

**International Symposium
Developing Countries facing Global Warming:
a Post-Kyoto Assessment**

Biofuels in Developing Countries: Situation and Prospects

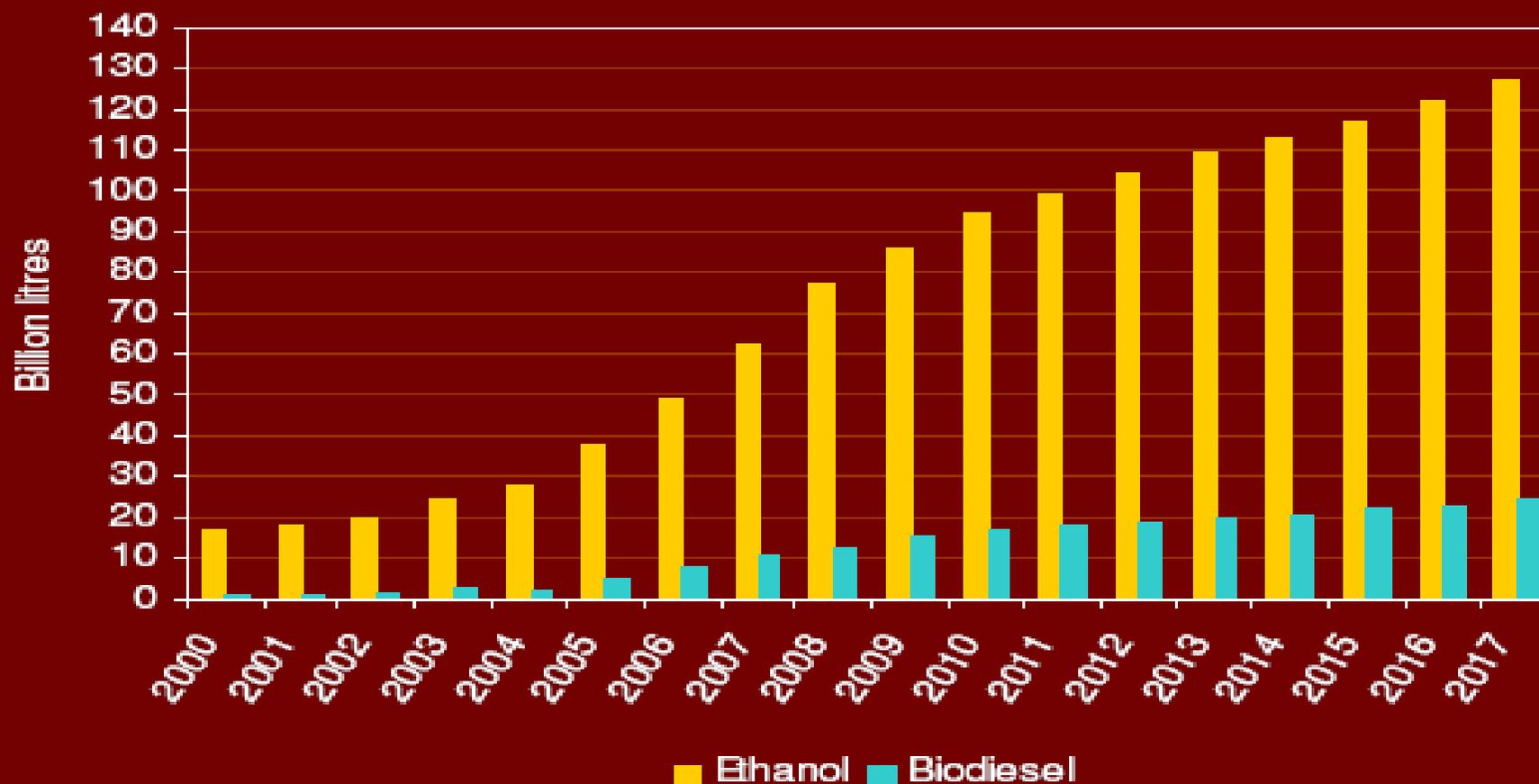
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1. Introduction

- **Biofuels comprise a very large diversity of fuels from organic origin**
- **Our focus is on first generation liquid biofuels, particularly bioethanol (from maize, wheat, sugar, cassava, ...) and biodiesel (from vegetable oils)**
- **Second generation biofuels, which do not compete with foodcrops, from lignocellulosic feedstock, are still years away from profitable production**
- **First generation biofuels are controversial for two reasons:**
 - 1. They compete with foodcrops for resources and drive up the prices**
 - 2. Their questionable Kyoto (GHG) effect**

World ethanol and biodiesel production, 2000-2017



Note: Figures for 2005-2017 include non-fuel ethanol

Source: OECD and FAO

Source: SOFA, FAO, 2008.

2. First generation liquid biofuels

- Cover now only 1 % of total transport fuel consumption**
- The nature of the by-products are important for their profitability**
- Developed countries have set ambitious biofuel targets**
- Almost all liquid biofuel production in developed countries is (heavily) subsidized, directly and/or indirectly**
- Sugar-cane-based ethanol production in Brazil is currently economically viable without subsidies**

Voluntary and mandatory bioenergy targets for transport fuels in G8+5 countries

COUNTRY/COUNTRY GROUPING	TARGETS ¹
Brazil	Mandatory blend of 20–25 percent anhydrous ethanol with petrol; minimum blending of 3 percent biodiesel to diesel by July 2008 and 5 percent (B5) by end of 2010
Canada	5 percent renewable content in petrol by 2010 and 2 percent renewable content in diesel fuel by 2012
China	15 percent of transport energy needs through use of biofuels by 2020
France	5.75 percent by 2008, 7 percent by 2010, 10 percent by 2015 (V), 10 percent by 2020 (M = EU target)
Germany	6.75 percent by 2010, set to rise to 8 percent by 2015, 10 percent by 2020 (M = EU target)
India	Proposed blending mandates of 5–10 percent for ethanol and 20 percent for biodiesel
Italy	5.75 percent by 2010 (M), 10 percent by 2020 (M = EU target)
Japan	500 000 kilolitres, as converted to crude oil, by 2010 (V)
Mexico	Targets under consideration
Russian Federation	No targets
South Africa	Up to 8 percent by 2006 (V) (10 percent target under consideration)
United Kingdom	5 percent biofuels by 2010 (M), 10 percent by 2020 (M = EU target)
United States of America	9 billion gallons by 2008, rising to 36 billion by 2022 (M). Of the 36 billion gallons, 21 billion to be from advanced biofuels (of which 16 billion from cellulosic biofuels)
European Union	10 percent by 2020 (M proposed by EU Commission in January 2008)

¹ M = mandatory; V = voluntary.

Sources: GBEP, 2007, updated with information from the United States Department of Agriculture (USDA, 2008a), the Renewable Fuels Association (RFA, 2008) and written communication from the EU Commission and Professor Ricardo Abramovay, University of São Paulo, Brazil.

Source: SOFA, FAO, 2008.

Approximate average and variable rates of support per litre of biofuel in selected OECD economies

OECD economy	ETHANOL		BIODIESEL	
	Average	Variable	Average	Variable
	(US\$/litre) ¹	(US\$/litre) ¹	(US\$/litre) ¹	(US\$/litre) ¹
United States of America ²	0.28	Federal: 0.15 States: 0.00–0.26	0.55	Federal: 0.26 States: 0.00–26
European Union ³	1.00	0.00–0.90	0.70	0.00–0.50
Canada ⁴	0.40	Federal: up to 0.10 Provinces: 0.00–0.20	0.20	Federal: up to 0.20 Provinces: 0.00–0.14
Australia ⁵	0.36	0.32	0.35	0.32
Switzerland ⁶	0.60	0.60	1.00	0.60–2.00

Notes:

¹ Values (except in the case of the United States of America and Australia) are rounded to the nearest US\$0.10.

² Lower bound of reported range. Some payments are budget-limited.

³ Refers to support provided by Member States.

⁴ Provisional estimates; includes incentives introduced on 1 April 2008.

Federal and most provincial supports are budget-limited.

⁵ Data refer to the fiscal year beginning 1 July 2006. Payments are not budget-limited.

⁶ Range for biodiesel depends on source and type of feedstock. Some payments are limited to a fixed number of litres.

Source: Steenblik, 2007, p. 39.

Source: SOFA, FAO, 2008.

Applied tariffs on ethanol in selected countries

Country/Country grouping	Applied MFN tariff	At pre-tariff unit value of US\$0.50/litre		Exceptions/Comments	
		Local currency or ad valorem rate	Ad valorem equivalent (Percentage)		Specific-rate equivalent (US\$/litre)
Australia	5 percent + A\$0.38143/litre		51	0.34	United States of America, New Zealand
Brazil	0 percent		0	0.00	From 20 percent in March 2006
Canada	Can\$0.0492/litre		9	0.047	FTA partners
Switzerland	SwF35/100 kg		46	0.232	EU, GSP
United States of America	2.5 percent + US\$0.54/gallon		28	0.138	FTA partners, CBI partners
European Union	€0.192/litre		52	0.26	EFTA, GSP

Notes: Ethanol is classified for trade purposes as HS 2207.10, undenatured ethyl alcohol.

Tariffs indicated are rates as of 1 January 2007.

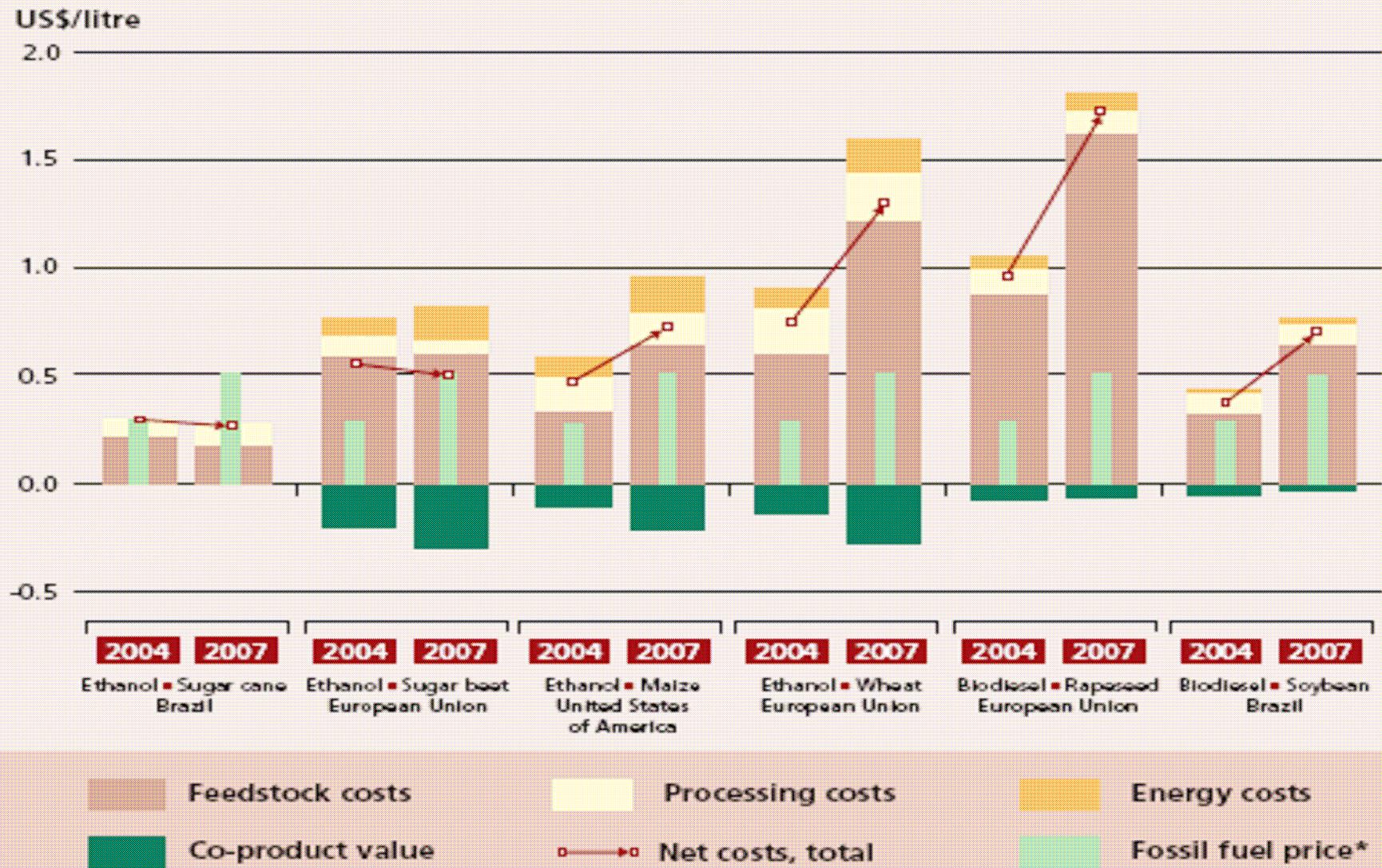
MFN = most-favoured nation; FTA = Free Trade Association; EFTA = European Free Trade Association;

GSP = Generalised System of Preferences; CBI = Caribbean Basin Initiative.

Source: Steenblik, 2007.

Source: SOFA, FAO, 2008.

Biofuel production costs in selected countries, 2004 and 2007

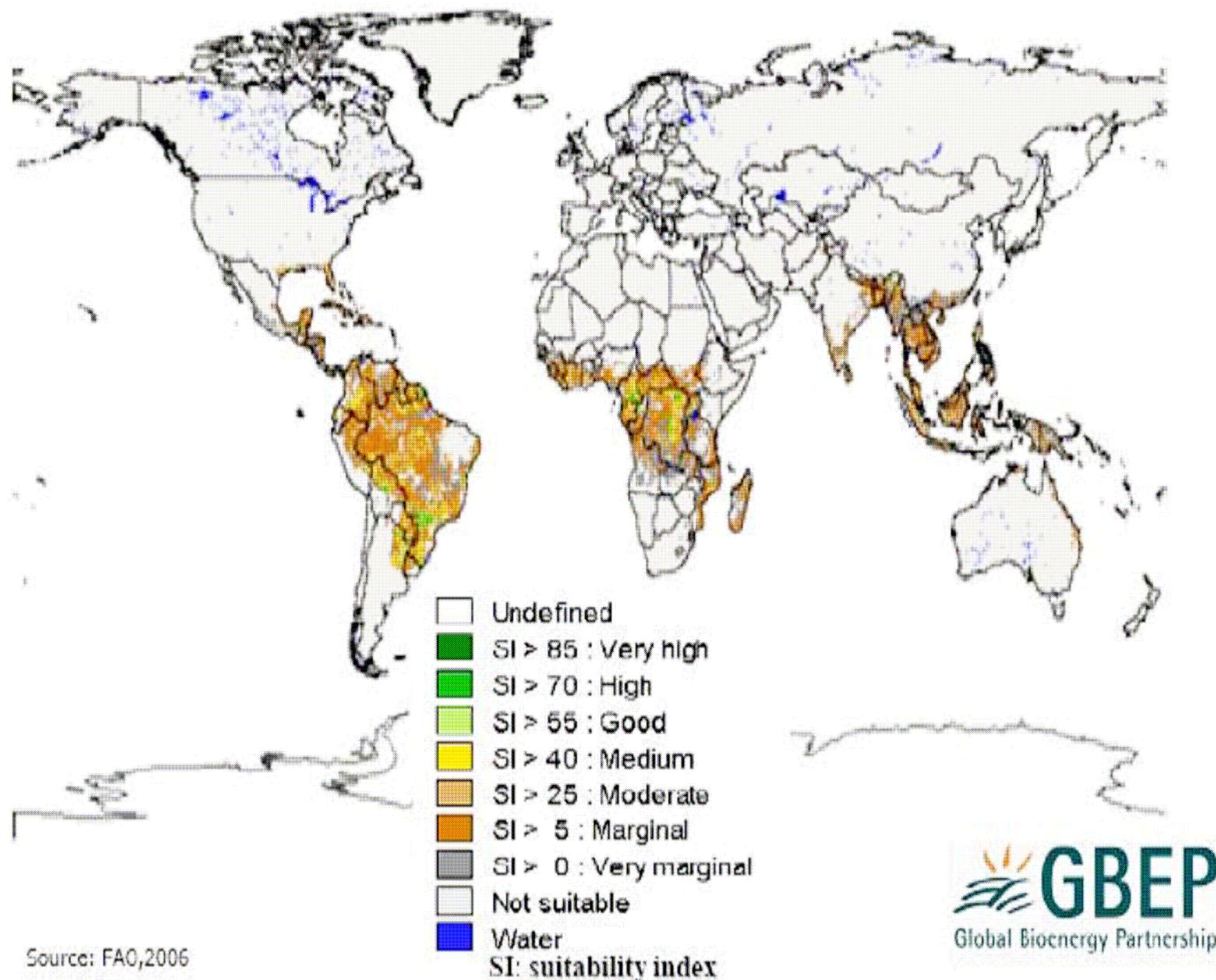


*Net price of petrol or diesel in national markets.

Source: OECD-FAO, 2008.

Source: SOFA, FAO, 2008.

Sugarcane/biofuels potential

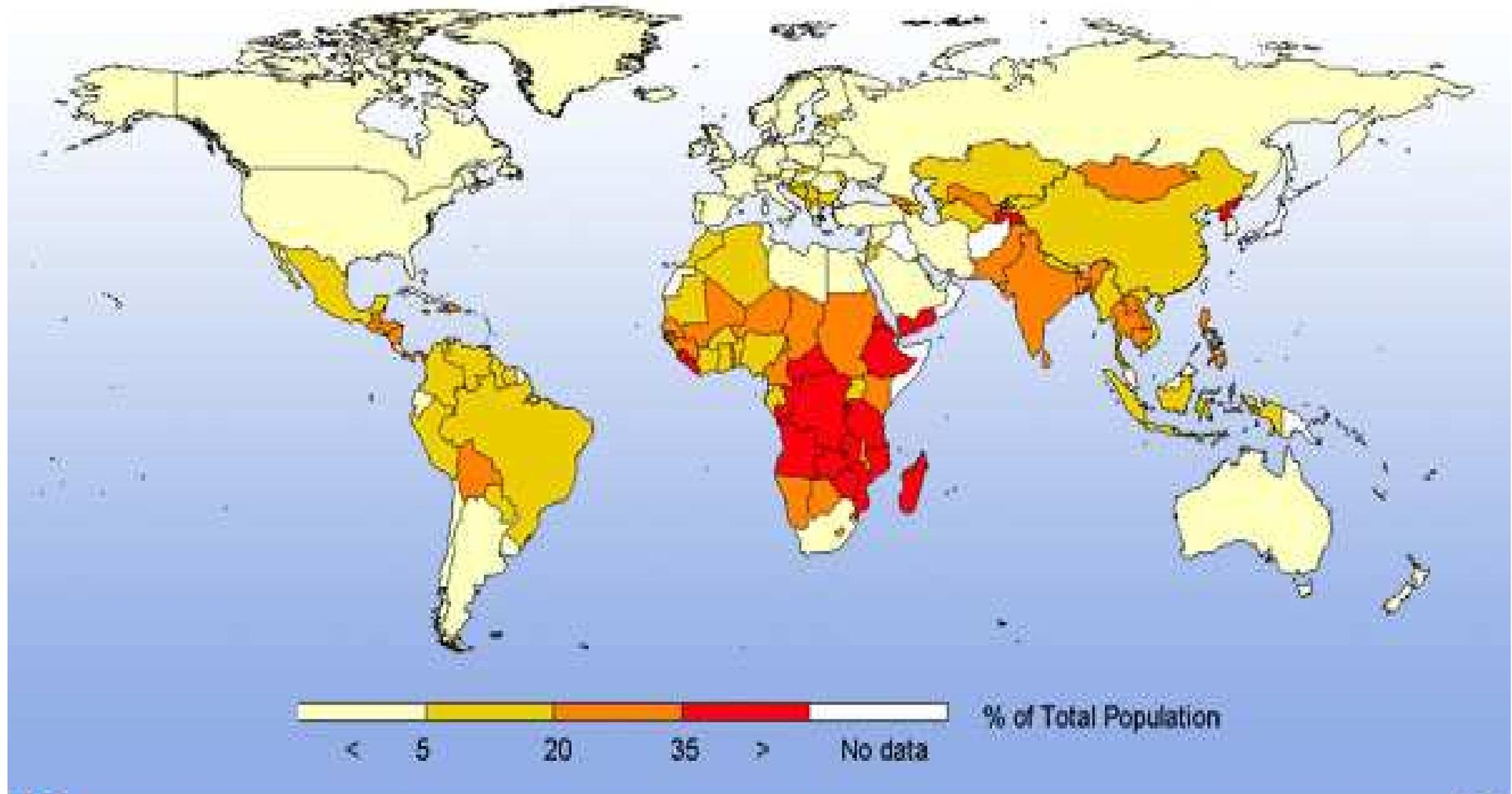


- **Most if not all poor developing countries are net-importers of food, particularly cereals**
- **Producing biofuels implies a trade-off with producing food, increasing the price of locally produced food and resulting in more food imports**
- **Only biofuel production on marginal lands, unsuitable for food production, such as Jatropha oil, does not harm food production. But there may still be a trade-off in terms of labor and other resources used**





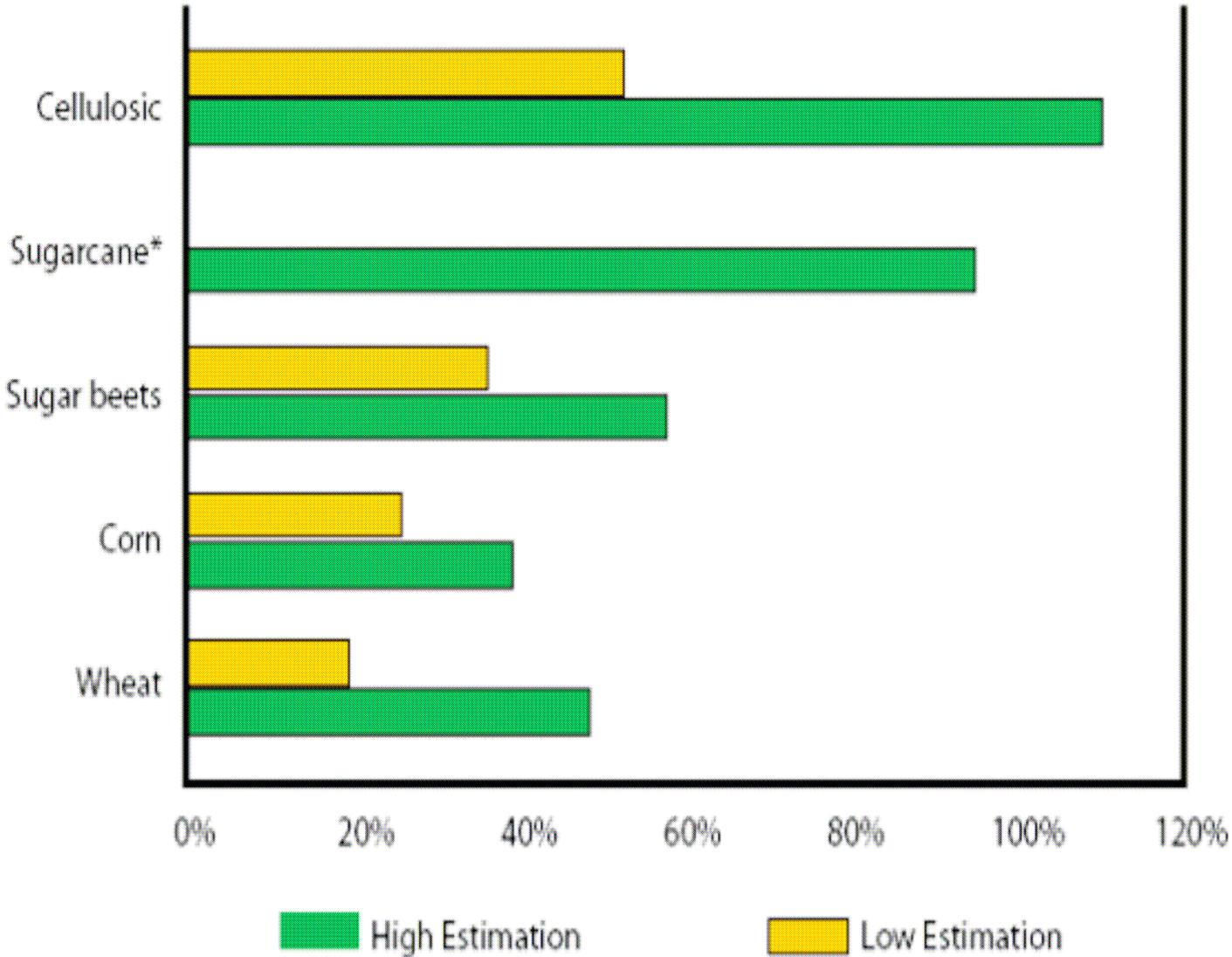
The Hunger Map



3. The Kyoto gains of biofuel

- Reducing GHG (CO₂) is the primary rationale for public subsidies**
- There is a lot of controversy about it, depending on whether land use (change) effects are taken into account and whether a full life-cycle analysis is done**
- In almost all cases, except bioethanol from Brazil, it is more indicated to improve the efficiency of fossil fuel use, to conserve existing forests (REDD) and savannahs and purchase carbon in the European Climate Exchange (reforestation)**
- Whenever virgin land needs to be cleared for biofuel production, the GHG picture is negative for a (very) long time**

Figure 1: Ethanol Well-to-Wheel GHG Emissions Reductions Compared to Gasoline



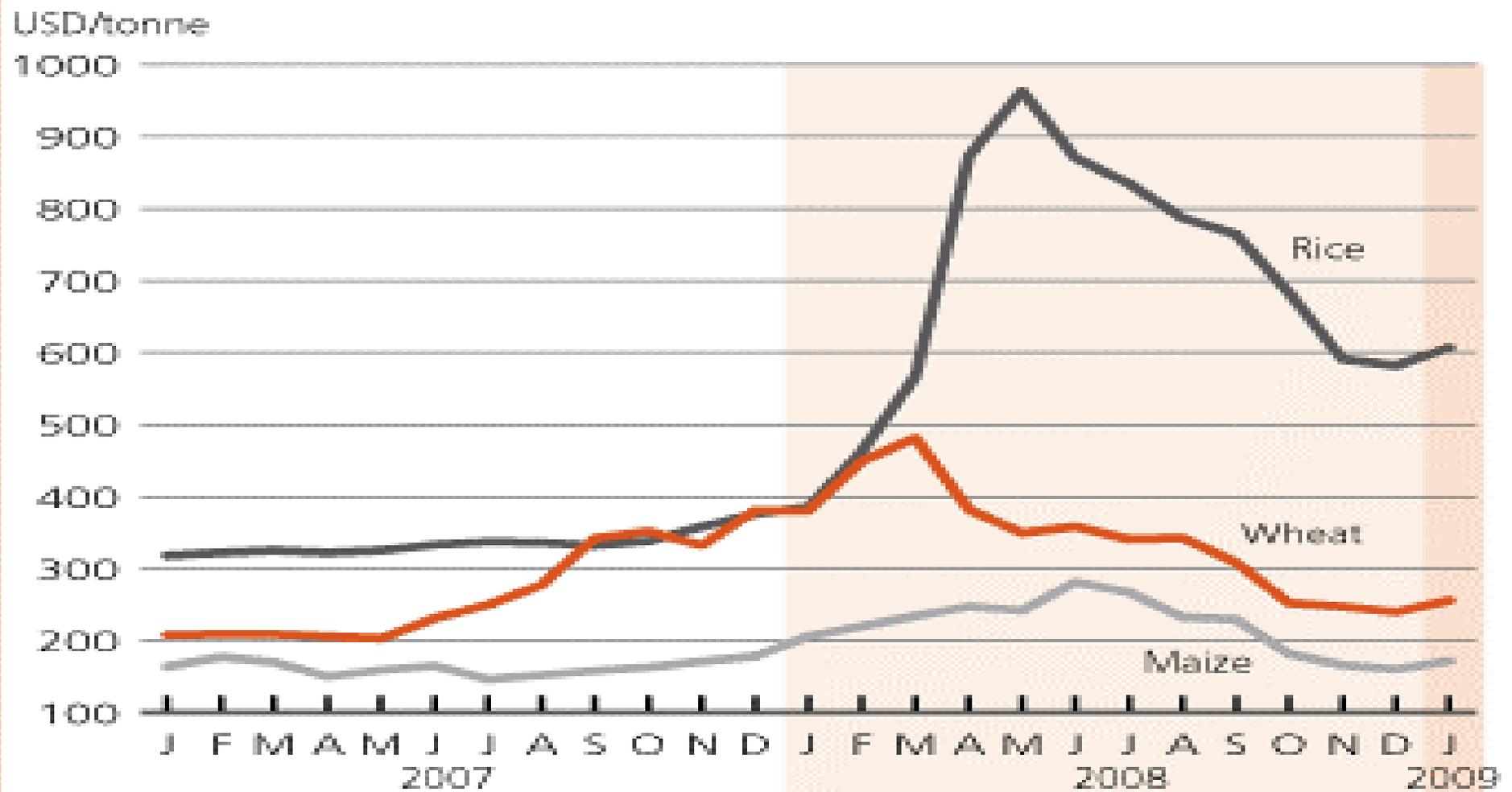
Source: IEA

Source: USAID, 2008.

4. Biofuels and food price increases

- Donald Mitchell (World Bank, 2008): 70-75 % of food price increases are due to biofuels**
- USDA (2008): one-third of increase in U.S. corn prices in 2007-2008 is from bioethanol**
- Biofuels can never replace all fossil fuels in the foreseeable future: 1/3 of US corn --> ethanol = 4% of gasoline**
- For poor developing countries (net food-importers), converting arable land to biofuels increases food insecurity**

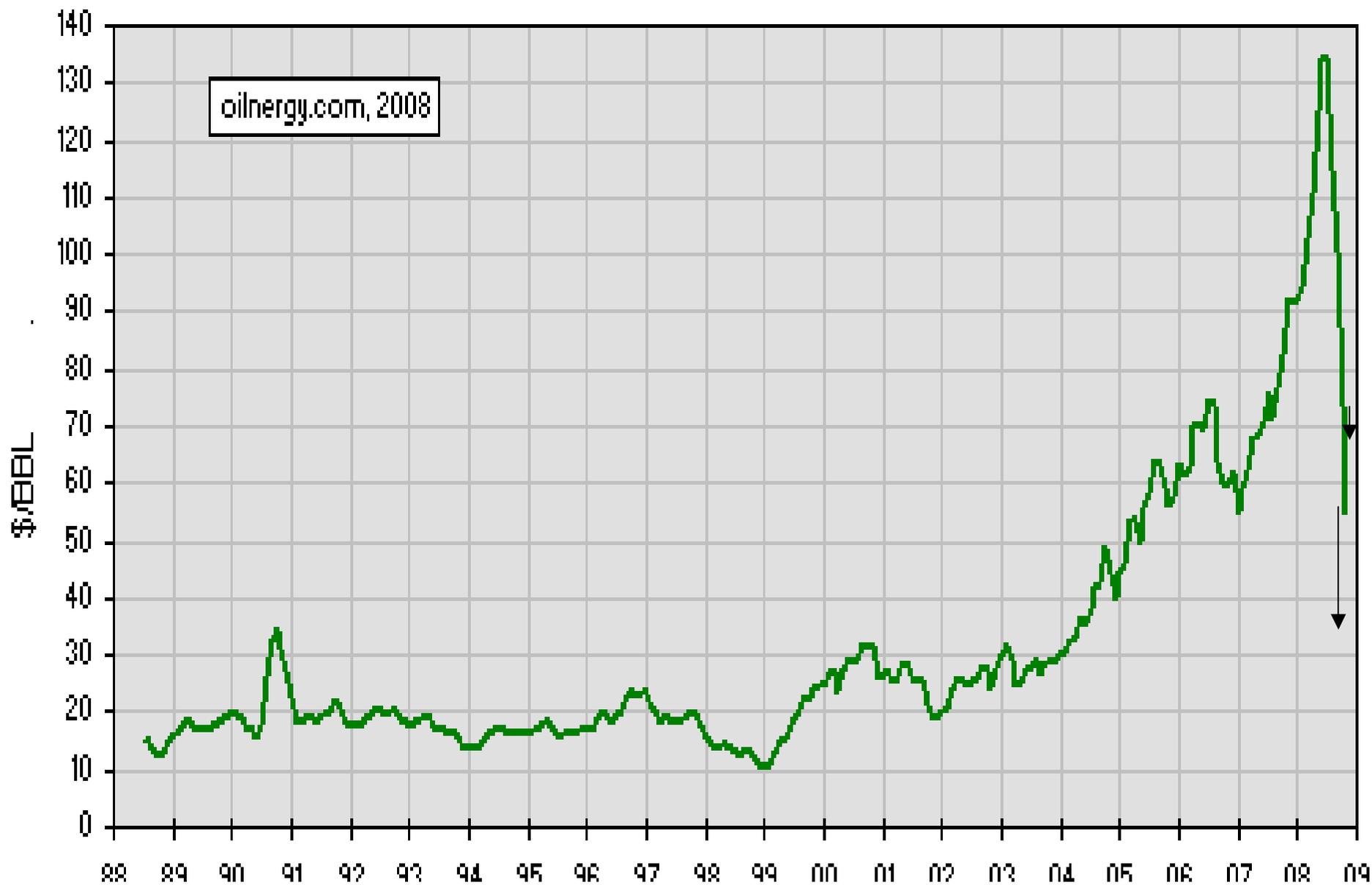
Selected international cereal prices



Note: Prices refer to monthly average.

Source: SOFA, FAO, 2008.

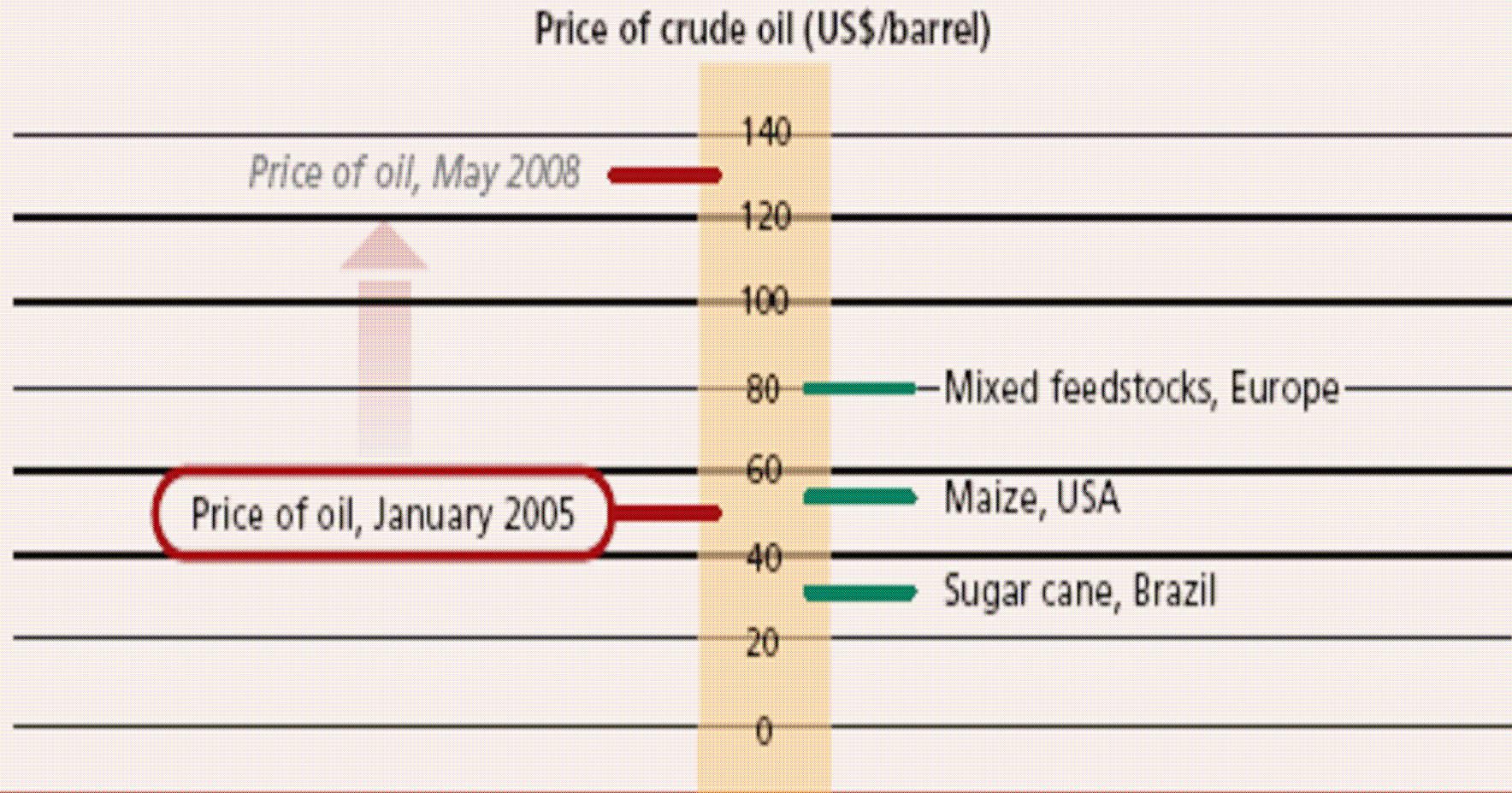
ICE Brent Crude Oil Closing Price (begin July 1988)



A dark blue SUV is shown from a rear three-quarter view. The vehicle has a roof rack, chrome trim on the rear bumper and tailgate, and multi-spoke alloy wheels. The text is overlaid on the rear window area.

**240 kg of maize
(100 liters of ethanol)
to fill one SUV tank**

Break-even prices for crude oil and selected feedstocks in 2005



Source: based on data from FAO, 2006a.

Source: SOFA, FAO, 2008.

- **The constraints that presently hamper agricultural growth and poverty reduction and food security will also prevent biofuel production and development**
- **It all depends on whether agricultural productivity growth can be enhanced to prevent a conflict between food and fuel**
- **Countries that are already major exporters of agricultural products (e.g. ACP sugar exporters, palm oil exporters) and where land is abundant and productivity high can become profitable exporters of biofuels and biofuel feedstock**
- **Nevertheless, biofuel can locally be very relevant in isolated areas with poor market institutions and infrastructure (e.g. DRC) for local transport and electricity generation (palm oil)**

5. Conclusions

- **Why biofuels?**

- **security and diversification of energy supply**
- **environmental protection (GHG)**
- **sustainable economic development**

- **Energy markets are now linked with agricultural markets – energy prices drive the prices of biofuels**

- **Environmental impacts depend very much on land-use changes; if land clearing is involved, Kyoto effects are invariably negative**

- **For most poor net-food importing countries, biofuel development is negative for food security**

- **But biofuels strengthen the case for focusing on agriculture as an engine of growth for poverty alleviation**
- **For large exporters of agricultural products, with good infrastructure and market institutions and rising agricultural productivities, biofuel crops as cash crops offer income-generating opportunities for farmers**
- **Second-generation technologies hold more promise and warrant more public support for R&D than present biofuel development**

**With thanks
for
your
attention!!!**