

# Chapter 1

## Introduction

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# **CHAPTER 1**

## **Introduction**

In the EAS (East Asia Summit) countries, power demand is steadily expanding due to a population increase and economic growth. Moreover, as improving the electrification rate is an important policy task in many countries, power demand appears certain to increase in the future in line with a rise in living standards. Meanwhile, as income is relatively low except for a small group of wealthy people, it is necessary to supply electricity at minimal possible cost. Therefore, for the EAS countries, steadily implementing large-scale power source development in an economically efficient way is an urgent task.

Basically, a country implements power source development on the premise of self-sufficiency. That is natural from the perspective of energy security of a country, and it is a rational approach when demand growth is moderate and the country can implement economically efficient power source development on its own so as to meet the demand. However, when demand growth outstrips the capacity to supply necessary domestic resources (manufacturing, human and financial resources) or when economically efficient power source development is difficult due to some constraints, such as high fuel transportation costs and power loss during transmission, importing electricity from neighboring countries should be considered as an option. In light of the above, it may be possible to optimize or to improve the efficiency of power infrastructure investments in terms of supply stability, economic efficiency and reduction of the environmental burden if we consider ways of developing power infrastructures (power sources and grids) on a pan-regional basis.

In the ASEAN region, HAPUA (The Heads of ASEAN Power Utilities / Authorities) and the Asian Development Bank are implementing initiatives related to intra-region power grid interconnections, and bilateral power imports and exports are ongoing. However, individual countries are still placing priority on optimization of investments at the domestic level. Besides, power imports and exports are not brisk enough to contribute to “power grid interconnection,” and moves toward pan-regional optimization have been slow.

## **1. Rationale**

The rationale of this study is derived from the 17th ECTF<sup>1</sup> meeting held in Phnom Penh of Cambodia on 5 July 2012. In this meeting, the ERIA explained and proposed new ideas and initiatives for EAS energy cooperation, including the following:

- Strategic Usage of Coal
- Optimum Electric Power Infrastructure
- Nuclear Power Safety management, and
- Smart Urban Traffic

The participants of the ECTF Meeting exchanged views on the above proposals and agreed that it was time to consider new areas in addition to the current work streams to reflect the dynamics of energy demand and supply in the East Asian region. As such, the ECTF Meeting endorsed the proposed new areas and initiatives.

As a result, The Economic Research Institute for ASEAN and East Asia (ERIA) has formulated the Working Group for the “Study on Effective Investment of Power Infrastructure in East Asia through Power Grid Interconnection”. Members from 9

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

EAS countries are represented in the WG with Mr. Ichiro Kutani of the Institute of Energy Economics, Japan (IEEJ) as the leader of the group.

## **2. Objective**

This study will quantify the possibility and benefits of the pan-regional optimization of power infrastructure investments in the EAS region. By doing so, the study will provide clues for policy decisions toward the development of optimal power infrastructures and investment decisions. In short, the study is intended to promote power infrastructure investments or support existing initiatives including GMS<sup>2</sup> and APG<sup>3</sup>.

## **3. Work Stream**

The study consisted of four work streams for fiscal year 2012.

(A) Collection and compilation of information relating to power infrastructures

Information relating to power infrastructures in East Asia will be collected and examined from the following perspectives:

- Forecast of power demand
- Power source development plans
- Power grid investments and interconnection plans
- Power generation and transmission costs
- Common systems and technical standards, etc. relating to power grid

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<sup>2</sup> Greater Mekong sub-region program led by Asia Development Bank.

<sup>3</sup> ASEAN Power Grid program led by HAPUA.

interconnection

When collecting information, we will pay as much attention as possible to the results of existing initiatives relating to power grid interconnection in East Asia, such as the initiatives of HAPUA (ASEAN Power Grid) and the ADB (Greater Mekong Sub-region Program).

Although information will be collected through document research in principle, a field survey may be conducted as needed.

(B) Identification of challenges and points of debate

Based on information collected as described in (A), challenges and points of debate relating to broad-area infrastructure development in East Asia will be identified. The following are examples of viewpoints of our analysis.

- Entities in charge of developing power grid interconnection infrastructures
- Costs of and financing for the development of power grid interconnection infrastructures
- Legal frameworks and technical standards relating to multilateral power trade
- Incentives for power grid interconnection and the political and administrative implementing capabilities, etc.

(C) Development of a broad-area power infrastructure simulation model and evaluation of the simulation results

Based on information obtained as described in (A), we will develop a broad-area power infrastructure simulation model for the EAS region. Using the developed power grid interconnection model, we will simulate combinations of power sources and power grid interconnections that would achieve the goals of minimizing the total investment amount and the CO<sub>2</sub> emission amount.

In addition, based on the simulation results, we will conduct a comparative analysis of the simulations and existing power infrastructure development plans

drawn up by individual countries. The comparative analysis will be conducted from the following viewpoints:

- Whether it is possible to reduce the investment amount compared with existing plans.
- Whether it is possible to reduce the CO<sub>2</sub> emission amount compared with existing plans.

(D) Draw out policy recommendation

Based on study outcome from above mentioned (A), (B) and (C), we will draw out policy recommendation to enhance effective investment of power infrastructure in EAS region.

#### **4. Working Group Activities in 2012**

In 2012, the WG was held for 2 times in November 2012 in Jakarta, Indonesia and April 2013 in Tokyo, Japan.

At the first meeting, information sharing and discussion regarding each country's power source development plan took place. Additionally, issues related to existing initiatives such as the ASEAN Power Grid and GMS were discussed.

At the second meeting, the validity of data input for simulations of optimal energy mixes was examined, and calculation results were evaluated and discussed.