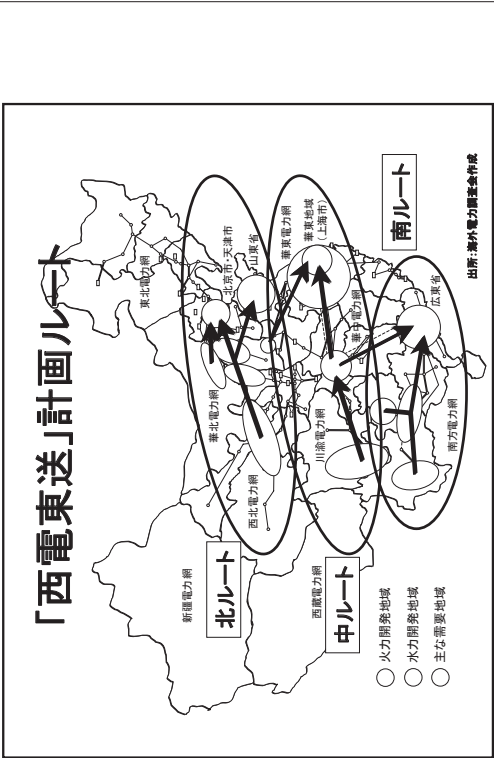
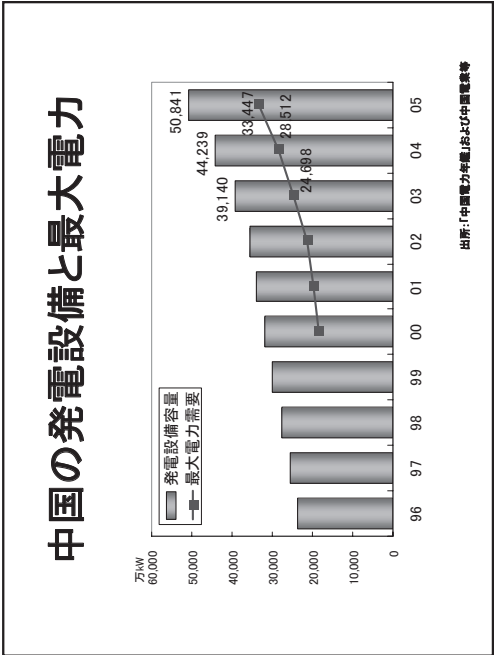
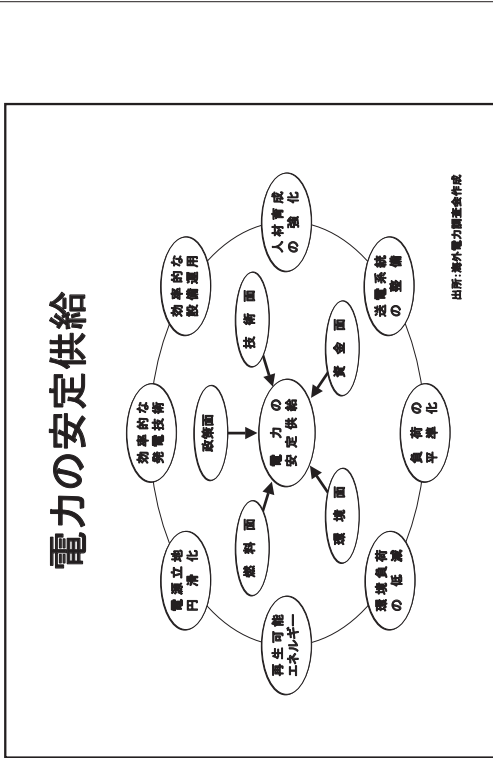
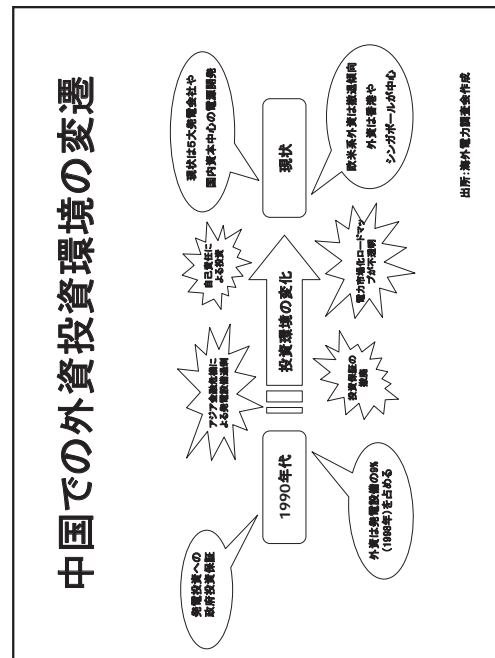
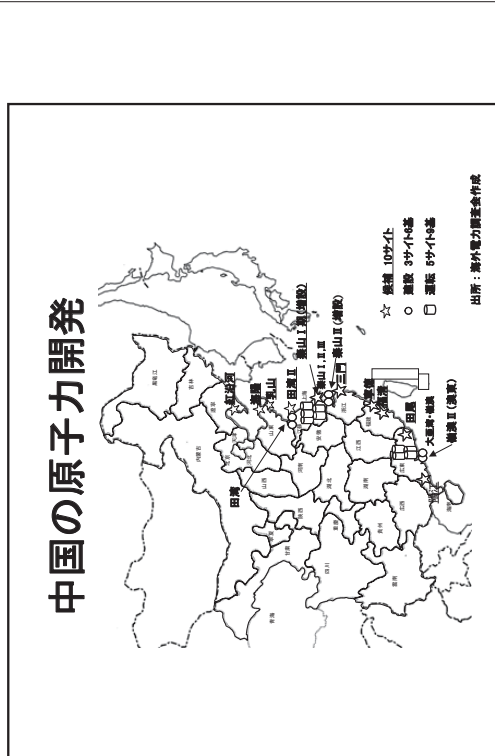
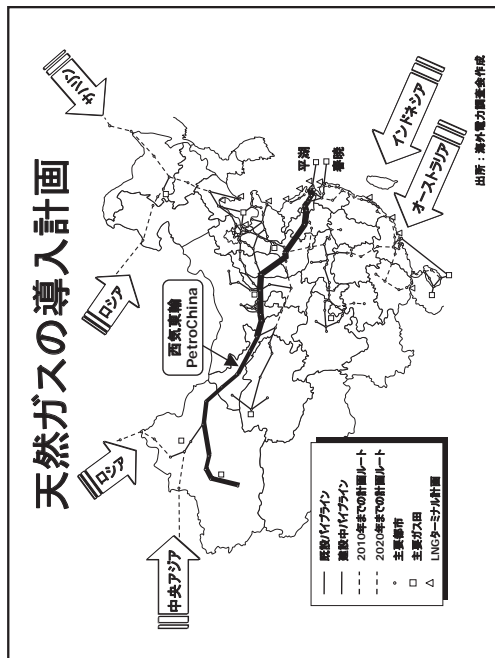
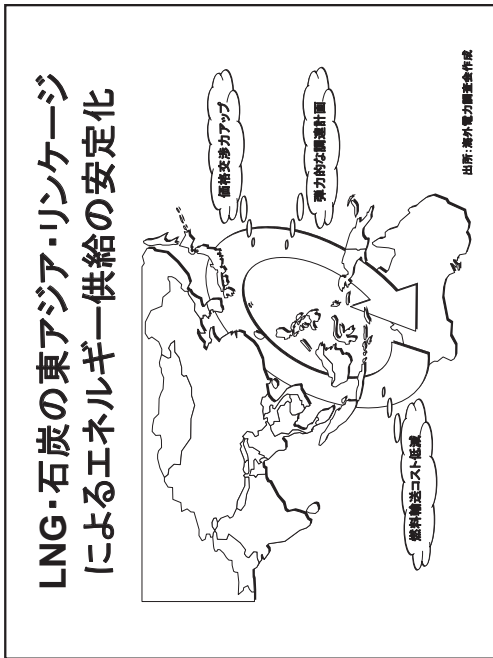


電力産業の安定供給と 東アジアのエネルギー・リンクエージ

(社)海外電力調査会
古市 正敏







日中韓の電力統計

(2004年版)

項目		日本	中国	韓国				
一般	人口(100万人)	127.6	1,299.9	48.1				
	面積(千km ²)	377.9	9,600	99.6				
	GDP(米10億ドル)	4,664	1,932	680.1				
	人口一人当りのGDP(米ドル/人)	36,542	1,490	14,143				
	対前年実質GDP成長率(%)	2.6	10.1	4.6				
電気事業	電化率(%) ^{※1}	100	98	100				
	主な電気事業者	10電力,電発,原電	国家电网,5大発電等	KEPCO,発電子会社等				
	主な電気事業者の従業員数(人)	136,270	N.A.	18,081				
発電設備	発電設備容量 ^{※2} [既設] (MW,%)	水力	45,191	19.3%	105,242	23.8%	3,879	6.5%
		火力	140,742	60.3%	329,483	74.5%	39,258	65.5%
		原子力	47,122	20.2%	6,836	1.5%	16,716	27.9%
		その他 ^{※3}	501	0.2%	820	0.2%	108	-
		計	233,556	100%	442,387	100%	59,961	100%
	人口一人当りの発電容量(kW/人)	1.83	0.34	1.25				
	石炭火力発電所の発電端熱効率(%)	40.28	34.4	39.3				
	発電設備容量 [将来] (MW,%)	年	2014	2020	2017			
		水力	47,670	18.1%	N.A.	N.A.	6,290	7.1%
		火力	153,270	58.3%	N.A.	N.A.	48,699	55.3%
原子力		61,490	23.4%	N.A.	N.A.	26,637	30.3%	
その他 ^{※3}		520	0.2%	N.A.	N.A.	6,412	-	
計	262,940	100%	950,000	100%	88,038	93%		
需給	発電電力量 ^{※4} (GWh,%)	水力	95,508	10.1%	330,990	15.1%	5,861	1.7%
		火力	565,666	59.7%	1,810,380	82.5%	204,777	59.9%
		原子力	282,442	29.8%	50,469	2.3%	130,715	38.3%
		その他 ^{※3}	3,140	0.3%	2,513	0.1%	350	-
		計	946,756	100%	2,194,352	100%	341,703	100%
	販売電力量 (GWh,%)	家庭用	272,547	31.5%	245,590	11.3%	48,615	15.6%
		商業用	125,036	14.4%	73,426	3.4%	92,726	29.7%
		工業用	455,042	52.6%	1,605,265	73.8%	150,557	48.2%
		その他	12,803	1.5%	251,849	11.6%	20,198	6.5%
		計	865,428	100%	2,176,130	100%	312,096	100%
人口一人当たりの販売電力量(kWh/人)	6,780	1,674	6,490					
最大電力(MW) ^{※5}	171,823	285,120	51,264					
最大電力対前年増加率(%)	4.8	15.4	7.6					
国際融通 電力量 ^{※6} (GWh)	輸出	-	N.A.	-				
	輸入	-	N.A.	-				
	融通差引	-	N.A.	-				
流通設備	送電線亘長 (km)	200kV以上	17,756	220,723	8,564			
		200kV未満	76,368	248,445	19,845			
		計	94,124	469,168	28,409			
	配電線亘長 (km)	中圧	714,173	N.A.	186,502			
		低圧	554,824	N.A.	193,862			
30kV級以下	計	1,268,997	N.A.	380,364				
送配電損失率(%) ^{※7}	5.2	7.7	4.5					
供給信頼度【停電時間(分/需要家) ^{※8} 】		18	949	17.5				
従業員一人当たりの販売電力量(MWh/人)		6,351	N.A.	17,261				
料金	総合販売単価(現地通貨/kWh) ^{※9}	17.1	0.47	74.6				
	為替レート(現地通貨/U.S.¢) ^{※10}	1.04	0.08	10.35				
	総合販売単価(U.S.¢/kWh)	16.5	5.67	7.20				

(注)

日 本:[電気事業便覧(平成17年版)],日本電気協会 [電源開発の概要 H17][電気保安統計 H15],METI
 韓 国:[経営統計 2004],KEPCO [電気年鑑 2006], KEA
 中 国:[中国電力年鑑2005][Electric Power Industry in China2005][中国電力企業連合会HP]等

(社)海外電力調査会

電力 連繋線の含意
技術的, 社会的, (文化的)

Seoul National Univ. Korea
Power System Economics Lab.
Prof. Jong-Keun Park

Contents

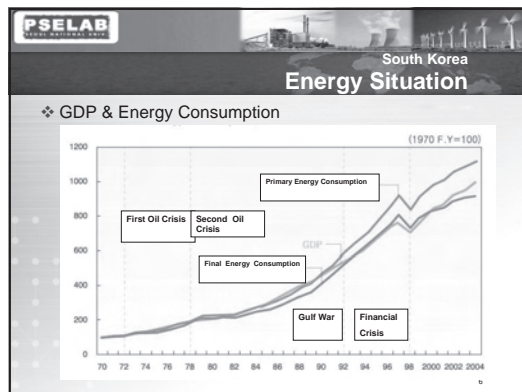
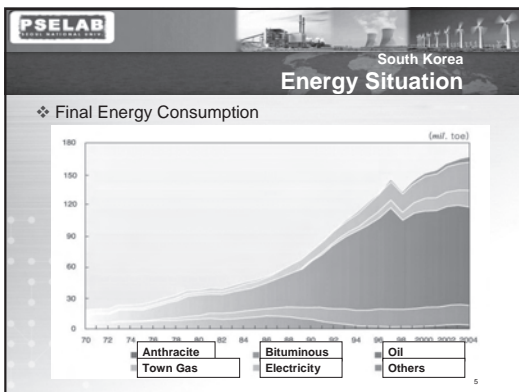
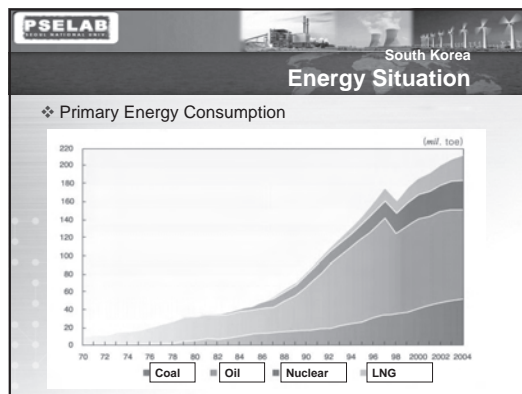
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2. Electric Power of Korea
3. Scenarios of North East Asia Interconnection
4. Eastern Asia Countries Cooperation from the Viewpoint of Electric Power

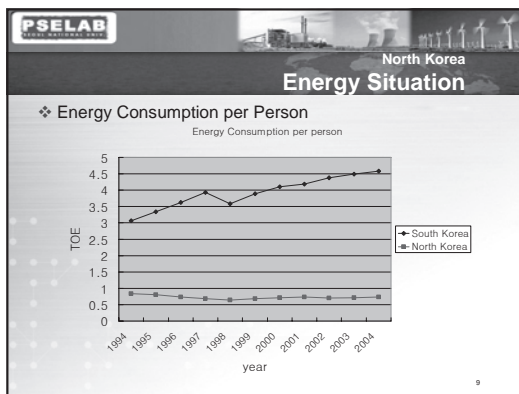
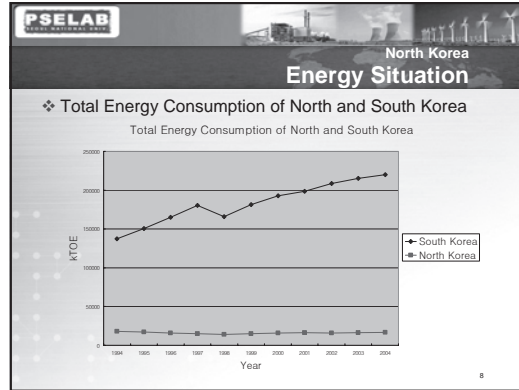
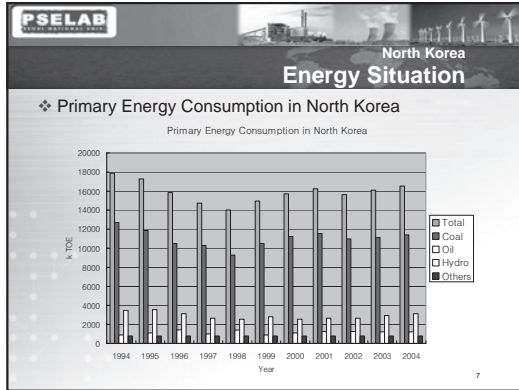
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1. Energy Situation of Korea

- ❖ Energy Situations of South Korea
 - Primary Energy Consumption
 - Final Energy Consumption
 - GDP and Energy Consumption
- ❖ Energy Situations of North Korea
 - Primary Energy Consumption
 - Comparison between North Korea and South Korea

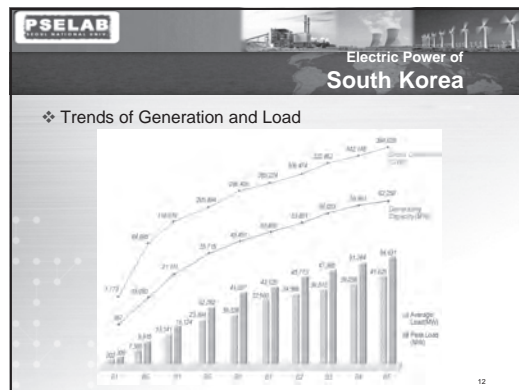
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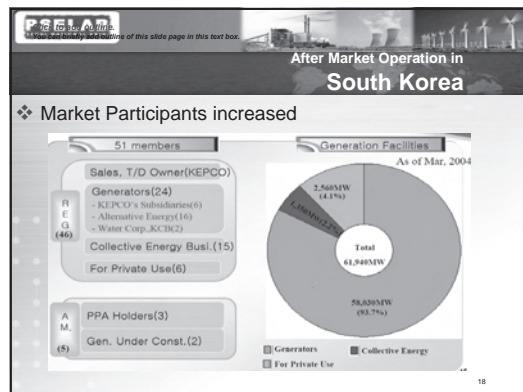
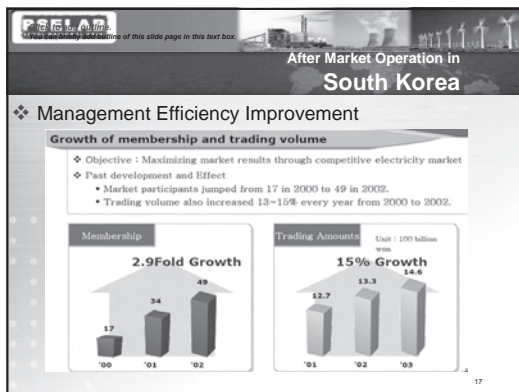
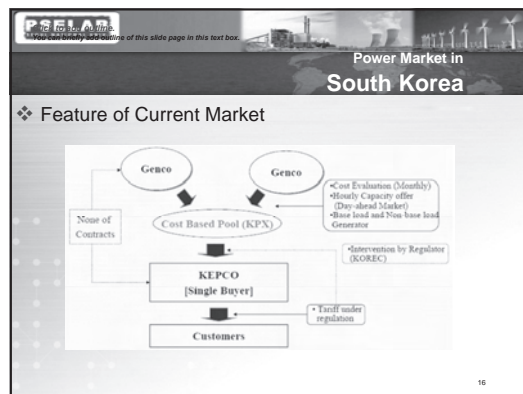
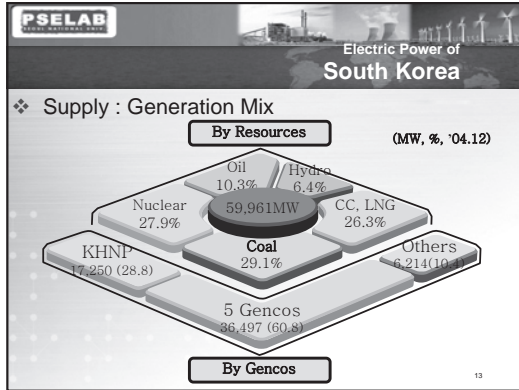


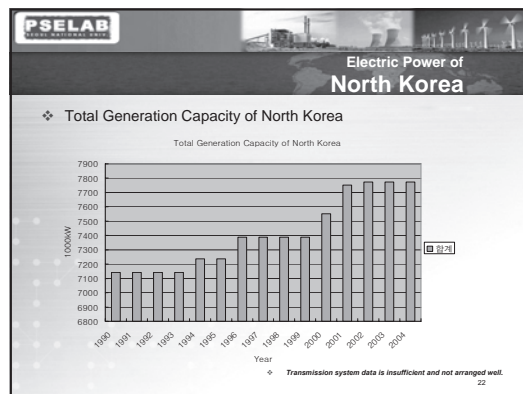
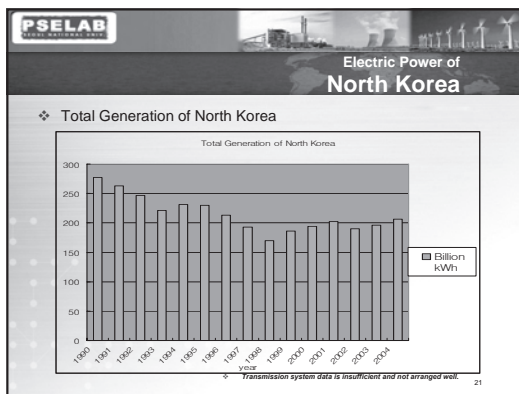
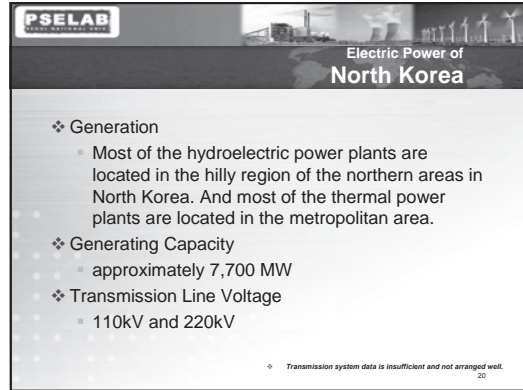
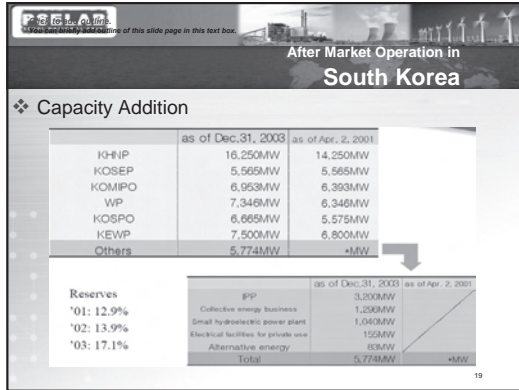


- 2. Electric Power in Korea**
- ❖ Electric Power in South Korea
 - Generation and Load
 - Supply : Generation Mix
 - Transmission
 - ❖ Power Market in South Korea
 - Feature of Current Market
 - Procedure of Power Trading
 - Current Cost-Based Pool

- 2. Electric Power in Korea**
- ❖ After market operation in South Korea
 - Management efficiency improvement
 - Market participants increased
 - Capacity addition
 - ❖ Electric Power of North Korea
 - Total generation
 - Total capacity
 - Comparison between North and South Korea
 - ❖ Comparison between North, South Korea and Japan







Electric Power of Korea, Japan

❖ Generation Comparison (2005)

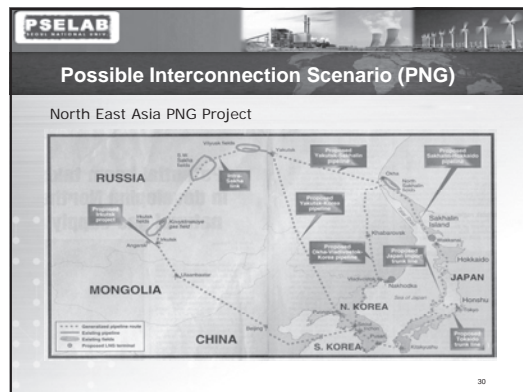
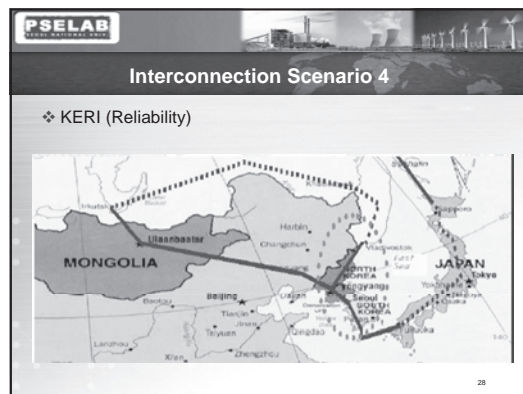
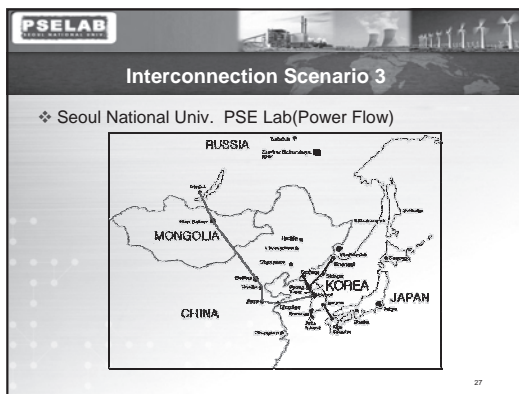
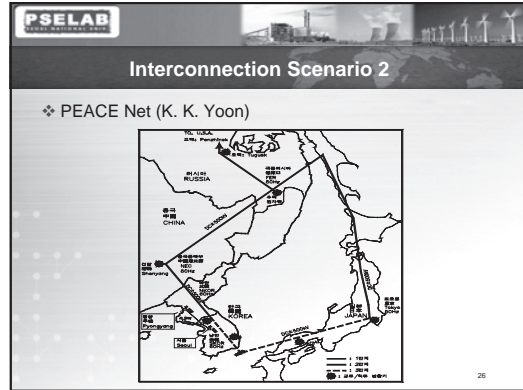
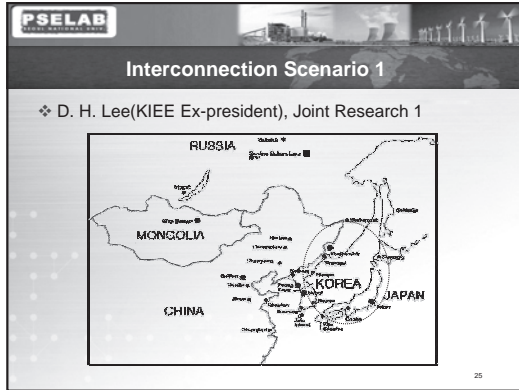
Generation	South Korea	North Korea	Japan
	10 ¹⁰ kWh, %	10 ¹⁰ kWh, %	10 ¹⁰ kWh, %
Total Generation	3,421	206	11,373
Hydro	59	125	1,031
Ratio	1.7	60.7	9
Thermal	2,055	81	7,470
Ratio	60.1	39.3	65.7
Nuclear	1,307	-	2,824
Ratio	38.2	-	24.8

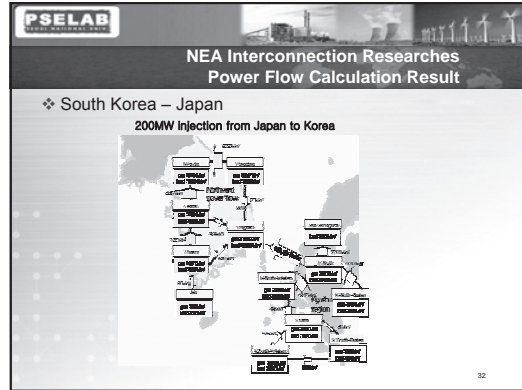
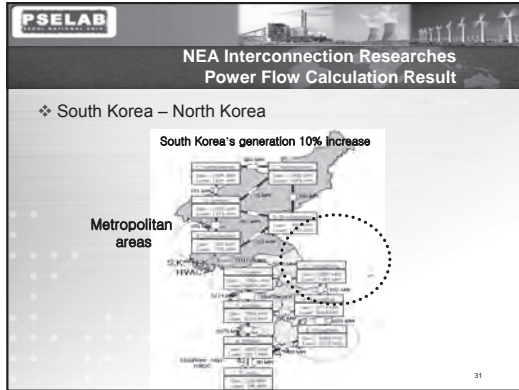
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3. Scenarios of North East Asia Interconnection

- ❖ Possible Interconnection Scenarios :
 - Russia, China, North Korea, South Korea, Japan
- ❖ Related Research in Korea
 - Power flow study
source : Power System Interconnection Plan, Seoul National Univ.
 - Reliability study
source : Technical Assessment for NEAREST, KERI
 - Economic feasibility study
source : Tentative Result for NEAREST Project -Economic Feasibility, Hongik Univ.
 - Feasibility Study of 2 Koreas' Interconnection
source : A Study on Evaluation of Tie Lines between North and South Korea and its Selection of the Best Alternative, Daejin Univ.

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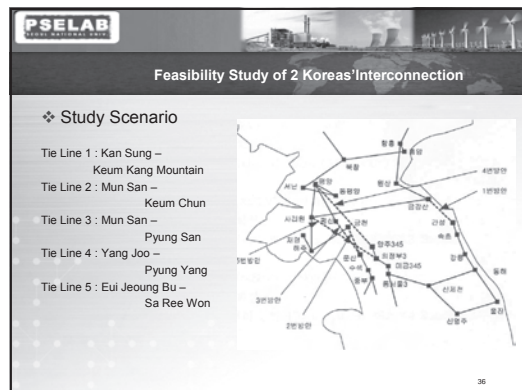
PSELAB
NEA Interconnection Researches
Reliability Study Results

2010 Year	No Interconnection			Interconnection		
	LOLE [Hrs./Yr]	EENS [Gwh/Yr]	EIR [PU]	LOLE [Hrs./Yr]	EENS [Gwh/Yr]	EIR [PU]
South Korea	0.682933	1.673132	1	3.5685	11.82403	0.99997
North Korea	338.45784	658.97156	0.99221	2.003261	6.03148	0.999973
Far East Russia	4.907834	4.324243	0.99992	1.86526	0.919985	0.999975
North East China	20.04523	40.05638	0.99991	2.14289	8.101669	0.999975
Mongolia	131.4	83.9195	0.985	0.81899	0.172636	0.999955
Japan	0.24075	0.59448	0.9999995	1.81674	19.36743	0.999978
AVE.	82.6224	131.5899	0.9962	2.0358	7.7362	1

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- PSELAB**
NEA Interconnection Researches
Reliability Study Results
- ❖ Summary for NEAREST Region Interconnection
- Overall reliability level for all countries are increasing by interconnection
 - Reasonable capacity of tie line is suggested as 3GW, because reliability level effect is saturated from 4GW in 2010
 - Reliability characteristics in 2020 which is similar with reliability trend of 2010 year has been obtained
- ❖ Power Exchange Pattern
- Seasonal power exchange between interconnected countries
 - (Summer Season) Russia, North Korea -> South Korea, Japan, China
 - (Winter Season) South Korea, Japan, China -> Russia, North Korea, Mongolia
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- PSELAB**
NEA Interconnection Researches
Economical Feasibility Results
- ❖ Interconnection Reduces Total Generation Capacity
- Restraining Excessive Capacity Expansion in South & North Korea
 - Increasing Capacity Utilization of Generators
- ❖ Bulk Power Flow from Russia to North Korea to South Korea
- ❖ Interconnection Increases Total Generation
- Caused by T/L Loss
 - Especially, Generation at RFE drastically Increases
- Interconnection : Economical
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PSELAB
NEA Interconnection Researches
Selection of Tie Lines between South Korea – North Korea

❖ Evaluation Value of Tie Lines

Tie Line	Construction Cost	Maintenance Cost	Total Loss	Overloading Factor	Overall (ranking)
#1	0.67	1.00	0.10	1.00	0.512(1)
#2	1.00	0.15	0.40	0.90	0.400(3)
#3	0.67	1.00	0.20	0.70	0.512(1)
#4	0.20	0.30	0.70	0.40	0.300(5)
#5	0.24	0.35	0.90	0.20	0.303(4)

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PSELAB

4. Korea – Japan Cooperation from the viewpoint of Electric Power

❖ Korea – Japan Cooperation from the viewpoint of Electric Power

- Joint Research
- National Project of Korea: NEAREST (North East Asian Region Electrical System Ties)
- Institute of Electrical Engineers : ICEE, KIEE, IEEJ

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PSELAB
Korea - Japan Cooperation
Joint Research

❖ Korea-Japan Joint Researches in Seoul Nat'l University

Year	Institute	Subject
1994–1996	KOSEF Tokyo Univ.	The research on economic dispatch plan and operation system development
2000–2003	KISTEP Hokkaido Univ.	International cooperative research on the environmentally sound energy management in the rim of the east sea
2006–2007	KOSEF Aichi Univ.	The research on interconnection and operation of electrical network and influenced electricity trade in North East Asia

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PSELAB
Korea - Japan Cooperation
National Project of Korea: NEAREST

❖ NEAREST Project (North East Asian Region Electrical System Ties)

- Title : Development of cooperational infrastructure for NEAREST
- Period : 2002. 12 ~ 2005. 12
- Main Organization : KERI (Korean Electricity Research Centre)
- Contents
 - (1) Research and analysis of interconnection system, D/B development
 - (2) To organize a conference group for power cooperation in Northeast Asia
 - (3) The evaluation and analysis of Technology, Economical feasibility, and marketability
 - (4) The establishment of a promotion plan for the NEAREST and policy consultation
- International Symposium
 - 1st International Symposium on NEAREST: 2004. 5. 18 ~ 19, Seoul
 - 2nd International Symposium on NEAREST: 2005. 10. 24 ~ 25, Seoul (<http://nearest.keri.re.kr/symposium2/index.htm>)

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