Session 7 : Energy and Environment

Mitsuho Uchida
Visiting Professor, Chukyo University

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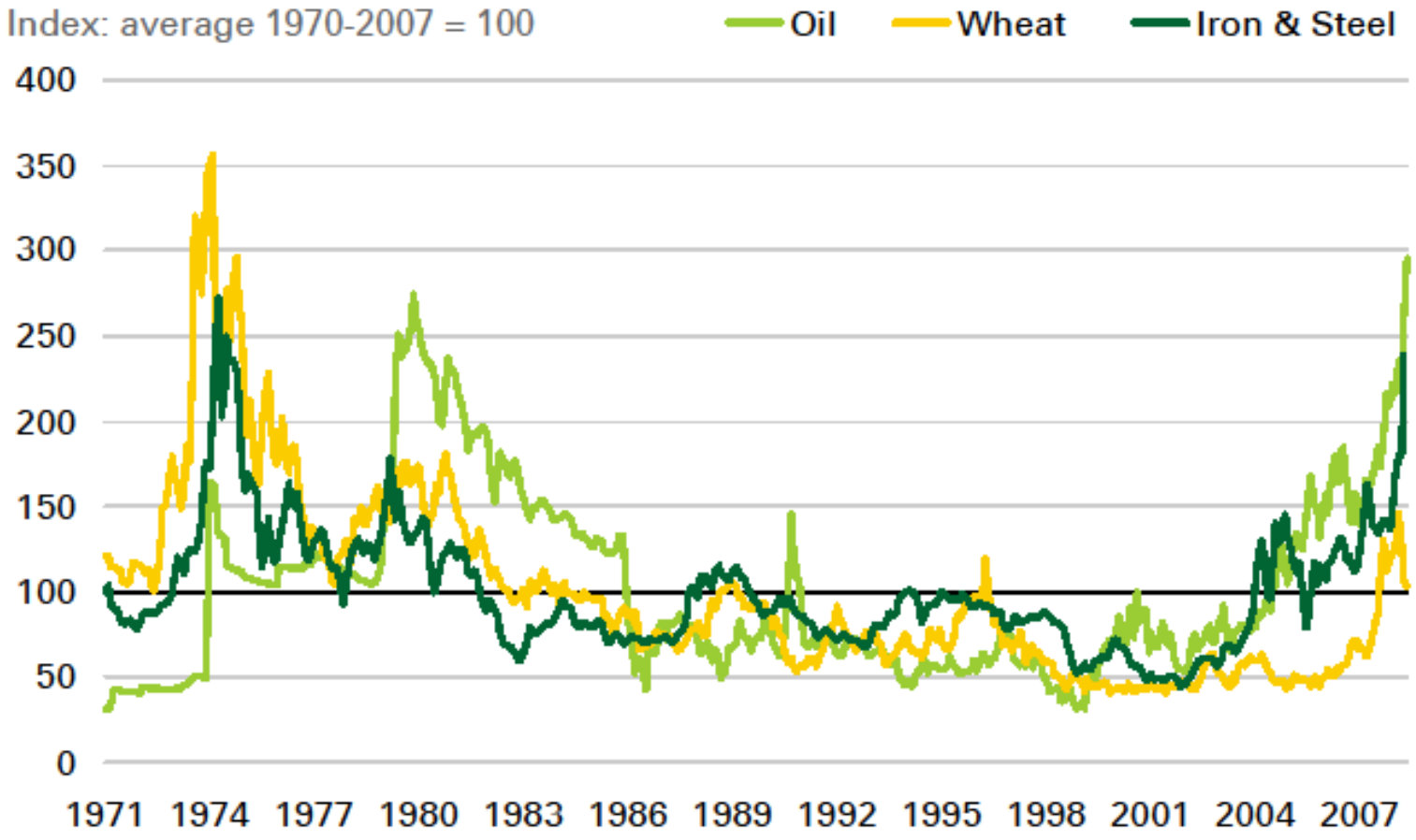
In Regional Cooperation and Development

Global Energy Risks

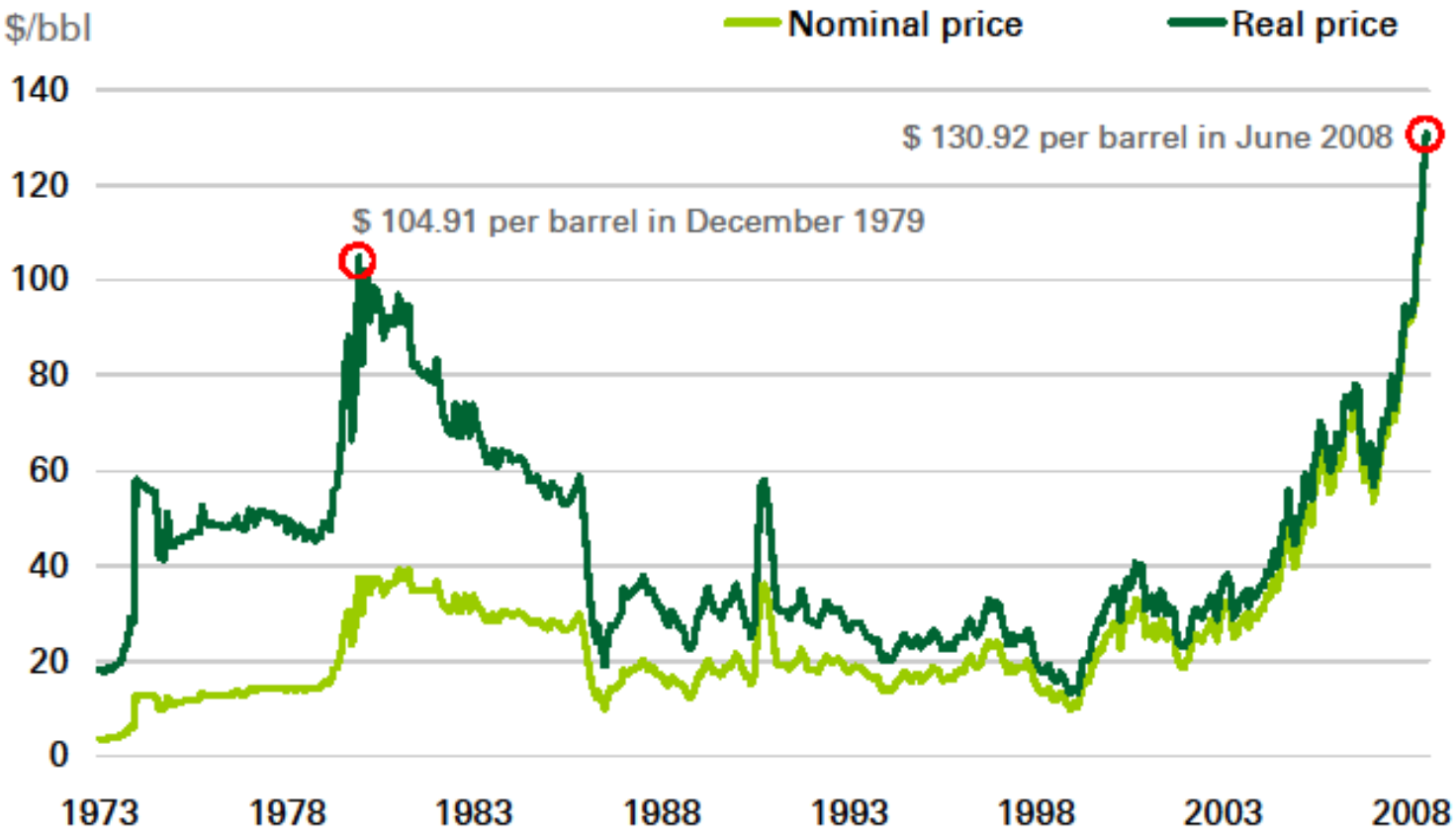
1. **World energy demand is and will be expanding at higher speed.**
2. **NEA is the world biggest energy market. In 2005, China overtook Europe in terms of energy consumption and will be, the world biggest energy consumer by 2015.**
3. **High dependency on fossil fuel in Asia may cause another oil shocks in near future.**

Real Commodity Prices



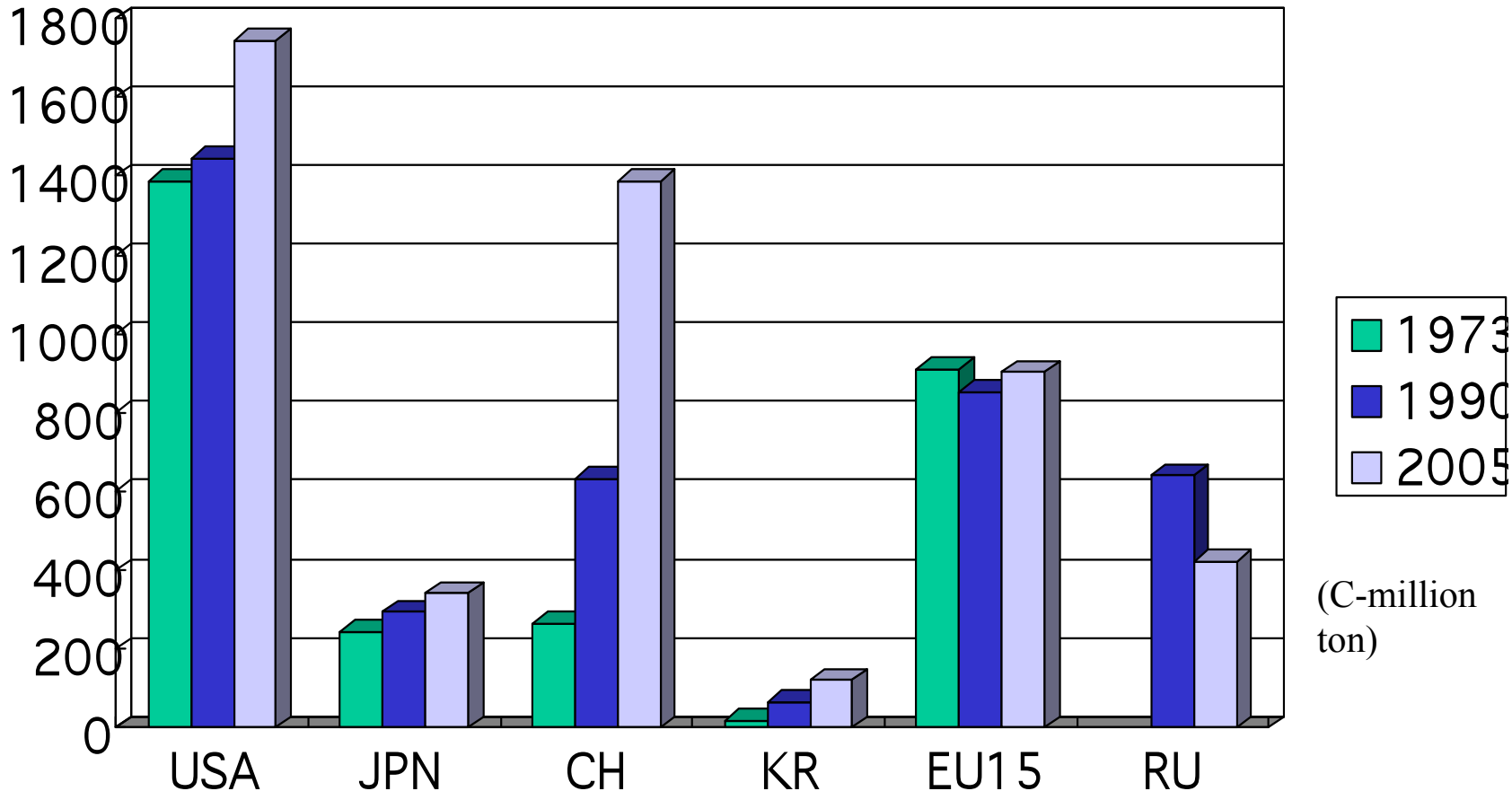
BP Statistical Review of World Energy 2008

Real and Nominal Crude Oil Price

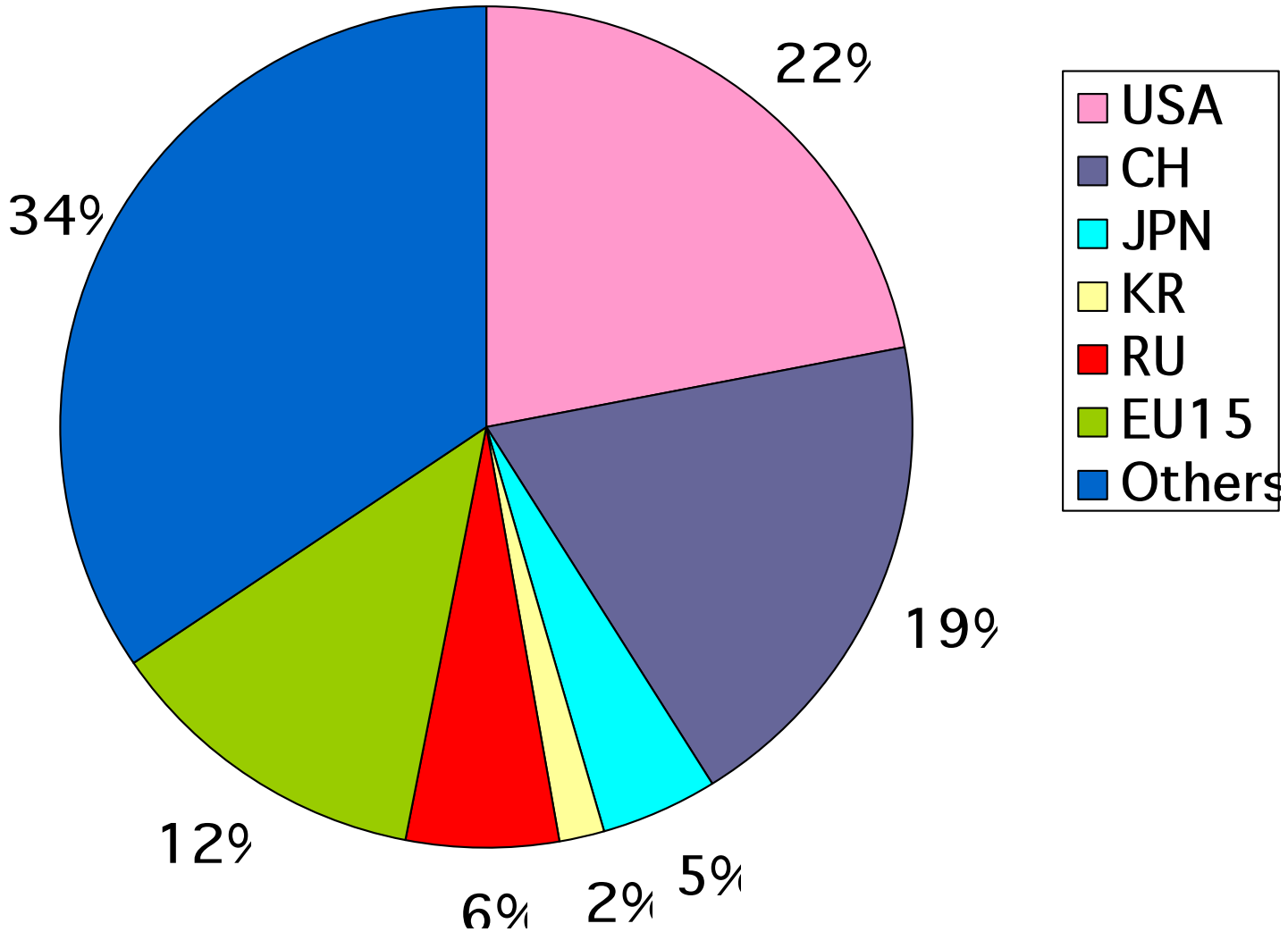


BP Statistical Review of World Energy 2008

World CO2 Emission



CO2 Emission (2005)



Global Environmental Risks

1. **World CO2 emission will increase more than double by 2050.**
2. **More than 80% of the incremental demand will occur in developing countries.**
3. **China has already overtaken EU and will overtake USA soon in terms of CO2 emissions and NEA share of CO2 emissions will be more than half of the world**

Energy policy in 21st century will be driven by the triple challenge of

- making substantial reduction in emissions of greenhouse gases, such as CO2
- while ensuring a secure supply of energy
- all at reasonable cost to the economy for promoting economic competitiveness in the globalizing world

The Road to Reduce CO2 Emissions

CO2=(CO2/ENERGY)(ENERGY/GDP)(GDP)

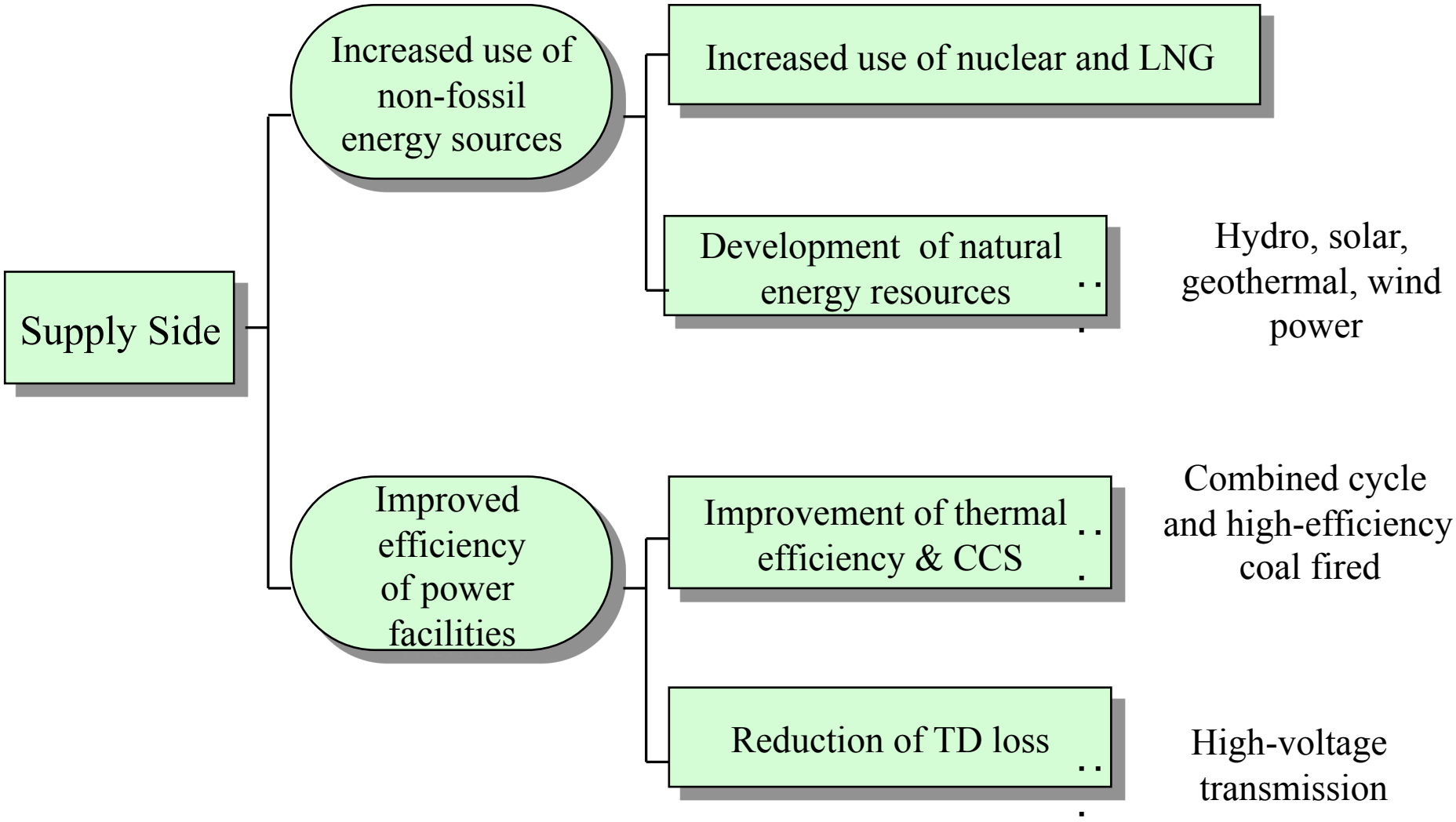
↓

1. Fossil Fuel Dependence Down→More use of Natural Gas & Nuclear & RES
2. Energy Efficiency Up →Fuel Efficiency & Changes of Industrial Mix
3. Economic Growth Down

Electricity is expected to play very important roles to solve the triple challenge

- on the supply side, potential advances in power generation technology and CCS
- on the demand side, advances in efficient electro-technologies such as heat pumps and the potential of electricity in transport, such as shinkansen, light rail, EV etc
- both will help to reduce CO2 emissions and boost energy supply security

CO2 Control Measures by Power Sector



Renewable Energy

- renewable energy technologies contribute the world's energy supply and demand mix in coming decades due to continuing innovations, improving cost competitiveness, expanding policy mandates, and enduring challenges relating to energy security, fuel price volatility, climate change, and sustainability.
- Solar and wind power is unstable energy and should be separate from existing power grids.
- Technical progress is critical to fill this gap.

Nuclear Power

- Nuclear power generation is an essential part of portfolio of carbon-free generation
- High capital costs but low running costs: suited for stable base-load power generation
- At present, 16 % of world's electricity is produced by nuclear power stations in 30 countries with 372 GW and projected to rise to 433 GW by 2030, mainly in Asia.
- After Great earthquake, Japanese government announced its policy of decreasing Japan's reliance on nuclear power plants for domestic electric power.

Nuclear can be replaced with RES!?

- The elimination of nuclear power plants cannot be achieved soon.
- In the short run, there is no choice but to switch to thermal power using natural gas.
- Circumstances surrounding natural gas have drastically changed. The amount of natural gas produced has sharply increased since the technology of extracting gas from shale was established in the US.

Natural gas :Plenty & More to come

- Huge gas fields are close by NEA, such as Russia Far East, Australia, SEA and Central Asia.
- Almost the entire thermal power generation fleet in Japan and Korea will need to be replaced in the coming decades. Conventional coal-fired to be replaced by latest CCGT to cut CO2 emissions by more than half.
- Fuel-cell cogeneration systems using natural gas installed in commercial complexes, homes and other facilities could improve energy efficiency dramatically while CO2 emissions would drop.
- Clean natural gas is a good choice for back-up generation system for solar and wind power.

Network Issues

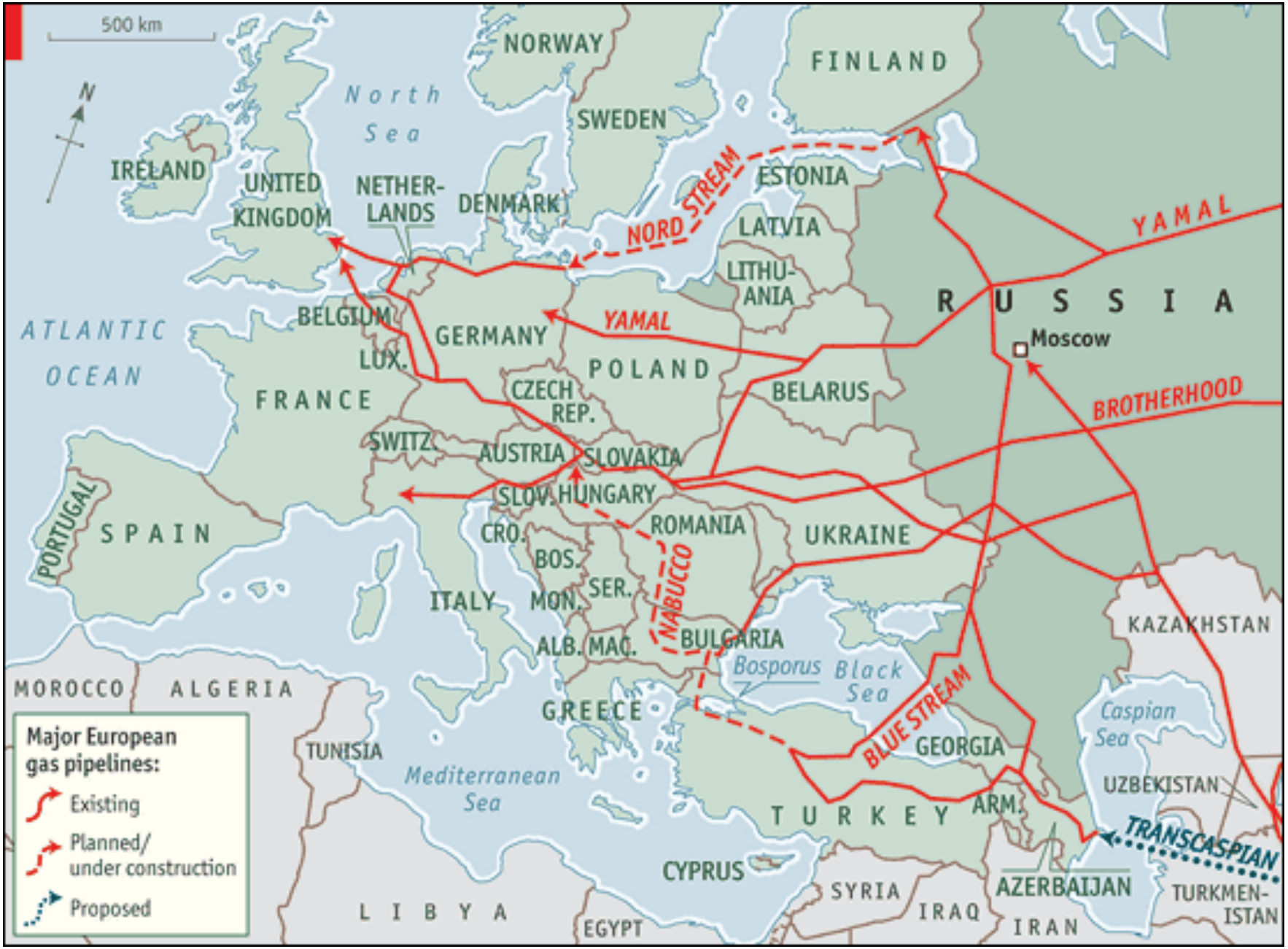
- The present grid networks were constructed so as to take advantage of the cost savings from large scale centralized power stations.
- Increasing use of RES, distributed generation, EV, etc will have significant implications for network operation.
- The paradigm of centralized power supply will be overtaken by the development of small and decentralized generation units

Development of International Energy Trade

- **US and Canada**
- **EU: operated by UCTE and prospects for power market stretching across European continent⇒“Lisbon to Vradivostok”**
- **ASEAN:Launching ASEAN Power Grid**
- **NEA?**

UCTE（Union for the Coordination of Transmission of Electricity）

- International association of transmission system operators in continental Europe, located in Brussels
- Through the networks of the UCTE, about 450 million people are supplied with electric energy; annual consumption totals approx. 2300 TWh.


500 km
N
North Sea
NORWAY
FINLAND
SWEDEN
IRELAND
UNITED KINGDOM
NETHER-LANDS
DENMARK
ESTONIA
LATVIA
LITHU-ANIA
NORD STREAM
YAMAL
RUSSIA
Moscow
ATLANTIC OCEAN
BELGIUM
LUX.
GERMANY
POLAND
BELARUS
FRANCE
CZECH REP.
SWITZ.
AUSTRIA
SLOVAKIA
BROTHERHOOD
SLOV.
HUNGARY
PORTUGAL
SPAIN
CRO.
ROMANIA
UKRAINE
BOS.
SER.
NABUCCO
ITALY
MON.
ALB.
MAC.
BULGARIA
KAZAKHSTAN
Bosporus
Black Sea
MOROCCO
ALGERIA
GREECE
BLUE STREAM
Caspian Sea
GEORGIA
TUNISIA
Mediterranean Sea
UZBEKISTAN
TURKEY
ARM.
TRANSCASPIAN
CYPRUS
SYRIA
AZERBAIJAN
TURKMEN-ISTAN
LIBYA
EGYPT
IRAQ
IRAN
Major European gas pipelines:
Existing
Planned/ under construction
Proposed

EU's European Neighbourhood Policy

1. Enlargement of European electricity and gas market

- The market is based on common standards governing market access, environmental protection and safety rules.

2. Three key mechanisms established:

- EU-Russia Energy Dialogue,
- EURO-Mediterranean Energy Partnership
- The initiative for a Southeast European regional energy market

Toward the NEA Energy Community

- To start with the integration of infrastructure in energy (gas and electricity), transport and communications in NEA countries
- Their availability and efficiency encourage entrepreneurship and investments, leading to economic prosperity in the region.

Integration of regional infrastructure is tough goal in NEA

- The region is geographically diverse and its economies are at different level of development
- Funding for infrastructure investment might be also the biggest problem
- Despite the difficulties, NEA should make the development of infrastructure linkage one of its primary goals