

# The Sustainability of Biofuels

## Issues to Consider

July 2008



## **Biofuels can help reduce greenhouse gas emissions**

The world is not starving because of biofuels

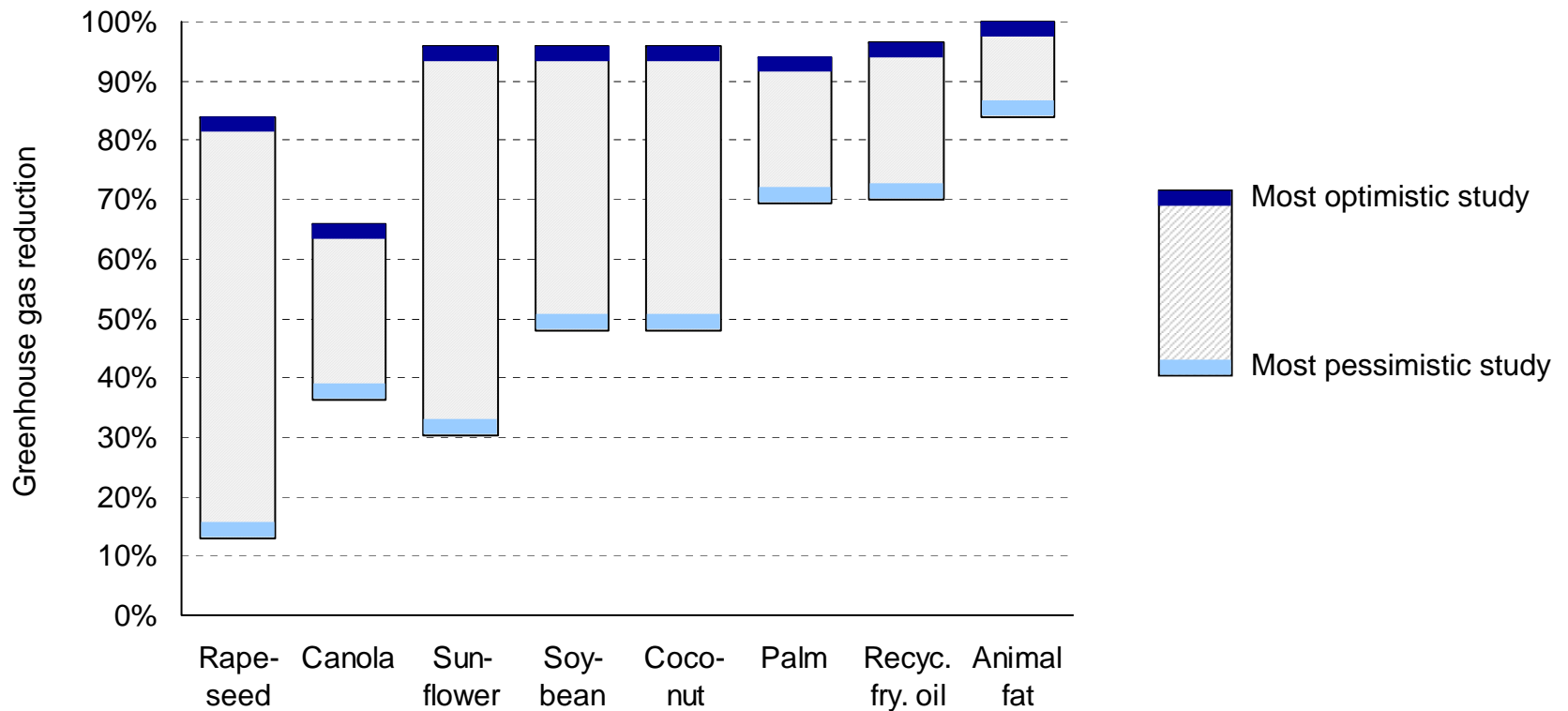
Price swings in agricultural commodities are common

The most sustainable source of energy should be chosen

All scientifically reputable studies show that the ongoing production of biodiesel can help reduce greenhouse gas emissions

### Greenhouse gas savings achieved by substituting a liter of diesel with biodiesel

by raw material, including all life-cycle emissions except the one time carbon release due to land use change



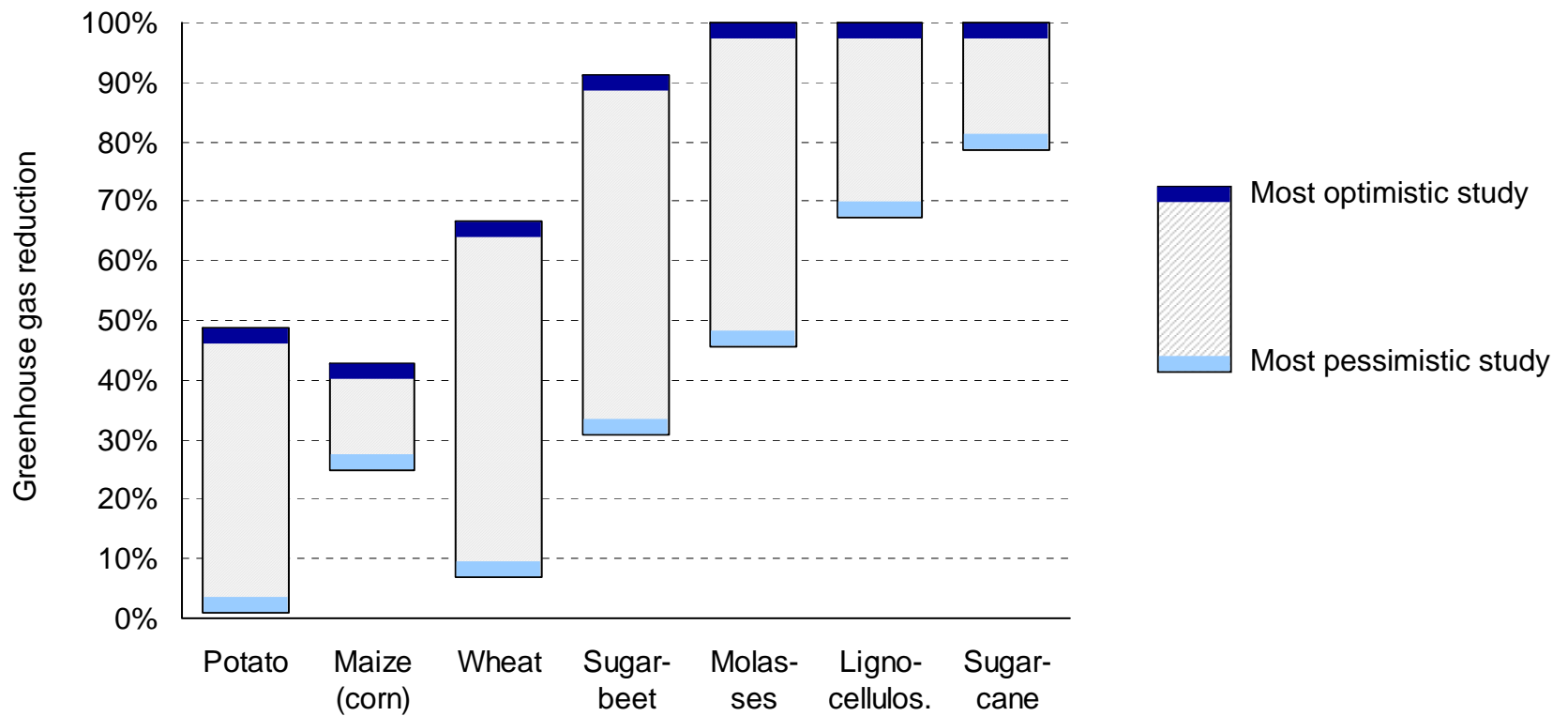
Source: Institute for Energy and Environmental Research Heidelberg, analysis of all published studies worldwide



Ethanol also reduces greenhouse gas emissions, but the savings vary widely depending on the raw material used

### Greenhouse gas savings achieved by substituting a liter of gasoline with ethanol

by raw material, including all life-cycle emissions except the one time carbon release due to land use change

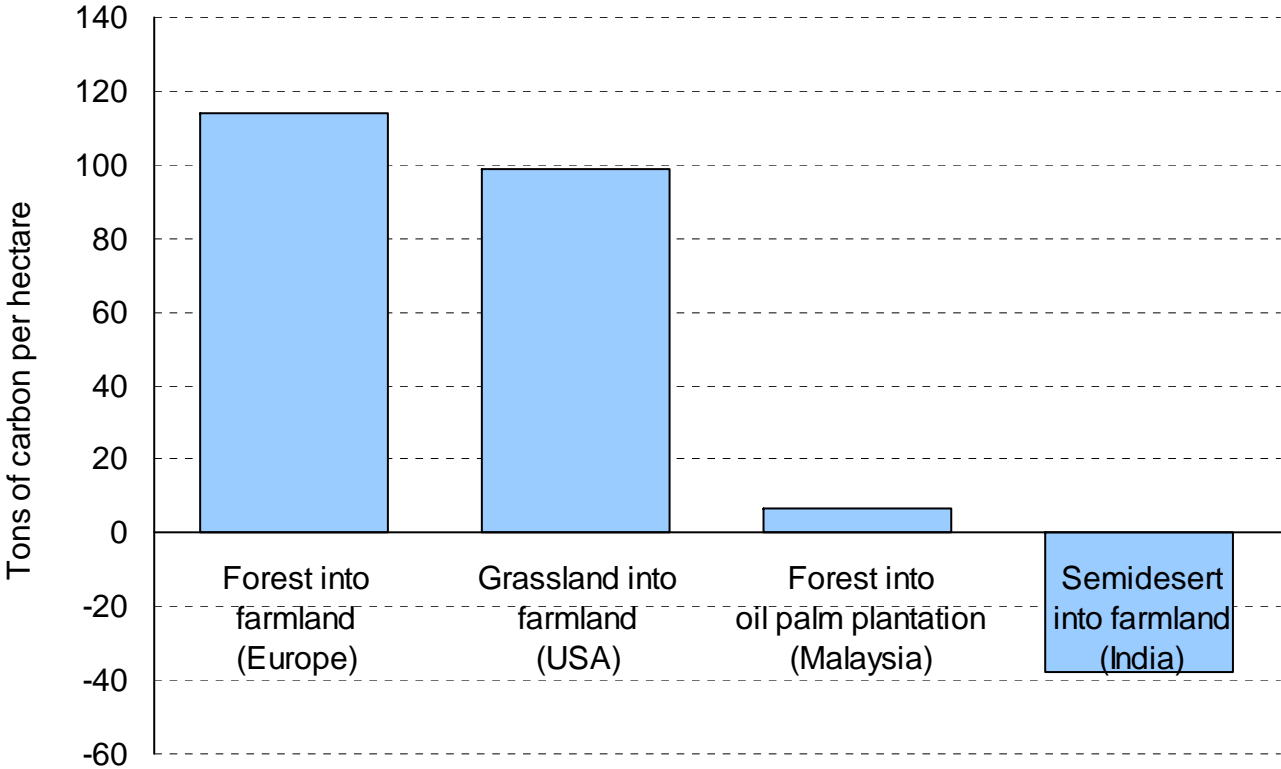


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One time carbon emissions due to land use changes also affect greenhouse gas balances depending on who has to factor them in and how

### Carbon emissions due to land use changes (above and below ground)

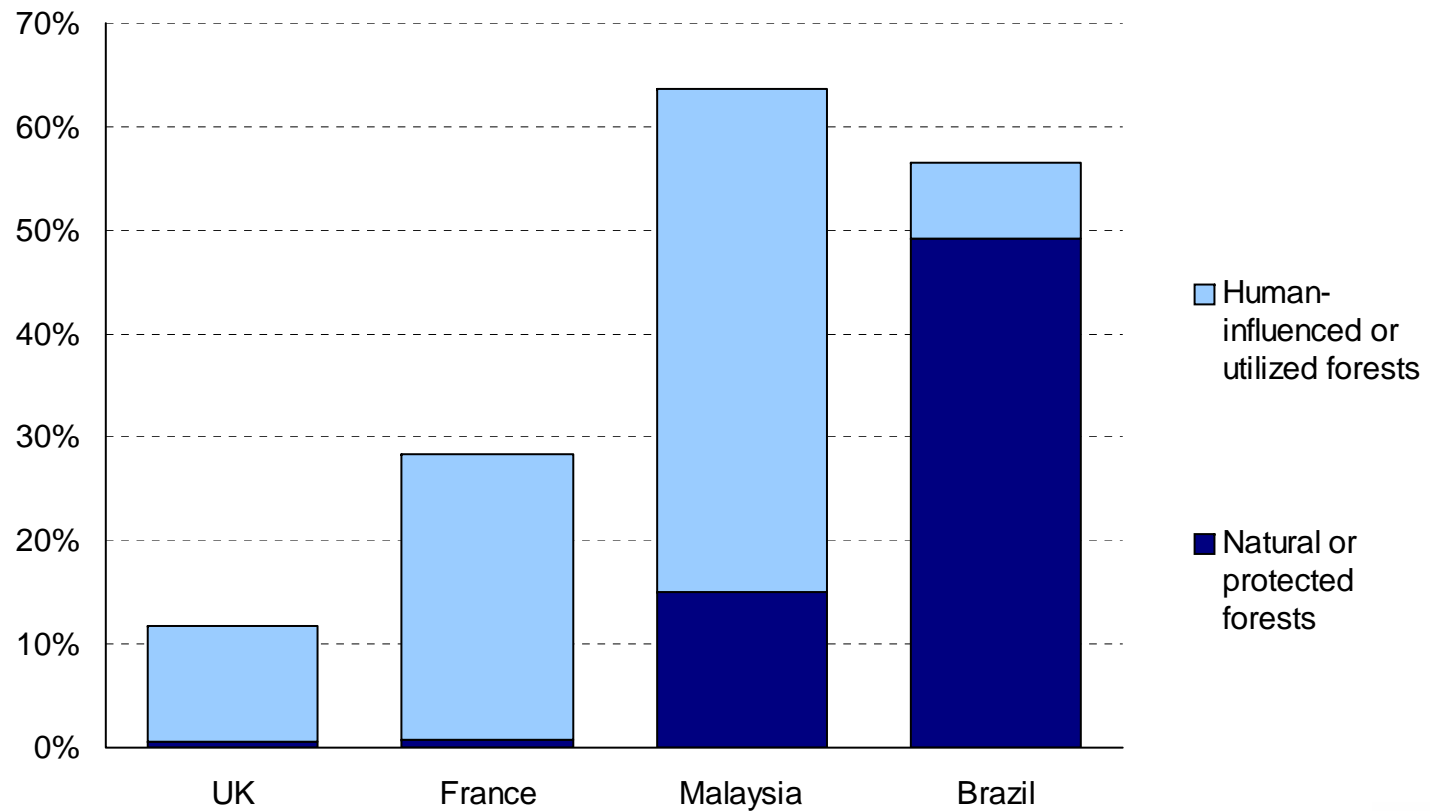


Source: Draft EU Renewable Energy Directive (carbon stock of farmland, grassland, oil palm plantations, and semidesert)  
UN FAO (carbon stock of national forests)



Europe is not a shining example of forest conservation yet the countrysides do not scare others off from wanting their nations to develop similarly

**Percent of land that was covered by forests in 2005**



Source: UN Food and Agriculture Organization



# Sustainability criteria have not yet been created for the fossil fuels that biofuels replace

## Environmental impacts of fossil fuels

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- Destruction of ecosystems, reduction of biodiversity at new drilling sites
  - Environmental protection areas (e.g. Arctic National Wildlife Refuge)
  - Deep sea
- Contamination of the environment due to accidents (e.g. Exxon Valdez)
- Stress on ecosystems in the area of existing oil fields
- Emissions of greenhouse gasses through the burning of fossil fuels (including natural gas and coal)

## Other sustainability issues

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- Oil revenues help keep undemocratic regimes in power (e.g. Nigeria, Sudan, Iran, etc.)
- Indigenous populations are driven off oil-rich lands
- Corruption
- War

Biofuels can help reduce greenhouse gas emissions

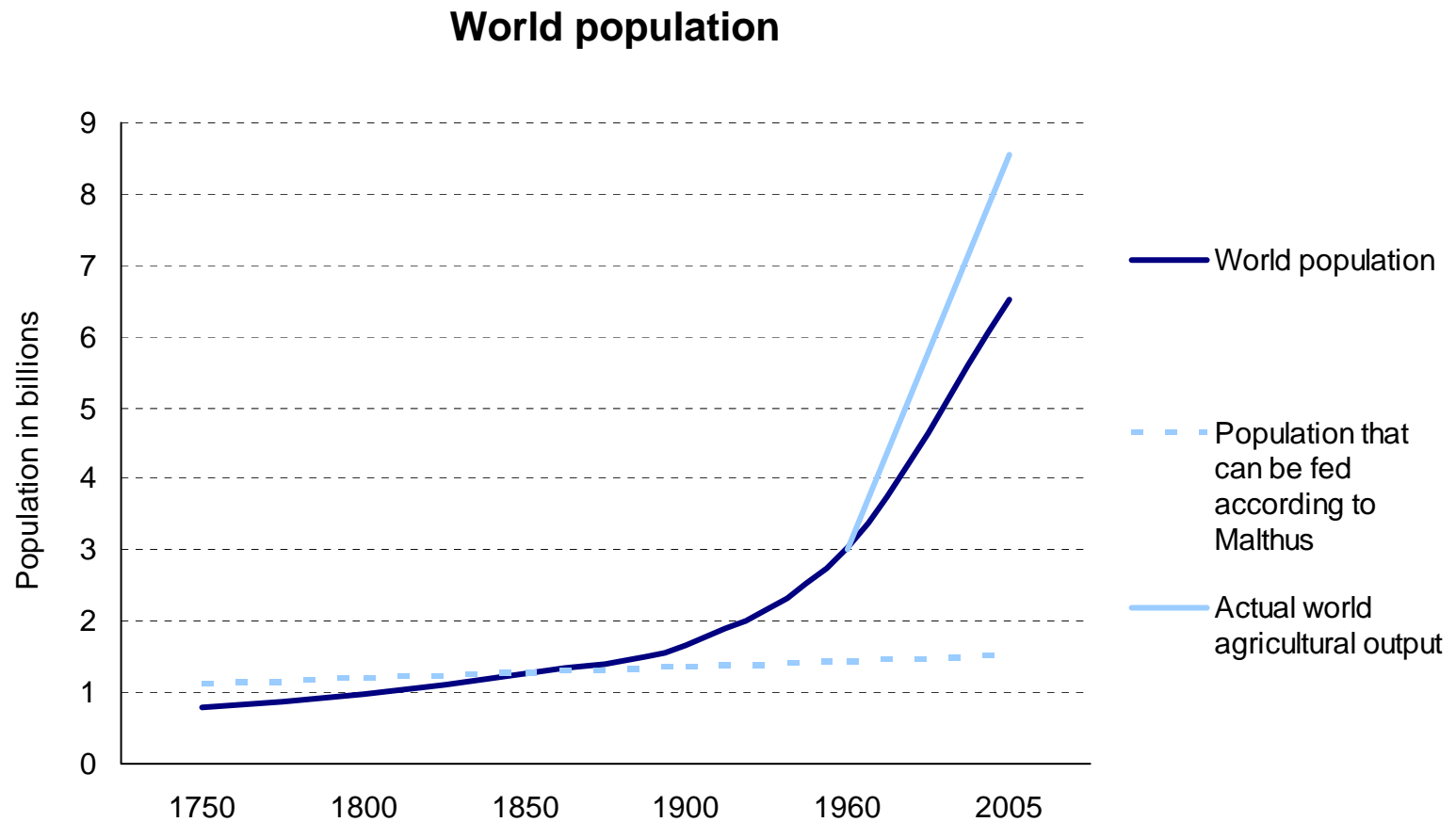
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Predictions that the demand for agricultural products will soon outstrip our ability to produce them have a long tradition, but have never been right



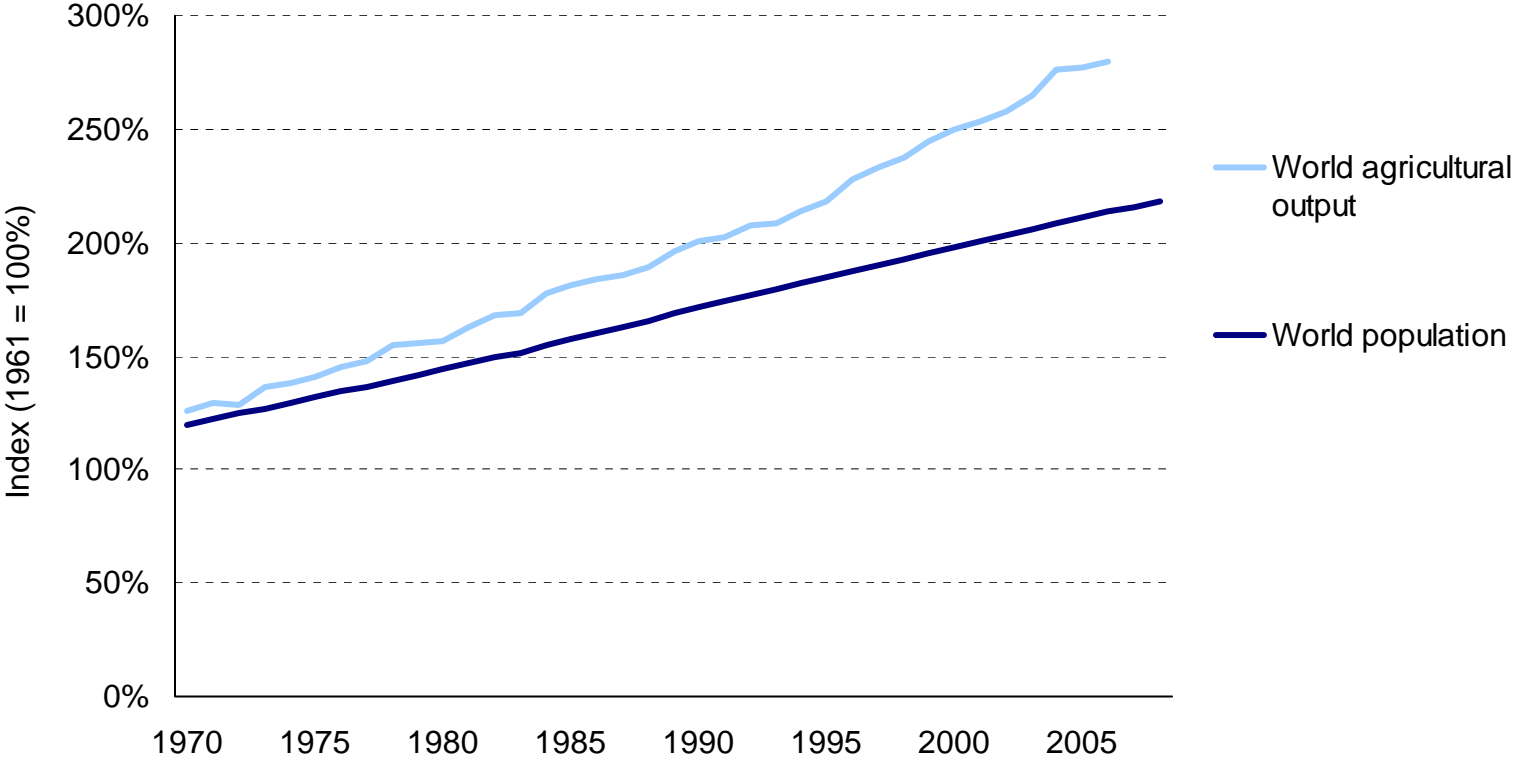
Source: UN Food and Agriculture Organization, UK Statistics Authority  
Thomas Malthus: „Essay on the Principle of Population“, 1798

Further predictions of starvation, similar to Malthus':  
- Paul Ehrlich: "The Population Bomb", 1968  
- Jean Ziegler: "An Announced Massacre", 2008



Agricultural production is growing faster than the population but the annual harvest varies - and the world has experienced droughts and floods in recent years

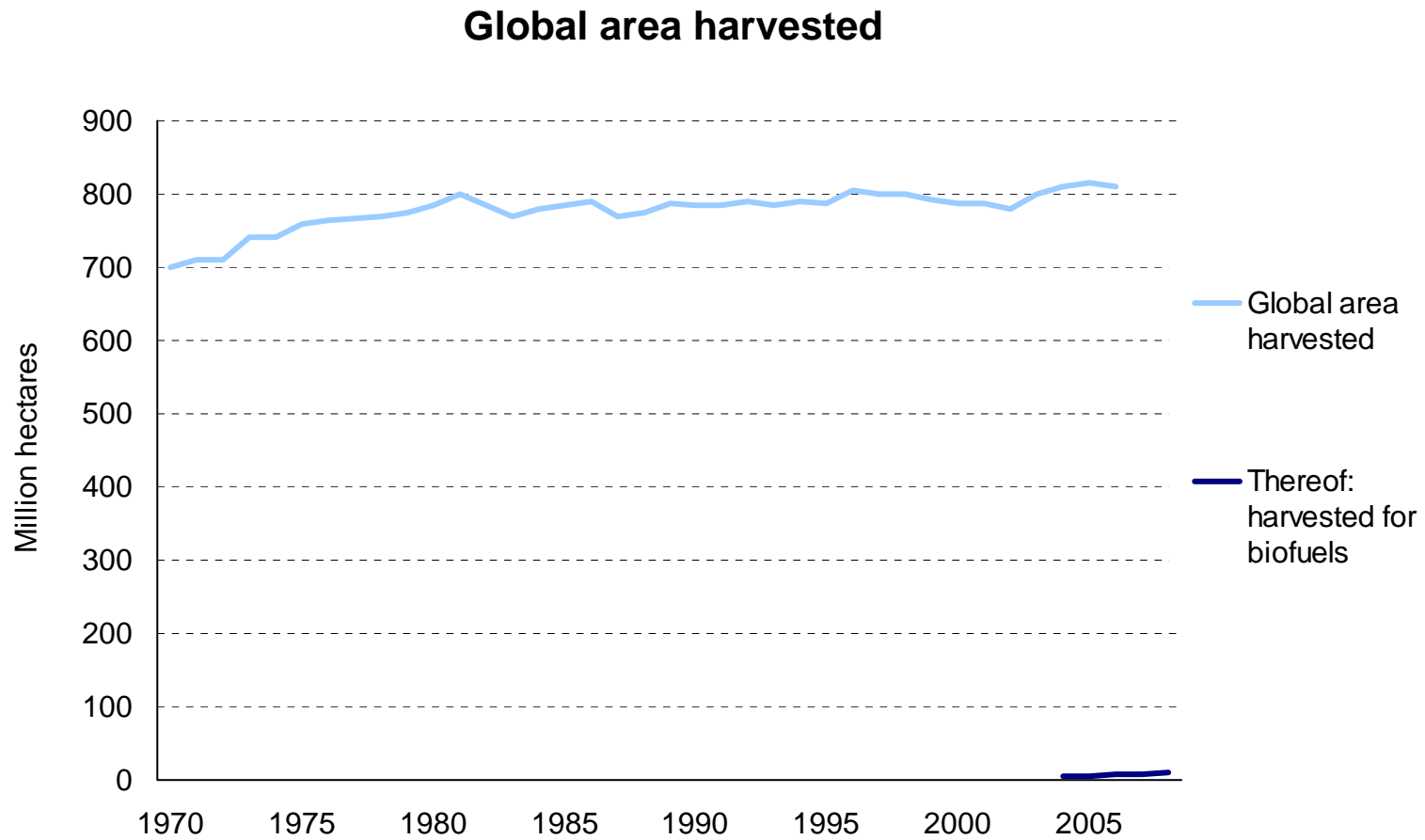
### Agricultural production and world population



Source: UN Department of Economic and Social Affairs, Population Division  
UN Food and Agriculture Organization



1.3% of the global area harvested in 2007 supplied raw materials for biofuels - that contributed somewhat to rising food prices, but was not the only cause



Source: US Department of Agriculture

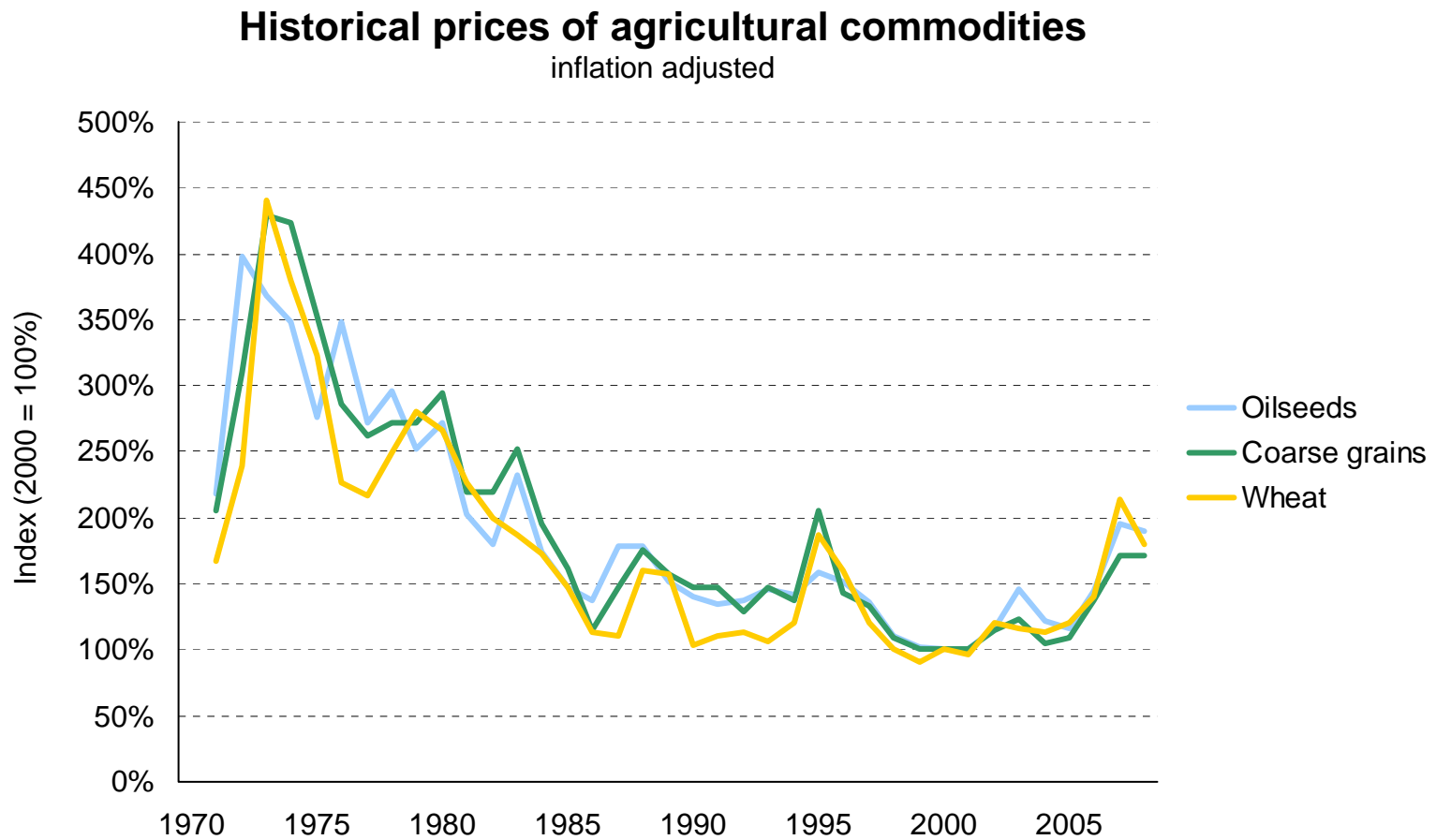
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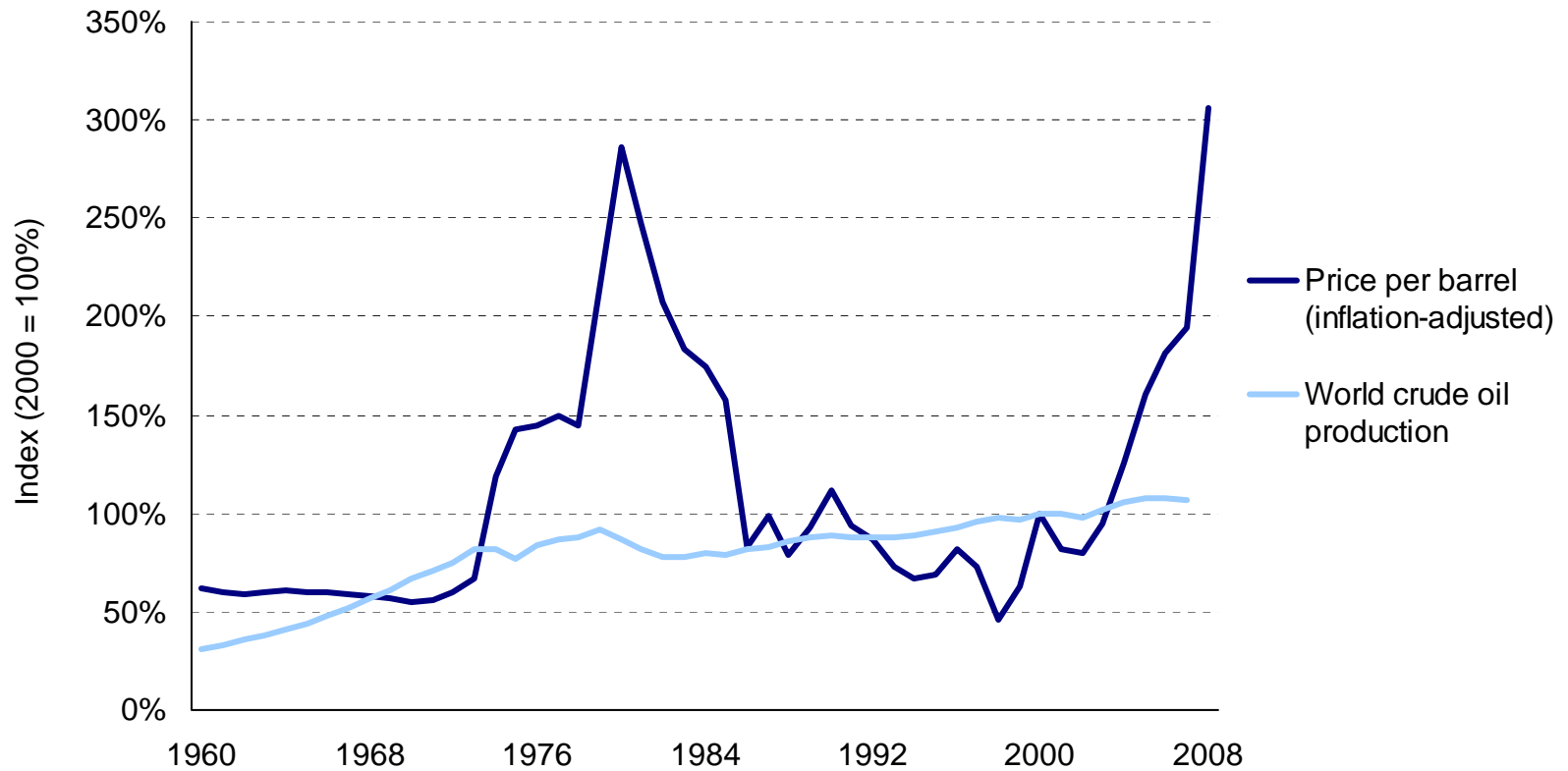
Price spikes in agricultural commodities occurred before biofuels were invented. High prices followed the bad harvests of 1972 and 1995 and especially the oil crisis of 1973



Source: UN Food and Agriculture Organization, OECD

When crude oil production is reduced, prices rise. Global production has been declining since 2005 even though demand from China and India has been increasing

### Crude oil production and prices

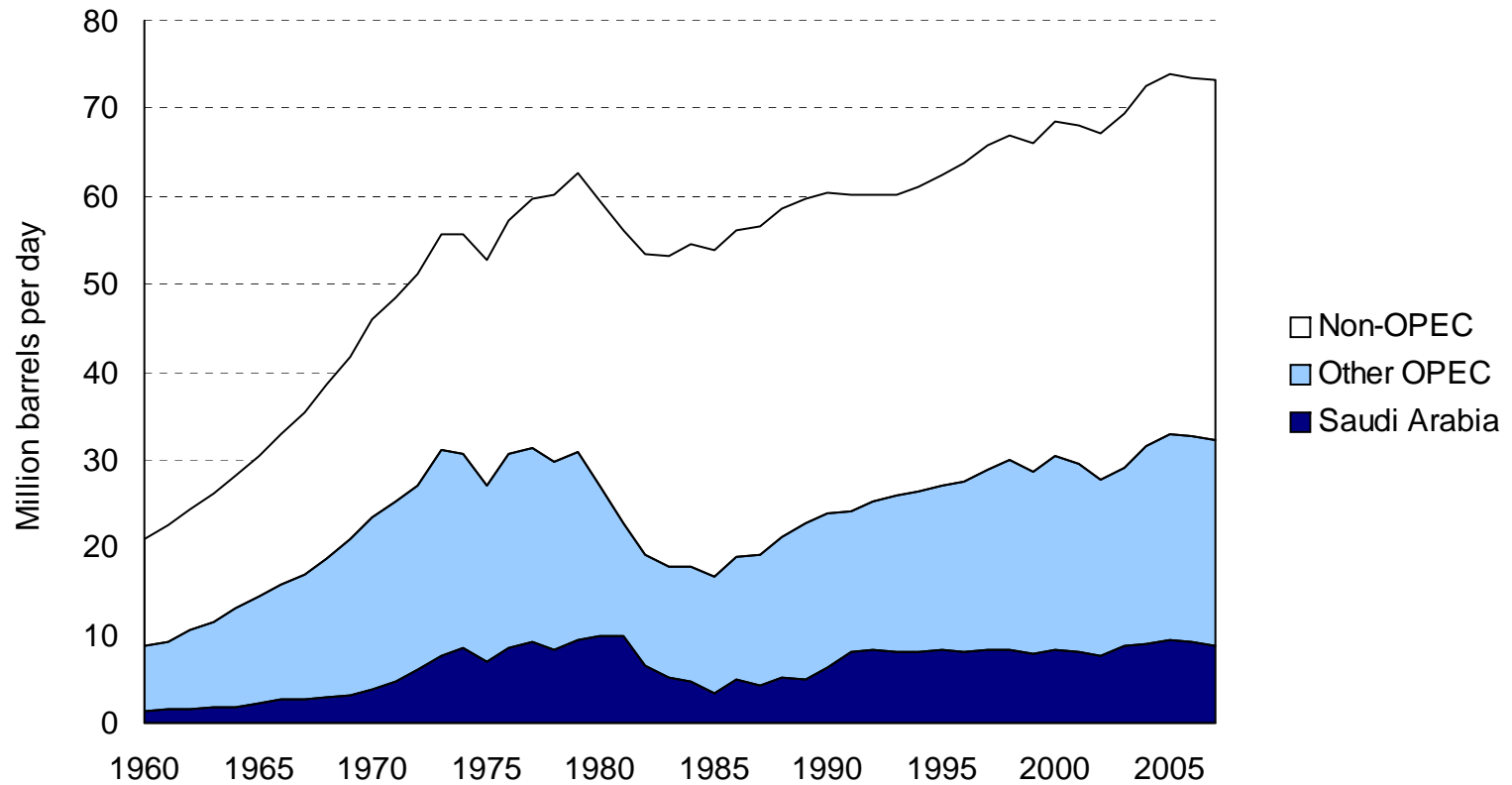


Source: US Energy Information Administration



The production decline is due to Saudi Arabia. The rest of the world has, on average, been keeping production stable while Saudi Arabia has been decreasing it

### Global crude oil production



Source: US Energy Information Administration



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Conservation is the best form of environmental protection but the most sustainable source of energy should be chosen to fill the needs that remain

## Summary and recommendations

- All scientifically reliable studies have concluded that the ongoing production of biofuels can help reduce greenhouse gas emissions and global warming
- There is no looming ceiling to agricultural output and the world is not starving because of biofuels
- Price spikes occurred in times without biofuels and will continue to occur in times with biofuels
- No source of energy is perfect - neither wind power, nor geothermal, nor brown coal, nor atomic
- The best way to protect the environment is to use less energy



To meet the needs that still remain, all forms of energy should be evaluated regarding their environmental, social, economic, and political sustainability and the best alternative should be chosen and allowed to develop