The Danish Energy Agenda
In a global context

Dansk Shell

October 24, 2006

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Ea Energy Analyses

Addressing

- Danish energy policy till present
- The global agenda
- The EU
- The current debate in Denmark
- Transport and biofuels
- A Shell perspective

1950s: Developing from WW2

- Petroleum was the agenda
- Since WW2 Denmark increasingly dependent on Energy imports
- Oil drilling in Denmark in 1950s with no result (Gulf oil)
- The national player A.P. Møller received exclusive rights in 1962 for 50 years - DUC
- Division of North Sea in mid-1960s

Nuclear? Risø 1955

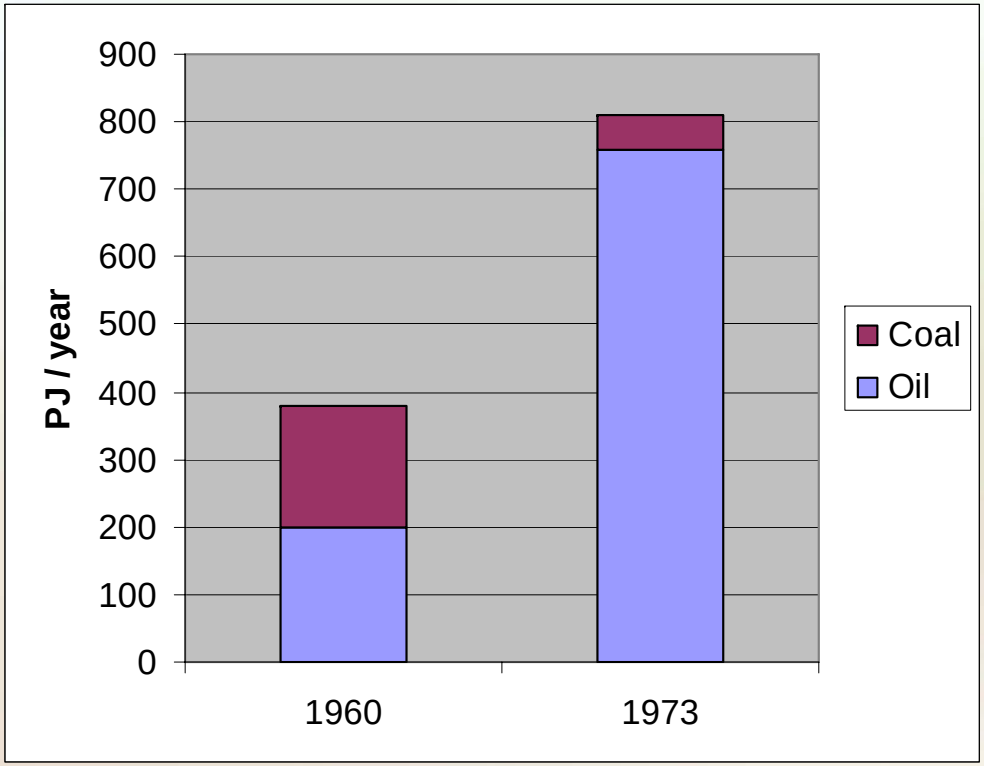
Roaring sixties: Oil consumption explodes

Basic policy:

”As much as possible as cheap as possible with as little inter-ference as possible”

- 1960: OPEC
- Hydro carbons around DK
- 1967: 6-day war

Denmark TPES 1960 – 1973
outgrows economy

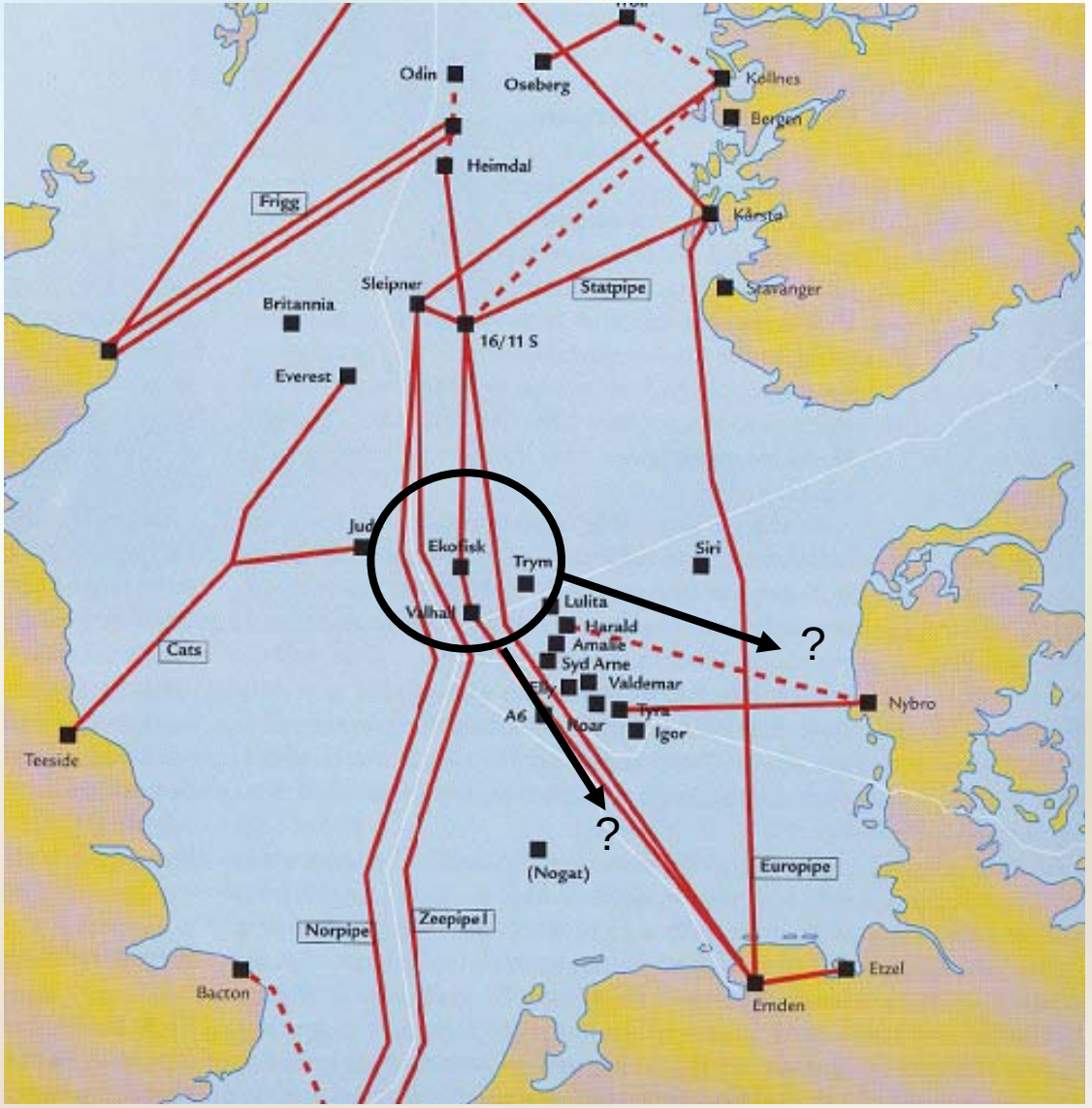


North Sea gas finds

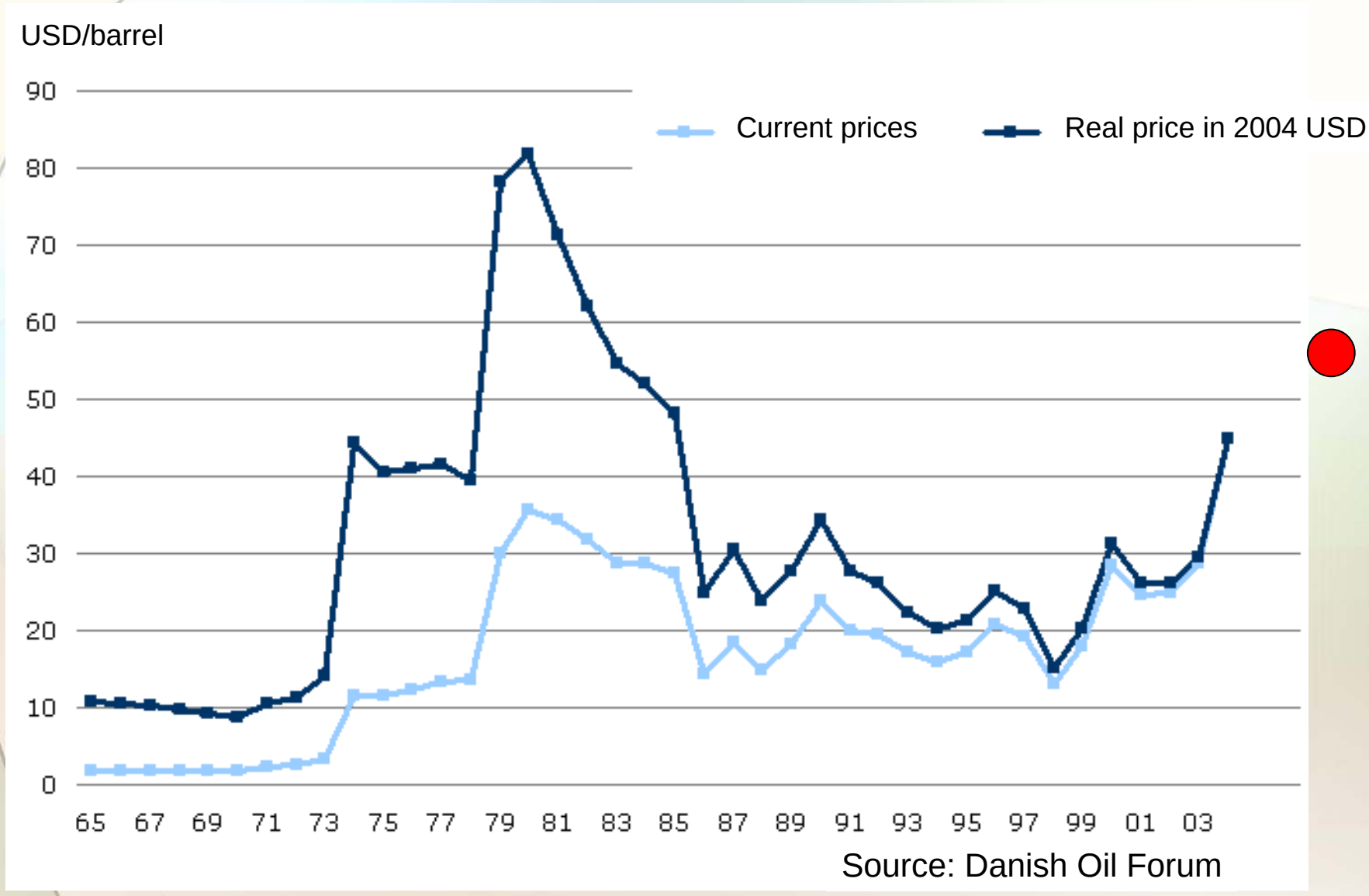
Still:

”As much as possible as cheap as possible. But emerging concerns since late 1960s”

- 1970: Ekofisk find
- 1971: The Energy Policy Committee
- 1972: Oil finds
- 1972: Common Market
- 1972: D(O)NG
- 1973: No gas
- 1973: Middle East war



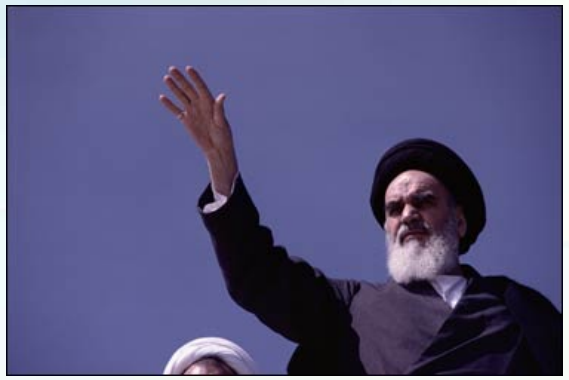
Oil prices - development



1973: Crisis

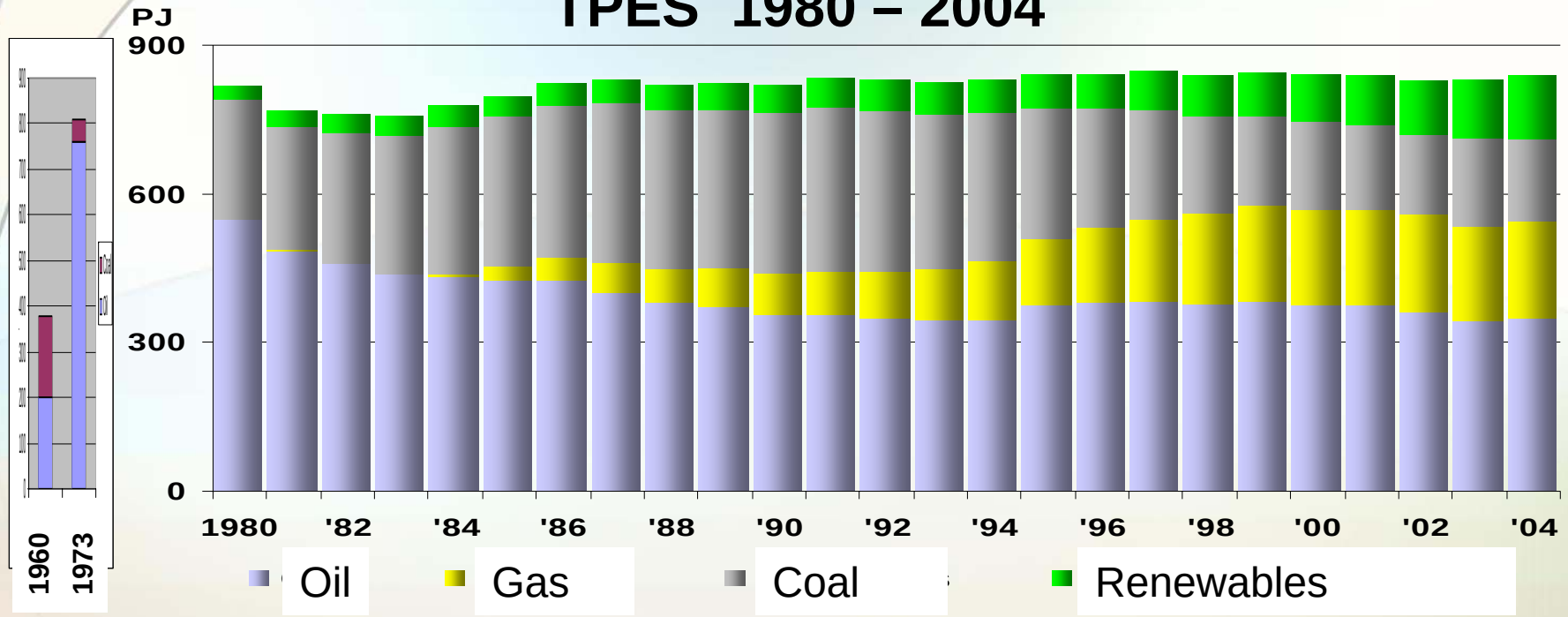
- Oil price jump by factor four – economic stability at stake
- Strict measures to save oil:
  - Reduced street lighting, no cars on Sundays, speed limits, campaigns for savings and ”lights out”, reduced room temperature, rationing.
- Land slide elections in December 1973
- Foundations for energy policy of the future ”**Dansk Energipolitik 1976**” is released:
  - Security of Supply, Diversifaction, Heat Planning, Energy efficiency, R&D, social economy, RE – *Nuclear?*

1978-79: Second price jump



- Oil prices jump by factor two
- Optimistic gas prospects in North Sea & talks of oil pipe to Fredericia
- Law on heat planning – Law on natural gas
- 1979: Three Mile Island, Harrysburg
- 1979: The Ministry of Energy is created
- 1980s: Taxes to ”stabilise” energy prices
- 1984: Oil pipe to Federicia – Gas pipe ashore
- 1980s: Stabilising taxes, national natural gas investment project, windpower, CHP, no nuclear

TPES 1980 – 2004

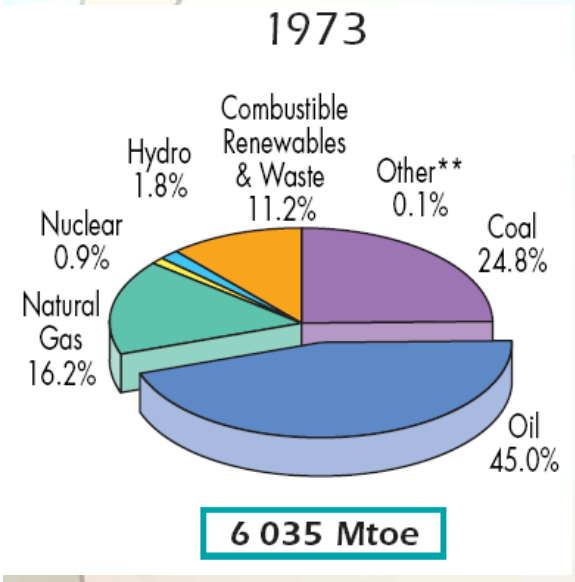


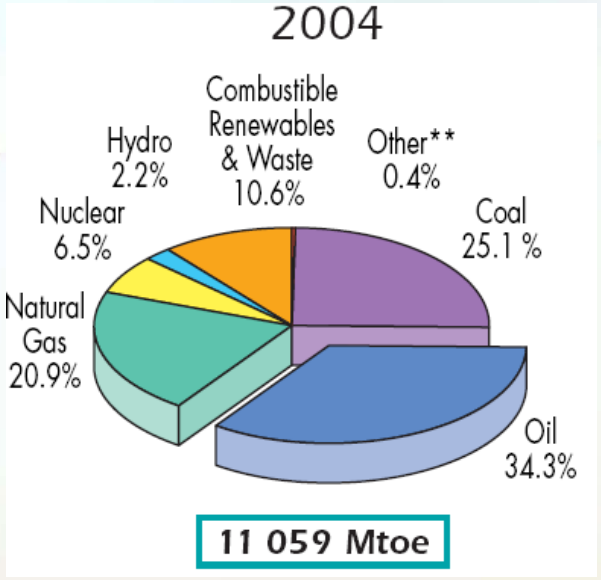
- 1990: Energy 2000 – 20% CO_2 reduction till 2005
- 1996: Energy 21 – Liberalisation of the electricity sector – preparing 21% Kyoto goal (1997)
- Recent: Continued focus on the 1976 agenda – the EU increasingly important

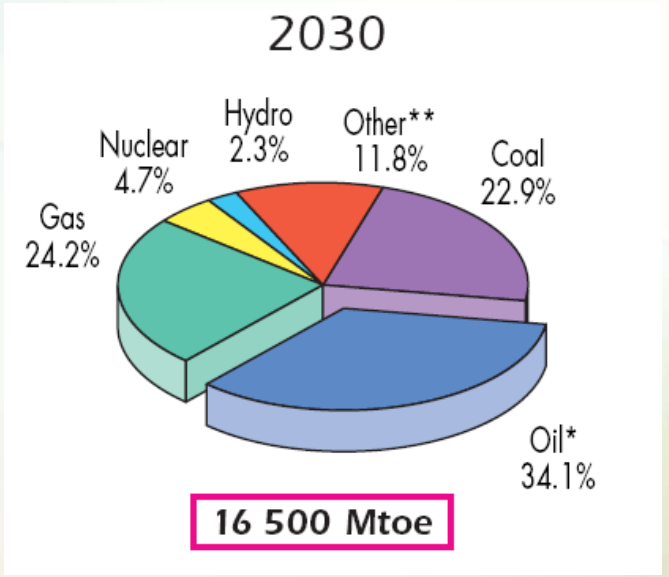
The global agenda

Continued growth

IEA 2006

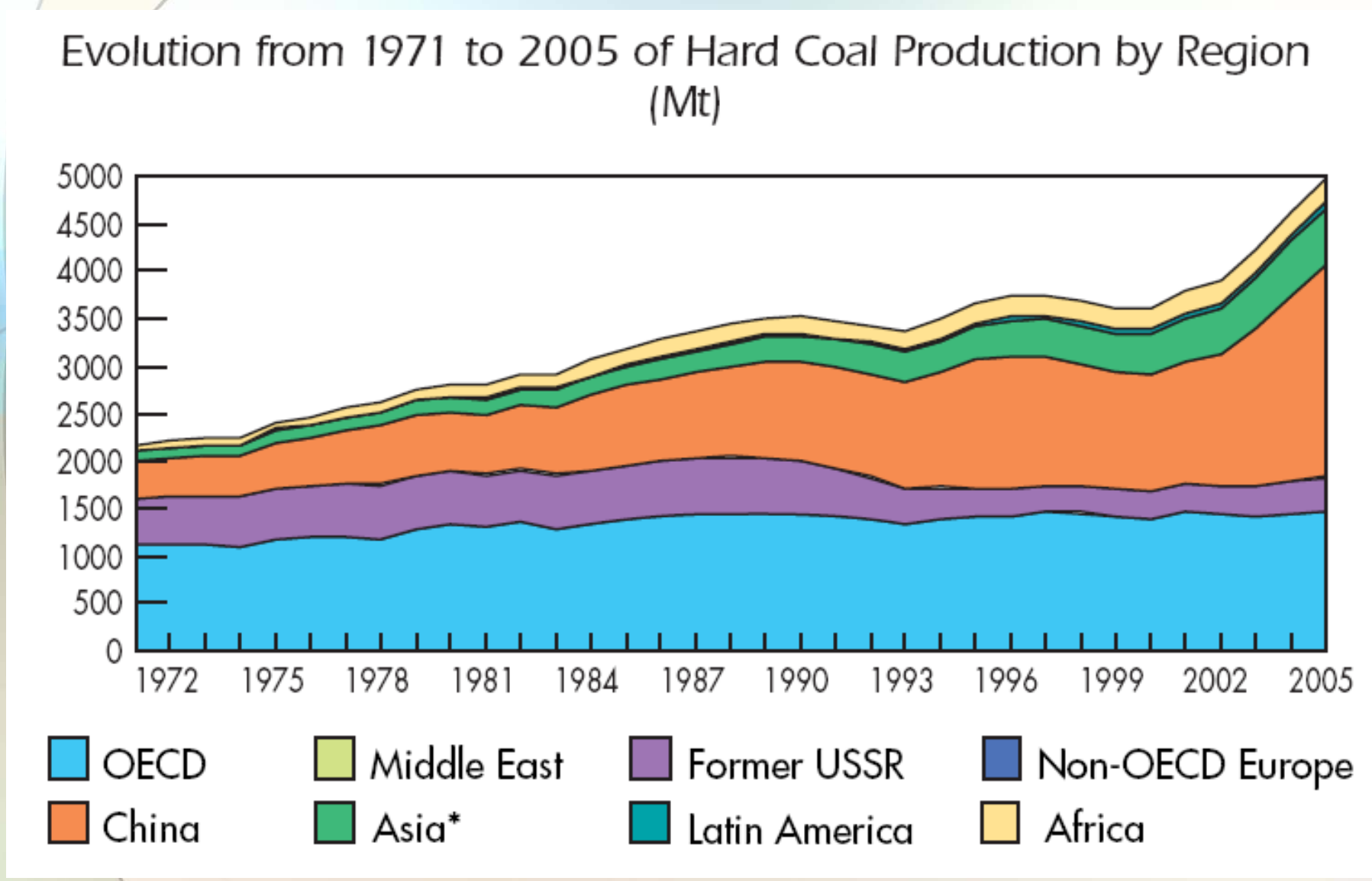






- Limits to resources?
- The CO_2 agenda?

When will China slow down ?



The EU

Main agenda

- **Security of supply**
  Large import share – can rise to 70% over next 20-30 years. World energy expected to rise by 60 % by 2030

1. **Internal market**
   Competitiveness in globalisation and cheaper prices

2. **Environment and climate**

The EU & Russia

- The EU predicts that by 2020 it will need to buy an additional 300 billion cubic metres of Russian gas a year, to meet growing domestic demand.
- But Russia's own energy strategy foresees additional sales to the enlarged EU of only 30 billion cubic metres, while it projects increasing amounts of gas going to the fast-growing Chinese market and the US.

Katinka Barysch 2004. The EU and Russia: Strategic partners or squabbling neighbours

Greenpaper, March 2006

- 6 priority areas including:
  - Internal market, security of supply, diversification, climate change, R&D and a coherent external policy

- Process:
  - Till September 2006: comments
  - October 2006: Council with Putin
  - December 2006: Energy council
  - March 2007: EU Council

Communication on external energy relations

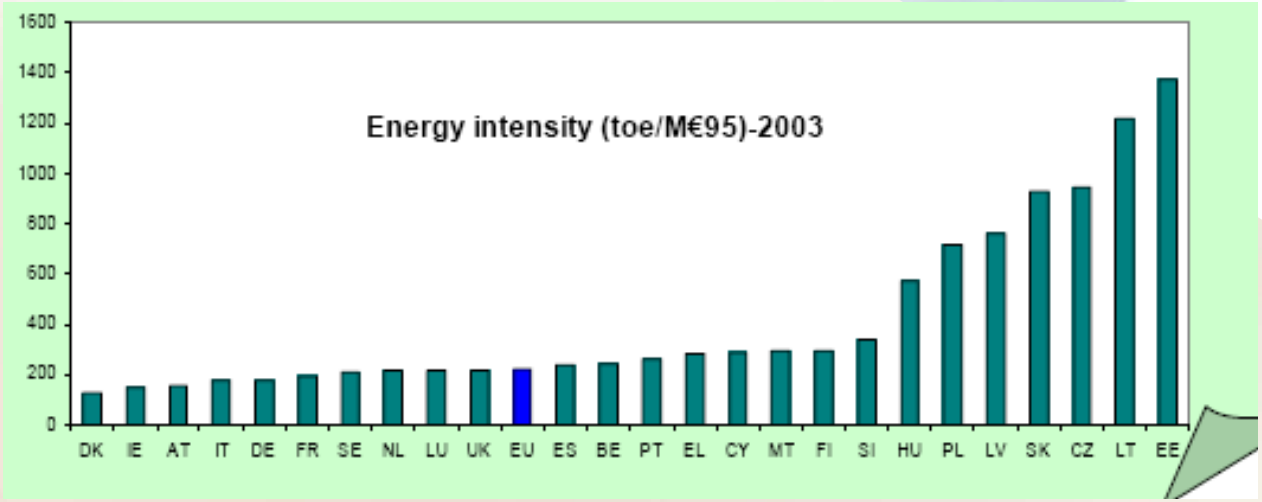
October 2006

Russia seeks ways to secure energy demand presented by the EU market. The EU needs Russian resources for its energy security. There is a clear interdependence.

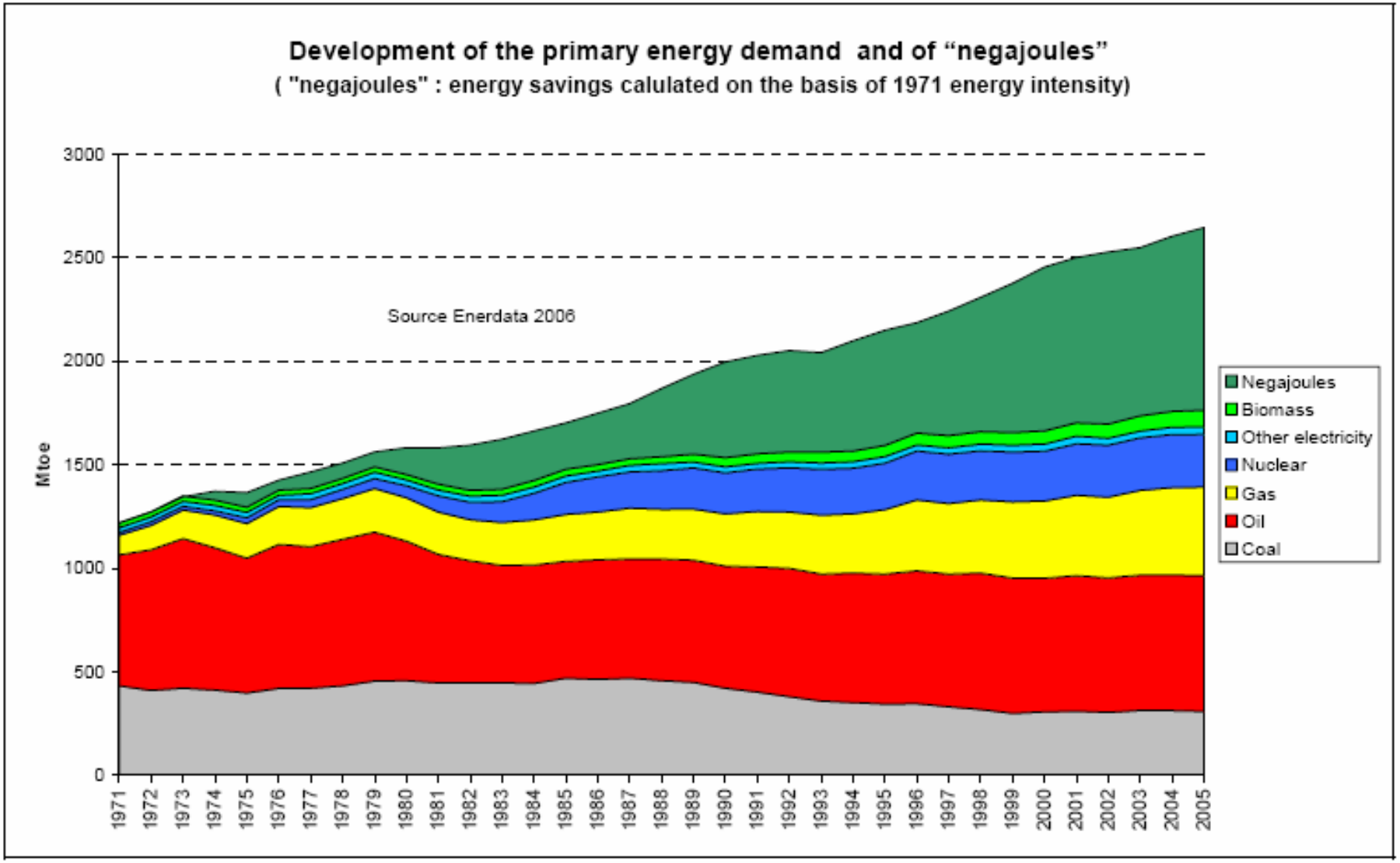
Russia wants a stronger presence in the EU internal energy market, ensured long term gas supply contracts, the integration of electricity grids and free trade for electricity and nuclear materials, as well as the acquisition and control of downstream EU energy assets (gas and electricity) and EU investments and technology for the development of the Russian energy resources.

The EU wants non-discriminatory and fair treatment from Russia in their energy relationship, in terms of supply from Russia and in terms of access to the Russian market for EU investors; a level playing field in terms of market conditions, investment and acquisitions in the upstream and downstream Russian energy infrastructure and resources; third party access to pipelines within Russia, including those for transit of energy products from the Caspian region and Central Asia; respect for competition rules as well as high levels of environmental security and safety.

- Energy Performance of Buildings Directive
- Cogeneration Directive
- Eco-design Directive
- Proposal of a Directive on energy services and end-use efficiency
- A new programme “Intelligent Energy – Europe”
- Other measures including renewable energies



Energy efficiency – Action plan



Savings potential

Sector	Energy consumption (Mtoe) 2005	Energy Consumption (Mtoe) 2020 (Business as usual)	Energy Saving Potential 2020 (Mtoe)	Full Energy Saving Potential 2020 (%)
Households (residential)	280	338	91	27%
Commercial buildings (Tertiary)	157	211	63	30%
Transport	332	405	105	26%
Manufacturing Industry	297	382	95	25%

Figure 2: Estimates for full energy saving potential in end-use sectors[12]

- Action plan of saving 20% by 2020 will be implemented over 6 years
- Minimum energy performance standards

Current debate in Denmark

Political agreement, March 2004:

- Prepare plan of action regarding energy efficiency, taking EU directives into consideration – POA published (1.7% p.a.)
- Prepare plan of action regarding future energy strategy towards 2025

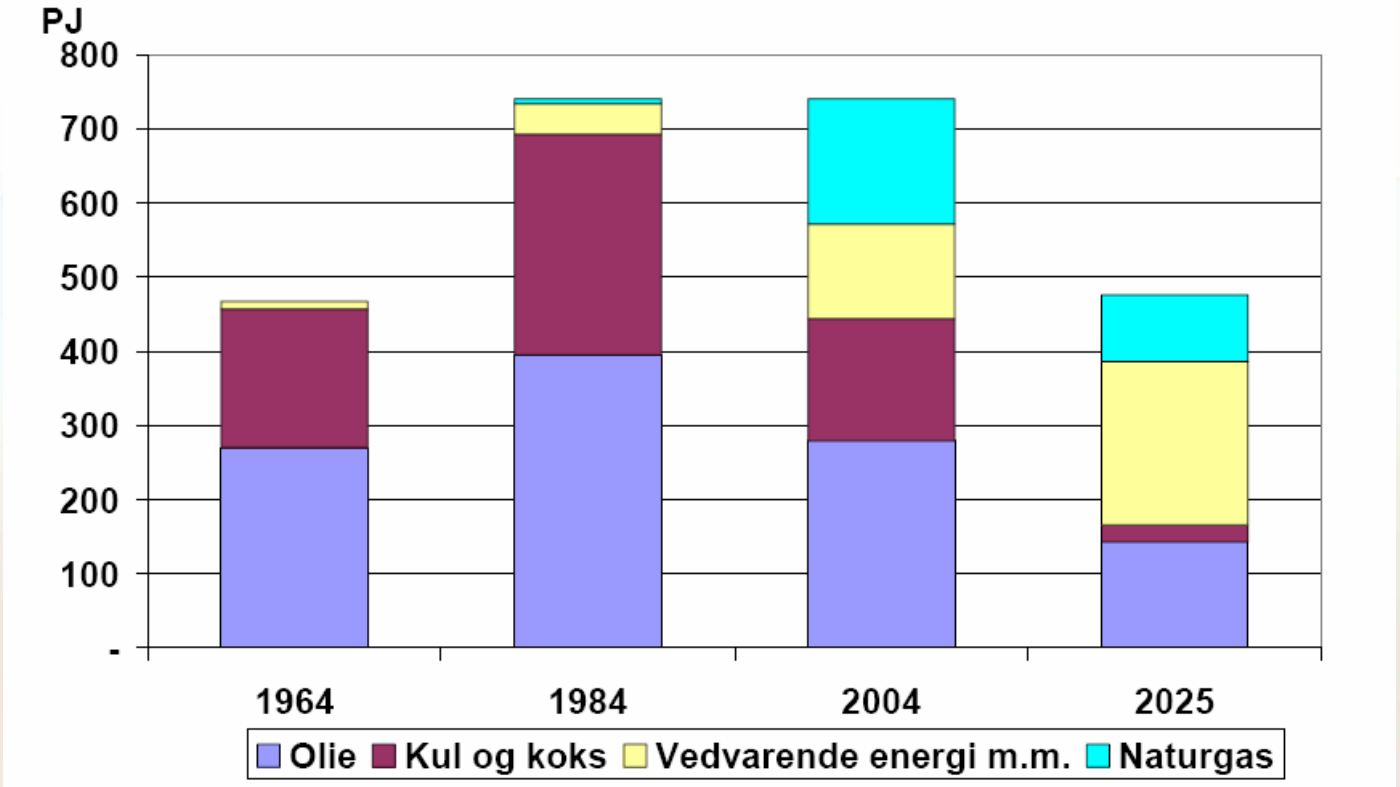





Spokesmen on energy policy


Danish Board of Technology

Joint project – all parties
October 2006



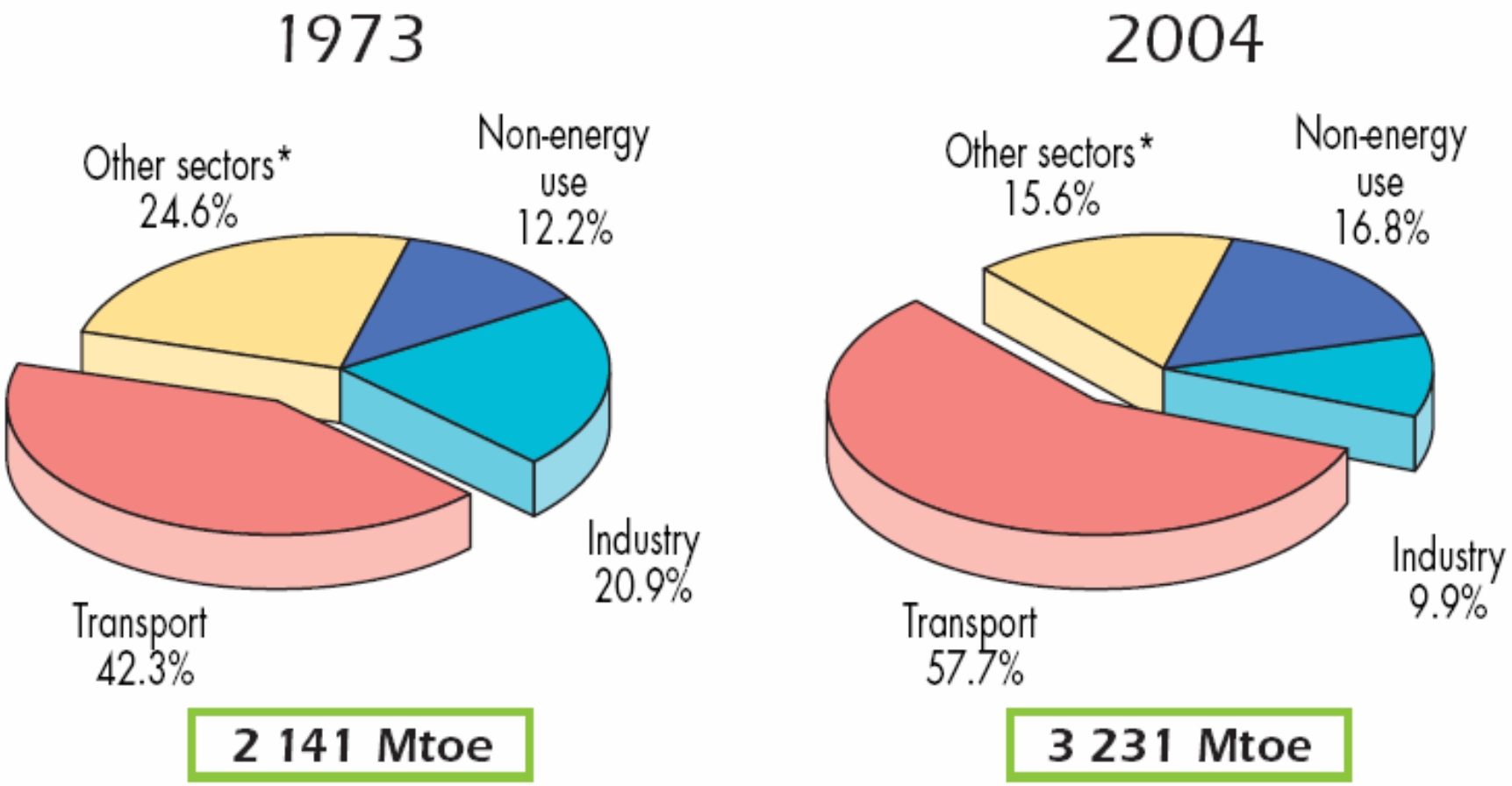
50% reduction of oil consumption in 2025
50% reduction of CO_2 emission in 2025

Investments and R&D

- Best practice when refurbishing buildings – passive houses
- Windpower, biomass, district heating
- Intelligent appliances
- Reduced loss in district heating
- Transport
  - Increased fuel efficiency – bio fuels
  - Road pricing

Transport and biofuels

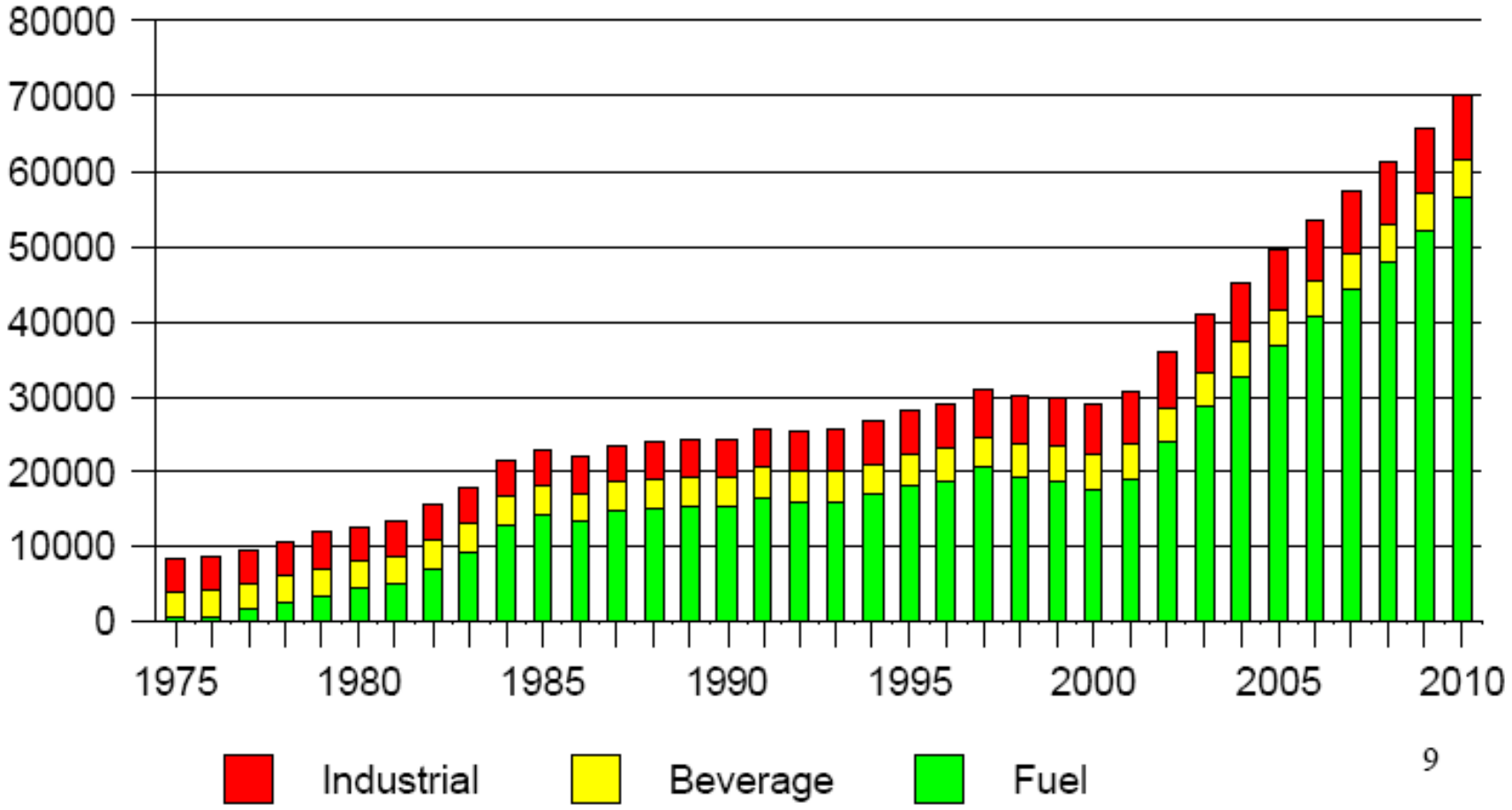
World oil consumption



*Other sectors comprises agriculture, commercial & public service, residential and non-specified.

World Fuel Ethanol

Ethanol production by type



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The debate

Advantages

- Local and CO_2 free resource – reduce oil dependency
- Easy. Take into operation with existing infrastructure in agriculture and transport industry
- Employment and income in rural areas
- Biotec industry has great hopes for 2nd generation technology
- New markets for agricultural products

But…

- Still too expensive – needs tax exemption or mandatory feed in
- CO_2 effect limited – or negative
- Not energy-efficient use of biomass resource. Energy for transport will rise
- Take biomass from other use – price increase. Ethical?
- More efficient solutions in transport will emerge
- No acute need for fuel change – increased energy efficiency might be better solution in the short- and mid-term