Chapter 1

Introduction

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Chapter 1
Introduction

1. Background and Objectives of the Research

The importance of reducing greenhouse gas (GHG) emissions in the transport sector has attracted attention worldwide, especially since the adoption of the Paris Agreement in 2015. To meet this target, East Asia Summit (EAS) countries have been making great efforts to introduce biofuels on a large scale, considering the potential of these resources. Meanwhile, the introduction of electrified vehicles (xEVs) is now expanding rapidly, and these could be another efficient option for reducing GHG emissions in the transport sector. Therefore, creating a future mobility fuel scenario with a balance of biofuel vehicles and xEVs is necessary.

The National Institute of Advanced Industrial Science and Technology (AIST) in Japan has been studying future mobility scenarios of EAS countries since 2014. In the AIST and Economic Research Institute for ASEAN and East Asia (ERIA) project, the scenarios for India, Indonesia, and Thailand were examined considering the potential of biofuels and xEVs and the constitution of power generation. As a result, well-to-wheel CO_2 emissions were estimated for several scenarios by creating energy mix models.

However, in that project, the sustainability of biofuels and xEVs was not taken into consideration. The diffusion of xEVs can contribute to a reduction in CO_2 emissions but may increase the demand for mineral resources induced by motors and batteries.

In this regard, this project aims at analysing the future scenario of EAS mobility, which highly contributes to the Sustainable Development Goals (SDGs) (Goals 7, 12, and 13) in consideration of the balance amongst transport CO_2 reduction, biofuel use, and demand for mineral resources. The outcomes will contribute to the EAS energy research roadmap (Pillar 3: Climate Change Mitigation and Environmental Protection corresponding to the ASEAN Plan of Action for Energy Cooperation 2016–2025, 3.5 Programme Area No.5: Renewable Energy, and 3.6 Programme Area No.6: Regional Energy Policy and Planning).

In fiscal year (FY) 2020, existing biofuel policies and implementation plans were updated from selected EAS countries as a foundation to accommodate emerging electric vehicle trends during the mobility energy transition (ERIA, 2021). As a result, information on biofuel policies and implementation mechanisms, as well as potential CO_2 reductions, was collected.

In FY2021, well-to-tank (WTT) GHG emissions from producing biofuels, tank-to-wheel (TTW) GHG emissions from using biofuels, and demand and CO_2 emissions from producing mineral resources considering mobility electrification were evaluated. For WTT GHG emissions, despite some variations in the emissions values from the different feedstock and countries, these were all lower than their fossil fuel counterparts (ERIA, 2022).

Following this progress, this report assesses the relationship between WTW GHG reduction of biofuel implementation and mobility electrification. In addition, the mobility scenarios of EAC countries are

examined, considering mineral resource constraints, the price of EVs, domestic (charging) facilities, and taxation systems. Finally, the priorities for biofuels and EVs in each country, as well as the expected policies and actions of implementing biofuels and EVs are analysed.

2. Study Methods

The topics and methods of study are as follows. The target EAS countries are India, Thailand, Indonesia, the Philippines, Malaysia, and Viet Nam.

(1) Evaluation of the potential for biofuels and their sustainability, including fuels from unconventional resources.

1st year	➢ Collate the existing research on biofuel sustainability assessment in EAS countries. ➢ Review the most updated biofuel sustainability standards. ➢ Identify the need for updating the research.
2nd year	➢ Collect additional information/data for updating the research as identified in the first year. ➢ Collect the existing research, which assesses the potential of biofuels from residual waste (and agricultural waste, etc.) ➢ Conduct additional assessments for updating the research results.
3rd year	➢ Interpret the research results after scientific validation. ➢ Prepare policy briefs to address policy concerns and needs vis-à-vis biofuel sustainability in EAS countries.

(2) Assessment of well-to-wheel CO_2 reduction considering the sustainability of biofuels and mineral resources.

1st year	➢ Updating the current biofuel policies of the countries to assess well-to-wheel CO_2 reduction. ➢ Evaluate the relationship between demand for xEVs and the consumption of mineral resources (cobalt, nickel, and rare earths) using an AIST original database of critical raw materials.
2nd year	➢ Estimate the well-to-wheel CO_2 reduction by biofuels and xEVs in EAS countries. ➢ Material flow analysis of mineral resources considering the supply chains for ores, alloys, devices (batteries and motors) and xEVs. ➢ Forecast the demand of xEVs and CO_2 emissions by mineral resources until 2050 in EAS countries considering the production capacity of mineral resources.
3rd year	➢ Scenario analysis of various biofuel policies in terms of CO_2 reduction.

	➢ Case study of the mobility scenario considering the balance between CO_2 reduction and the potential of biofuels/mineral resources.

3. Policy Recommendations

(1) Mobility scenario and strategy of EAS countries.

(2) Reduction of transport energy consumption and CO_2 emissions in EAS countries.

(3) Implementation of sustainable transport energy, which highly contributes to SDGs.

4. Timeline/Schedule

Timeline of FY2022–2023:

January 2023 1st working group meeting

April 2023 2nd working group meeting

June 2023 Submission of report

September 2023 Publication of report

Timeline of the total project: September 2021–June 2023

References

Economic Research Institute for ASEAN and East Asia (ERIA) (2021), 'Analysis of Future Mobility Fuel Scenarios Considering the Sustainable Use of Biofuels and Other Alternative Vehicle Fuels in East Asia Summit Countries', *ERIA Research Project* 2020 No. 18. Jakarta: ERIA.

ERIA (2022), 'Analysis of Future Mobility Fuel Scenarios Considering the Sustainable Use of Biofuels and Other Alternative Vehicle Fuels in East Asia Summit Countries – Phase II', *ERIA Research Project* 2021 No.16. Jakarta: ERIA.