

# Impact of EU Biofuel Policies

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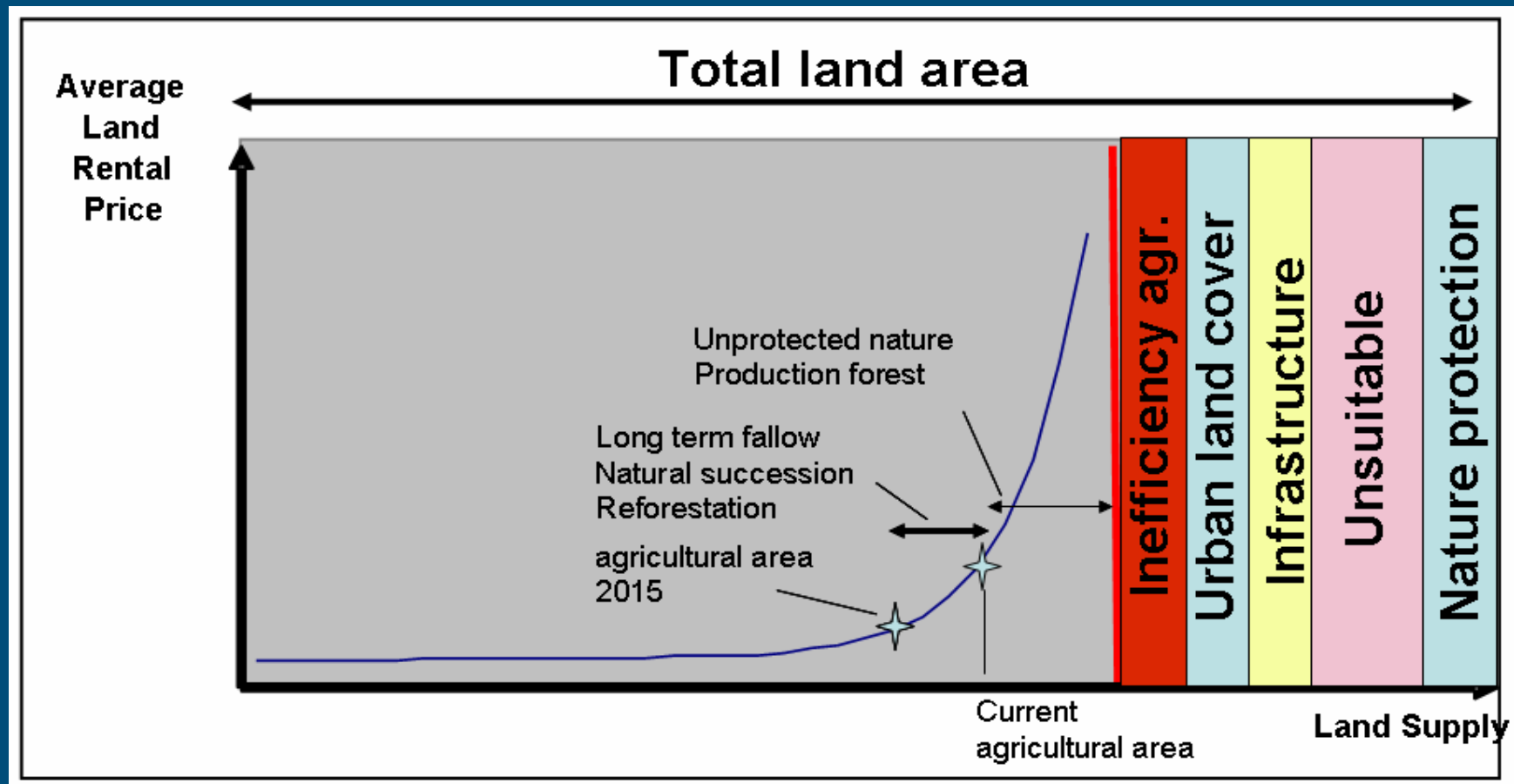
# Outline of Presentation

- Introduction
- Methodology
- Modeling results of enhanced biofuel production
  - Impact at Global level
    - Primary agricultural production
    - Trade
    - Land use
- Summary and conclusion

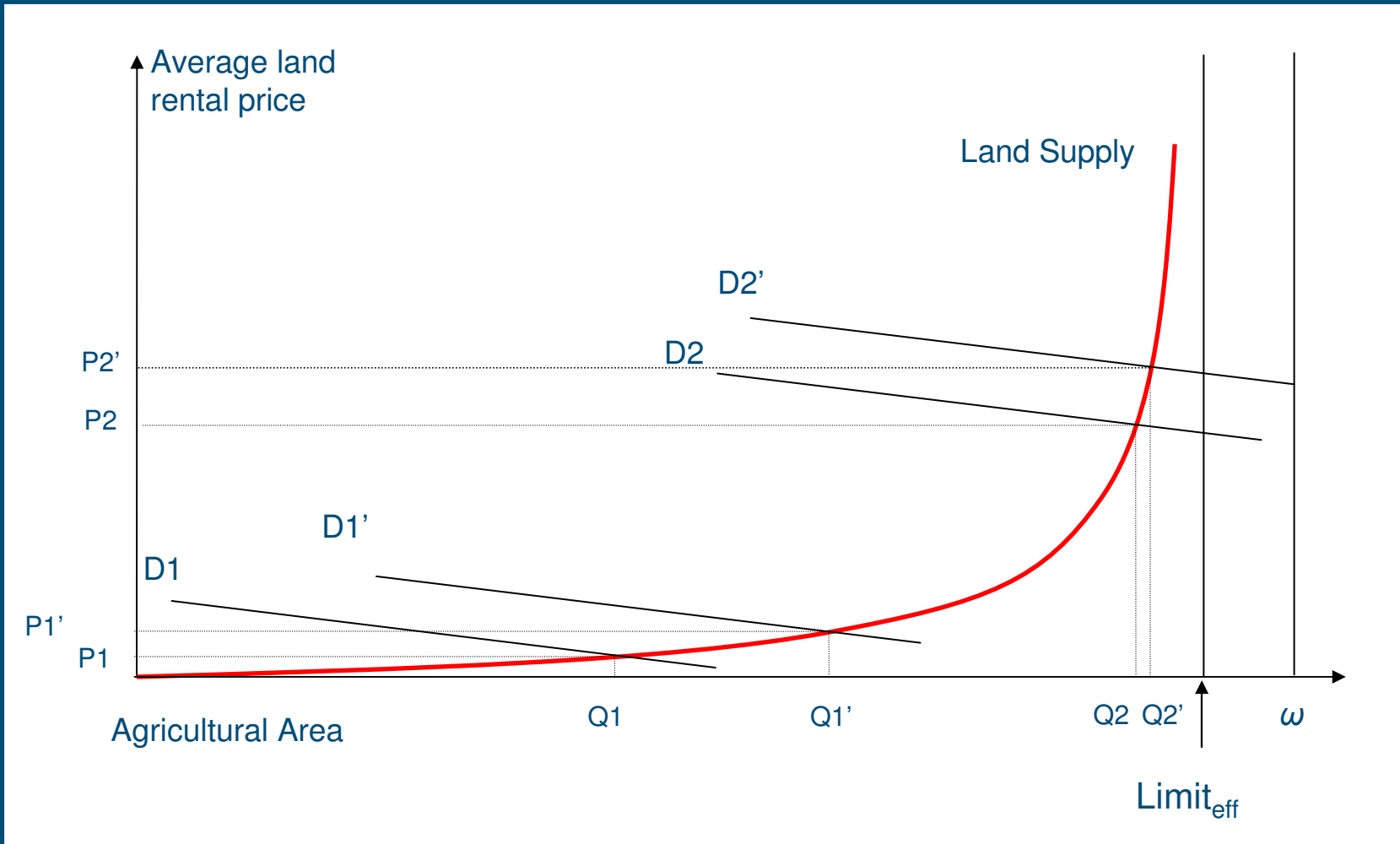
# Methodology (I)

- Instruments applied analyzing policy options in the area of biofuels
  - General equilibrium model: LEITAP
    - Extended version of the GTAP model
    - Land allocation function; land supply curve,
    - Bio-energy crop use in petroleum sector
  - Spatial land use model: CLUEs
    - disaggregate LEITAP/IMAGE to temporal resolution of two years and a spatial resolution of 1 km
    - uses land claims of the different sectors at national level
    - Allocation of these claims over the land area according to location suitability, spatial policies and transition rules

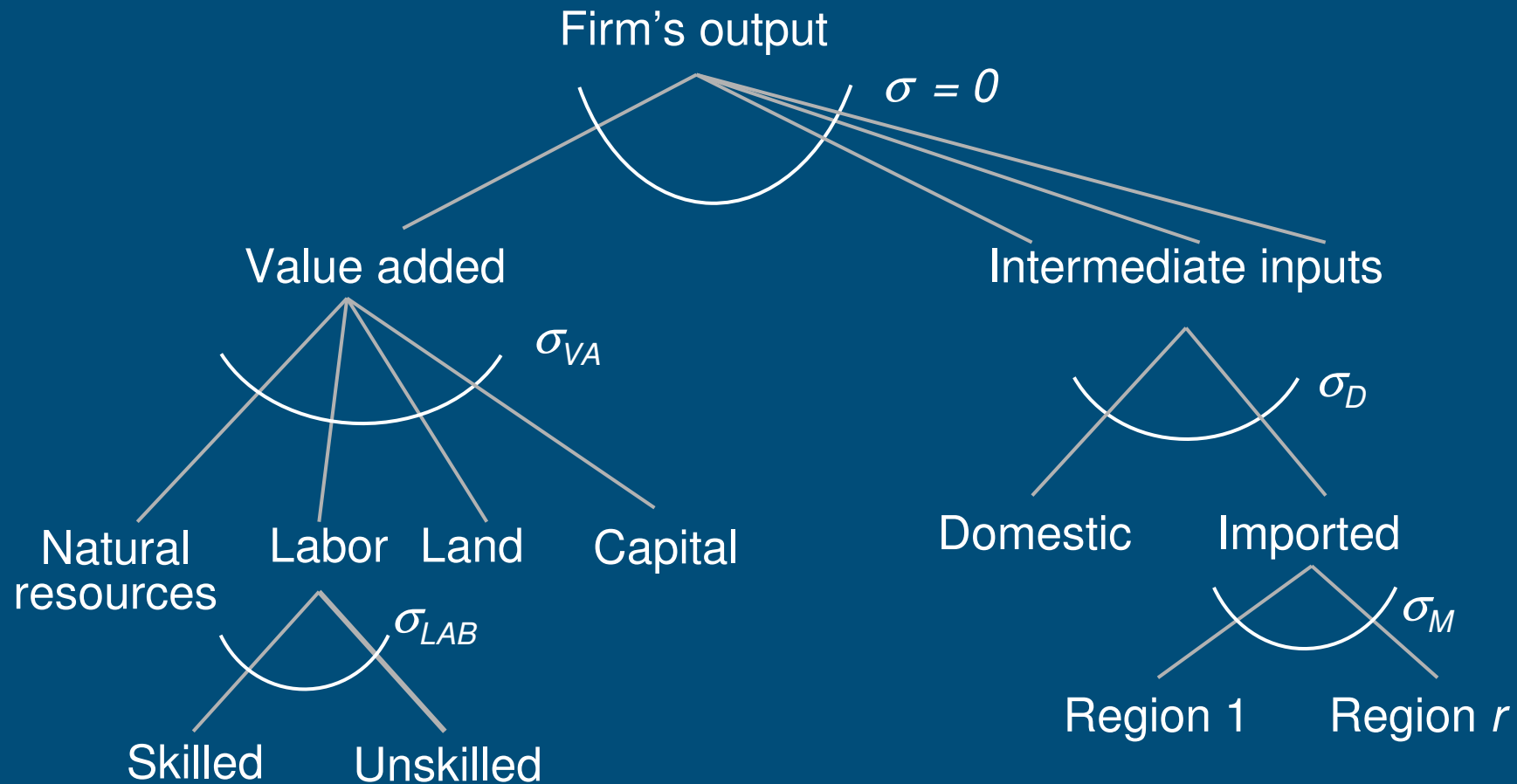
# Methodology (II)



# Methodology (III): Impact of an Increase in Land Demand

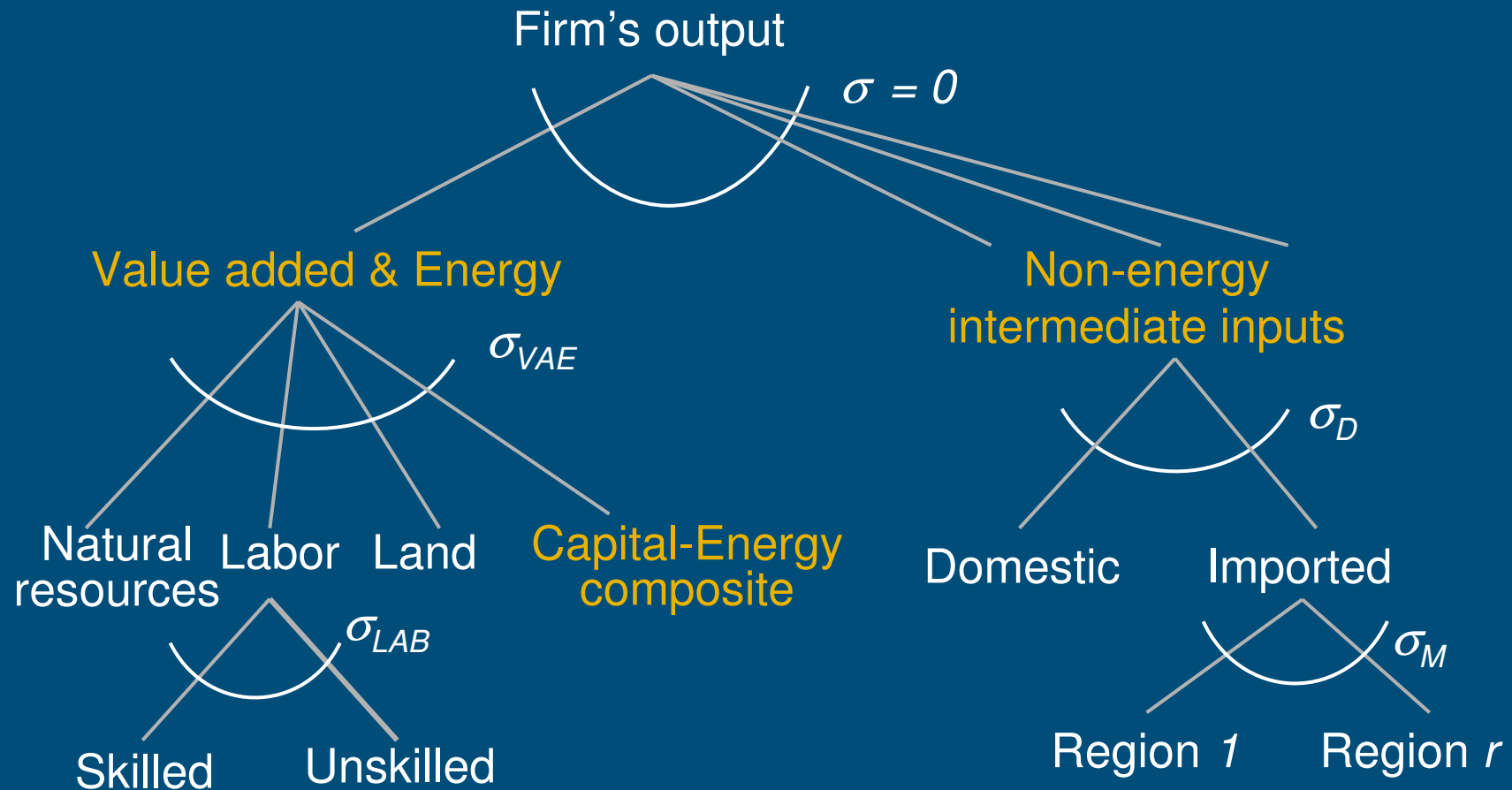


# Standard GTAP: Production Structure



# GTAP-E Production Structure

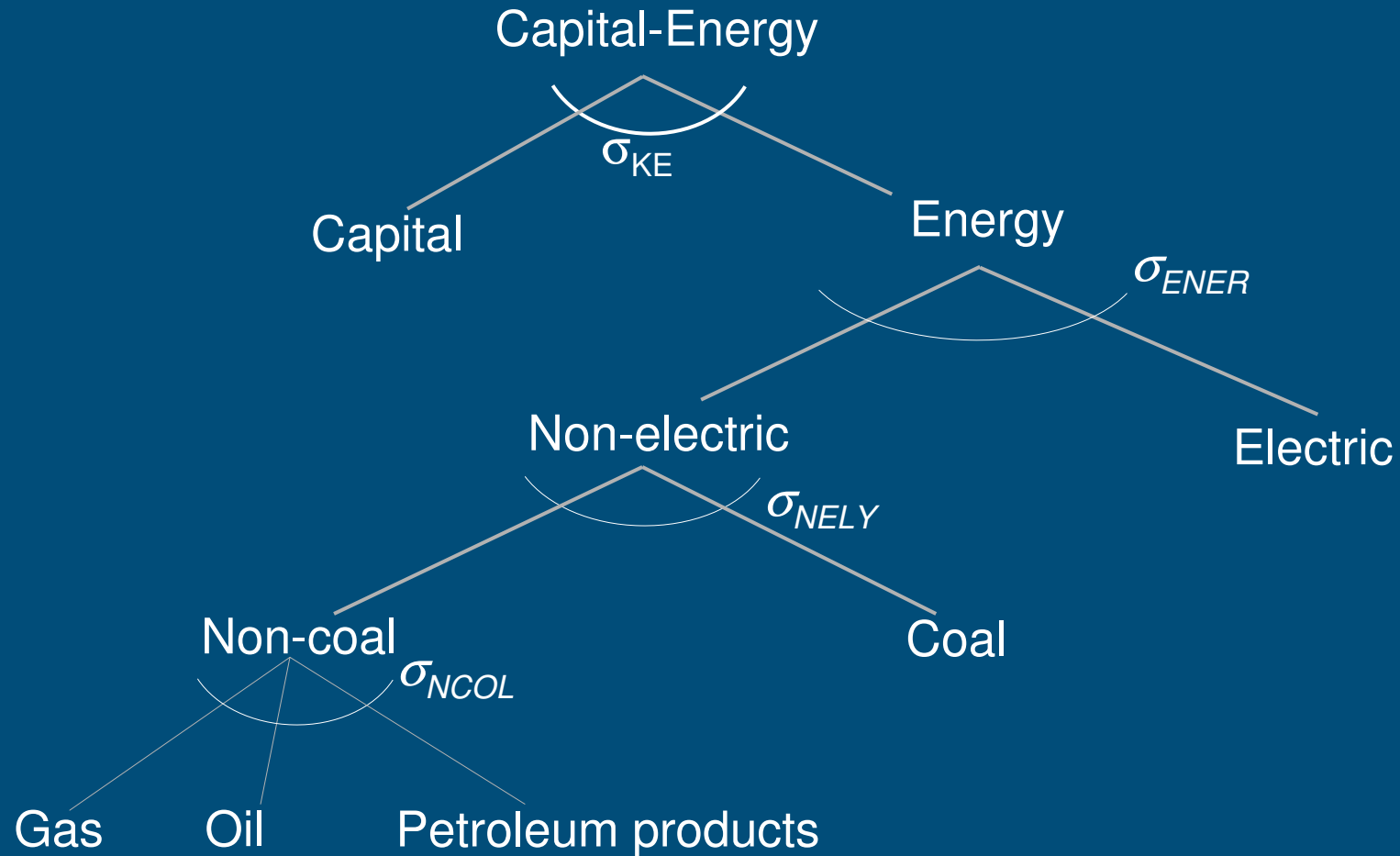
(Burniaux, Truong, 2002)



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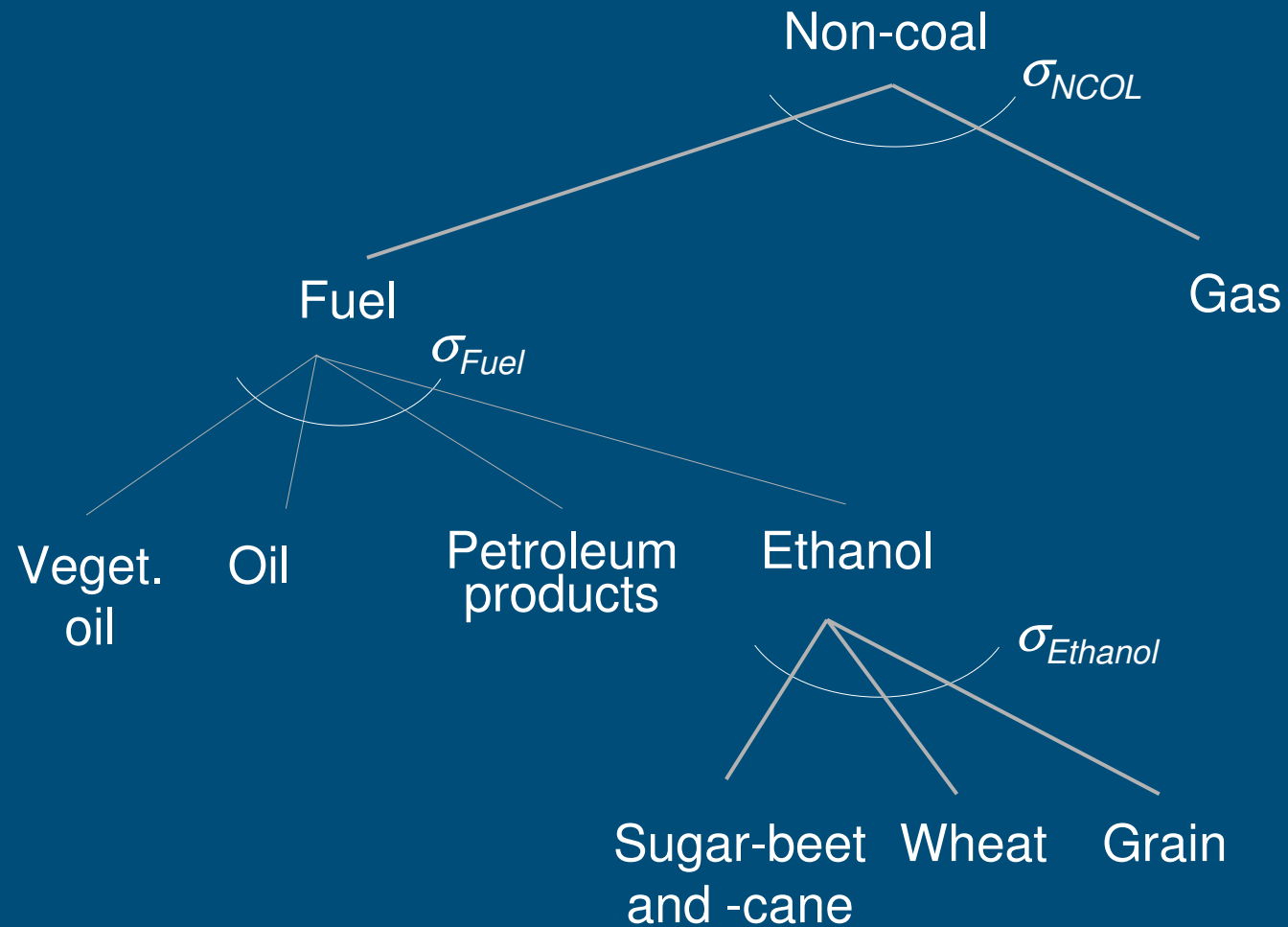
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# GTAP-E: Capital-Energy Composite





# Modeling Biofuels in LEITAP



# Implementing the Biofuel Policies

- Mandatory blending as an example of biofuel policy
  - Price incentive (subsidy or tax exempt) to use bio-fuel crops
  - ‘Neutral subsidy’: Additional (endogenous) sales tax on petrol finances the prices incentive to use bio-fuel crops

# Scenarios calculated

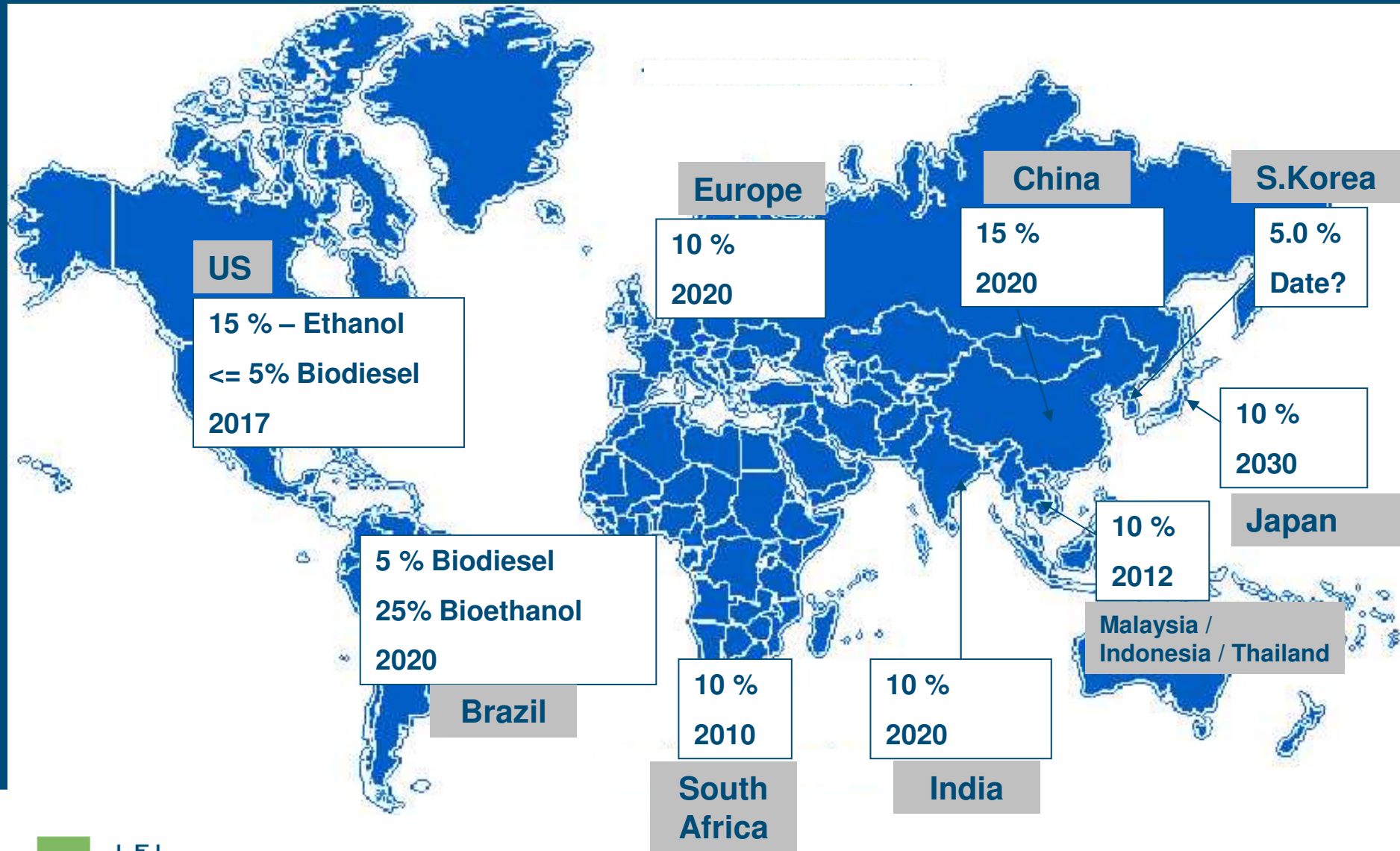
## ■ Reference scenario

- A1 SRES 'Global Economy'
- Reduction of price and income support to agriculture

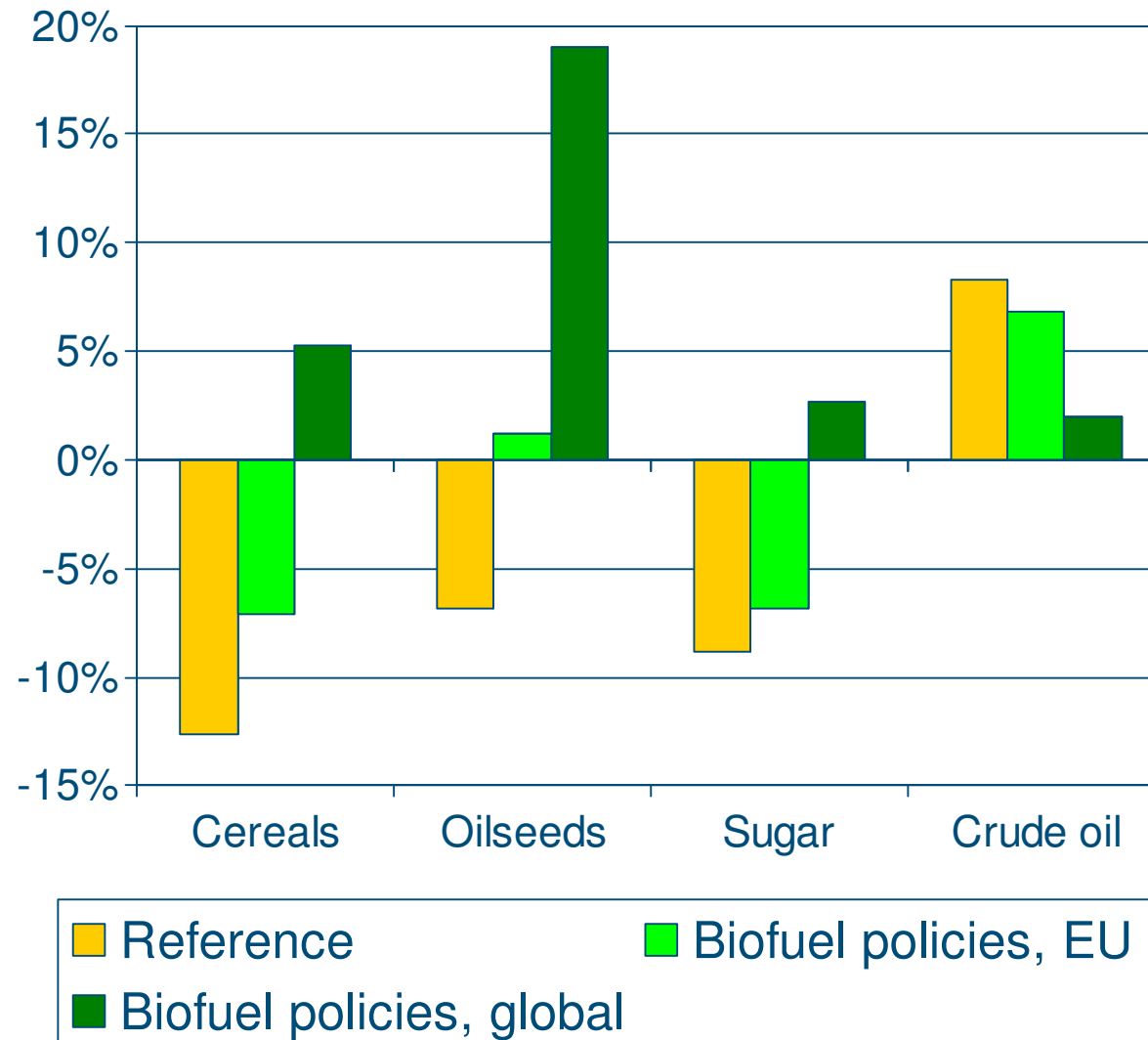
## ■ Policy scenarios

- Implementation of EU biofuel directive (BFD)
  - Targets
    - 5.75% share of biofuel consumption in transportation by 2010
    - 10% share of biofuel consumption in transportation by 2020
- Implementation of biofuel initiatives outside Europe

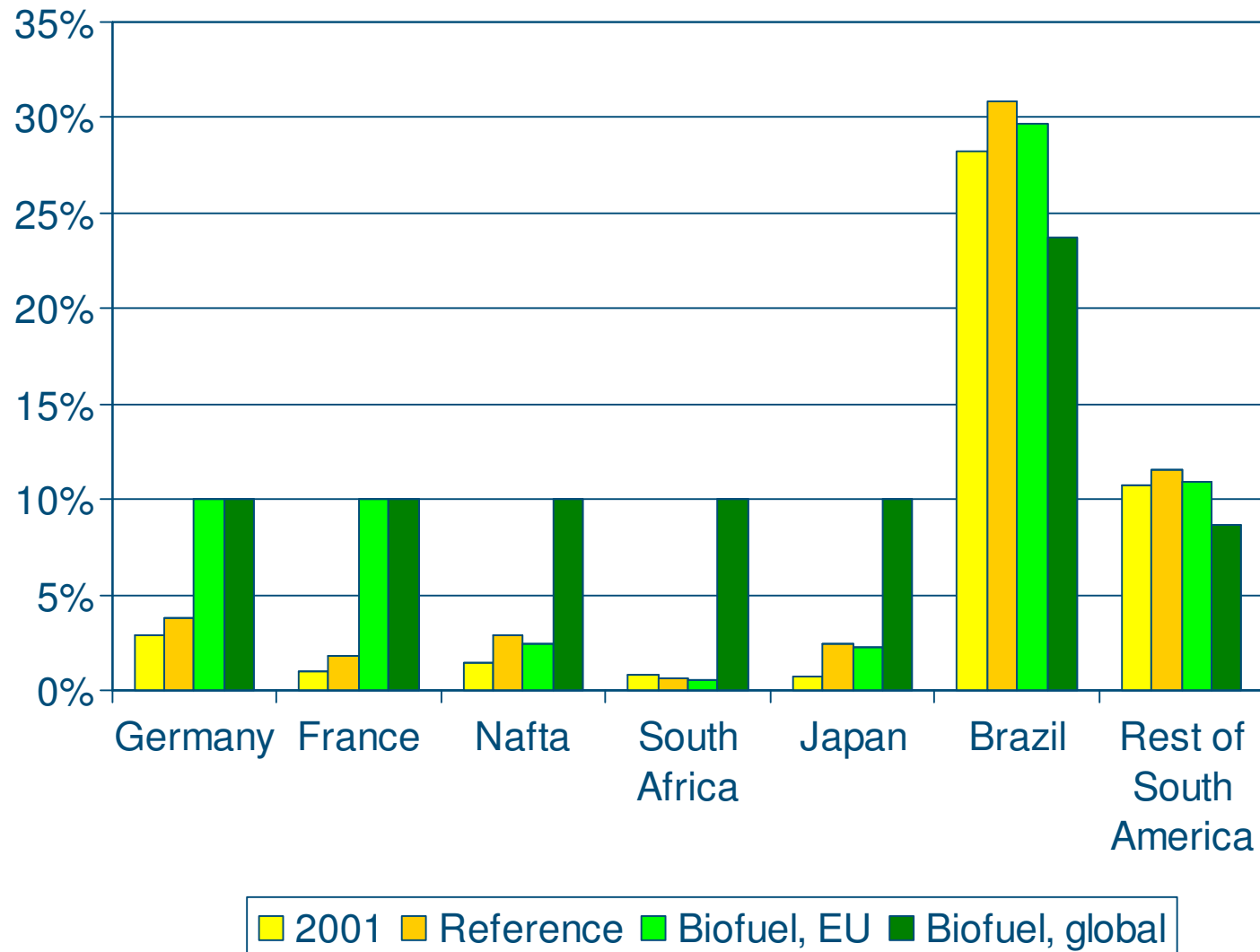
# Targets for Bio-fuels Worldwide



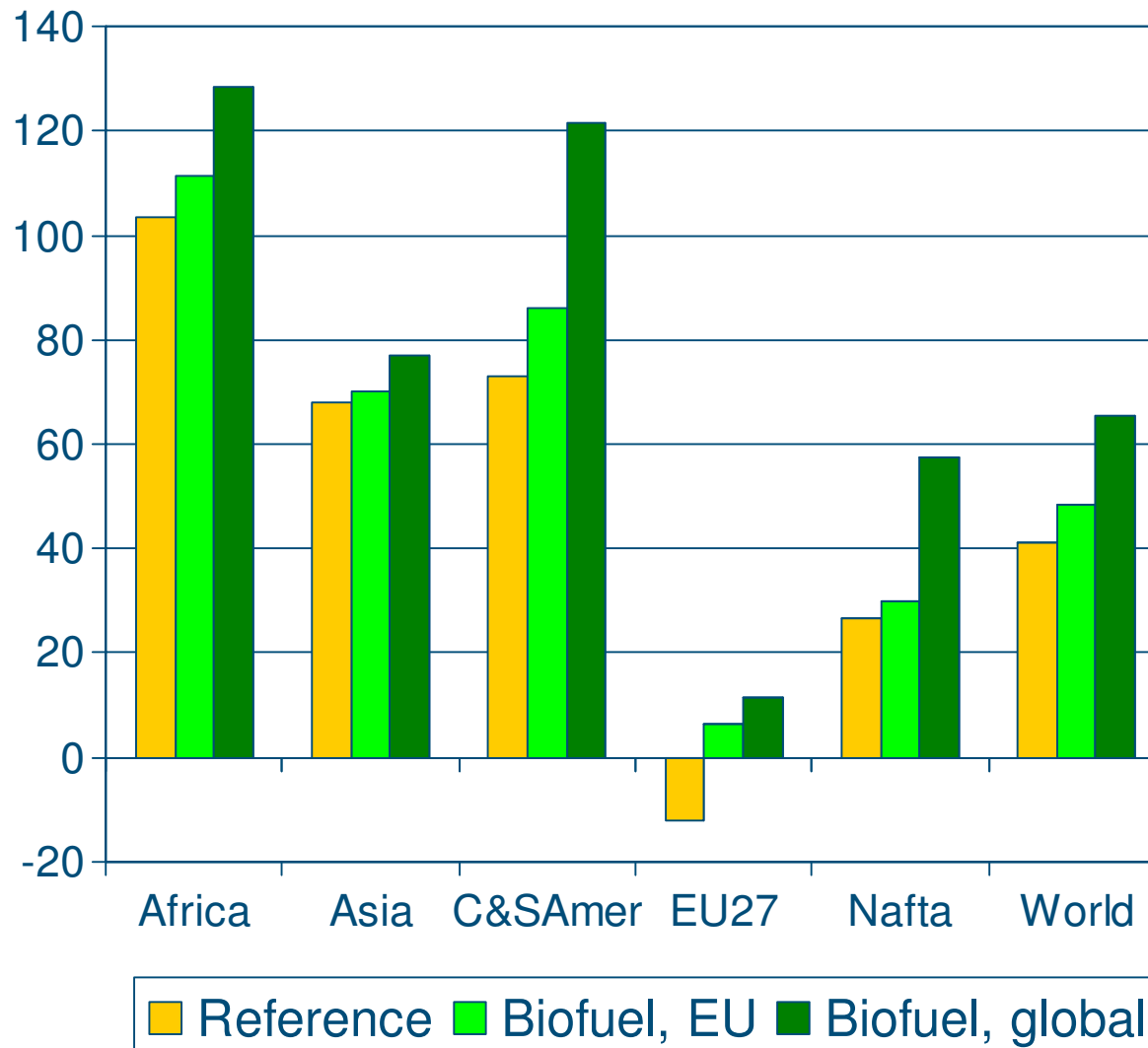
# Impact of Biofuel Directives on World Prices, in %, 2020 relative to 2001



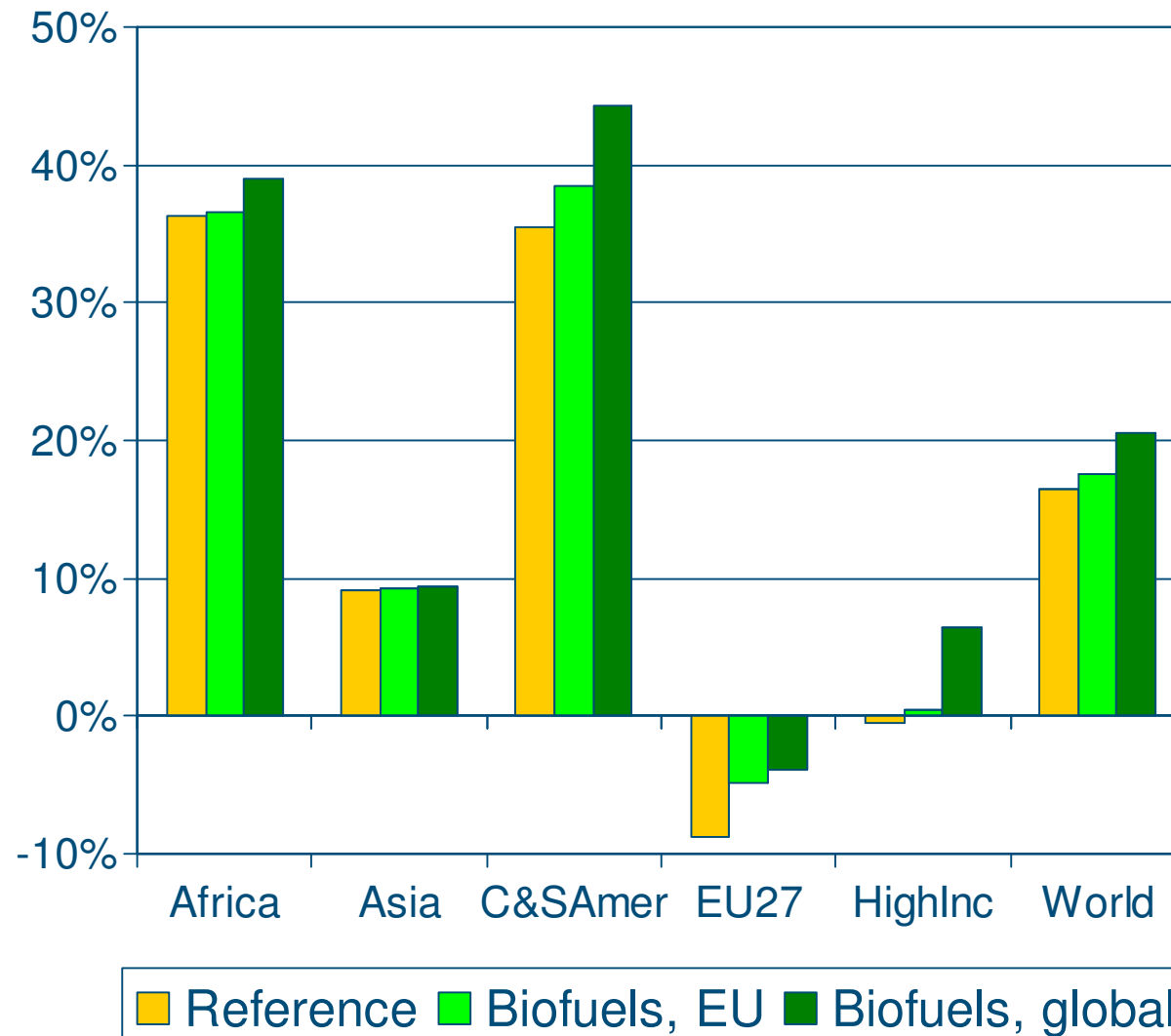
# Development of Share of Biofuels, in %, 2020



# Impact of Biofuel Directives on Biofuel Crop Production, in %, 2020 relative to 2001

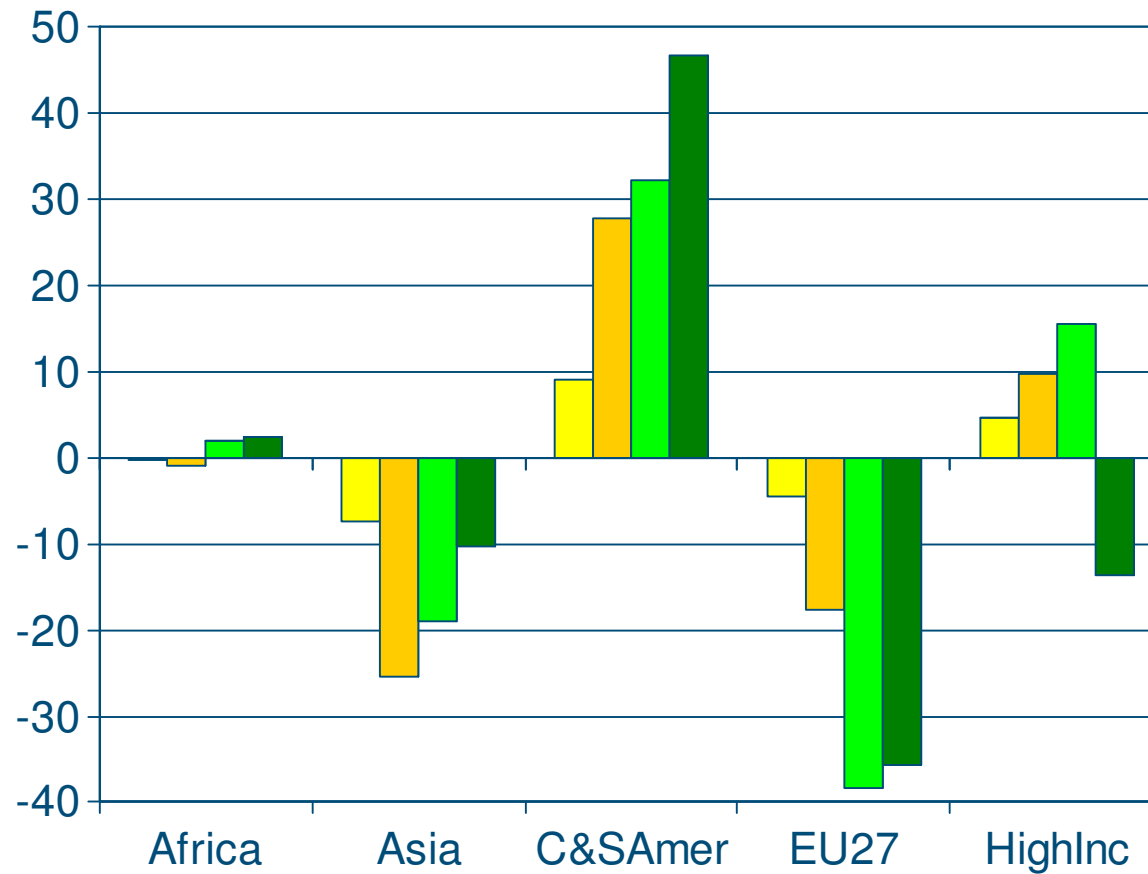


# Impact of Biofuel Directives on Agricultural Land Use, in %, 2020 relative to 2001





# Net-Exports in Biofuel Crops, in Bill. USD



Initial, 2001

Reference, 2020

Biofuels, EU, 2020

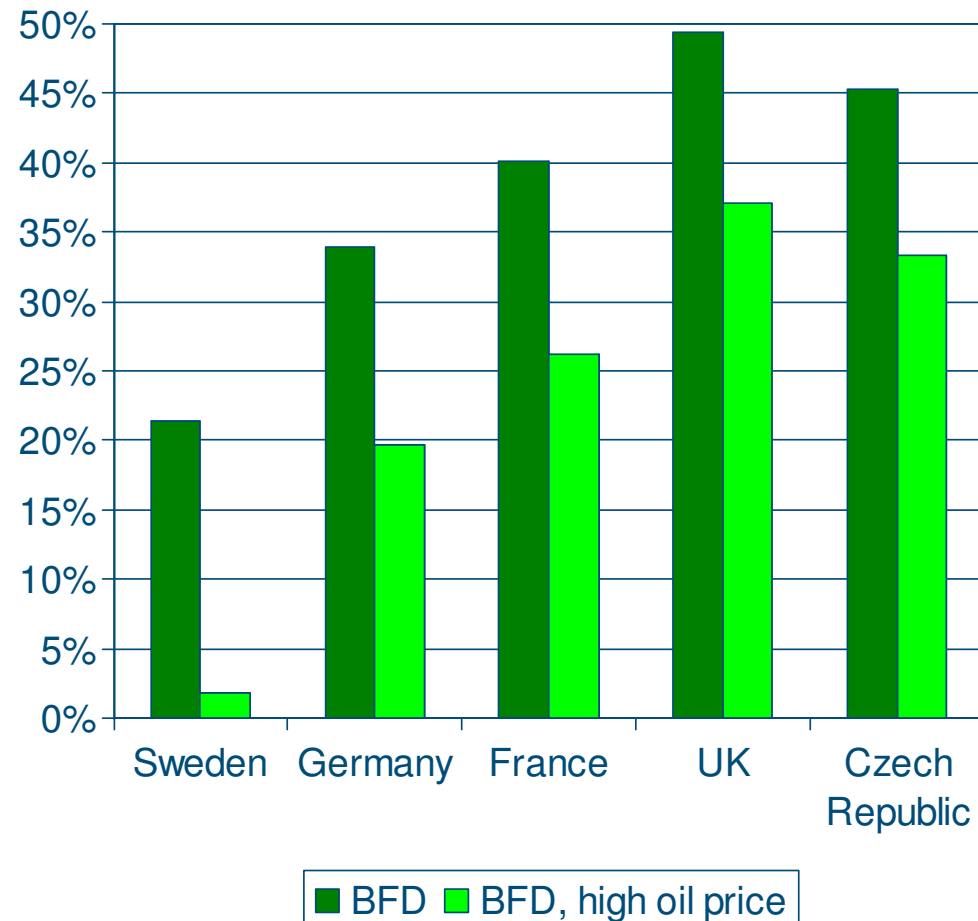
Biofuels, global, 2020

# Initial Share of Biofuel Use and Subsidies on Inputs in Petroleum Industries, 2020

## Initial Biofuel Shares:

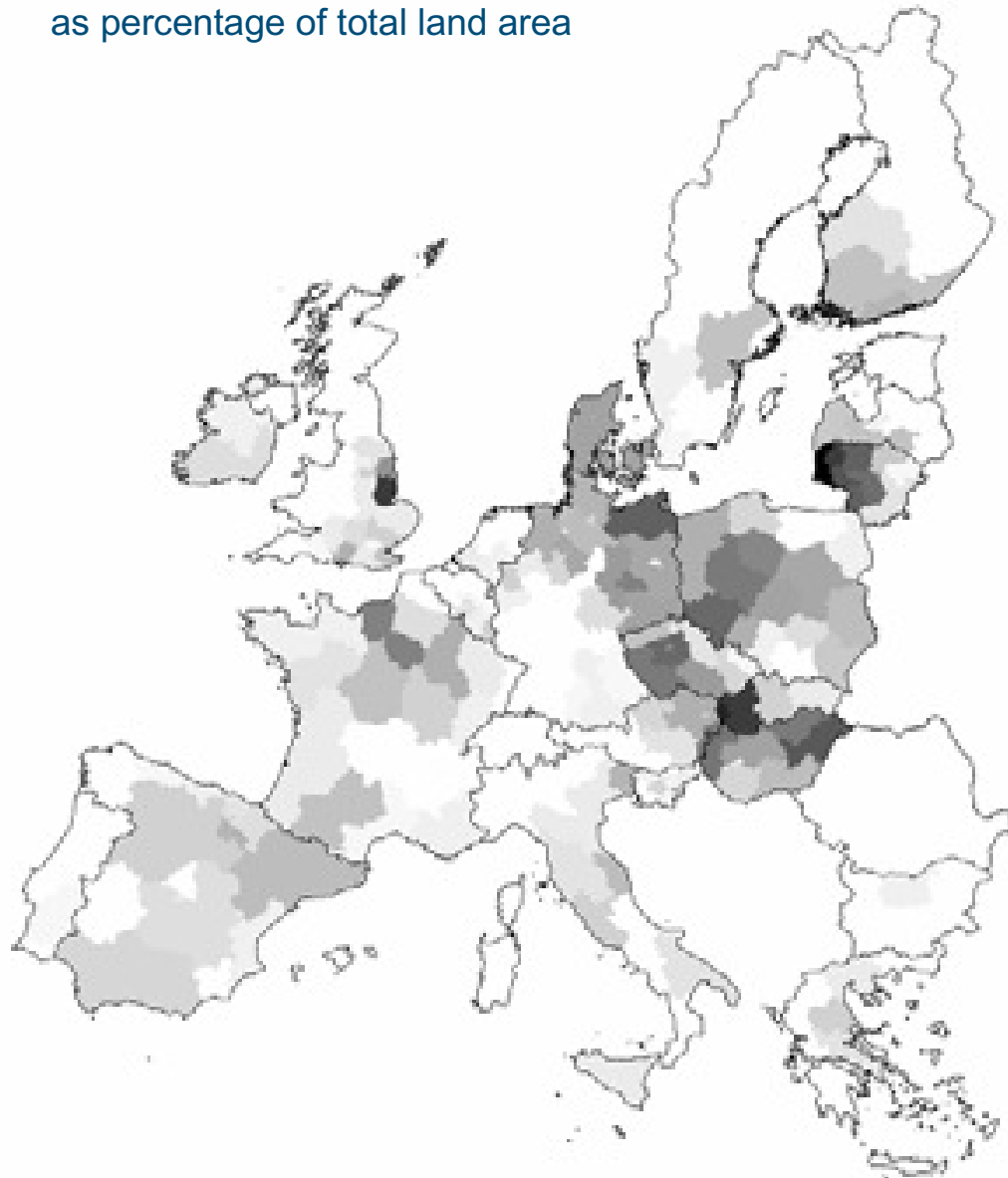
Sweden	2.9%
Germany	1.9%
France	0.9%
UK	0.3%
Czech Rep.	1.2%

## Subsidy on Biofuel Crops in Petro.



# Biofuel cultivation at Regional Level in the EU, in 2020

as percentage of total land area



Percentage biofuels:



Hotspots of biofuel crop production:

- in areas with high initial biofuel crop production (Germany, France)
- in area with land reserves (new EU member states)

# Summary and Conclusions

- EU Biofuel Directive/ global biofuel initiatives
  - High subsidies indicate big challenges to fulfill the biofuel targets
  - Impact on global agri-food markets
  - Strong effect on agricultural land use
- Limitations of empirical analysis
  - Focus on 1<sup>st</sup> generation
  - High uncertainties with regard to technological change and development of crude oil price
  - Results may under-estimate real developments