

Executive Summary

There is an eco town development plan in Temburong District, Brunei Darussalam. The eco town concept is about applying energy efficiency technologies to achieve lower energy demand, especially electricity, to be used by buildings, and renewable energy such as solar photovoltaic (PV). At the request of the Ministry of Energy and Industry (MEI), Brunei Darussalam, ERIA conducted a research study. The study measured the impact of the application of energy efficiency technologies for buildings and installation of solar PV with electricity storage as power supply system based on the Temburong district development plan prepared by Town and City Planning Department under the Ministry of Development (MOD).

For energy efficiency technologies for buildings, ERIA applied two types of building energy intensity (BEI): (i) normal township (ordinary BEI) and (ii) eco township (green BEI, like Green Building Index in Malaysia). In Temburong District, several types of buildings – office, hotel, shopping mall, hospital, and others – will be constructed based on the Temburong district plan. If MOD could apply the eco township (GBI), electricity demand would be reduced by 30% from the normal township, which is a significant effect. In general, if buildings could apply the eco township (GBI), construction cost would be higher than that of the normal township, but power generation cost could be saved due to lower electricity demand. Focusing on initial cost of solar PV and storage, the eco township (GBI) will contribute a reduction of about US\$ 100 million compared with the normal township.

Based on hourly electricity demand (normal and eco) and solar radiation data, ERIA conducted simulation studies on hourly-basis power supply using diesel power, solar PV, and electricity storage. Three scenarios were examined: (i) Case 1: diesel (12 megawatts [MW]), solar PV, storage; (ii) Case 2: diesel (6MW), solar PV, storage; and (iii) Case 3: only solar PV and storage. All scenarios showed feasible solutions, although Case 3 did not involve diesel power. However, power generation cost will be high at a levelised cost of energy (LCOE) of US\$.40. The study recommends to use diesel power initially, and to gradually shift the power generation mix to greater use of solar PV with storage system, leading to a decrease in cost of both solar PV and storage.

According to the hourly solar radiation data in 2016, it was rainy and cloudy during the summer months from March to May, and consequently the operation rate of solar PV was 9%–13%. Data on the solar radiation status in Brunei Darussalam is harder to obtain than for the Middle East and California.