The impact of biofuels on the world fertilizer market

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Presentation overview

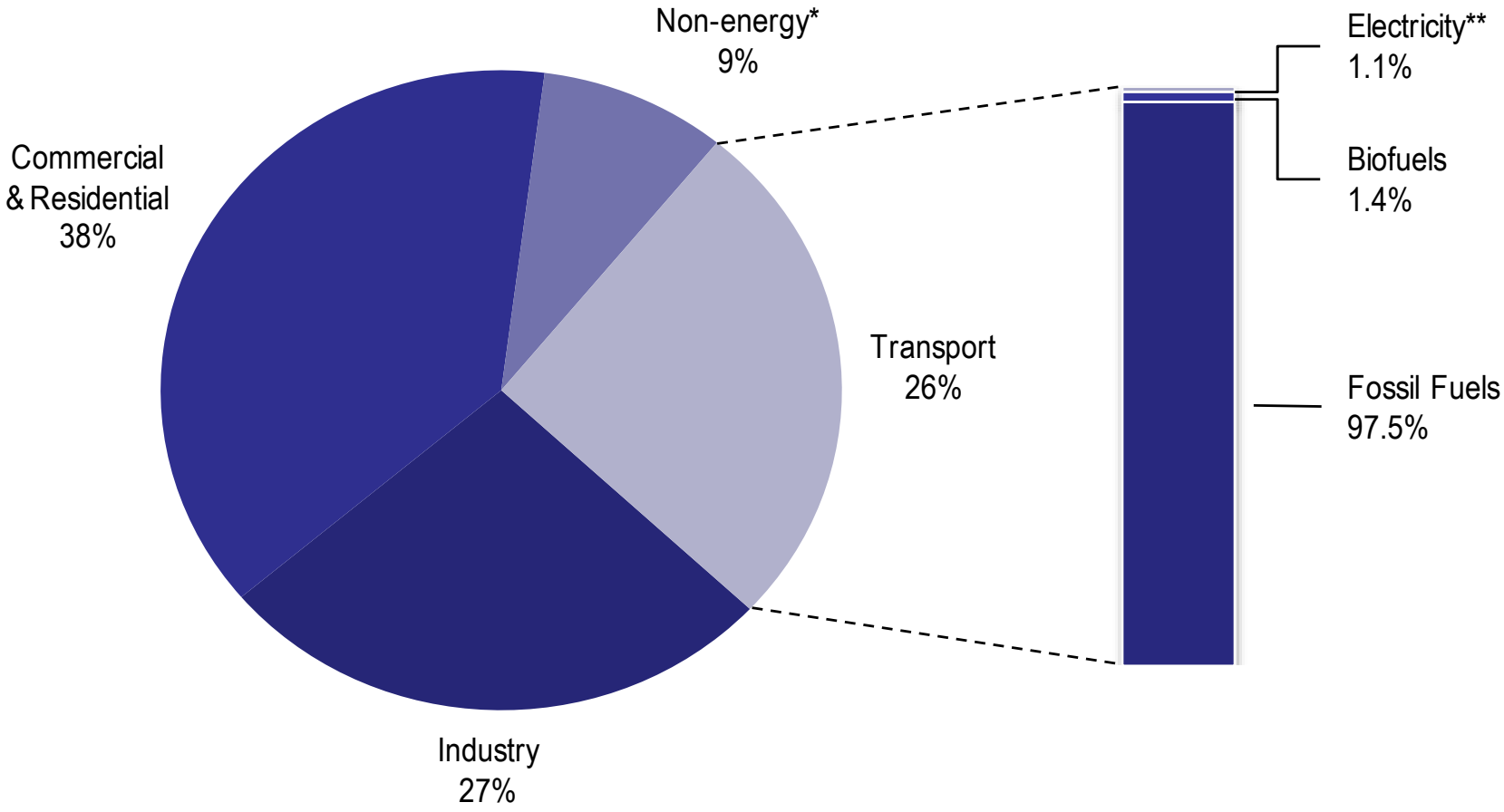
- Definitions and scope
- Factors which translate biofuel market developments into fertilizer demand
- Recent global biofuel developments and forecast
- The impact on fertilizer demand

Definitions and scope

Some definitions

- Biofuel – renewable crops used for transportation
- Technology
  - 1G – Bioethanol (sugar and starch-based) and Biodiesel (vegetable oils)
  - 2G (cellulosic, etc) - 5-10 years away

Transport fuel share of global energy consumption,
total = 7.8 billion toe



*Non-energy uses primarily include fossil fuels used for petrochemicals

** Here electricity includes only non-fossil fuel sources such as hydro, nuclear energy, solar or geothermal

Source: IEA

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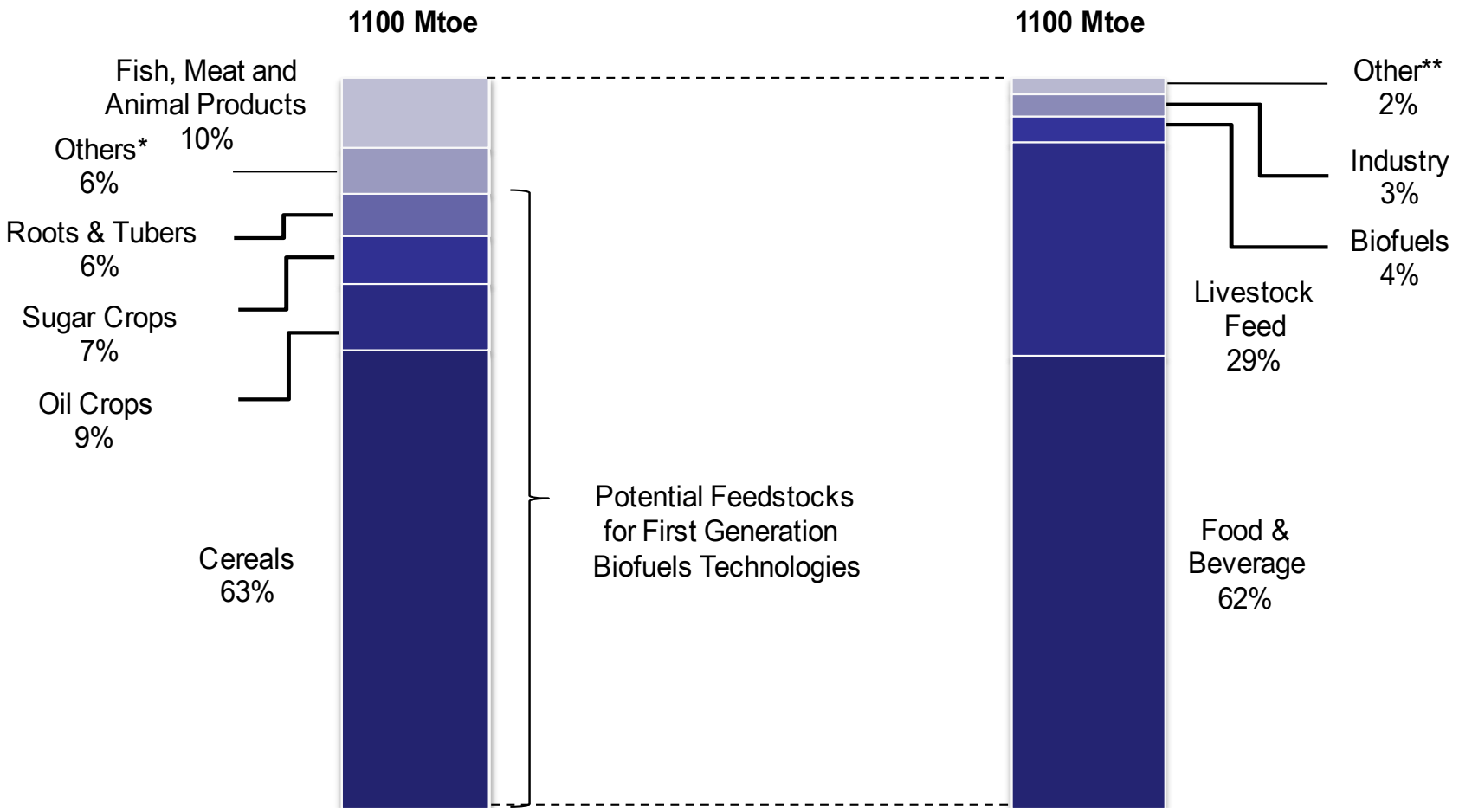
Global farming industry energy production breakdown for 2006



* Pulses, vegetables, fruit, nuts etc.

** Seed production, processing losses, transportation losses, etc.

Source: FAO

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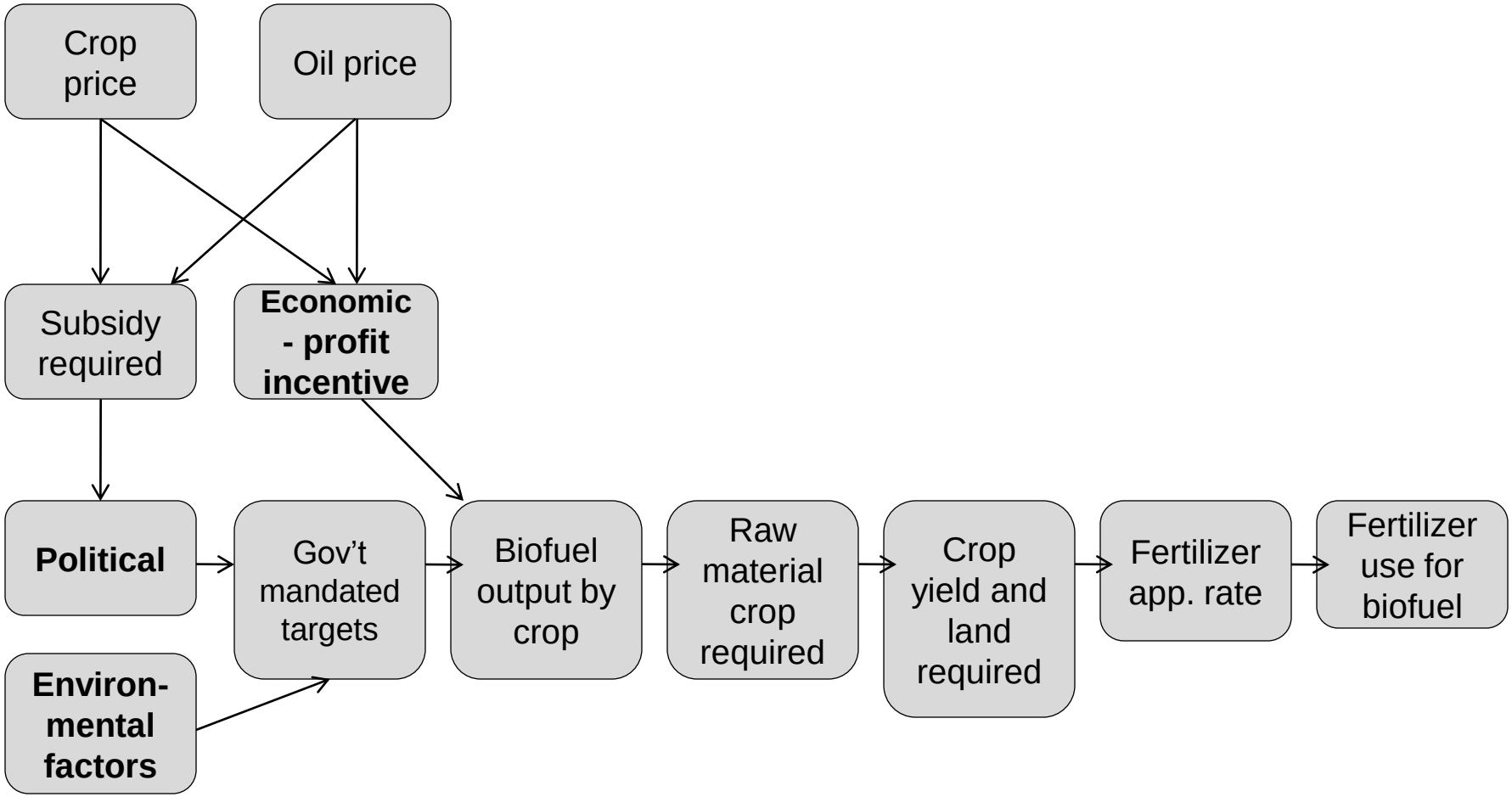
Factors which translate biofuel in to fertilizer demand

What factors translate biofuel market developments into fertilizer demand?



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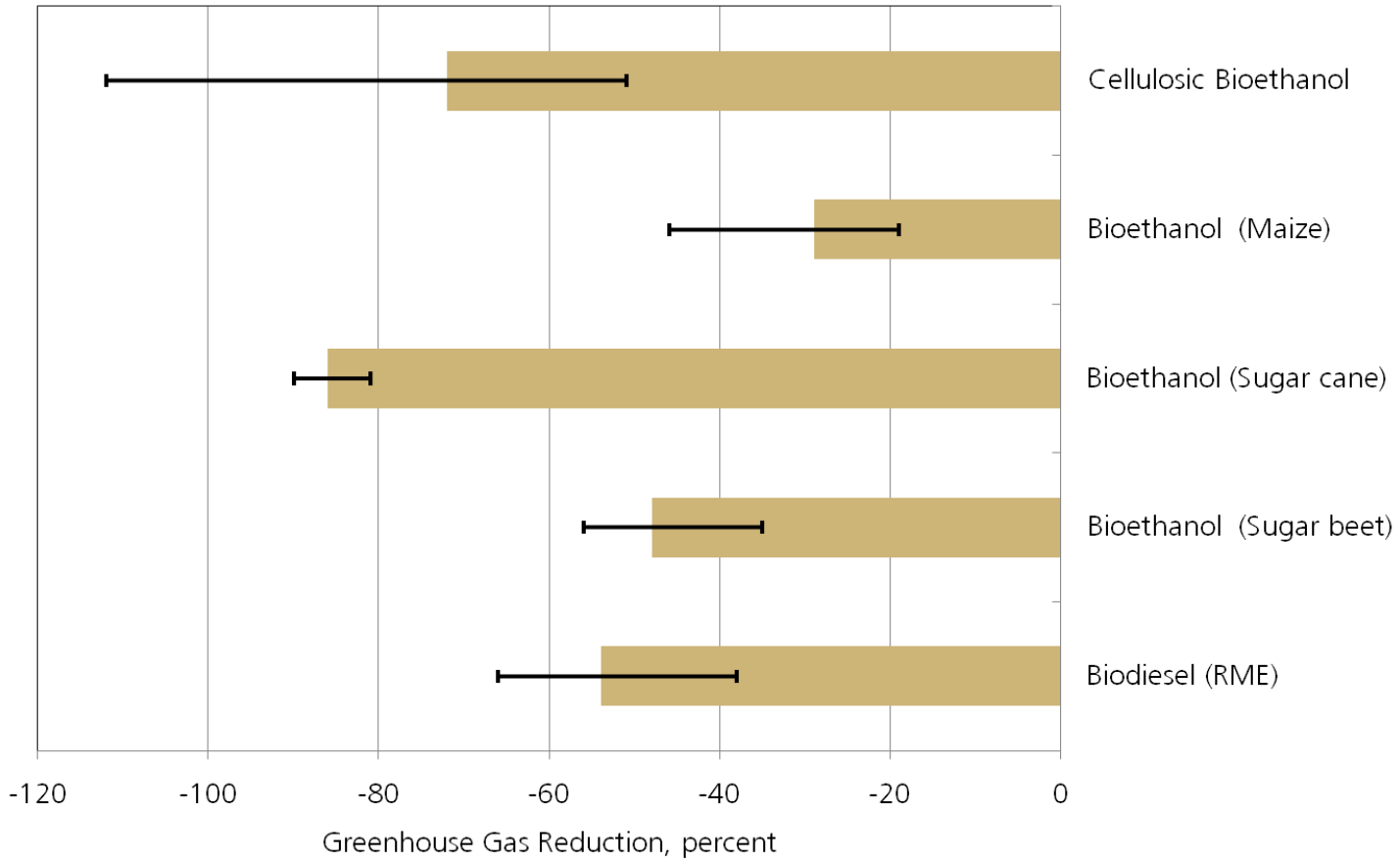
Political drivers

- Energy security, diversity of sources, reduced dependence
- Employment and industrial development
- Agricultural support
  - Higher crop prices = happy farmers

Environmental drivers

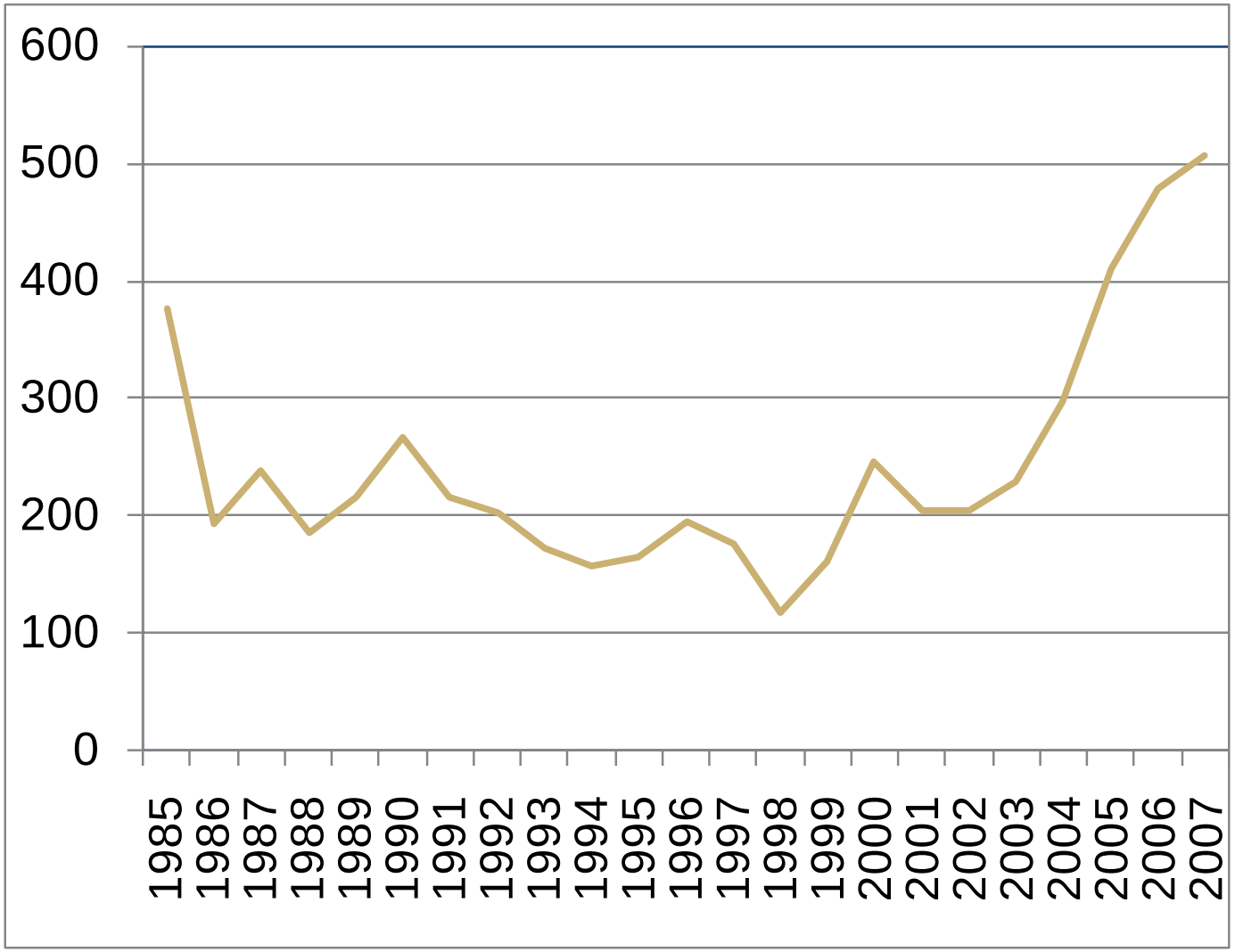
- In general, CO2 saving with intensification
- Expansion of land = ?



Source: IEA, various

Economic drivers – rising oil prices

Brent crude oil, US$/TOE, $ of the day



Source: DOE

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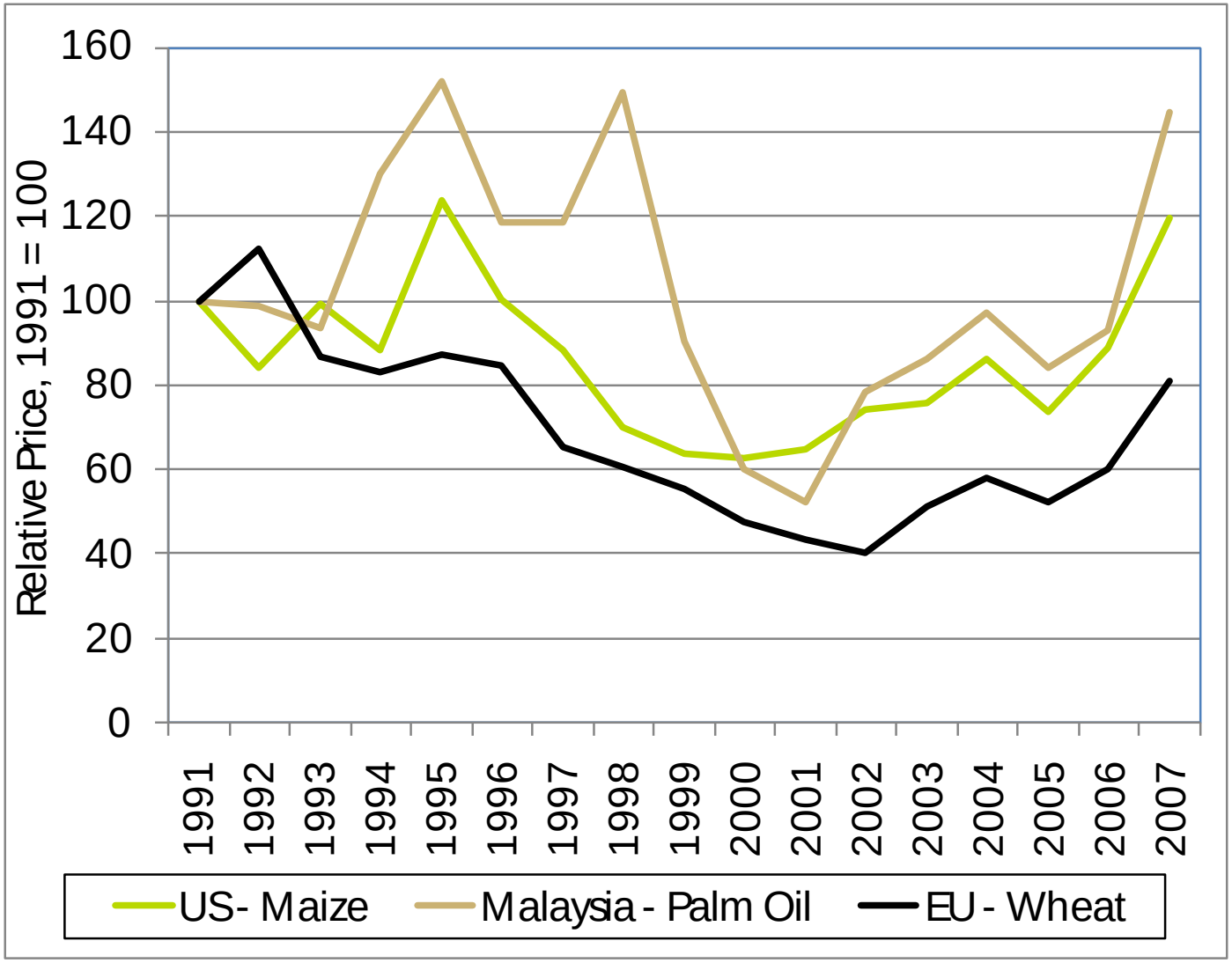
Relatively stable crop prices, until 2006



Source: USDA, World Bank

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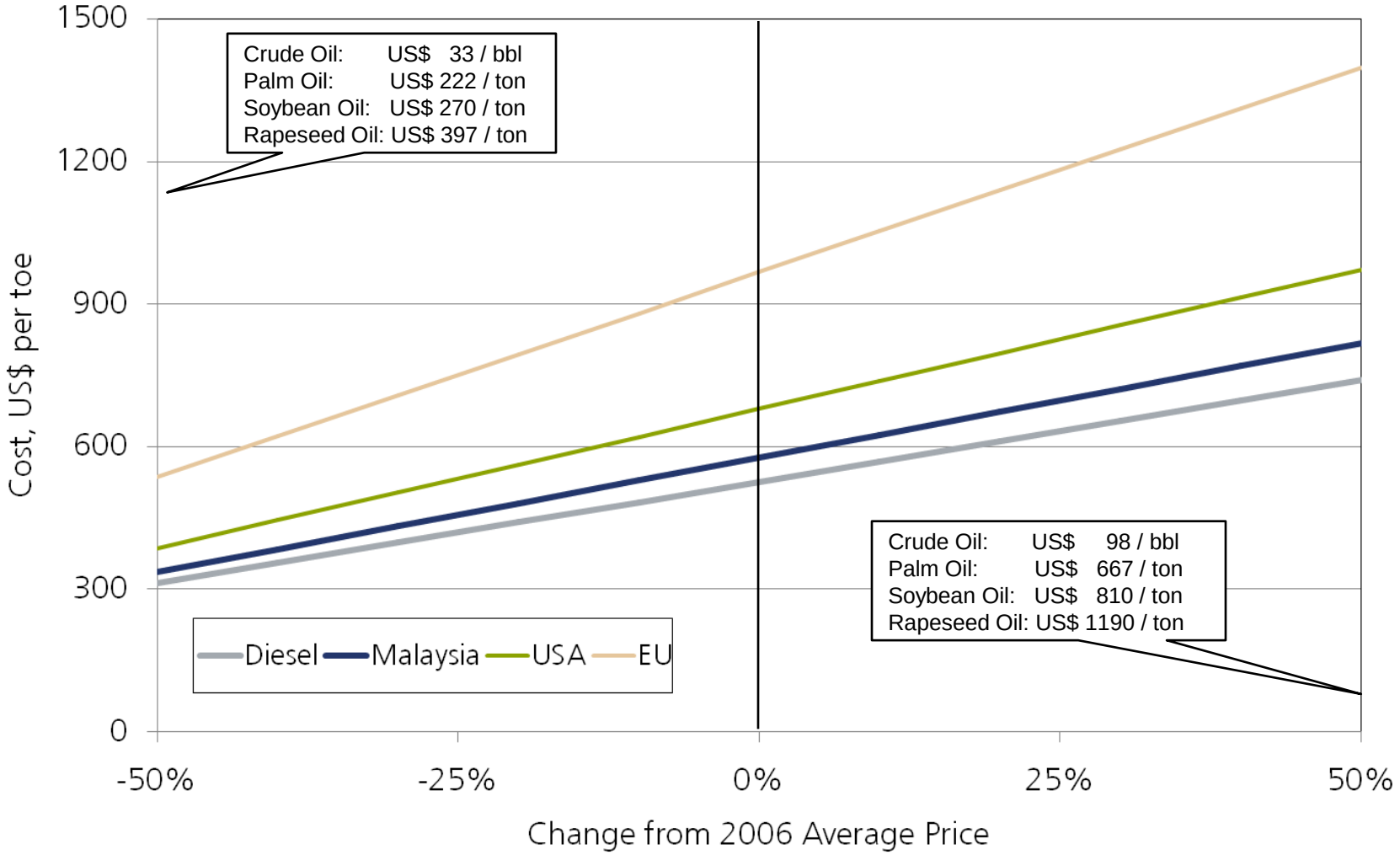
Feedstock sensitivity analysis for biodiesel cost of production vs. fossil diesel



Source: Integer

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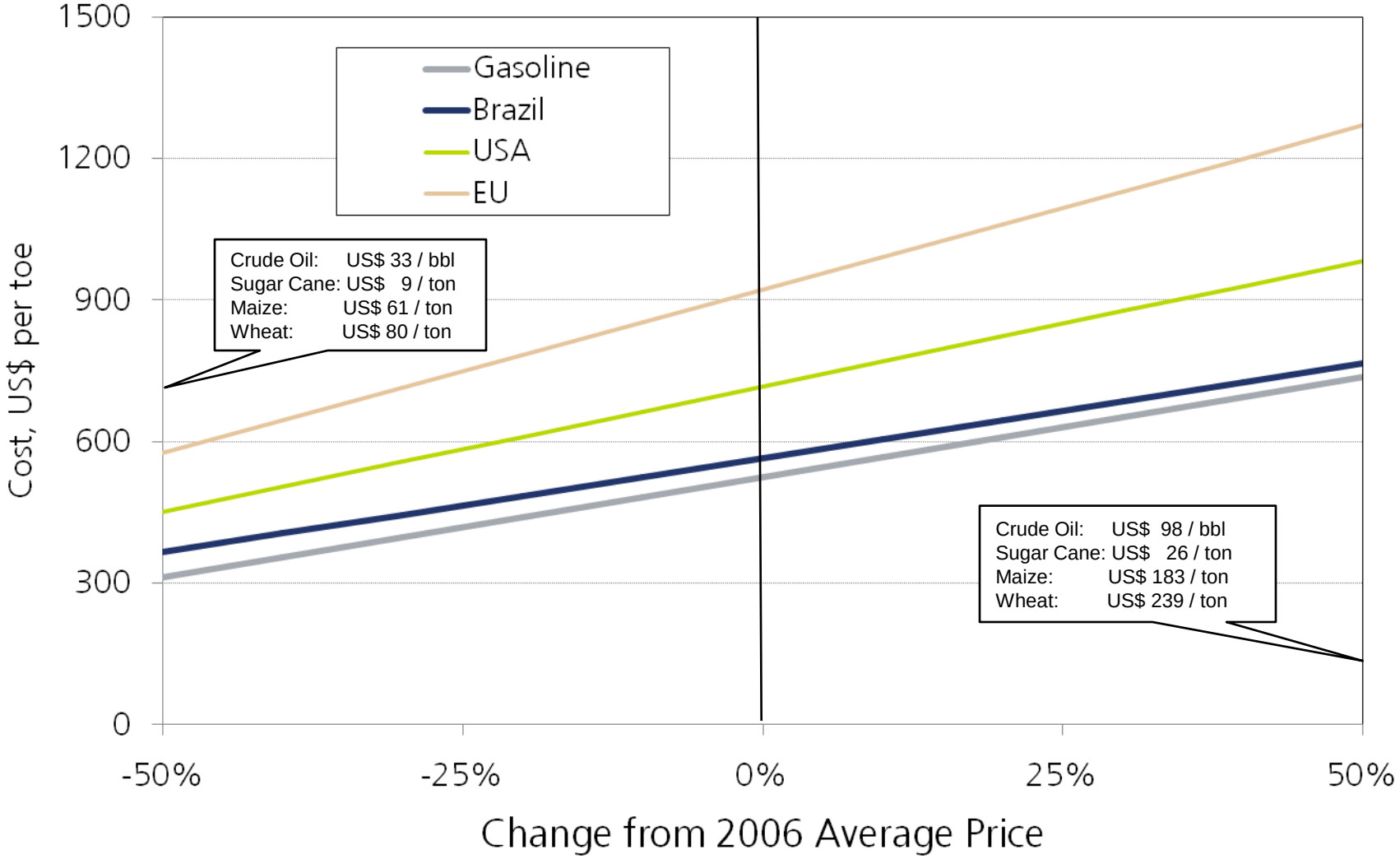
Feedstock sensitivity analysis for bioethanol cost of production vs. gasoline



Source: Integer

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Projection of biofuel production

- Forecast fuel consumption
- National/regional targets: are these targets achievable given economics, politics etc?
- % share of biofuel of total transport fuel consumption
- Biofuel production forecast:
    - By region, by fuel

Biofuel raw material crop requirements

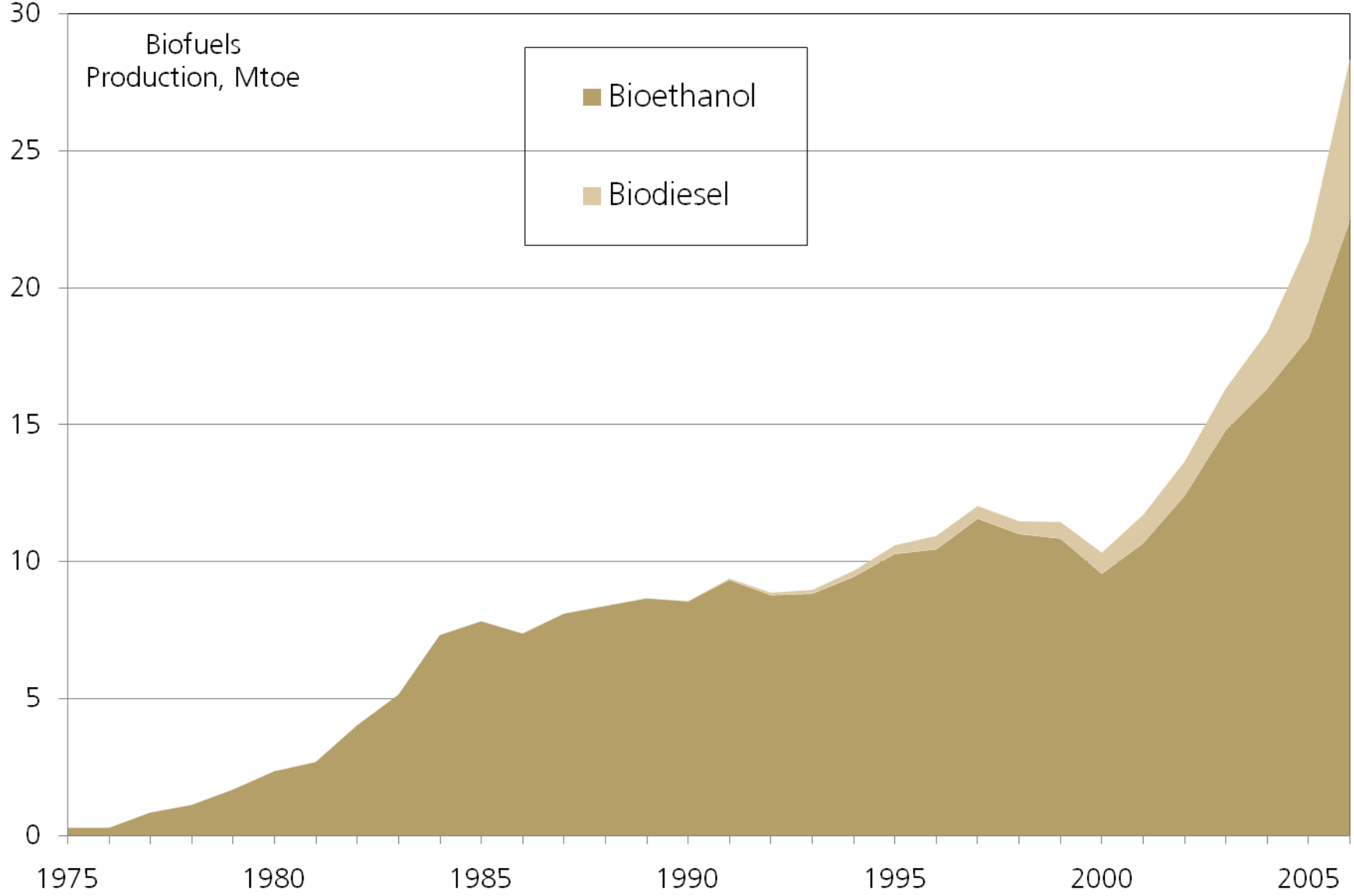
- Biofuel capacity/production by crop
  - US – ethanol from corn, diesel from soybeans
  - Brazil – ethanol from sugar, diesel from soybeans
  - Europe – ethanol from cereals, diesel from rapeseed

Land requirements and fertilizer consumption

- Crop production/yield = land use by crop
- Fertilizer application rate x land use by crop = biofuel related fertilizer consumption

Recent global biofuel developments and forecast

Biofuel production split – bioethanol & biodiesel



Source: Integer

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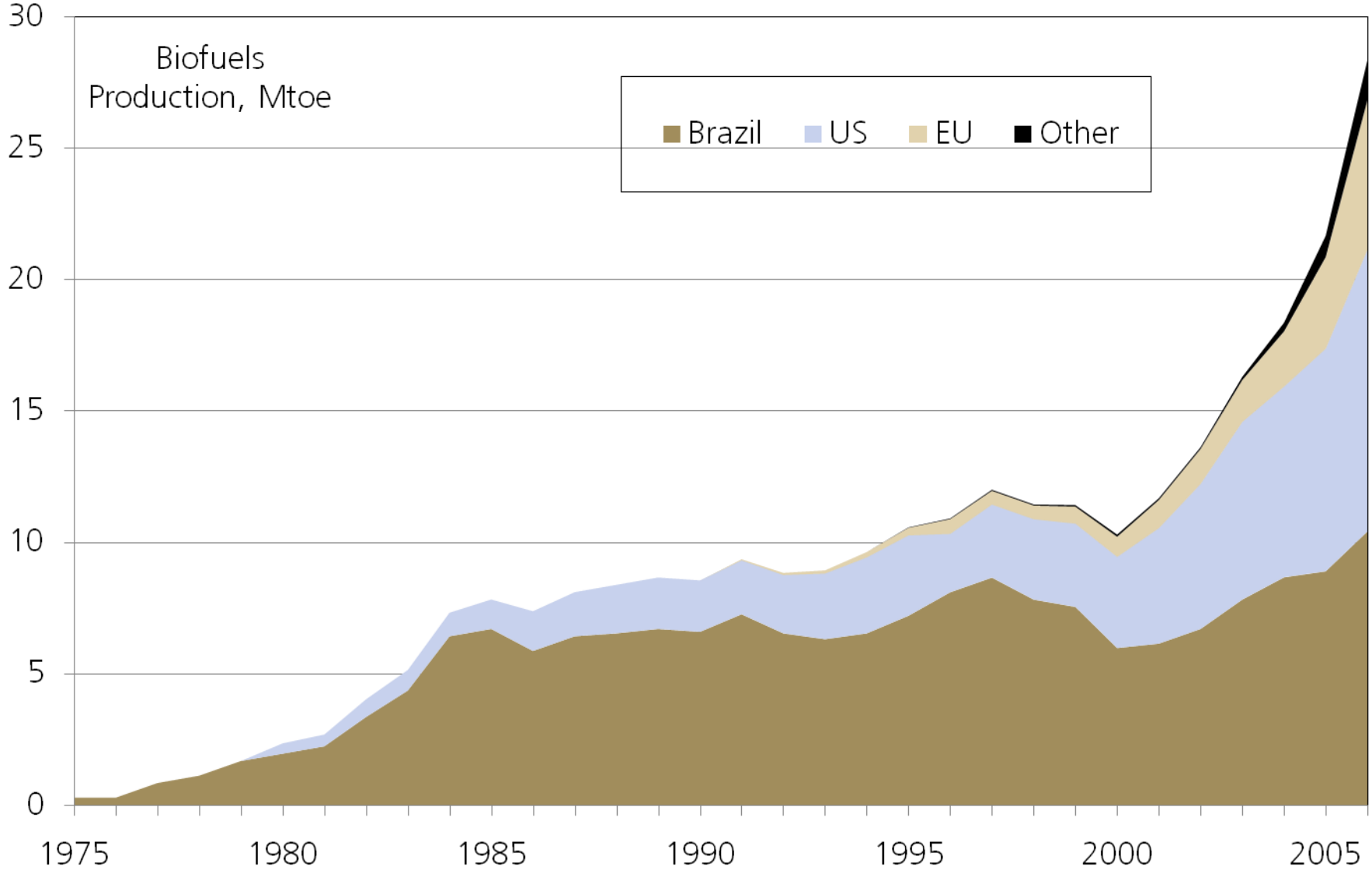
Biofuel production split, by region



Source: Integer

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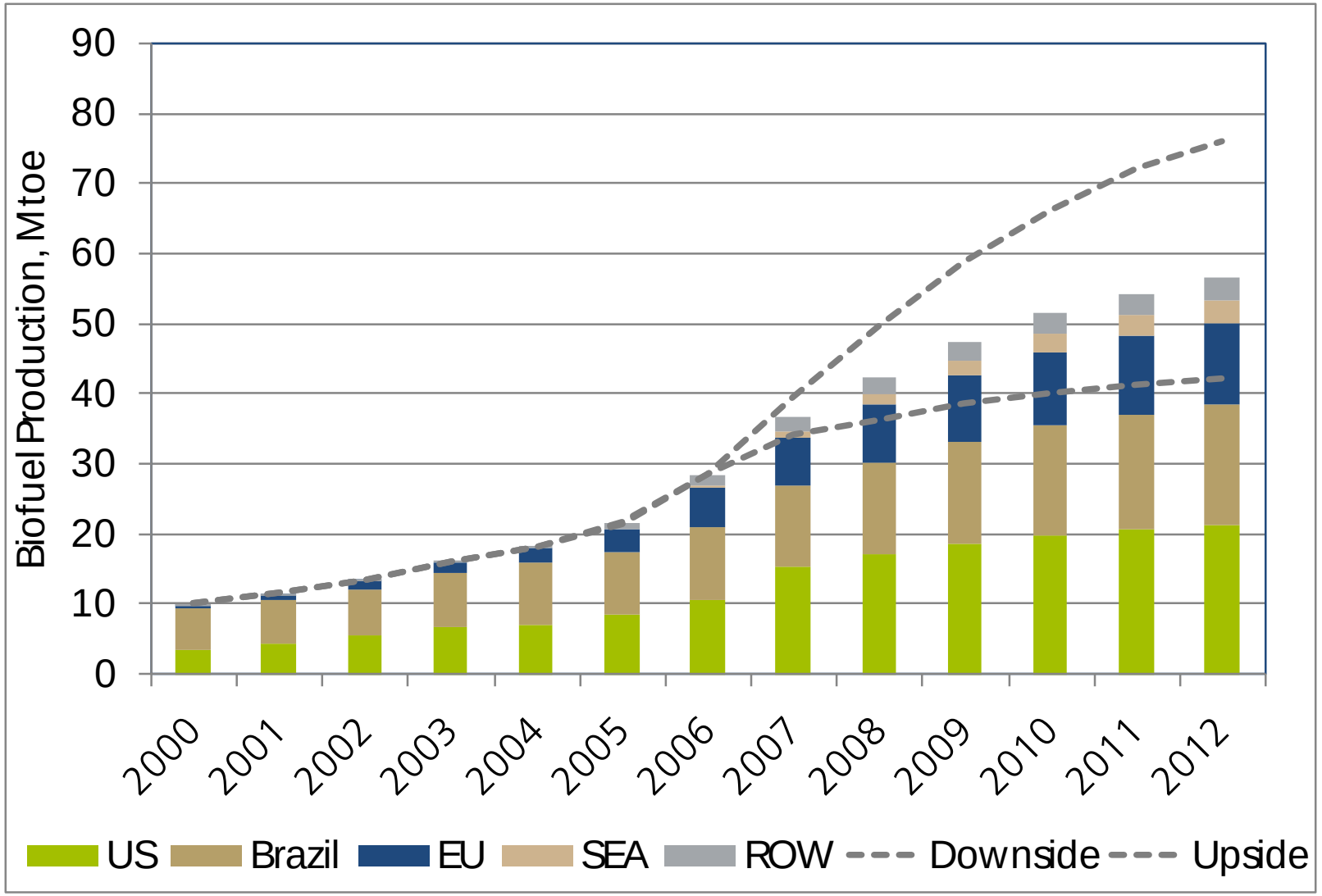
Biofuel production forecast – total by region



Source: Integer

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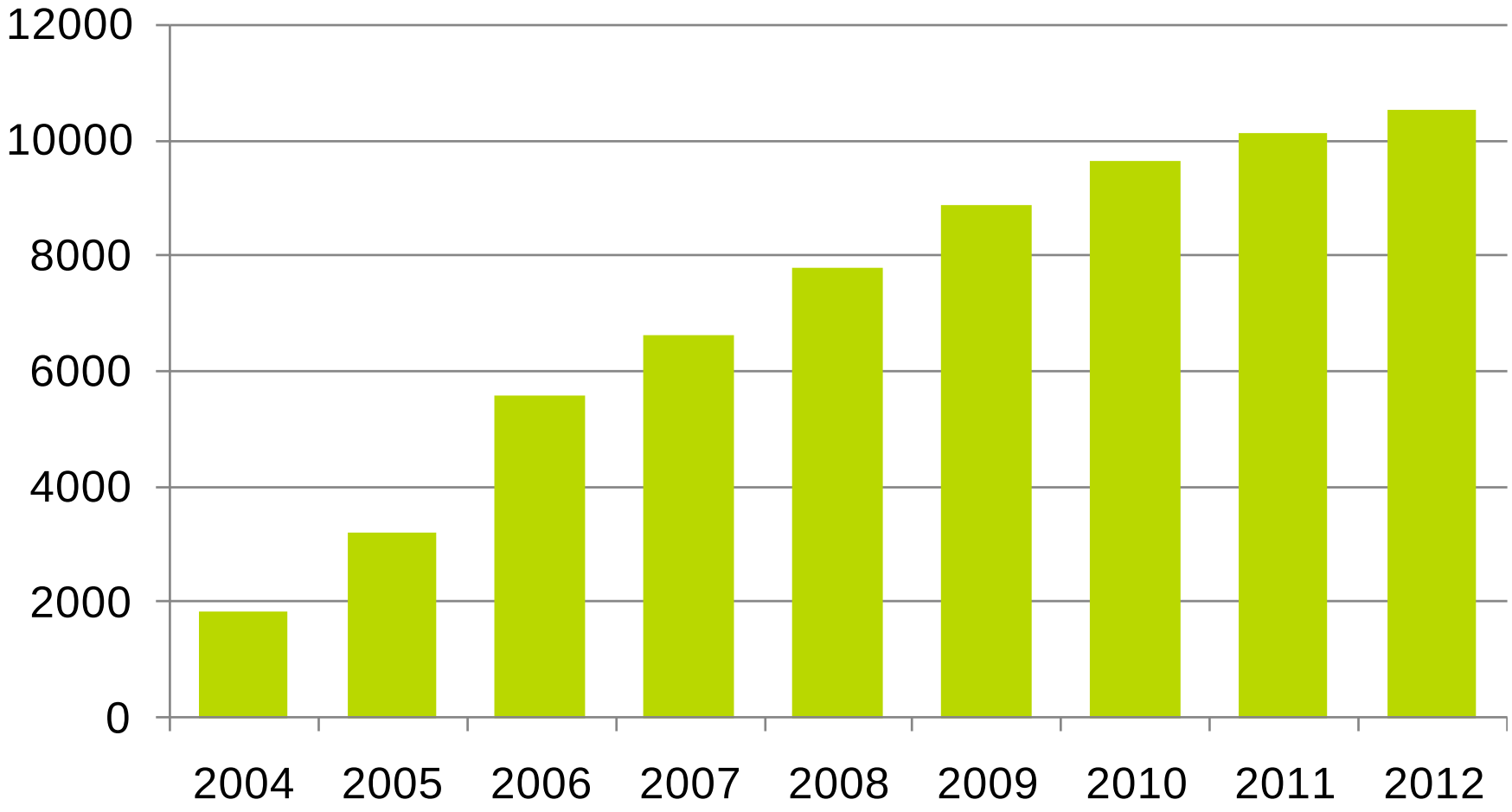
EU –targets elusive, but still major impact on land use

Biofuel planted area (thousand hectares)



Source: Eurostat, Integer

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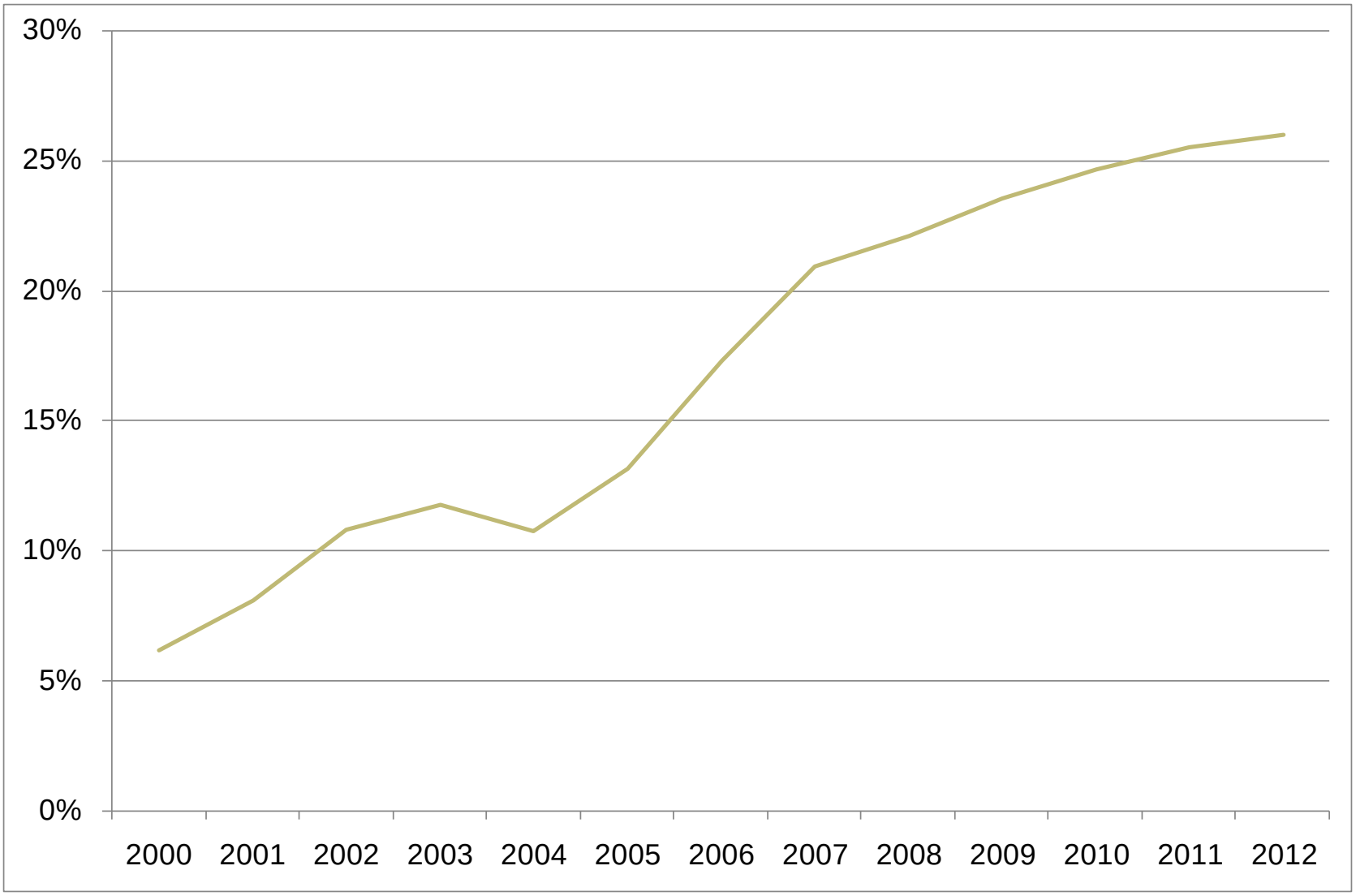
USA – biofuel demand taking over corn

Corn use for ethanol as % of total corn production



Source: USDA, Integer

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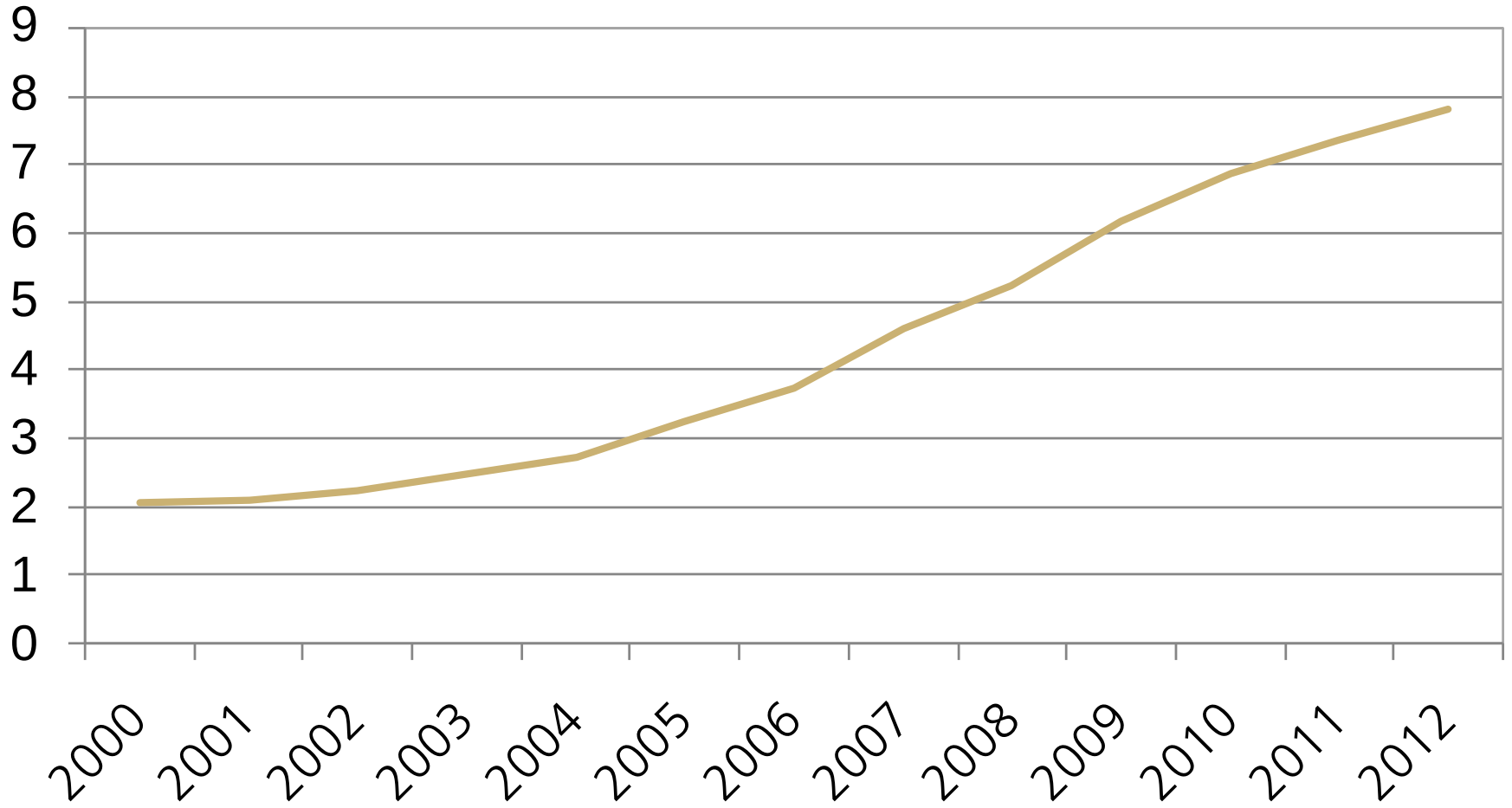
Brazilian biofuel area continuing to expand – strong fundamentals, mature market

Planted area (million hectares)



Source: Dept of Agriculture, Brazil; Integer

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Rest of the World

- Indonesia and Malaysia – oil palm growth and strong potential
  - But doubts over exports, recent economics unfavourable, no subsidies
- Rest of the world
  - Developing - lower on political agenda than food security
  - Developed- many schemes and targets, but compared to ‘big 3’, biofuels potential is much smaller

Impact on fertilizers

Measuring the biofuels effect on fertilizers

• Factors to consider:

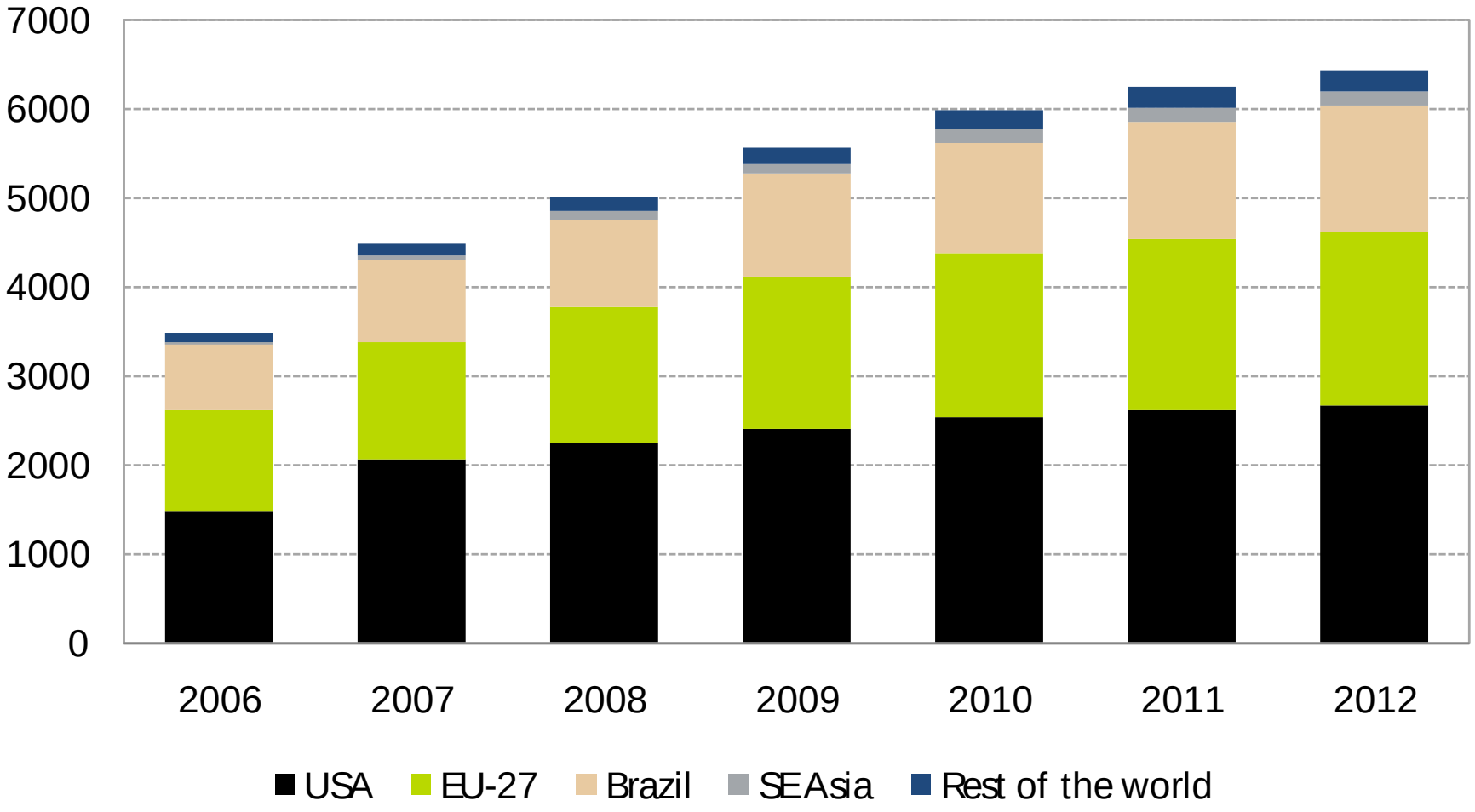
- Impact overall: change in world fertilizer consumption as a result of crop production related to biofuel

- Change in fertilizer consumption at country/region level in biofuel producing/consuming countries

- Changes in other countries/regions affected indirectly – increased fertilizer use as a result of shifting crop patterns, supply gaps, higher crop prices

Base case: N, P and K fertilizer consumption on crops used to produce biofuels

(thousand tonnes nutrient)



Source: Integer, FAO, USDA, ANDA, IFA

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The relative impact of biofuels growth

- Assuming non-biofuel fertilizer demand increases by a straight line 2.5% per year to 2012:
  - Increase in nitrogen demand for biofuels 7% of total increase (biofuels + non-biofuels)
  - Increase in phosphate demand for biofuels 8% of total increase
  - Increase in potash demand for biofuels 15% of total increase

What is happening at a country/region level

- Growth in nitrogen in **US** for corn, at the expense of soybeans (low N)
- In the **EU:**
    - Switch to rapeseed in Europe, biggest increase in nitrogen
    - Expansion of area – reduction of set aside
- Growth in sugar cane in **Brazil**, some expansion of soyabeans for diesel, more so to compensate for lower US production

Knock-on effect on other countries/regions

- EU/US area is constrained such that productivity increases are insufficient to supply new biofuels market demand
- Impact of biofuels on crop markets:
  - Lower US corn availability for export
  - Lower US soyabeans availability
  - Lower EU cereals crop availability
- Reflected in higher cereal/oilseed prices
- Positive impact on countries with potential for intensification (dormant crop yields, immature fertilizer use)
- And potential for land expansion – Brazil

Summary and conclusions

Summary and conclusions

- The relationship between land and energy is now strongly established
    - Technological lock in, sunk investments, political commitments
    - Winners – land owners, farmers, input suppliers
    - Losers – crop consumers, tax payers?
- Biofuels and renewable energy are high on the political agenda, even though 1G economics are questionable

Summary and conclusions

- Biofuels will continue to exert significant positive influence on the fertilizer industry:
  - Across all nutrients
  - In biofuel producing/consuming countries
  - In countries with intensification/expansion potential for filling crop supply gaps
- But, key point to watch
  - Longer term growth rate subject to swings in energy and crop prices, and political decision making