# Chapter 1

# Introduction

September 2023

**This chapter should be cited as**

Study team (2023), 'Introduction', in Department of Energy, Prime Minister's Office, Brunei Darussalam and ERIA (eds.), *Study on Green Hydrogen Production in Brunei Darussalam.* ERIA Research Project Report FY2023 No. 10, Jakarta: ERIA, pp.1.

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Hydrogen is a promising fuel and technology for becoming carbon neutral towards 2050 or 2060, and Brunei Darussalam has significant potential for producing blue and green hydrogen. Blue hydrogen is produced from natural gas or as a by-product of the liquefied natural gas production process. Green hydrogen is produced from electrolysis facilities using electricity from renewable energy, such as hydropower, geothermal power, biomass, solar, and wind. However, Brunei only has solar photovoltaic (PV) potential due to its geographical and climate conditions.

Thus, this project firstly surveys solar PV potential capacity in Brunei, focusing on water surfaces and the bare ground. When we conduct the survey on land, we need to pay attention to forest areas. Secondly, based on the solar PV potential capacity and assumed capacity factor of the solar PV system, the amount of electricity generation by the solar PV system is estimated. Thirdly, this project estimates hydrogen production amounts based on the power generation by the solar PV system referring to existing hydrogen production efficiencies, such as the International Renewable Energy Agency (IRENA).

This project also forecasts hydrogen demand by 2040 in and out of Brunei by sector – power, industry, and transport. The export targets of Brunei are other Association of Southeast Asian Nations (ASEAN) countries, such as Indonesia, Malaysia, the Philippines, Singapore, and Thailand. If green hydrogen production does not meet the hydrogen demand in the ASEAN region, Brunei will need to produce blue hydrogen to supply to the ASEAN countries.

In addition, this project studies economic analysis of the green hydrogen business for Brunei. This study focuses on a review of oil and gas historical production, estimation of capital investment of the solar PV system and electrolyser facilities, the economic impact of the capital investment on Brunei's economy, and the possibility of clean hydrogen for replacing oil and gas exports. Not only Brunei Darussalam but also other countries, such as Middle Eastern countries, India, and Australia, will produce clean hydrogen and export it to Asian countries, so Brunei will face hard competition regarding exports of clean hydrogen. One advantage for Brunei Darussalam is its location, as it is closer to ASEAN and East Asian countries than Middle Eastern countries, India, and Australia. Thus, Brunei will play a key role in the clean hydrogen supply network in the East Asia Summit region.