

## Preface

Global energy trends indicate a shift from fossil fuels that contain carbon to variable renewable energy (vRE) with zero carbon. Solar photovoltaic (PV) and wind power, which are typical vRE sources, have been increasing due to their significant low costs and appropriate government policies, such as feed-in tariff and renewable portfolio standards. The rapid increase of the solar PV market surely contributes to the vRE's significant low costs. However, vRE still has negative aspects – intermittency, seasonality, and low capacity factor – which are big reasons for the smaller share of vRE especially in the ASEAN region. Hydropower is a better energy source than vRE but its seasonality due to the big gap in hydropower output between the dry and the wet seasons is still a negative factor. The early disruptions to the ecosystem and damage from dams also add to the negative image of hydropower.

Currently, hydrogen is highlighted as a future energy option because of clean and stable energy. There are two hydrogen sources: one is fossil fuels with carbon capture utilisation and storage and other is water electrolysis, which uses electricity from renewable energy. Thus, hydrogen will be abundant. In addition, the transport and storage of hydrogen are technically available, and their cost is lower than electricity transmission lines and electric storage.

Hydrogen demand will be wide and consumed for large-scale power generation, fuel cell electric vehicles as well as heating demand in the industry sector. Thus, the hydrogen demand potential in the future, such as 2030–2050, will be significant (please refer to the hydrogen phase 1 report). But a big issue is hydrogen's extremely high supply cost.

Therefore, the Economic Research Institute for ASEAN and East Asia continues to implement the hydrogen potential study phase 2. It covers hydrogen to be produced from unused brown coal applying the gasification process and transformed into liquefied hydrogen for long-distance transport. ERIA also established the hydrogen working group to discuss how to the East Asia Summit countries can shift to a hydrogen society.



Professor Hidetoshi Nishimura

President, Economic Research Institute for ASEAN and East Asia

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Shigeru Kimura

Special Adviser to the President on Energy Affairs

Economic Research Institute for ASEAN and East Asia

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