Chapter 1

Introduction

1-1 Background and Objective

The ASEAN Member States are pursuing the use of renewable energy as a step towards energy security and environmental sustainability. Amongst various renewable energies available, solar photovoltaic (PV) attracts the most attention because of its ease in installation and rapidly decreasing system cost. In some cases, solar PV can compete against conventional fossil-fired power generators. Thanks to supportive policies, its utility-scale – the so-called mega solar – and rooftop installations are expanding in the region.

However, there is a need to simultaneously invest in flexibility mechanisms – or storage technology in particularly – to absorb variable electricity output from solar PV. When a country fails to manage the fluctuation, it could result in unstable electricity supply (i.e. frequency and voltage change beyond the norm of grid regulations) and, in the worst case, could lead to a blackout. This problem regarding variable output of renewable energy and grid stability is well known amongst experts. However, in general, flexibility mechanism/technology and its application are not well understood and developed to become commercially feasible.

In this light, this study focuses on the effectiveness, necessary capacity, and cost of storage technologies so as to promote their deployment in the market and subsequently, to accelerate the penetration of renewable energy in the energy mix of ASEAN Member States.

1-2 Work Stream

This study is structured in four steps:

Step 1: Summarise the current solar PV installation and policy status in ASEAN member countries. This serves as a basis for the policy recommendations in the study.

Step 2: Provide an overview of the storage technology together with its characteristic. It covers both commercially available technology such as pumped storage hydropower generation and pilot-level technology such as compressed air storage.

Step 3: Do a simulation analysis to quantify necessary battery storage capacity against assumed solar PV output. The result is used to calculate cost of power generation of solar PV + battery system, and its cost competitiveness against conventional power generation sources is assessed.

Step 4: Deliver policy recommendations that promote a flexibility mechanism (i.e. battery storage system) in a power grid, thus encouraging renewable energy installations.

Two working group meetings were organised to discuss and share the issues.

First meeting: February 2018 in Putrajaya, Malaysia

Second meeting: April 2018 in Jakarta, Indonesia