

## EXECUTIVE SUMMARY

In the 16th ECTF<sup>1</sup> meeting held in Vientiane of Lao PDR on 25 August 2011, Japanese government proposed several new idea and initiatives for EAS energy cooperation. Responding to the proposal, the ECTF Meeting endorsed the new areas and initiatives, which included the Energy Security Index for East Asian Countries.

The Economic Research Institute for ASEAN and East Asia (ERIA) approved the proposal of the Japanese government to conduct a study on the energy security index. As a result, the Working Group (WG) for the study on development of Energy Security Index and assessment of energy security for East Asia Countries was convened.

The first objective of the study was to develop an index that quantitatively indicated the energy security situation, and could thereby, help policymakers to accurately gauge the energy security situation in their country.

The second objective was to analyze the linkages between policies and the historical trends shown in the index, and thereby assess the impact that policies have on the energy security situation.

The last objective was to propose policy recommendations to policymakers in East Asian countries on improving energy security based on the following analysis:

- What methods and approaches are effective for improving energy security
- What kinds of regional cooperation are useful for improving energy security

For this study, a Working Group was organized comprised of experts from East Asian countries. In the first year of the study (e.g. FY2011), the WG convened two times to develop indexes which is able to explain, not the all, but some aspect of

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<sup>1</sup> Energy Cooperation Task Force under the Energy Minister Meeting of EAS countries.

energy security.

For this year, the WG convened two times to discuss the correlation between calculated ESI and past policies. In an analysis, we focused on a past transition of ESI and relevant policies in each country. Although the change of ESI can be explained by various elements including policies and economic situation, we had selected a few specific policies to simplify the assessment work. Since the purpose of the study is to find core element of correlation between the ESI and policies, this procedure does not deteriorate the analysis.

The following table shows selected policies to be analyzed.

<b>List of policies</b>	
Description	Specific Policy
Coal	Coal mining (Indigenous) Coal use promotion Import source country diversity
Crude oil	Crude oil E&P (Indigenous) Refinery construction Import source country diversity Oil Stocks (SPR) Alternative fuel promotion (other than oil)
Natural gas	Natural gas E&P (Indigenous) Natural gas use promotion Import source country diversity
Nuclear	Nuclear development
Hydro	Hydro development
Geothermal, wind, other	Renewable energy development
Biofuels & waste	Renewable energy development
Electricity	Electrification Supply reliability
All energy	Energy conservation/efficiency
CO2 Emission	CO2 Emission reduction
Price and subsidy (incl. tax incentive)	Coal production subsidies Coal consumer price control (below international prices/import costs) Crude oil production subsidies Oil product consumer price control (below international prices/import costs) Natural gas production subsidies Natural gas consumer price control (below international prices/import costs) Electricity tariff control (below costs)

The correlation between ESI and policy is summarized in the following table.

When look at the records of an assessment, in most cases there was a correlation

between past policy and change of ESI with a few exceptions. While there are ESIs directly affected by specific energy policy, there are others that are believed to be impacted multiple factors such as changes in industrial structure, economic activity, technology development and market conditions (costs and price). Hence, we should be careful to watch these assessments.

### Correlation between policy and ESI (Summary)

ESI	KHM	CHN	IDN	JPN	KOR	LAO	MYS	MMR	NZL	PHL	THA	VNM
1 TPES self-sufficiency	No	No	No	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes
2 Coal self-sufficiency		No	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No	Yes
3 Crude oil self-sufficiency							No	Yes	Yes	Yes	Yes	No
4 Natural gas self-sufficiency			No		Yes			Yes	No	Yes	No	Yes
5 Coal R/P		No	No	Yes	Yes				Yes	Yes	Yes	Yes
6 Crude oil R/P							No	Yes			No	Yes
7 Natural gas R/P			No				No	No		Yes	No	No
8 Coal R/C		No	Yes	Yes	Yes				Yes	Yes	Yes	Yes
9 Crude oil R/C			Yes				Yes	Yes			Yes	Yes
10 Natural gas R/C			Yes				Yes	No		Yes	Yes	Yes
11 Coal import source country diversity					Yes		Yes					
12 Crude oil import source country diversity		Yes		No	No							
13 Natural gas import source country diversity					Yes						No	
14 TPES diversity	Yes	No	Yes	Yes	Yes		Yes		Yes	Yes	Yes	Yes
15 Power generation fuel diversity	Yes	No	Yes	Yes	Yes		Yes		Yes	Yes	No	Yes
16 Crude oil Middle East dependence		No		No	No							
17 Natural gas Middle East dependence					Yes							
18 Reserve margin of generation capacity		Yes	No	Yes	No		Yes	-	No	Yes	Yes	No
19 Power outage frequency			Yes	Yes	Yes		Yes		No			
20 Power outage duration			No	Yes	Yes		Yes		No			
21 Commercial energy access	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
22 Electrification	Yes	Yes	Yes	-	-	Yes	Yes	Yes	-	Yes	Yes	Yes
23 TPES / GDP		Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
24 TFEC / GDP		Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
25 Days of on-land oil stocks				Yes	Yes			Yes	No		Yes	
26 CO2 Emissions / TPES	No	Yes	No	Yes	Yes	No	No	No	No	No	No	No
27 CO2 Emissions / Fossil fuel	No	No	No	No	Yes	Yes	No	No	No	No	No	No
28 CO2 Emissions / GDP	No	Yes	No	Yes	Yes	No	No	No	No	No	No	No
29 CO2 Emissions / Population	No	Yes	No	No	No	No	No	No	No	No	No	No

Note: KHM: Cambodia, CHN: China, IDN: Indonesia, JPN: Japan, KOR: Korea, LAO: Laos, MYS: Malaysia, MMR: Myanmar, NZL: New Zealand, PHL: Philippines, THA: Thailand, VNM: Vietnam

In this year, the study delivered following implications for the energy security of EAS countries.

1. Measuring the effects of policy is extremely important as a reference for future policy planning and for effectively allocating limited budgetary resources. In this sense, despite various restrictions, this research carries with it great significance because it attempts to qualitatively measure the existence of policy effects.
2. One ESI consists of multiple policies effect, making it difficult to qualitatively assess what effect which of these policies had on ESI changes. For example, changes in the TPES per GDP used to assess energy efficiency are affected by changes in energy consumption as well as changes in industrial structure.
3. However, when examining both ESI changes averaged out over a long period of time, such as five or ten years, and the existence of policy thought to be correlated to such changes, assessments showed a correlation existed between several policies and ESI.
  - Resource development promotion policy and R/C ratio
  - Oil dependence reduction policy and diversity in primary energy as well s power supply
  - Commercial energy supply policy or electrification rate improvement policy and commercial energy supply ratio or electrification rate
  - Energy saving policy and energy efficiency
  - Oil stock policy and oil stock amounts
4. Generally, policy requires a long period of time before it causes changes in the country's actual energy supply-demand situation. This is because investments in equipment and devices that use energy are typically large in nature, while such equipment and devices have a long service life, meaning that it is difficult to change energy supply-demand situation over a short period of time.

For example, several countries are implementing policy on climate change, and such policy has only been rolled out recently. Consequently, enough time has yet

to pass until such policy has made changes in the energy supply-demand situation, making it impossible to verify the effects.

5. Conversely, there are also policy effects that cannot be verified even after a sufficient amount of time has passed since the policy was implemented. One example is dependence on the Middle East for oil supply. The study could not verify declines in dependence despite the existence of policy for such purposes. This is believed to be due to geographic reasons, or the fact that large amounts of crude oil are existing in the Middle East and that there is no other supply source in the Asia Pacific region large enough to replace the Middle East. Therefore, essentially policy effects are difficult to obtain.
  
6. A combination of multiple indirect methods is believed to be useful toward achieving targets for which policy has a difficulty exerting effects. For example, in the case of dependence on the Middle East for oil supply mentioned above, the fundamental purpose of policy is to avoid the serious geopolitical risks posed by the Middle East. This purpose can be achieved to a some extent by implementing multiple layers of policy, including reducing the use of oil for which the country depends on Middle East imports, preparing for supply interruption risk with the use of oil stocks, and providing support aimed at long-term stability in the Middle East.
  
7. The strength of regulations on the energy industries or energy markets is an important element that determines the effects of energy policy. The strength of such regulations become weaker in order of the following situations: (1) monopoly by state-owned enterprises; (2) private-sector companies play a leading role but business regulations are in place; and (3) private-sector companies play a leading role and deregulation has been implemented (market oversight remains in place using environmental / safety regulations or government administration)

The situation where state-owned enterprises have a monopoly over energy

markets in which regulations are strong is believed to be the easiest way to reflect policy intention more directly in the market over a comparatively shorter period of time. In many of the countries studied, all or certain important parts of energy markets were monopolized by state-owned enterprises and this proved to be effective in terms of the ease of implementing energy policy.

In situations with strong regulations, however, the screening and management ability of the market regulator, government, largely determines market efficiency and the level of services provided to end consumers. Caution should also be heeded regarding the possibility that the heavy involvement of politics that typically occurs in such situations could inhibit policy execution.

8. Generally, it is believed that leaving the markets to open competition among private-sector companies will result in more diverse services at a lower cost. However, it is important to note that private-sector companies essentially do not take action beyond economic rationalities.

For example, in the selection of power sources, if attempting purely to fulfill economic rationalities, most private-sector companies would choose subcritical pressure coal-fired power plants. However, this carries with it the potential to go against the requirements of energy security, which include risk dispersion through energy source diversification, reduced demand through improved energy efficiency, and environmental impact reductions. Energy security is a requirement of the nation that exceeds corporate behavior. As such, it is impossible to completely eliminate the involvement of the national government in a country's energy markets.

However, it is a proven fact that incorporating the capital, human resources and innovation of private-sector companies into energy markets will provide profits for the energy markets. Consequently, an appropriate balance should be struck between the government and private-sector companies depending on the unique situation of each country.