Challenges in Achieving a Low-Carbon Future : Increased Role of Electricity

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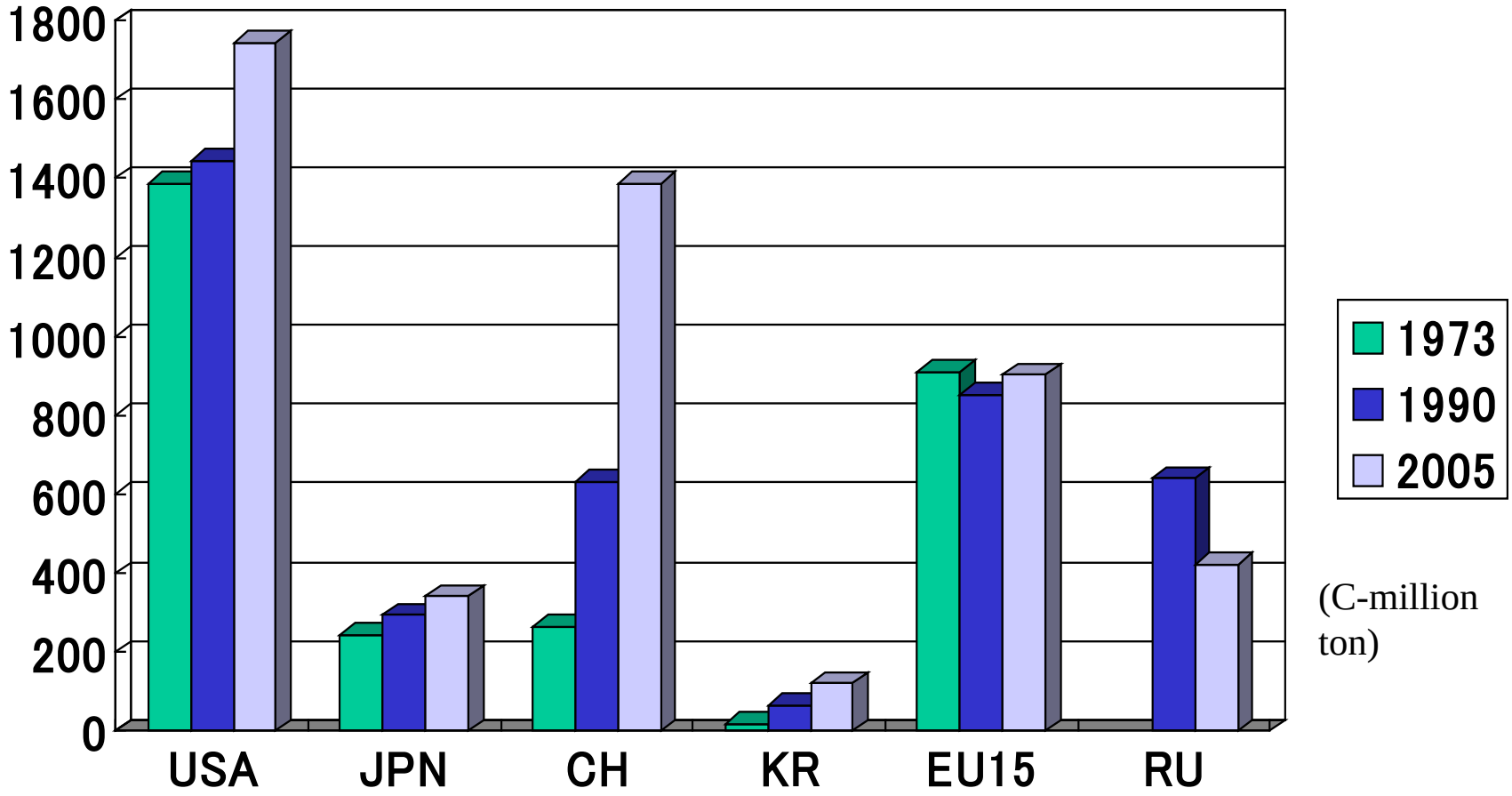
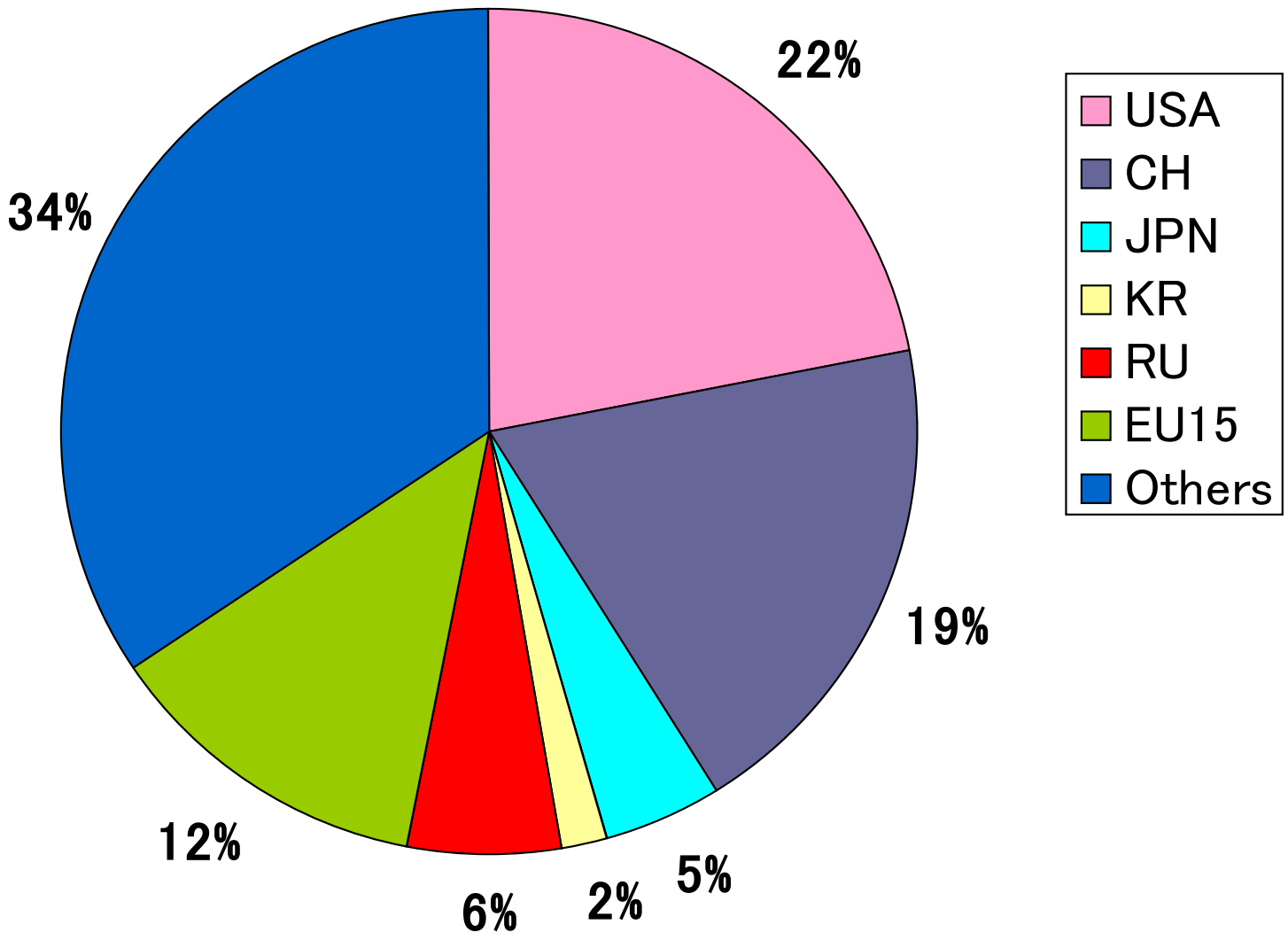
Global Energy Risks

1. **World energy demand 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.**

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 challenges 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

Electricity is expected to play very important role to tackle the triple challenges

- 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 carbon emissions and boost energy supply security

Electricity is Key to a sustainable future

- Electricity generation accounts for about a third of the world's CO2 from energy use, which in turn accounts for two-thirds of all greenhouse gas emissions. This is one of the sectors in which deep cuts in emissions are most practicable – the technologies for producing electricity without emitting carbon dioxide are either in use or close to deployment.
- A carbon neutral power supply delivered through a properly functioning competitive energy market will be a key part of the solution to the great energy climate challenges.

Renewable Energy

- Anticipated that commercial renewable energy technologies will make growing contributions to 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.
- However, there remains a massive gap between available sources and ones that currently can be harnessed in economically, environmentally, and socially acceptable ways. 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.
- Large risks and uncertainties in both licensing and subsequent construction, operation waste management and decommissioning. Controlling costs is a key and difficult objective.

Thermal Power Generation

- For reasons of fuel supply diversity, economic efficiency and energy security, coal-fired generation will remain an indispensable part of a well-balanced and diverse supply of power resources.
- The latest advanced clean generating technologies should be used wherever possible and the demonstration of carbon capture and storage technology should be accelerated.

Natural gas

- We need to introduce and support research into RES for low carbon future. But cannot expect immediate results. More use of natural gas is a quick way to cut CO2 emissions.
- 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 combined cycle gas turbine(CCGT) to cut CO2 emissions by more than half.
- As gas system is compact, it can be easily installed in inland areas or factory premises, if gas pipeline is close by
- If fuel-cell cogeneration systems using natural gas are installed in commercial complexes, homes and other facilities, energy efficiency would dramatically rise 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 and optimized to take advantage of the cost savings from large scale centralized power stations.
- Climate change will have significant impact on the operation & development of T & D network caused by
  - new and distributed generation technologies
  - changes in demand patterns
  - smart grids and its contribution
- 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?**

Market integration will contribute to building a secure and sustainable future

- Market integration is the only way we can reach our overarching policy objectives. We will never be able to deliver our ambitious energy efficiency or greenhouse gas emission targets without fully utilizing the opportunities that large and integrated markets offer.
- We would not be able to reap the full benefits of liberalized markets, if competition was only to happen within national borders.

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.**

Climate change is a long-term issue, which will need to be tackled over the next 50 years or more.

But if we delay our actions, our cumulative emissions will require steeper reductions and lead to higher costs.

Any actions to tackle with the challenge needs huge investment and international cooperation.

Global energy-climate challenges require a global approach. Why not work together for our future!