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

- Global cooperation
- Efficiency
- Equity / Environment
- Regional orientation

European Leadership

Global Economy

Domestic Orientation

Transatlantic Markets
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

- General Equilibrium model of the Global Economy
- Partial Equilibrium Model of the Global Oil Market
- Bottom-up model of Global Energy Demand
- Partial Equilibrium Models of the European Natural Gas and Electricity Markets
3. Scenario results: Oil market

Production of oil in Global Economy

- Russia: non-conv.
- Russia
- South America: non-conv.
- Europe
- Africa
- Asia
- South America
- Middle East
- North America
3. Scenario results: Oil market

Production of oil in all scenarios

- Non-Conventional
- Asia
- Africa
- Europe
- Russia
- South America
- North America
- Middle East

The chart shows production levels in million barrels per day for the years 2000, European Leadership, Transatlantic Market, Domestic Orientation, and Global Economy.
3. Scenario results: Oil market

Price of oil

- Global Economy
- Domestic Orientation
- Transatlantic Market
- European Leadership
3. Scenario results: European gas market

Consumption by origin

- 2000
- European Leadership
- Transatlantic Market
- Domestic Orientation
- Global Economy

Graph showing consumption in billion m3.
3. Scenario results: European gas market

Price of natural gas

- European Leadership
- Transatlantic Market
- Domestic Orientation
- Global Economy
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.