

# Chapter 1

## Background

July 2022

**This chapter should be cited as**

ERIA Study team (2022), 'Background', in Shigeru Kimura, Yoshiaki Shibata, Soichi Morimoto, Kei Shimogori, Yuji Mizuno (eds.), *Decarbonisation of ASEAN Energy Systems: Optimum Technology Selection Model Analysis up to 2060*. ERIA Research Project Report FY2022 No. 05, Jakarta: ERIA, pp.1-2.

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## Background

The goal of the Paris Agreement (United Nations [UN], 2015) is ‘holding the increase in the global average temperature to well below 2°C above pre-industrial levels, and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels’. It aims to reach the global peak of greenhouse gas (GHG) emissions as soon as possible and ‘achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century’ (UN, 2015). Many countries have announced highly ambitious medium- to long-term GHG emission reduction targets. The Intergovernmental Panel on Climate Change (2021) warned that unless CO<sub>2</sub> and other GHG emissions are drastically reduced in the coming decades, global warming will exceed 1.5°C and 2°C during the 21st century. The decarbonisation movement is expected to spread across not only developed countries but also many other countries, including in Association of Southeast Asian Nations (ASEAN), which have presented or are expected to present ambitious GHG emission reduction targets, including carbon-neutral declarations.

Such large-scale GHG emission reductions require the fundamental transformation of energy systems: the almost complete decarbonisation of the power sector, followed by electrification or decarbonisation of energy consumption other than electricity, and offsetting of remaining CO<sub>2</sub> emissions using negative-emission technologies. However, the availability of power systems or low-carbon energy and the possibility of using alternative energy vary significantly across countries and regions, and energy transition cannot be accomplished uniformly. Asian countries are still highly dependent on fossil fuels and, unlike Europe, not blessed with abundant wind resources. Accelerating decarbonisation whilst maintaining economic growth is not straightforward.

The study

- (i) aims to quantitatively describe the energy transition pathway necessary to realise carbon neutrality in ASEAN countries through model analysis;
- (ii) provides information to formulate energy policies in each country and seek support from developed countries; and

- (iii) suggests how to minimise the additional costs of transforming the energy supply–demand structure by using a cost-optimal technology selection model, which evaluates combinations of energy technologies.

The study uses a single model covering the 10 ASEAN countries. In analysing the model, we discussed energy policies and actual situations with the ASEAN countries and, on that basis, considered assumptions for the analysis and priorities of technologies to be introduced. The study is merely a second opinion to support ASEAN countries as they develop their own road maps for energy transition towards carbon neutrality. We will review our assumptions and reflect the latest data in the model analysis when the expected cost reduction of each technology is updated by international organisations and research institutes.