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Long Term Energy Scenarios

Prague,
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2003

Long Term Scenarios for Energy Markets

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Structure

1. Background:
 - ▶ why?
 - ▶ research questions regarding energy markets
2. Four scenarios:
 - ▶ what are general characteristics?
 - ▶ driving factors behind energy markets
 - ▶ method
3. Scenario results:
 - ▶ Oil market
 - ▶ European natural gas market
 - ▶ European electricity market
 - ▶ Emissions and climate policy
4. Conclusions

1. Background: *why new scenarios?*

1. Ultimate goal is to discuss strategic policy issues in Netherlands
2. therefore, we need long-term scenarios of the Netherlands
3. first step is establishing international scenarios
4. lot of international scenarios exist (IEA, EU, IPCC, Shell, etc.), but we want:
 - to explore the future in stead of extrapolate the past
 - more focus on Europe
 - to look up to 2040

1. Background: *Questions to answer*

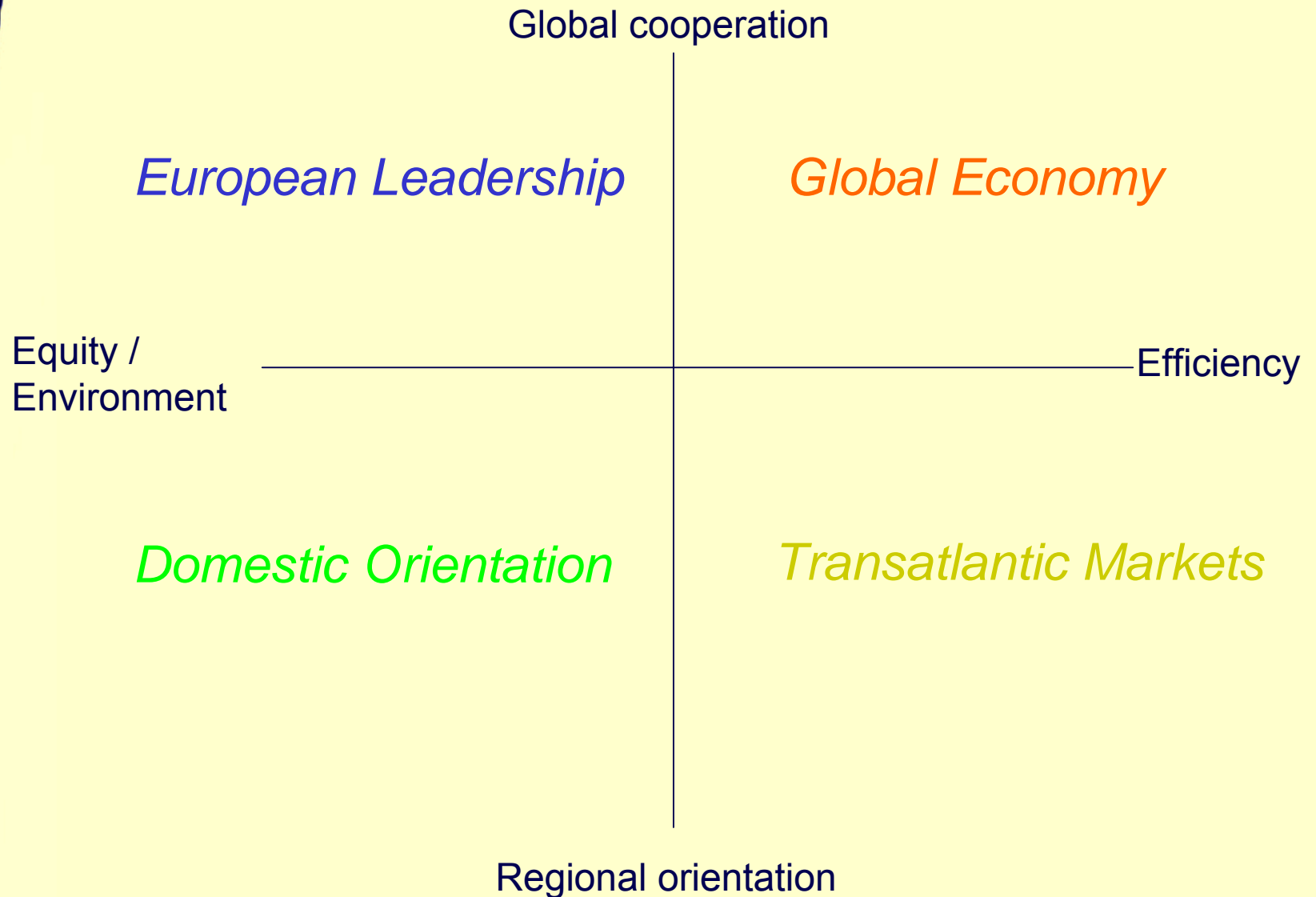
1. Growth of energy use (global, Europe)?
2. Prices of oil, gas, coal and electricity?
3. Emissions of CO₂ and carbon-tax needed to reach stabilisation?
4. Import dependency of Europe?

2. Four scenarios: *general characteristics*

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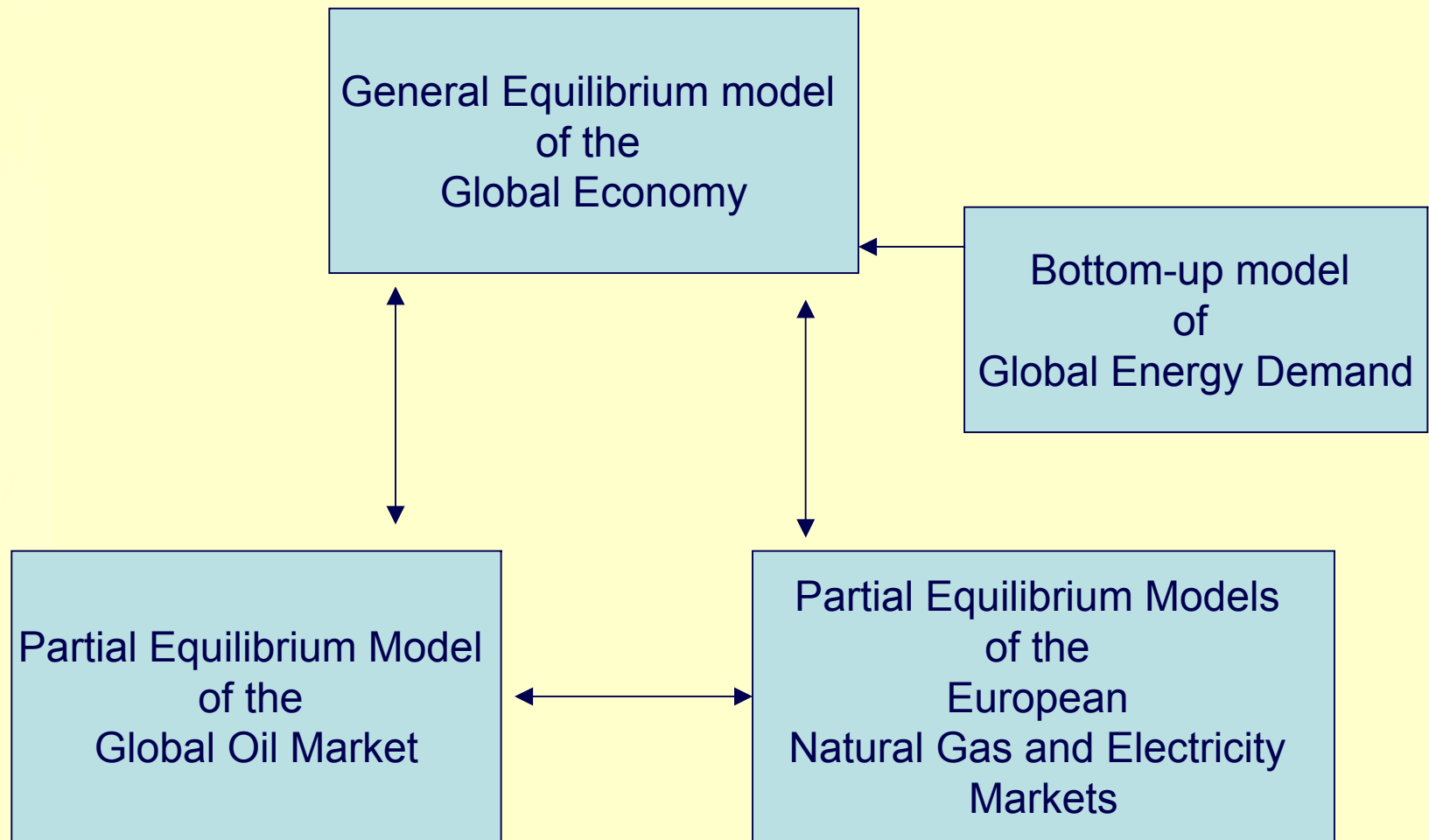
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2. Four scenarios: *driving forces behind energy*

- **European Leadership:**
 - moderate growth, abundant supply of oil and gas, fierce environmental policy
- **Transatlantic Markets:**
 - moderate growth, limited supply of oil and gas, fierce competition, limited environmental policy
- **Domestic Orientation:**
 - low growth, limited supply of oil and gas, moderate competition, local environmental policies
- **Global Economy:**
 - high growth, abundant supply of oil and gas, fierce competition, limited environmental policy

2. Four scenarios: *method*



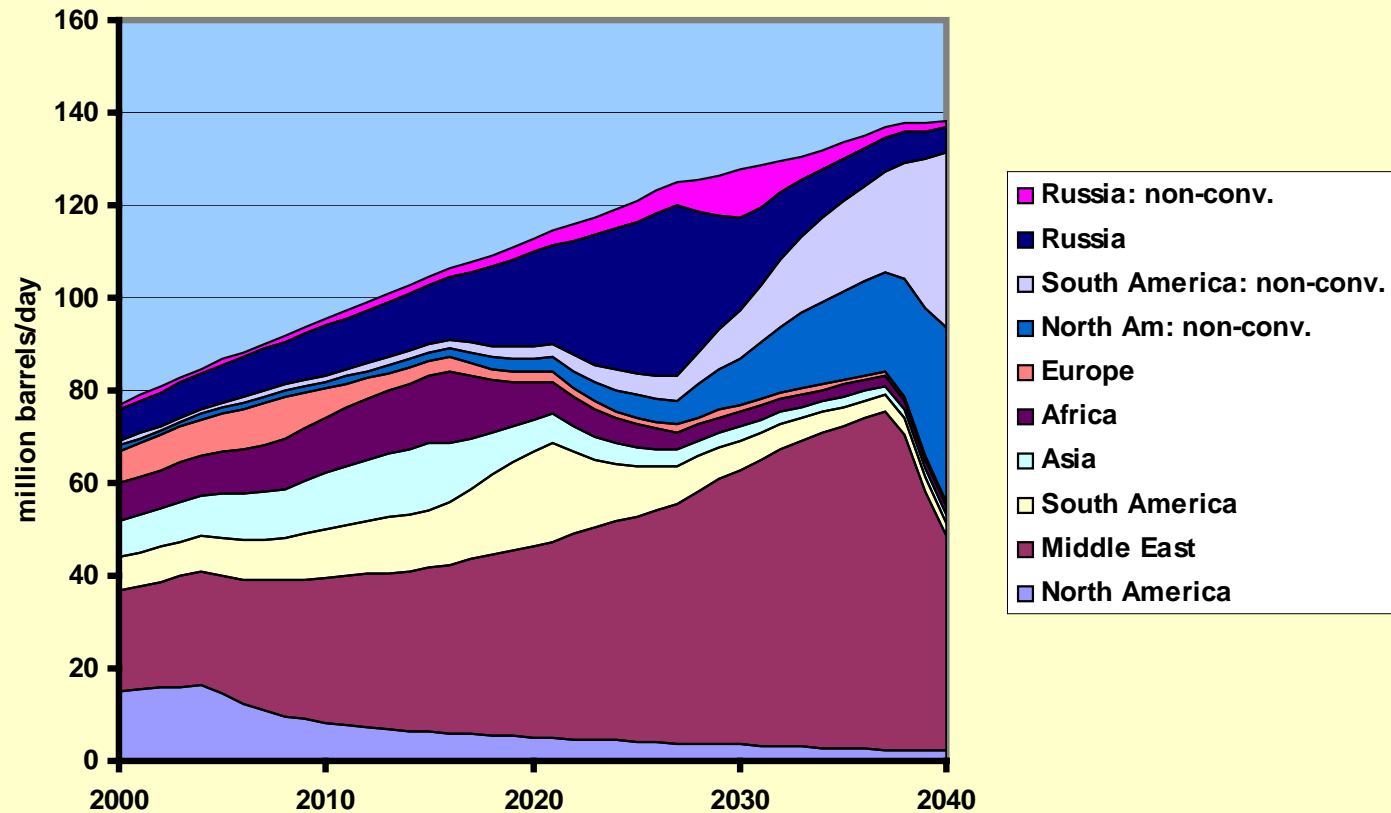
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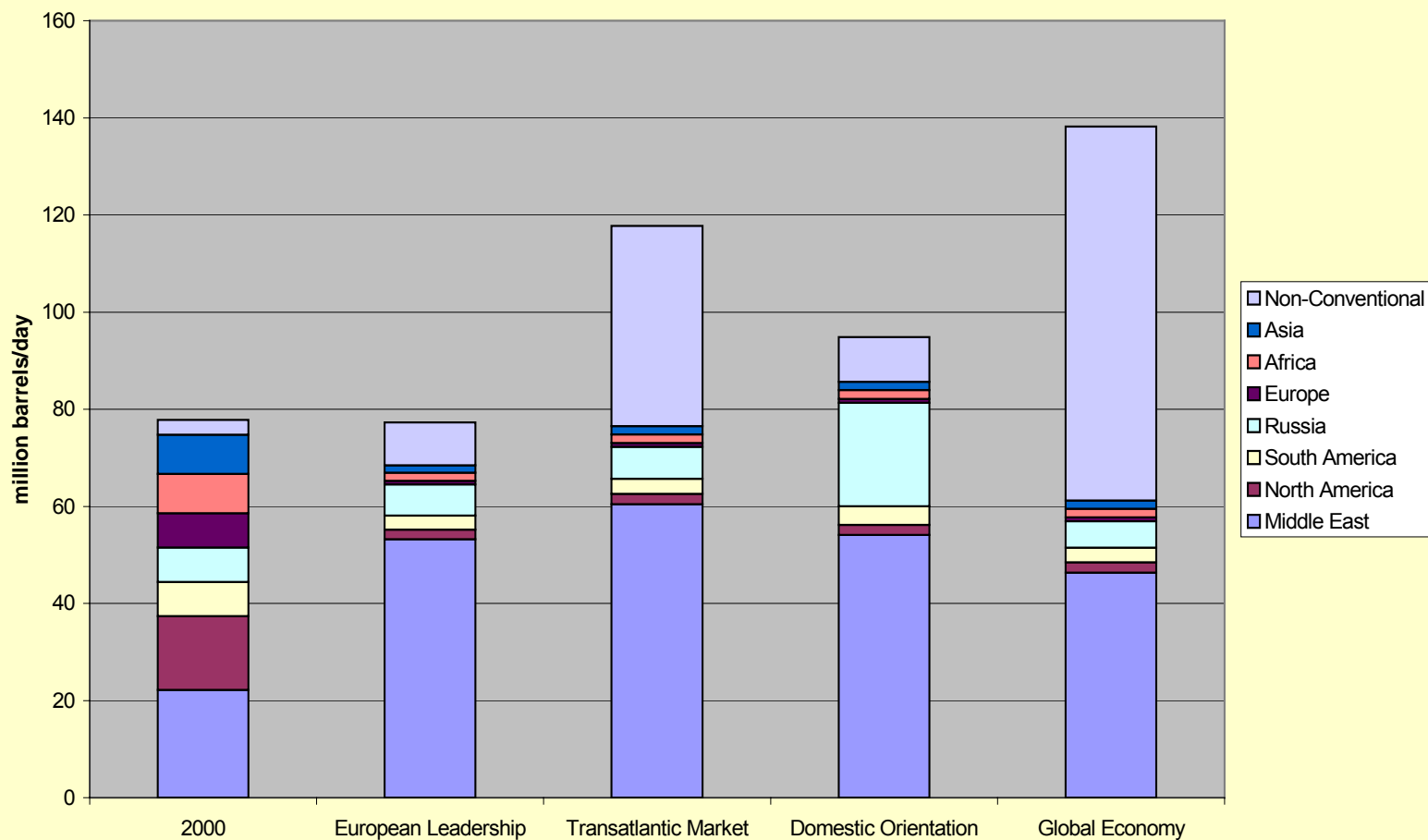
3. Scenario results: Oil market

Production of oil in Global Economy



3. Scenario results: Oil market

Production of oil in all scenarios



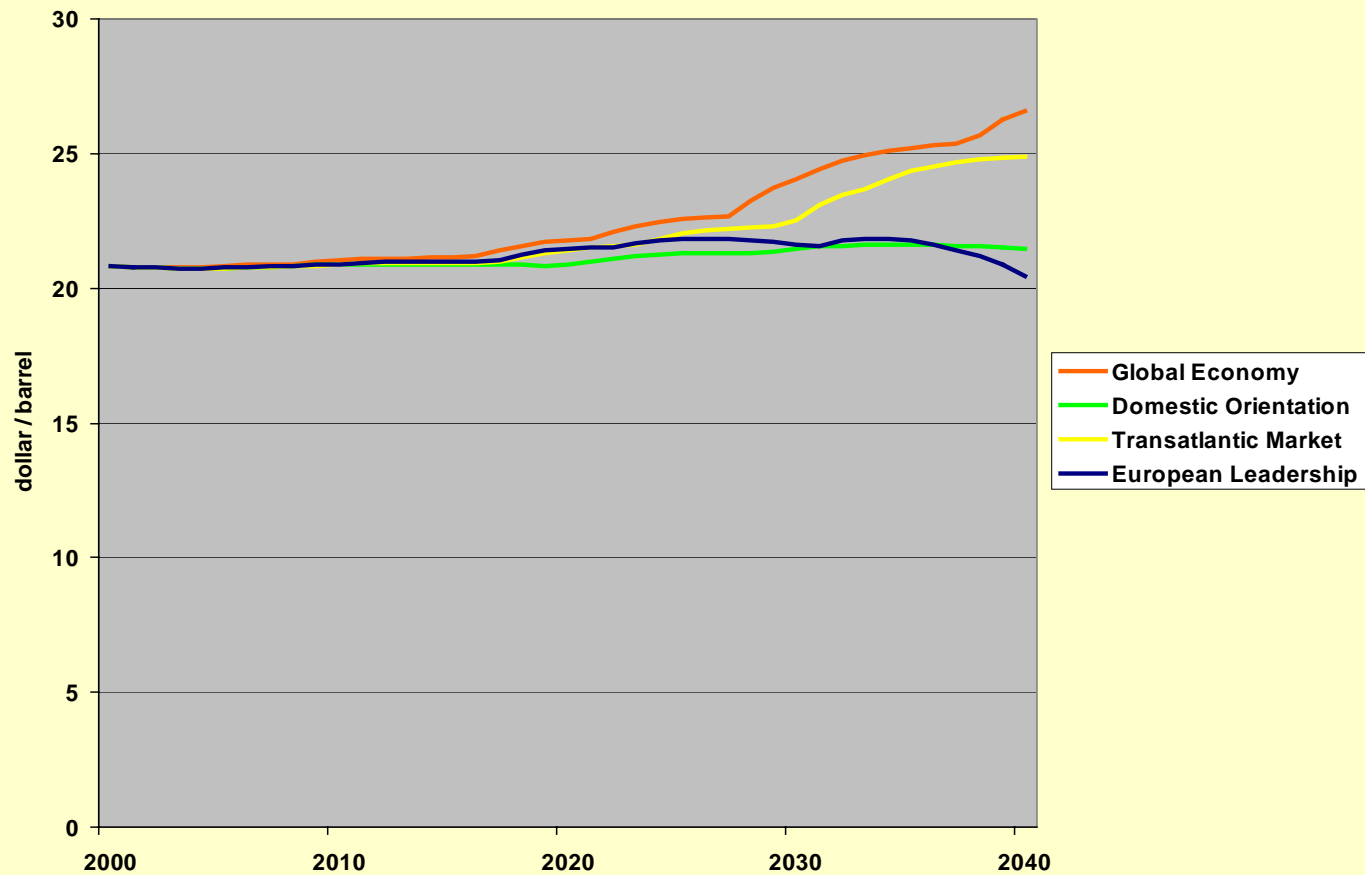
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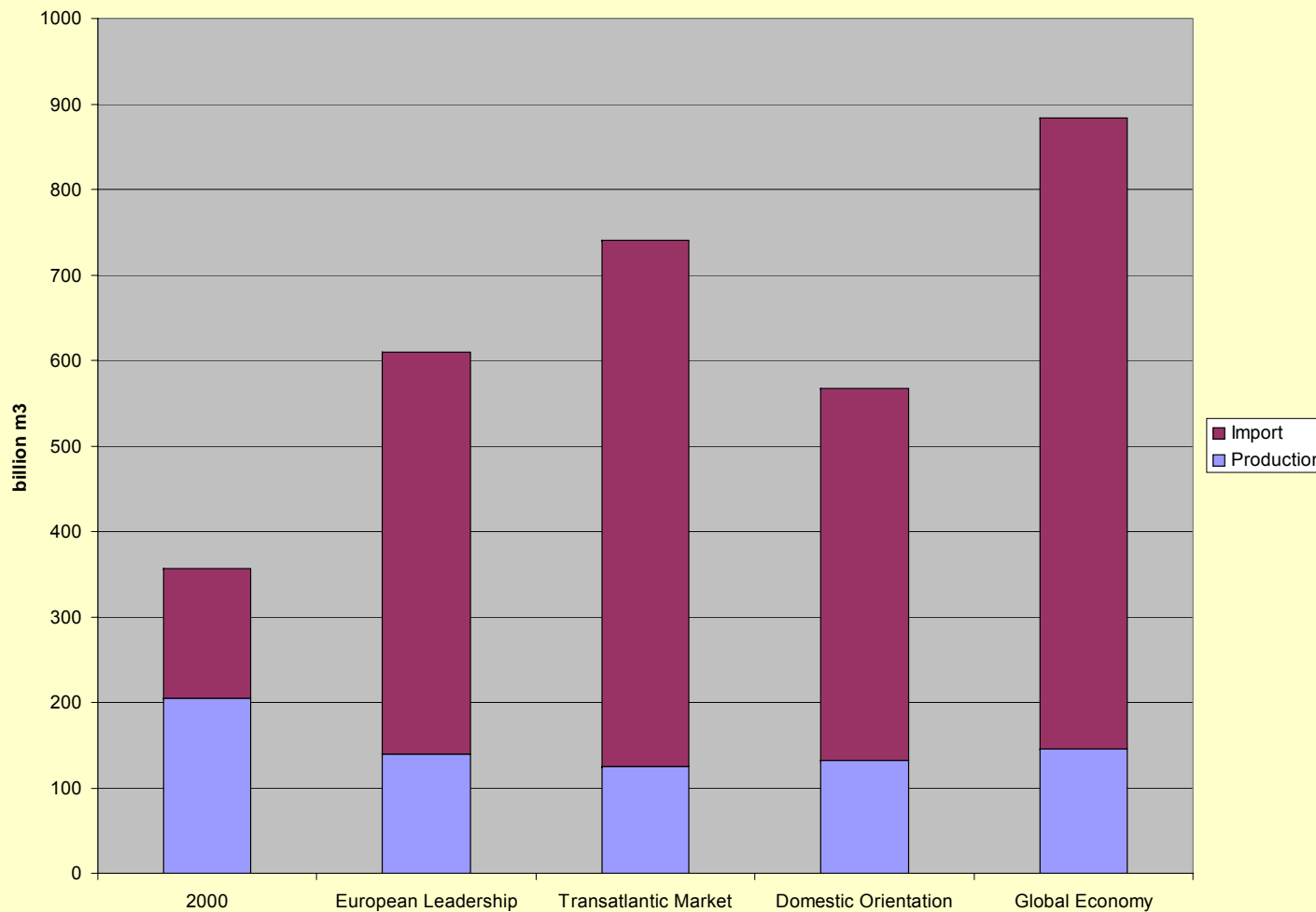
3. Scenario results: Oil market

Price of oil



3. Scenario results: European gas market

Consumption by origin



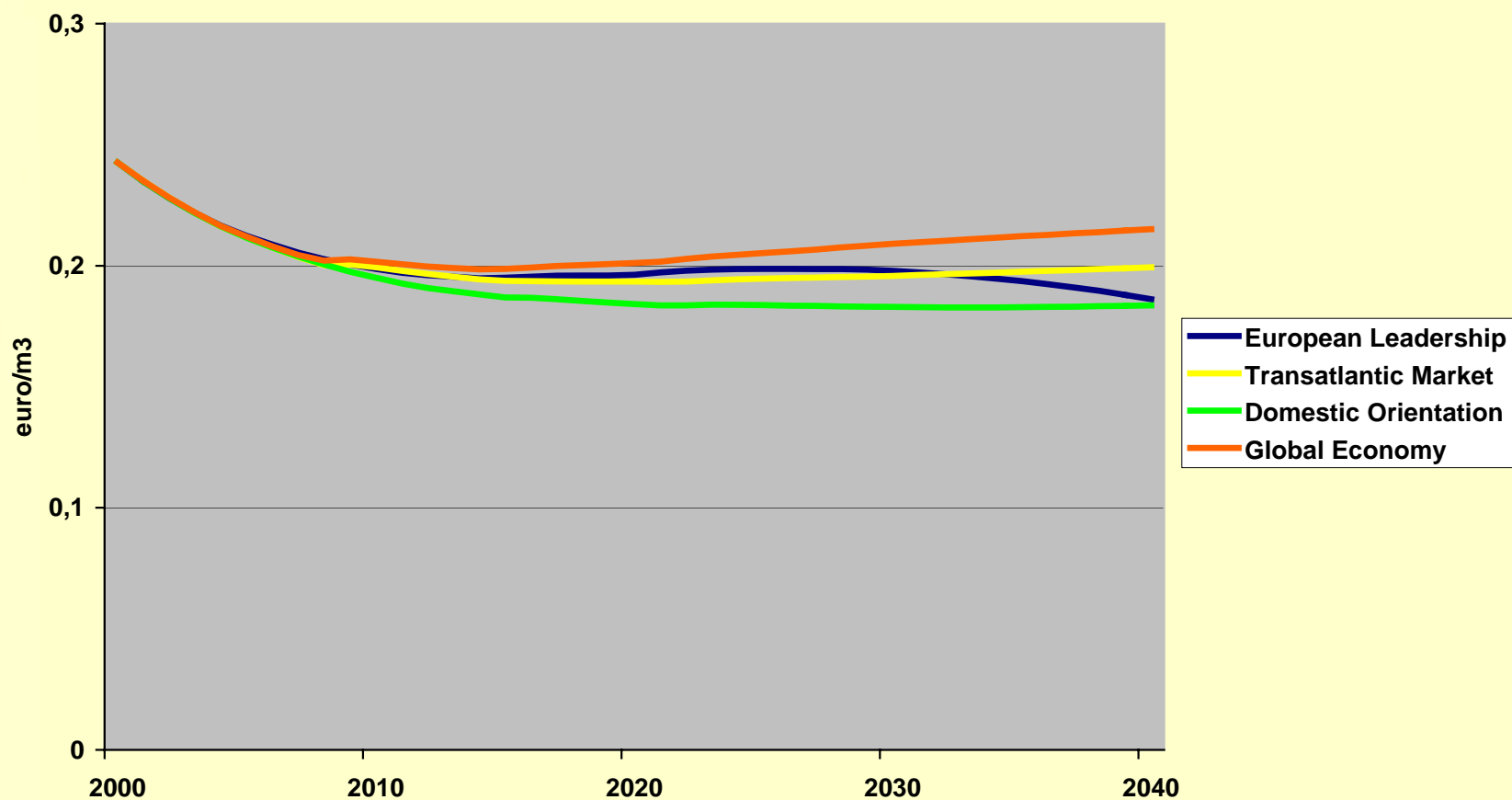
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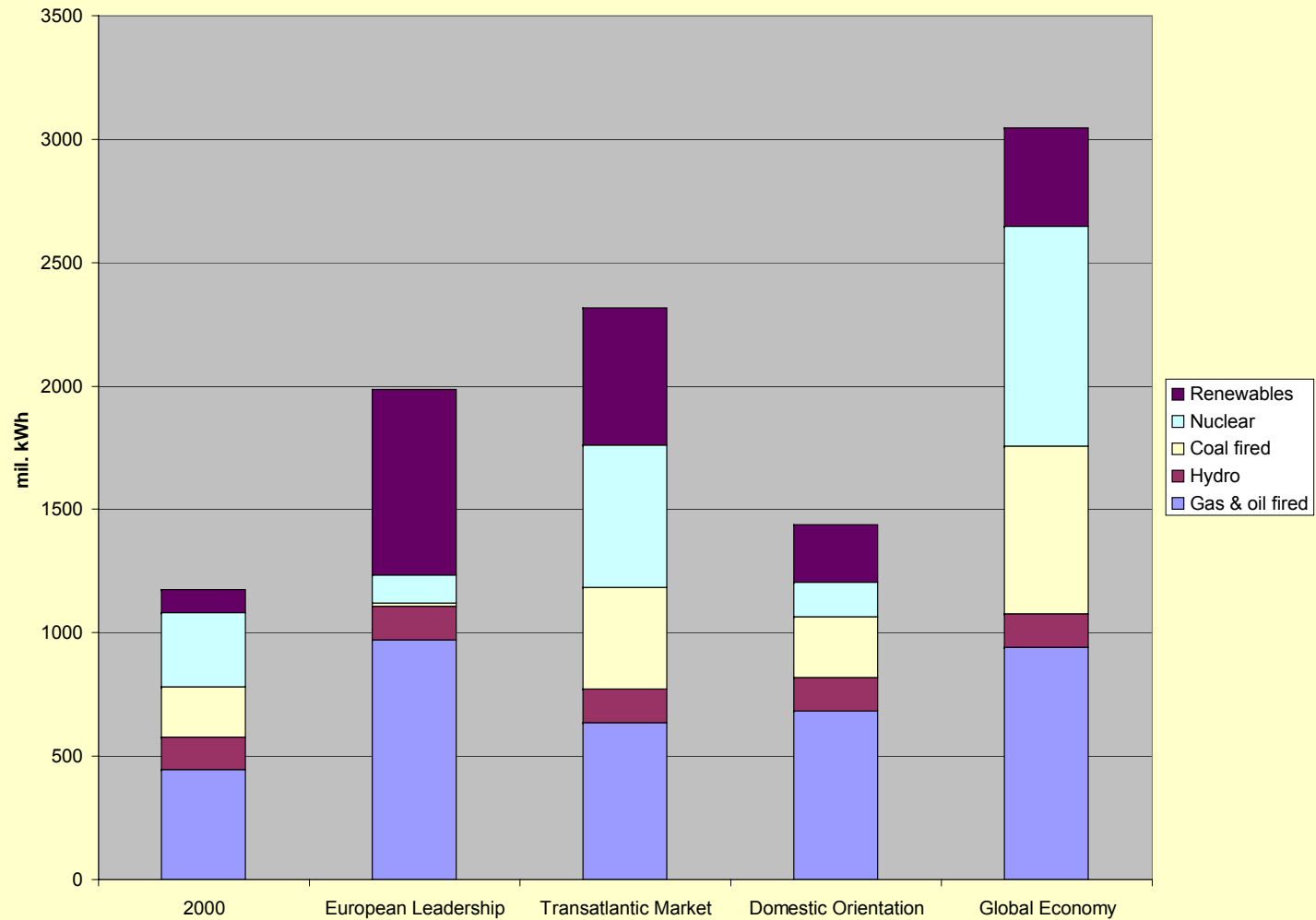
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3. Scenario results: European gas market

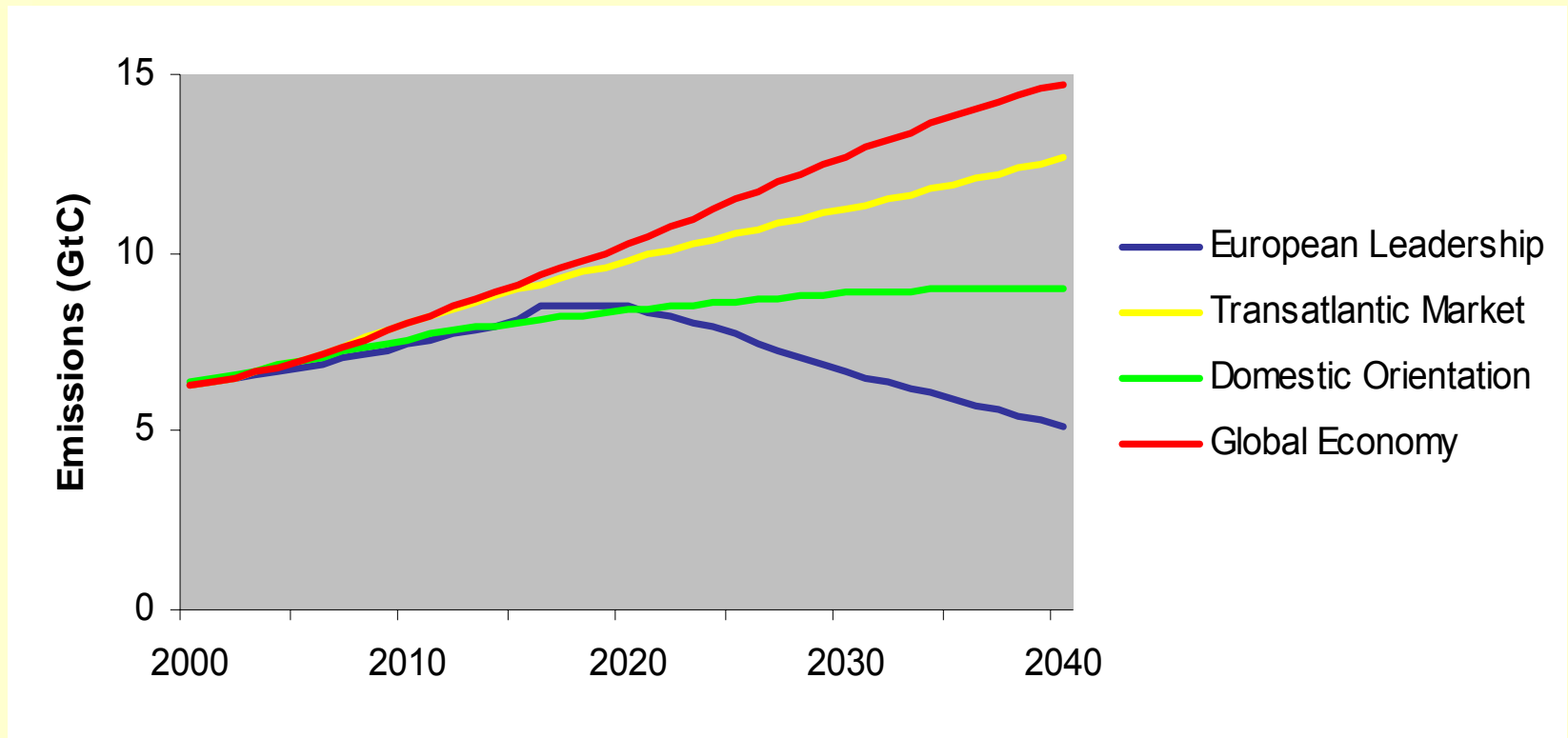
Price of natural gas



3. Scenario results: European electricity market



3. Scenario results: emissions



In European Leadership: price of carbon in 2040 is \$450/tC or \$40/barrel oil

Global costs: 1.5% GDP in 2040 (if 'worldwide cap-and-trade system')

4. Conclusions

1. Economic growth and environmental policies determine levels of consumption and production of energy.
2. Commodity prices are stable in the long term due to flexibility at the supply side. Resource scarcity is not a real problem up to 2040, although on regional level significant changes will occur.
3. Costs of climate policy can be low; economic effects depend mainly on the choice of policy instruments.
4. Europe will become more and more dependent on foreign sources of primary energy.