Bio-energy and Food-security. The Impact of Bio-energy Production on Global Agri-food Markets

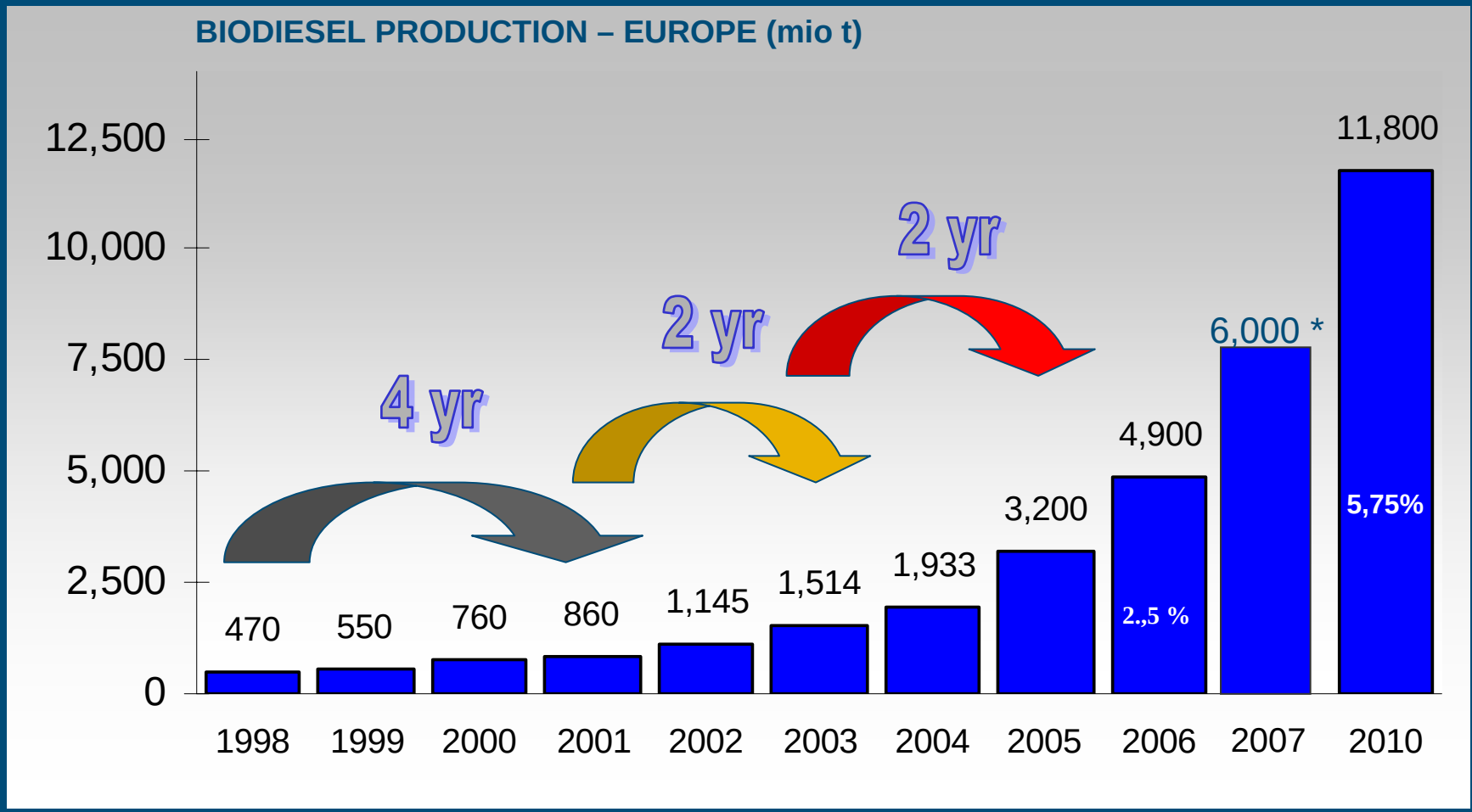
Martin Banse

LEI (The Hague, NL)

Koninklijke Nederlandse Akademie van Wetenschappen and the Copernicus Institute, Utrecht University, 12/12/2007

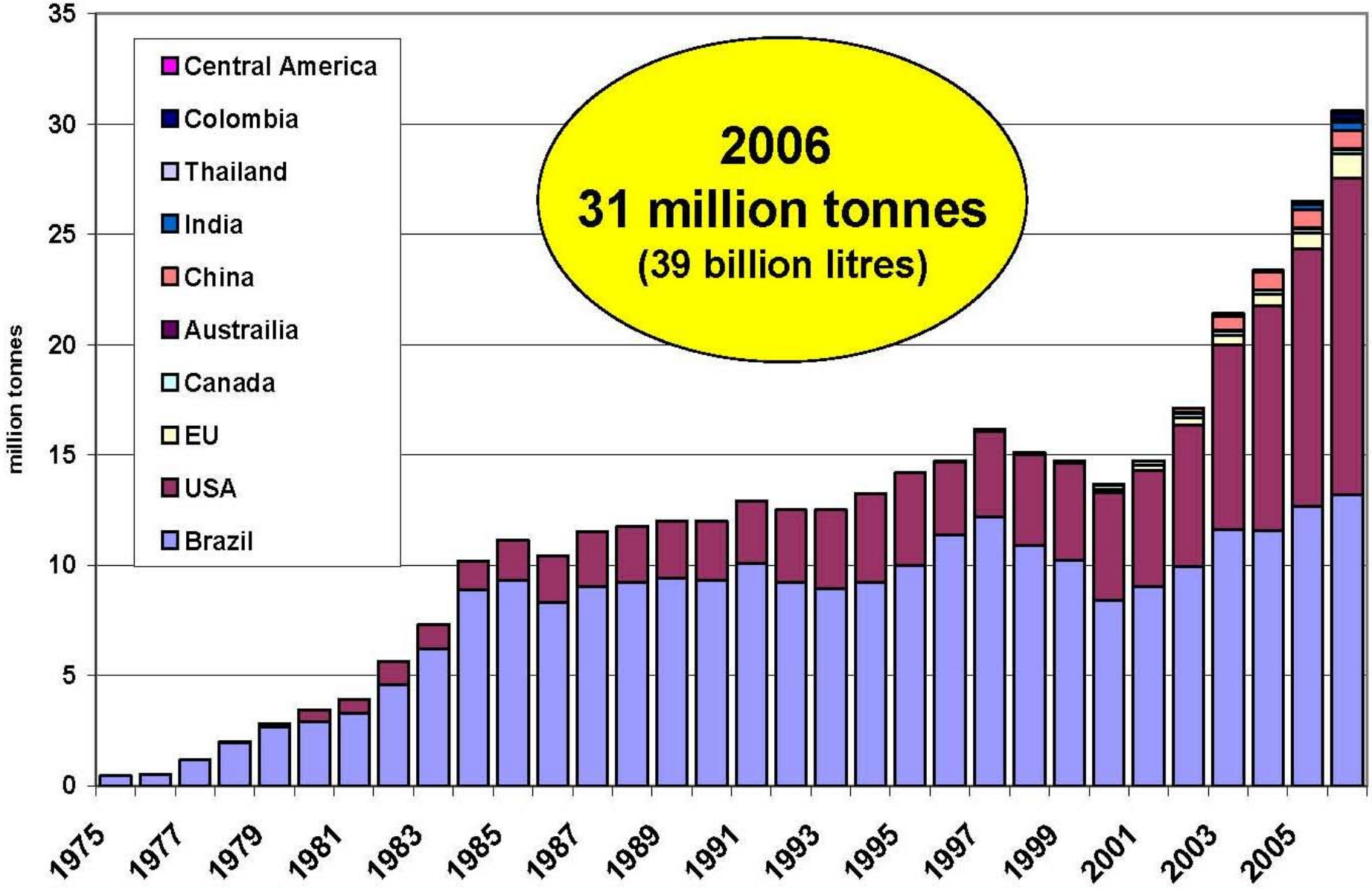
LEI WAGENINGEN UR

Biodiesel Market Development: EU



Source: FO Licht (2007).

World Fuel Ethanol Production



Source: FO Licht

What's behind the Revolution?

- Political and economic concerns over cost and security of imported oil and gas supplies
- Environmental concerns over impact of global warming due to greenhouse gas emissions from fossil fuel use

Government promotion of biofuel use in transport fuels

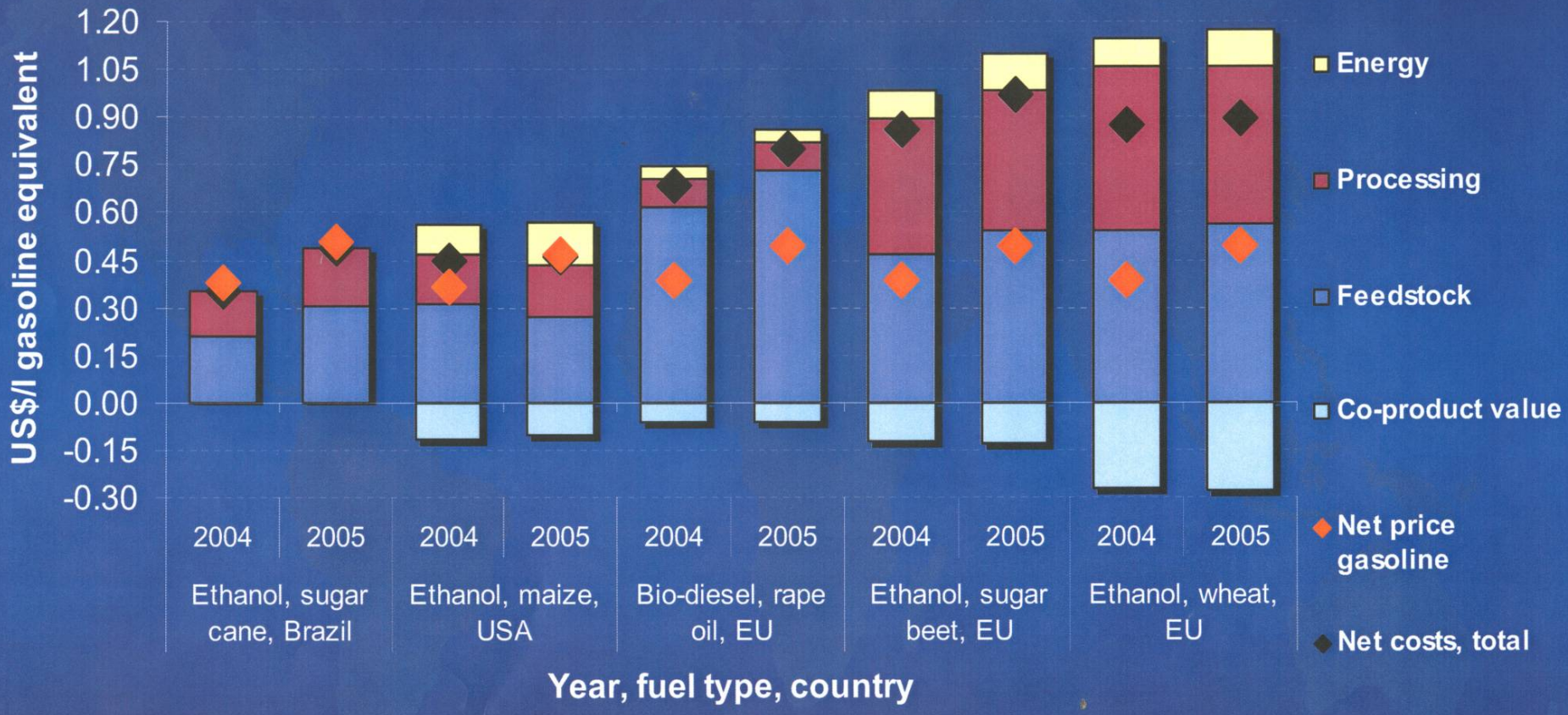
Rapid expansion of biofuel production

Economic and social concerns over impact of higher food prices and patterns of agricultural development on vulnerable groups, particularly in developing countries (e.g., urban poor)

Why are there Problems?

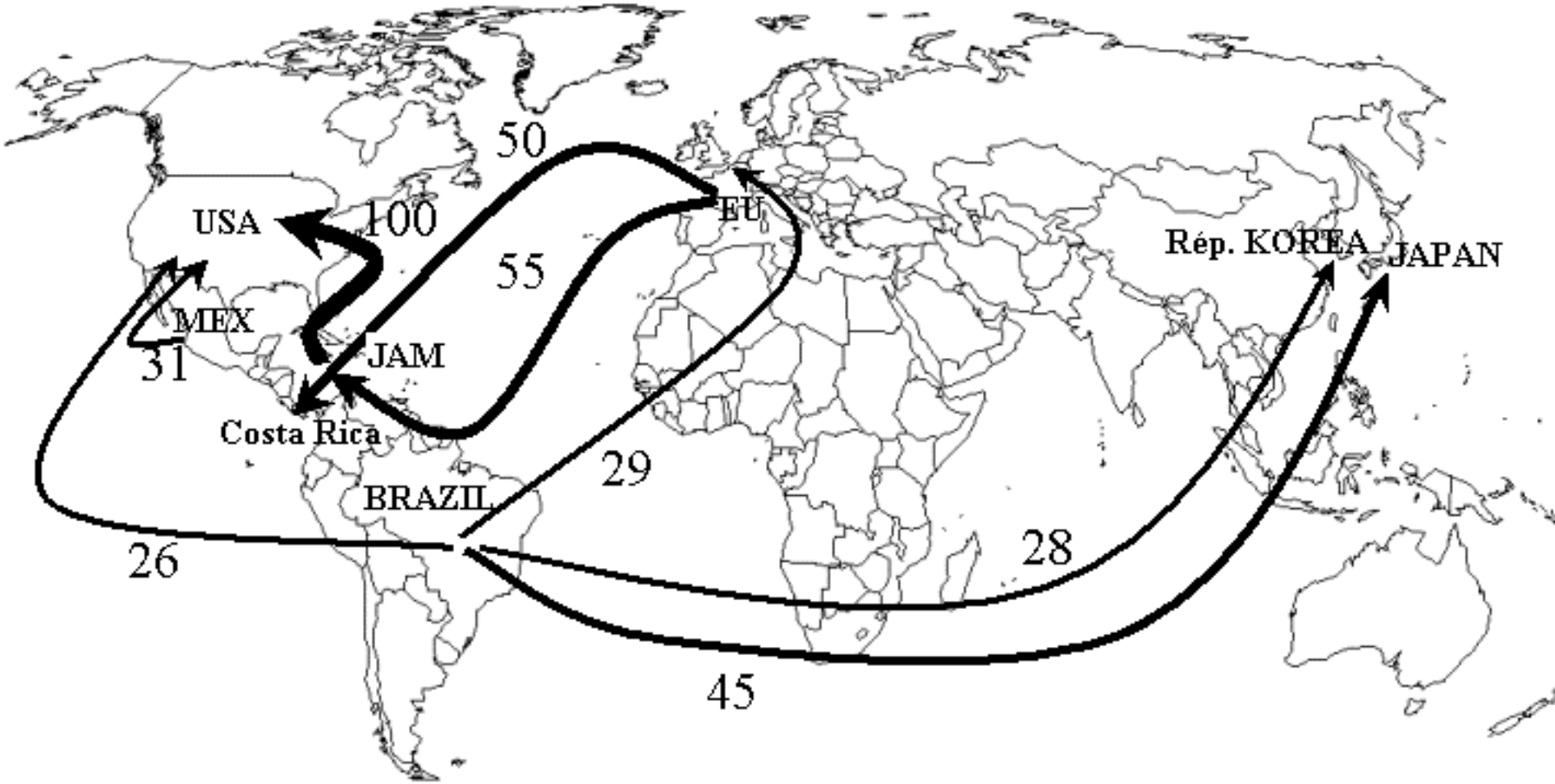
- Improving security of fuel supplies means producing more biofuel at home, but …
- …the biggest fuel consumers (USA and EU) cannot produce biofuels as cheaply as some tropical countries, …

A major challenge: Production costs



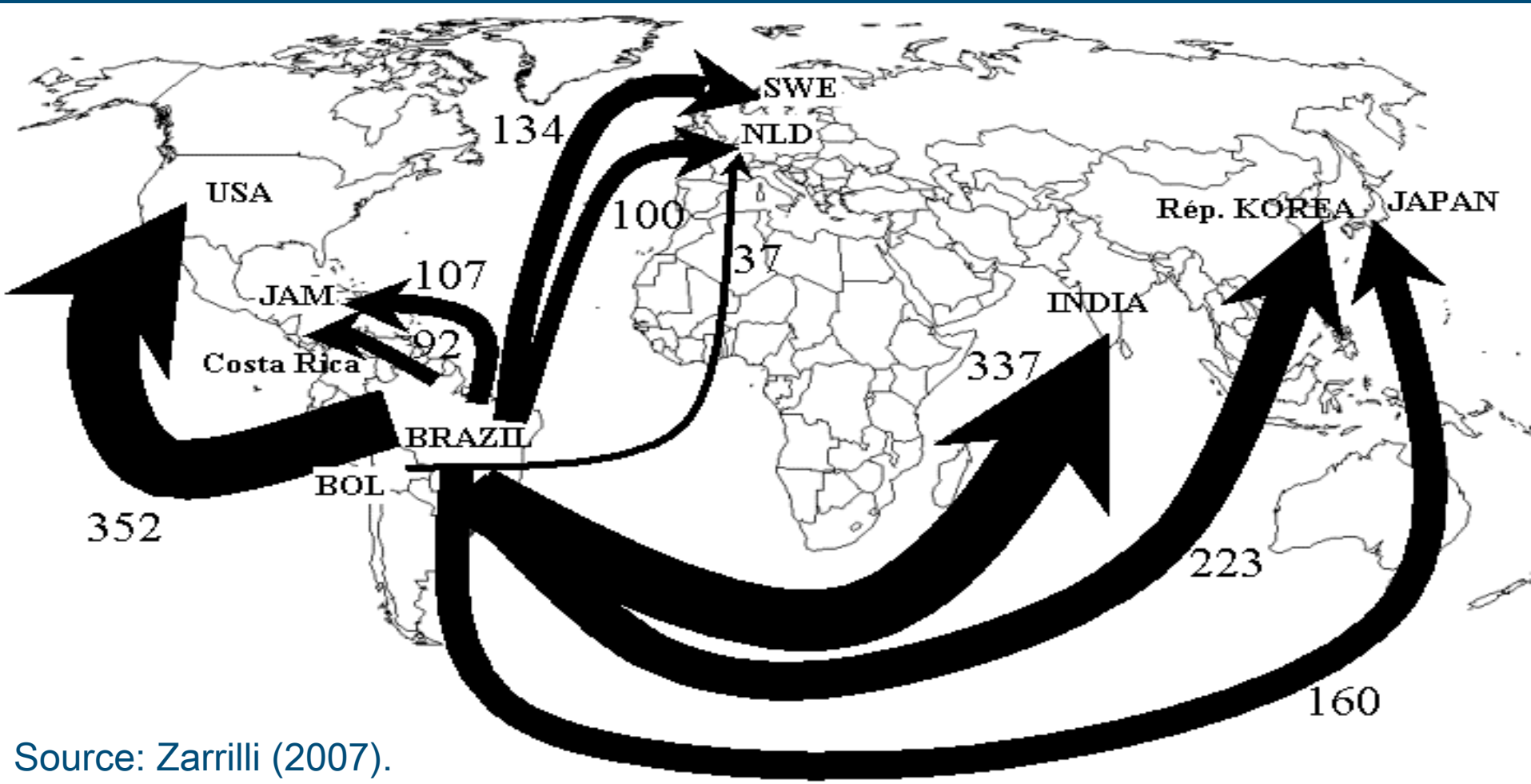
Source: OECD (2007).

Flows of ethanol in 2000 (thousand tons)



Source: Zarrilli (2007).

Flows of ethanol in 2004 (thousand tons)

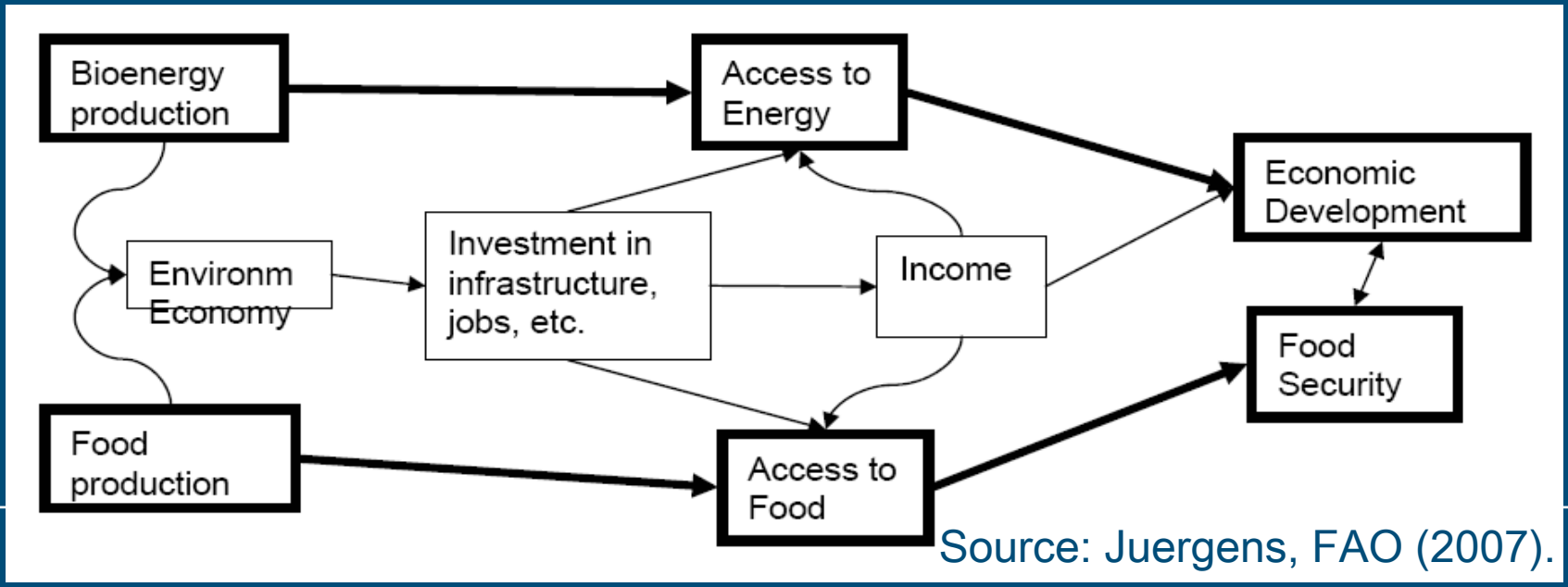


Source: Zarrilli (2007).

Total trade of ethanol: 3 billion liters (2004)
Total production of ethanol: 39 billion liters (2006)

Biofuel and Food Security

- Four dimensions of food security (FAO, 2007)
  - Availability,
  - Accessibility,
  - Stability, and
  - Utilization



Source: Juergens, FAO (2007).

Optimists

- Triple solution to the problems of poverty, climate change and energy security
- Local energy solutions for net energy importing countries
  - cheaper fuel for poor people
- International Bioenergy Platform (FAO)
  - Bioenergy main Benefits
    - Impacts food security
    - Improves livelihoods
    - Reduces poverty
    - Promotes employment and rural infrastructure
    - Stimulates the double role of agriculture and forestry:
    - Reduces Carbon emissions

Pessimists

- Filling the petrol tank of a Range Rover with ethanol requires enough grain to feed a person for one year
- 10% of world's sugar harvest converted to ethanol brought doubling of price of sugar
- Price of palm oil
  - + 15% over last year,
  - 25% gain expected next year
- Increase in tortilla price in Mexico

Cassman and Liska, 2007

- Pro's:
  - Sugar cane biofuel in Brazil accounts for 4.2 million jobs,
  - palm oil in Indonesia is expected to create 2.5 million jobs next few years
- Cont's:
  - use of food crops for biofuels could lead to an
    - increase in food prices
    - undernourishment of the poor, particularly in those countries which are net food importers or experience regular food shortages

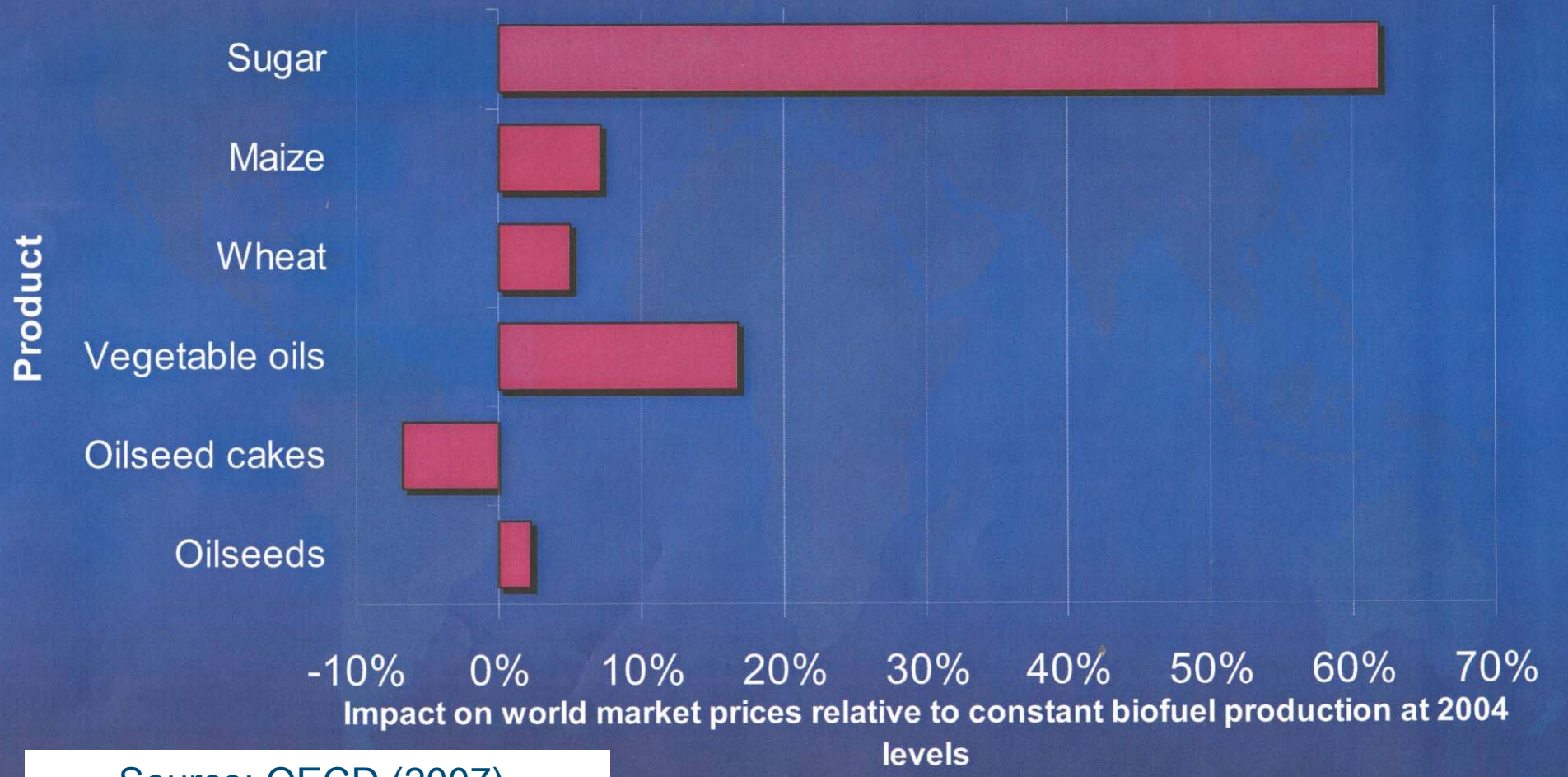
Biofuels as a challenge for quantitative analysis

- Urgent need of an economic assessment of biofuels to analyze the impact on
  - World price
  - Production
  - Land use
  - International trade
  - Food security
  - Agricultural income
  - Employment
  - ….

One (important) Aspect: Price Changes

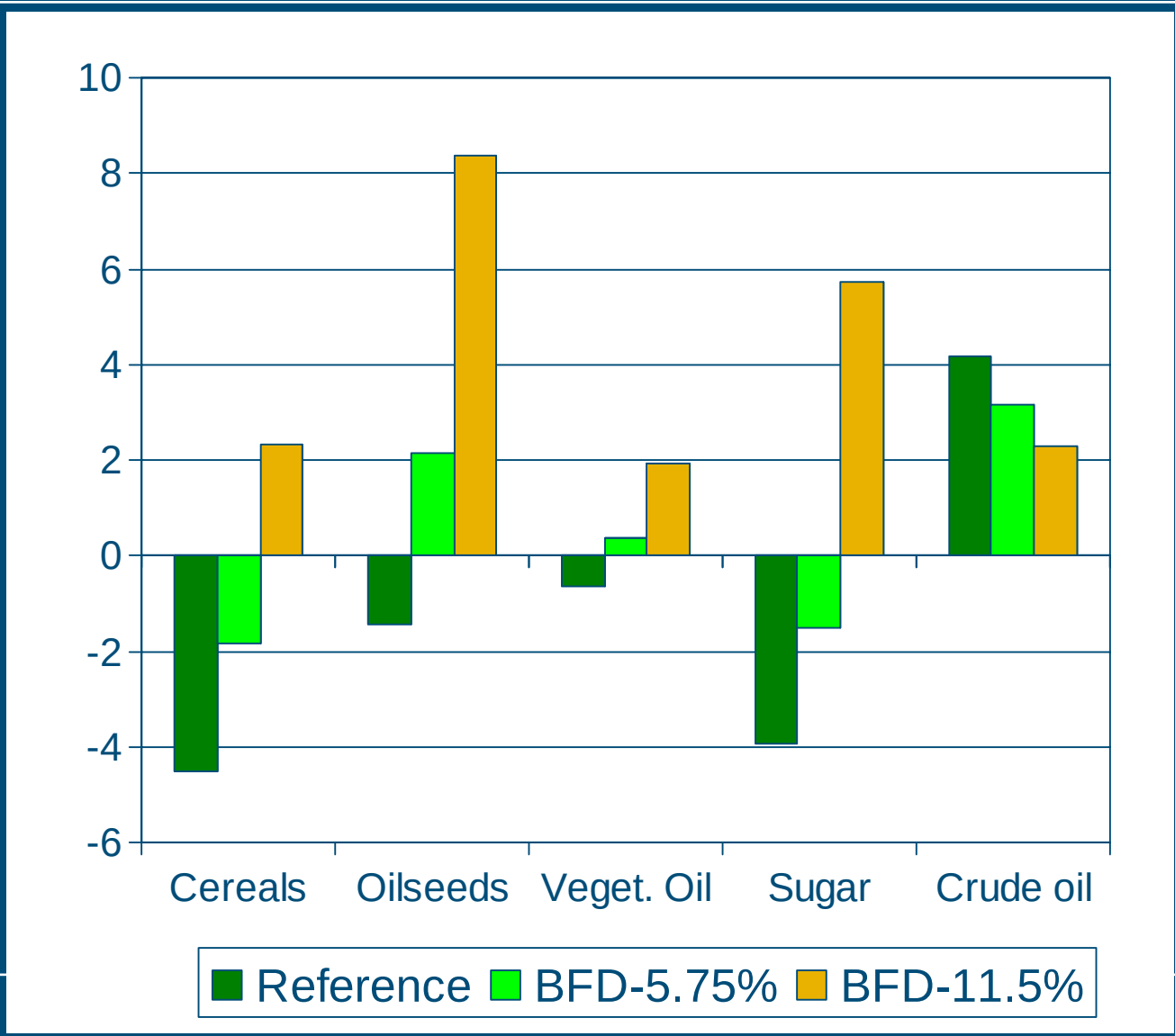
- Some price projections are surprising at first sight, but it all depends on the underlying assumptions …

Noticeable impacts on world market prices (2014)

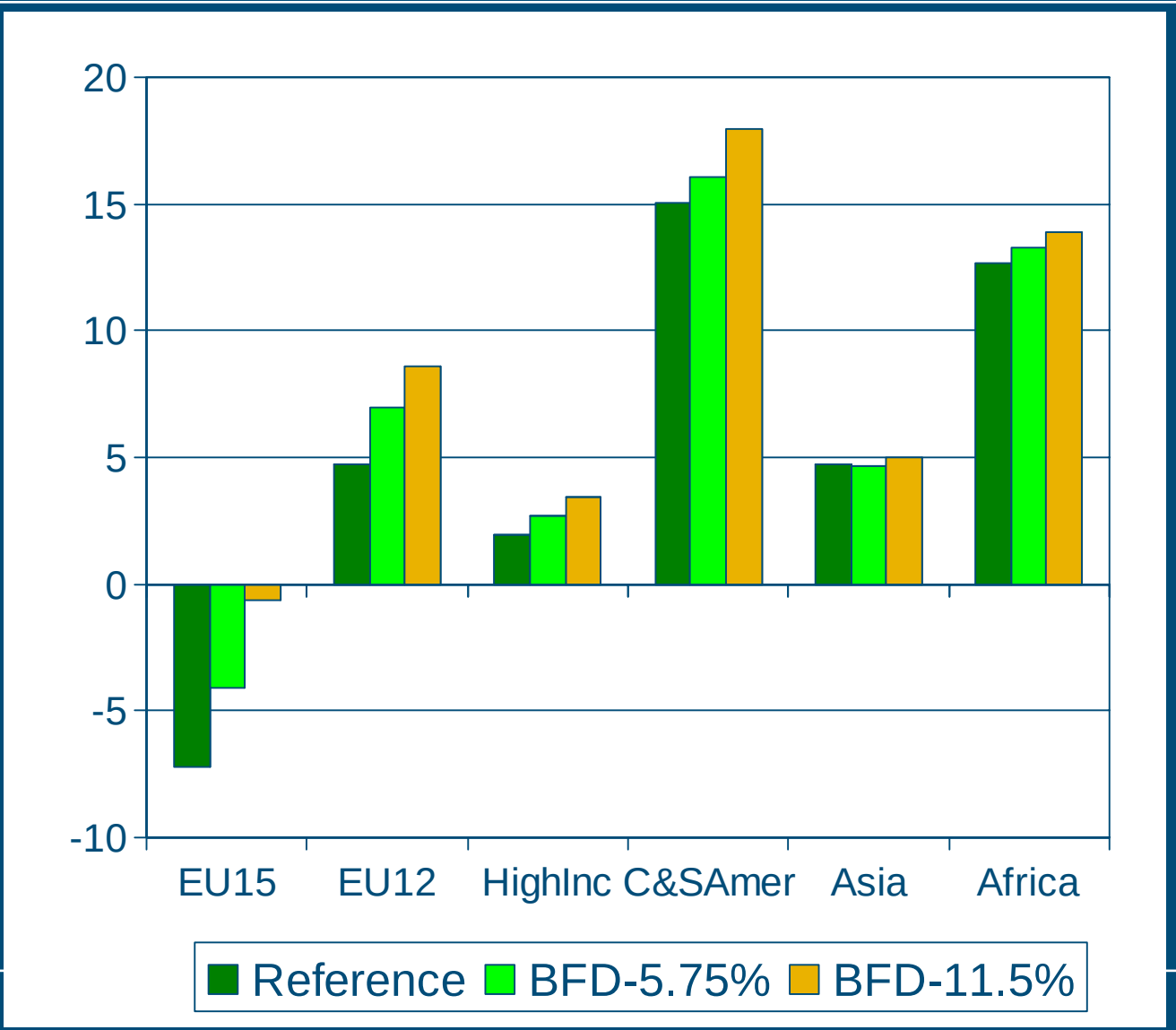


Source: OECD (2007).

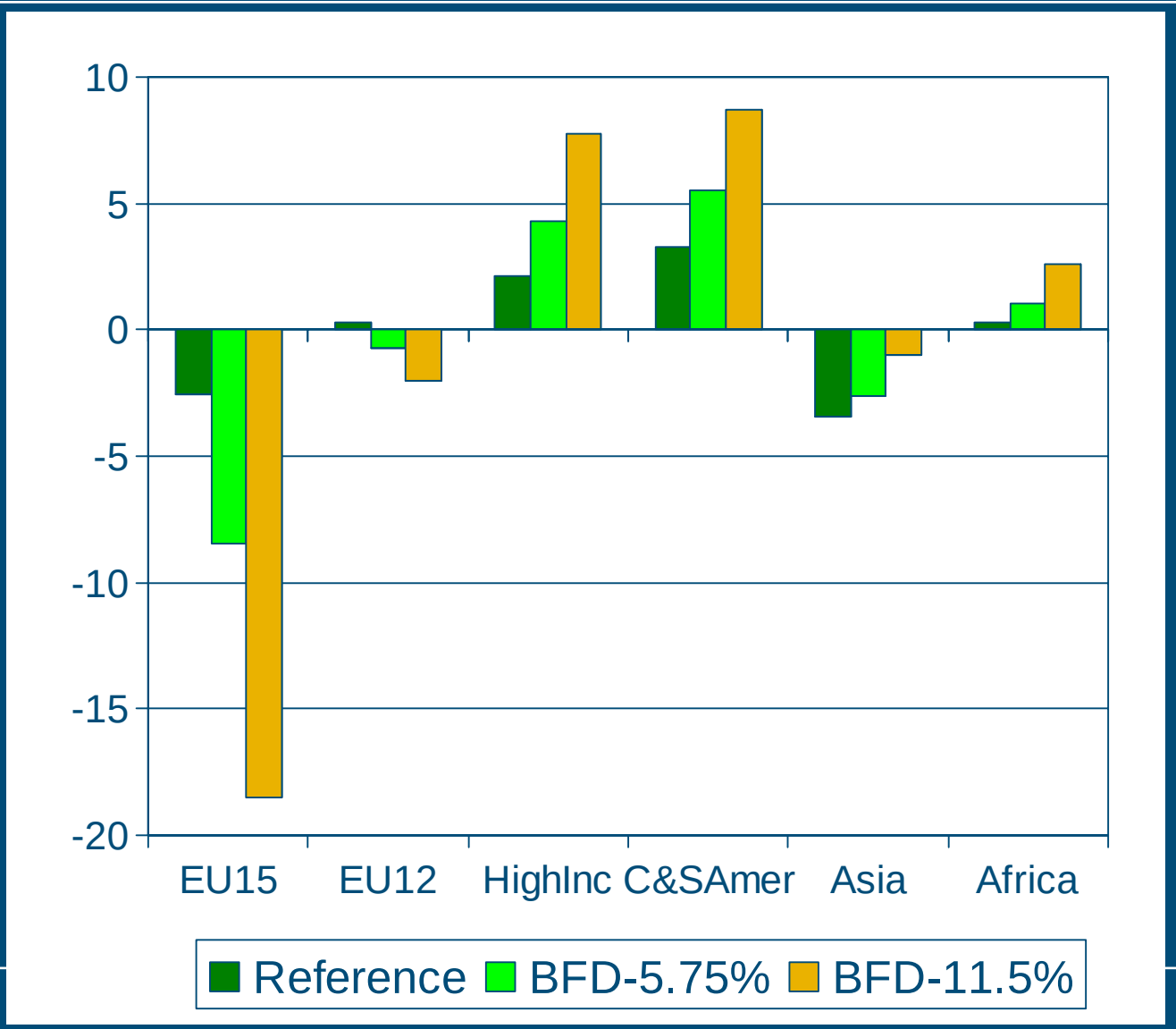
Impact of EU-Biofuel Directive on World Price Level, Change in %, relative to Reference, 2010



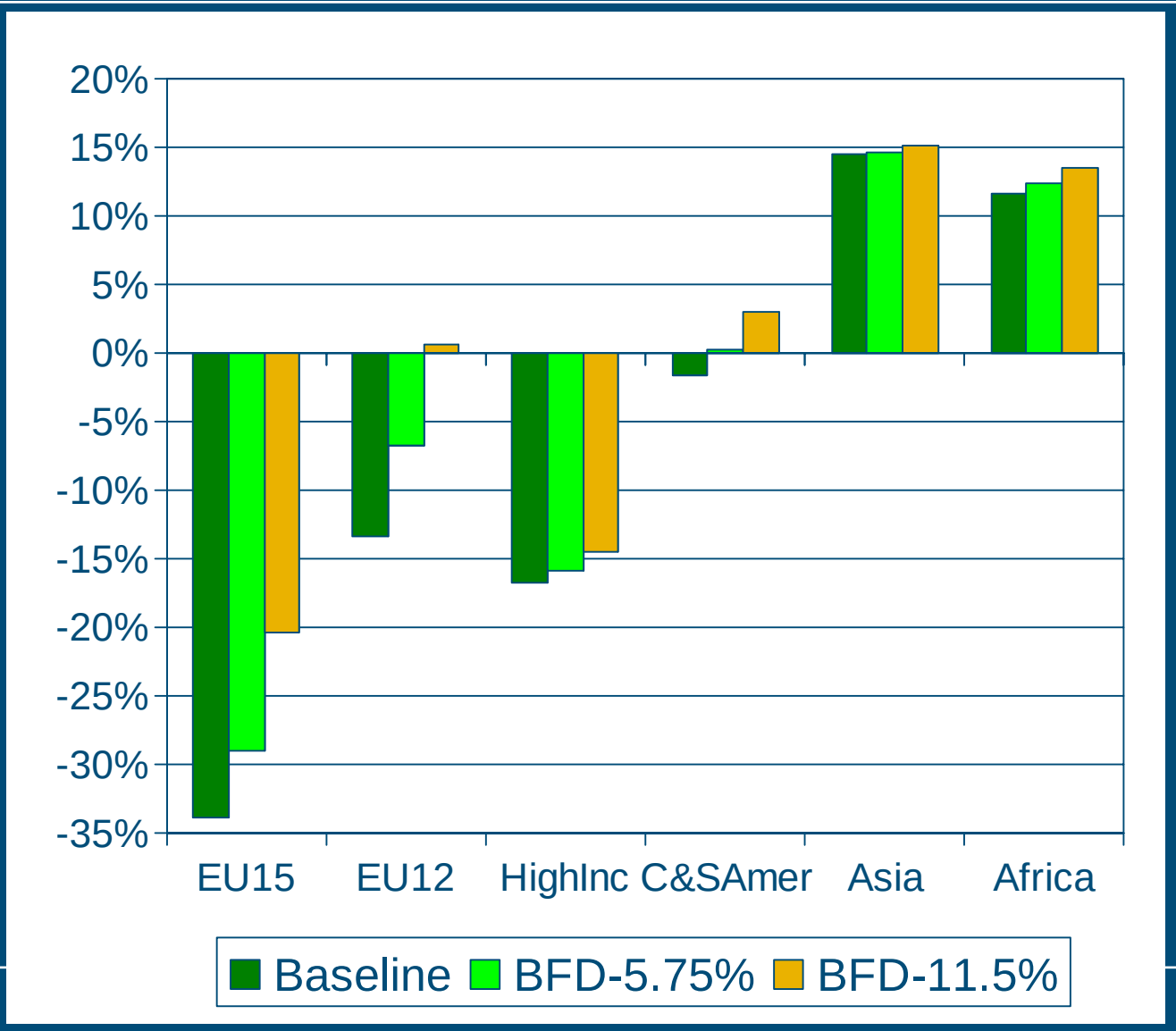
Impact of EU-Biofuel Directive on Agricultural Land Use, change in %, 2010



Changes in Net Biofuel Crop Trade, in Bill. USD, 2010 rel. to 2001



Changes in Agricultural Income, change in %, 2010 relative to 2001



Summary and Conclusions (1)

- How can we realize these potential benefits?
- Poverty reduction, equity dimensions and food security
  - access to, ownership and use of land by the poor;
  - difference between different biofuel production systems
  - poor people's access to biofuel supply chains to poor people
  - winners and losers under different scenarios
  - impacts on food production and food prices

Summary and Conclusions (2)

- The precise impacts of biofuels on food security are not clear
  - Enhanced biofuel production bear changes and challenges on the agriculture in developed and developing countries:
    - Biofuel production can threaten the availability of food supplies
    - Depending on the extent of land, water, and other productive resources diverted away from food production
    - 1st generation biofuels perfect substitutes to food and feed
    - However, 2nd generation biofuel requires land resources
- Current 'food-feed-fuel' debate often over-simplistic and fails to reflect the full complexity of factors that determine food security

- For further information:
  - martin.banse@wur.nl
  - LEI homepage at www.wur.nl
    - with a link to bioenergy assessment