Global Biofuel Production and Food Security: Implications for Asia Pacific

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2011 PECC Agricultural and Food Policy Forum:
"Moving Beyond Market Volatility to Foster Food Security"
Organized by CTPECC

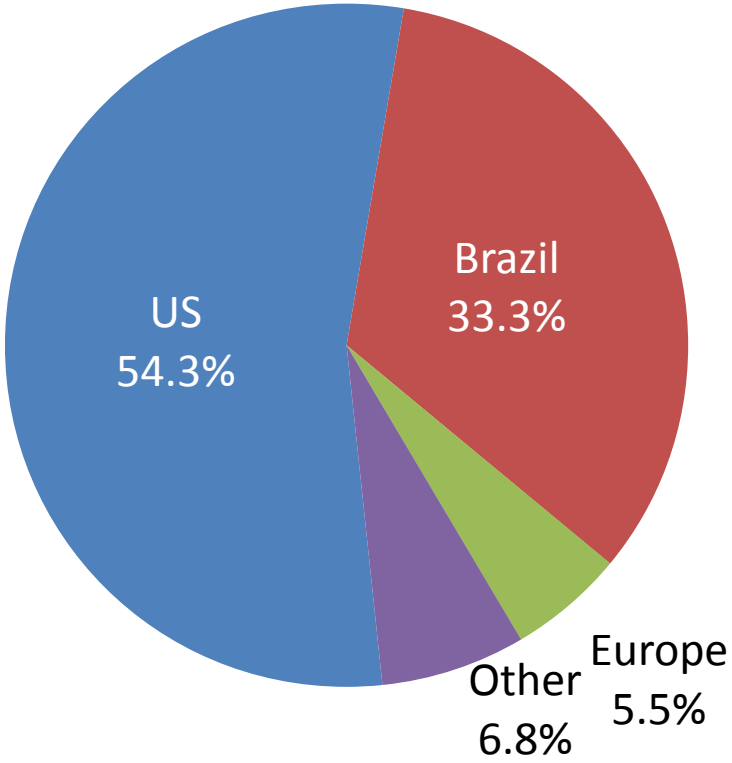
December 1-2, 2011

Outlook for Biofuels

- Background
- How important are biofuels?
- What is the outlook for biofuels?
- Impacts on food prices, volatility, and the food system?
  - What others have said
  - Current evidence
- Impacts on Asia-Pacific

Production Concentrated in Three Markets, 2010

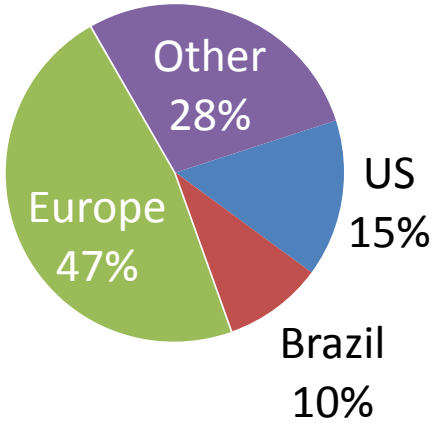
Ethanol = 82.9 billion litres



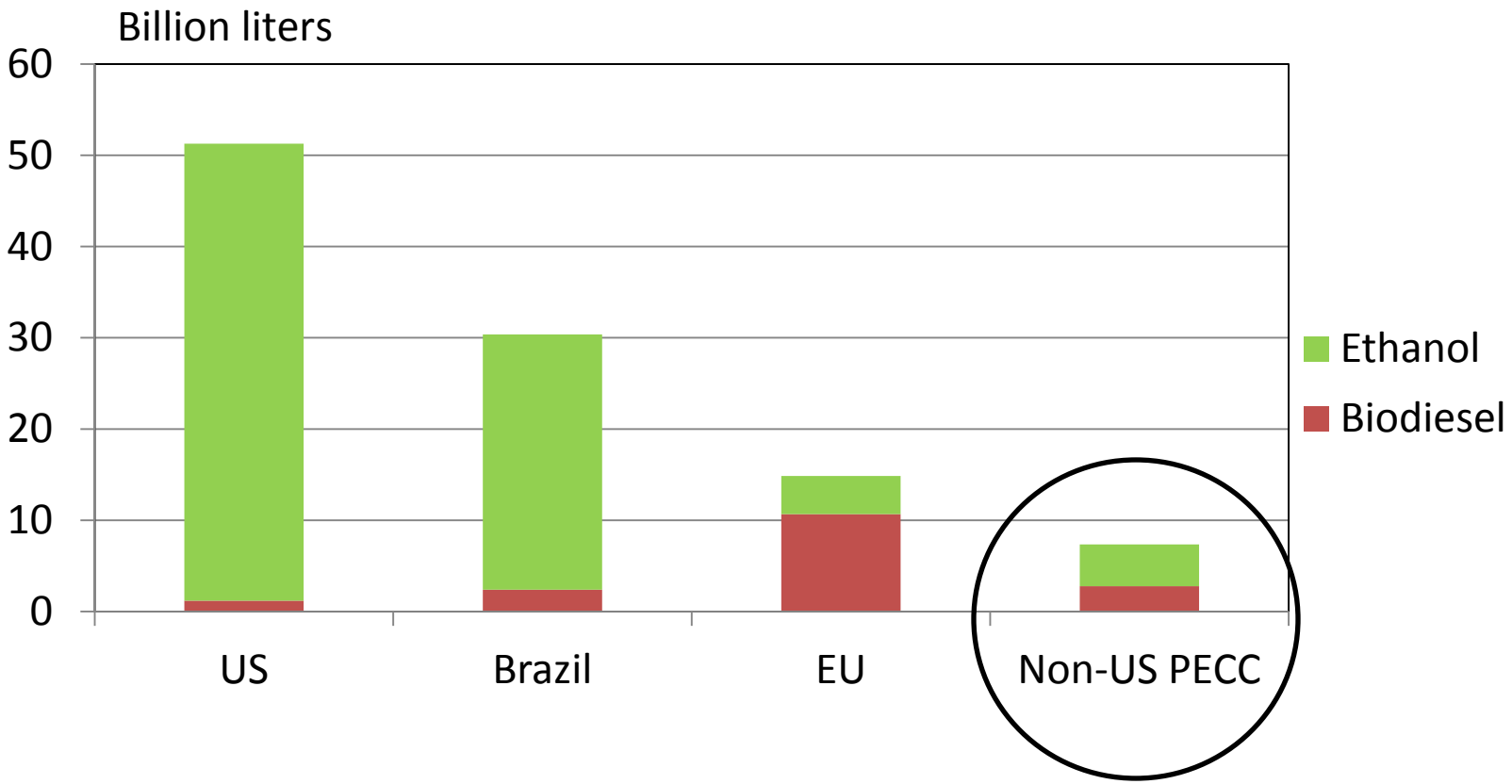
US
Brazil
Europe

Account for 89% of global biofuel production

Biodiesel = 19.9 billion litres

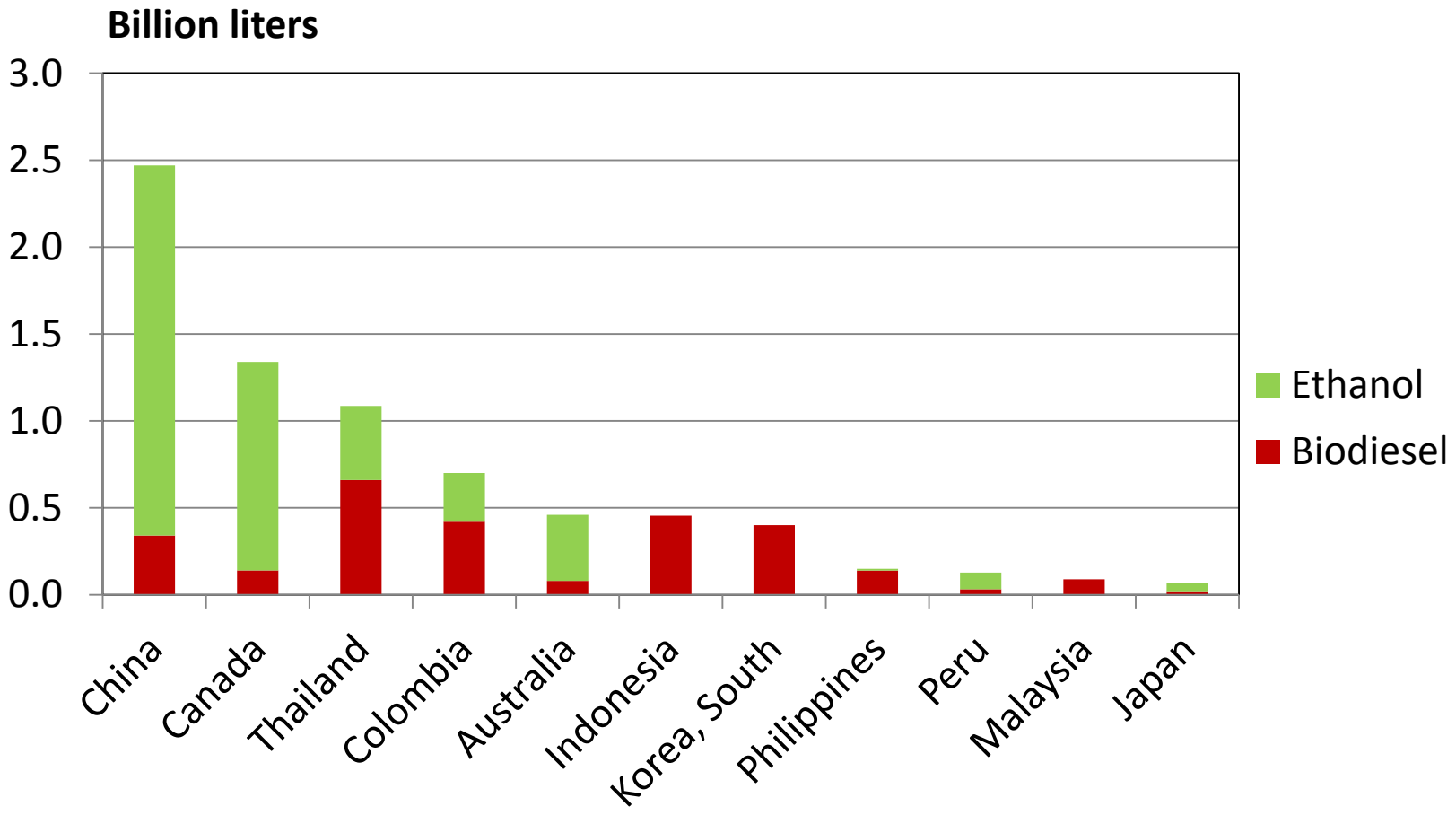


Non-US PECC Minor Player, 2010



Source: USDA, Renewable Fuel Association, National Biodiesel Board

With China and Canada in the Lead, 2010

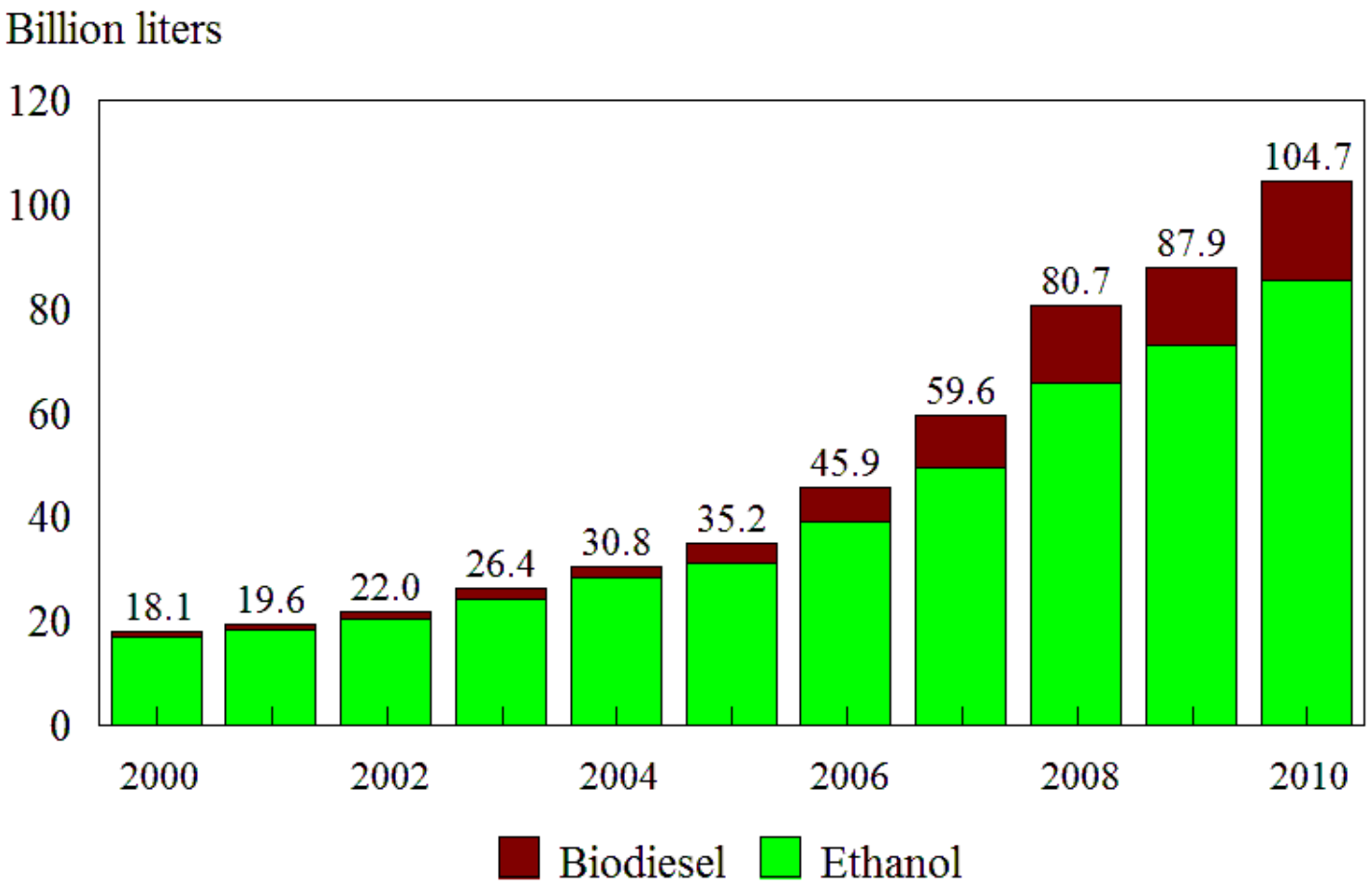


Source: USDA, FO Licht

How important are biofuels?

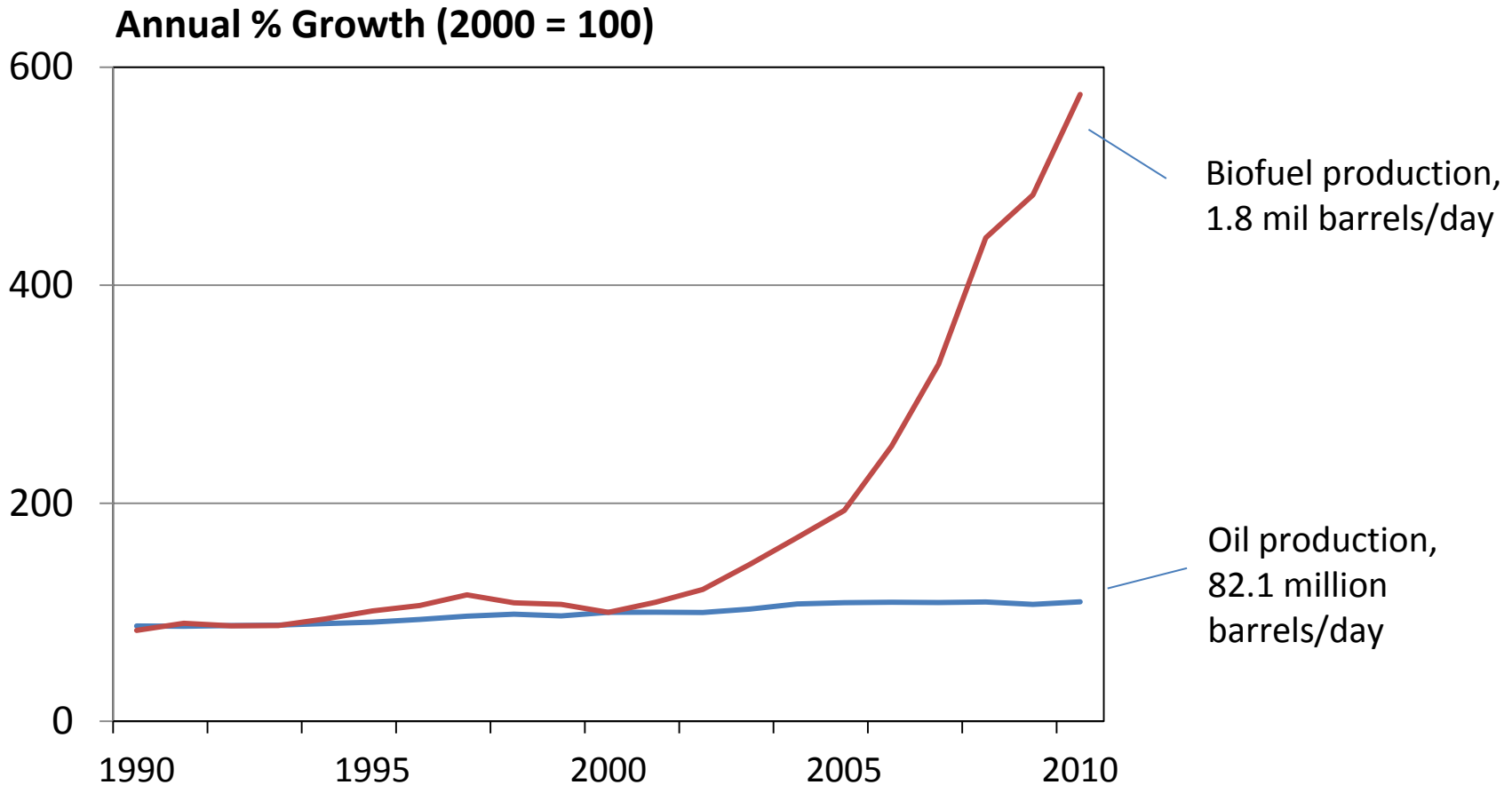
How important are biofuels ?

Five-fold Expansion in Production



How important are biofuels?

Expanding Much More Rapidly Than Oil



Sources: FO Licht, BP

How important are biofuels ?

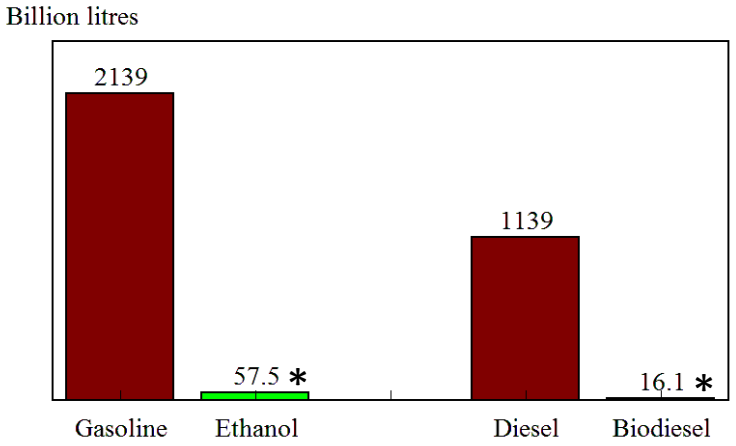
Biofuels Remaining a Miniscule Share of Global Transportation Fuel, 2010

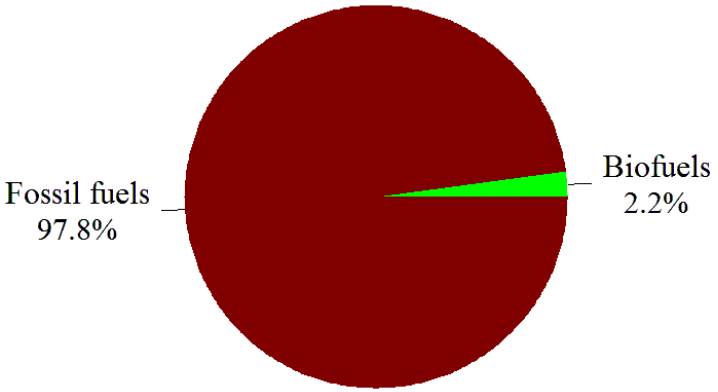
82 million barrels per day

4.8 trillion litres of crude oil per year

2.1 trillion litres of gasoline

1.1 trillion litres of diesel

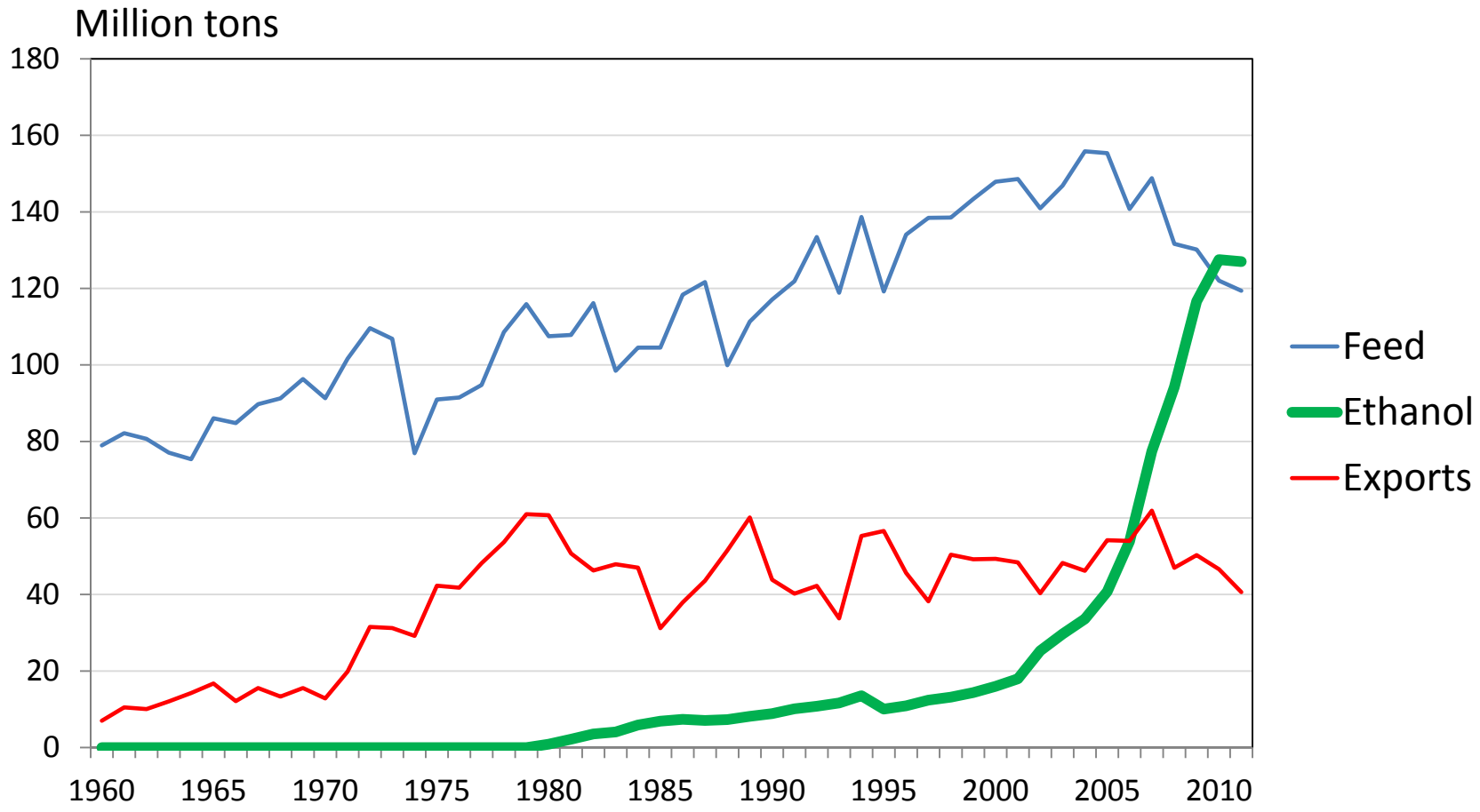




*--Converted to fossil fuel equivalent

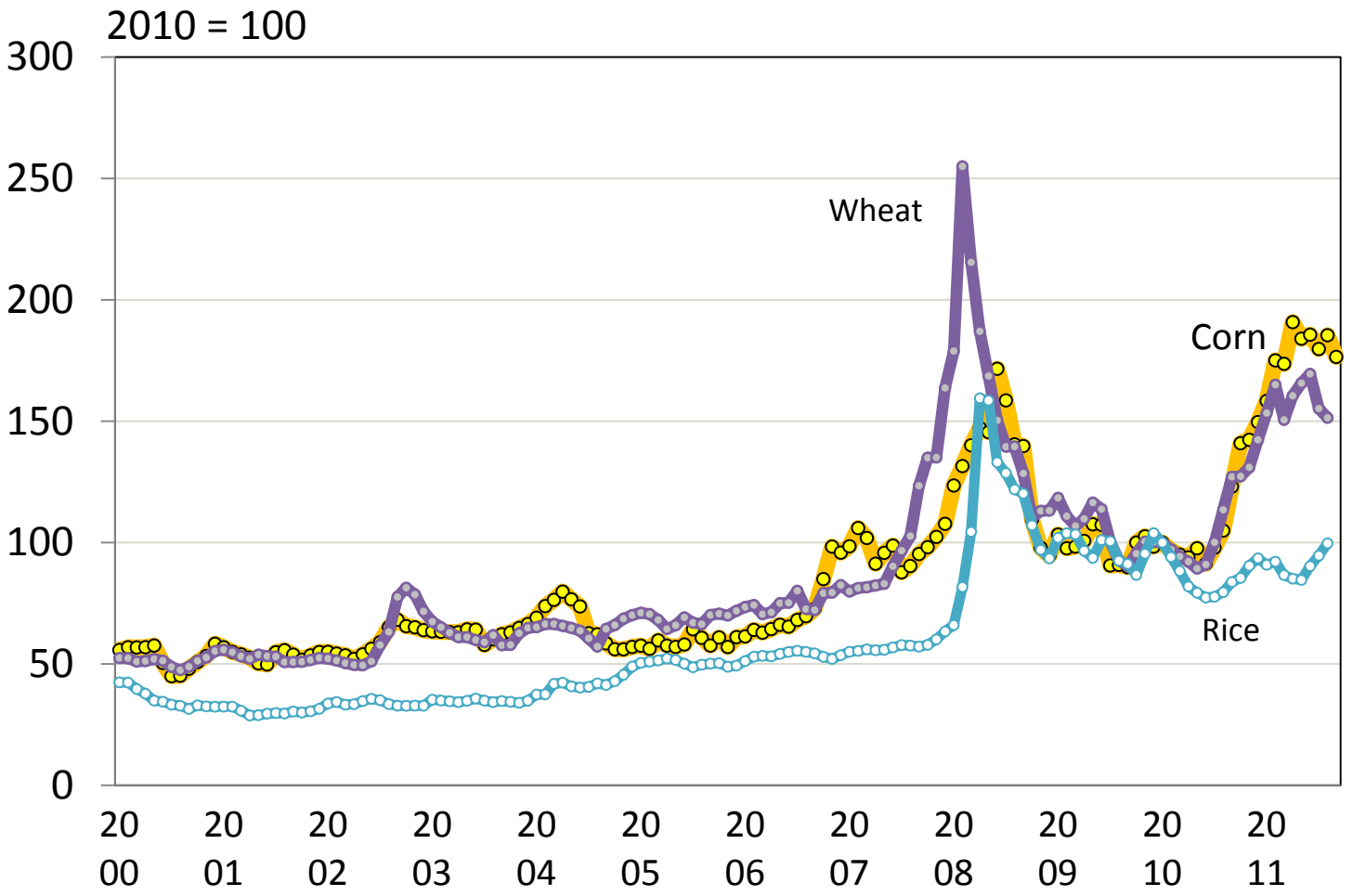
Sources: BP, Renewable Fuels Association, National Biodiesel Board

Now a Major User of U.S. Corn



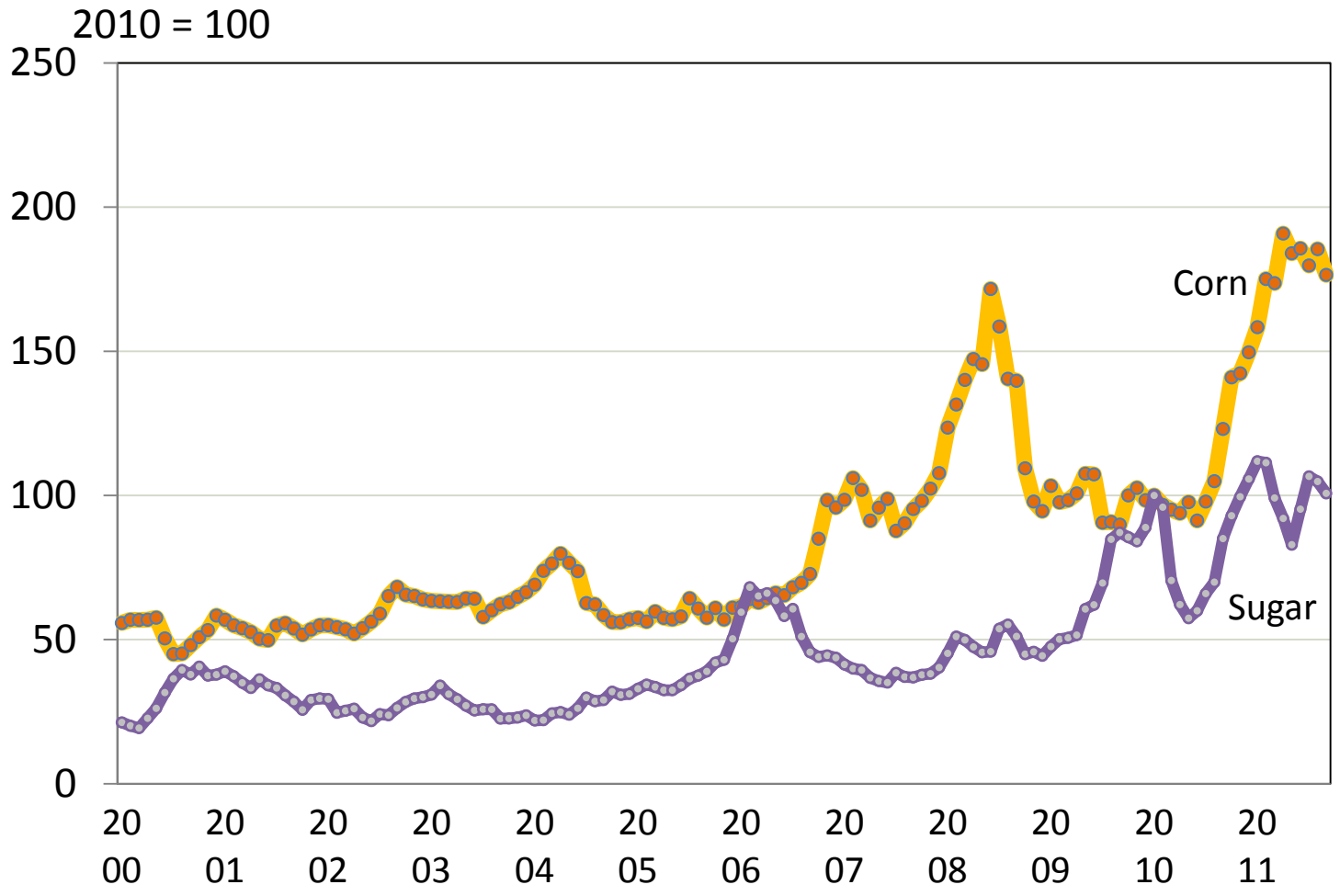
Source: USDA

A Contributor to Spiking Grain Prices?



Source: World Bank

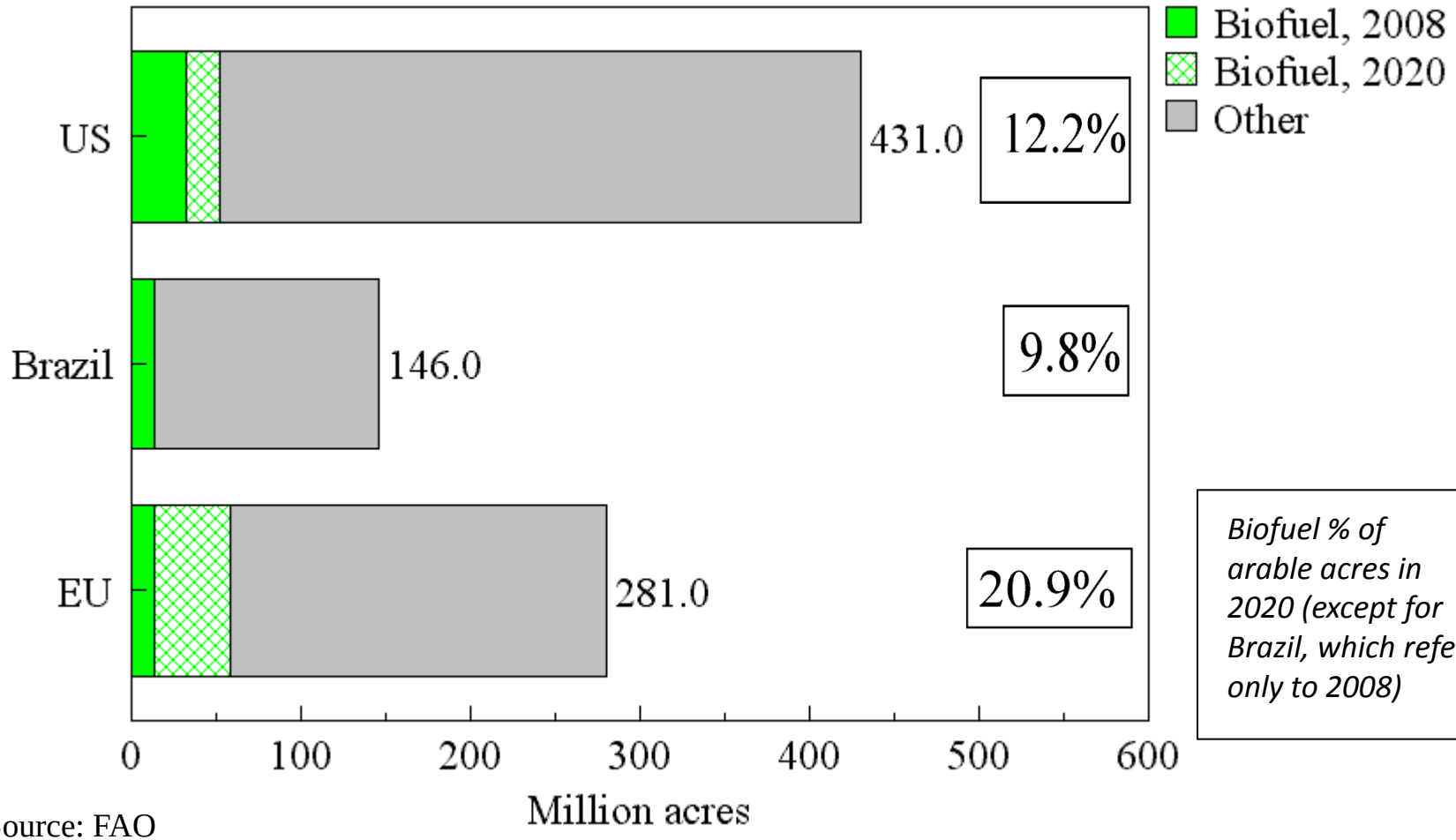
Corn and Sugar Prices Out of Step?



Source: World Bank

How important are biofuels?

Sizable Land Requirements for Leading Producers



Biofuel % of arable acres in 2020 (except for Brazil, which refers only to 2008)

Source: FAO

How important are biofuels?

But Small Relative to World Grain Area

KEY BIOFUEL STATISTICS

	2000-01	2002-03	2004-05	2006-07	2008-09
Biofuels as a share of global grain and oilseed area (percent)					
EU oilseeds	0.00	0.06	0.15	0.24	0.34
US maize	0.13	0.27	0.37	0.76	1.11
Land used for US ethanol from maize as a share of (percent)					
US Maize area	3.63	7.32	9.45	18.03	27.54
US Grain area	0.99	2.00	2.79	5.68	8.44
World grain area	0.16	0.32	0.43	0.85	1.26

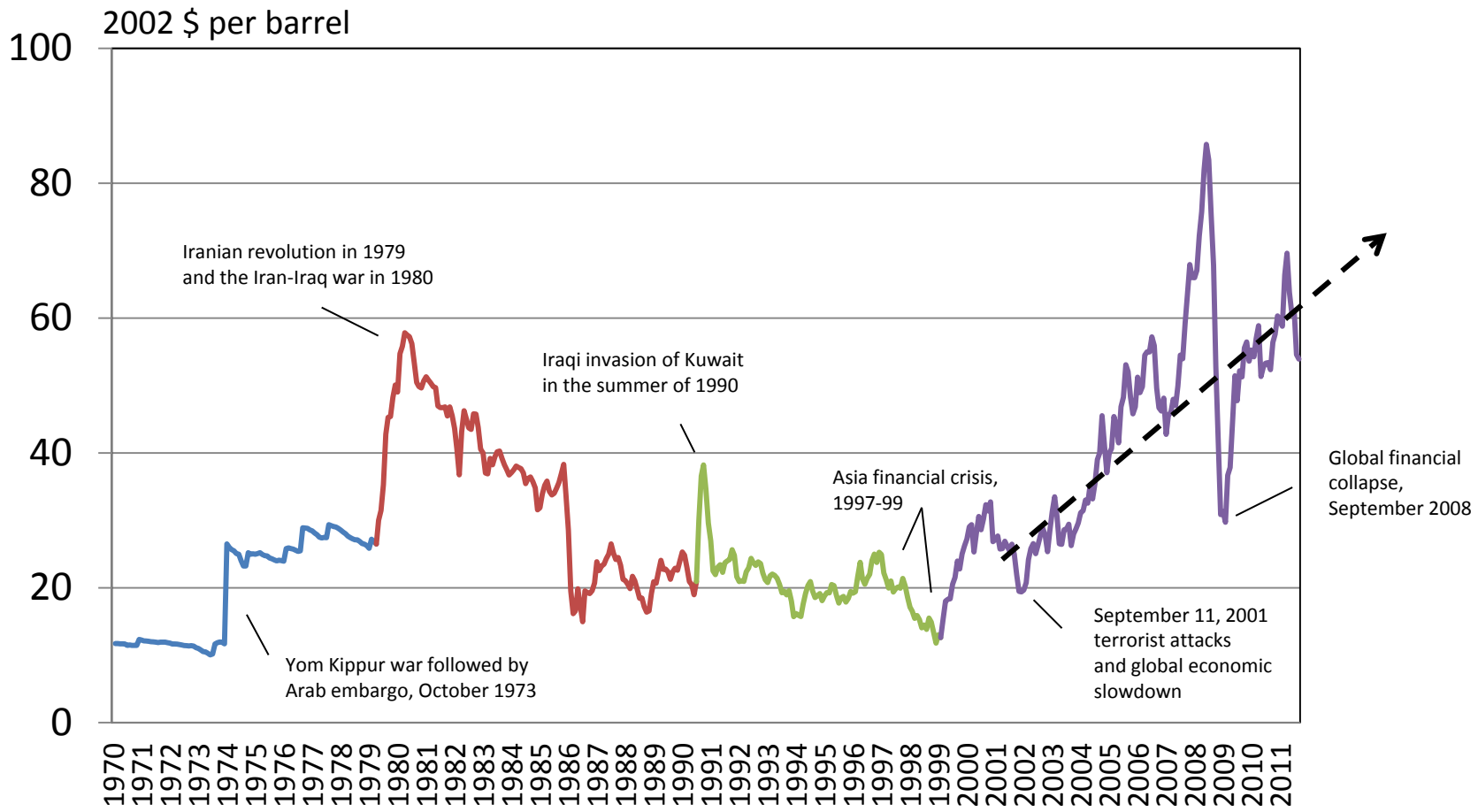
Notes: The shares have been calculated based on average world yields.

Source: John Baffes and Tassos Haniotis. *Placing the 2006/08 Commodity Price Boom into Perspective.* World Bank. July 2010.

What’s the outlook for biofuels?

Positive Outlook Factor #1

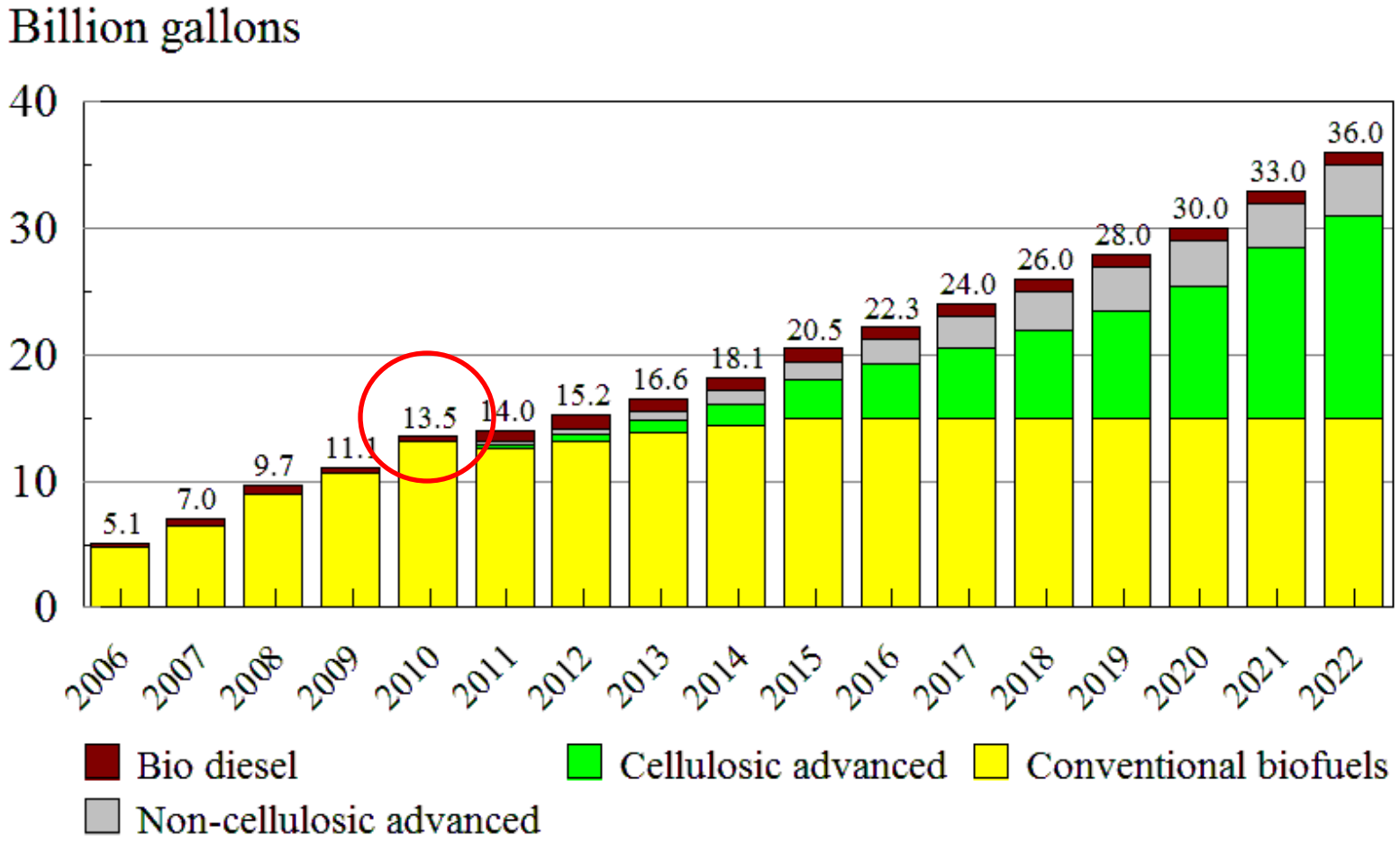
A New Era of High Oil Prices



Source: Federal Reserve of St. Louis; West Texas Intermediate crude deflated using Producer Price Index for all commodities

Positive Outlook Factor #2

Supportive Public Policy in US



Positive Outlook Factor #2

Supportive Public Policy in the EU

EU Renewable Energy Directive (RED)

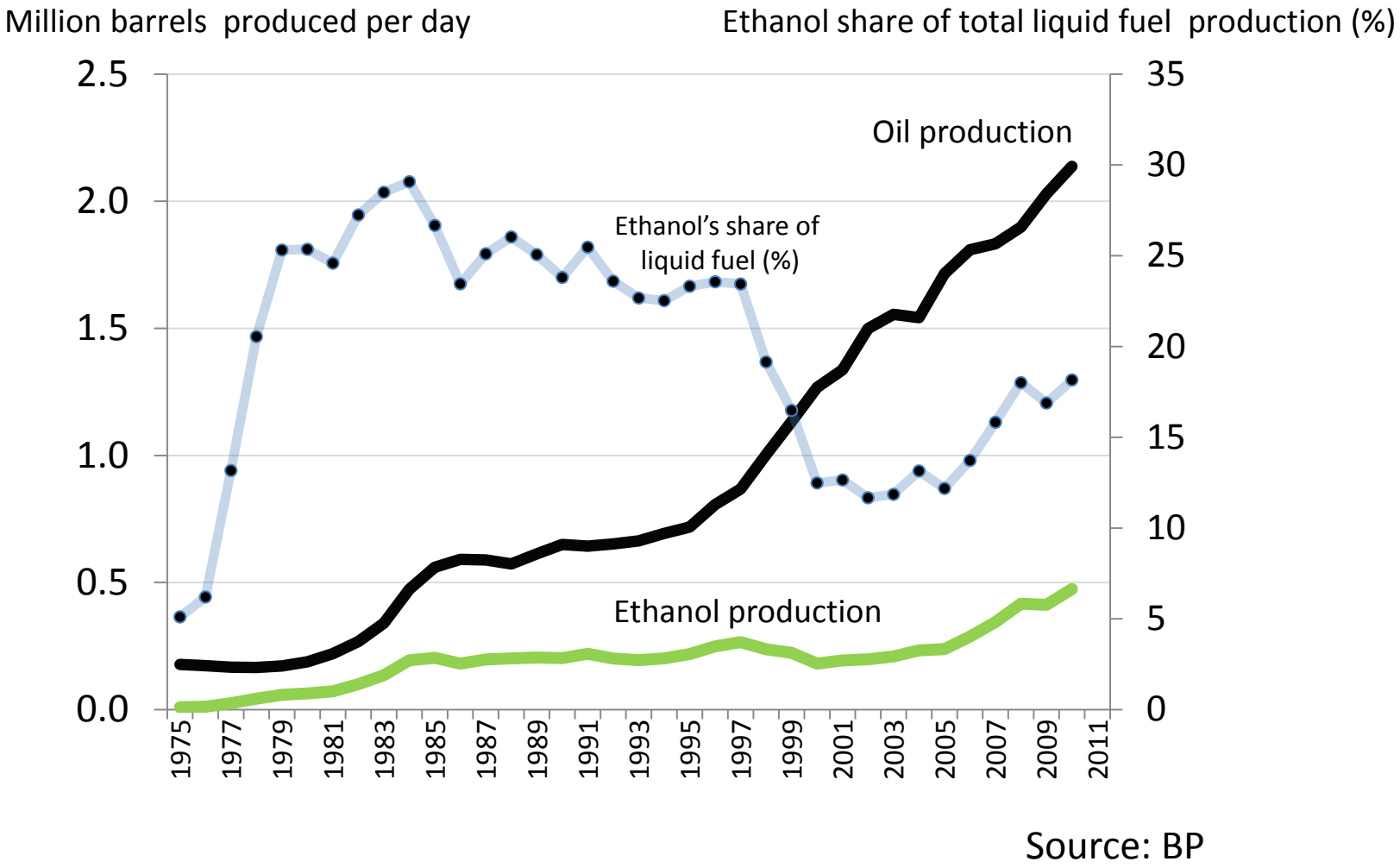
The EU Council and Parliament agreed in May 2009 as part of the Climate Change & Energy Package to

--Cut GHG emissions by 20% by 2020,
--Improve energy efficiency by 20%, and
--Achieve a 20% share for renewable energy in total energy consumption by 2020.

Especially relevant to biofuel use, the RED sets a mandatory goal for each nation to use at least 10% renewable energy in transportation by 2020.

Positive Outlook Factor #2

Supportive Public Policy in Brazil



Source: BP

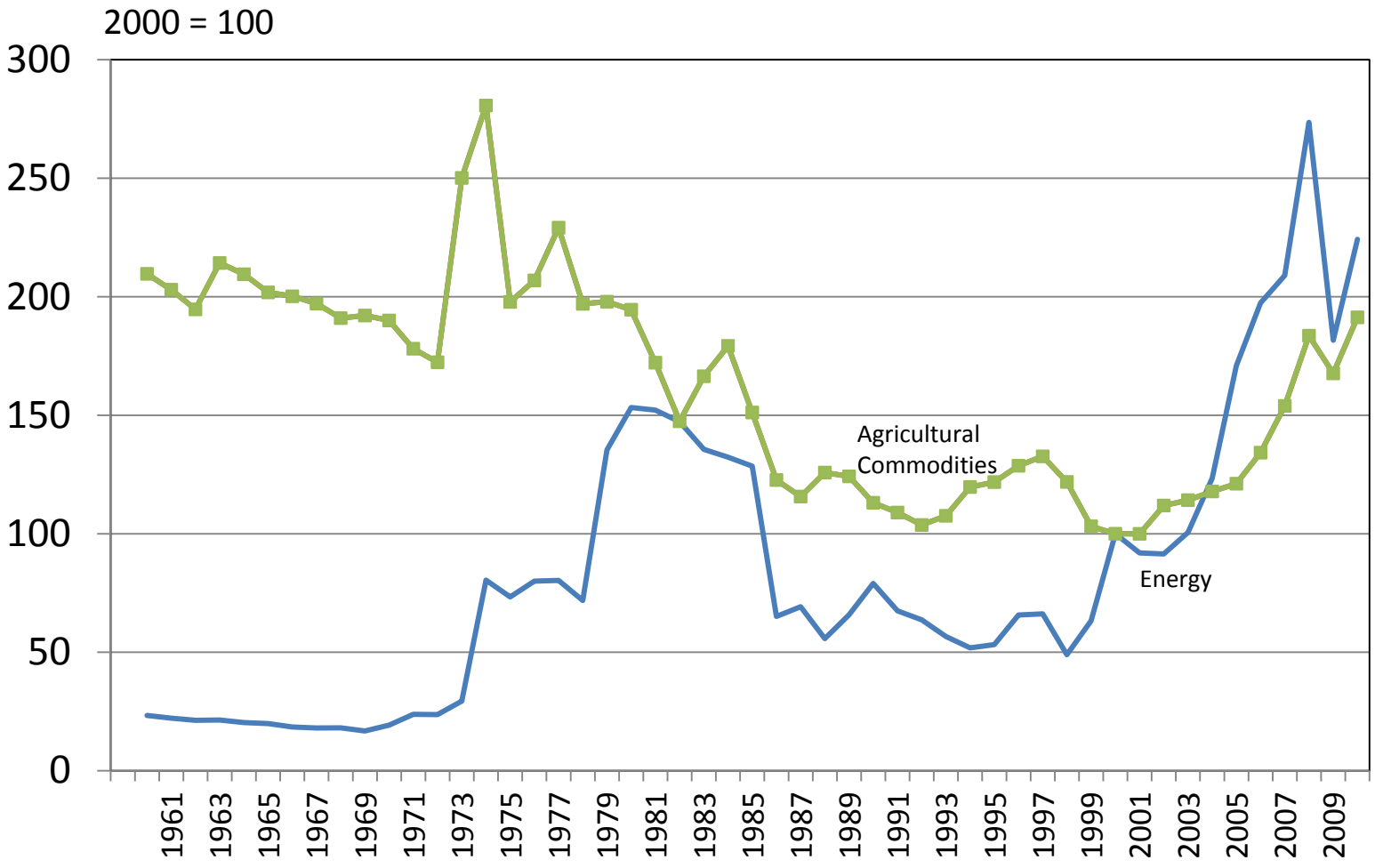
Positive Outlook Factor #3

Biofuel Not a Radical Alternative as an Additive

	Hydrogen	Biofuels
Energy Security Risk	Low	Low
Cost per Mile	?	Low
Infrastructure Cost	Very High	Low
Technology Risk	Very High	Low
Environmental Cost	?	Low
Implementation Risk	Very High	Low
Interest Group Opposition	High	Low
Political Difficulty	High	Low
Time to Impact	Very high	Low

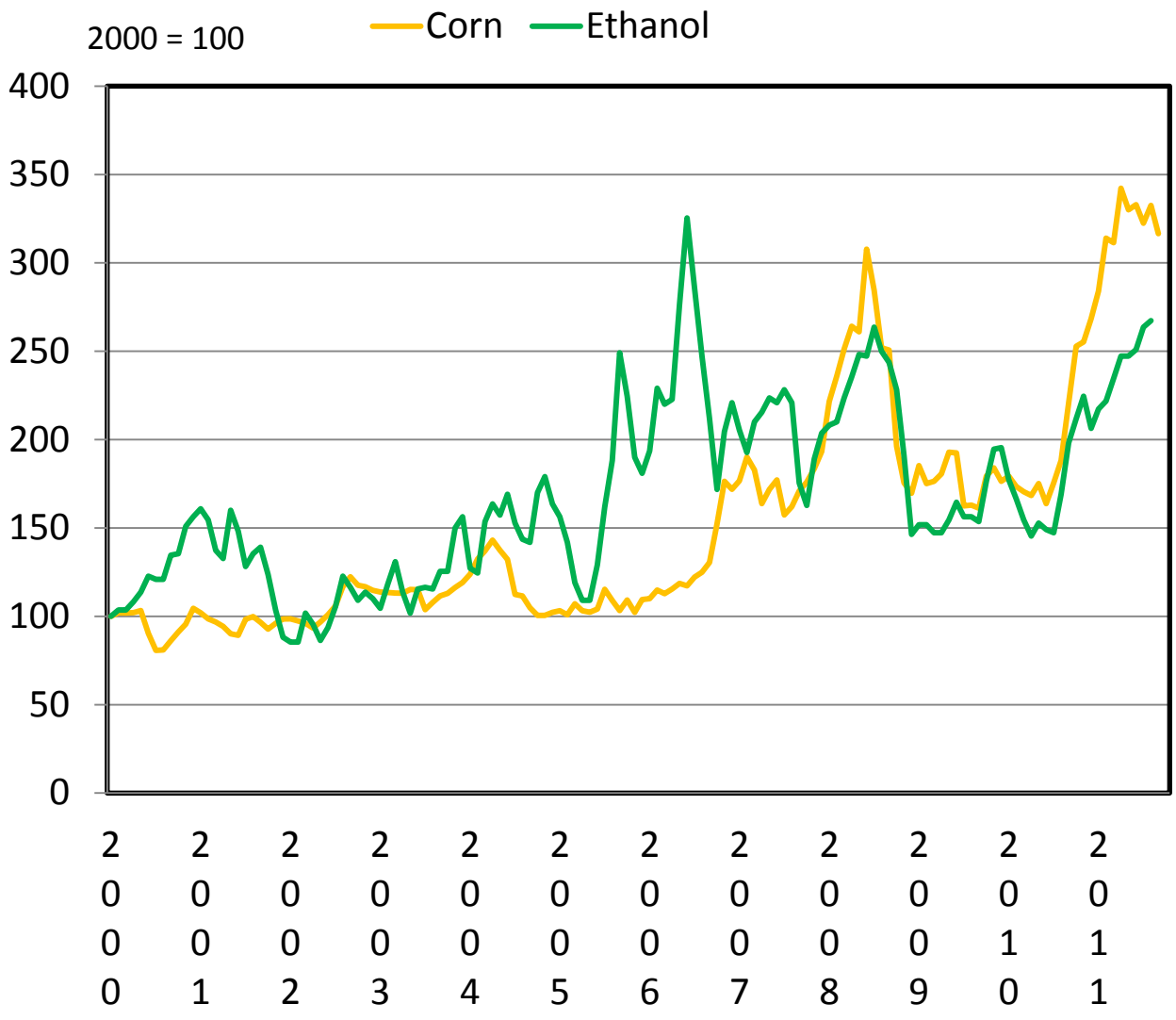
Source: Vinod Khosla, A Near Term Energy Solution, (vk@khoslaventures.com).

Agricultural and Energy Prices More Correlated

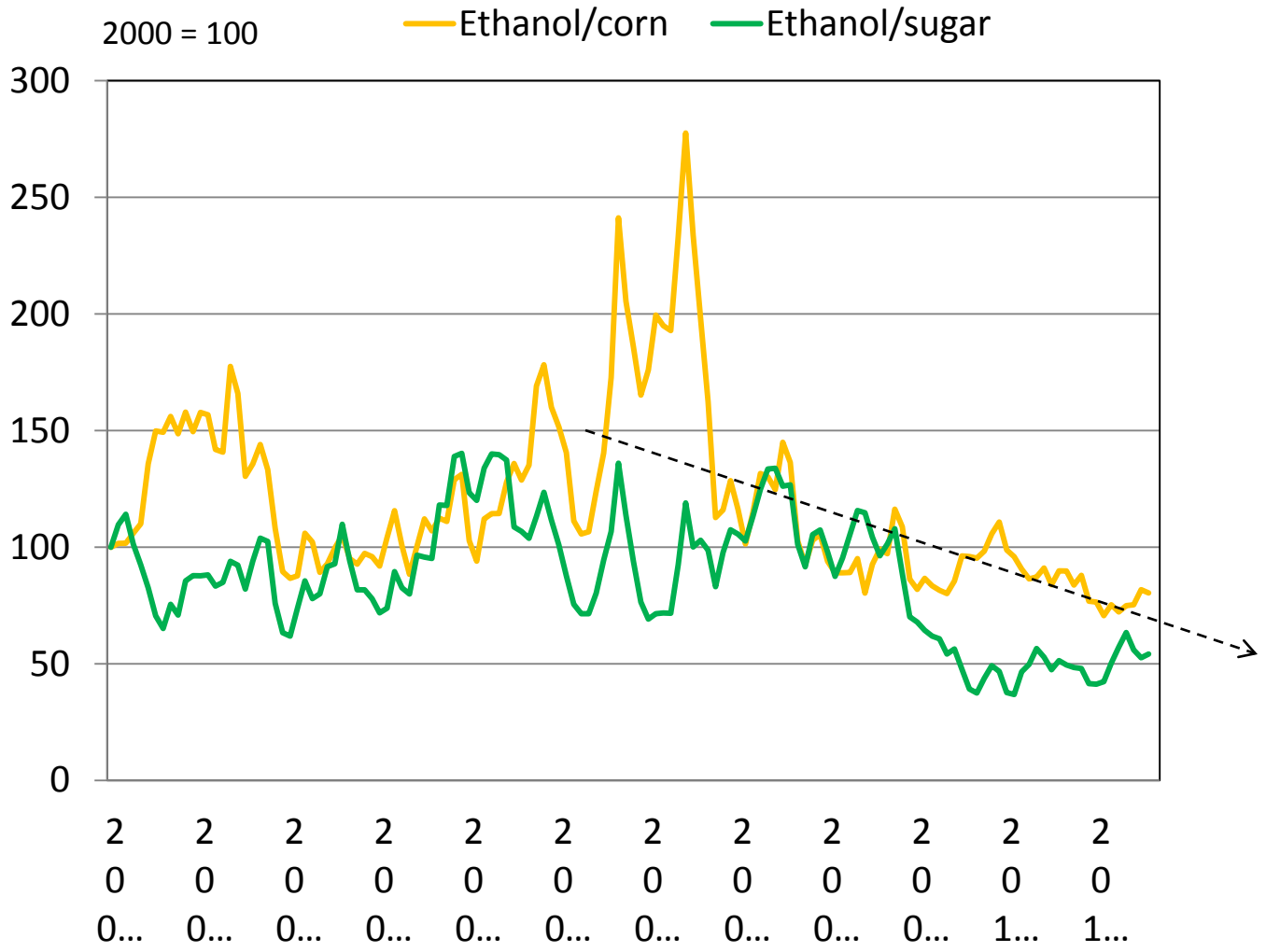


Source: World Bank

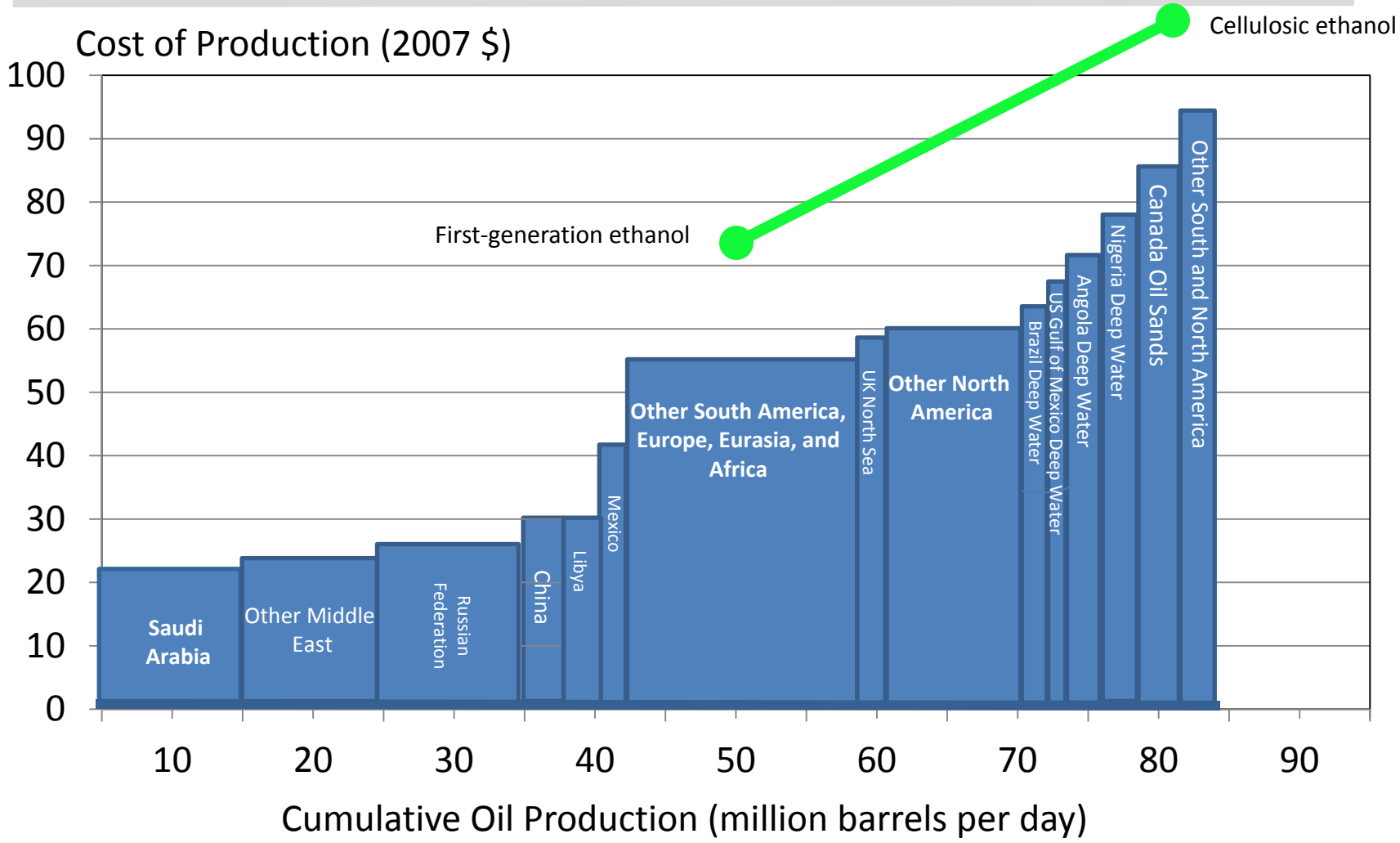
In the Specific Case of Ethanol and Corn



.....Leading to Declining Profits



High Oil Prices Not Just Good for Biofuels



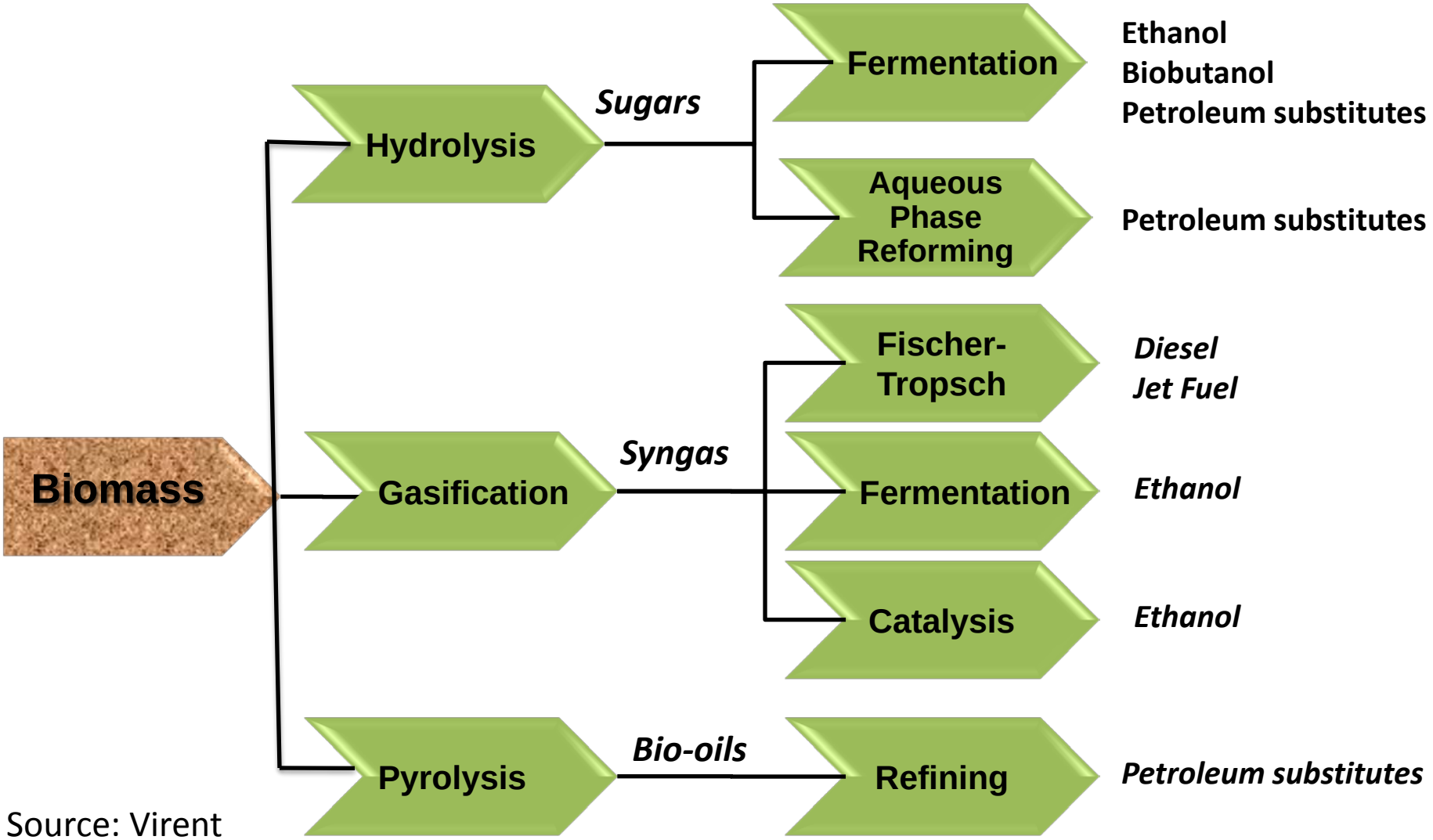
Source: http://www.theoildrum.com/files/murphyfig_1.png

The “Promise” of Next-Generation Biofuels

- Still big uncertainties…but numerous companies in the game. Overpromising, under delivering???
- Total global production is probably less than an average first generation biofuel plant….less than 100 million gallons
- Key hurdles:
  - Reducing production and capital costs,
  - Sustaining pre commercial financial support,
  - Developing supply arrangements, and
  - Overcoming technical constraints, such as the blend wall.
- Shift in focus among some companies to biofuels closer substitutes to fossil fuels.

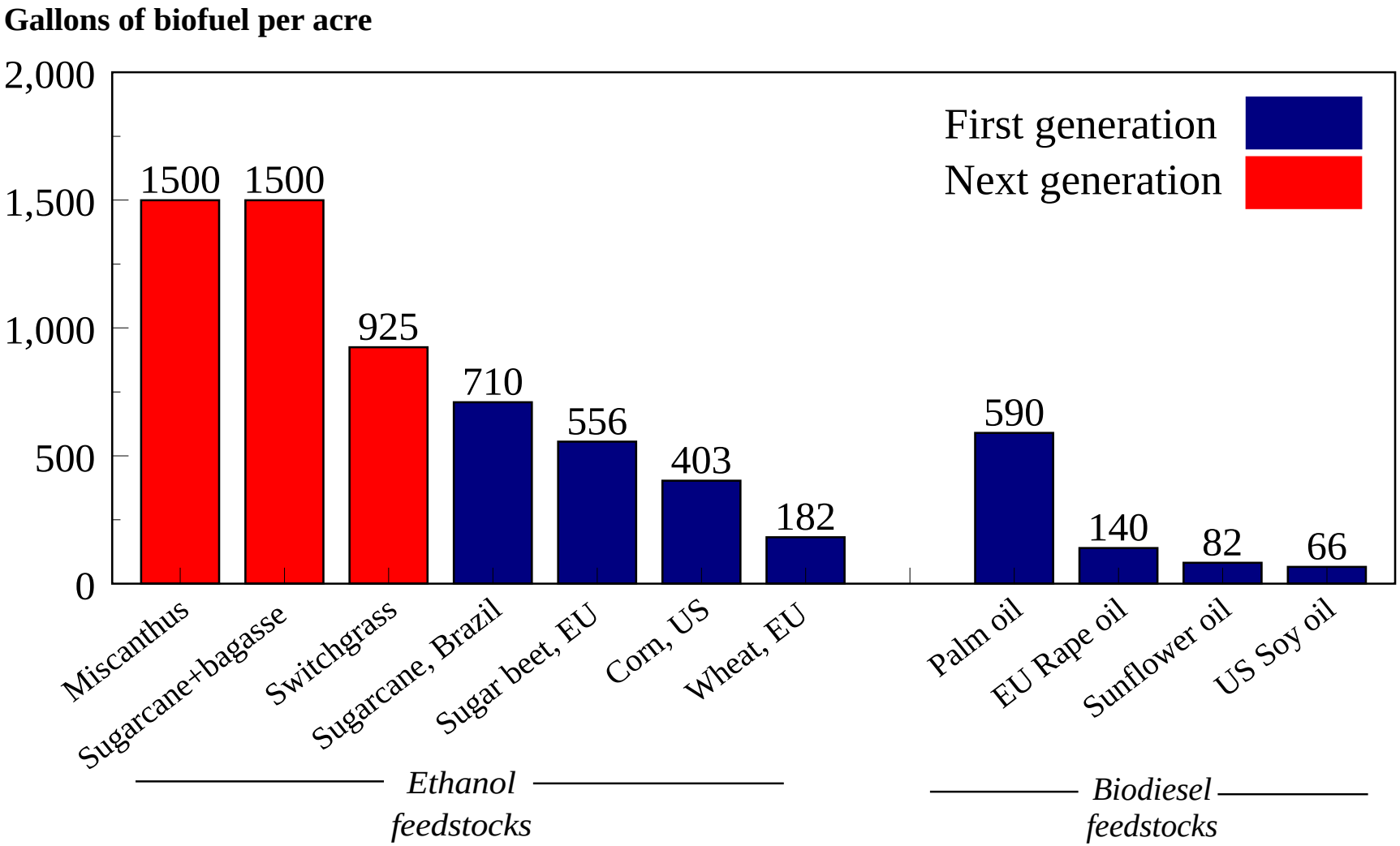
Uncertainties and Challenges #3

The "Promise" of Next- Generation Biofuels



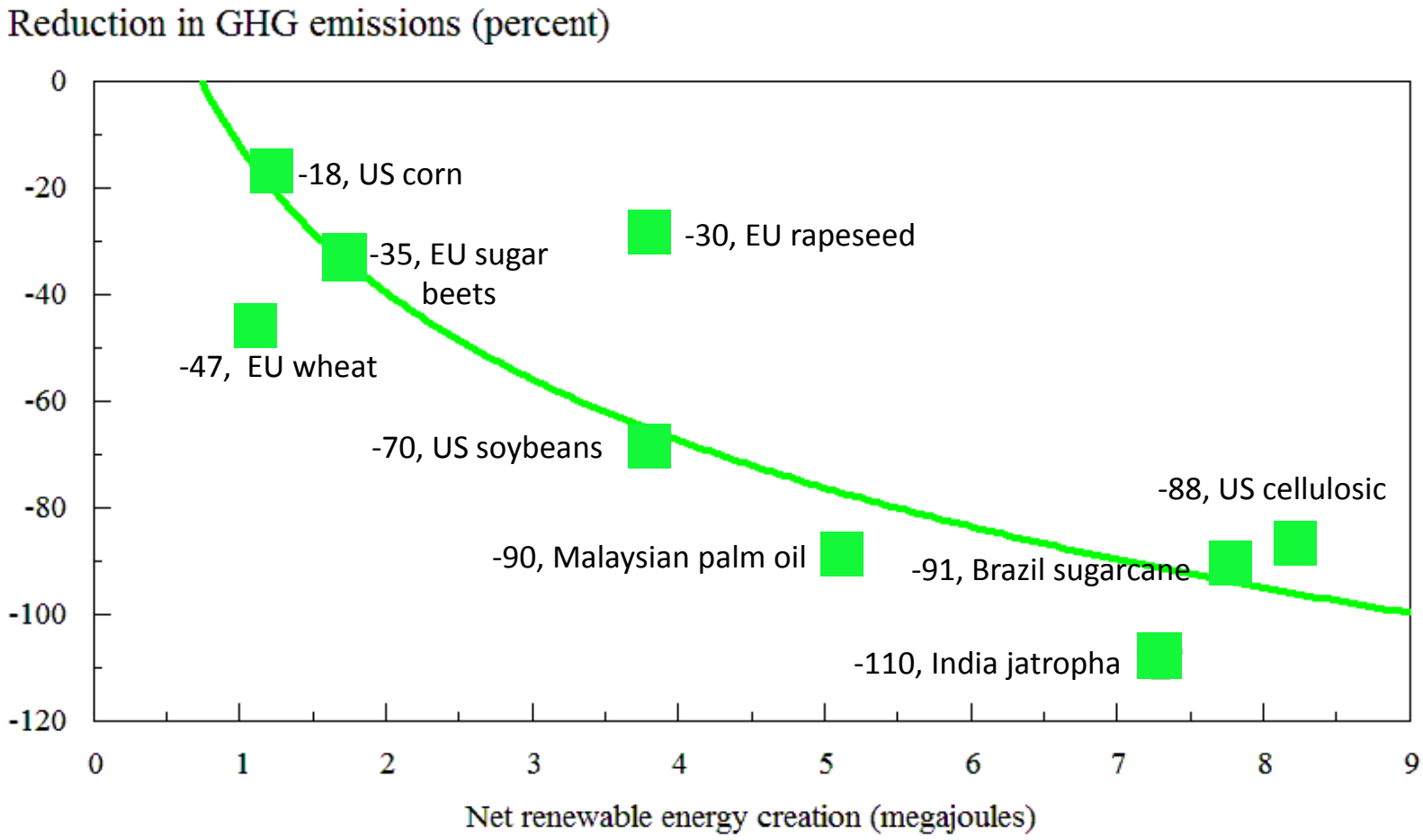
Source: Virent

Higher-Yielding Biomass Means Less Land Needed



Uncertainties and Challenges #4

Higher–Yielding Biomass Reduces Environmental Impacts



Source: IMF, World Economic Outlook, Oct. 17, 2007, table, "Costs and Benefits of Biofuel Prodution," p. 49; Net renewable energy creation relative to petroleum-based fuels: "Defined as the new energy created relative to the energy input in the production, distribution, and retailing of biofuels. Measured relative to the new energy created in the production of the respective fossil fuel (measured in megajouls/megajouls)." Percent reduction in GHG emissions "Defined as the change in life cycle greenhouse gas (GHG) emissions per kilometer traveled by replacing fossil fuels with biofuels in conventional vehicles. Life cycle means that the emissions are measured over the production cycle of the respective fuel."

Impacts on food prices, volatility, and the food system?

- The research
- Impacts on Asia-Pacific region
- Concluding points

What impacts on food prices, volatility, and the food system?

– The research:

- World Bank, *Mitchell* (2007). "The increase in internationally traded food prices from January 2002 to June 2008 was caused by a confluence of factors, but the most important was the large increase in biofuels production from grains and oilseeds in the U.S. and EU." ….70-75 percent increase in food commodities prices was due to biofuels and the related consequences of low grain stocks, large land use shifts, speculative activity and export bans.
- World Bank, *Baffes and Haniotis* (July 2010). In this paper, we examined three key factors (regarding the rise in commodity prices) whose role has been somewhat controversial: speculation, the growth of demand for food commodities by emerging economies and the role of biofuels….Biofuels played some role too, but much less than initially thought.
- Farm Foundation (July 2008). Biofuels have had a major impact on corn prices, but in recent years, most of those increases have been driven by oil.
- IFPRI, *Headey and Fan* (2010). ….a growing number of studies are finding that biofuels production has a large positive impact on food prices, but virtually no negative impact on energy prices. In the foreseeable future, biofuels production does not look good for global food security, unless ways can be found to minimize the diversion from food production or involve poor farmers in biofuels production.

Impacts on Asia-Pacific

- Since biofuel production is of fairly minor significance throughout most the Asia-Pacific region, with the exception of the United States, the effects are mostly indirect. These are the principal effects:

- The derived demand for converting biomass to fuel represents an added component of global demand for commodities used as biofuel feedstocks. Thus, to the extent that biofuel expansion raises prices of corn, sugar, and vegetable oils, it affects the cost structure of competing users or processors.

  - For Asia-Pacific, the feed-livestock complex would be most affected. Asia-Pacific is a large user and net importer of feedstuffs and livestock products. Production of byproduct Distilled

  - Food price increases have their greatest impact on the urban poor who are more dependent on a money-based economy and spend large shares of their household budget on food.

- Higher prices increase the returns to agriculture and other primary industries, and may help to keep more resources in the primary sector than would otherwise be the case.

- Investment in biofuel plants provides local employment and stimulates the surrounding economy. Construction has temporary benefits, while operation has more sustained economic impacts. These impacts in the Asia-Pacific are small because production in the region outside the United States is minimal.

Concluding Points

High oil prices will sustain regional interest in alternative fuels, including biofuels

Biofuels will play a modest role as part of a portfolio of solutions
to high energy prices including, conservation and use of other alternative fuels

Constraints to future production of biofuels:

--Declining/low profitability given correlation
between output and input prices;
--Technical limits to using ethanol or biodiesel and high cost of
adapting infrastructure;
–Slow advances in technology for reducing costs of producing
both first-generation biofuels and commercializing the conversion
of cellulosic biomass;
--Ambiguity about the environmental impacts; and
--Era of government deficits and reduced public support.