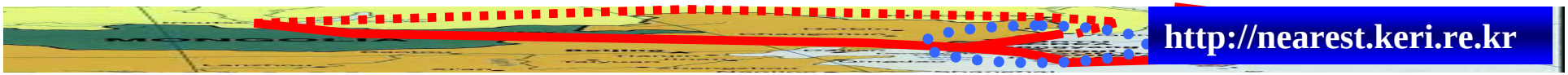
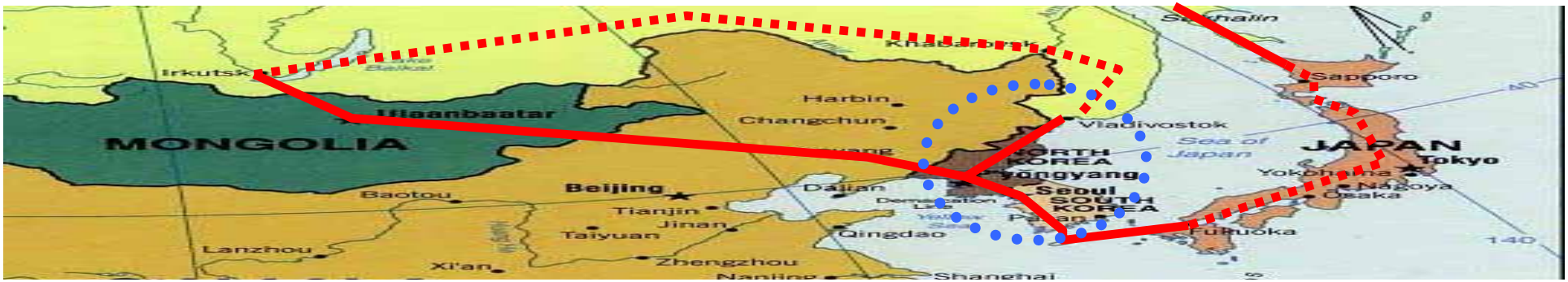


CURRENT STATUS & FUTURE

- Electricity Industry in Northeast Asia -



2004. 3

Park, Dong-wook, Yoon, Jae-young, Kim, Ho-yong

KERI

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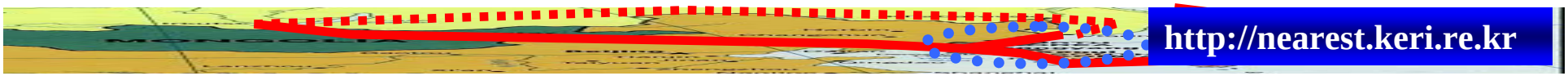
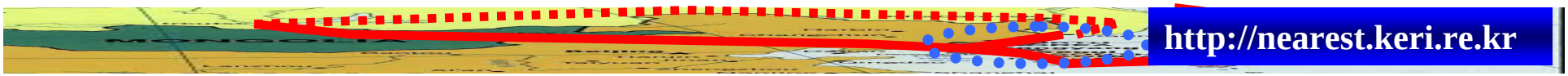
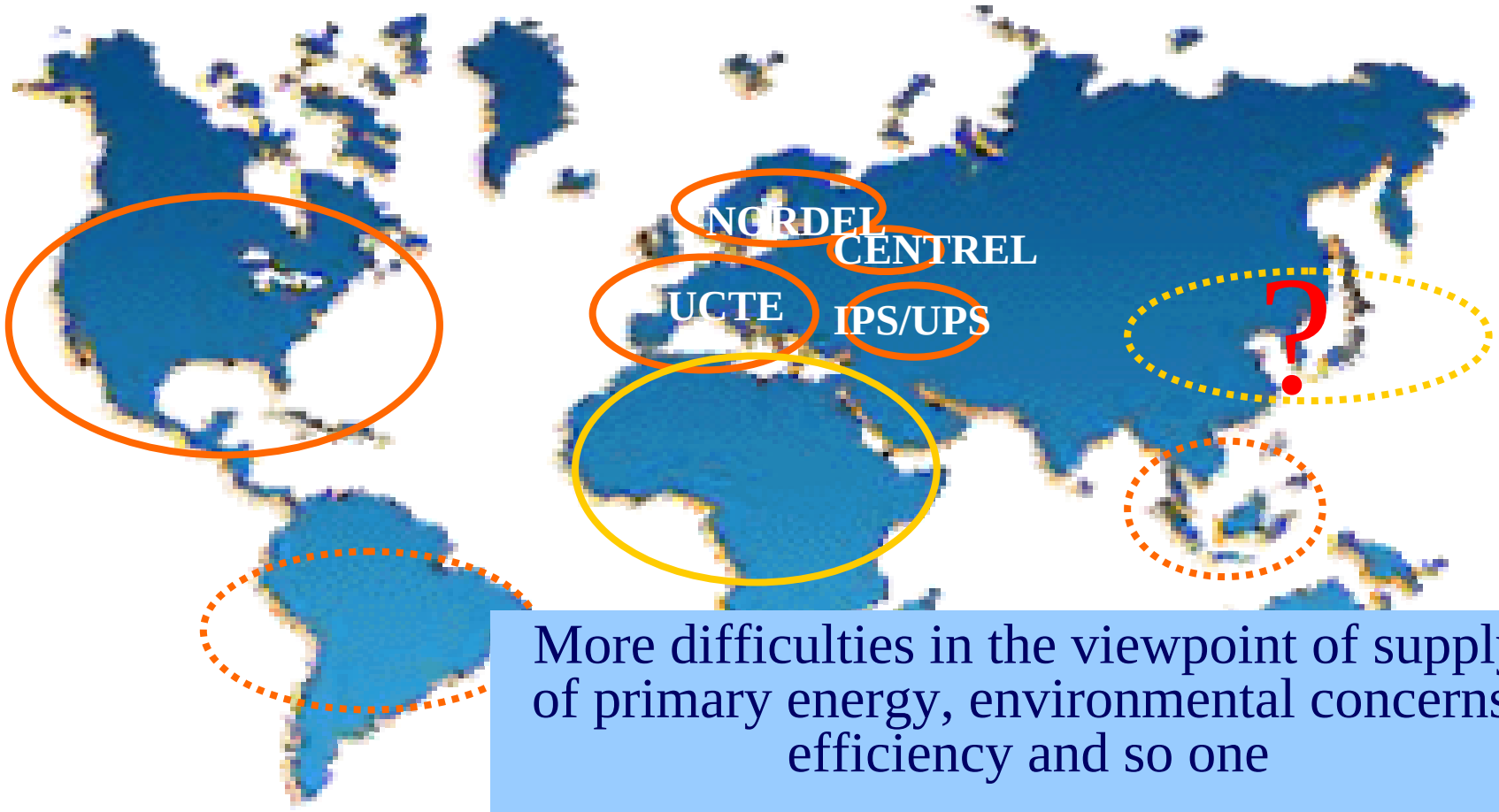
CONTENTS



- INTRODUCTION
- ELECTRICITY INDUSTRY
- ISSUES
- ON-GOING PROJECT
- CONCLUSIONS

I. INTRODUCTION





More difficulties in the viewpoint of supply of primary energy, environmental concerns, efficiency and so one

TO INTERNATIONAL COOPERATION

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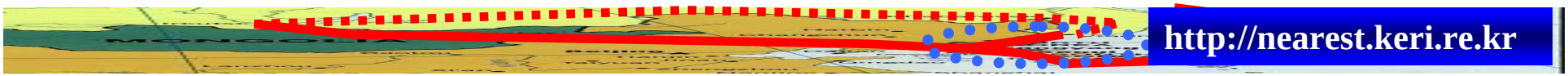
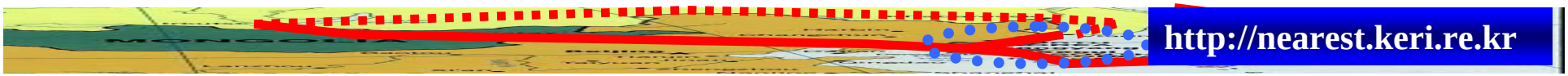
II. EL. INDUSTRY



❑ Power Demand and Generating Capacity[GW]

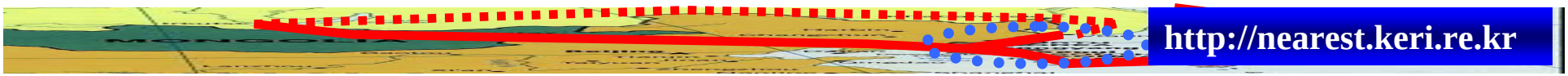
COUNTRY	GENERATING CAPACITY		PEAK DEMAND
CHINA	319.3(37.9)	*5.8(0.7)*	?(23.0)
JAPAN	259.0	*4.7*	175.9
RUSSIA	215.3(7.1)	*3.9(0.1)*	136.7(4.7)
DPRK	3 – 8(?)	*0.055 – 0.146*	?
MONGOLIA	0.9	*0.016*	?
ROK	54.7	*1.0*	48.1

II. EL. INDUSTRY in CHINA

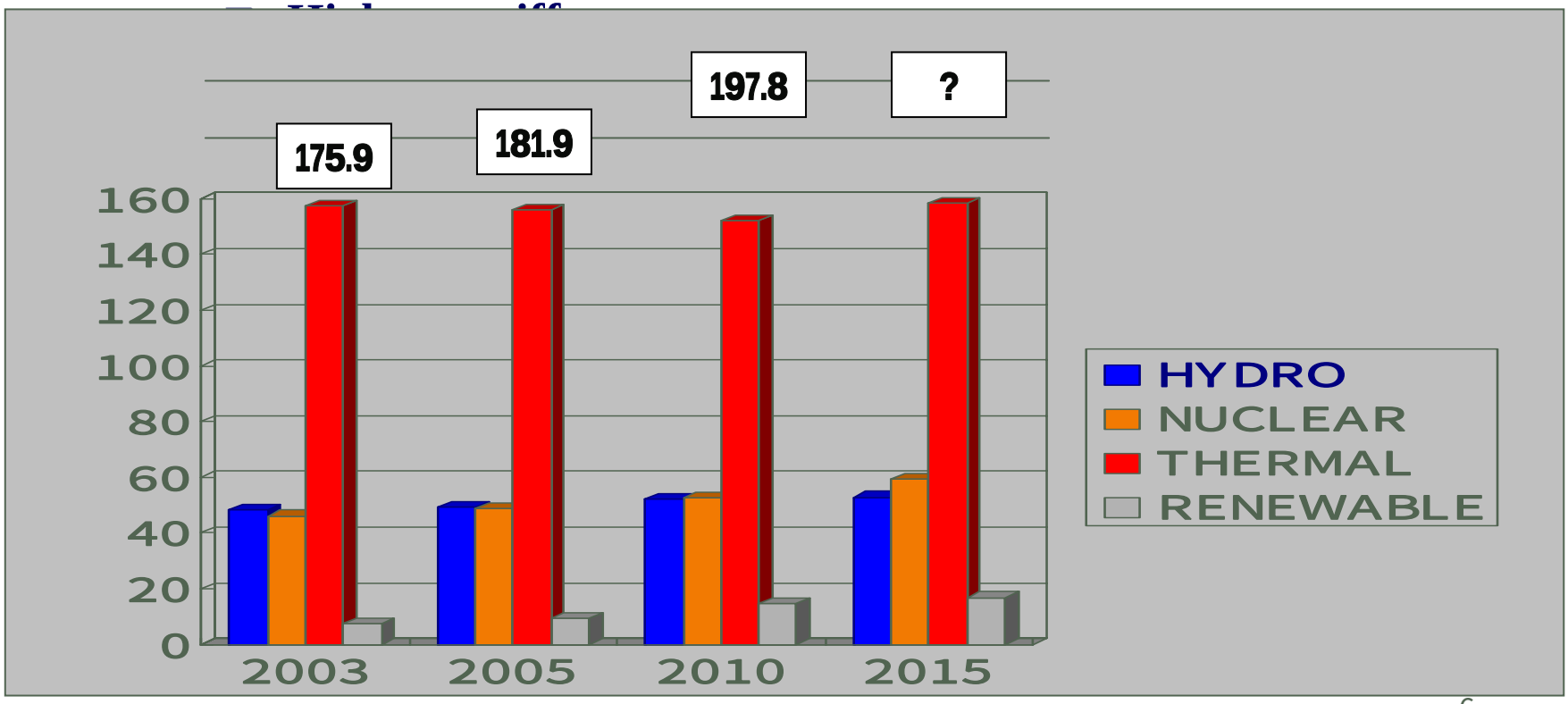


- **No detailed information about the future of Chinese power system. And, Mongolian, neither.**

II. EL. INDUSTRY in JAPAN



- Capacity reserve rate : 46.6('03) – 37.5('10) %
- Saturation of peak demand : annual increase rate of 1.3%



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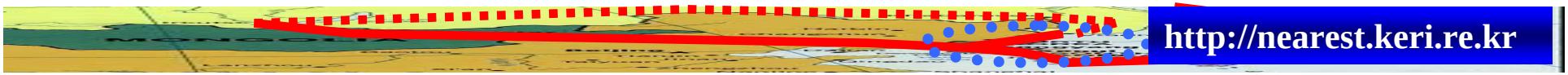
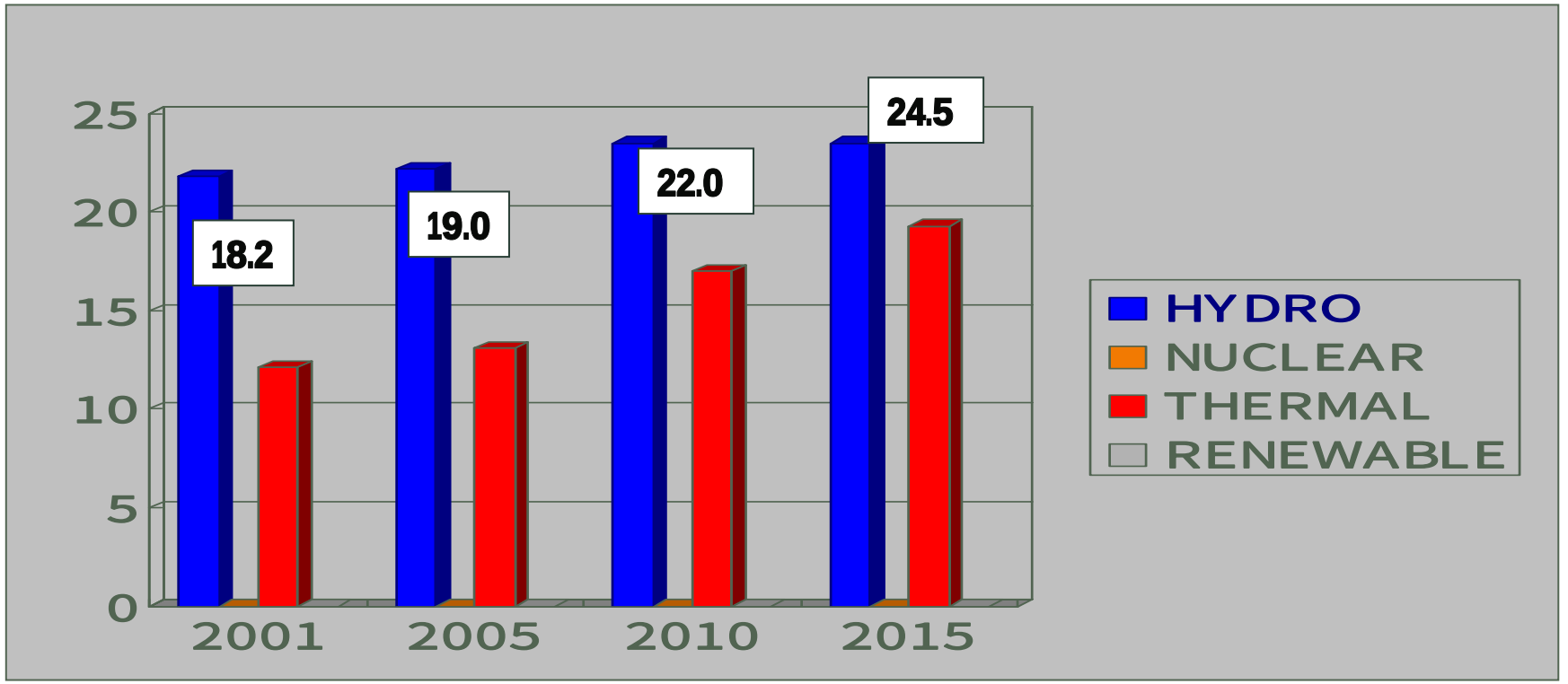
II. EL. INDUSTRY in EAST SIBERIA



- Capacity reserve rate : 86.3(’01) – 74.7(’15) %
- High potential of hydraulic resources but low power demand



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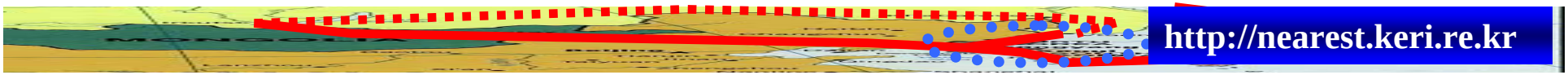
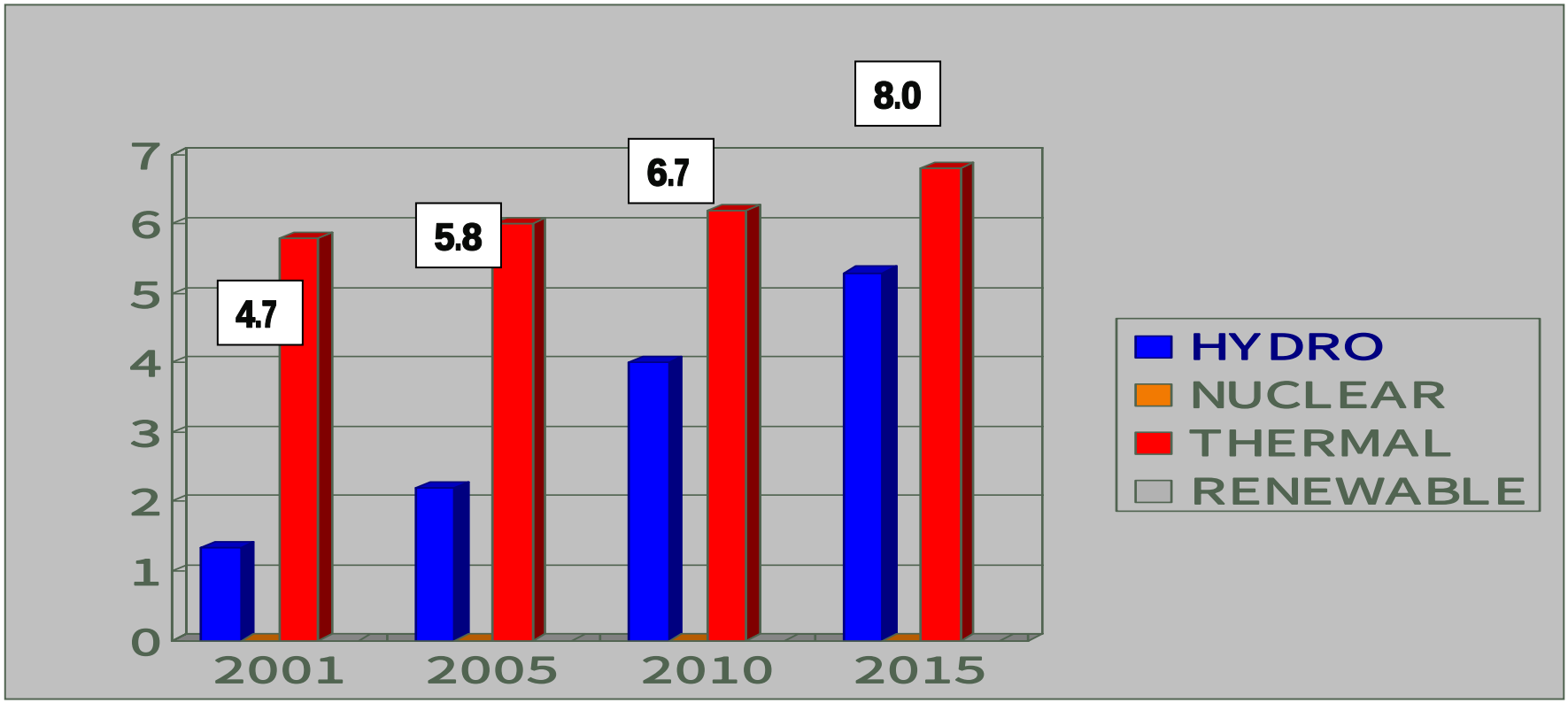
II. EL. INDUSTRY in FAR EAST RUSSIA



- Capacity reserve rate : 51.0(’01) – 59.5(’15) %
- High potential of hydraulic resources but low power demand



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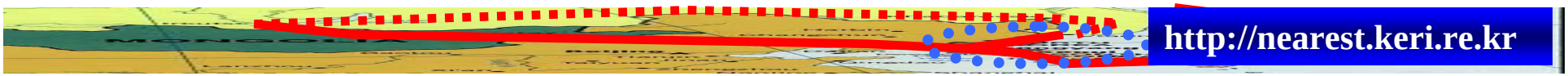
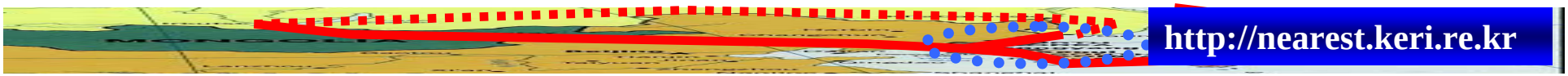
II. EL. INDUSTRY in DPRK

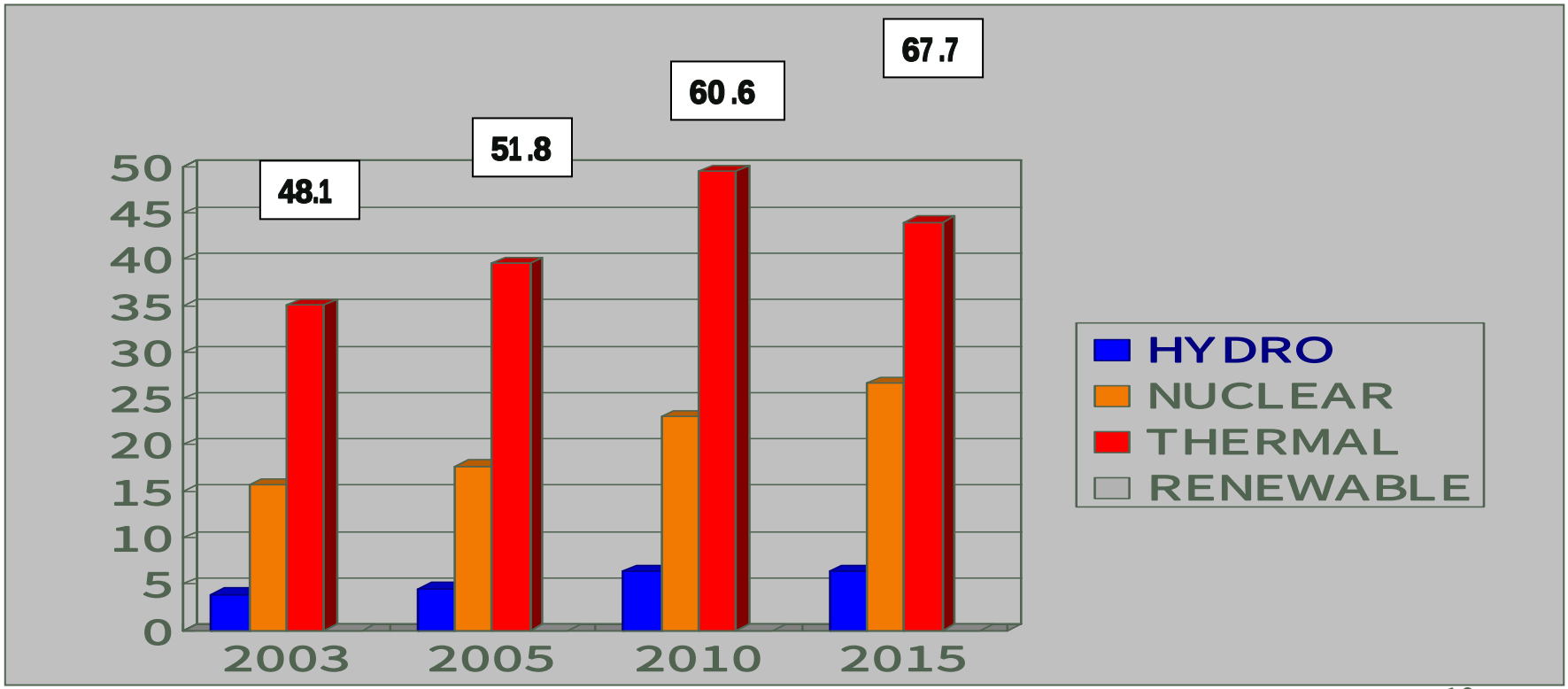


- Trying to get official data and information from the authority. Already requested.
- Having requested power supply of 500[MW] at once and 2,000[MW] at the final stage, in 2001
  - Thereafter, 1,000[MW] capacity has been developed by themselves
- Having signed MOU for interconnection between Vladivostok and Cheongjin for power supply of 500[MW] needed for North-east area of DPRK

II. EL. INDUSTRY in ROK



- Capacity reserve rate : 15 – 20%
- Fraction of nuclear power capacity : 28.8 – 34.5%
- Annual increase rate of peak demand : 3.4%



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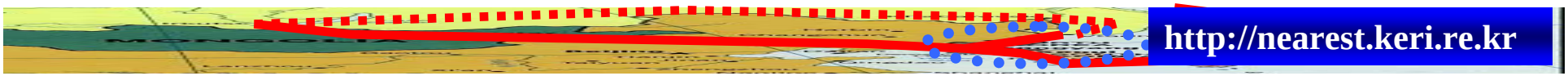
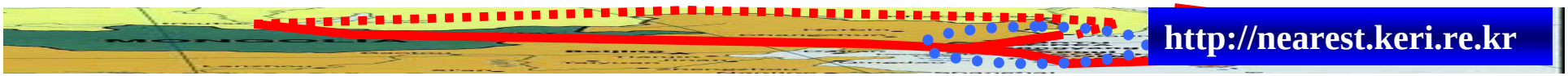
III. ISSUES



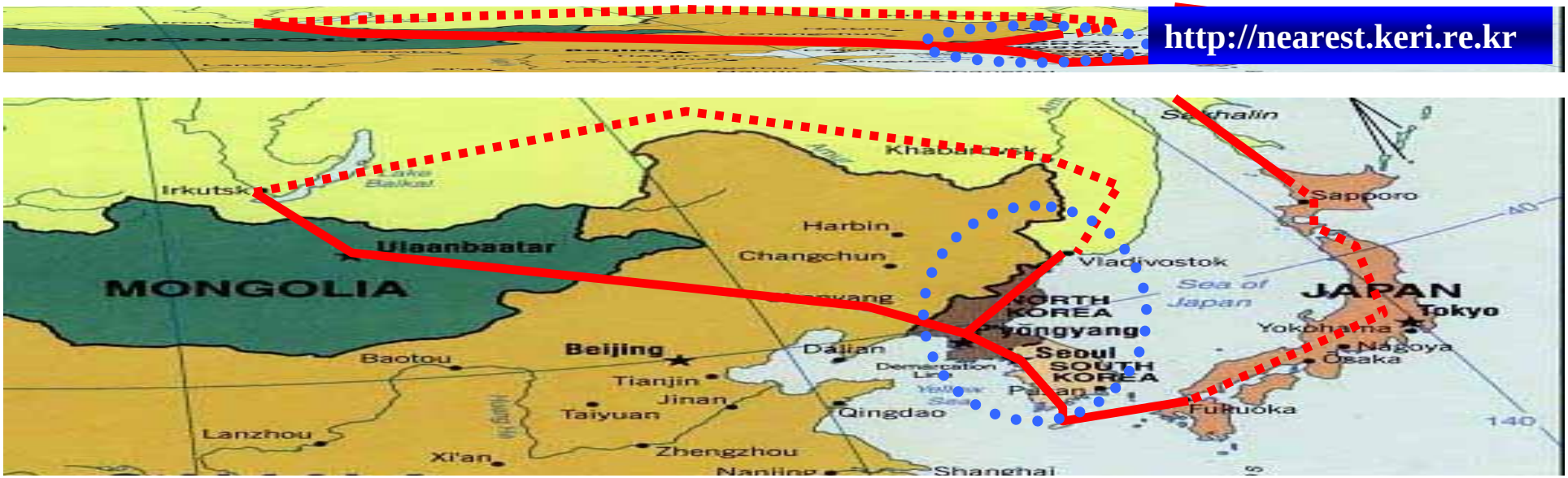
- **Shortage of generating capacity**
  - **DPRK and Mongolia**
- **Excess of generating capacity**
  - **Japan, East Siberia and Far East Russia**
- **Energy security(High reliance on import of primary energy)**
  - **ROK, Japan, DPRK and (China and Mongolia)**
- **Reinforcement of network including regional interconnection**
  - **China, DPRK and (Mongolia)**

III. ISSUES



- **High tariff**
  - **Japan**
- **Others**
  - **Power cooperation between North and South : ROK and DPRK**
  - **Difficulty in siting power plants in Seoul area, load center : ROK**
  - **Financing economy development program, raised by exporting energy resources : Siberia and Far East Russia**

IV. ON-GOING PROJECT



To have started a research project on NEAREST sponsored by the Korean government

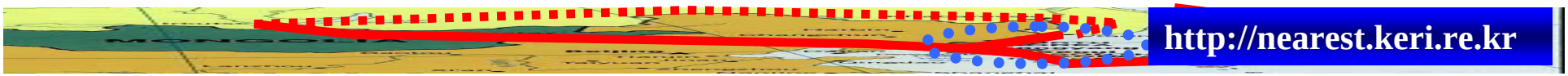
North-East Asian Region Electric System Ties : NEAREST

http://nearest.keri.re.kr

R.O.Korea ⊕ D.P.R. Korea ⊕ Russia, Mongolia, China, Japan

KOREA ELECTROTECHNOLOGY RESEARCH INSTITUTE

IV. ON-GOING PROJECT



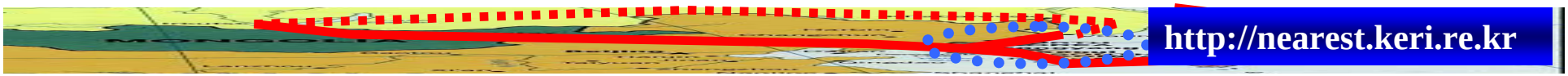
❑ Research project on NEAREST

- ❖ To be sponsored by the Korean government
- ❖ To be managed by KERI with several domestic and overseas participating organizations
- ❖ To be carried out from Dec. 1, 2002 to Nov. 30, 2005

❑ Scope of the project

- ❖ To evaluate technical, economic and market feasibility
- ❖ To build up database
- ❖ To build up international cooperation

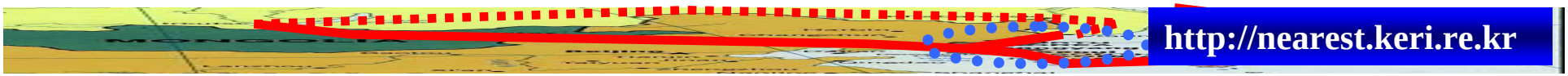
IV. ON-GOING PROJECT



❑ Technical and Economic Feasibility at the 1st stage

- ❖ **Discuss technical impacts on the ROK power system under the assumption of system interconnection between ROK and Far East Russia in the year of 2000 as follows;**
  - ➢ **No limitations to power supply from Far East Russia**
  - ➢ **No power flow between DPRK and the other two countries, that is, direct interconnection between ROK and Russia with DPRK as as a passage through.**
  - ➢ **Discuss technical impacts in the viewpoints of load flow, fault current, stability, reliability, reasonable amount of power trade and so on**
- ❖ **Evaluate economic benefits**
  - ➢ **Finally, evaluate reasonable power flow from Russia, avoided capacity development and operation cost, reasonable capacity and operation reserve, etc.**

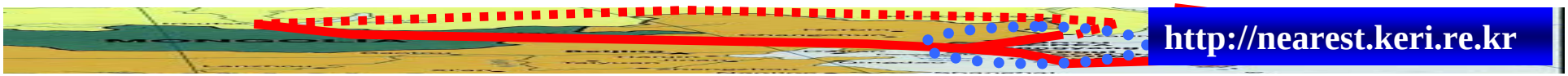
IV. ON-GOING PROJECT



❑ Technical and Economic Feasibility at the 2nd stage

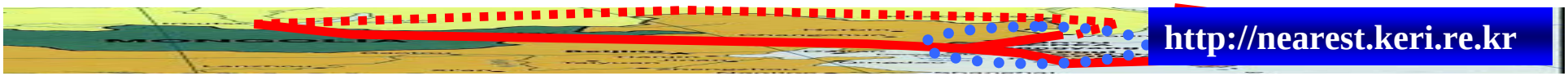
- ❖ **Discuss technical impacts on the participating systems when being interconnected in the year of 2010(Far East Russia-DPRK-ROK)**
  - ➢ **Considering technical limits of participating systems**
  - ➢ **Considering the planning and operation criteria discussed at the 1st stage**
  - ➢ **Considering effects on environmental pollution**
- ❖ **Evaluate economic benefits of the participating systems by the same way as used at the 1st stage**
- ❖ **If DPRK data is not available, its impact will be discussed qualitatively.**

IV. ON-GOING PROJECT



- **Technical and Economic Feasibility at the 3rd stage**
  - **Evaluate theoretically maximum economic benefits and its share of the participating countries(Far East Russia-DPRK-ROK) when being fully interconnected in the year of 2010. "Fully interconnected" means a unified single system.**
- **Technical and Economic Feasibility at the 4th stage**
  - **Discuss qualitatively effects of system interconnection of all the six countries in Northeast Asia**

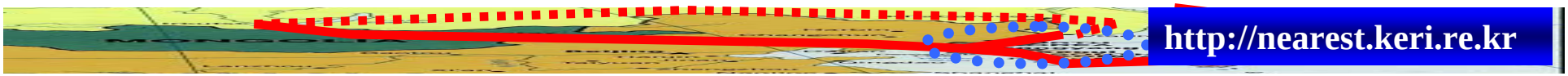
IV. ON-GOING PROJECT



❑ Market feasibility

- ❖ Possibility of power cooperation considering law, institution, politics, energy security, experiences in the other regions
  - ➢ Main business body : Government, private(or non-government) or mixed
  - ➢ Restructuring of power industry : price, trading form and so on
  - ➢ Settling of disputes among players
- ❖ Concrete plan and strategy including project financing
  - ➢ Energy chart, Multi-lateral agreement, cooperation body and so on
  - ➢ Sharing method of profit(or benefit)
- ❖ Expected barriers and countermeasures
- ❖ Priority as a national project disregarding economic benefit
  - ➢ Other motivations

IV. ON-GOING PROJECT



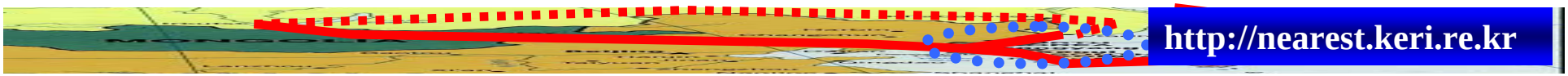
❑ International cooperation

- ❖ International joint-work : Russia(VOSTOKENERGO, ESI), DPRK(Ministry of electricity and coal industry, Remote power control research institute)
- ❖ International cooperation : APERC, IEA, UNESCAP

❑ Build-up of D/B

- ❖ http://nearest.keri.re.kr
- ❖ Difficulty in gathering data of Japan, China, Mongolia and DPRK

V. CONCLUSION



- **System interconnection is one of best solutions**
  - **Whether will NEAREST be mutually beneficial ?”**
  - **Whether can barriers against NEAREST be overcome ?**