

Korea's Perspective on Energy and Economic Cooperation in Northeast and Central Asia

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*Energy Resource Cooperation and Corporate Strategy in
Northeast and Central Asia***

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Korea at a Glance (2006)

- **Land Area: 99,646 km²**
 - **More than 70 % unproductive hill/mountains**
 - **Population: 48.5 million**
 - **High population density**
 - **Skilled man powers**
 - **Moderate Climates**
 - **Cold winter: Low productivity in agricultures**
- ⇒ **Economic Development Strategy:**
- **High value-added industries**
 - **Export to international markets**
- **GDP: US\$ 887 billion**
 - **per capita: US\$ 18,372**



Korea at a Glance (2006)

- **Limited Energy Resources**
 - **Domestic Reserves: Anthracite,, hydro, renewables**
 - **No oil, natural gas, bituminous coals**

- **Energy Import (2007)**

- **Import Dependency: 96.7%**
- **Energy Imports: \$ 95.0 billion (Energy Import/Total Import: 26.6%)**
- **Crude Oil: Saudi Arabia, UAE, Kuwait, Iran, Qatar, ...**
 - ✓ **ME Dependency of Crude Oil: 80.7%**
 - ✓ **Russia 1.6%, Central Asia 0.5 %**
- **LNG : Indonesia, Qatar, Oman, Malaysia, Brunei, ...**
 - ✓ **LNG 1.5 million tons from Russia (2009)**
- **Coal : Australia, China, Indonesia, Russia, Canada, ...**
 - ✓ **Russia 11%**

- **Korea ranks in the world**

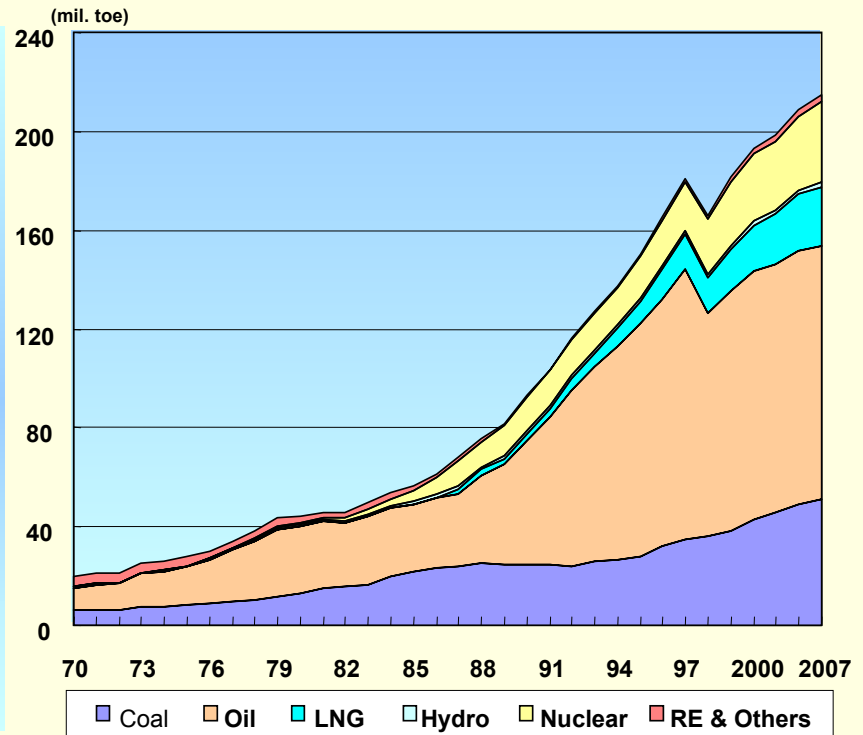
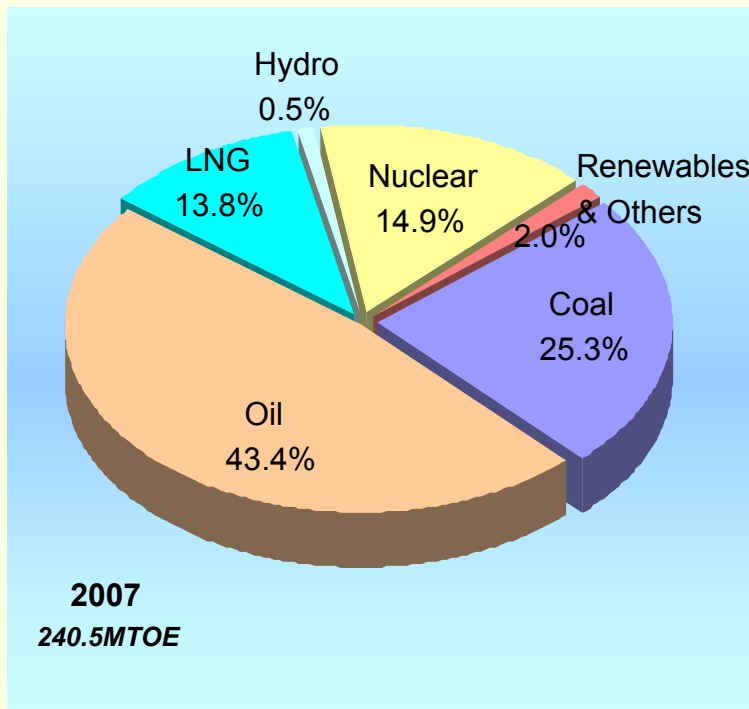
Economic Development in Korea

- ◆ Korea was one of the least developed countries in terms of industrial development in early 1960's → It has been transformed into one of leading industrial countries in the world during the last 40 years.

Korean Industries in 1960 and in 2006

	1960	2006
GDP per capita (in US\$)	82	18,173
Share of Manufacturing (in GDP(%))	14.4	24.7
Major Industries	Wigs Eyelashes Clothes Plywood	Shipbuilding(world no.1) Automobile(world no.5) Semiconductor(world no.3) Steel(world no. 5)

Primary Energy Consumption by Source



□ Trend in Consumption Shares (1981→1990→2007, %)

- Oil ↓: 58.1 → 53.8 → 43.4
- Coal ↓: 33.3 → 26.2 → 25.3
- LNG ↑: 0 → 3.2 → 13.8
- Nuclear ↑: 1.6 → 14.2 → 14.9

Energy Capacity Expansion in Korea

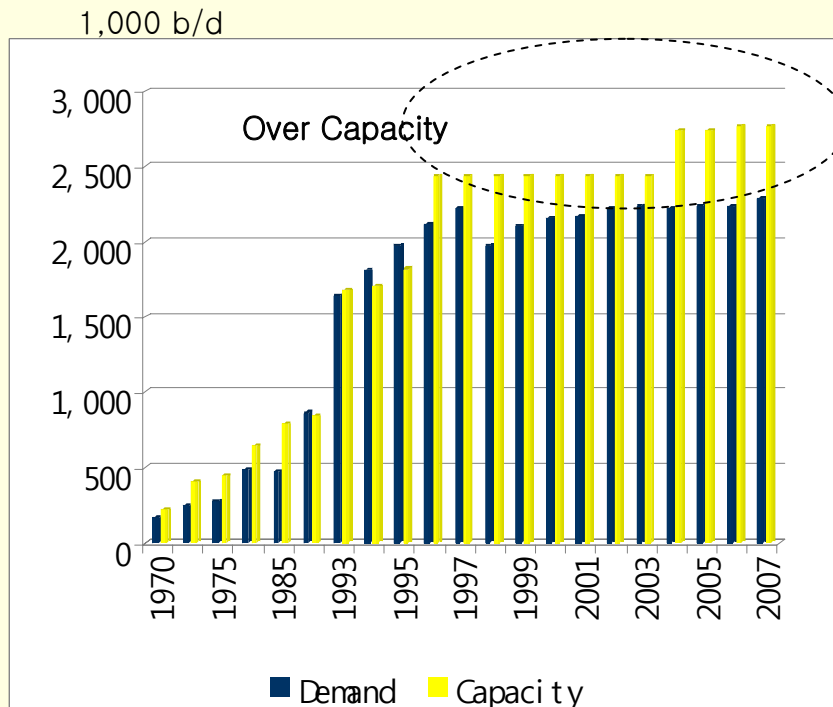
	Unit	1980	1990	2006
Total Energy	MMTOE	43.9	93.2	223.4
per capita	TOE	1.15	2.2	4.8
Generation capacity	GW	10.4	24.1	70.4
Generation	TWh	40.1	118.5	367.6
Refinery capacity	thousand bbl/d	640	840	2,772
Oil imports	MMbbl	196.7	409.6	1,083.9
LNG Imports	thousand M/T	-	2,291	25,222
City gas consumer	Thousand	99	1,220	12,141
Coal production	million ton	18.7	19.8	4.6
Coal imports	thousand M/T	7.7	24.0	76.0

Source: KEEI(2007), *Yearbook of Energy Statistics*

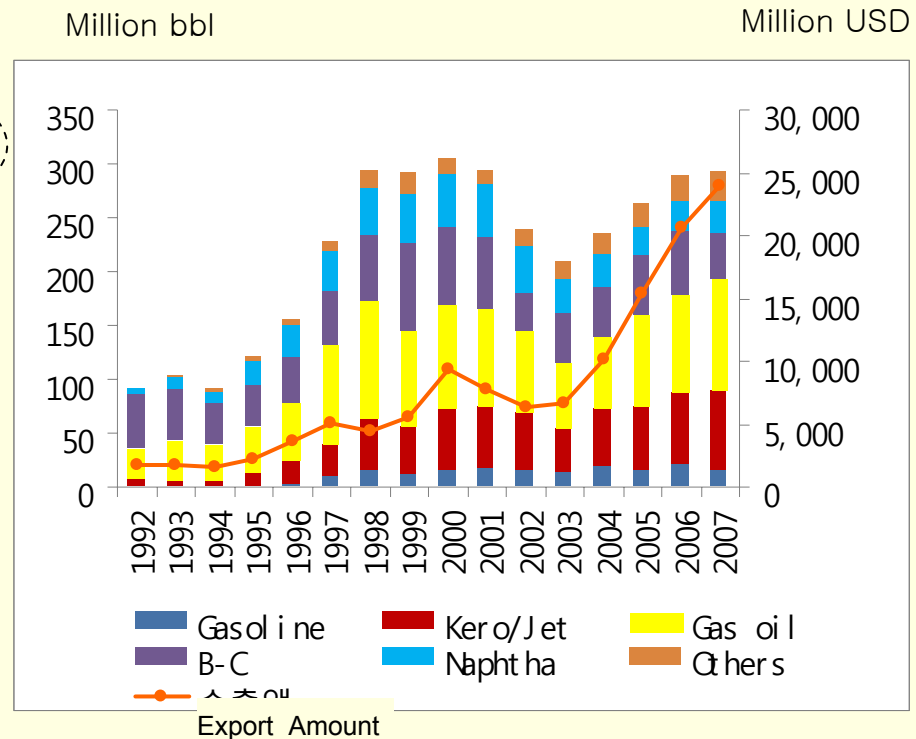
Oil Import and Facility in Korea

- Due to large scale investments in 1990s, Refinery facilities has been over-capacity.
 - ✧ **Total refinery capacity : 2.77 million b/d**
- Petroleum export recorded \$24 billion in 2007 (5th largest export commodity in Korea)

[Demand vs. Capacity]

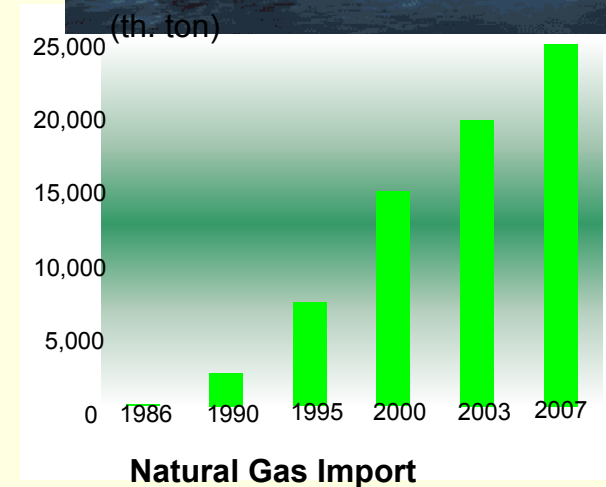


[Petroleum Product Exports]



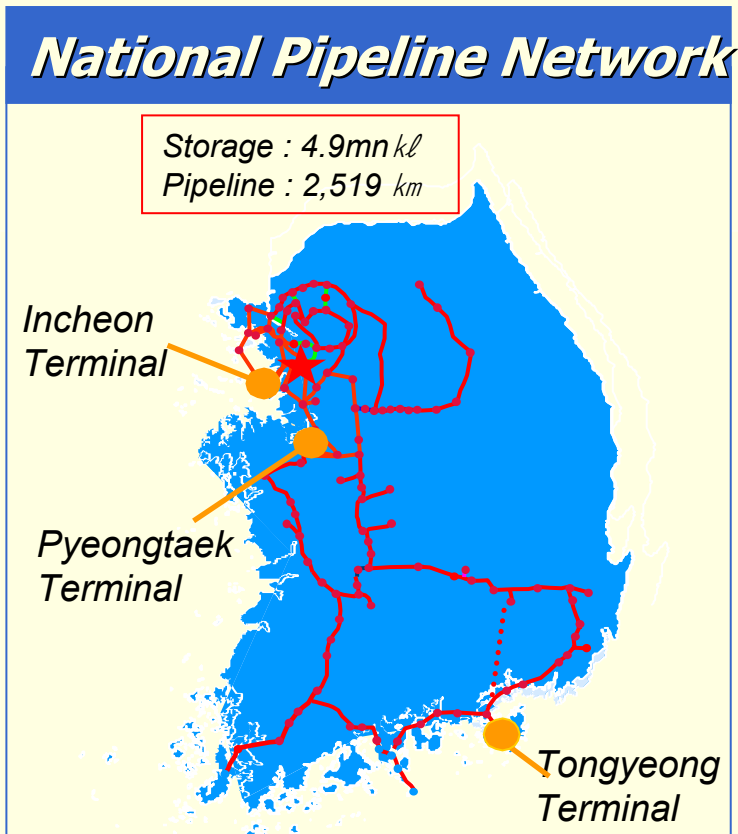
Natural Gas Development in Korea

- Korea is 7th largest natural gas importing country.
- Natural gas are imported from eight countries by Ship (LNG)



Natural Gas Development in Korea

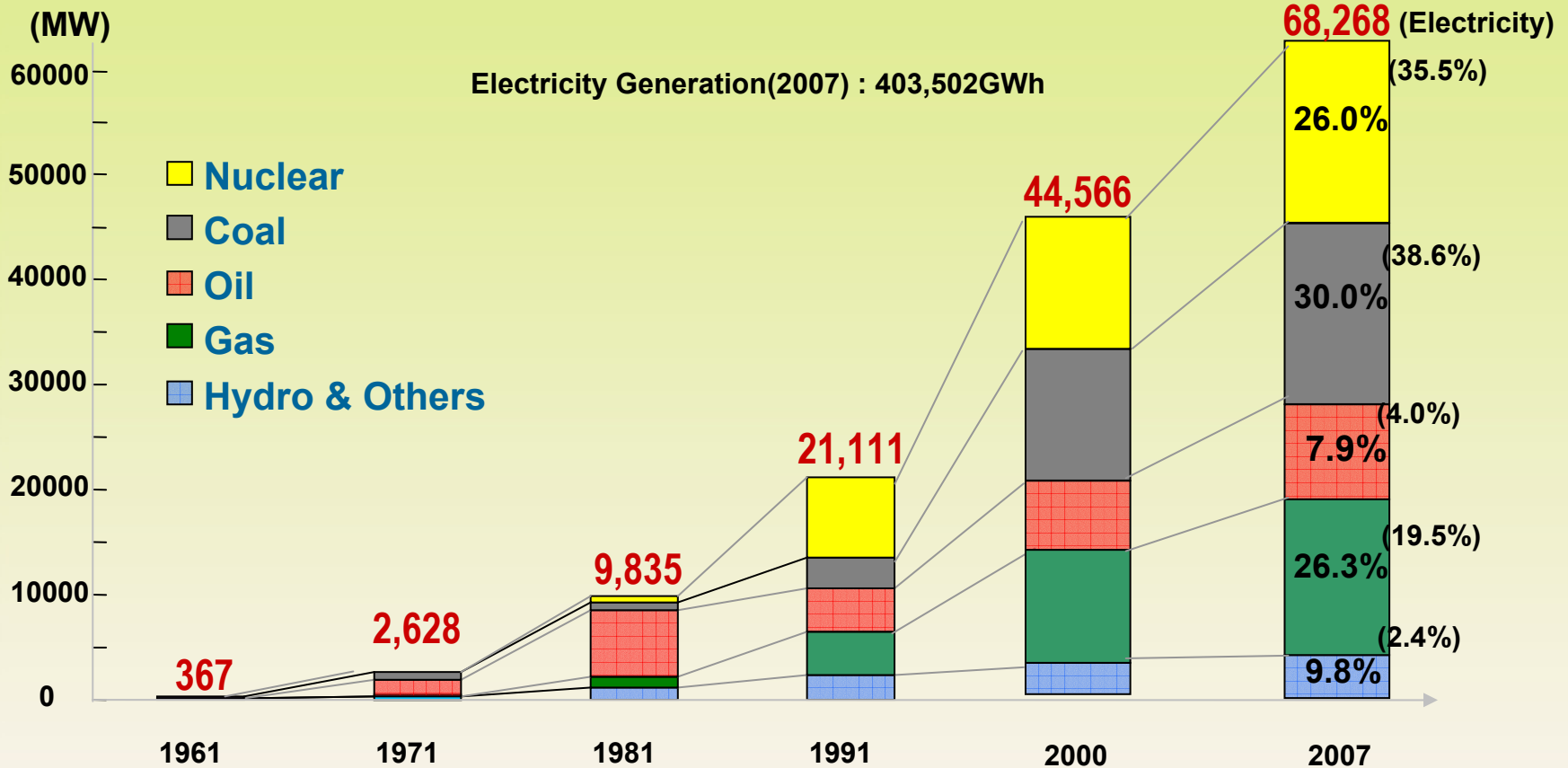
- There are three LNG terminals and nationwide pipeline networks for transport of natural gas.



	Start	Storage Capacity (1,000 kl, #)	Re-gas Capacity (Ton/h)
<i>Incheon</i>	<i>Oct. 1996</i>	<i>3,480(18)</i>	<i>3,690</i>
<i>Pyeongtaek</i>	<i>Nov. 1986</i>	<i>1,000(10)</i>	<i>3,016</i>
<i>Tongyeong</i>	<i>Sep. 2002</i>	<i>1,400(10)</i>	<i>1,350</i>
<i>total</i>		<i>4,880(38)</i>	<i>8,056</i>

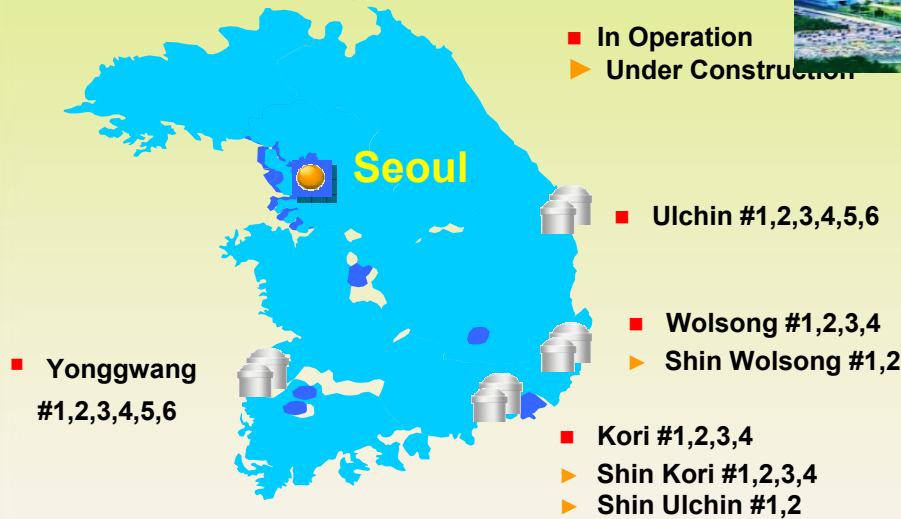
Electricity Development in Korea

Power Generation Capacity Increase Trend



Electricity Development in Korea

Nuclear power plants

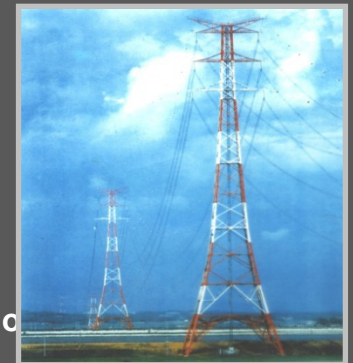
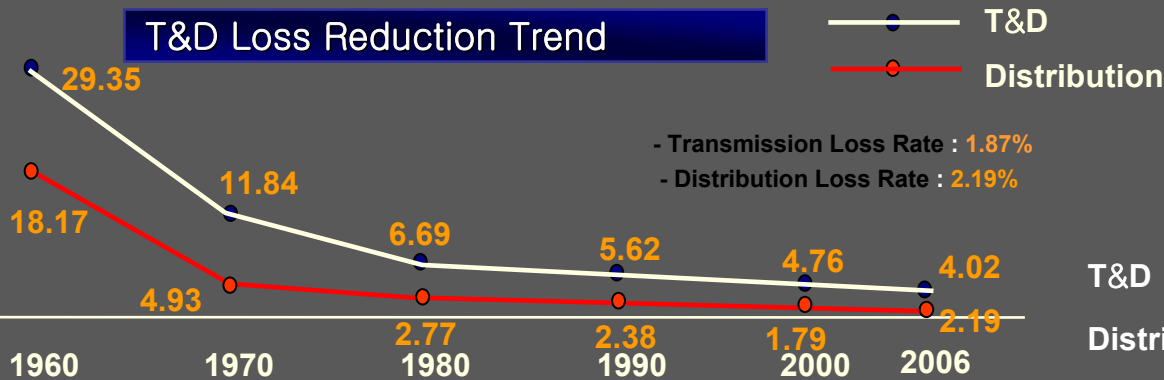


Site	In Operation	Under Const.	Total
Kori	4 (3,137)	4 (4,800)	8 (7,937)
Wolsong	4 (2,779)	2 (2,000)	6 (4,779)
Yonggwang	6 (5,900)	-	6 (5,900)
Ulchin	6 (5,900)	2 (2,800)	8 (8,700)
Total	20 (17,716)	8 (9,600)	28 (27,316)

(As of Dec, 2007, Units: MW)

Loss rate (%)

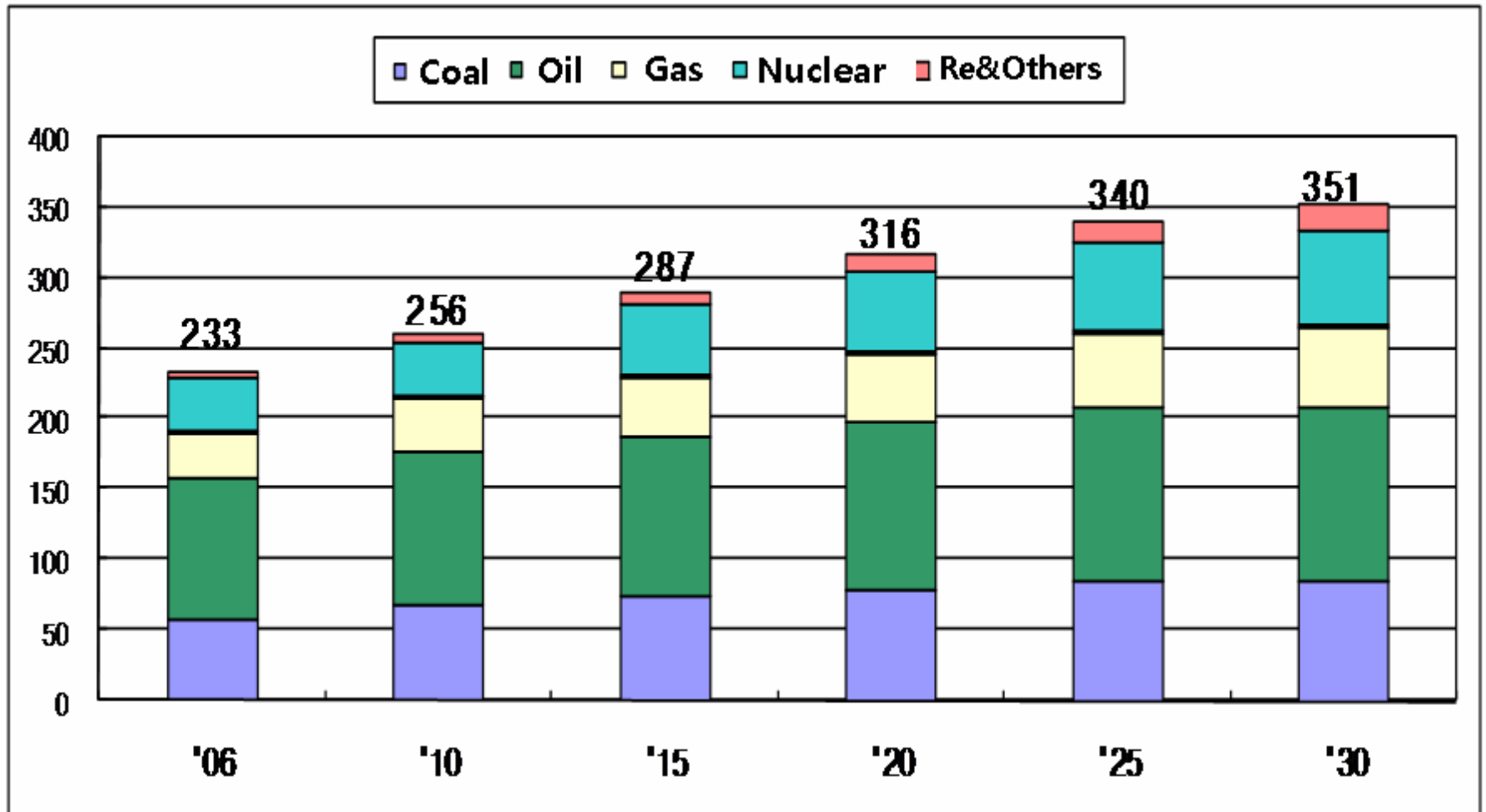
T&D Loss Reduction Trend



T&D
Distribution

Energy Demand Outlook in Korea

(Unit: million toe)



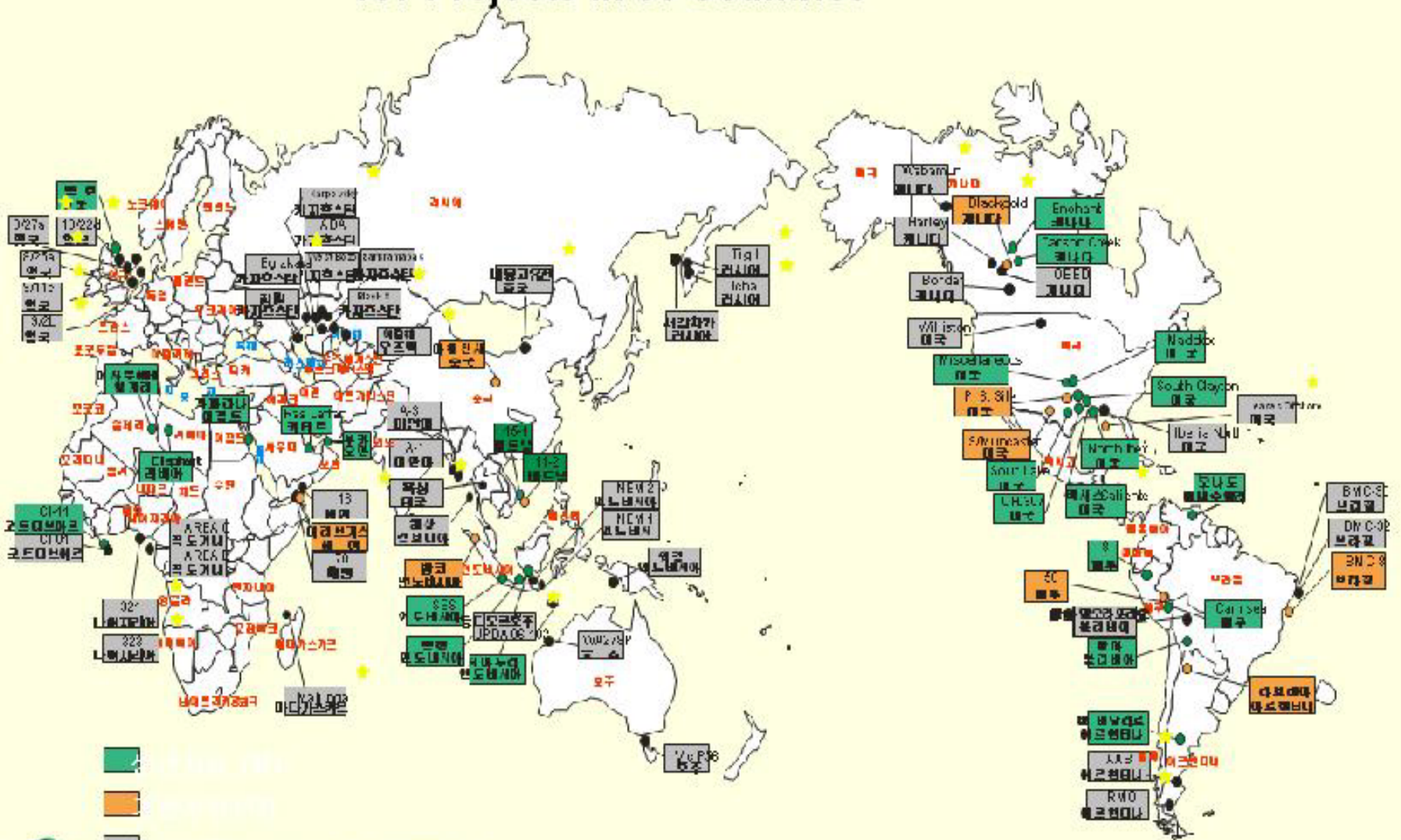
Source: KEEI(2008)

Energy Policy Challenges in Korea

- **Strengthen Energy Supply Security**
 - **Diversification of energy resources & import sources**
- **Governmental Support to Overseas Energy Resources Development**
 - **Support to exploration and development company**
 - **Government's target of overseas E & P business**
 - **Oil from overseas projects/total imports: 18% in 2012 & 28% by 2016 from 4.2 % in 2007**
- **Active Promotion of Bilateral Energy Resources Cooperation**
 - **Establishment of Inter-governmental Energy and Mineral Resources Cooperation Committee**

Present Status of Overseas Projects by Korea

137 Projects in 35 Countries




Korean Overseas E&P Strategy

■ Intensive investment and Joint Development on E&P Projects at 6 Core Strategic Area

- Russia (East Siberia and Russian Far East), Caspian and Central Asian Region
- Build up Strategic Business Partnership with NOCs
(Rosneft, Gazprom, KazMunaiGaz, UzbekneftGas, Socar, Turkmengaz, Turkmenneft)





II. Opportunity for Energy Cooperation in Northeast & Central Asia

Energy Cooperation Opportunity in NE Asia

- **Resource and Project Developments**

- **Oil**

- Oil Development pipeline construction in East Siberia
- Sharing refinery/upgrading facilities

- **Natural gas**

- Development of natural gas field in Russian Far East and China: **Irkutsk, Yakut, Sakhalin**
- Construction of cross-border pipeline networks: **< Russia - China - Korea > + < Russia - DPR Korea - Korea >**

- **Electricity**

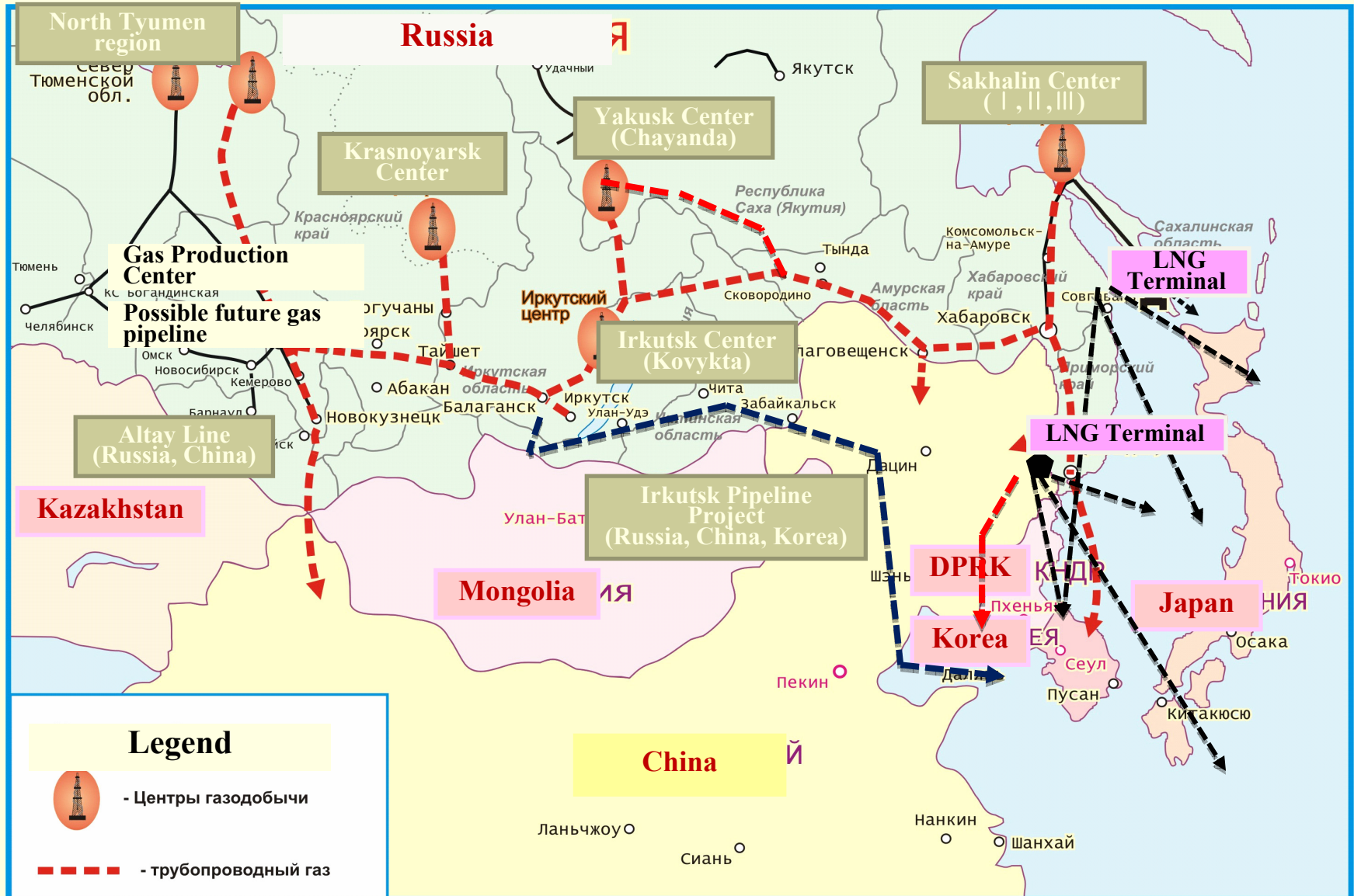
- Cross-border power interconnection grids

- **Coal**

- Coal mine development in Russia and Mongolia

⇒ **Improvement of regional energy security capability & economics and efficiency + Common regional energy market**

Russia's Gas Development & Export Plan



Energy Cooperation Opportunity in Central Asia

- **Abundant Natural Resources**
 - **Oil, Natural Gas, Uranium, Nonferrous metal**
- **Rapid Economic Growth**
 - **Azerbaijan 26.4%, Kazakhstan 9.4%, Uzbekistan 7.0%, Turkmenistan 6.0% (2005)**
- **Main Development Targets**
 - **Diversification of economy and socio-economic development: heavily dependent on oil and gas sector**
 - **Sustainable development: development of strategic industry and new growth engine**
- **State Program on Socio-economic Development focusing on Development of Non-oil Sector/Manufacturing**

Korea's Cooperation Potential

Northeast & Central Asia

- **High reserves for oil and gas to develop for exports**
- **High economic growth**
- ⇒ **Need for improvement of social & economic infrastructures**
 - **Power plants & systems**
 - **Other SOC's:**
 - **Telecom, road, railway, pipelines**
- **Open & friendly policy to foreign investments**
- ⇒ **Need for foreign investment & advanced technology**
 - **Diversification of industry from energy**
 - **IT, Petrochemicals, Ship building,**

Korea

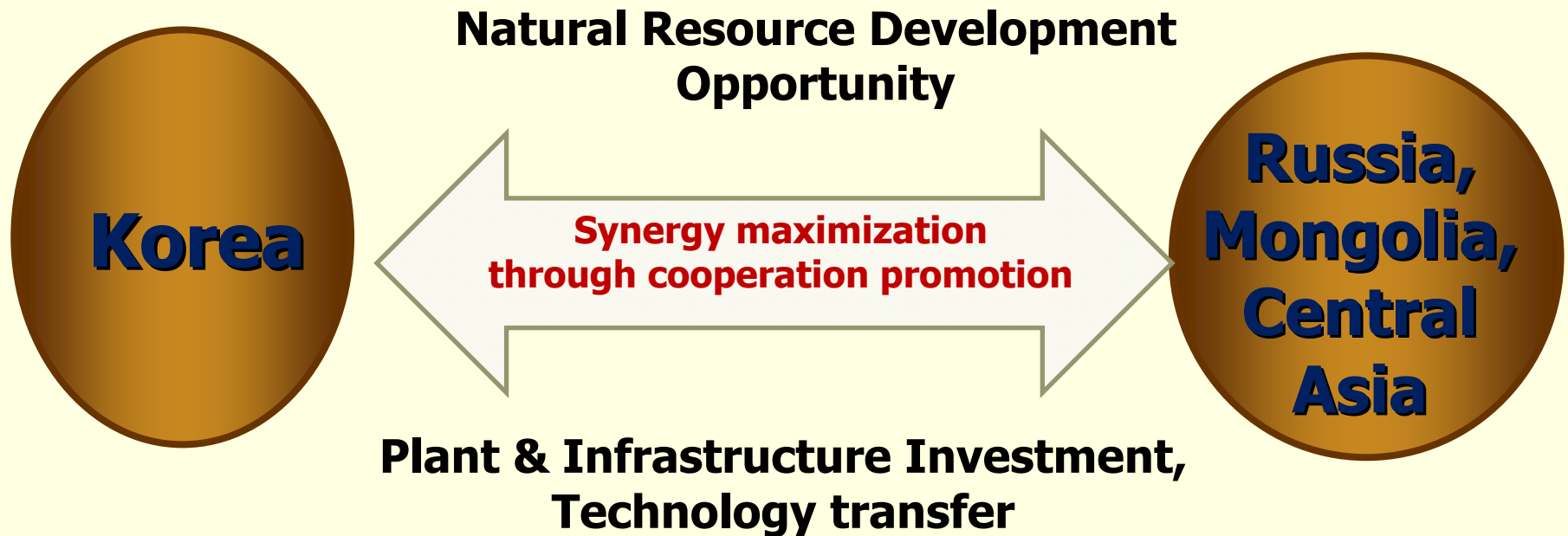
- **Need for overseas oil and gas development**
 - **Energy Diversification/ Security**
- **Sharing Korea's experiences for down-stream industry**
 - **Refinery expansion**
 - **0.64 ('80) → 2.7 million bd ('07)**
 - **Power developments**
 - **10.4 ('80) → 70.4 GW ('07)**
 - **Petrochemicals**
- **Well-established government/ business partnership for international relations**
 - **Policy supports for overseas development**



III. Cooperation Strategy

Comprehensive Approaches

- **Combining Energy + High-value Added Industry + Infrastructure Development Projects**
- **Enhancing partnership between government and business sectors**
- **Energy Research Cooperation: Joint research and expert seminar**

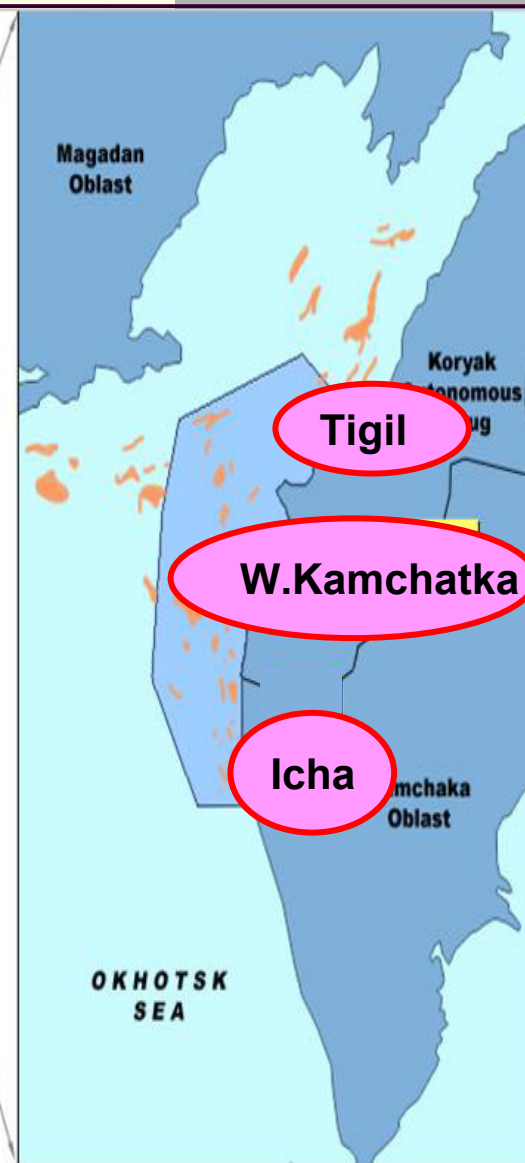


Thank you very much
Gamsa'hamnida

Russian Project of Korea

■ Block W.Kamchatka, Tigil, Icha [Exploration Projects]

- **W. Kamchatka : Offshore**
 - Interest : Rosneft 60%, Korea 40%
 - '04. 9 : Execution of MOU between Rosneft and KNOC
 - '05~'07 : 2D & 3D Seismic Acquisition
- **Tigil, Icha : Onshore**
 - Interest : CEP(Canada) 50%, Korea 50%
 - '06~'07 : 2D Seismic Acquisition



Central Asian Project of Korea (KNOC)

■ Kazakhstan

- **ADA : KNOC's operating Block, Oil discovery**
- **Egizkara : Exploration Block**
- **S. Karpovsky : Exploration Block**
- **October. 2005 : Branch office in Almaty**

■ Uzbekistan

- **Aral sea : '06.12 Execution of JOA between Uzbekneftegaz and KNOC**
- **Namangan, Chust : Under Joint Study**

■ Azerbaijan

- **Inam : Participation July 2007**

The Caucasus and Central Asia



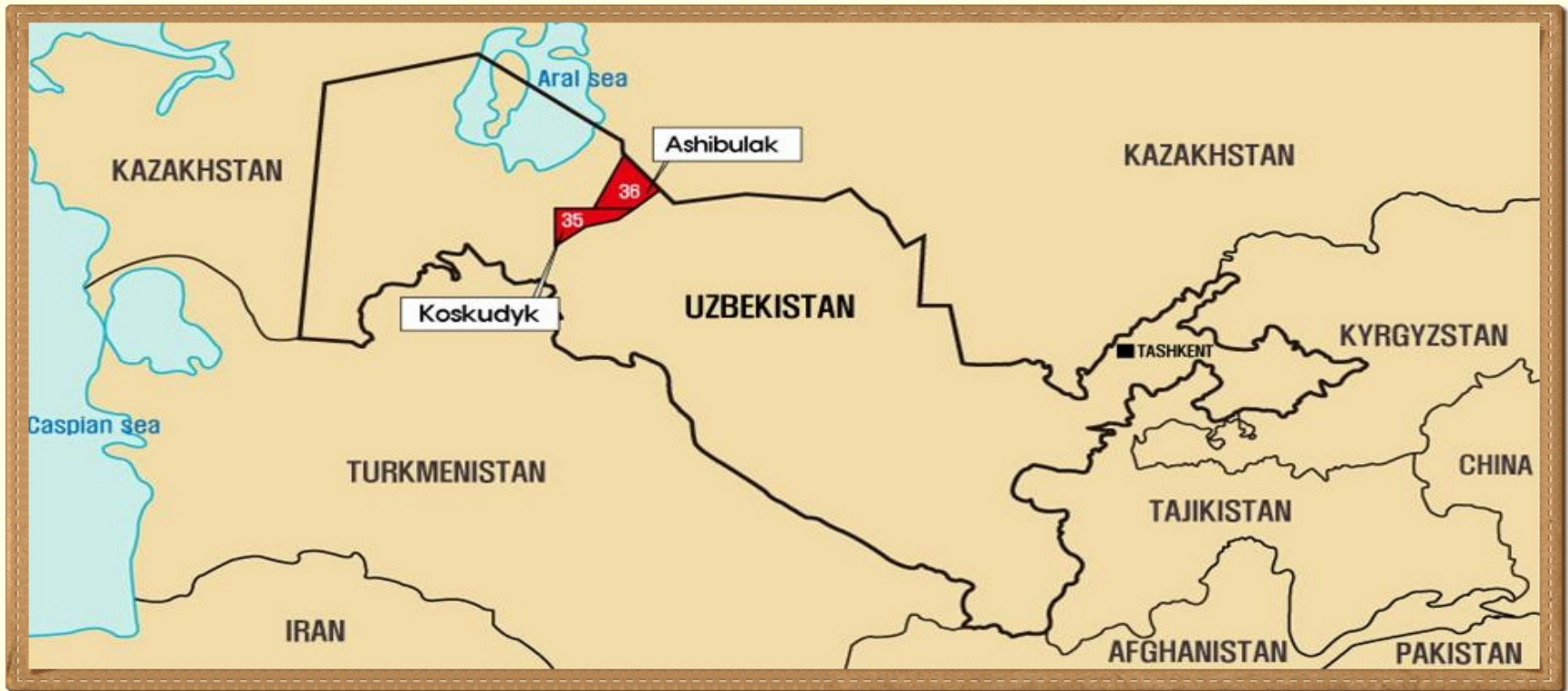
Surgil Field + Ustyurt Gas Chemical Complex



■ **JV with Korean Consortium (KOGAS, LOTTE, SK Gas, LG and STX energy) for complex development of Surgil field with construction of Ustyurt gas chemical complex.**

- **There are discovered over 15 fields in Ustyurt region; Surgil field located in Muynak region of Karakalpakstan**
- **Reserves of gas approved by Schulmerger report over 140 bcm**

Blocks 35 / 36 in Uzbekistan (Daewoo International)



- **Participation : 2008. 2**
- **Equity : 100% (Operator)**
- **Contract : Exploration Agreement**
- **Location : Ustyurt region, NW Uzbekistan**
- **Acreage : 35 Block - 2,184 km², 36 Block - 4,683 km²**

Energy Transport Network in Northeast Asian Region



Oil Pipelines in Caspian Region

