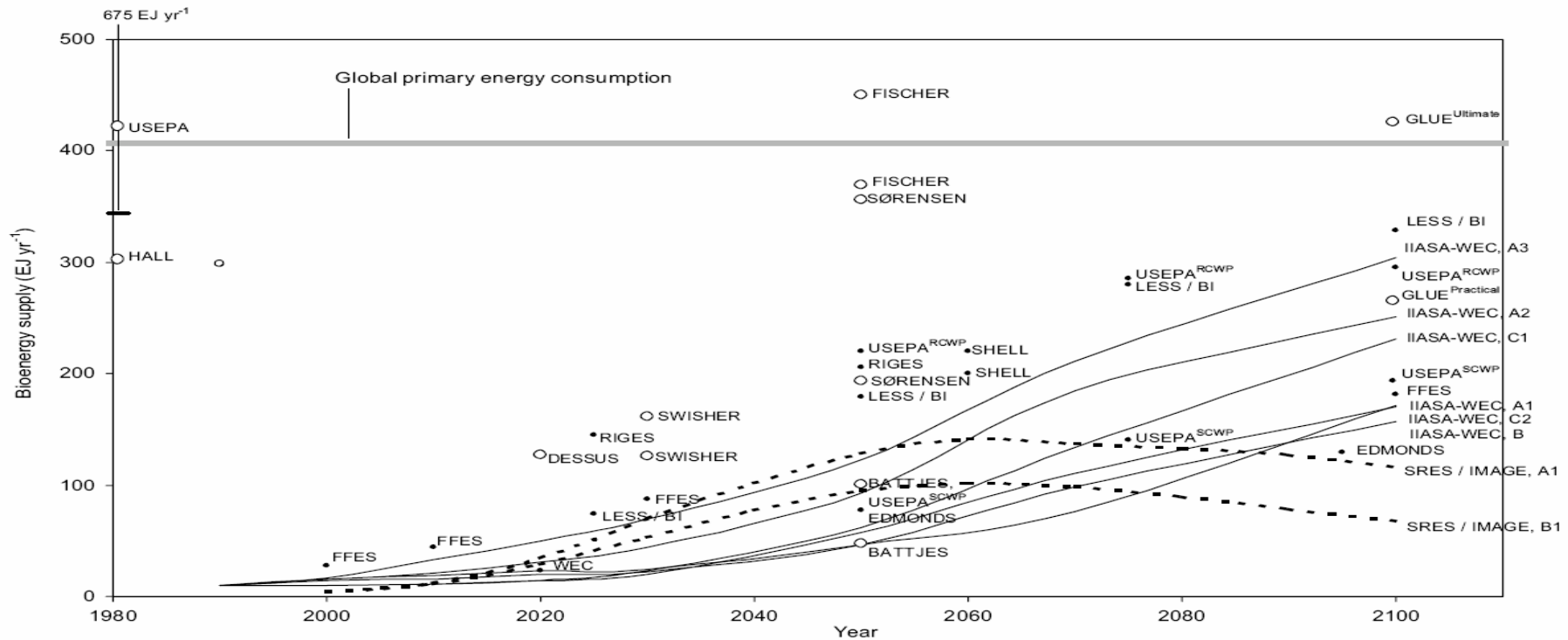
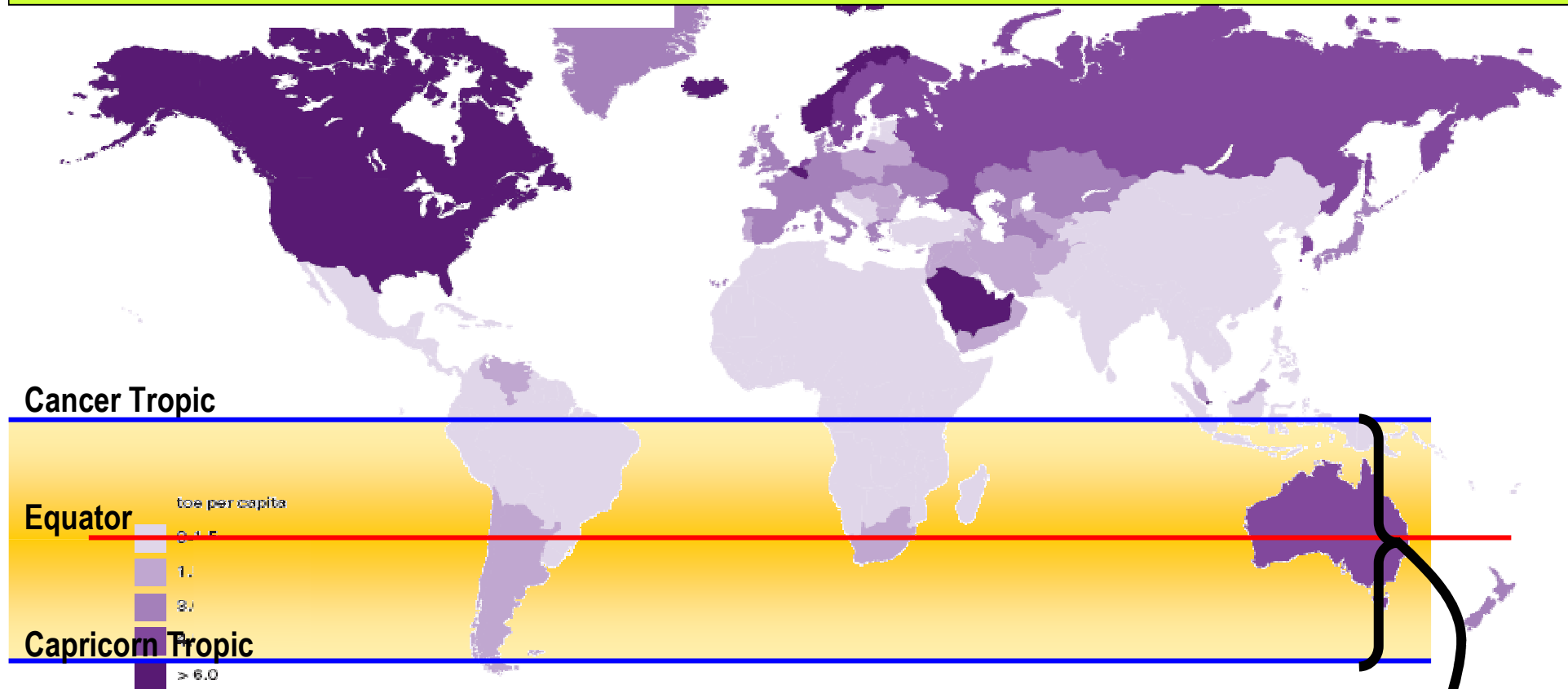


Fig. 2. Potential biomass supply for energy over time. Resource-focused studies are represented by hollow circles and demand-driven studies are represented by filled circles. USEPA and HALL, who do not refer to any specific time, are placed at the left side of the diagram. IIASA-WEC and SRES/IMAGE are represented by solid and dashed lines respectively, with scenario variant names given without brackets at the right end of each line. The present approximate global primary energy consumption is included for comparison. (The global consumption of oil, natural gas, coal, nuclear energy and hydro electricity 1999–2000 was about 365 EJ yr<sup>-1</sup> [43]. Global biomass consumption for energy is estimated at 35–55 EJ yr<sup>-1</sup> [44–46].)

**Stabilization of GHG concentration at 450 ppm in 2100  
will require ~400 EJ biomass energy**

# WORLD ENERGY CONSUMPTION

The greater consumption per capita is outside the tropics!



Tropical Area ↔ Biofuels

# *A NEW GEOGRAPHY OF THE GLOBAL ENERGY*

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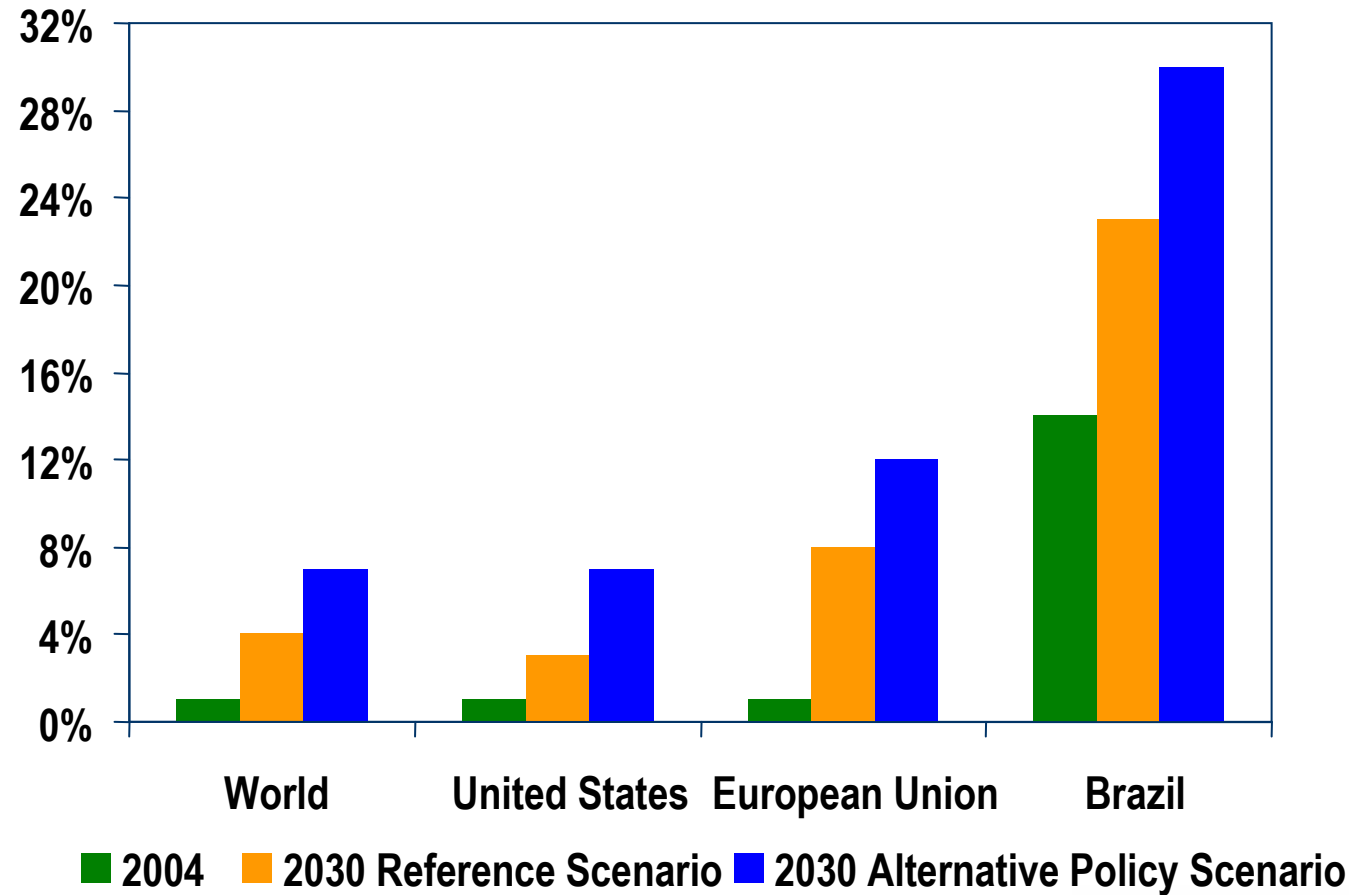
**Bioenergy can change the geography of the global energy market**

➤ **increasing**

- **the diversity of geographic and fuel sources;**
- **the energy security;**
- **the economic role of developing countries;**
- **the development of fuels and technologies towards a low carbon economy**

➤ **challenging the oil economy**

## *Potential Share of Biofuels in Road-Transport Fuel Consumption*



## ***TOWARDS THE BIOFUEL COMMODITY***

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**According to 2006 IEA Alternative Scenario, biofuels are expected to make a significant contribution to meeting global road-transport energy needs.**

**They account for 7% of the road-fuel consumption in 2030 in that scenario, up from 1% today. In the Reference Scenario, the share reaches 4%.**

**In both scenarios, the U.S., the European Union and Brazil account for the bulk of the increase and remain the leading producers and consumers of biofuels.**

**Ethanol is expected to account for most of the increase in biofuels use worldwide, as production costs are expected to fall faster than those of biodiesel – the other main biofuel.**

**Nevertheless,**

- further cost reductions are needed in the context of WTO rules;**
- biofuel environmental and social sustainability criteria should be identified and agreed.**

# ***ARE BIOFUELS A SUSTAINABLE OPTION?***

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## ***THE PALM OIL CASE IN INDONESIA***

***According to a recent research of “Wetlands International” and “Delft Hydraulics”, the expanding production of palm oil in Indonesia to meet the increasing demand of biofuels in Europe was created by draining and burning the peat land, as well by razing huge tracts of the Southeast Asian rain forest in combination with overuse of chemical fertilizers.***

***Peat is an organic carbon storage sponge. Peat land is 90 per cent water. Draining and burning the peat land releases about 2 billion tons of carbon/year, equivalent to 8% of annual global emissions from the use of fossil fuels.***

***This driven Indonesia the third-leading emitter of green house gases after USA and China.***

***In the case of palm oil from Indonesia the production of biofuels can produce more harmful emissions than the fossil fuels they replace.***

# *ARE BIOFUELS A SUSTAINABLE OPTION?*

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## ***Food versus Fuel***

The increasing demand for agricultural land for energy crops production would provide opportunities for sustained increase in agricultural commodity prices. This may result in significant resource transfer to rural areas in developing countries, bringing opportunities for improvements in the standards of living.

In the short term, however, higher commodities prices may negatively affect access to food for poor people in developing countries, especially net-food importing developing countries.

The increasing use of land for energy crops production is raising concerns about land availability for all needed purposes, such as food, feed, energy, grazing and conservation.

On the other hand, some argue that there is room for land availability expansion at the global level which would allow accommodating competing demands for land use.

## ***Cross links: Impacts on international commodity prices***

	<b>An additional 10 million tonnes of ...</b>				
	<b>Sugar</b>	<b>Maize</b>	<b>Sugar and Maize</b>	<b>Soybeans and Maize</b>	<b>Sugar, Maize and Soybeans</b>
<b>Corresponding energy [biofuels]</b>	<b>0.195 EJ</b>	<b>0.087 EJ</b>	<b>0.282 EJ</b>	<b>0.167 EJ</b>	<b>0.349 EJ</b>
<b>Commodity</b>	<b>... used for biofuels would change international prices (percent) in the long-run by :</b>				
<b>Sugar</b>	<b>+9.8</b>	<b>+1.1</b>	<b>+11.3</b>	<b>+2.3</b>	<b>+13.8</b>
<b>Maize</b>	<b>+0.4</b>	<b>+2.8</b>	<b>+3.4</b>	<b>+4.0</b>	<b>+4.2</b>
<b>Vegetable oils</b>	<b>+0.3</b>	<b>+0.2</b>	<b>+0.2</b>	<b>+7.6</b>	<b>+7.8</b>
<b>Protein</b>	<b>+0.4</b>	<b>-1.2</b>	<b>-1.2</b>	<b>-8.1</b>	<b>-7.6</b>
<b>Wheat</b>	<b>+0.4</b>	<b>+0.6</b>	<b>+0.9</b>	<b>+1.8</b>	<b>+2.0</b>
<b>Rice</b>	<b>+0.5</b>	<b>+1.0</b>	<b>+1.2</b>	<b>+1.1</b>	<b>+1.4</b>
<b>Beef</b>	<b>+0.0</b>	<b>+0.2</b>	<b>+0.2</b>	<b>+0.4</b>	<b>+0.4</b>
<b>Poultry</b>	<b>+0.0</b>	<b>-0.4</b>	<b>-0.4</b>	<b>-2.1</b>	<b>-2.0</b>

## **International comparison of ethanol incentives** (US cents/litre)

<b>Country</b>	<b>Production incentive</b>	<b>Reduced excise tax</b>	<b>Import tariff (MFN)<sup>1</sup></b>	<b>Exceptions from tariff</b>
<b>Australia</b>	—	28.9¢ Value of rebate on excise tax	28.9¢ Effective rate because excise tax not rebated	None
<b>Brazil</b>	—	30¢ (Sao Paulo)	—	Mercosur
<b>Canada</b>	up to 16.4¢ (variable rate, QB)	up to 15.1¢ (BC)	4.3¢	NAFTA, CAFTA, Chile
<b>EU</b>	—	up to 70.9¢ (Ger)	24.1¢	EFTA, GSP (not incl. Brazil)
<b>Switzerland</b>	—	57.8¢	27.7¢	EU, GSP (incl. Brazil)
<b>USA</b>	13.5¢ + state	up to 8.4¢ (MO)	2.2% + 14.3¢	NAFTA, CBI

## *Biofuels : a sustainable option*

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**Biofuels can help in reducing emissions if produced in appropriate way.**

**Life cycle analysis, labelling and “certification of origin” of biofuels should be introduced in the global energy market.**

**Labeling and certification should be used to ensure sustainable development, environmental gains and promote social equity. However, sustainability criteria should not represent a way for Government to “protect” their domestic market against developing countries export opportunities. Un necessary trade barriers should be avoided taking into consideration of certification capacity building in developing countries.**