

Chapter 1

Introduction

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Chapter 1

Introduction

1. Background and Objectives of the Research

Reducing greenhouse gas (GHG) emissions in the transport sector is now attracting attention worldwide, especially after 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 their resources. Meanwhile, the introduction of electrified vehicles (xEVs) is now expanding rapidly, which can be another efficient option to reduce GHG emissions in the transport sector. Therefore, creating a future mobility fuel scenario with the 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 this 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 the result, well-to-wheel CO₂ emissions were estimated for several scenarios by creating energy mix models.

However, in the previous project, the sustainability of biofuels and xEVs has not yet been taken into consideration. Diffusion of xEVs can contribute to the reduction of CO₂ 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) (7, 12, and 13) in consideration of the balance between transport CO₂ reduction, biofuel use, and mineral resources demand. The outcome will contribute to the EAS energy research road map (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).

2. Study Method

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

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

1st year	<ul style="list-style-type: none"> ➤ Collate the existing research on biofuels sustainability assessment in EAS countries. ➤ Review the most updated biofuel sustainability standards. ➤ Identify needs for updating research.
2nd year	<ul style="list-style-type: none"> ➤ Collect additional information/data for updating 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 assessment for updating research results.
3rd year	<ul style="list-style-type: none"> ➤ Interpret research results after scientific validation. ➤ Prepare policy brief to address policy concerns and needs vis-à-vis biofuels sustainability in EAS countries.

- (2) Assessment of well-to-wheel CO₂ reduction considering the sustainability of biofuels and mineral resources.

1st year	<ul style="list-style-type: none"> ➤ Updating with current biofuel policy of the countries to assess well-to-wheel CO₂ reduction. ➤ Evaluate the relationship between demand of xEVs and consumption of mineral resources (cobalt, nickel, and rare earths) using AIST original database of critical raw materials.
2nd year	<ul style="list-style-type: none"> ➤ Estimate the well-to-wheel CO₂ reduction by biofuels and xEVs in EAS countries. ➤ Material flow analysis of mineral resources considering supply chain between ore, alloy, device (batteries and motors) and xEVs. ➤ Forecast the demand of xEVs and CO₂ emissions by mineral resources until 2050 in EAS countries considering the production capacity of mineral resources.
3rd year	<ul style="list-style-type: none"> ➤ Scenario analysis of various biofuel policy in term of CO₂ reduction. ➤ Case study of mobility scenario considering the balance between CO₂ reduction and potential of biofuels/mineral resources.

3. Policy Recommendations

- (1) Mobility scenario and strategy of EAS countries.
- (2) Reduction of transport energy consumption and CO₂ emissions in EAS countries.
- (3) Implementation of sustainable transport energy which highly contributes to SDGs.

4. Timeline/Schedule

Timeline of fiscal year 2021–2022:

December 2021 1st working group meeting

May 2022 2nd working group meeting

June 2022 Submission of report

September 2022 Publication of report

Timeline of the total project: September 2021–June 2023