

Chapter 1

Introduction

September 2016

This chapter should be cited as

ERIA (2016), 'Introduction', in Kutani, I., M. Motokura, and N. Okubo (eds.), *Cost Assessment of Energy Security Improvement in East Asia Summit Region*. ERIA Research Project Report 2015-6, Jakarta: ERIA, pp.1-6.

Chapter 1

Introduction

1.1 Background and Objective of the Study

Energy security is a central pillar energy policy in all East Asia Summit (EAS) countries. Self-sufficiency of energy supply forms the basis of energy security, and there are many policy options to improve it. Enhanced oil production, increased use of domestically available renewable energy, and improved energy efficiency are examples of effective policies.

Meanwhile, the government is requested to utilise its tax income in an economically effective manner. Since each policy option has different costs and effects, a careful assessment is required before choosing policies to gain the maximum utility under the limited budget.

This study will try to assess the cost and effect of different policy options, and compare them with each other to provide an indication for more economically effective policy options. This assessment is expected to help policymakers choose better policy options to improve the self-sufficiency of energy supply for the country's energy security.

1.2 Study Method

1.2.1 Study method and work stream

Based on the achievements of the Energy Security Index study since 2011, we decided to extend and deepen the study on energy security of the region in the following manner.

(A) Reassessment of the energy security situation in the region

Since possible policy options and their cost and effect naturally differ in each country, we will select one or two countries as subject of the study. Data availability is one of the important elements that shall be considered in this process.

(B) Development of an assessment method

The study will identify the assessment method of the cost and effect of policy options.

Index: 1 percent improvement of self-sufficiency

Policy options: to increase fossil fuel production
to increase renewable energy production
to increase nuclear power generation
to improve energy efficiency

(C) Cost and benefit assessment

A survey will be conducted to collect the necessary information. The cost and effect of each policy option will be assessed and described in a chart to make comparisons easier.

(D) Derivation of policy recommendations

The study will analyse the results to derive policy recommendations.

1.2.2 Country coverage

Policy implications will cover all ERIA member countries, but assessment work will be conducted only for one or two selected countries.

1.2.3 Working Group

To conduct the above-mentioned study, the Working Group (WG) was organised and a meeting was held. The WG consists of experts from the region and a research team from The Institute of Energy Economics, Japan (IEEJ) as the secretariat. The study outcome will be discussed and shared in the WG meeting.

1.3 Focus of FY2015 Study: Self-sufficiency

(A) Why focus on self-sufficiency?

Methods for improving energy security vary by country because of various restrictions and constraints.

- (a) Natural resource endowment (fossil fuel, water, geothermal, wind, solar, etc.)
- (b) Geographical constraints (unused land, flat land, national parks, etc.)
- (c) Environmental consideration
- (d) Policy restrictions

In 2011, the ERIA WG developed the Energy Security Index for assessing conditions

of energy security quantitatively. The resulting index is presented below.

Table 1.1 Developed Energy Security Index in 2011

Components	Assessment Item	Index
Development of domestic resources	1. Self-sufficiency	1.1 TPES self-sufficiency ratio (including nuclear)
		1.2 Reserve and production ratio
		1.3 Reserve and consumption ratio
Acquisition of overseas resources	2. Diversity of import partner	2. Diversity of import partner for oil, gas, and coal
	3. Diversity of energy use	3. Diversity of energy use in TPES and electricity
	4. Dependence on Middle East	4. Dependence on Middle East for oil and gas
Transportation risk management	-	-
Development of reliable domestic supply chain	5.1 Reliability of energy supply	5.1.1 Reserve margin of generation capacity
		5.1.2 Power outage frequency and duration
	5.2 Build supply infrastructure	5.2 Commercial energy access ratio
Demand management	6. Energy efficiency	6.1 TPES per GDP 6.2 TFEC per GDP
Readiness for supply disruptions	7. Strategic reserves	7. Days of on-land oil stocks
Environmental sustainability	8. CO ₂ intensity	8.1 CO ₂ emissions per TPES
		8.2 CO ₂ emissions per fossil fuel
		8.3 CO ₂ emissions per GDP
		8.4 CO ₂ emissions per capita

CO₂ = carbon dioxide, GDP = gross domestic product, TFEC = total final energy consumption, TPES = total primary energy supply.

Source: Economic Research Institute for ASEAN and East Asia Research Project Report 2011, No.13.

Among these indicators, for 2015 the focus was drawn to self-sufficiency from three vantage points.

(A) Self-sufficiency is a comprehensive indicator

Self-sufficiency is a comprehensive indicator that combines fossil fuel production (coal, oil, and natural gas); nuclear power generation; renewable energy use (hydro, geothermal, wind, solar, and others); diversity of total primary energy supply (TPES); diversity of power generation fuel; and energy efficiency.

Therefore, optimal measures to improve self-sufficiency are different among countries because of their unique conditions, such as endowment of natural resources and constraint in land use. In other words, a country can improve self-sufficiency by taking the approach most suited to its situation based on the presence of natural resources and methods of energy use.

(B) Worsening self-sufficiency is a trend in most countries

The following table presents self-sufficiency trends in the past and the outlook for self-sufficiency in the future. In most countries, especially developing countries in the Association of Southeast Asian Nations (ASEAN), self-sufficiency is declining and is expected to become even worse than it is now. This indicates that in developing countries in the ASEAN, the speed of increasing fossil fuel production cannot keep pace with that of increasing energy demand. Avoiding a drop in self-sufficiency is needed to reinforce energy security in the entire EAS region. Measures to address this are much anticipated.

Table 1.2 Self-sufficiency in the Past and Future Outlook

Country	Actual (IEA)					Estimation	
	1970s	1980s	1990s	2000s-1	2000s-2	2020	2035*
Australia	120%	162%	196%	232%	254%	377%	444%
Brunei	2186%	1089%	796%	837%	624%	721%	619%
Cambodia	-	-	83%	80%	16%	11%	12%
China	102%	105%	101%	97%	92%	62%	53%
India	92%	94%	87%	80%	67%	38%	32%
Indonesia	234%	194%	164%	151%	195%	126%	121%
Japan	11%	17%	19%	19%	18%	17%	12%
Korea	29%	27%	17%	19%	20%	18%	19%
Laos	-	-	92%	99%	80%	158%	100%
Malaysia	121%	206%	183%	155%	134%	85%	53%
Myanmar	98%	101%	98%	135%	235%	248%	209%
New Zealand	56%	79%	88%	81%	83%	79%	81%
Philippines	47%	62%	50%	51%	52%	51%	39%
Singapore	0%	0%	0%	0%	0%	0%	1%
Thailand	55%	62%	59%	57%	55%	29%	21%
Vietnam	91%	94%	116%	130%	145%	81%	48%
OECD Total	67%	77%	75%	72%	71%	-	-
ERIA Total	79%	87%	84%	84%	85%	63%	-

Note: * Indonesia, Malaysia, Myanmar: 2030; New Zealand: 2025.

Source: Economic Research Institute for ASEAN and East Asia (ERIA) Research Project Report 2011 and 2013.

(C) Data availability

Data on self-sufficiency can easily be obtained from International Energy Agency (IEA) statistics. Self-sufficiency is easy to use as an indicator for cross-cutting assessments.

1.4 Working Group Activities in FY2015

To conduct the above-mentioned study, the WG was organised. It consists of experts from the region and a research team from IEEJ as the secretariat.

In FY2015, the WG meeting was held one time in March 2016 in Bangkok, Thailand.

First, the meeting explained the study, which was followed by an interim report on case studies targeting Japan and Thailand and an accompanying discussion on the report.

In terms of assessment method, two major views were shared. First is the consideration for an effective and outside method of expression. For example, it was pointed out that if the cost of improving self-sufficiency could be expressed as the increased portion of electricity tariffs, it could make self-sufficiency easier to understand and could provide a stronger impression among policymakers and politicians. Second is the relationship between climate change and energy issues. This analysis narrows the focus on self-sufficiency, but climate change and energy issues are almost inseparable. It was pointed out that each choice aimed at improving self-sufficiency could be analysed for its impact on carbon dioxide (CO₂) emissions.

By energy type, the WG participants pointed out issues with fossil fuels and nuclear power. Developing fossil fuel resources domestically is an economically viable choice as regards increasing self-sufficiency rate. However, in some cases social acceptance could pose a problem to the development of fossil fuel resources, thus careful consideration is necessary. The massive environmental changes before and after the nuclear accident at the Fukushima Daiichi Nuclear Power Plant were ascribed to nuclear power. This, too, represents a problem related to social acceptance.

In addition to these, another important perspective was provided at the WG meeting. It is the examination of self-sufficiency for the entire region instead of an individual country. Self-sufficiency is an issue related to the security of a country, including its military affairs. Therefore, a general approach is essentially for an individual country to strive to increase its self-sufficiency. However, as seen from the example of the European Union, assuming a regional community that encompasses security issues, the conventional understanding of energy security and approaches to realising energy security can be interpreted differently. That is, importing energy is deemed a risk for the importer but not energy trade among countries comprising a community. Therefore, it is possible to assess self-sufficiency and energy security of an entire regional community. This philosophy matches perfectly with the concept of the ASEAN Economic Community established in December 2015 and represents an ideal approach for this region.