Perspectives for Sustainable Energy Development in Northeast Asia

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1. PREFACE

In the contemporary world, the greatest challenges for the sustainable development are the energy security and global warming. As highlighted at the ninth Meeting of APEC Energy Ministers held in Fukui, Japan, in June 2010, "we have to take on the difficult challenge of enhancing regional energy security in the midst of emerging concerns about the global environment and world economy."[1]. Principal solutions to counter these challenges will be construction of a Low-carbon Society by (a) reinforcing Supply and Security of Traditional Energy Sources, (b) promoting Smart Use of Fossil Energy improving energy efficiency and conservation (EEC), and (c) developing Non-fossil Energy Supply. Reform of socio-economic structure will also be required to achieve the goal.

In Northeast Asia, where oil demand is growing fast while oil production remains stagnant, we are under threats of vulnerable oil supply and volatile oil prices traditionally. The discriminative oil pricing on the Middle East crude oils known as the Asian Premium has been prevailing for decades due to lack of strong alternative supply sources other than the Middle East. Recent emergence of Russian crude oil supply from its Far East ports may mitigate the situation.

Growing GHG emissions are another concern of Northeast Asia. It is widely recognized today that the business-as-usual (BAU) scenario without additional policy actions on increasing emissions would not be sustainable. The Northeast Asia region, being the world largest energy consumer and GHG emitter, must take responsible actions to curb emissions as aimed under the Copenhagen Accord of 2009. A *"Low-carbon Society"* is a solution to this challenge as well as the energy security and economic growth challenges at the same time. It is a concept just born recently, yet policies toward this goal need to be formulated from now on.

To take collective actions against these challenges, Northeast Asia should aim at establishing an international framework for regional co-operation on energy and environment toward construction of a low-carbon society with practicable schemes and institutions. Time is essence to mobilize these measures, as energy demand grows fast tightening energy supply and worsening global warming while reform of the energy structure and development of better energy infrastructure take not years but decades.

2. ENERGY OUTLOOK OF THE WORLD AND NORTHEAST ASIA ФОРМЛЕНИЯ

Today, Asia is the engine driving the world economy. It is the world largest energy market and consumed 4.0 billion tons oil equivalent (toe) of energy in 2009 according to BP; of which Northeast Asia consumed 3.0 billion toe, Southeast Asia 0.44 billion toe and South Asia 0.56 billion toe [2]. As energy markets in Japan and South Korea are already in a matured stage, energy consumption of the emerging Asia is forecast to grow fast. Among others, China became the single largest energy consuming country in the world in 2009, and will almost double it during the projection period, from 1.77 billion toe in 2007 to 3.45 billion toe in 2035, according to the forecast of IEEJ [3]. China's energy consumption has exceeded that of OECD Europe and the US, and will catch up with the entire European continent around 2035.

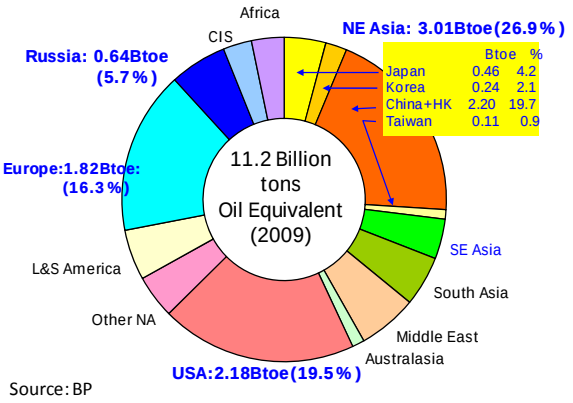


Figure 1. World Energy Consumption

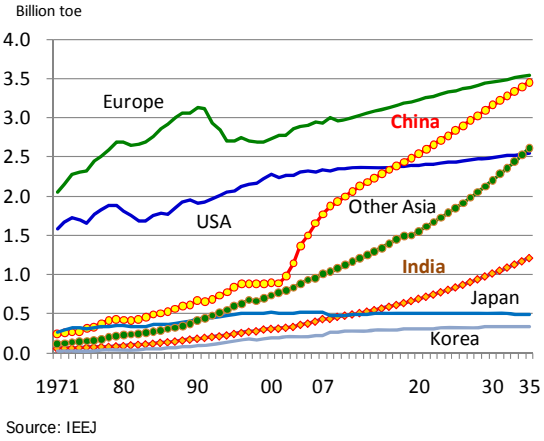


Figure 2 World Energy Outlook (IEEJ)

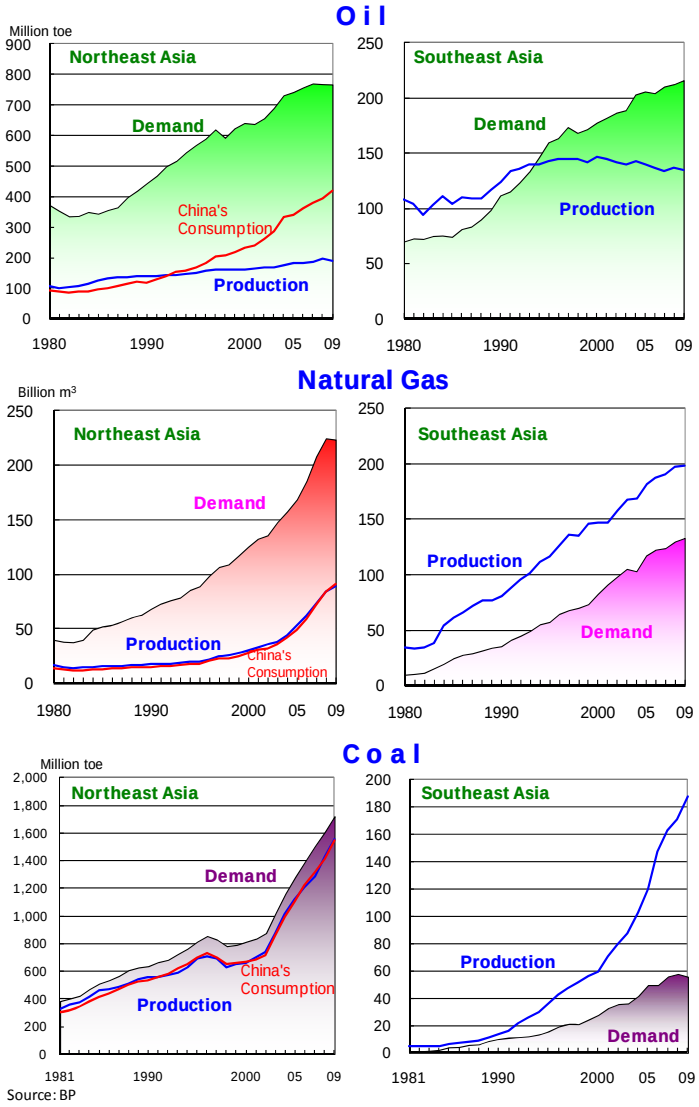


Figure 3. Asia's Fossil Energy Balance

3 ISSUES AND CHALLENGES FOR NORTHEAST ASIA

3.1 Northeast Asia

In Asia, supply/demand balance of fossil energies shows distinctive differences among energy sources reflecting the resource distribution. For oil supply, China and Southeast Asia used to be significant export centers during the 1970-1980s. However, both of them became net oil importers in 1993, coincidently. Since then, oil consumption is growing fast in both regions while their oil production remained stagnant. Considering the oil reserves in these regions, this trend would not reverse in future.

On natural gas, Southeast Asia is the traditional LNG exporter to Northeast Asia. Domestic gas consumption is growing fast in the gas exporting countries; however, they have managed to maintain a significant gas export capacity. Their export surplus may deplete gradually if additional reserves were not found at certain pace. However, new LNG supply from Australia, the Middle East and Russia are set to increase substantially in coming several years to sufficiently offset the decreasing export margin of Southeast Asia.

Coal is abundant in Asia. China is the world largest coal producer and consumer. China used to be an influential coal exporter in the Asia-Pacific region only several years ago, but became a net coal importer in 2009. It is

mainly because of the discrepancy between resource and market distribution in the country. Chinese domestic coal located in the northern interior region must be railed and shipped for a long distance before reaching the robust market in the southern provinces. Energy infrastructure there is being developed at a high pace since energy is the fuel to drive the fast growing economy. Thus, import of coal is required and highly competitive there.

Despite increase of Chinese coal import, the Asia-Pacific coal market is relatively stable as Indonesia and Australia are developing their reserves for export steadily. Indonesia has become the world largest steam coal exporter today. Coal supply in the region is expected to remain stable while domestic consumption increases, all in all putting heavier burden on environment.

As observed above, when we feel threats to energy security in Northeast Asia, it is the oil supply security. Particularly, Japan and South Korea depend on the Middle East crude oils heavily. China has cautiously kept the Middle East ratio below 50%. This policy has been successful so far, being partially forced so with poor refining ability to process the Middle East high sulfur crude oil. Given that its oil import will grow more than double in the long run, however, it is inevitable that China's Middle East dependence will increase sooner or later. To cope with the trend, many new refineries with sophisticated facilities to treat high sulfur crude oils are being constructed under joint ventures with the Middle East countries.

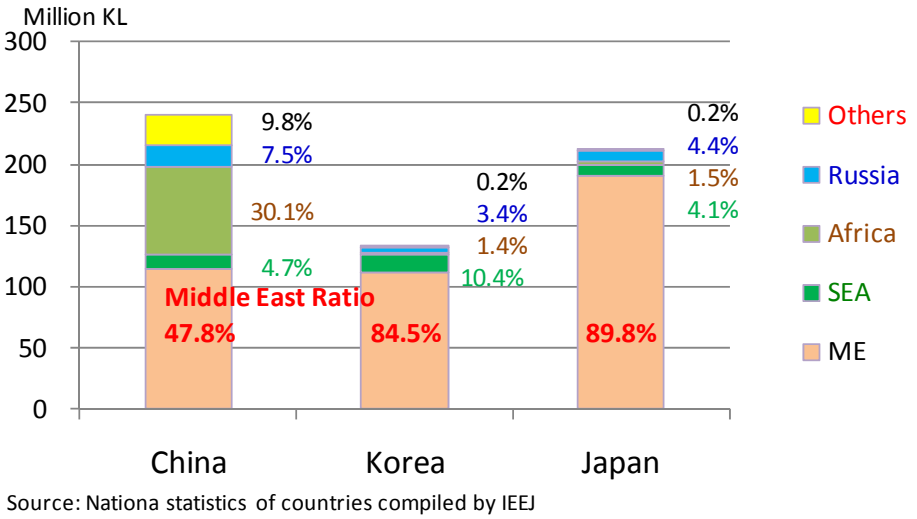


Figure 4. Crude Oil import of Northeast Asia

3.2 Russia

Russia is exporting a substantial amount of fossil fuels; mainly oil and natural gas. Its traditional export market is Western Europe. The main customer is a matured market and the European Union is planning to reduce fossil fuel consumption significantly in their battle to counter global warming. Russia needs to secure reliable and stable markets.

Russia's energy export for the Far East virtually started in 1999 when the Sakhalin-2 project began export of Vityaz crude oil from a temporary production facility stationed in the icy water offshore Sakhalin. Russian crude oil in the Far East gained another momentum after 2005 when the production of Sokol crude oil from the Sakhalin-1 project started. The DeKastri terminal is the first permanent facility in the eastern Russia to export locally produced crude oil. Then, in early 2009, the Sakhalin-2 project started export of LNG and crude oil from the permanent facility built at Prigorod-

noye located at the southern tip of the island. In late 2009, the Kozmino terminal located to the east of Nakhodka started operation to export Siberian crude oils transported via the East-Siberia-to-Pacific-Ocean (ESPO) pipeline and rail link.

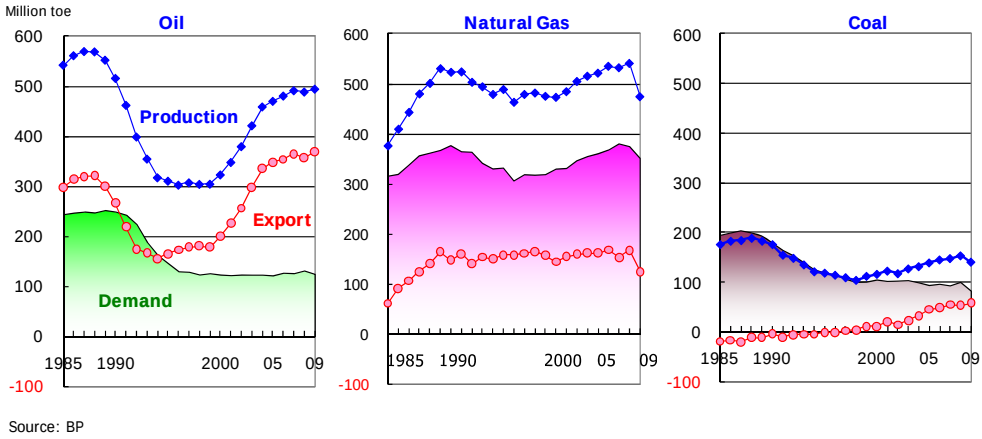


Figure 5 Russia's Fossil Energy Balance

As shown in Figure 6, Japan's crude oil import from eastern Russia is increasing fast. Major brands are Vityaz from Sakhalin-2, Sokol from Sakhalin-1 and the Siberian Blend transported via the ESPO pipeline. Nakhodka Blend, mixture of topped crude mainly composed of east Siberian crude oils railed to the coastal refinery, has gained certain share in recent years.

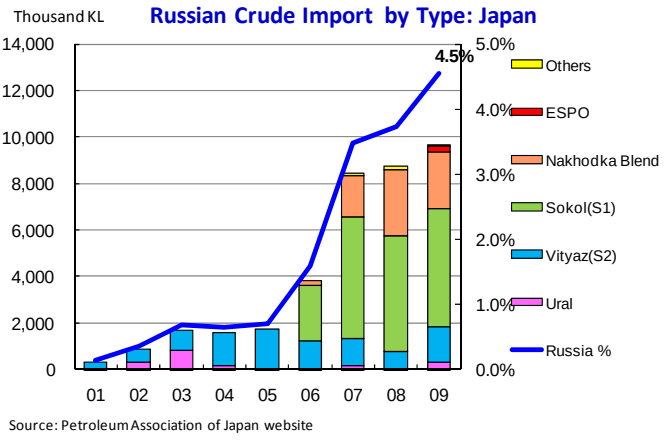


Figure 6 Japan's Russian Crude Import by Type

Since export of the ESPO pipeline crude oil has just started in 2009, there is only a slight sign of it appearing in the graph. However, its export is running at a pace of one million tons per month during the first six months of 2010, and this will significantly push up Russian crude export to Asia in 2010. All of these crude oils are light with low sulfur; their high quality compares to that of the WTI and Brent as shown in Figure 7.

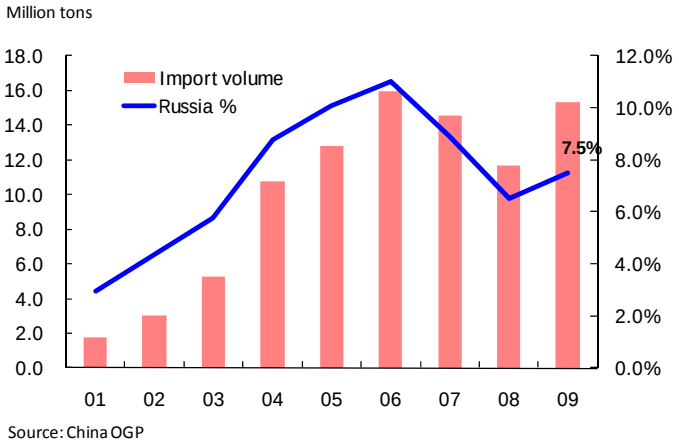


Figure 7 Russian Crude Import to China

China has been importing Russian Siberian crude oils via the Siberian railway linking both countries about 10 to 15 million tons per year. In February 2009, China and Russia made an agreement of "loan for oil" deal where China will import 15 million tons per year of crude oil from Russia. This arrangement will be maintained at least for the next two decades. In addition, China has an agreement to import 30 million tons of Russian crude oil, which is scheduled to be imported via the ESPO pipeline. A branch line of the ESPO pipeline connecting to the northeastern provinces of China is scheduled to complete in 2010. This will significantly raise the Russian crude oil imports to China. In addition, coastal provinces of China will benefit from the marine export of Russian crude oils from Kozmino, DeKastri and Prigorodnoye.

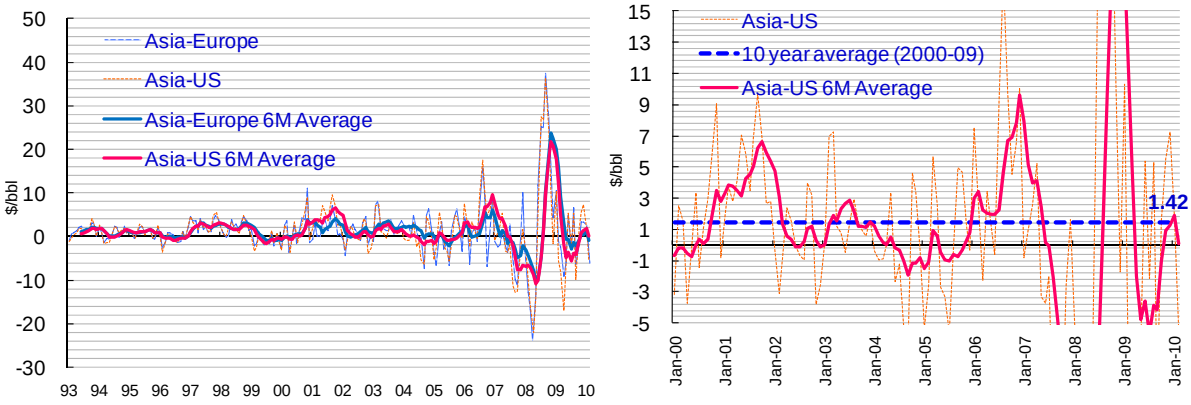
Once the under construction section of the ESPO pipeline between Skovorodino and Kozmino is completed, the pipeline will bring maximum 50 million tons per year of Siberian crude oils setting aside 30 million tons branched to China from Skovorodino. Then, Russia will be exporting 100 million tons per year or 2 million barrels per day of crude oil from its eastern provinces, while crude oil import of Northeast Asia was 584 million tons in 2009. This will not only simply accommodate increasing China's oil import, but also give a substantial impact on the crude oil market in Northeast Asia.

4. IMPACT OF INCREASING RUSSIAN CRUDE EXPORT IN NORTHEAST ASIA

4.1 Asian Premium

Growing Russian crude oil inflow to Northeast The Asian Premium of the Middle East crude oil supplied to Asia, compared to those supplied for the US, was $1.42 per barrel as an average for the past ten years representing the discriminatory pricing. It has been fluctuating violently adding another burden on the vulnerable oil supply of the region. There are several factors and explanations behind this "biased" pricing such as Middle Eastern exporter's policy to restrict resale of their cargoes, or their willingness to take a certain share in the US and European markets even with a discount.

The biggest reason among them is, however, that Asian oil customers do not have alternative supply sources with a compatible volume to compete the Middle Eastern sources. Because Asian oil buyers do not have any other economic options besides buying Middle Eastern crude oils, they are forced to accept the terms and prices provided by the Middle Eastern suppliers



Source: Compilation by IEEJ

Figure 8 Asian Premium of the Middle East Crude

Although Russia obviously is not able to overtake the dominant position of the Middle Eastern suppliers in the Asian market, if the ESPO and Sakhalin grades will eventually supply two million barrels per day to Asia as planned, Asian oil importers could have an effective counter against the Middle East suppliers. In fact, Middle East suppliers have begun to cope with this emergence of new competitor in the Asian market. Saudi Aramco has secured a crude oil storage facility in Okinawa, the southern territory of Japan, and ADNOC of UAE is also seeking for a similar opportunity. What these Middle Eastern oil exporters consider is that they need to have a supply base in the Asian market so as to make up the geographical disadvantage against Russian suppliers and to quickly respond to a sudden increase of the regional oil import demand. Competition among oil suppliers has already begun in Asia, and such a competitive environment will certainly redress the "biased" pricing custom by Middle Eastern suppliers to Asian oil importers.

4.2 Light-Heavy Spread

Another impact will be observed in the light-heavy crude oil price spread. The gravity and sulfur percentage of the Sakhalin and ESPO grades are in general light and sweet as shown in Figure 9. Currently, the ESPO grade is mainly composed of crude oils from Vankor, Talakan, and Verphnechon fields, and Vankor in particular is the dominant source of the blended grade. As other East Siberian field developments are advanced, the share of the Vankor grade with relatively heavy and sour quality falls, and the ESPO's quality will improve in future. This light and sweet quality is a perfect match to the future oil product demand structure in Asia, namely an increase of lighter oil products demand such as motor gasoline and diesel oil to meet the accelerating motorization process.

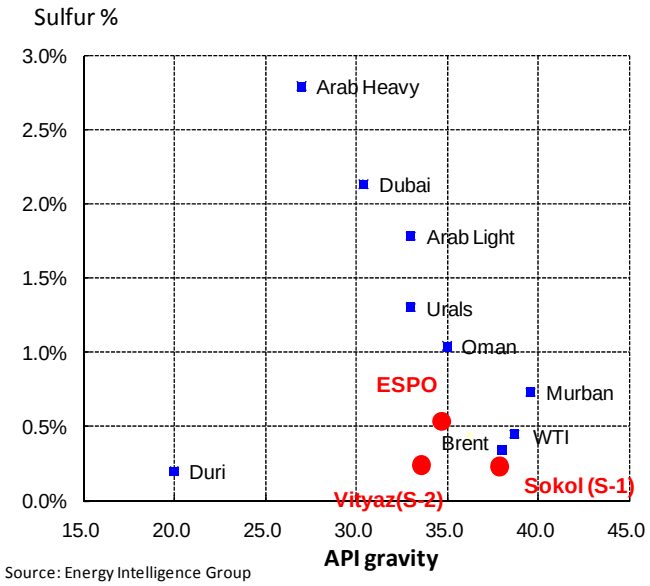


Figure 9 Qualities of Various Crude Oils

Increase of such light crude oil supply will also affect the light-heavy price spread. Figure 10 shows the price differential between Arabian Light (API33) and Arabian Heavy (API27). It moved violently along with the crude oil price level, while the technical cost to compensate the quality difference is estimated to be two to four dollars per barrel. Since the middle of last year it has kept relatively a lower level compared to the oil price.

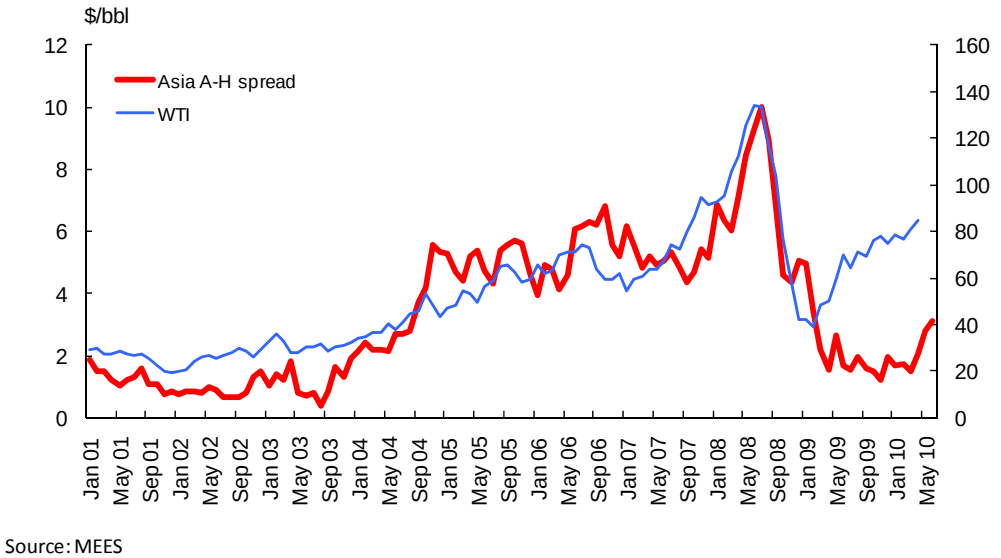


Figure 10 Light-heavy spread (Arab Light minus Arab Heavy)

In the Asian oil market, it is believed that the average crude oil quality will become heavier in future because several major heavy-grade development projects are being undertaken in Saudi Arabia (Manifa), Oman (Mukhaizna), and Bahrain (Awali). Besides them, Neutral Zone (Wafra) and Iraq (Zubair and West Qurna) are also planning to develop their

heavy grade deposits. Given such a series of heavy grade developments, Asian refiners, notably those of Japanese and Chinese ones, have invested in upgrading capacities in recent years. The increase of light crude oil flow from Russia, however, will offset the increase of heavy grades from the Middle East, and thus may narrow the projected light-heavy price spread.

4.3 The New Asian Marker Crude

The third expected impact is its potential to become a new *regional marker grade*. The current oil pricing systems in Asia Pacific are rather patchy. Some oil producers determine their selling price retroactively based on the price assessments by certain news publishers, while Oman sets its selling price *a priori* with reference to the futures price traded in Dubai Mercantile Exchange (DME) as shown in Table 1. It has been argued that the current pricing system in the Asian market is opaque unlike those in the US and European market where actual crude oil prices are set through open market transactions.

TABLE 1 CRUDE OIL PRICING SYSTEM FOR MIDDLE EASTERN CRUDE OILS

	Saudi Arabia / Kuwait / Iran	Oman	Abu Dhabi
Indexed crude oil	Platts Oman/Dubai	DME Oman (pre-shipment pricing)	None Absolute value (post-shipment pricing)
Index-based pricing	Pre-shipment pricing,	-	Post-shipment pricing
Spot transaction	None (resale prohibited)	DME – individually negotiated (resale allowed)	OSP+/-α Major-purchased oil may be resold

Source: IEEJ

Once the ESPO pipeline moves to the full scale operation, it is highly possible to become a new marker crude oil in Asia. It may drastically change the current pricing system into a more open and transparent one. Realizing this change is of course no easy task. There will be three conditions. One is sufficient supply for spot sales. The volume of the spot ESPO crude oil supply needs to become large enough to ensure sufficient trade amount in the market. The current ESPO grades are mainly composed of the Vankor grade; but additional new production from other East Siberian fields will be critically important to have additional physical supply.

The second condition is market liquidity. To be a marker grade, the ESPO grade has to be traded in a highly liquid market with a number of active participants to determine the price which both buyers and sellers find comfortable. Limited liquidity may cause a price manipulation by certain parties and thus will undermine the grade's credibility as a marker crude oil.

The third condition, though somewhat related to the second one, is the diversity of sellers. At this moment, Rosneft is a dominant seller of the ESPO grade, and more than half of the tendered cargoes so far are sold by Rosneft. In order to ensure that market functions in an objective manner, a large number of sellers should be present in the market. If additional exploration and development in East Siberia are taken by players other than Rosneft, it will contribute to diversify suppliers, and enhance transparency and objectiveness of the market.

It is of course hard to achieve these conditions shortly in the near future. Yet, it is highly possible that start of the ESPO grade export solves the issues facing the Asian oil market as mentioned above. It is also expected that export of the ESPO grade will increase in a way to enhance the transparency and liquidity of the Asian crude oil market.

Northeast Asia needs to establish more reliable and stable pricing mechanism for their crude oil procurement. Russian crude export to East Asia can play an important role in establishing a fair and equitable crude oil pricing system in the Asian market.

5. OUTLOOK OF CO_2 EMISSIONS

As energy consumption grows fast in East Asia, CO_2 emissions there will also increase greatly. According to the IEEJ Outlook, the Asian share over the global CO_2 emissions will rise significantly from 38.5% to 47.2% during the projection period. Asia is the key in the world efforts to counter global warming.

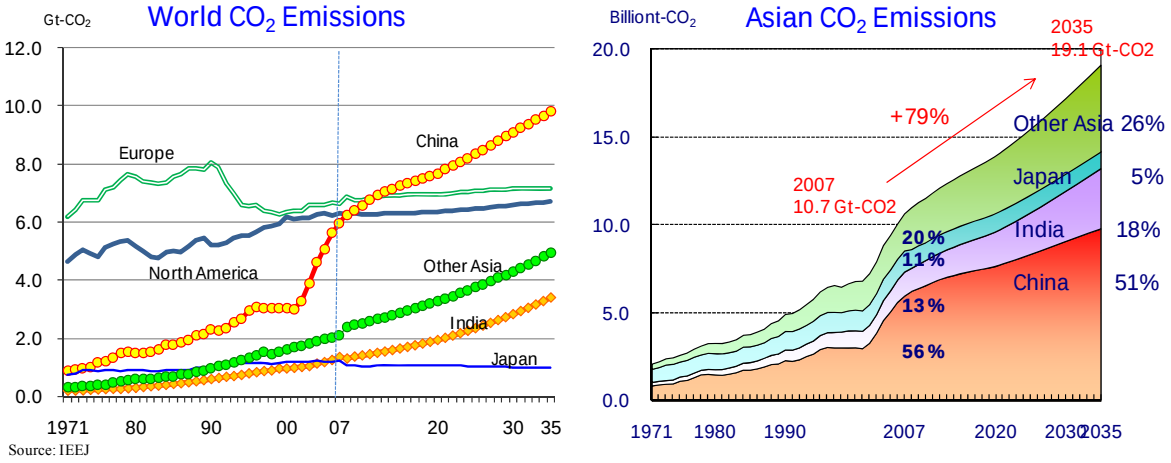


Figure 11 Outlook of World CO_2 Emissions

Among Asian countries, China, being the world's largest coal producing and consuming country, is catching up with developed countries in terms of CO_2 emissions. China's GHG emissions have exceeded that of the United States in 2007 after recording a big jump since the turn of the century. Although its speed is thought to be slowing down reflecting global economic downturn in 2008 and 2009 and its efforts of raising energy efficiency, China will overtake the entire European continent around 2013. As its per capita income and energy consumption is still low, China's energy consumption will continue to increase and its global share of GHG emissions will increase from 21.5% in 2007 to 24.2% in 2035. India is also a coal consuming country, and its GHG emissions may increase even faster than China; the global share will reach 8.4% in 2035 substantially increasing from 4.9% in 2007. China and India collectively share 46% of the global CO_2 emissions increase during the projection period, and other Asian countries another 22%. A significant increase of energy consumption and CO_2 emissions is anticipated under the Reference Scenario, which is definitely not sustainable. However, introducing innovative technologies proactively, energy consumption and CO_2 emissions could be reduced substantially as shown in Figure 12. Under this Advanced Technology scenario, it is assumed that present best available technologies (BAT) will be widely adopted and some innovative technologies such as carbon capture and storage (CCS) will be commercialized.

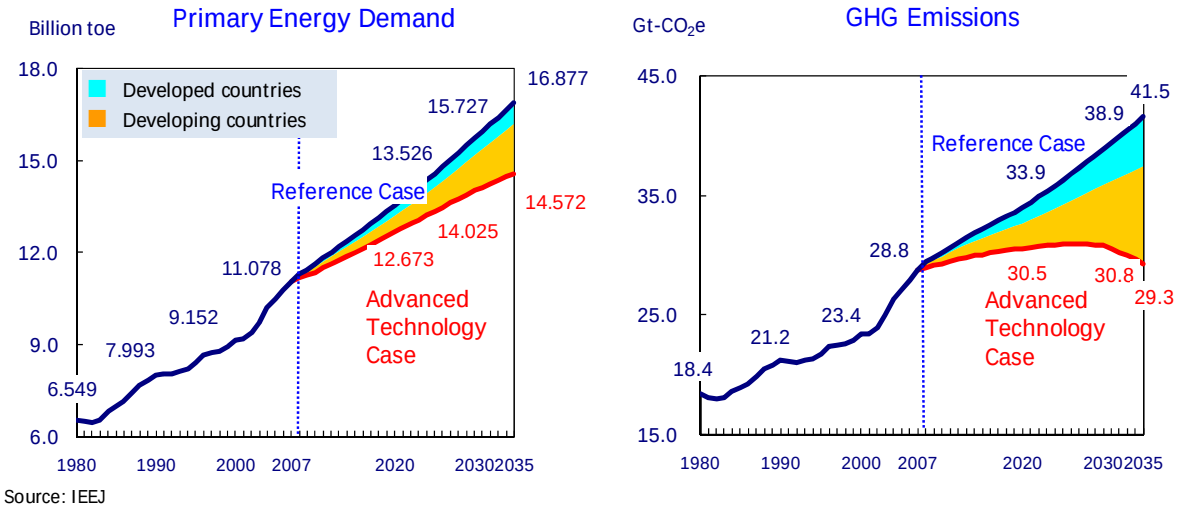


Figure 12 Emissions Reduction by Advanced Technologies

The substantial emissions reduction is particularly the case for emerging economies. The blue part in the graph shows the reductions to occur in the developed countries, while the orange part shows that for developing countries. As seen here, potential of emissions reduction is substantially greater for emerging economies.

Among measures to mitigate CO_2 emissions, energy efficiency and conservation (EEC) on the consumption side is expected to make the largest contribution as shown in Figure 13. EEC will share 46 percent of the total reduction, followed by fuel switching on the supply side at 32 percent; the latter includes switching from coal to natural gas and increase of non-fossil fuel use such as proactive introduction of nuclear, solar and wind powers. In addition, CCS is expected to become commercial around 2030 and make certain contribution in cutting emissions. The global GHG emissions are forecast to peak out by 2030.

However, this is still substantially higher than the emission level of 1990, which was 21.2 Gt-CO_2. In order to achieve the level of emissions referred to in the Copenhagen Accord, we need to further accelerate our efforts.

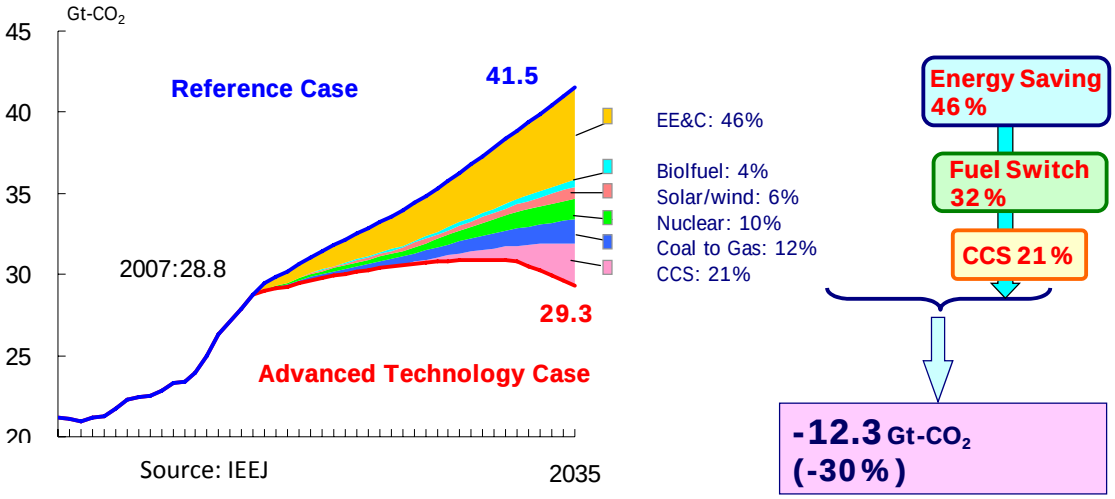


Figure 13 Mitigation of CO2 Emissions by Measures

Another finding here is that, after introducing various measures proactively developing new and unconventional energy sources, fossil fuel will continue to play a key role in the energy-mix of the world and Asia. In the Asia-Pacific region, coal will remain the most reliable and economic energy source. Oil will continue to be the main fuel for transport and its demand will continue to increase. Natural gas will play an increasingly important role to accommodate the growing demand for heat and power, as it offers better efficiencies and lower carbon footprint.

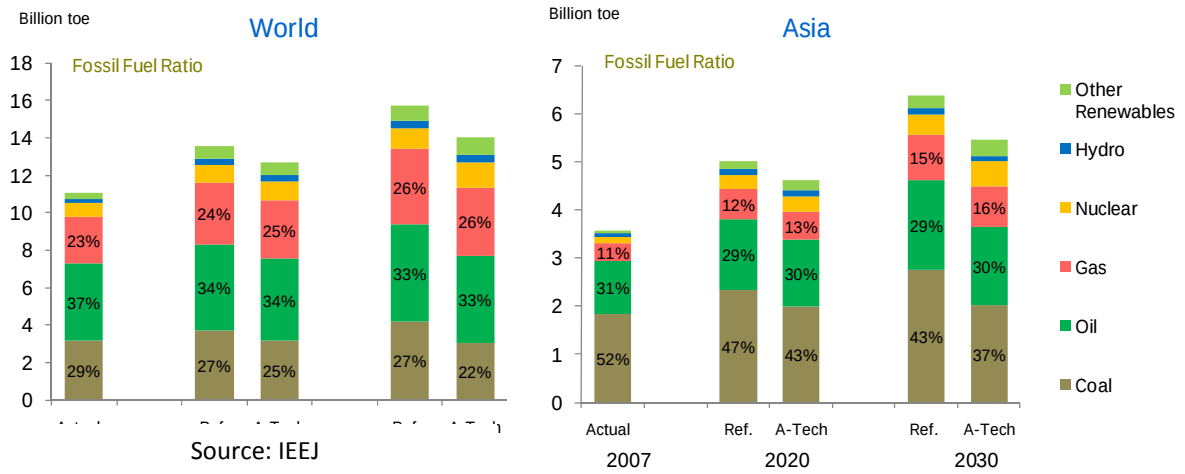


Figure 14 Energy Mix of the World and Asia under A-Tech Scenario

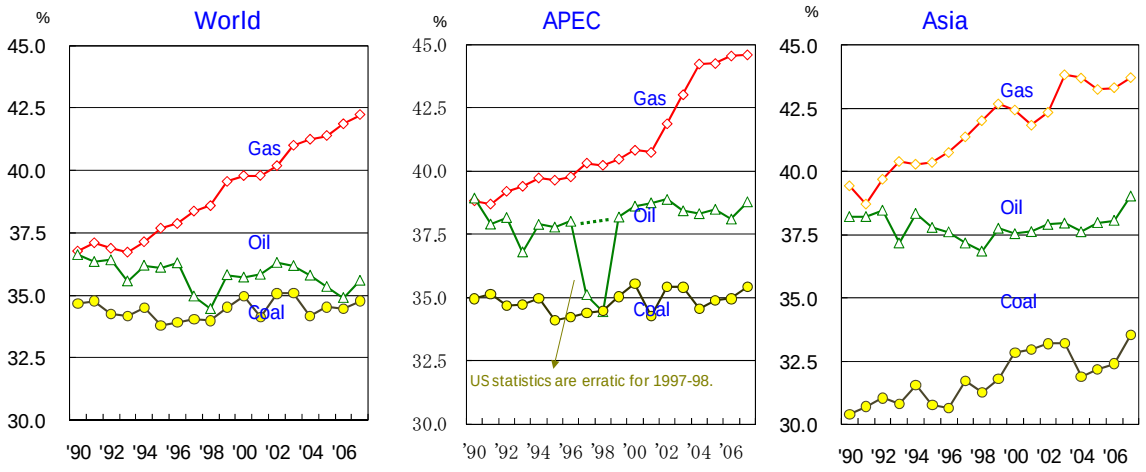
Under the circumstances, steady development and smart use of fossil fuel is an important policy objective for Asia. Efficient use of fossil fuels will reduce import of oil and gas as well as GHG emissions simultaneously. They should also be used to enable greater use of intermittent renewable energies through well harmonized energy management.

6. MEASURES FOR EFFICIENCY IMPROVEMENT

As observed above, substantial potential is expected for energy efficiency and conservation (EEC) and non-fossil energy development to reduce fossil energy consumption and GHG emissions; to list a few, such as harmonization of appliance standards through Cooperative Assessments of Standards and Testing (CAST), promotion of renewable energy development via Renewables and Efficiency Deployment Initiative (Climate REDI), Clean Coal Technologies (CCT), Carbon Capture and Storage (CCS), Smart Energy Grid (SEG), Net Zero Energy Buildings (NZB) and Houses (NZH), Low-carbon Model Town, etc. In this section, we illustrate possibility of efficiency improvement in the electric power generation sector, as a typical example.

Efficiency of thermal power generation, in particular gas turbine combined-cycle (GTCC) technology has advanced markedly in recent years. As shown in Figure 15, thermal efficiency of gas-fired stations has improved significantly in the past decades. However, that of coal-fired thermal and oil-fired thermal has remained stagnant. For oil-thermal stations, this may be because construction of new oil-thermal stations was banned in the OECD countries after the oil crises of the 1970s; old and non-efficient oil-thermal plants are phasing out sooner or later. Except for Asia, efficiency of coal thermal stations has remained almost flat, while that of Asian plants are still low compared with the world average. This illustrates the fact that severer treatment of exhaust gas has required more own consumption at plant and Asian coal-thermal plants are not sufficiently

large enough yet to enjoy economics of scale.

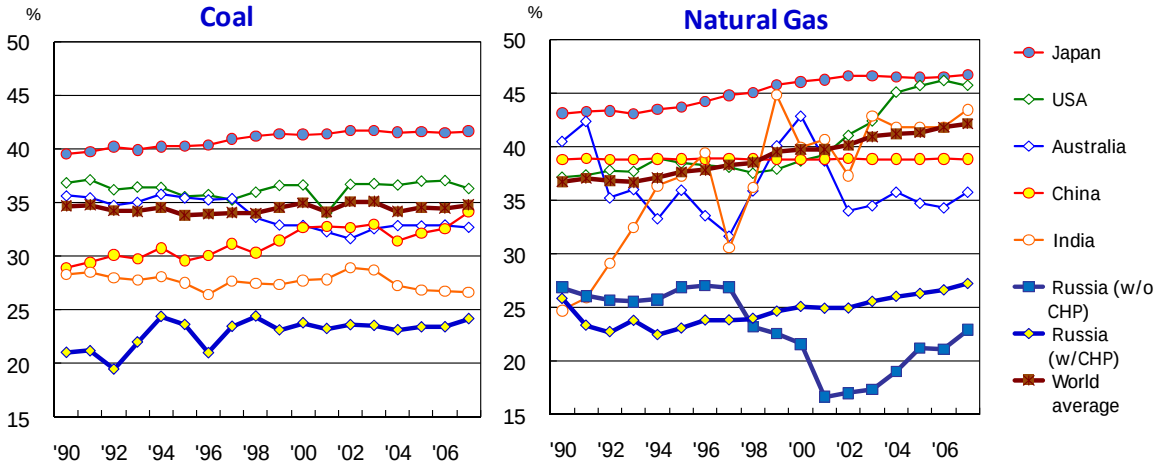


Source: IEA Energy Balances of OECD/non-OECD countries 2009 version

Figure 15 Efficiency of Thermal Power Generation

As a national average, Japan has achieved the world highest thermal efficiency for both gas-fired and coal-fired thermal power generation. According to the IEA statistics, however, there are many low-efficiency thermal plants in operation worldwide. This is typically the case for emerging economies. Statistics for Russia also shows low efficiency and erroneous movement on the trend of efficiency without combined heat and power (CHP). For coal-thermal power, Japan achieved average 41.6% efficiency in 2007, while India recorded merely 26.6%. For gas-thermal power, Japan achieved 46.8%, while Russia achieved 27.3 % as CHP.

Raising efficiency of the existing plants to the level of an average for Japan, many countries can save fuel for power generation by 15 to 60 %. In addition, the latest plant of the most advanced combined cycle (MACC) gas thermal power started this year in Japan (No.1 Unit of Kawasaki Power Station) has achieved thermal efficiency as high as 58.6% with exhaust gas temperature of 1,500 degree C. The company is aiming at 61% for the No.2 unit there with the exhaust gas temperature of 1,600 degree C, which is starting in 2016 [4]. Also, the latest advanced ultra-super-critical (A-USC) coal thermal plant in Japan, the No.2 unit at Isogo Power Station, Yokohama, has achieved 43% after deducting own use. Applying the latest proven technology, we will be able to save fossil fuel use in the power sector significantly.



Source: IEA (Energy balances of OECD/Non-OECD countries – 2009)

Figure 16 Efficiency of Thermal Power Generation by Country

If the current best efficiency for coal-thermal plant realized in Japan (43%) were achieved worldwide, 1.4 giga tons (Gt) of CO_2 emissions could be reduced annually; if the efficiency become 45%, the reduction will be 1.7 Gt-CO_2. Demand for coal will also be reduced substantially. Among them, 1.1 Gt or 80% of CO_2 reduction could be achieved only by three countries, namely, the United States, China and India. The same applies to gas-thermal generations as well.

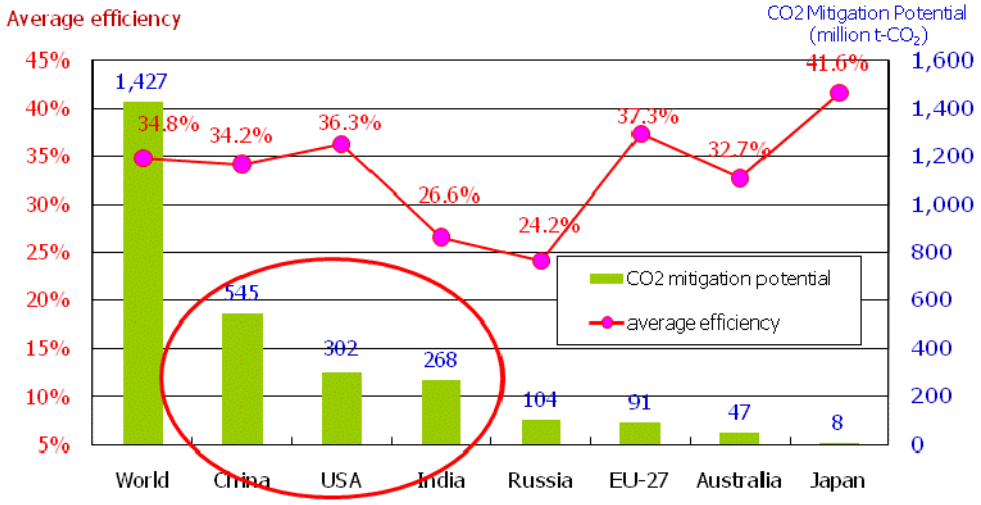
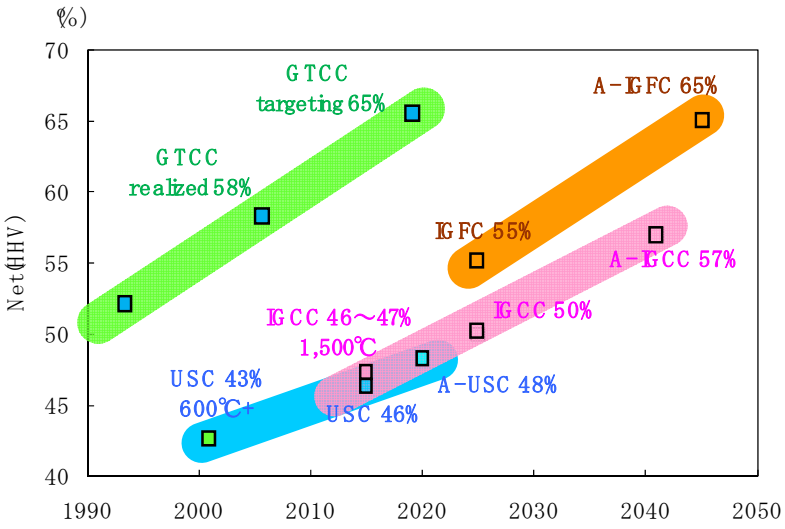


Figure 17 CO_2 Reduction Potential at Thermal Power Generation

Efforts are being made worldwide to promote research and development of technologies for better generation efficiency. For gas-thermal plans, engineers are aiming at an extreme target of thermal efficiency as high as 65%. To apply this for coal-thermal plants, for which abundant fuel supply is expected, gasification process is necessary. Engineers are aiming at 57% of overall efficiency for Advanced Integrated Coal Gasification Combined Cycle (IGCC). Large scale fuel cell technology is still in an infant stage, but technology such as

IGFC is expected to realize further improvement of energy efficiency.



Source: Cabinet of Japan," Cool Earth 50 - Energy Innovative Technology Plan"

Figure 18. Technologies of Better Efficiency

7. SUMMARY AND CONCLUSION

In summary, energy consumption is set to grow in Northeast Asia, which threatens sustainable development of the region putting heavier burden on oil supply security and environment. The BAU scenario that assumes no additional policy action is merely not sustainable. *A Low-carbon society shall be a sustainable solution,* and Northeast Asia should make collective actions toward this goal. Major members of this region are well industrialized having technologies, funds, and abilities to aim it. We should jointly challenge exploration for and application of unproven technologies beyond commerciality and untested social systems across national border. To implement this, we should consider creation of the Northeast Asia Organization for Energy Cooperation.

The regional cooperation program under this scheme will consist of four pillars, namely, ativities on fossil energy security, energy efficiency and conservation (EEC) and non-fossil fuel development, plus comprehensive policy formulation to integrate individual sectors. Reinforcement of fossil energy security includes subjects such as exploration and development of fossil energy resources including frontier and unconventional deposits, construction of energy infrastructure and network, reinforcement of the region's collective ability to respond oil supply emergency, creation of a fair and equitable energy market, assurance of open and transparent investment regime, provision of funds for investment, etc. Strengthening oil stockpiling and more flexible management of the stock will be one of the important subjects to be regionally considered. Enhancement of EEC and development of non-fossil fuels require technology transfer, R&D of innovative technologies, funds for investment, review of laws, institutions and administration systems, and so on. To facilitate these, several regional institutions should be established with functions as suggested below;

1) Northeast Asia Organization for Energy Cooperation

The organization shall be the center for regional energy cooperation, to be created with experts and funds contributed by member

countries. It should be responsible for formulating draft of strategies, plans and policies toward the goal of establishing a low-carbon society as the whole region. It should also serve as a regional center for information sharing, policy harmonization and capacity building on policy planning.

Institutional researches that require collaborative work may be attached to this head quarter; such as standardization of data, compilation of energy indicator and formulation of a regional outlook model. On the technical side, harmonization of standards and testing will be an important issue to promote trade and investment in energy efficient appliances. However, in-depth R&D on individual subjects may be conducted separately.

There should be subordinate organizations as below for implementation of specific tasks. It may also play a role like a regional branch of the IEA for coordination with other regions of the world.

2) Centre for Matching Technologies/Business Partners:

The fundamental function of this center is matching and coordination of technologies and business partners on energy efficiency and conservation (EEC) and renewable energy development available in the region. Research and training functions may also be attached to this centre. It should be equipped with a solid database for information sharing, which will be the platform for its operation. The centre should be operated under the principle that fair price must be paid for commercial technologies and intellectual property, although generous technology transfer and/or financial support are welcome.

3) Organization for Providing Funds:

Sufficient funds are necessary to develop energy resources and infrastructure, and to push forward low-carbonization of the society. The regional financial organization should specialize in energy development for construction of a low-carbon society, but should not dilute the purpose mixed with poverty reduction or economic development; the latter would cause lack of professional concentration. In addition to providing budgets or subsidies for R&D activities, it should supply loans with long term credit extending for 15 to 20 years at a low interest rate, which will substantially lower the threshold of capital intensive projects. Such funds are not commercially available, but are possible to be created with sovereign authorities of nations. It would substantially mitigate the situation that many low carbon technologies are unaffordable for developing countries where great potential of emissions reduction lies.

The organization should also call for discussions on fair and transparent investment regime across national borders.

4) Supervisory Committee on Energy Market and Emission Trading:

We have learnt that market mechanism could not automatically create fair and stable market for energy. The regional supervisory committee should create fair and equitable energy markets, set out fair rules for international transaction and audit market behaviors. Such action of the region will become a strong weapon to remove unfair customaries such as the Asian Premium.

Emission trading is an effective but imperfect system to reduce energy use and GHG emissions; it will work soundly only under appropriate conditions. The committee should prepare standard ruling and regulations, and supervise emission trading so that the market should function effectively.

5) Committee on Peaceful Use of Nuclear Power

Nuclear power will substantially diversify the energy mix of the region and reduce its GHG emissions, while it is an energy source to be dealt with utmost care. The committee should discuss the fundamental elements of the peaceful use of nuclear power and deal with issues relating to its safety, security and non-proliferation. It should also consider support for developing countries newly introducing nuclear energy with the technologies and experiences on peaceful nuclear use, which the

region has accumulated to date. It is more important to collectively establish a reliable nuclear fuel recycle system rather than individually compete for nuclear power businesses.

6) Committee on International Rulings and Arbitration:

We cannot avoid a risk of conflicts and disputes in conducting business or projects. We need clear, fair and enforceable ruling across national borders to protect players challenging international projects that may have features new to our society. The committee with certain authority should mediate disputes quickly to avoid stranding of international projects. It may recommend member countries on preparation of appropriate laws and regulations, and also establish rules and model cases for international arbitration of cooperative projects.

For sustainable development of Northeast Asia, we need more energy while we should curb global warming. In this difficult challenge, Northeast Asia should create a model international framework to collectively mobilize resources and wisdom of the region. Such model should be workable with practicable schemes and institutions -- shared institutions, technology transfer, R&D agreements, and administrative systems -- toward a low-carbon society.

5. ЛИТЕРАТУРА

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[2] BP Statistical Review of the World 2010.
[3] Koichi Ito, et al, “Asia/World Energy Outlook 2009”, October 2009, IEEJ. Base year of the forecast is 2007.
[4] Tokyo Electric Power Co., Ltd. (Tepco), “Improvement of Heat Efficiency at Thermal Power Plants”, Tepco website, updated June 24, 2010.