Executive Summary

Worldwide, efforts are being made to tackle climate change and achieve the United Nations' Sustainable Development Goals. In the first half of 2021, the Leaders' Summit on Climate organised by the President of the United States, Joe Biden, and the summit of the Group of Seven demonstrated the accelerating actions on climate change. The International Energy Agency (IEA) in May 2021 released a report on the path to achieving 'Net Zero by 2050,' outlining a concrete roadmap for the global energy sector. In Southeast Asia, all members of the Association of Southeast Asian Nations (ASEAN) have participated in the Paris Agreement and submitted their respective nationally determined contributions. Moreover, Brunei Darussalam, Cambodia, the Philippines, Singapore, Thailand, and Viet Nam submitted their updated nationally determined contributions.

Renewable energy (RE) and electric mobility play central roles in climate change countermeasures. Solar and wind power generation and batteries for electric mobility have achieved significant cost reductions over the past decade. They are even cheaper than fossil fuels in some countries, leading to rapid growth in their adoption. However, there has been insufficient adoption and cost reduction of these technologies in ASEAN countries. Thus, a certain level of policy support is necessary to further encourage the diffusion of RE in the future. It is essential to examine the extent to which citizens in ASEAN countries accept the cost burden and accelerate cost reduction through means such as innovation, including incremental ones.

This study examines the willingness to pay (WTP) for RE and electric mobility in ASEAN countries, using discrete choice experiments (DCEs) and the contingent valuation method (CVM). It targets Malaysia, the Philippines, Thailand, and Viet Nam. Specifically, major cities were chosen as the target regions. For the renewable WTP, Bangkok for Thailand (survey period: December 2020 to March 2021), Manila for the Philippines (December 2020 to April 2021), and Kuala Terengganu and Kuala Nerus for Malaysia (February to March 2021) were selected. The sample size of the household survey was 250 for Bangkok, 300 for Kuala Terengganu, and 250 for Manila (for each of DCE and CVM).

We estimated household WTP using the conditional logit regression. In the regression equation, the utility, the dependent variable, was assumed to be a linear function of the attributes of RE share and price. Types of RE, including solar, biomass, hydropower, wind, mini-hydro, and small-scale hydro, were represented by dummy variables. Solar (Thailand

and Malaysia) and hydro and geothermal (Philippines) energy were considered to be the status quo types in the model. Respondents preferred higher RE shares, and the RE share coefficients in all three cities were positive and significant at the 1% level. Increased prices reduced the utility for households, and this effect was also found to be statistically significant at the 1% across the three countries.

For the estimation of the mean WTP as a percentage of monthly electricity bills in United States dollars when increasing the RE share to different levels, households prefer a higher renewable proportion in the electricity mix. The WTP values for solar are highest in all the three countries. When the RE share was 40%, the WTP values of solar cells were 5.54% in Thailand and 17.31% in the Philippines. The WTP values for biomass were lower compared to other options in Thailand and Malaysia: 1.17% in Thailand and 3.04% in Malaysia when the RE share was 30%.

To check the robustness of the results, a contingency valuation method was also utilised in the Philippines to assess the WTP to increase the RE share to 50%. The resulting values are broadly consistent with those from the DCE.

The WTP for RE is only a few percent in most cases, and the highest value is about 20% for solar in the Philippines (for an increase in RE share to 60%). These figures are mostly consistent with those estimated for developing countries, according to the literature review. This result suggests that consumers are willing to pay more money for RE, but the amount is not significantly large. RE itself has been steadily decreasing in cost worldwide, but as more RE is introduced, there will be increasing costs for grid measures such as transmission expansion and energy storage deployment. Innovations to lower the cost of system integration as well as to develop renewable energy technologies will be increasingly necessary in the future, and there is a need to strengthen innovation so that the total cost can be kept within this small figure.

Solar photovoltaic systems have the highest awareness amongst RE and are regarded as the most environmentally-friendly energy as shown in the surveys of all target countries. Furthermore, in all the countries investigated, biomass receives a consistently lowest value. The WTP also corresponds to this tendency, with a higher price for solar photovoltaic and a lower price for biomass energy, and the other technologies (wind and small hydro) mostly falling in between. It is a fact that biomass energy can cause air pollution if not used with end-of-pipe technologies. In addition, air pollution ranks high on the list of environmental problems that people are concerned about, which may explain why people have a bad impression of biomass. However, since biomass is an important RE that can be dispatched, it is necessary to properly regulate biomass energy

and dispel its bad image. As for solar power generation, the WTP is high and the impression is good, so it may be prioritised for expanding deployment.

The research team also explored consumers' preferences for sustainable transportation by estimating the willingness to pay for electric motorbikes in Viet Nam. Previous studies have suggested the importance of electric motorbikes use in developing countries to reduce the high levels of air pollution and provide an alternative to private cars. However, few studies have analysed consumer attitudes and the type of policy interventions that could promote wider adoption. We conducted a survey and choice experiment for electric motorbikes in Viet Nam, including questions on personal mobility, knowledge of electric motorbikes, a choice experiment, and attitudes towards environmental problems. All the attributes including price, speed, range, fuel cost, and maintenance cost, except for charging time, were found to be statistically significant. The marginal willingness to pay for each of the attributes is USD17.6 to improve the top speed by 1 kilometre per hour (km/h), USD27.3 to improve the range by 10 km, USD25.5 to reduce the fuel cost by 4.4 cents/km, and USD7.5 to reduce the maintenance cost by 4.4 cents per month.

Compared to the results of phase one, the percentage of people who have been economically affected by COVID-19 has generally increased. Therefore, this may have influenced the results of this survey. Although we do not know how long the impact of COVID-19 will last, we need to be careful when comparing the results from this survey of WTP with those in the literature.