Chapter 4

Policy Recommendation

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4.1 Self-sufficiency Measures

The most appropriate method for a country to improve its self-sufficiency depends on the country's existing resources, level of economic development, available usable land, and the ability of the public to bear costs. Generally speaking, countries with rich fossil fuel resources will increase their fossil fuel production; countries rich in hydro resources will capitalise on their hydro resources; and agricultural countries or those with extensive undeveloped lands will increase biofuel (power generation and direct use) production. Utilising nuclear energy is also an effective method.

Among the many different methods to improve a country's self-sufficiency, energy efficiency and conservation (energy saving) are common for all countries.

The figure below shows primary energy supply per gross domestic product, one of the indices of energy-use efficiency. Many EAS countries have a figure above the Organisation for Economic Co-operation Development average (poor efficiency), inferring a high potential for energy saving. In the case study for Japan, while energy saving plays a limited role in improving self-sufficiency, it still has many benefits with the potential to reduce TPES by 10 percent or more versus the business-as-usual scenario (BAU). This validates that even though Japan has already achieved high energy efficiency, with the implementation of a powerful energy saving policy, potential can still be achieved.

There are methods that require large amount of investment to realise the energy saving potential. However, energy saving can be achieved also by modifying the energy consumption habit. For this reason, the promotion of the right mindset and sustained education among citizens are crucial.

Table 4.1 Total Primary Energy Supply per Gross Domestic Product

Country	1970s	1980s	1990s	2000s-1	2000s-2
Australia	0.321	0.299	0.280	0.250	0.243
Brunei	0.165	0.313	0.402	0.382	0.483
Cambodia	-	-	1.158	0.879	0.665
China	3.676	2.348	1.307	0.877	0.800
India	1.322	1.248	1.102	0.913	0.776
Indonesia	1.053	0.878	0.871	0.912	0.803
Japan	0.146	0.114	0.109	0.108	0.099
Korea	0.331	0.317	0.348	0.333	0.304
Lao	-	-	1.096	0.897	0.844
Malaysia	0.417	0.463	0.492	0.514	0.511
Myanmar	2.797	2.270	1.958	1.114	0.827
New Zealand	0.269	0.287	0.328	0.286	0.255
Philippines	0.509	0.498	0.535	0.470	0.363
Singapore	0.266	0.222	0.275	0.192	0.124
Thailand	0.658	0.517	0.542	0.612	0.593
Vietnam	2.178	1.911	1.369	1.168	1.074
OECD Average	0.299	0.247	0.217	0.196	0.180
ERIA Total	0.413	0.366	0.356	0.359	0.379

Note: 2000s-1: 2000–2006, 2000s-2: 2007–2009
ERIA = Economic Research Institute for ASEAN and East Asia, OECD = Organisation for Economic Co-operation and Development.
Source: ERIA Research Project Report 2011, No.13.

4.2 Challenges for Improving Self-sufficiency

4.2.1 Assessment of cost-effective potential

The assessment of cost is necessary to evaluate the potential for self-sufficiency improvement in a cost-effective manner. In the case of fossil fuel, market price should be considered in addition to research and production costs. The cost of electric power generation can be estimated using the generation cost calculation sheets created by the Government of Japan. This can be used to calculate cost for work done in Japan using the highest cost scenario and cost appropriate for other countries by modifying cost elements.

It must be noted, however, that although something may be cost-effective, still there will be an increased public burden except in the case of energy-efficiency improvement. Each country has a different cost-bearing capacity. It is essential to choose a method suitable for a country's current conditions.

In the case study for energy saving in Japan, potential and cost were calculated as a sum of each method. While it is a possible approach for Japan, a country with extensive experience in energy saving, it is not for countries with little or no experience in energy saving, thus, calculation of potential and cost should be addressed first.

4.2.2 Balance between energy mix and carbon dioxide emissions

This study evaluated methods for improving self-sufficiency from an economic standpoint. While economy is one of the three pillars of energy policy, the other two perspectives, namely, energy security and environmental sustainability, were omitted from this evaluation. Based on the standpoint of energy security, sometimes it is necessary to choose an energy source outside of economic consideration since emphasis is put on the balanced use of various energies. The same is true from the perspective of environmental sustainability. Although economic rationality is an important factor, decisions cannot be based on it alone. The actual implementation of policies may take careful consideration to balance the three pillars – economy, energy security, and environmental sustainability.

4.2.3 Balancing cost of electricity supply

Renewable energy is a desirable form of energy that contributes to improving self-sufficiency since it is carbon neutral, environmental friendly, and does not lead to CO_2 emissions. However, power generation technologies, such as solar and wind, that are subject to weather conditions have the issue of output intermittency. When such power-generated technology flows into the grid in bulk, the unstable voltage and frequency will damage the stability of the grid. As a result, it becomes necessary to spend additional investment on stabilising the grid, such as installing backup thermal power or storage batteries. However, it is not clear what these additional costs aimed at system stability are, and thus they were omitted from the calculation. We hope to see an incorporation of balancing cost when evaluating the cost of solar and wind energy.

4.2.4 Public acceptance

Even if there is cost-effective potential, the people living in areas where fossil fuel is developed

or where power generation plants are constructed will oppose such potential because of environmental destruction, which can delay or suspend the project. To avoid this, measures to prevent air and water pollution and soil contamination need to be implemented and a positive relationship with the local community established. Also, the government has to implement measures that provide incentives to the local community. As for nuclear power, the public mindset has changed since the nuclear accident at the Fukushima Daiichi Nuclear Power Plant, realising its potential.

4.3 Self-sufficiency by Region

There are many factors to consider as regards self-sufficiency on a country-by- country basis, such as natural resources and economic development, which limit the choices for increasing self-sufficiency. On the other hand, the number of choices expands when considering self-sufficiency from a regional perspective.

In some countries, energy access, such as electrification, takes priority over self-sufficiency. In such cases, it may be easier to achieve energy access targets by implementing measures on a regional scale instead of within a country.

It is essential that countries have trusting relationships with one another. Thus, the first step is to maintain positive bilateral relationships. For example, if a neighbouring country is fully trustworthy, energy imports from that country will not pose risks to the importer because these imports can be deemed roughly the same as domestic resources. In the Mekong Region, there is a movement to proactively utilise the abundant hydroelectric resources found in Lao PDR. If sufficient trust is found among neighbouring countries, there will be no risk of imports from energy trade with Lao PDR, and hydroelectric power will be a beneficial choice for contributing to the self-sufficiency improvement of the entire region.

Considering regional self-sufficiency under such a situation will result in new energy exports and imports between countries or an increase in such. Therefore, infrastructure to support exports and imports, such as distribution lines and pipelines, is essential.

4.4 Implication for Each Country

The WG deliberated and shared the implication for each of the EAS countries based on the results, which are presented below.

Country	Implication
Cambodia	• Cambodia has potential for coal and hydro energy. In the rural areas, there is potential for renewables. • Hydro energy has the highest potential and the lowest cost. There is potential for solar energy. • Coal-fired power plants are necessary to complement hydro energy in the dry season. • Cambodia has a plan to provide all villages with electricity generated by hydro or coal-fired power plants by 2020. The current electrification rate is 62 percent, and the government aims to boost this to 70 percent by 2030.
China	• China aims to decrease its coal consumption. This is being done as an environmental measure and takes priority over economic benefit. Coal currently accounts for 68 percent of TPES, but the 13th Five-Year Plan commencing in 2016 aims to bring this down to 66 percent by 2017 and under 60 percent by 2020. • One short-term initiative is to increase the usage of natural gas. The share of natural gas currently stands at 5.8 percent, but the government aims to boost this to 10 percent by 2020. • One long-term initiative is to develop renewable energy in the form of smart energy (i.e. internet-connected solar and hydro energy). Infrastructure has to be developed for solar and wind. • China will strengthen its distributed energy and distributed energy storage systems to increase the usage of clean energy. • In terms of energy efficiency, it aims to build green buildings using smart monitoring technology by 2020. In the transportation sector, the government will promote the usage of electric vehicles. It will also

	improve energy-use behaviour. • The self-sufficiency rate currently stands at 90.7 percent, but this is expected to drop to 85 percent by 2030, so China is preparing for this decreased self-sufficiency. • The cost elements are currently being examined.
India	• India has to start by compiling data that can be used to assess the security situation. • It has to take an all-South Asia approach, which includes cooperation with the ASEAN. • Regarding energy demand, price sensitivity is high so the focus is on the impact that lower oil prices will have on energy efficiency. • Energy intensity is high in the industrial and public sectors. • India has set goals for renewable energy, one of which is to achieve 40 GW of rooftop solar. • There is significant potential for hydro energy. There is also a large-scale pumped storage power project underway, but it is making little headway. • Demand-side energy efficiency is particularly important in the transport sector.
Indonesia	• Energy security is being discussed by the Dewan Energi Nasional; the development of energy resources, better usage of domestic energy, and effective energy usage are some of the measures that have been raised by the council. • From the standpoint of energy security coal is vital, but discussions are ongoing with regard to the balance between coal usage and CO_2 emissions. • Indonesia faces a dilemma: development would progress if it boosted the margins of the contractors in the production-sharing agreement (15 percent for coal and 30 percent for gas), but that would also increase costs.
Korea	• The situation in Korea is similar to that in Japan.

	• To improve self-sufficiency, Korea must boost the shares of both nuclear and renewable energy and increase energy efficiency. • Nuclear energy is the cheapest in Korea.
Lao PDR	• Lao PDR plans to develop competitive sustainable energy by 2030 to become the 'battery' of the ASEAN. • The total potential for hydro power is 26,000 MW, but this is not enough for the entire region. • The development and usage of hydro energy in Lao PDR can help reduce the ASEAN-wide CO_2 emissions, so a regional block approach will be suitable.
Malaysia	• Malaysia is trying to reduce its dependence on coal. The government plans to build three or four natural gas-fired power plants. • It has to review potential power importation from Bakun Hydro, Sarawak, East Malaysia, as a long-term option since Sarawak has hydro power potential of more than 20,000 MW. • It has a lot of waste, biomass, biogas, and geothermal power which can be converted into renewable energy. • There is potential to build a power plant using biomass, but most palm oil mills are located in remote areas and facing difficulty obtaining long-term fuel (empty fruit bunches) as a source of fuel for renewable energy power generation. • The long-term plan is to promote the ASEAN Power Grid interconnection and conduct a bilateral agreement with neighbouring countries, such as Singapore, Thailand, and Indonesia, for power import or export and natural gas export to other ASEAN countries for gas usage optimisation.
Myanmar	• Oil production is on the decline, so priority has been placed on oil and natural gas development and domestic supply. • Potential for hydro energy is high, but it will take time to achieve. • There is a plan to interconnect the power grids of Myanmar and Lao PDR.

Philippines	• There is potential for coal, oil, natural gas, and renewable energy in the Philippines. However, if dependence on coal rises, so will CO_2 emissions. • To boost self-sufficiency, the fuel mix in the power generation sector must be taken into consideration. • In the Philippines, energy access is more important than self-sufficiency. • The Philippines has formulated a long-term energy plan. • Incentives targeting the local communities are necessary to develop renewable energy.
Singapore	• Coal produces a large amount of CO_2 emission, but this can be offset by biomass. • To expand renewable energy, it is important to gain acceptance from the local communities, and communication is essential. • It is important to recognise that intra-regional transactions do not threaten the security of the home country.
Thailand	• Thailand has offshore oil and natural gas and is developing and using lignite inland. • Increasing and developing the reserves of these resources represent an important part of Thailand's energy policy.
Viet Nam	• Diversification of domestic resources for power generation is necessary. • The share of renewable energy in the power sector is 10 percent. • There is need for development of thermal power plants with appropriate rate, consistent with the supply and distribution of fuel. - Prioritise use of domestic coal to develop coal power plants in the North. - Build and put power plants using import coal for the South, due to the limitation in domestic coal production. - Develop power plants using liquefied natural gas to diversify fuel sources for electricity production.

- There is need to develop nuclear power plants to ensure stable power supply since the primary sources of domestic energy will be depleted.
- As regards import and export of electricity, Viet Nam has to implement efficient power exchange with the countries in the region (ASEAN and Greater Mekong Subregion).
- There is need to improve efficiency in energy use and energy conservation.