Energy Security of Northeast Asia:
Current State, Energy Demand/Supply Projection and Investment Needs

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Current Energy State in NEA

[Overview of NEA Energy Situation]

- **Only 6 Countries But a Significant Group**
  - 27% of world population, 19% of world GDP
  - 25% of world energy consumption
  - 18% of world CO_2 emissions
  - Faster growth of economy & energy demand than other regions

(Year 2000)	South Korea	Japan	China	Russia	Mon-golia	North Korea	NEA	World
Primary Energy (10^6 TOE)	192.9	558.7	950.0	612.0	2.6	15.7	2,332	9,179
Per Capita Energy (TOE/person)	4.08	4.40	0.75	4.21	1.03	0.71	1.44	1.51
Energy/GDP (TOE/ 10^6 $, '95)	312	105	912	1,751	n.a.	735		
Population (10^6)	47.3	126.9	1,273.0	145.5	2.5	22.0	1,617	6,075

Current Energy State in NEA

[Energy Mix of China]

- Dominance of coal (62.0%)
- Small portion of natural gas (3.0%)

Primary Energy Consumption (2001)

	Primary Energy Consumption (million TOE)	%
Oil	231.9	27.6
Natural Gas	24.9	3.0
Coal	520.6	62.0
Nuclear Energy	4.0	0.5
Hydro-Electricity	58.3	6.9
Total	839.7	100.0

Source : BP Statistical Review of World Energy, June 2002.

Current Energy State in NEA

[Energy Mix of Japan]

- Relatively high nuclear dependency (14.1%)
- Big oil and natural gas importer

Primary Energy Consumption (2001)

	Primary Energy Consumption (million TOE)	%
Oil	247.2	48.0
Natural Gas	71.1	13.8
Coal	103.0	20.0
Nuclear Energy	72.7	14.1
Hydro-Electricity	20.4	4.0
Total	514.5	100.0

Source : BP Statistical Review of World Energy, June 2002.

Current Energy State in NEA

[Energy Mix of S. Korea]

- High oil dependency, rapid growing natural gas consumption
- Big energy importer (overseas energy dependency 97.3%)
  - · Import Bill: US$33.7 billion (23.9% of total import bill)
  - · 3rd largest oil importer, 2nd largest coal and LNG importer

Primary Energy Consumption (2001)

	Primary Energy Consumption (million TOE)	%
Oil	103.1	52.6
Natural Gas	20.8	10.6
Coal	45.7	23.3
Nuclear Energy	25.4	13.0
Hydro-Electricity	0.9	0.5
Total	195.9	100.0

Source : BP Statistical Review of World Energy, June 2002.

Energy Security Issues in NEA

[Energy Security – A New Angle]

- **Quantity Risk (traditional focus)**
  - Political or strategic energy supply disruption
- **Price Risk + Quantity Risk**
  - Short-term supply shortage ⇒ Price shocks
- **Environmental Risk + Price Risk + Quantity Risk**
  - Economic vulnerability to environmental sanctions

⇨ **"Energy Security" : Stable, Cost-Effective and Sustainable Supply of Energy**

- Set up an efficient and environment-friendly energy supply system + emergency preparedness + international cooperation

Energy Security Issues in NEA

[Dimensions of Energy Security]

- **Energy Supply Security**
  - Traditional Concern of Securing Stable Energy Supply
    - · Import source and fuel diversification
    - · Contract flexibility, reliable delivery routes & system
    - · Domestic infrastructure integrity & storage
    - · Participation in resource development, ...
- **Energy Economic Security**
  - Broader Perspective of Fortifying Economic Security from Energy Instability
    - · Reduce vulnerability to price volatility
    - · Enhance energy efficiency
    - · Market liberalization, minimize impacts from environmental issues, ...
- **Energy for Security**
  - Geopolitical Aspect of Energy
    - · Energy as a catalyst for international economic cooperation
    - · Easing international tensions

Energy Security Issues in NEA

[Factors Threatening NEA Energy Security]

- **Rapid Growth of Energy Demand**
  - Annual growth rate for 1999~2020 (EIA forecast):
    China 4.7%, South Korea 2.8%, World Average 2.2%
- **Growing Dependency on Oil**
  - Oil becoming the leading primary energy in NEA:
    Japan (2nd largest consumer), China (3rd), South Korea (6th)
- **Increasing Import from Outside the Region**
  - 76% of NEA oil imports from the Middle East in 1999:
    Japan (86%), S.Korea (72%), China (46% → 79% in 2020)
- **Vulnerability to Environmental Issues**
  - High dependency on coal (China 64%) and oil (S. Korea 51%, Japan 50%, China 30%)

Energy Security Issues in NEA

[Why Energy Cooperation in NEA?]

- **Strengthen Energy Security**
  - Import source & fuel diversification
  - Emergency preparedness : less vulnerable to external shocks
- **Economic Benefits**
  - Resource development
  - Cost-effective energy supply
  - Spill-over effects : steel industry, construction, employment….
  - Market liberalization
- **Environment-Friendly Energy Mix**
  - Wider access to environment-friendly energy (natural gas, hydro power)

Energy Security Issues in NEA

[Obstacles to NEA Energy Cooperation]

- **Political and Institutional Obstacles**
  - Relations among the countries within NEA & Inter-Korean tension
  - Uncertainty in investment and market conditions, esp. in transitional economies
- **Economic Obstacles**
  - Financing of huge investment costs
  - Competition with other energy projects outside of NEA
- **Geographical/Technological Obstacles**
  - Technological difficulties in the tundra area

⇨ **Much to be done & requires concerted efforts**

Energy Demand/Supply Projection

[Energy Demand Forecast by Country]

	year	South Korea	Japan	China	Russia	Mon-golia	North Korea	NEA	World
10^6 TOE	2000	192.9	558.7	950.0	612.0	2.6	15.7	2332	9,179
	2020	311.8	586.0	1707.0	841.0	3.7	65.3	3515	13,167
	% (Ave. Growth)	2.2	0.2	3.0	1.6	1.8	7.4	2.1	1.8
Share (%)	2000	8.3	24.0	40.7	26.2	0.1	0.7	25.4 100.0	100.0
	2020	8.9	16.7	48.6	23.9	0.1	1.9	26.7 100.0	100.0

Source : IEA, KEEI

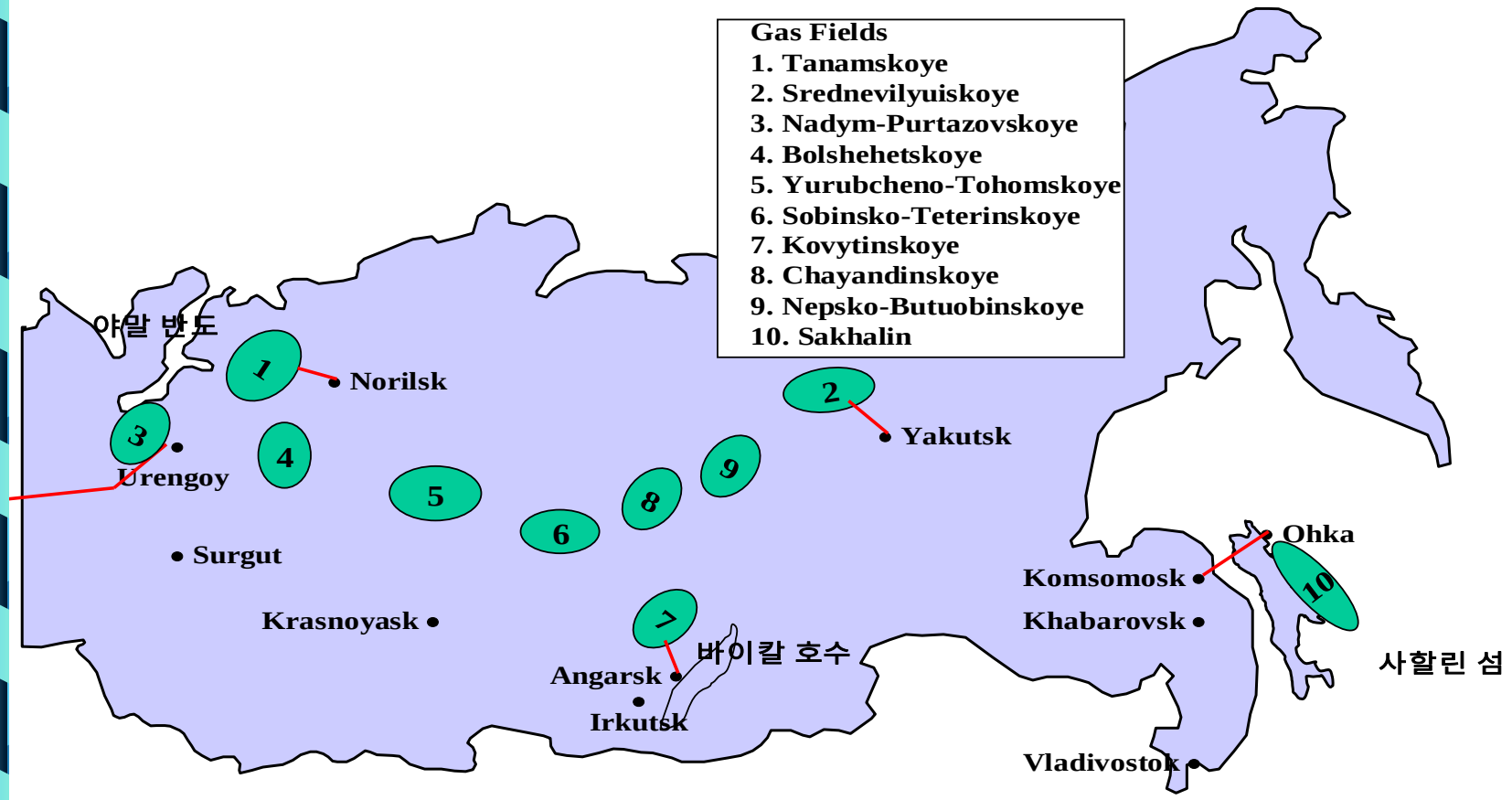
Energy Demand/Supply Projection

[Energy Demand Forecast by Fuel]

	Year	Coal	Oil	Gas	Elec.	Others	Total
NEA (10^6 TOE)	2000	926	757	441	191	15	2,332
	2020	1,390	1,065	717	312	31	3,515
	(%)	(39.5)	(30.3)	(20.4)	(8.9)	(0.9)	(100.0)
World (10^6 TOE)	2000	2,355	3,604	2,085	902	233	9,179
	2020	3,128	5,003	3,531	1,046	457	13,167
	(%)	(23.8)	(38.0)	(26.8)	(7.9)	(3.5)	(100.0)

Source : IEA, KEEI

<East Siberia · Far East Gas Fields>



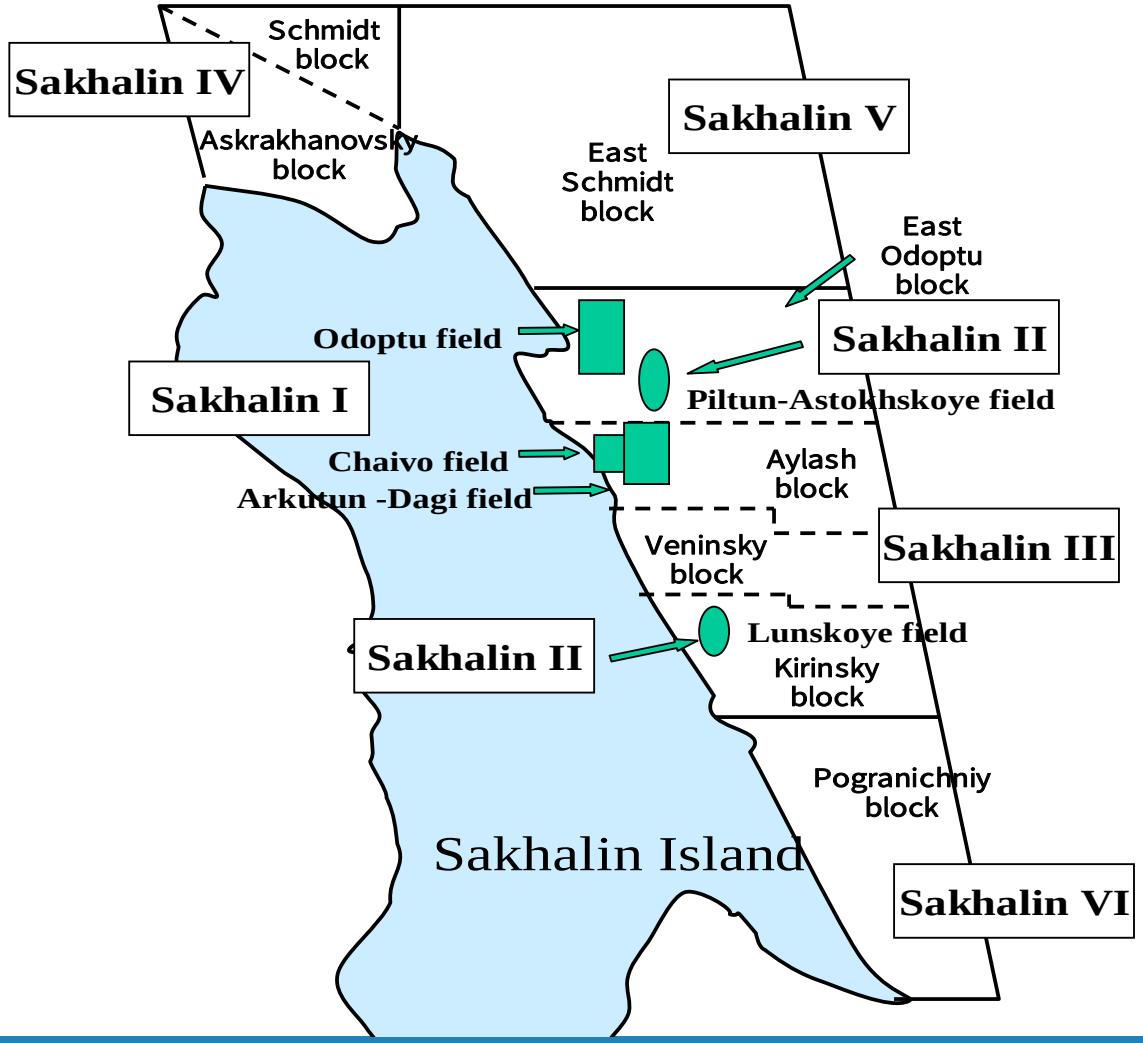
<East Siberia Oil & Gas Fields>

Oil, Gas Fields	Oil (10^6 TOE)		Natural Gas (bcm)	
	A+B+C1	C2	A+B+C1	C2
Krasnoyarsk				
Yurubcheno-Tokhomskoye	58.4	301.1	93.7	321.2
Sobinskoye	3.0	8.2	138.7	19.6
Irkutsk				
Verkhne-Chonskoye	159.5	42.1	11.7	83.8
Kovyktinskoye	-	-	296.7	1100.7
Sakha (Yakutia)				
Talakanskoye	106.1	18.1	35.5	18.6
Chayandinskoye	9.9	23.1	164.8	44.7
Srednebotuobinskoye	54.4	11.9	152.3	18.6
Srednevilyuiskoye	-	-	160.0	-
Srednetyungskoye	-	-	156.2	9.2

<Sakhalin Oil & Gas Fields>

Oil, Gas Fields	Oil (10^6 TOE)		Natural Gas (bcm)	
	A+B+C1	C2	A+B+C1	C2
Piltun-Astokhskoye	84.9	24.2	58.9	19.3
Lunskoye	2.6	5.2	324.5	59.6
Arkutun-Daginskoye	9.1	104.3	22.0	46.2
Chaivo	18.2	1.3	113.9	26.6
Odoptu-More	38.1	4.4	58.1	26.2

<Sakhalin Projects>



<Sakhalin Projects>

Projects	Reserve (10^6 TOE)	Consortium
Sakhalin I	1000	Exxon:30%, Sodeco:30%, SMNG-Shelf:23%, Roseneft-17%
Sakhalin II	850	Sakhalin energy: 25%, Royal Dutch Shell: 55%, Mitsubishi:20%
Sakhalin III Kirin Block	1500	ExxonMobil:33%, Rosneft:33%, Texaco:33%
Sakhalin III Ayash, East Odoptu Block	600	ExxonMobil, Rosneft, Rosneft-SMNG
Sakhalin IV	700	Rosneft:50%, Rosneft-SMNG:50%
Sakhalin V	600	TBA (BP, Rosneft expected)
Sakhalin VI	350	TBA (Rosneft, ExxonMobil, Texaco expected)

<Prospective PNG Projects>

Irkutsk : 3 routes

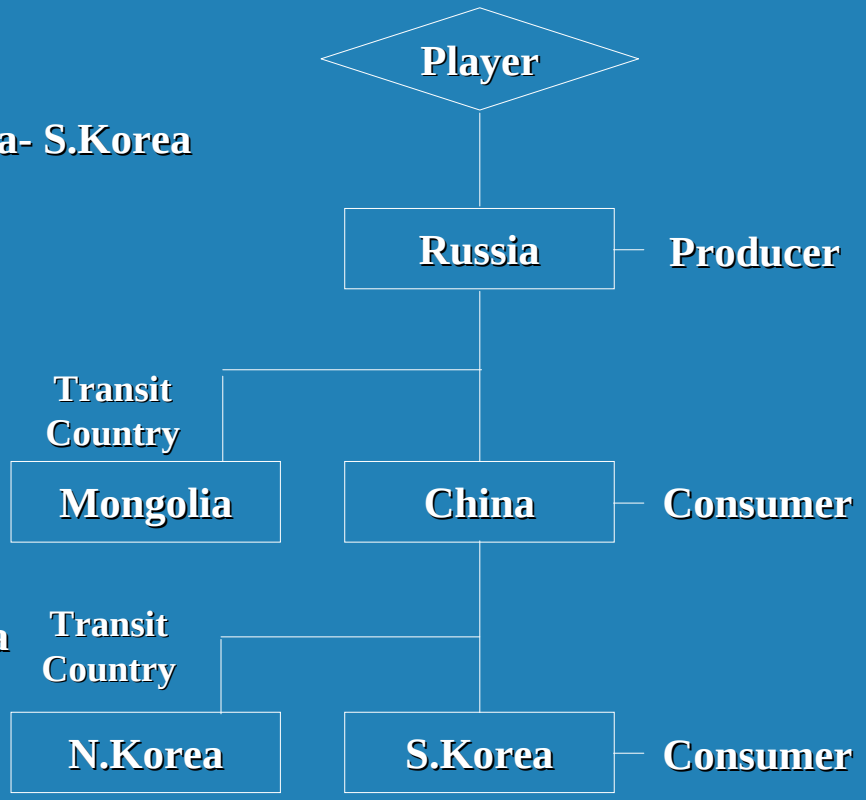
Russia- China- S. Korea
Russia- Mongolia- China- N.Korea- S.Korea
Russia- China- N.Korea- S.Korea

Yakutsk : 2 routes

Russia- China- N.Korea
Russia - N.Korea- S.Korea

Sakhalin : 3 routes

Russia- China- N.Korea- S.Korea
Russia- N.Korea- S.Korea
Russia- China- S.Korea



<Natural Gas Scheme in NEA>

Source : KRI International Co.

<East Siberia Oil Pipeline Projects>

	Angarsk-Daqing	Angarsk-Nakhodka	Pacific
Suggested by	China(CNPC) Russia(Yukos)	Transneft	Russian Energy Ministry
Distance (km)	2,213	3,765	4,000
Trans. Capacity (10^6 b/d)	0.6	1.0	1.8
Supported by	China	Japan	Japan
Construction period	2003-2005	2007	n.a.

- Sino-Russian Energy Cooperation signed in 1996
  - Supplement of production decrease at Daqing field, using Daqing facilities
- Japan's participation suggested at 2003 Japan-Russia Summit Talk
  - Support 5 billion US$, guarantee 800,000 b/d for Nakhodka route
- Route to be decided in 2004
- Pipeline connection under review in S. Korea

Investment Needs for Energy Infrastructure

[Energy Investment Outlook : 2001~2030]

- **Developing countries require almost half of global energy investment .**
  - **Energy production and demand increase most rapidly.**
- **Share of energy investment in the economy**
  - **Russia : 5%+, China : 2.5%**

Cumulative Energy Investment (billion US$)

	2001~2010	2011~2020	2021~2030	2001~2030
Russia	**269**	**391**	**389**	**1,050**
China	**578**	**787**	**888**	**2,253**

Source: IEA, World Energy Investment Outlook

Investment Needs for Energy Infrastructure

[Estimated Investment Needs for NEA Energy Projects]

Gas Project	Investment (billion US$)	Oil Project	Investment (billion US$)
Sakhalin I	12.0~15.2	Angarsk-Daqing	1.7
Sakhalin II	10.0	Angarsk-Nakhodka	5.2
Sakhalin III Kirin Block	15.0	Pacific	11.0
Sakhalin III Ayash East Odoptu Block	13.5		
Sakhalin V	33.0		
Irkutsk	11.0~16.0		

Investment Needs for Energy Infrastructure

[Issues of Financing Energy Investment]

- **Cannot be taken for granted**
  - **Financial resources at a global level are not deficient.**
  - **Risks faced by investors are formidable and are changing.**
- **Financing in developing countries is the biggest challenge.**
  - **High risks impede inward capital flows.**
    - **Exchange-rate risks, economic/political instability**
    - **Uncertain legal and regulatory regimes**
  - **Poorly developed financial markets**

    ⇨ **Need to create an investment framework and climate**
- **Government action and international cooperation to lower potential barriers will be vital.**

Envisaged Strategies and Framework

- **Roadmap for Energy Cooperation in Northeast Asia**
  - Establishment of information/data sharing mechanisms
  - Encourage business dialogues & participation
  - Confidence building
  - Development of joint policy agenda
  - Creation of institutionalized frameworks for multilateral regional energy cooperation: Treaty, Charter, Regional Energy Community

- **More Dialogue Required to Address**
  - Political & institutional concerns
    - Investment protection treaties, Assurance of fiscal stability (tax, tariff), Dispute settlement mechanism, Harmonization of technical standards, etc.
  - Governmental, commercial & research sector interchange
    - Senior Officials Meeting, Expert Forum, Business Forum

⇨ **Need to share fair/transparent principle for NEA energy cooperation**

Envisaged Strategies and Framework

- **Institutional Vehicle for Infrastructure Financing**
  - **- Finance infrastructure investment/economic development in NEA**
  - **- Mobilize international capital market for NEA infrastructure needs**
  - **- Reduce investment risks**
    - **· Inter-governmental supporting scheme for investment promotion and protection**

- **Suggested Institutional Arrangements**
  - **- SOM, Secretariat, Working Groups and R&D body**
  - **- Formal, but non-binding (e.g., APEC)**
  - **- Policy consultation and coordination**

Envisaged Strategies and Framework

- **Vladivostok Statement: First Agreement of Senior Officials**
  - Endorsement of objectives and principles of Khabarovsk Communiqué
  - Periodical meetings of Senior Officials
  - Establishment of working groups : Electric Power and Interconnection, Interstate Transit of Fossil Fuels, Prospective Energy Planning and Programming
  - Immediate establishment of a TFE to draft an inter-governmental consultative mechanism
  - Further consultation for founding a research center for NEA cooperation
- **Imminent Issues and Suggested Direction**
  - Follow-up to the Vladivostok Statement needed
  - Participation of China and Japan in SOM and TFE encouraged
  - Good working relationship with other international/regional organizations : WTO, UNDP(TRADP), APEC(EWG), ASEAN+3, OPEC, UNCSD(WSSD), EU (ECT), Others?

Envisaged Strategies and Framework

- **Strategies and Steps toward NEA Energy Cooperation**
  - **Consensus building**
  - **Consultative process**
  - **Policy development and coordination**
  - **Establishment of legal and institutional bases**
  - **Implementation and investment**

Concluding Remark

- **PNG Projects in NEA for 3Es**

  - Energy Security, Economic Benefit, Environmental Improvement

- **Can Provide Win-Win Opportunity for Countries in the Region**

  - Obstacles can be overcome by practical interests.

- **Much to be done & requires concerted efforts**