RESEARCH CATALOGUE

ENERGY AND ENVIRONMENTAL POLICY

COST-BENEFIT ANALYSIS AND IMPLICATION OF DIFFERENT ROOFTOP PV SYSTEMS WITH AND WITHOUT ENERGY STORAGE ON THAI UTILITIES AND RATEPAYERS

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The main objectives of this research

- To quantify the economic impacts of rooftop PV and battery on three Thai utilities and ratepayers.
- To come up with a set of policy implications for accommodating the use of rooftop PV and battery.

The study was performed under nine different PV adoption scenarios, by varying buyback rate and PV cost reduction, using Cost-Benefit Analysis (CBA). Under the Thailand's tariff structure, Thai utilities are well-protected as they are able to pass all costs due to PV through the ratepayers (utility customers) by increasing retail rates. When PV adoption is low, both net economic impacts on utilities and retail rates are minimal and depend on the utility type. In contrast, when PV adoption ranges from 9% to 14% out of total generation in 2036, 5-year retail rate impacts become significant and the rate increases fall between 0.42 and 0.80 THB/kWh (6%-12% of projected retail rates in 2036). Moreover, household batteries are able to decrease overall impacts to the power system and retail rates by increasing self-consumed PV of solar customers and increasing the solar capacity and energy values to utilities.

As a result, the increase of a 5-year retail rate of selected cases decreases from 0.61 (without battery) to 0.55 (with battery) THB/kWh (decreasing from 9.5% to 8.5% of the projected retail rate in 2036). Thus, it is important for Thailand to weigh costs and benefits across different stakeholders and maximize the benefits of PV and battery.

Some parts of this work (CBA of PV-only system and customer economics of PV-battery system) were also conducted at the Lawrence Berkeley National Laboratory (LBNL) under the supervision of Dr. Naïm Darghouth, and the Fraunhofer Institute for Systems and Innovation Research ISI (Fraunhofer ISI) under the supervision of Dr. Barbara Breitschopf and Prof. Wolfgang Eichhammer. This work was also presented at the National Renewable Energy Laboratory (NREL) and the Fraunhofer Institute for Solar Energy Systems ISE (Fraunhofer ISE).