

World Fuel Ethanol Analysis and Outlook

Prepared for METI

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World Fuel Ethanol

Some basic concepts

- By production route:
Fermentation vs. Synthetic
- By composition:
Anhydrous vs. Hydrous
- By end-use:
Beverage, Industrial, Fuel

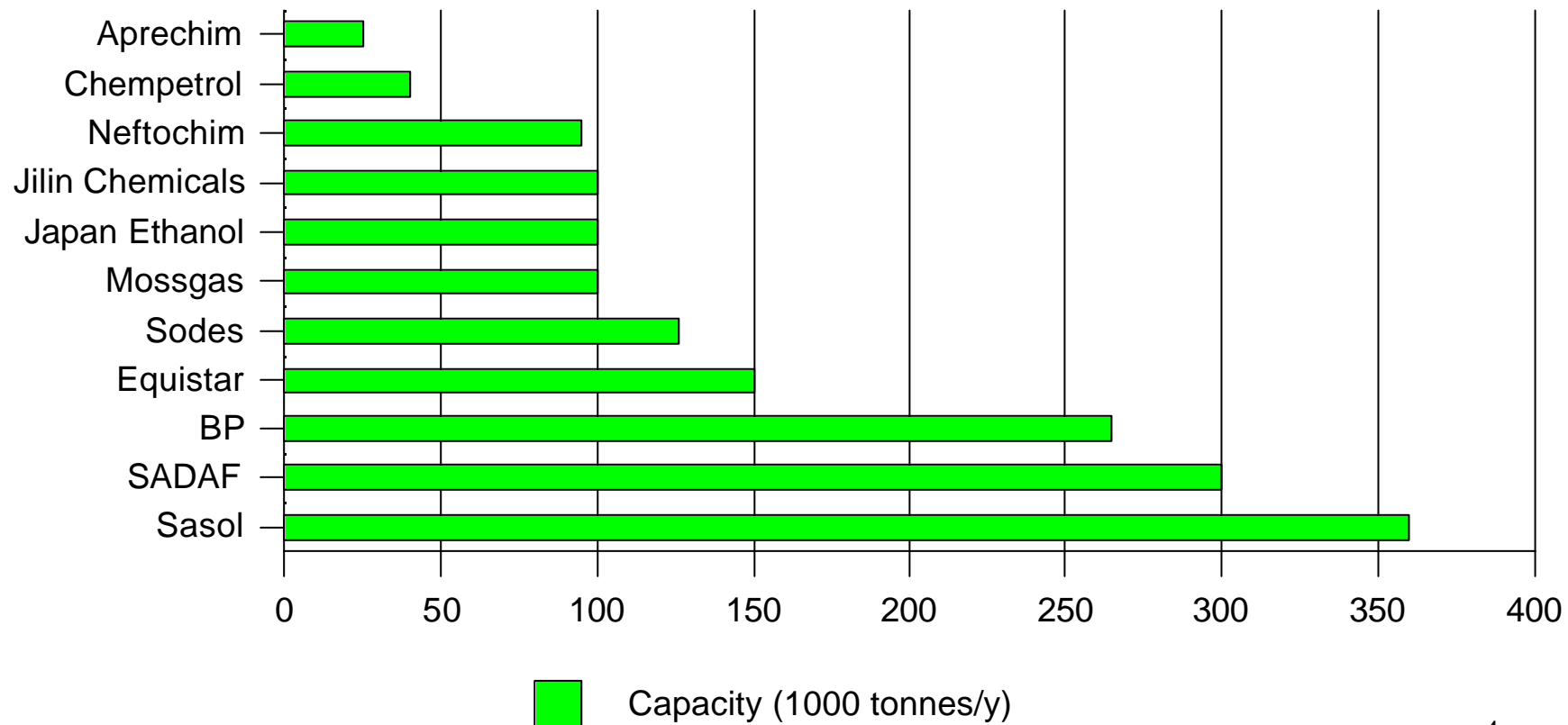
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The production route

- Synthetic ethanol:
Ethylene, coal; non-renewable
- Fermentation ethanol:
Grains, sugar crops, tapioca, wood etc;
renewable

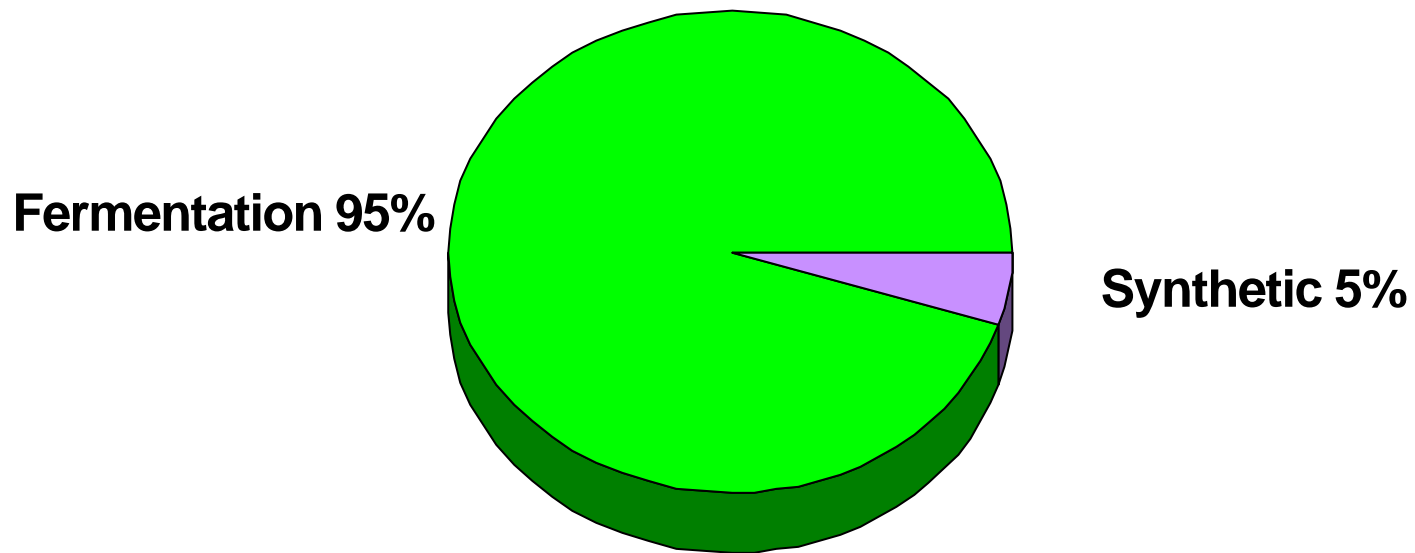
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The largest synthetic producers



World Fuel Ethanol

Share of synthetic ethanol



World Fuel Ethanol Composition

- Anhydrous:

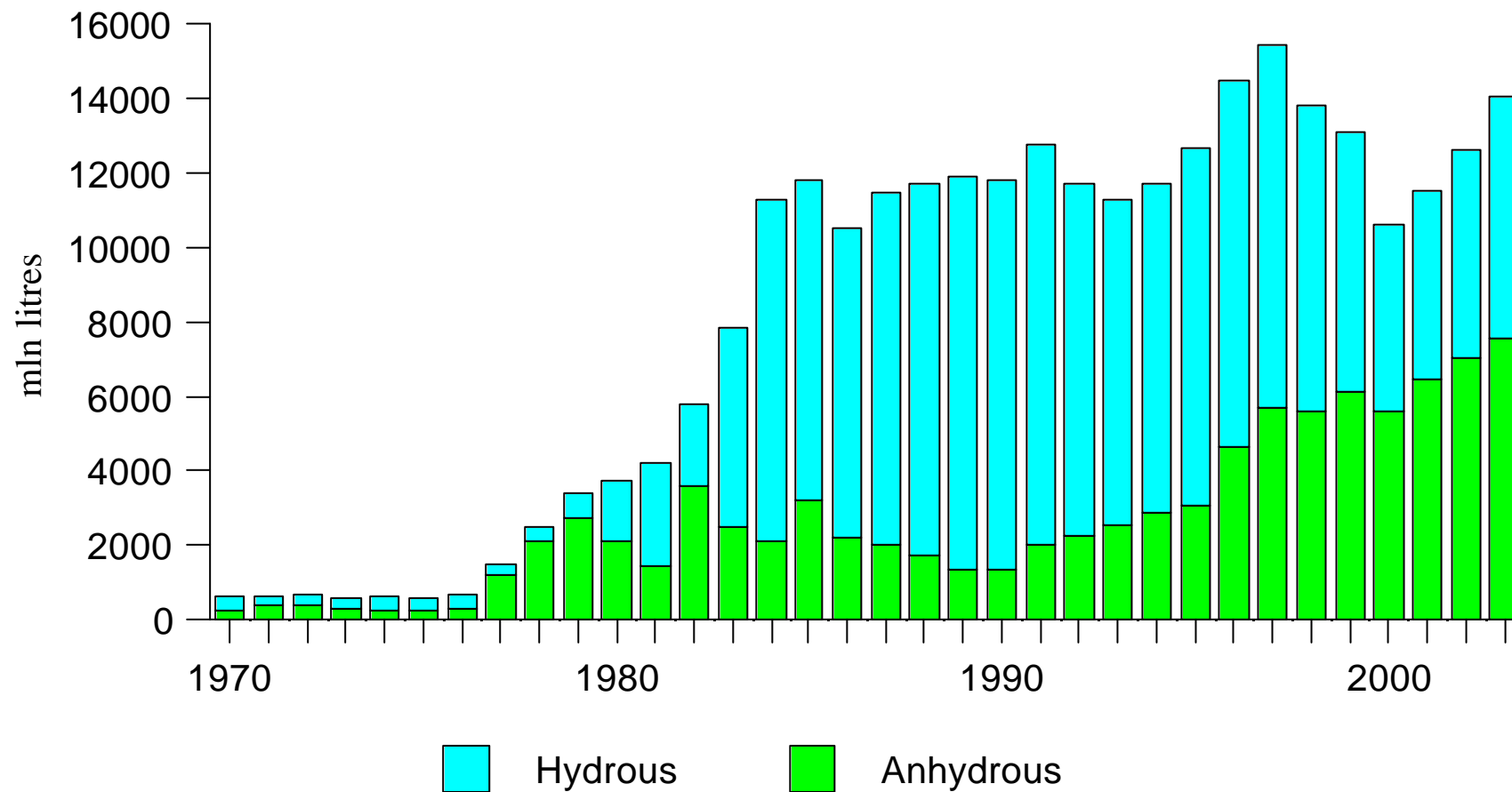
99 ° pure, may be used in fuel blends.

- Hydrous:

96 ° pure, may be used as 100% fuel substitute.

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Fuel alcohol in Brazil



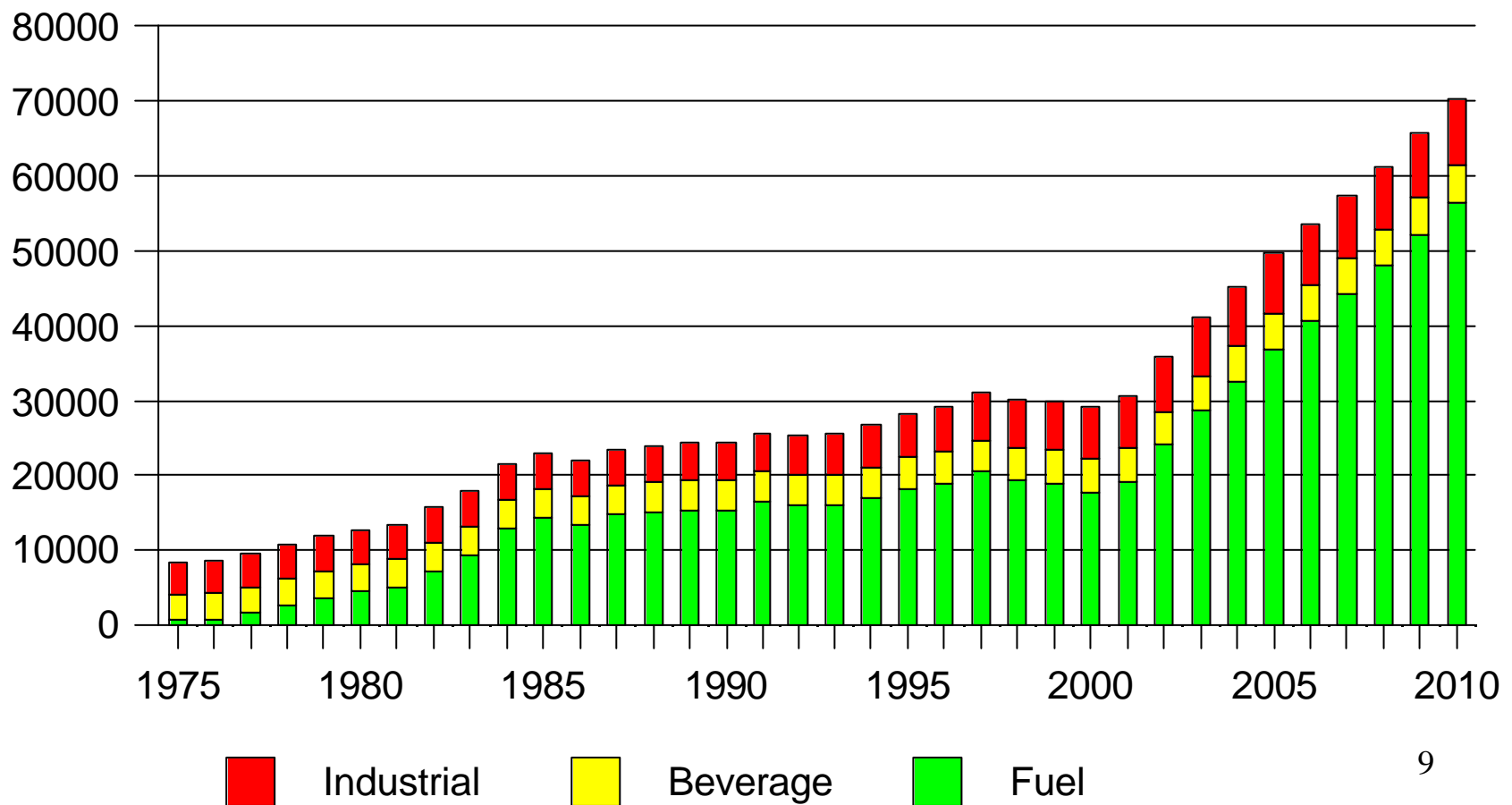
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End use

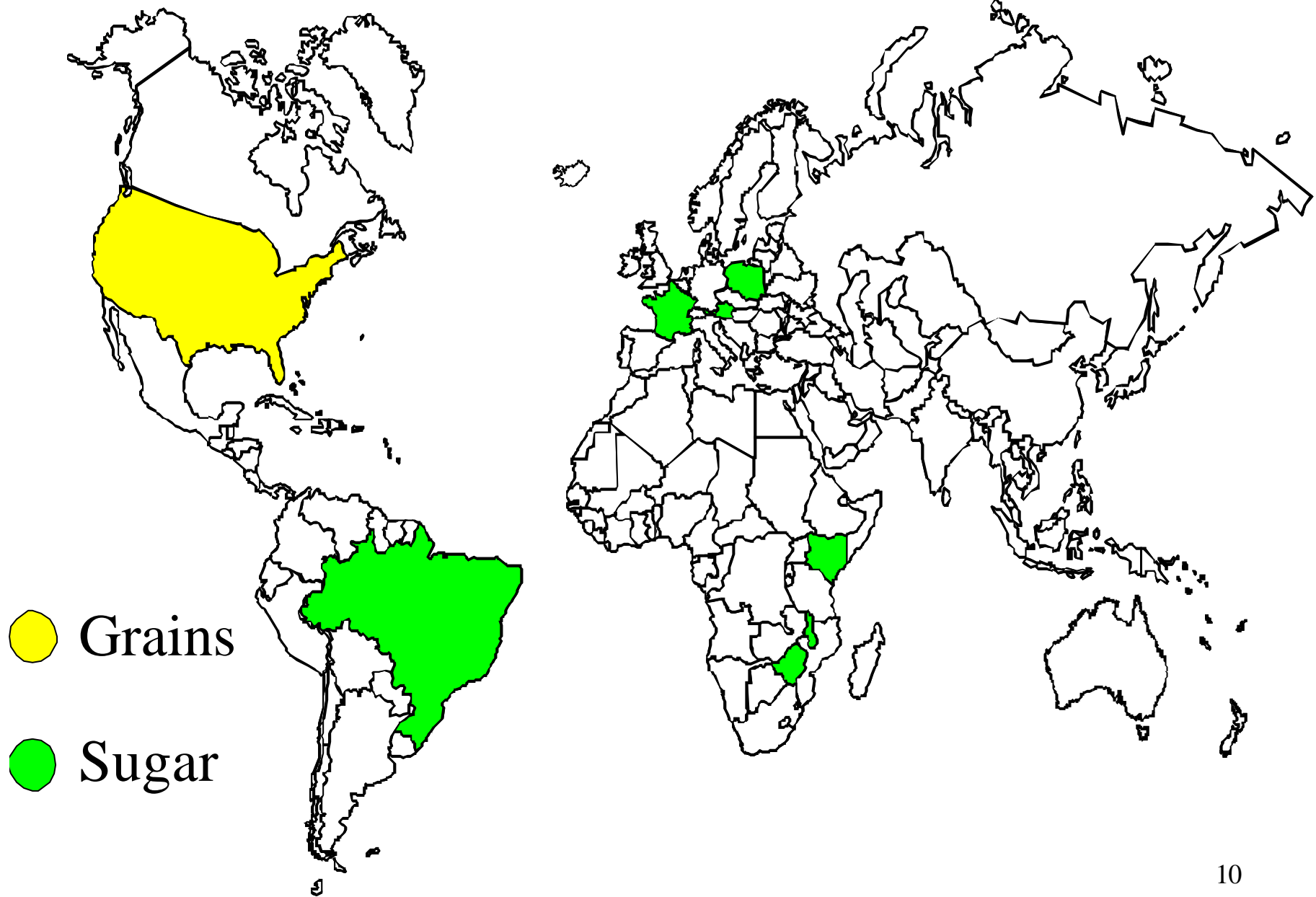
- Beverage alcohol:
Alcoholic spirits: vodka, shochu etc.
- Industrial alcohol:
Cosmetics, paints, inks.
- Fuel alcohol:
Blends or pure form.

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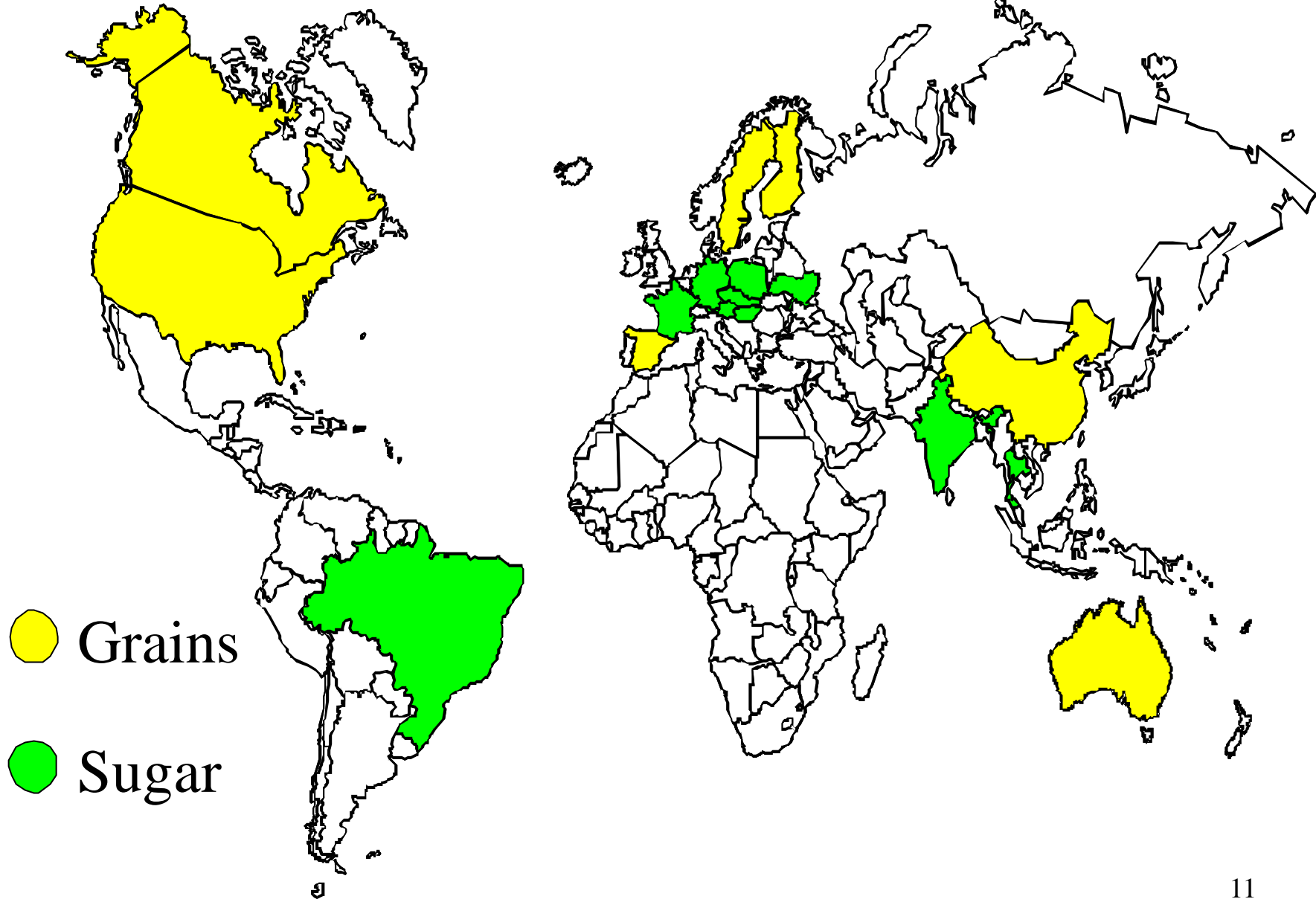
Ethanol production by type



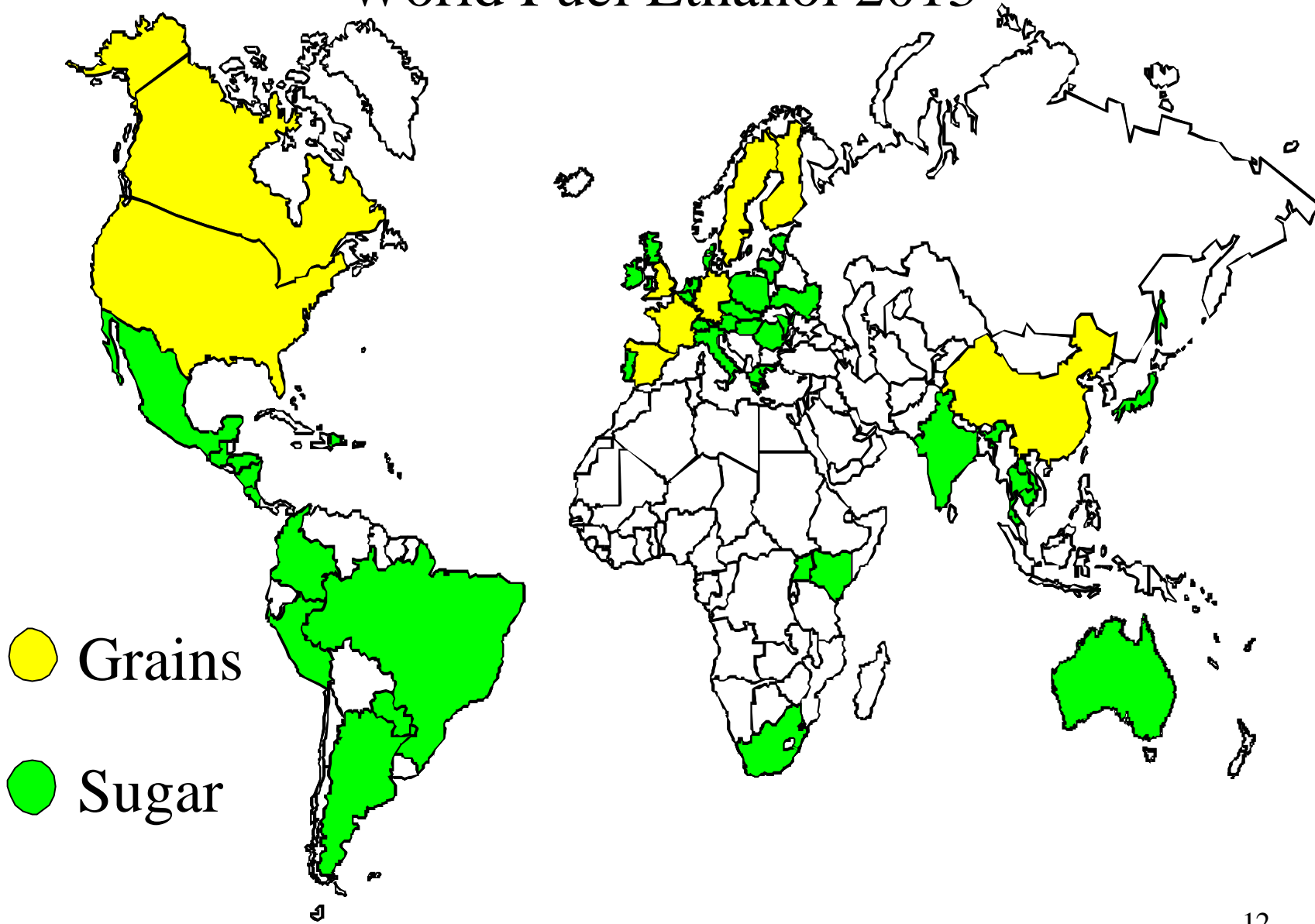
World Fuel Ethanol 1993



World Fuel Ethanol 2003



World Fuel Ethanol 2013



World Fuel Ethanol

The drivers of growth I

- Ethanol is good for the environment (Kyoto)
- good for rural areas
- reduces dependence on oil imports
- enhances technological knowledge base

World Fuel Ethanol

The drivers of growth II

- Demand is virtually unlimited.
- Cost reduction potential is huge.
- A tried and tested technology.

World Fuel Ethanol

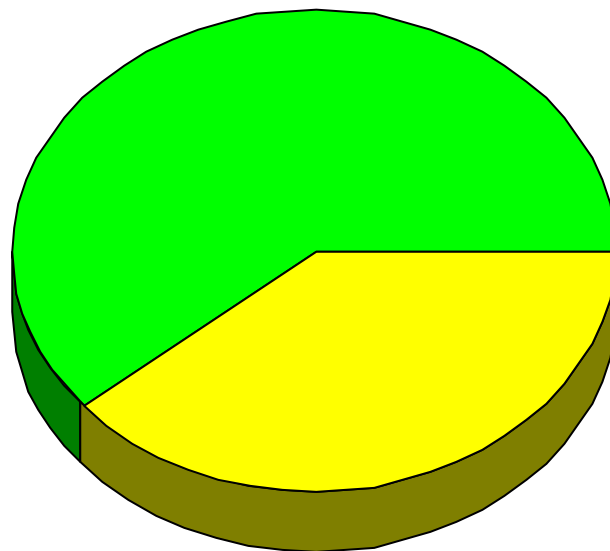
Success factors for biofuels

- Feedstocks
- Technology
- Policy

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World fuel ethanol production by feedstock

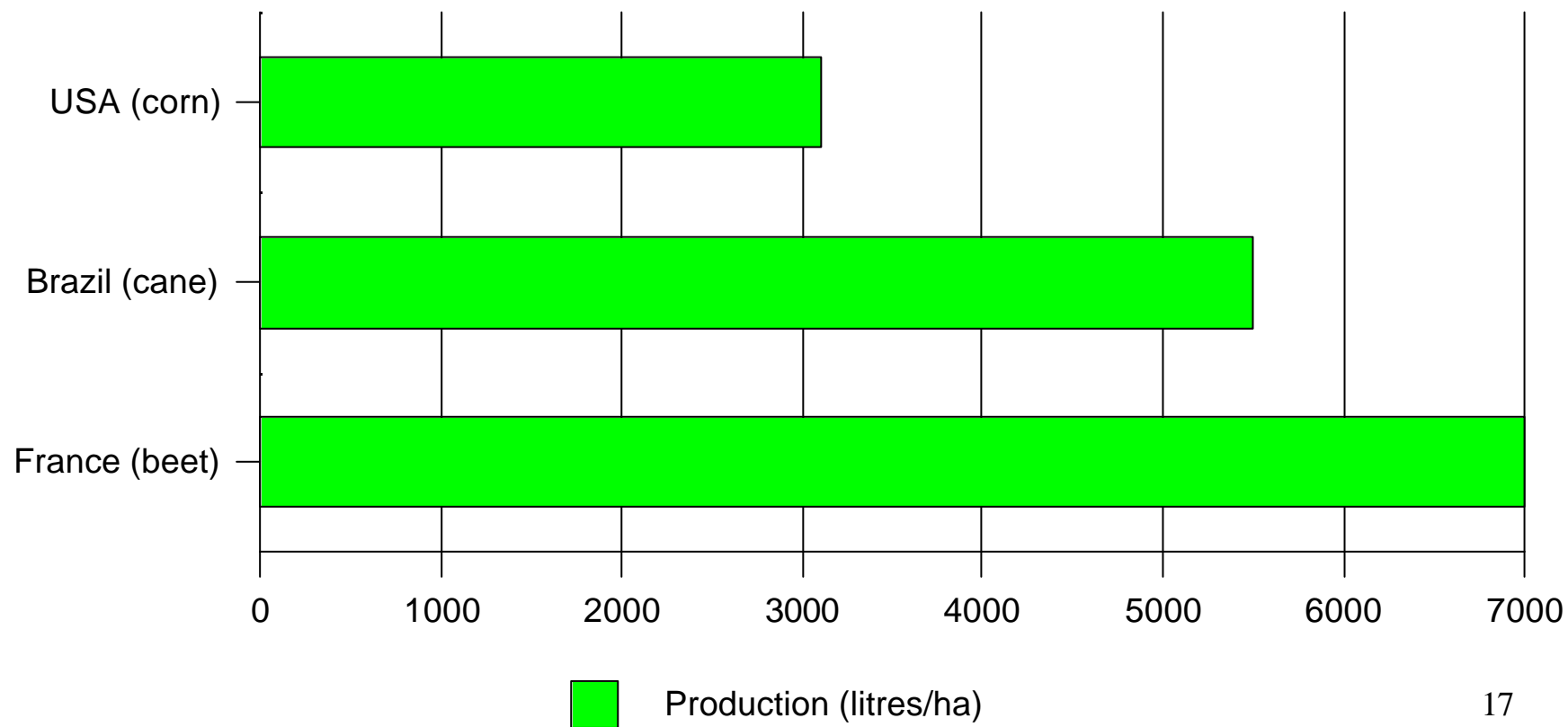
Sugar crops 61%



Grains 39%

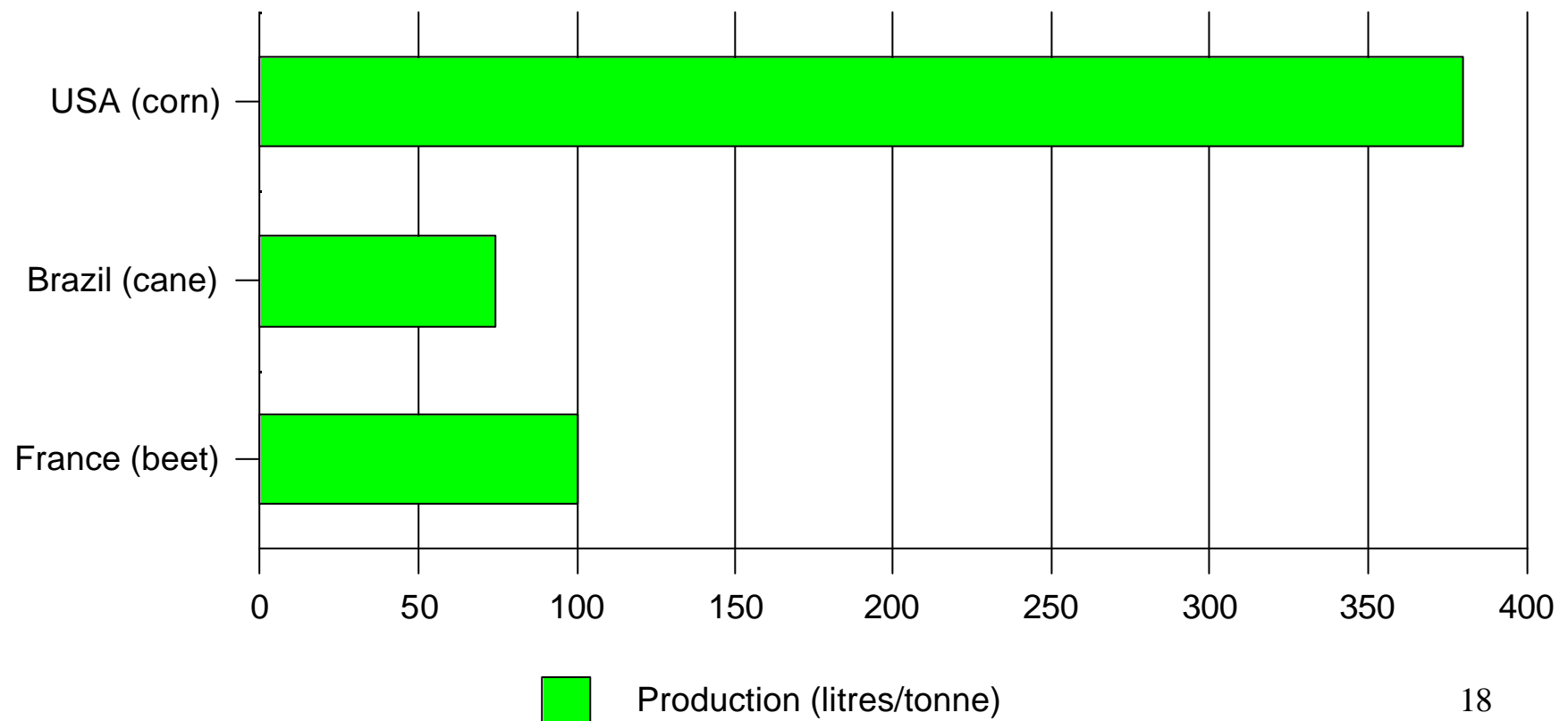
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Ethanol yields per ha



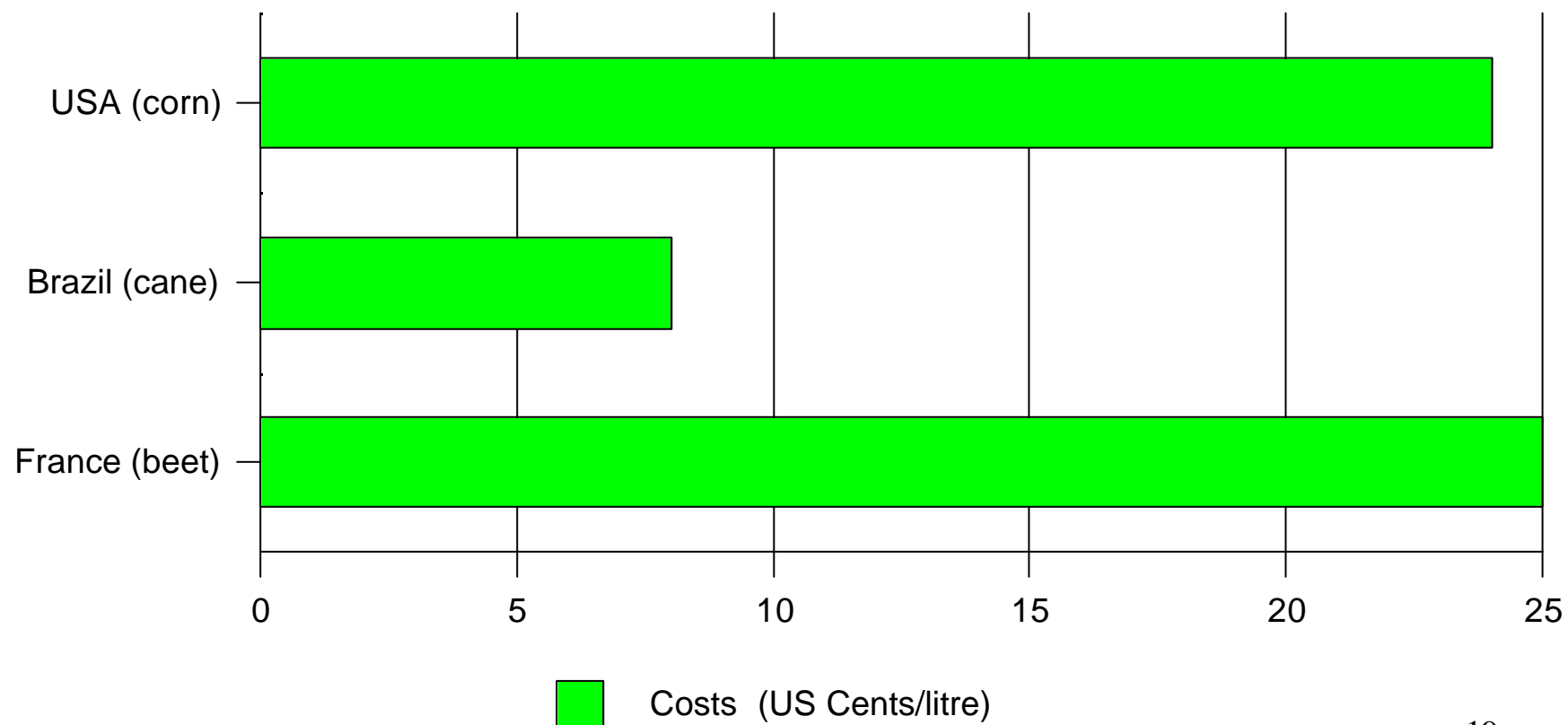
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Ethanol yields per tonne of feedstock



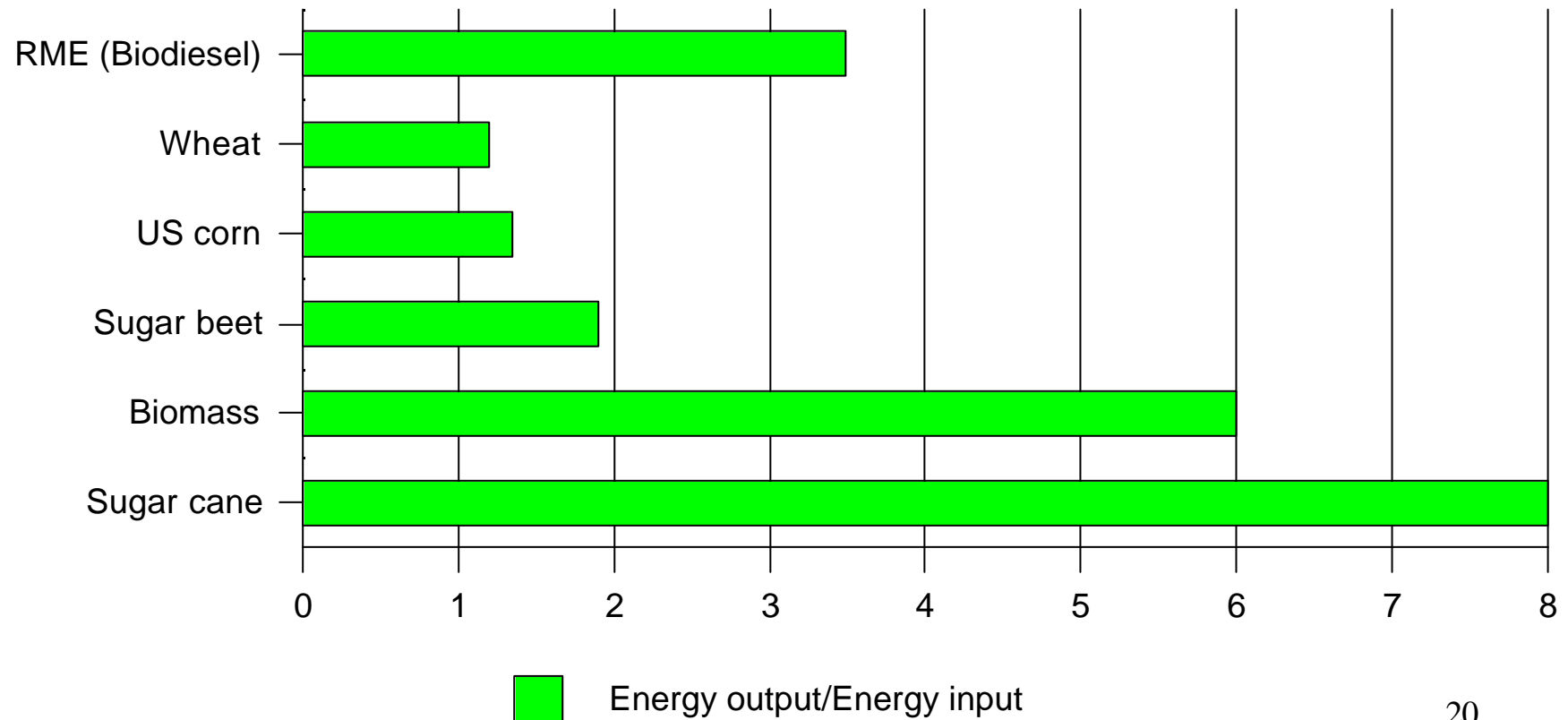
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Gross feedstock costs per litre of fuel ethanol



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Energy balance by feedstock



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The case for political support

- Ethanol may serve socially desirable goals but it...
- is more expensive than gasoline
- faces an unfavourable opportunity cost structure

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Production cost reducing subsidies

- Feedstock price support.
- Capital cost support.
- Income tax concessions.

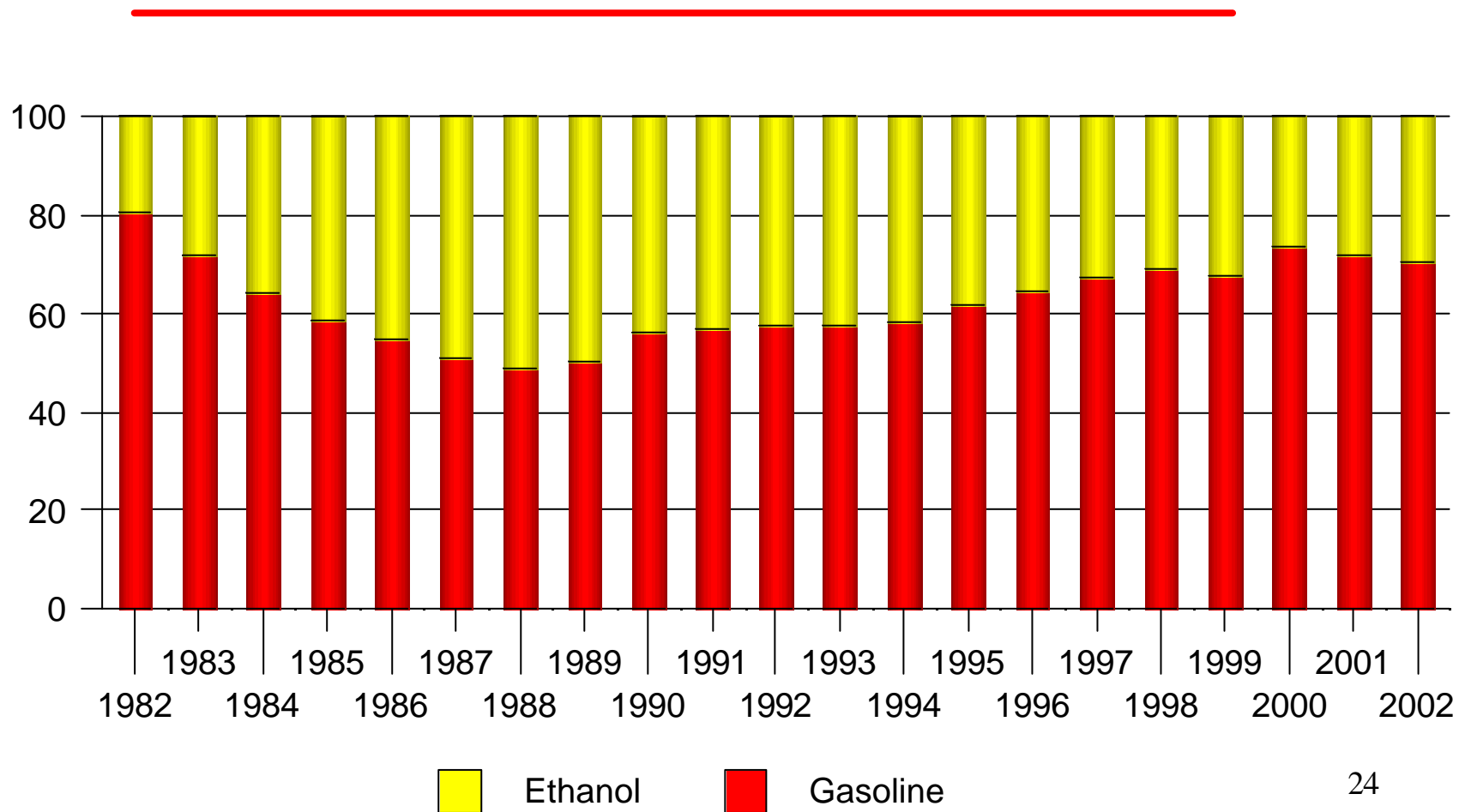
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Income enhancing subsidies

- Excise tax concessions.
- Guaranteed (captive) markets.
- Price guarantees.
- Direct price support

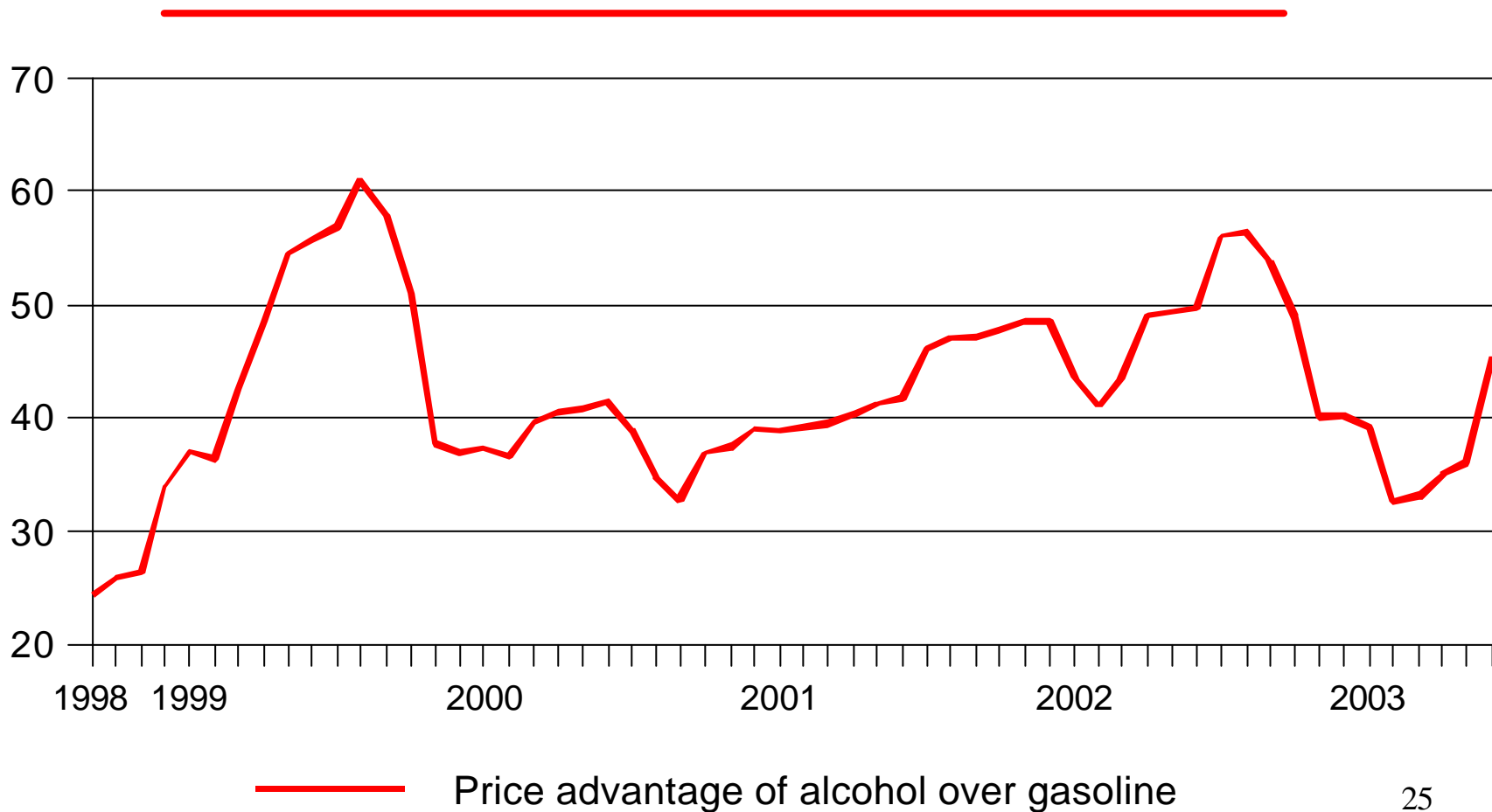
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Ethanol in Brazil



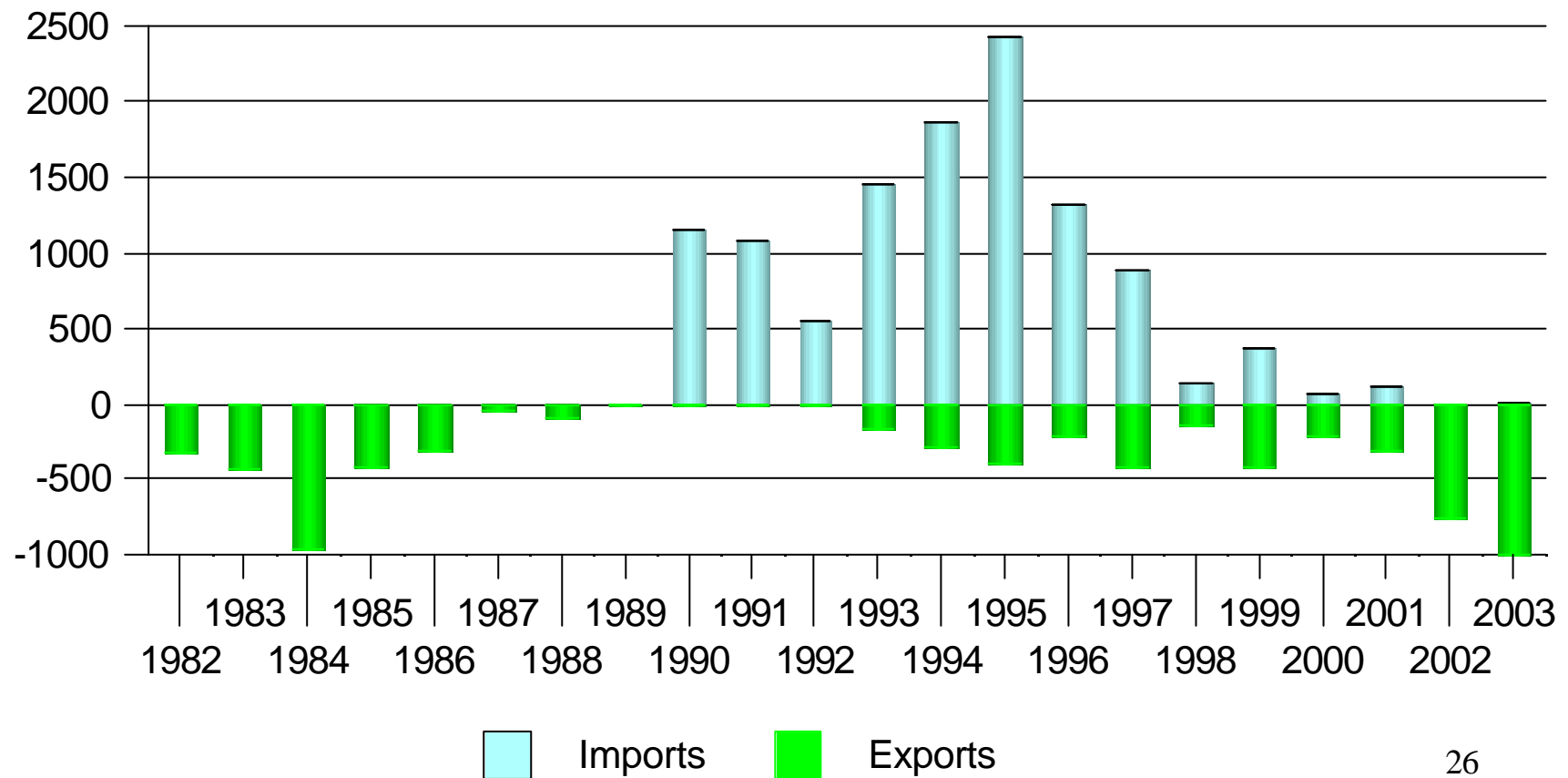
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Brazil – ethanol vs. gasoline economics



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Brazil's ethanol/methanol trade



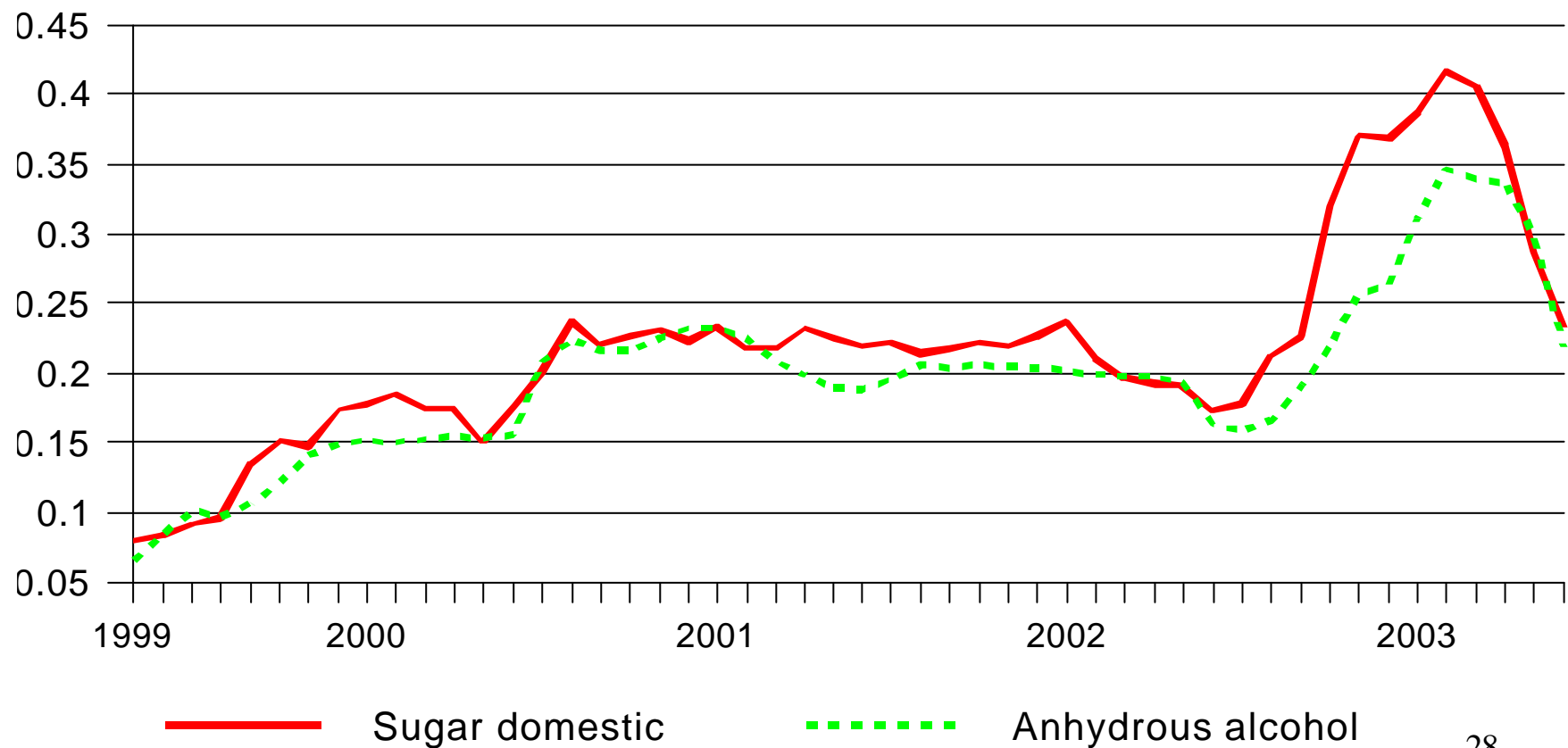
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Determinants of volatility in Brazil

- The weather: El Nino, La Nina.
- Sugar cane serves as raw material in two (four) markets:
 - Sugar (domestic and international)
 - Ethanol (domestic and international)

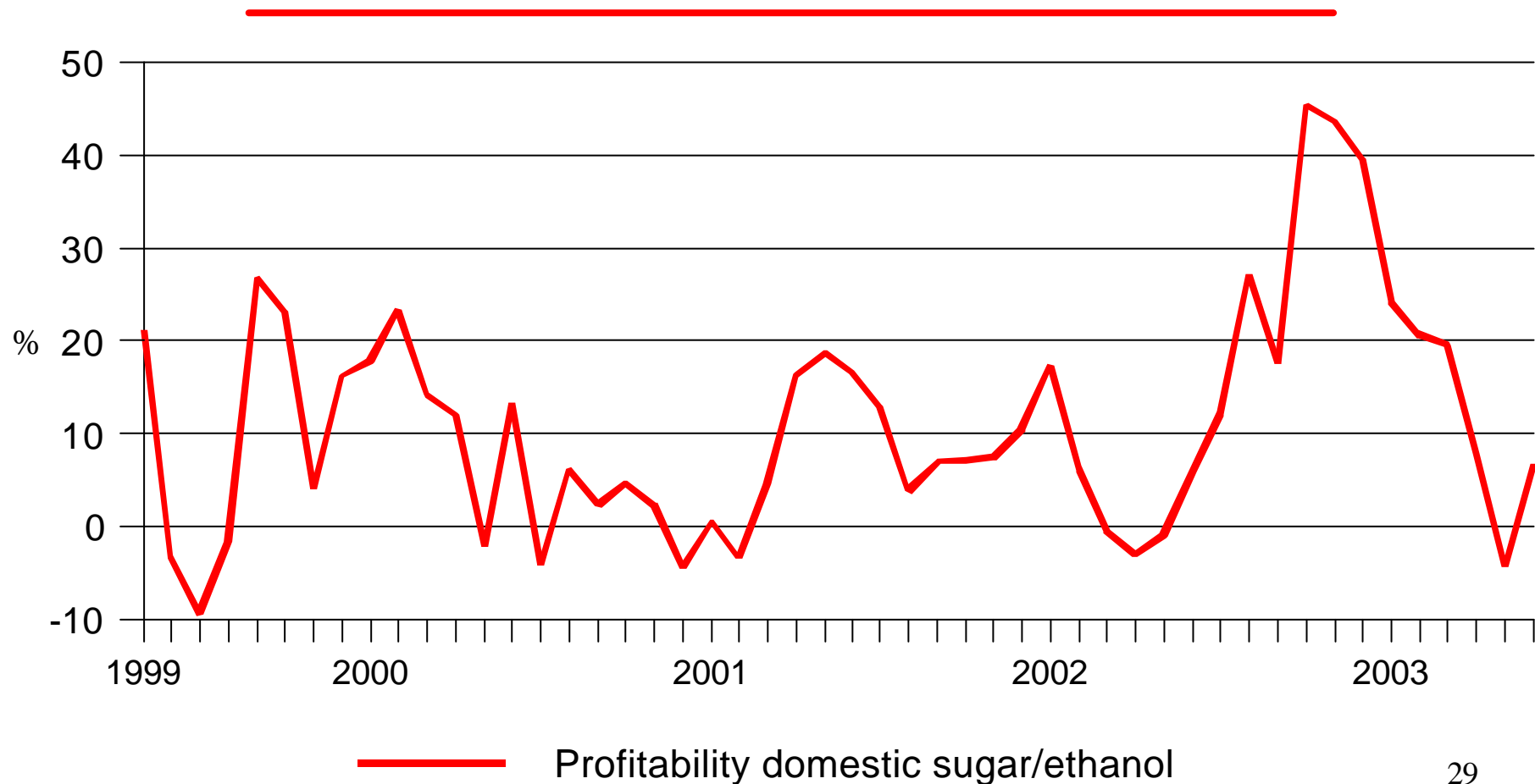
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Brazil – ethanol vs. sugar economics



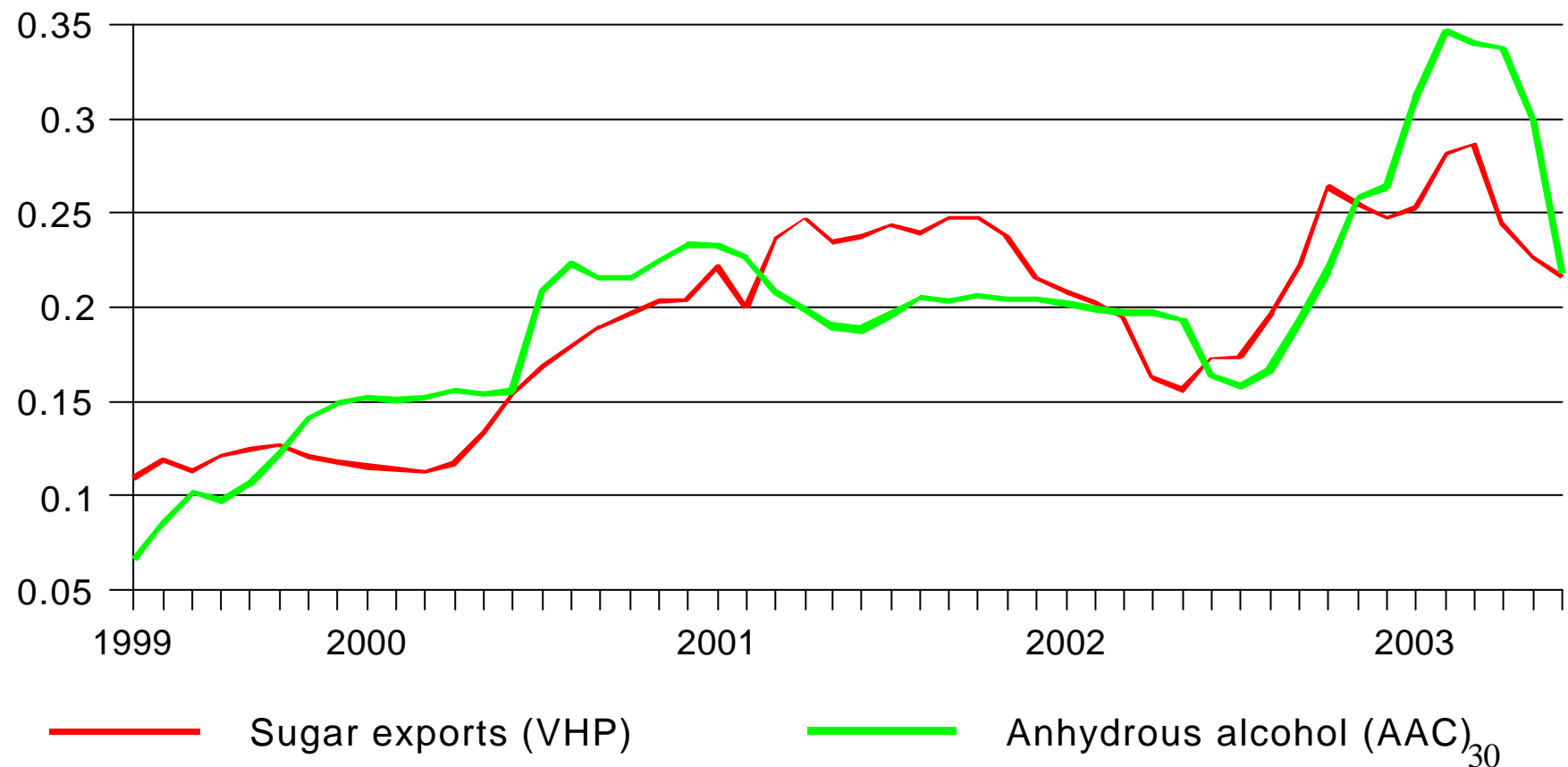
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Brazil – ethanol vs. sugar economics



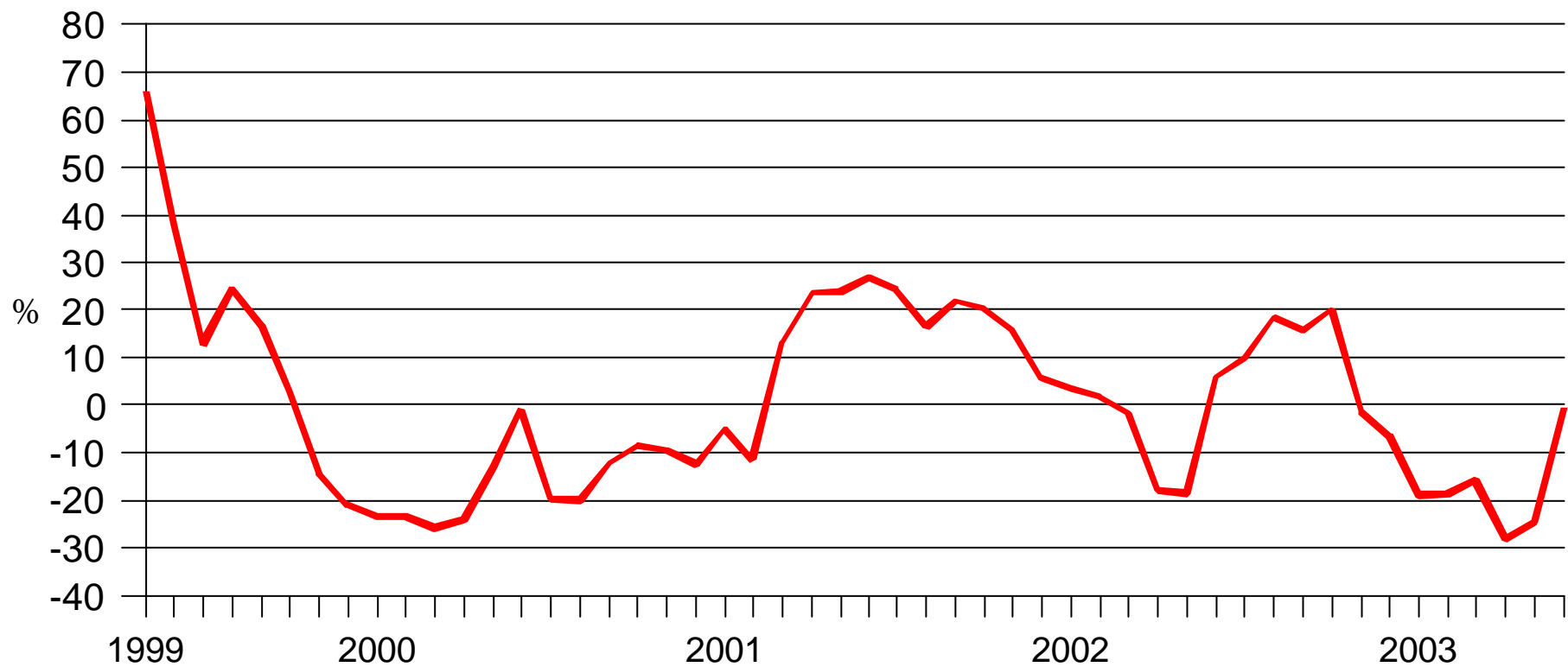
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Brazil – ethanol vs. sugar economics



World Fuel Ethanol

Brazil – ethanol vs. sugar economics



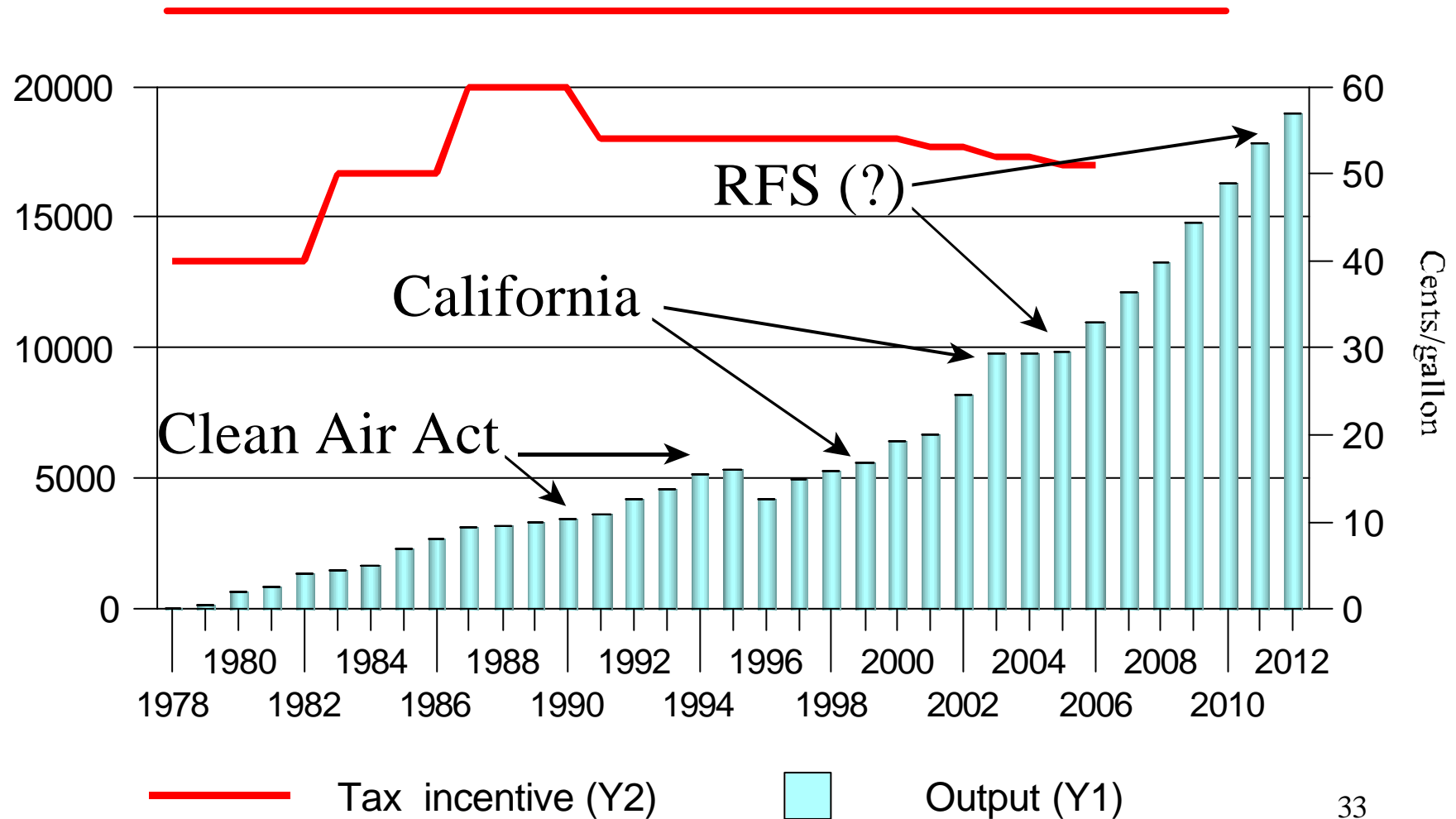
— Profitability sugar exports/ethanol

World Fuel Ethanol Remedies

- Spread cane growing over the country.
- Decouple ethanol from sugar production (dedicated ethanol-for-export plants).

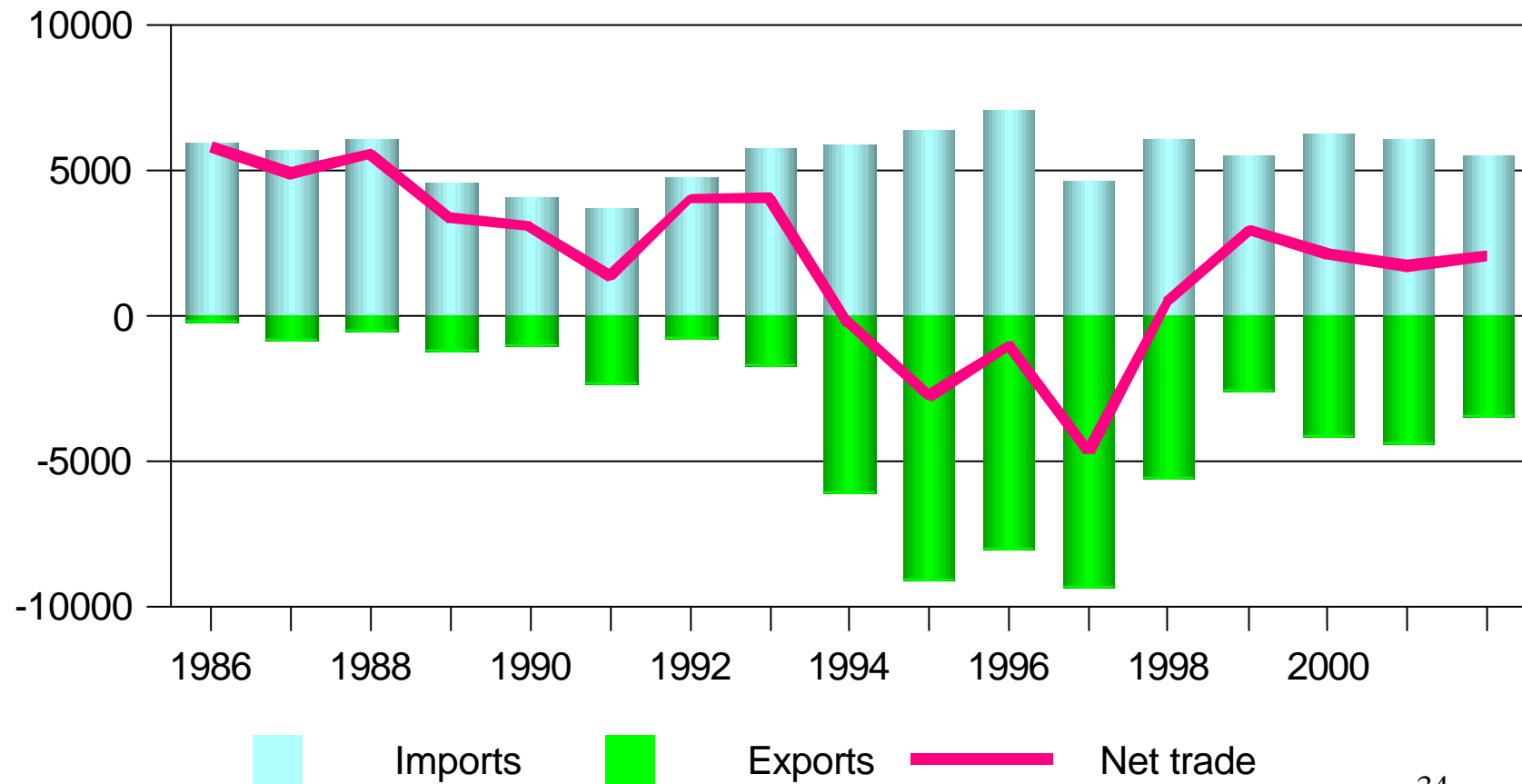
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US ethanol



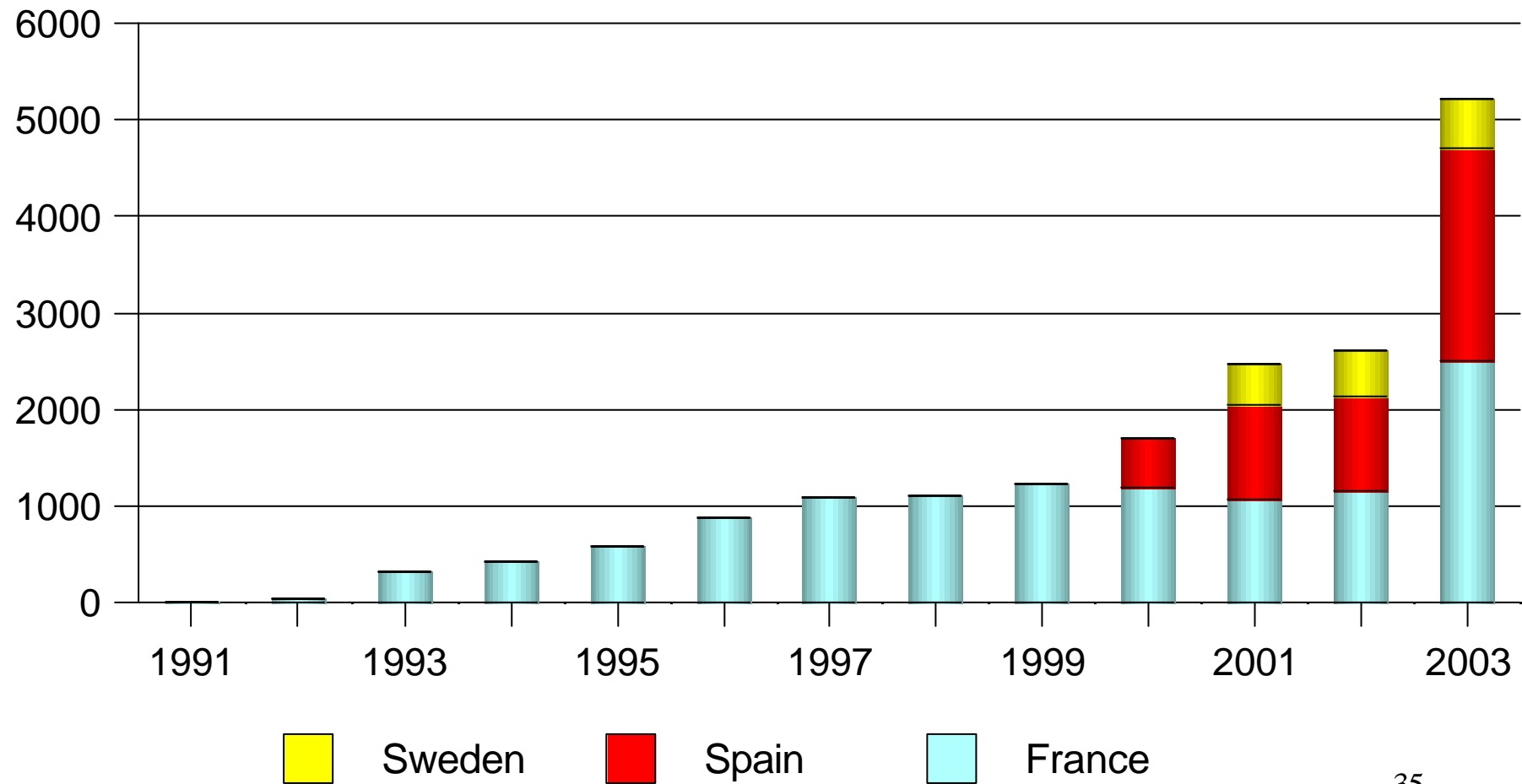
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Will high stocks boost US ethanol exports?



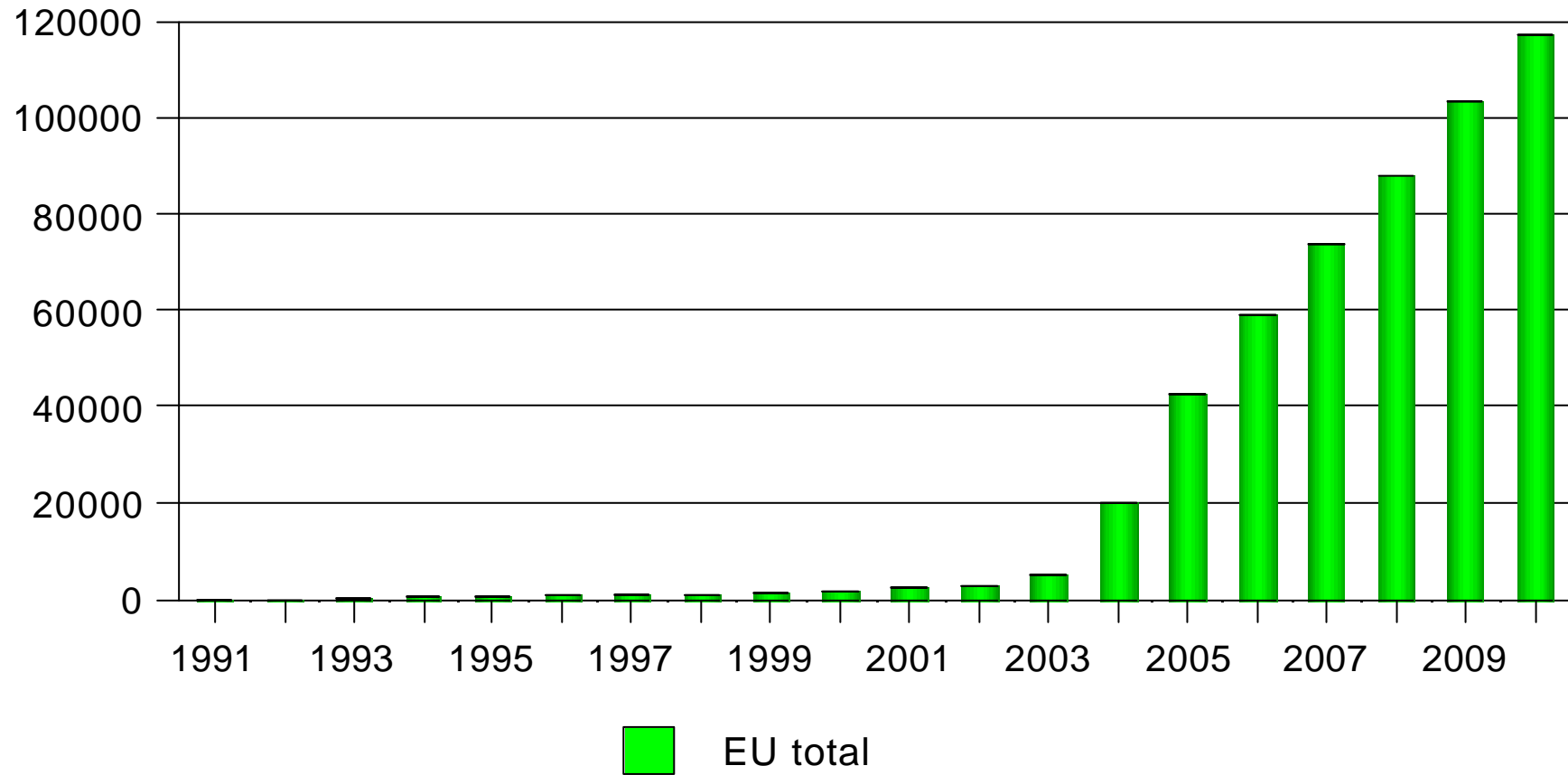
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The European Union



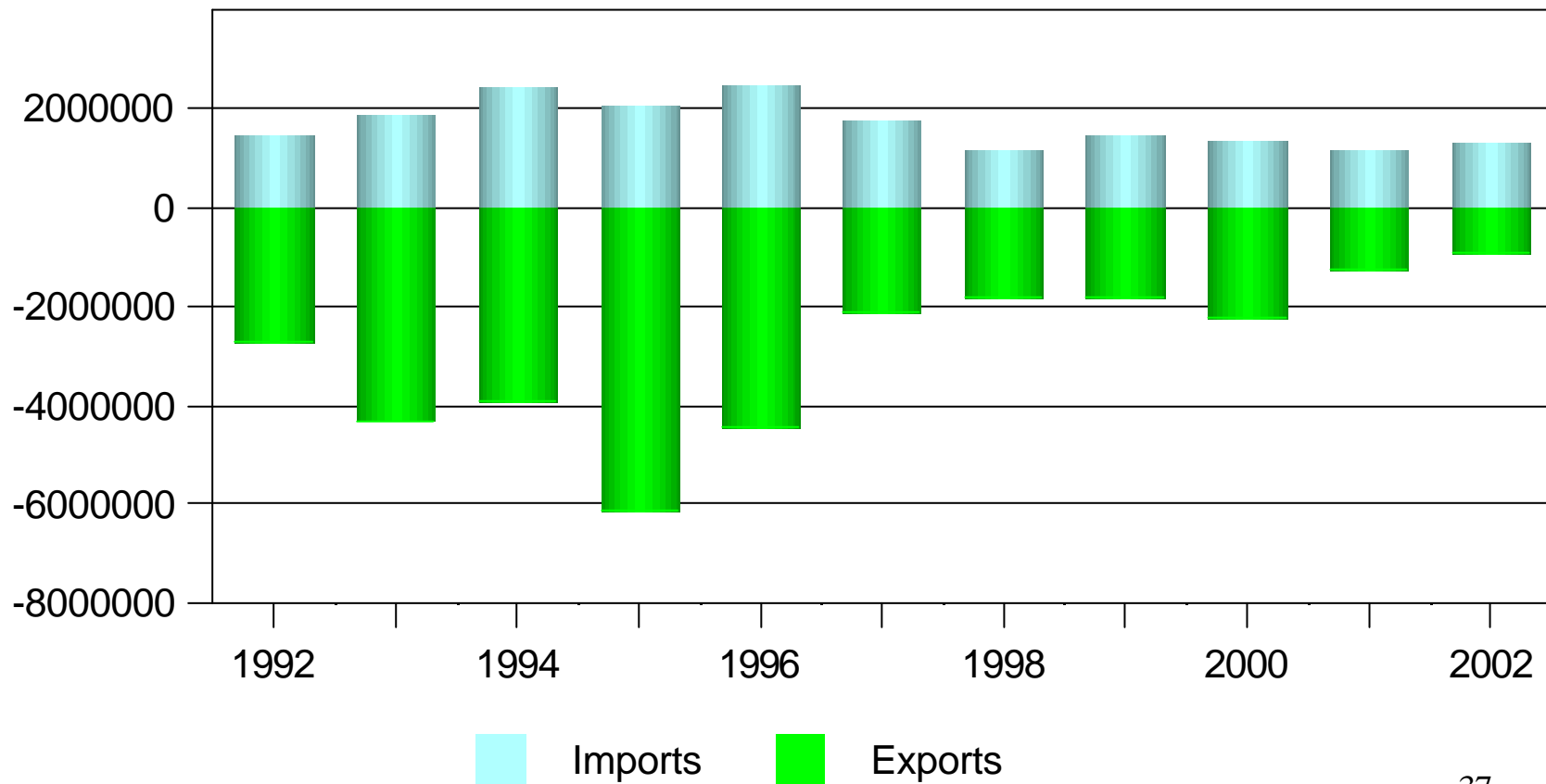
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The European Union



World Fuel Ethanol

EU to become net ethanol importer



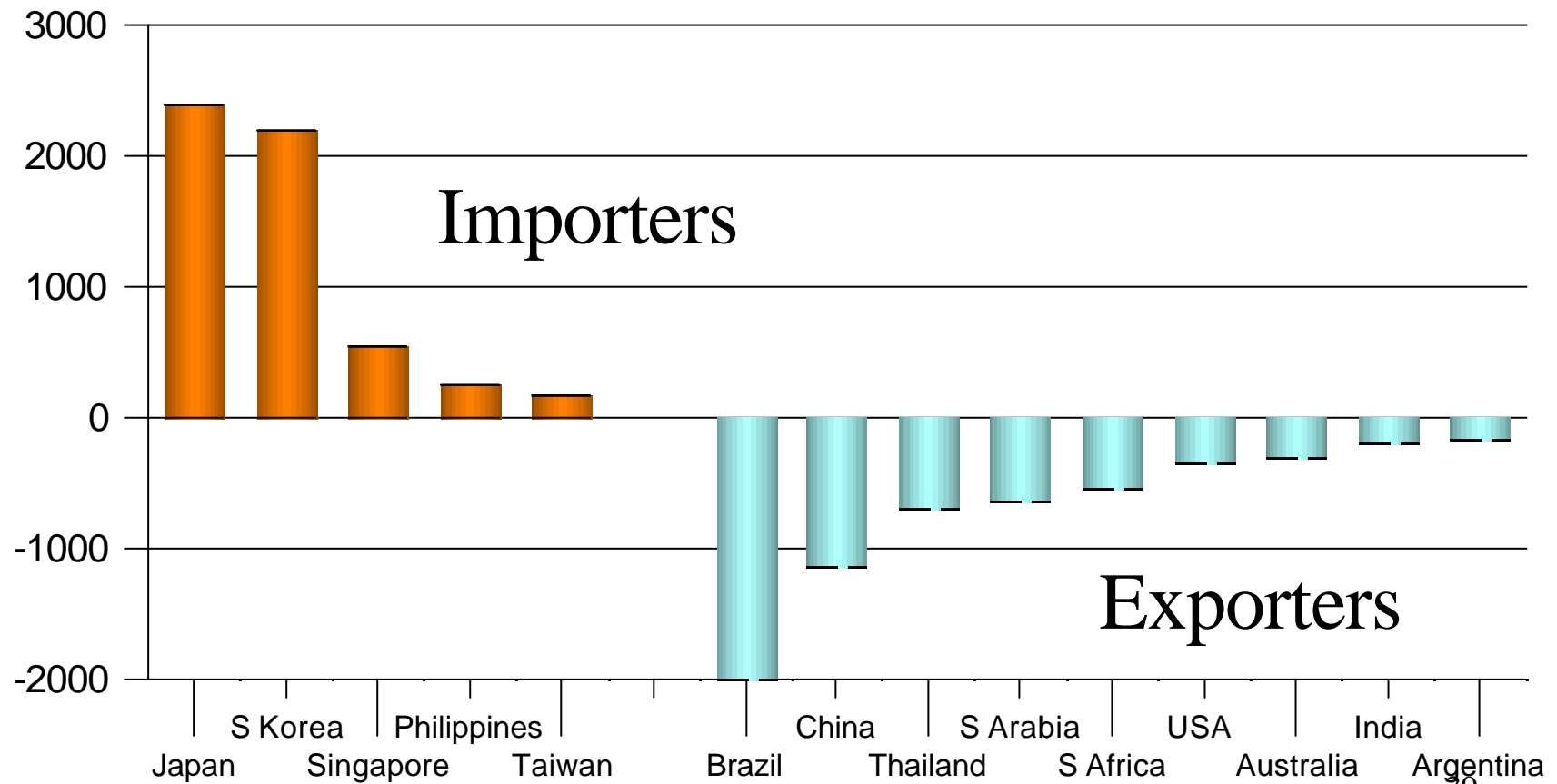
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Fuel ethanol in Asia/Pacific

- India: mandate, blending started 2003, country-wide blending seen in 2004.
- Thailand: tax reductions, investments subsidies.
- China: mandate in some regions.
- Australia: tax exemption, direct support.

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The 2002 supply/demand balance in Asia/Pacific



World Fuel Ethanol

Current suppliers in Asia/Pacific

- Current suppliers with potential
 - Brazil
 - Thailand
 - India
 - South Africa

World Fuel Ethanol

Future suppliers in Asia/Pacific

- Future suppliers with potential
 - Peru
 - Central America
 - Colombia

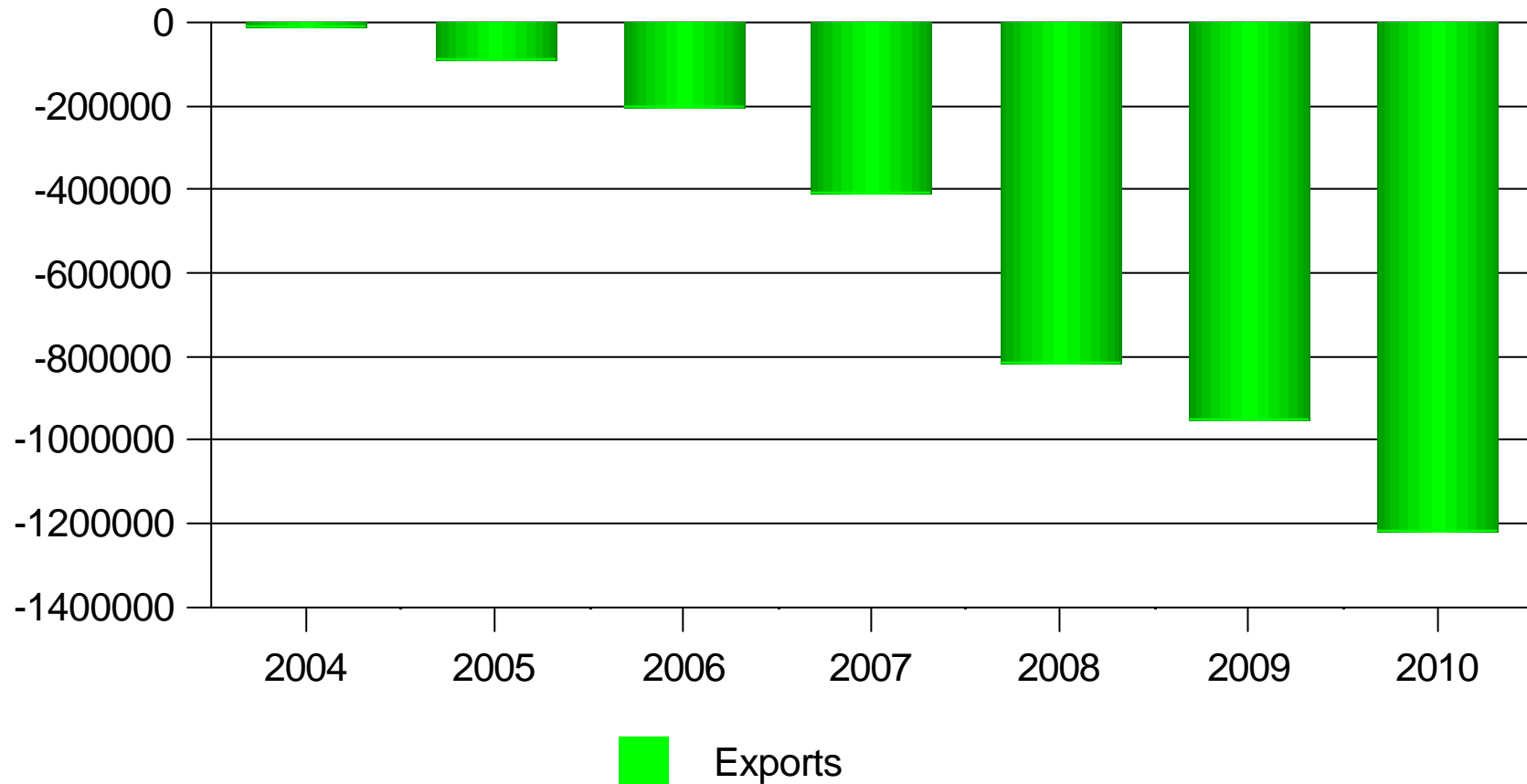
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The Mega-Project in Peru

- Domestic and international effects
 - Introduce E-10
 - Replace MTBE/lead
 - Fight coca (cocaine)
 - Export to the US under Andean Pact
 - Export to Japan

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Export potential under the Mega-Project



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Central America

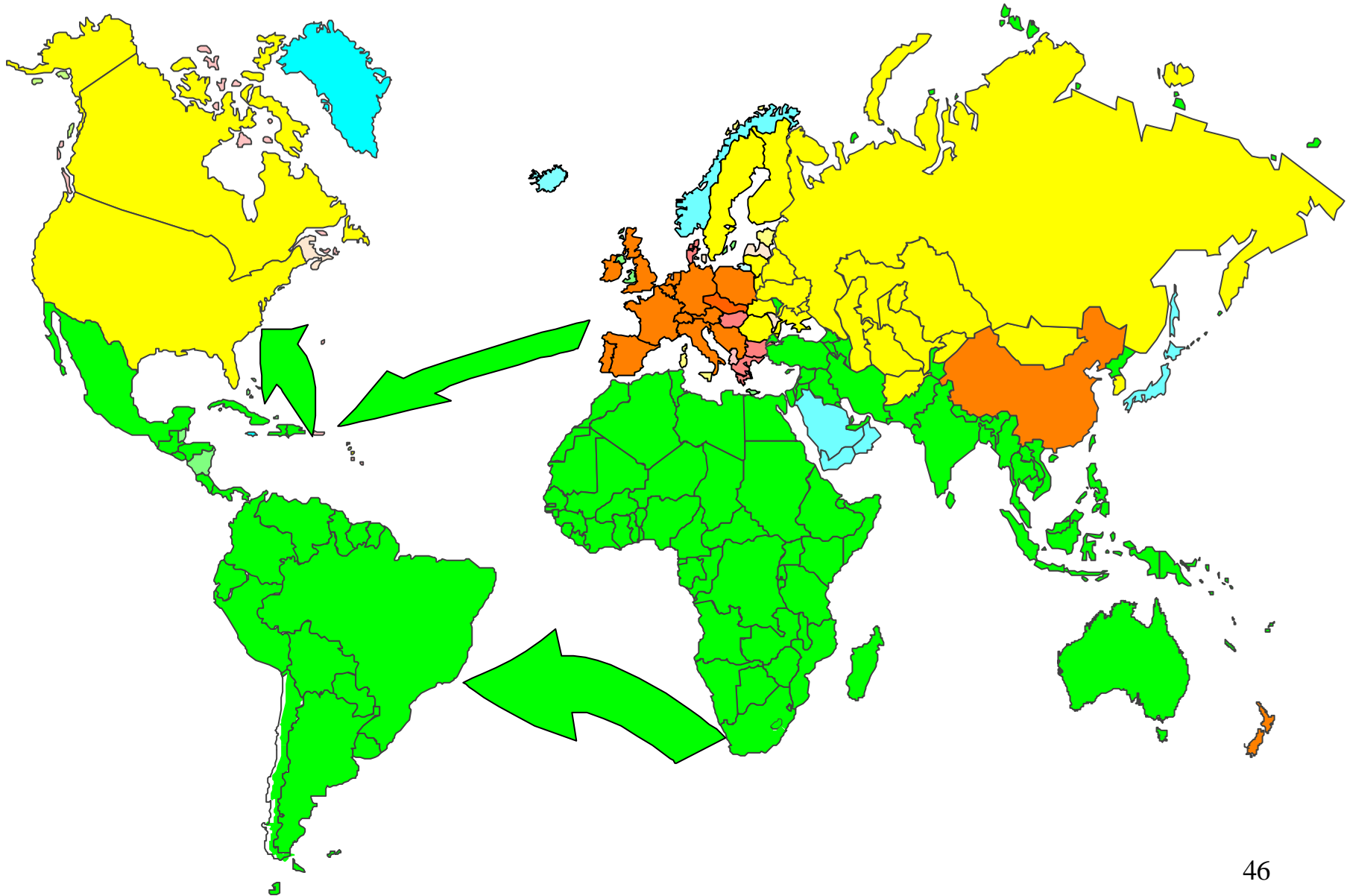
- Domestic and international effects
 - Introduce E-10
 - Replace MTBE/lead
 - Provide alternative outlet for sugar cane
 - Export to the US under CBI
 - Export to Japan (?)

World Fuel Ethanol

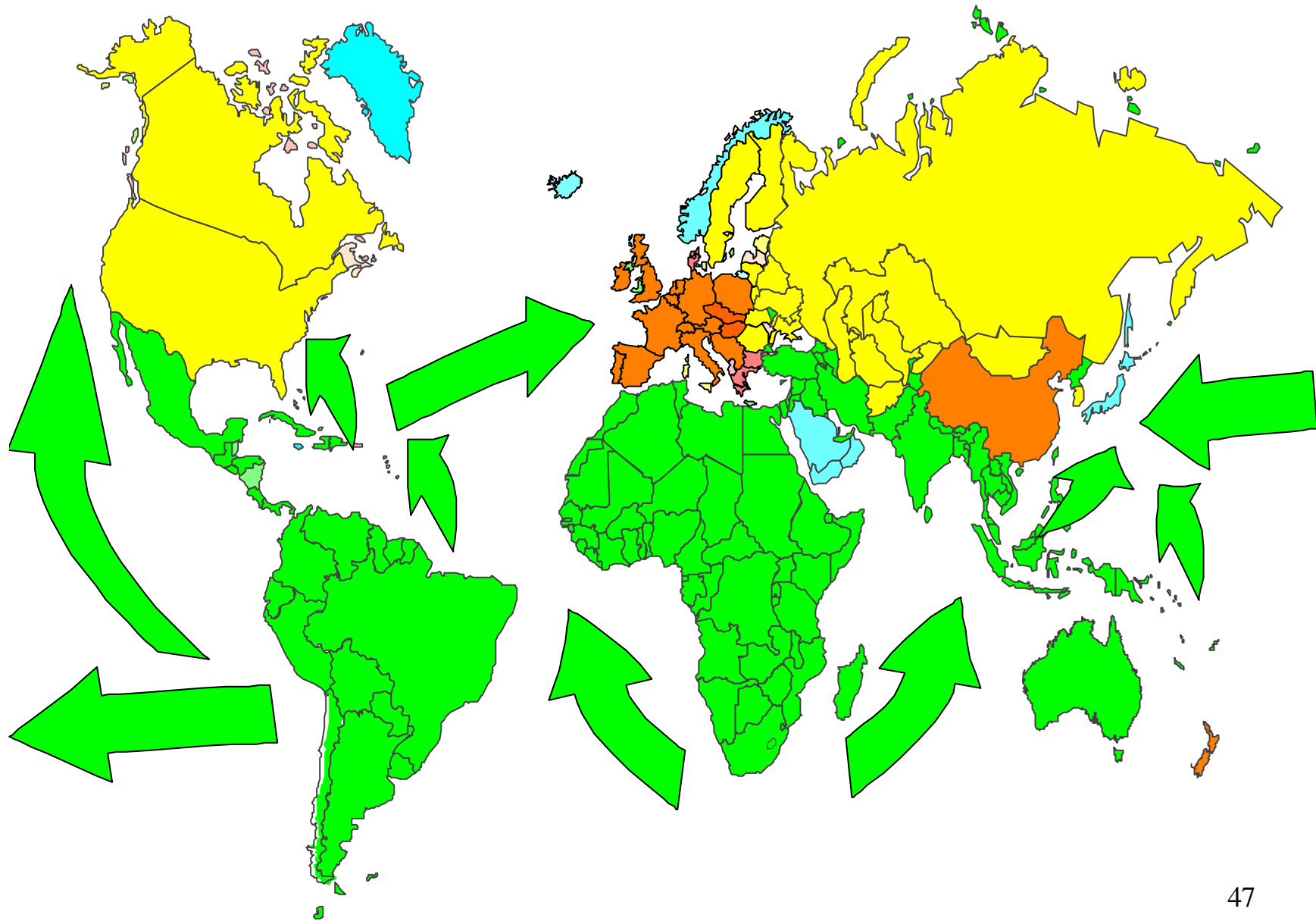
Colombia

- Domestic and international effects
 - Introduce E-10
 - Replace MTBE/lead
 - Exports ?

World Trade in Fuel Ethanol 1990s

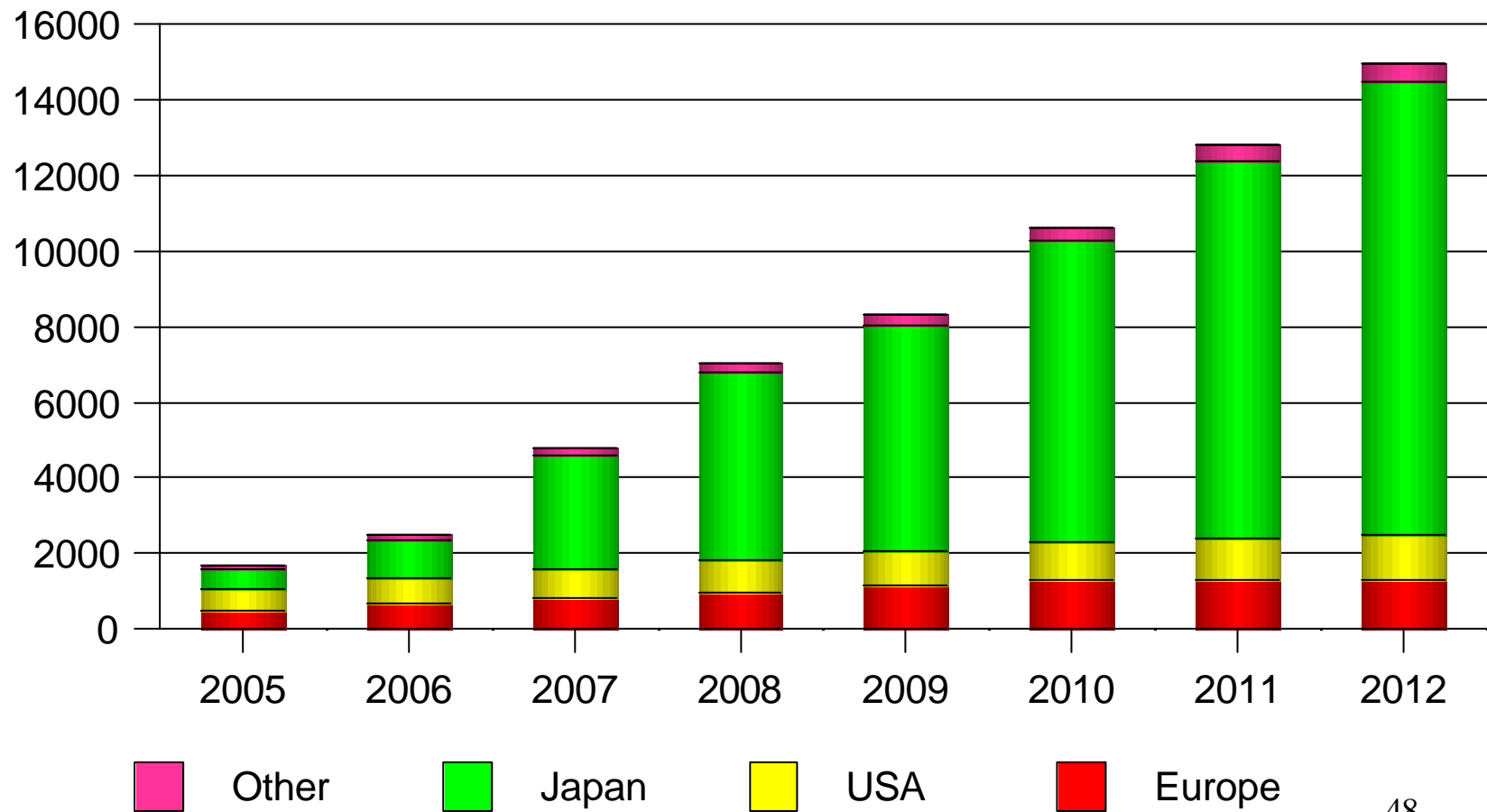


World Trade in Fuel Ethanol in the Future



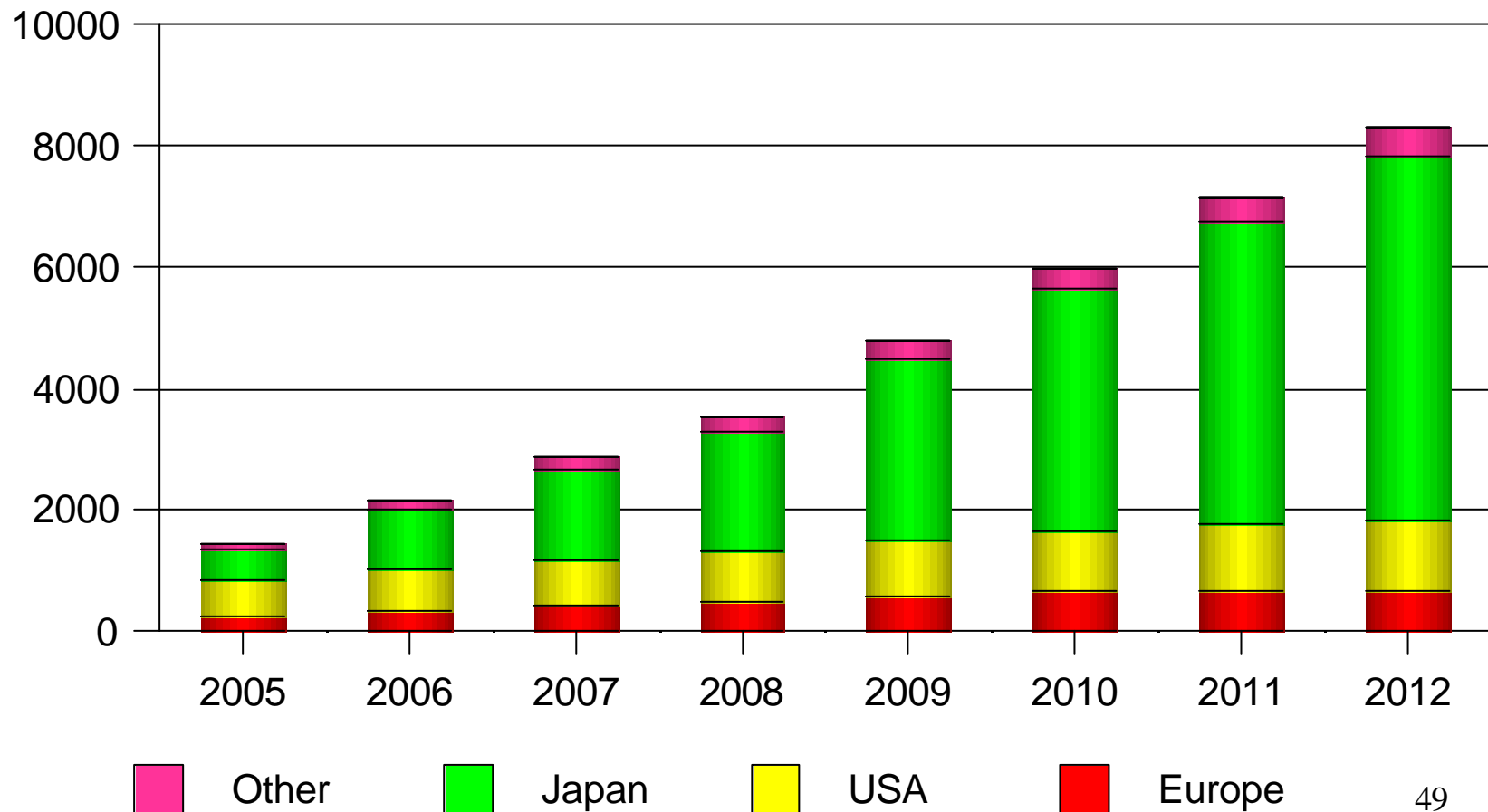
World Fuel Ethanol Imports

By country (very optimistic scenario)

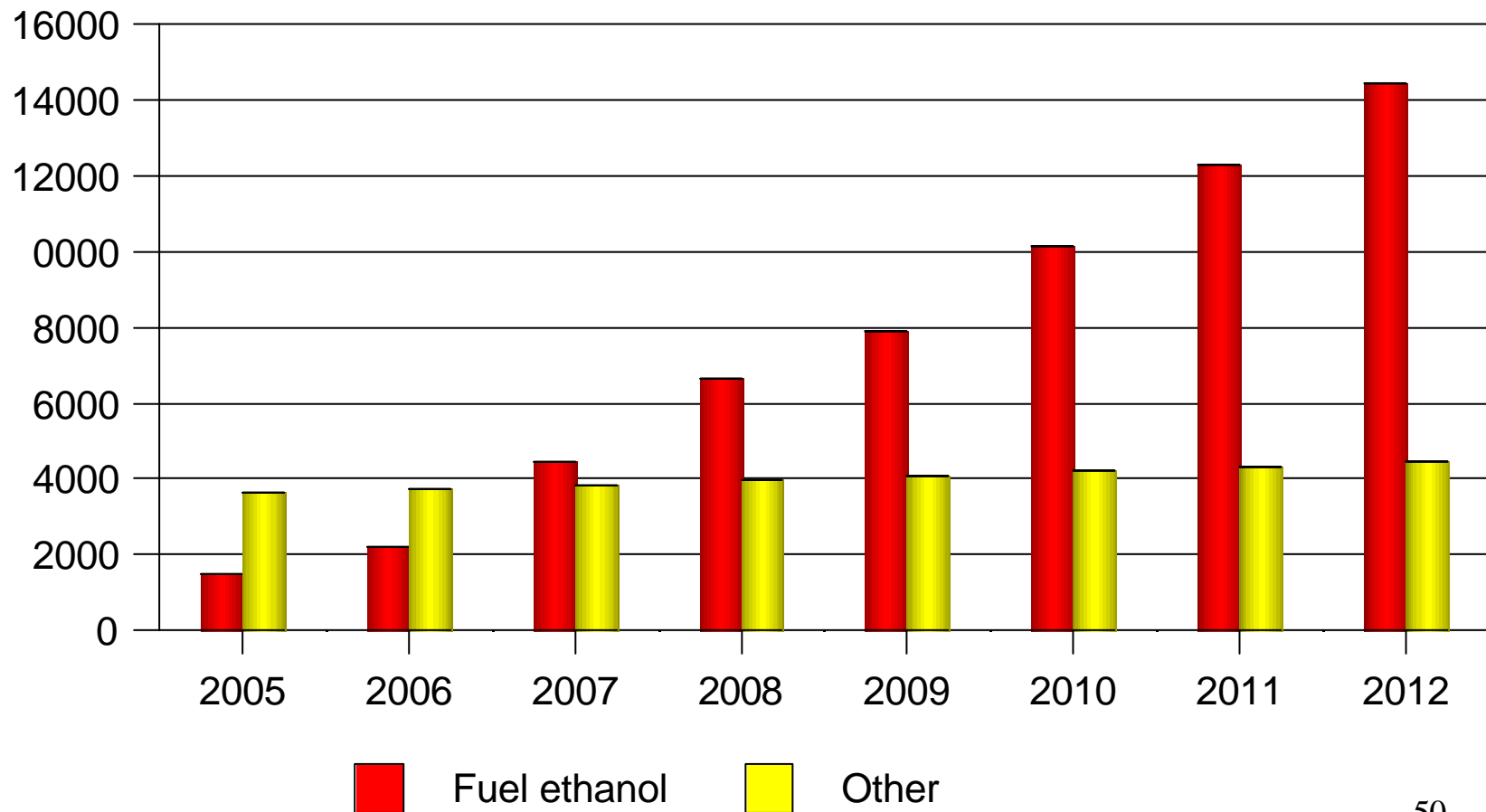


World Fuel Ethanol Imports

By country (optimistic scenario)

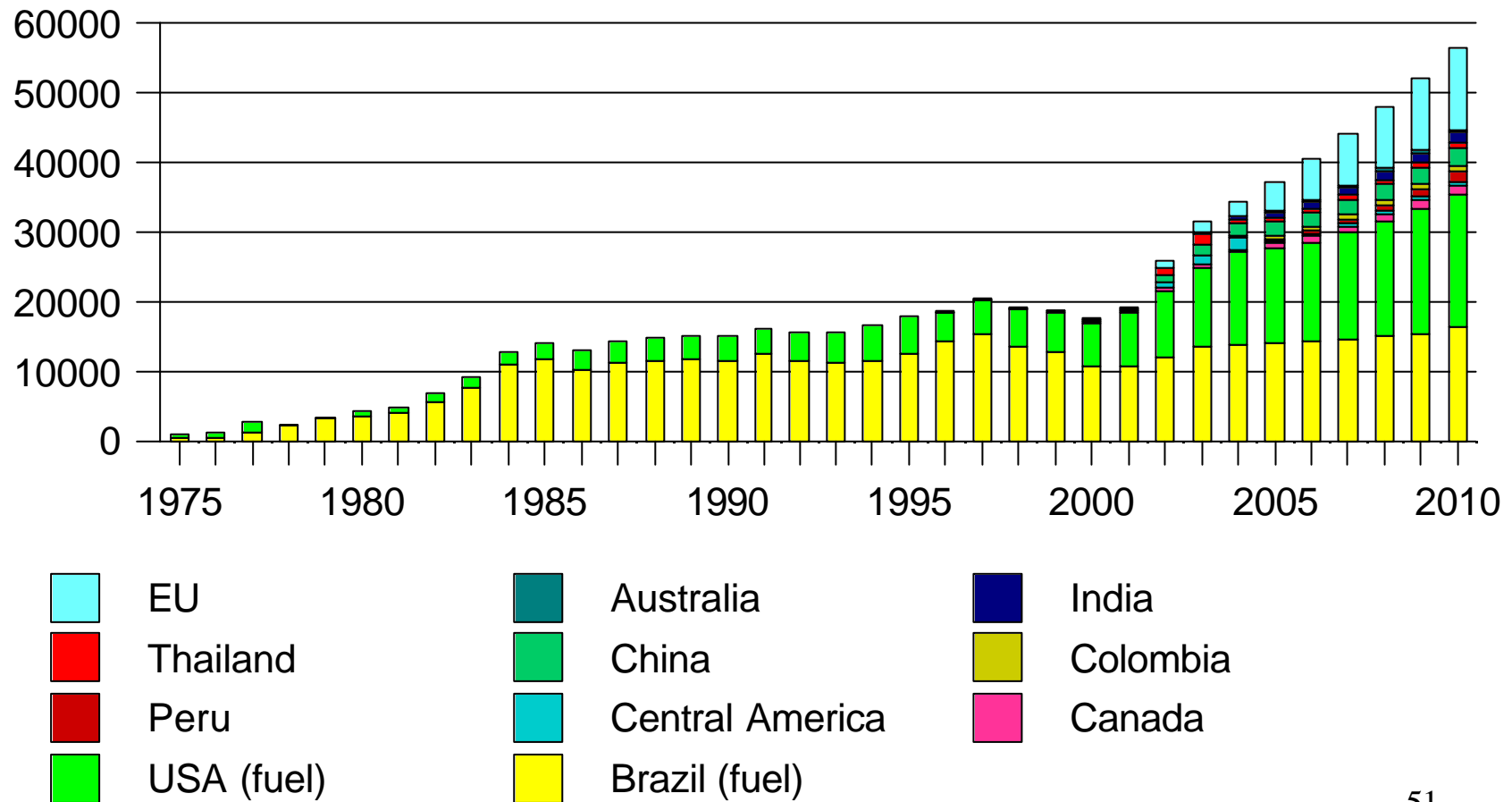


World Fuel Ethanol Imports vs. beverage and industrial ethanol trade



World Fuel Ethanol Production

By country



World Fuel Ethanol

Conclusions

- World production will continue to grow strongly
- Trade will grow as well but pace will depend on
 - The sugar-alcohol economics
 - New investments in origins
 - Establishment of a viable trading system (futures)
 - Solution of the subsidy issue
- Overall outlook is very bright