Energy Cooperation and Technology Exchange Among Northeast Asian Countries

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Good morning ladies and gentlemen,

Today, I would like to discuss on possible cooperation in the fields of energy and environment among Northeast Asian countries.

Since last summer, we are experiencing resource inflation worldwide. Prices of oil, coal, natural gas and iron ores are soaring rapidly, and power shortage in industrial regions of China is getting worse. All these symptoms might develop into a serious ill if not properly taken care of. To cope with this, we need to consider seriously on regional cooperation on energy and environment. And we need initiative and action for cooperation, but not a study for another study.

1. Northeast Asia as One Region

Today, northeast Asia sub-region is the fast growing energy center driven by high economic growth of China. The sub-region consumes 2/3 of the Asian energy consumption that shares more than 30% of the world energy consumption. Countries in northeast Asia are in similar energy positions in terms of import dependence, limited supply source and long distance transportation. But, they are yet to develop full-scale collaboration. Economy and industry of the region will further consolidate, and China's problem is now the region's problem requiring concerted efforts.

1.1 Asian Energy Outlook

This chart shows that Asia shares about 1/3 of the world energy consumption and Northeast Asia 2/3 of the Asian energy consumption. Our region consumes much greater energy than EU 15s. We are too large to fail.

Regarding the energy structure, oil and gas play major roles in Japan and Korea, while coal dominates in China. One serious concern is that we depend upon the Middle East over 3/4 of the crude oil import. Watching the unstable situation in the Middle East, this is the region's great vulnerability. In addition, we are forced to accept unstable and unfair oil pricing, such as Asian Premium.

1.2 Energy Outlook of Northeast Asia.

Looking to future energy demand, Japan may be moderately leveling off, as its economy is in a matured stage in terms of energy consumption and its population will start decreasing within several years.

Korea recorded substantial increase of energy consumption in 1990s, but it may become moderate in the coming years, since its economy will be shifting to hi-tech, less-energy-use structure.

In contrast, China will continue rapid increase driven by high economic growth. With vast land and big population, absolute increase of China's energy consumption will be huge; the incremental demand by 2020 may exceed the current energy consumption of Japan and Korea.

1.3 China's Petroleum Outlook

China's petroleum outlook typically shows our situation. China's oil consumption exceeded that of Japan in 2003, to make her the world second largest oil consuming country after the United States. The oil demand is forecast to keep growing and reach almost 500 million tons in 2020, while the domestic production may be leveling off as major oil fields like Daqing are maturing. Thus, China's oil import may triple in the next two decades. There is a dream plan being murmured to control the demand at 400 million tons and enhance the domestic production to 200 million tons, and thus to control the import at 200 million tons. Even if this dream plan were materialized, the oil import will double in the same period. That is something like that another Japan, the world second largest oil importing country, is emerging in the region. Then, our dependence on the Middle East will inevitably increase.

1.4 Natural Gas outlook of Northeast Asia

Natural gas market in Japan and Korea is almost matured. In contrast, the potential demand increase of China will be greater than the current demand of the region. But, in China, nationwide gas market is just to emerge. It may grow fast, or it may be stagnant as IEA predicted. The lower line is close to IEA's prediction, and the upper line is close to the prediction of Energy Research Institute. Since last year in China, the West-East pipeline has been launched successfully and now the coastal provinces are suffering from severe power shortage. Therefore our Chinese colleagues are more confident now on the higher side projection.

The key factors will be China's policy on environment and electricity tariff, relating law and administration system and determination of enforcement.

2. Energy Challenges facing Northeast Asia

Major energy issues facing northeast Asia are, firstly, mismatch of demand and supply and, secondly, environment pollution. To cope with these issues, our objective is, in a short-term, to mitigate influence of turbulences, such as supply disruption, and in a long-term, to moderate mismatch of demand and supply and environment deterioration. In preparing counter measures, it is important to consider characteristics of each energy sources. We will go through them one by one.

2.1 Facts and concerns.

Northeast Asia is facing energy shortage, while rich resources are located near by eastern Russia, and also facing serious environment pollution caused by heavy use of coal in China. Our concerns are to secure sufficient and stable energy supply, stable energy price typically prejudiced by the Asian premium of the Middle East oil, and to improve environment with rational use of technology and cleaner fuels.

2.2 Short term and Long term

Measures to deal with energy issues will be different for short term and long term.

Firstly, to avoid panicky reaction of market, we should be prepared to short term turbulences caused by extreme weather or unexpected disruption of supply due to accidents, regional conflicts, war, etc. The cures are to eliminate anxieties and speculations, and take quick response to calm down the situation, in particular, quick reporting system and Emergency Response Program. Initiatives are already taken in this field like activities by APEC and Asean+3, however, workable system is yet to be established.

Secondly, long term issues need diligent treatment and perseverance.

They are caused by, on one hand, demand movement in the market which is difficult to control or precisely predict, and on the other hand, long lead time required enhancing supply ability. Market price is supposed to give signal according to economic theory, but, in actuality, signals are often speculative, erroneous or coming out only when the situation is desperately serious. We are facing with this exact situation now in China.

Cures are to reinforce the supply base of energy, in a grand size, by proper navigation and initiative. This requires regional cooperation.

2.3 Characteristics of Energy Sources

To reinforce energy supply base of Northeast Asia, we need to implement grand size projects mobilizing all of our potentials. To this end, we need to carefully select our approach reviewing characteristics of energy source, location and project economics.

Firstly, considering characteristics of energy sources, oil should be given a priority in short-term preparedness, because of its superior flexibility for exchange. Exchanging energy each other in emergency may be constrained by physical nature of energy for transferring, availability of compatible facilities and supplemental supplies. In every aspect, oil is superior to other fuel sources. Other than transport, we can process oil for every purpose.

3. Designing the Regional energy Cooperation

Among the various players, only governments with sovereign power can agree on international ruling and institutions. Therefore, government sector should properly design the structure of cooperation and take initiative for implementation. Once order is established, private sector can be mobilized.

In designing the energy cooperation, the most fundamental thing is to know facts. Based on reliable information, policy and program can be formed properly. Then, as a procedure to demonstrate objectives and milestones, a Master Plan backed by realistic implementation program is necessary.

Here, we should note that the trend of regional cooperation is "from aid to collaboration." Today, the region's industries are more advanced and need world-class high-techs for further development. Then, "cost for value" and "alliance beyond aid" will be the new principle for the real collaboration in Northeast Asia.

(Detail investigations on the foregoing are given in 3.1 through 3.3.)

3.1 Role of Government

In promoting regional energy cooperation, the role of government is very important. Since the private sector cannot touch upon sovereignty, only the government sector can initiate international cooperation. The role of government sector will be

a. Establish common recognition among countries that regional cooperation is beneficial for the region as well as each member,
b. Draw up a road map
c. Define the roles of the government sector and private sector, and
d. Prepare proper play ground for the actual players

3.2 Information and Planning

I will skip this page.

3.3 Direction of G-to-G Cooperation

Looking to the current cooperation between China and Japan, we face with various problems and inefficiencies. For example:

a. "Request First" principle,
b. One by one project completion
c. Budget dicing under please-everyone allocation
d. High threshold of JBIC Yen loan
e. Two step loan system requiring full guarantee of local entities as project promoter

After project finding, projects become smaller, slower and/or sub-integrated during project promotion process.

To solve these problems, we need integrated and coherent planning. Establishing Energy/Environment plan, not just a political propaganda but one with realistic implementation program is the first thing we need. Since a grand size international energy project requires mobilizing most modern hi-techs, the style of cooperation should be changed from ODA to equitable cooperation. ODA basically provides primary technologies, but most of them are outdated. On the other hand, advanced technologies are of core competence of entities that hold them. To mobilize them, we should introduce a concept of "Cost for Value".

4. Increasing Energy Supply in Northeast Asia

Increasing energy supply, another important factor is what is the value of the project and how economics works. A realistic measure to enhance the region's energy supply base is to best utilize the Russian resources. Then, we should note that characteristics of a project vary sector by sector, and the government role may be different, accordingly.

4.1 Potential Energy Projects in Northeast Asia

This table shows potential energy projects in the northeast Asia.

4.2 Potential Energy Flow in Northeast Asia

This chart shows potential energy supply routes from Russia to northeast Asian

markets.

4.3 Projects as Business Model

Then, in considering project materialization, we need to design the business structure properly. To this end, firstly, we should consider the characteristics of each sector of the project.

The upstream sector is very adventurous business competing each other with own insights and hi-techs. It is a high-risk high-return business with success ratio of 10% or so, and is the typical field for the private sector.

The pipeline sector is stable if the resource and the market is assured. This is a typical utility type business.

The market is sometime unpredictable and the mass-market for small unit users, namely commercial/residential sector, needs long lead time to build up. This sector is a mixture of commercial and utility businesses.

Then, we should consider project values for implementation. In terms of economic analysis, projects will be classified as:

a. Commercially viable. A project qualifies certain commercial criteria, for example 12% rate of return, and should be in a pretty size. If it is too large, the private sector may just dismiss it.
b. Other projects may be economically viable. Cost recovery with a certain margin is OK but does not clear commercial criteria, or its economics is attractive but too large in size for private sector's challenge.
c. Projects may be required socially, but its social benefit cannot be measured to explicitly improve economics.

If a project is commercially viable, just let them go ahead pushed by market forces. But, if they are not, its social benefit at the market is the key whether we should consider any political actions or not. The Russian natural gas may fall in the category B. That is,

a. Resource potential is huge but remote. Economics of developing them can be justified only when transportation cost is reasonably low.
b. Therefore, the pipeline economics is the key. It can be politically adjusted if substantial social benefit is expected.
c. To justify such political action, its social benefit should be defined as political consensus. Then, such benefit should be more than just replacing the existing supply of LNG.

4.4 Economics of Pipelines

Now, I would like to explain how the contemporary project evaluation works using a simplified model. As shown in these charts, a pipeline tariff comprises CAPEX, OPEX, interest, tax and fair return. Economics depends on the project term also. The longer the project duration or cost recovery period, the lower the pipeline tariff. One very apparent fact is that, in justifying commerciality, in this case 12% return on equity investment covering 35% of the total fund, the financial service fee composed of interest, tax and profit is more than double of the technical cost, namely CAPEX plus OPEX. Therefore, there is a big room for the society to consider and handle the project artificially.

This observation indicates that, what we should study regarding pipeline economics at this preliminary stage is not to upgrade the cost estimation but to consider appropriate financial structure.

Let us look into their economics more in detail.

4.5 Economics of Pipelines: Observations

As shown in the table, the commercial pipeline tariff is below $3/Bbl for oil and $2/MMBtu for natural gas. These are more than double of conventional ocean transportation. But the technical cost is only 1/3 of them. Compared with the prevailing imported cost, $30/Bbl for crude oil and $4/MMBtu for natural gas, pipeline cost is only 10% of the final price for oil, but almost 50% for natural gas.

We observe that, in case of oil,

1. Pipeline can offer substantial cost improvement compared with railway transportation.
2. Market is readily available as contract term is relatively short and flexible for crude oil, but
3. Project size is gigantic for private businesses.
   Only the last item is the obstacle for implementation.

In case of natural gas, on the other hand,

1. The pipeline tariff comprises almost 50% of the final price, being a substantial hurdle,
2. Market is yet to be developed,
3. Competition with other gas sources is harsh, and
4. Project size is gigantic for private businesses.

We need to solve all of these issues.

4.6 Economics of Pipeline: Conclusion

Investigating the pipeline economics, we conclude that the pipeline tariff is crucial in realizing the Northeast Asia gas trade and, since its financial service fee is enormous, we can consider political actions. In order to justify such action, it is necessary to establish national and international consensus that the pipeline will bring a great social benefit. Then, the pipeline tariff can be lowered substantially by:

1. Lowering commercial criteria, for example 7% ROE as an utility business standard, and giving favorable tax rate,
2. Providing institutional finance of super long term, and/or
3. Subsidizing.

In implementing these measures, government initiative is essential. Here, if a project is under one government, we can think in this way.

1. The aggregate government take is determined by the final market price however the tax rates are distributed among project sectors. It is the sum of the social benefit plus tax on the aggregate profit from the project that can be determined by the balance of the final market price and the total project cost in upstream and pipeline.
2. Then, if favor is given to the pipeline sector, it can be recovered from the other sector, if the total project is economically viable.
3. And, such benefit can be realized only when the whole project is materialized.

As an international project, we should also consider fair distribution of government takes among countries at stake.

4.7 Natural Gas versus Coal for Power Generation

Here, let us look into the competition between natural gas and coal.

Natural gas is a clean fuel in terms of TPS, SOx and NOx. Combined cycle technology is greatly improving the efficiency of gas power generation. At the latest commercial plants in Japan, 50-54% efficiency is already realized. Considering this, CCGT will be more than competitive with coal for a wide range of load on power plants. The key is if the competition between the two energy sources is being performed like this in the market. Environment protection has long been neglected in China giving a priority to immediate economics of power plants. Environmental facilities are mostly not equipped, or, not operated to keep the operation cost low.

To realize due comparison of the two fuels in the market, a key is the consciousness of environment protection as the society. Important elements are policy, law and rulings coherent between energy and environment, enforcement of rules by the administration, and review of electricity tariff that hardly allows construction of necessary new facilities.

5. Areas of the Regional energy Cooperation

In this section, we will look into candidate items for the regional cooperation by energy source.

Reviewing them including more items you may raise, implementation program should be aligned with priorities in view of their benefit, urgency, lead time and maneuverability. It is also necessary to clearly define the areas of government and private sector activities. Here, the roles of the government sector will be:

a. International coordination
b. Taking initiative on implementing not-readily commercial but socially beneficial projects, and
c. Preparing or adjusting domestic laws and institutions to draw up proper market design.

Principles to be applied here should be discussed and refined further before making recommendations. Also, effective style to make recommendation should be considered.

5.1 Oil Supply Security

In the oil sector, mainly on supply side, following items are for immediate discussion.

1) National oil stock piling and regional emergency response system
2) Joint oil purchase and fleet operation
3) Joint development of technology, product and market
4) Large scale joint project

On the demand side, various subjects may be discussed relating to effective use and energy conservation, eventually leading to technology transfer program.

5.2 Efficient Use of Coal

In China, coal is the major source of energy and pollution. Major subjects will be relating to:

1) Development of coal mines
2) Upgrading of transportation system
3) Rationalization of coal use
4) Joint technology development

Here, we should note that, in China and other developing countries, coal is produced and consumed mostly in a very primitive manner. Application of existing standard technology, but not very much sophisticated ones, will substantially upgrade the value chain of coal. Not a study but an implementation program is needed urgently.

5.3 Modernization of the Power Industry

Although nationwide reform of the power industry is underway in China, its power industry inherits the traditional aspects. In the process of the ongoing surgery, following issues should be considered:

1) Modernization and upgrading of power stations
2) Optimization of transmission/linkage system management
3) Demand side management
4) Financial arrangement
5) Power supply from Russia

In particular, modernizing the industry requires huge fund. Not only the countries of the region, but also worldwide financial institutions such as IMF, The World Bank, ADB and so on, should review their policy to support this.

5.4 Natural Gas

Japan and Korea have developed nationwide natural gas use based on LNG, while Chinese gas market is just to emerge. Natural gas will provide China with reliable energy source and an effective measure to improve energy oriented pollution. As IEA recommended, first thing to do is to develop natural gas market. So far, we see the determination of the country to develop use of natural gas raising its share from 3% to 12% or more. However, we have not seen any realistic policy to implement this. An integrated master plan needs to be established, in particular correlating environment policy and review of electricity and gas tariff. Other subjects for regional cooperation will be:

1) Natural gas utilization technology
2) Natural gas import by pipeline, and
3) Financial arrangement to raise necessary fund

5.5 New and Renewable Energies

New and renewable energies are mostly not commercial, but have substantial social benefits. Political determination is essential to enhance their use. Then, a road map for rural electrification and environment improvement should be shown. As an effective measure in this field, a realistic CDM mechanism should be established as soon as possible to enhance regional cooperation.

6. Conclusion and Recommendations

6.1 Objectives of International Cooperation

Finally, I would like to conclude that the regional cooperation should be promoted step by step, considering urgency and maneuverability, as follows:

1. Reliable statistics and quick information exchange system should be established,
2. For emergency response, priority should be given to oil, and
3. To enhance region's supply base, Northeast Asia should establish the region's Energy/Environment Master Plan to show policy objectives and road maps toward them clearly.

6.2 Establishment of implementing Body

To implement the foregoing actions, we need implementing bodies at government level as well as among private players. At the government level, similar activities have been initiated as ASEAN+3 under "Hiranuma Initiative". Confining the members to northeast Asian countries might cause political tension because of delicate geopolitics in the region, but to implement realistic energy cooperation in the region, something like "Northeast Asia Energy Initiative" needs to be established. Then, once some road map is given, Northeast Asia Energy Forum as a coordinating body of private sector players should be established.

For the overall coordination, Master Committee may be established, under which individual subjects may be pursued by specific working groups.

For these activities, each member country should identify and nominate its responsible office as a focal point for international dialogue. Agreements there should be legally binding to assure enforcement of each country. Reaching such stage will be a lengthy procedure, as we do not have regional dialogue yet. The process may be upgraded gradually, step by step confirming that all members recognize the needs and benefits of such agreements. Although this will be a time consuming procedure, I trust that human wisdom will find out the desirable path to assure sustainable development of the region, someday not very remote.

Thank you for your kind attention.