

# Chapter 1

## Background, Objectives, and Methodology of the Study

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# Chapter 1

## Background, Objectives, and Methodology of the Study

### 1. Background

Electricity demand in the Association of Southeast Asian Nations (ASEAN) region is increasing as its economy grows steadily. Power plant development is expected to proceed towards a well-balanced optimal generation mix of coal, gas, and renewables to address the surging demand.

The Joint Ministerial Statement of the 36th ASEAN Ministers on Energy Meeting acknowledged that, with the rising demand for coal use to generate power up to 2040, ASEAN member states (AMS) have their shared view that coal is strategically important, given its affordable generation cost and abundant availability in the East Asia Summit region. Accordingly, most ASEAN governments foresee coal to remain a major generation source even in the long run. Yet they are also committed to making utmost endeavours in reducing emissions to address climate change issues by introducing renewable energy and facilitating the cleanest-possible utilisation of coal. As the declaration says, utilisation of clean coal technology (CCT) is vitally important.

During the initial development period in the ASEAN region, regardless of the generation source, the development of large power plants to supply electricity to urban and/or industrial areas was initiated to bolster overall national development. Now that the fruits of national development are to be shared broadly with all people in each member state and the region, the relevant governments are pressured to facilitate the development of smaller-scale power plants – 100 MW or less – in the areas yet to enjoy the benefits of electricity. However, a high-efficiency ultra-supercritical (USC) boiler that is deemed to be the most environmentally compliant amongst the broadly available technologies may not apply to such a smaller-scale power plant. Circulating fluidised bed (CFB) firing technology that enables high efficiency even on low-rank coals is more excellent even over USC if such smaller-scale power generation is required.

Full-fledged biomass utilisation is one of the important issues for the AMS, for which agriculture and forest industry remain the crucial industry sectors. Most of the residue is treated as waste either through incineration or landfill, which may cause environmental degradation if continued in the coming future. These wastes, converted as fuel, are of different varieties in terms of types, grades, and characteristics and are sufficient in quantity.

In summary, such biomass resources are ready for utilisation and are expected to be one of the most promising renewable fuels for smaller-scale power generation in addressing the issues of CO<sub>2</sub> emissions reduction and rural electrification that is crucial to rural development. However, biomass resources are intermittent as the rest of the renewable resources since they are seasonal.

Coal, being an available generation source, in this context may be complementary with biomass resources and vice versa. This is because biomass resources may realise significant CO<sub>2</sub> emissions reduction that may not be achieved if such a smaller-scale power plant is operated on coal only.

The Study on Biomass and Coal Cofiring in the ASEAN Region (the phase 1 study) (ERIA, 2019) was conducted to finally provide a proposal for CO<sub>2</sub> emissions reduction and better energy security through coal and biomass cofiring on CFB boilers in the ASEAN region. The phase 1 study formulated two models from the member states: (i) biomass-rich coal producer, i.e. Indonesia, and (ii) biomass-rich coal importer, i.e. the Philippines, both of which have a high potential for cofiring.

The phase 1 study, as discussed in the next chapter, made a policy proposal of the applicable methods of cofiring and measures for dissemination with required policy instruments that are to be in place. Also discussed are the outcomes of the techno-economic evaluation of the two models in terms of the advantages of utilising own resources, better national energy security, better environmental compliance – all of which are expected to benefit the AMS through cofiring.

## **2. Objectives**

This phase 2 study aims to identify the required measures suitable to the respective AMS and guidelines for ASEAN to facilitate biomass utilisation focusing on cofiring through best practices. The phase 1 study had highlighted the interest and concern of the AMS in biomass utilisation and cofiring in their policy context of renewable energy development enhancement and CO<sub>2</sub> emission reduction. It identified the following two models, plus additional cases for further consideration:

- (1) Indonesia – 50 MW CFB, domestic coal
- (2) The Philippines – 50 MW CFB, imported coal
- (3) Thailand – cofiring on a mine-mouth subcritical or biomass gasification/small-scale gas engines.

The phase 2 study is expected to identify and indicate examples of best practices, including the outcome of phase 1, and formulate guidelines for an optimal policy framework for ASEAN to facilitate biomass utilisation focusing on cofiring. The phase 2 study will analyse the measures to be taken and the role to be played by cofiring in addressing the forthcoming issue of grid fluctuation due to the massive introduction of renewables.

### 3. Methodology

- (1) Formulation of by-country strategies for cofiring technology introduction, implementation, and dissemination

The phase 1 study identified two models for which the policy proposal would be made before phase 2 study started.

While the Working Group (WG) members were highly concerned about including cofiring as part of their policy measures for CO<sub>2</sub> emission reduction and better energy security, they desired to obtain further practical information about the measures to be taken that are tailored for each AMS.

Accordingly, phase 2 will focus on identifying and formulating by-country strategies to facilitate the introduction, implementation, and dissemination of cofiring by conducting the following on topics such as the introduction of potential cofiring technology in each AMS, issues to be addressed, envisaged best practices, policy measures to be taken, benefits and advantages, etc.:

- Electronic communication with WG members for information and advice to formulate the optimal strategy for each target AMS
- Collective discussions at the two-time WG meetings as referred to below (item 2).
- Internet surveys to enhance the accuracy of the strategies to be formulated.

- (2) Two-time WG meetings

Two-time WG meetings were planned and conducted online, for which the members for the phase I study were requested through the relevant government institutions and utilities to stay on in the WG for phase 2.

The purpose of each WG meeting was as follows:

- First WG meeting: Discussion on topics such as introducing in each AMS of potential cofiring technology, issues to be addressed, envisaged best practices, policy measures to be taken, benefits and advantages, etc.
- Second WG meeting: Presentation of draft report by the Japan Coal Energy Center (JCOAL) that covers proposals for each AMS. Discussion on the draft for incorporating comments and advice from the WG members.