

Chapter 1

Introduction

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Chapter 1

Introduction

1. Background and Objectives

The electrification of mobility is now in fashion and some European countries have announced a ban on internal combustion engines in the future. From the perspective of production to energy consumption, electric vehicles are not necessarily zero-emission vehicles when electricity is supplied from fossil resources. In addition, the spread of electric supply stations is indispensable to the introduction of electric vehicles. However, the rapid expansion of infrastructure such as supply stations is difficult.

On the other hand, vehicles with improved fuel efficiency like hybrid and plug-in hybrid cars have appeared and those cars are also effective for the reduction of greenhouse gas (GHG) emissions. Conventional infrastructure is available for these vehicles, and GHG emissions reduction can be expected by promoting the use of biofuels produced from domestic resources in the East Asia Summit (EAS) countries. In order to introduce electrified vehicles, it is realistic to proceed step-by-step depending on the characteristics of vehicles and the development of infrastructure. However, it is not always clear whether the current electrified vehicle introduction plan is effective in reducing the environmental load.

In this study, we set up multiple scenarios in consideration of the introduction of policies of electrified vehicles in each country, and calculated by simulation the energy consumption, global warming gas emissions, and biofuel demand in each case. Based on the results, the best way to introduce electrified vehicles to reduce GHG emissions was clarified. We also held policy dialogues with government policymakers and industry representatives to exchange opinions on the research results. With these opinions in mind, we made recommendations on future environmental measures and biofuel policies in the transport sector. Regarding next-generation bioethanol produced from non-conventional resources, we have identified the challenges for commercial-scale supply.

The results of this research will contribute to the EAS energy research roadmap (Pillar 3: ASEAN Action Plan for Energy Cooperation 2016–2025 Climate Change Mitigation and Environmental Protection) 3.5 Program Area No. 5: Regeneration Energy and 3.6 Program Area No. 6: Regional Energy Policy and Planning).

2. Methodologies

A working group was established and operated with invited experts of energy policy makers, energy engineering scientists, amongst others, from each country. This study covered the simulation of the GHG emissions reduction effect by the electric vehicle based

on the electric power situation and the fuel efficiency improvement vehicles using biofuel, and the estimation of the biofuel supply potential including the biofuel derived from non-conventional biomass resources needed in the high concentrated use of biofuels by vehicles. In the first step, the current supply and demand situation of electric power and biofuels in some ASEAN countries were investigated. Policies on the introduction of electrified vehicles of each country were also investigated. Based on collected data, well-to-wheel CO₂ emissions were estimated in the second step. Finally, the reduction effect of CO₂ emissions by electrification was calculated by a simulation and effective plans for mobility electrification were proposed. In addition, the amount of non-conventional biomass resources and the productivity of the next generation biofuels were investigated, and the biofuel supply potential was made clear to correspond to the high concentrated use of biofuel in vehicles.

3. Research Schedule

In 2019, we held two working group meetings. Members from India, Indonesia, and Thailand reported on national policies regarding the introduction of electrified vehicles. In addition, scenarios were set up to simulate the impact of introducing electrified vehicles on energy consumption such as oil consumption and the reduction of environmental impact. In addition, as demand for bioethanol is expected to increase with the growth of electrified gasoline vehicles such as hybrid electric passenger cars, we conducted a survey on the use of non-conventional resources and lignocellulosic ethanol. In 2020, based on the simulation results of the first year, we discussed the effective introduction of electrified vehicles that contribute to energy consumption reduction and GHG emissions reduction, and summarised policy recommendations. We invited government officials and representatives of industry in India, Indonesia, and Thailand to hold policy dialogues, make policy recommendations, and exchange opinions.

The outline of the events is shown below, and details are summarised in the appendix at the end of this report.

3–6 December 2018	Field Surveys in India, Thailand, and Indonesia
30–31 January 2019	FY2018 First Working Group Meeting in Bangkok, Thailand
8–9 May 2019	FY2018 Second Working Group Meeting in Yogyakarta, Indonesia
10 May 2019	Management Discussion in Jakarta, Indonesia
15 January 2020	FY2019 First Working Group Meeting in Koriyama, Japan
25 February 2020	Policy Dialogue in Bangkok, Thailand
3 March 2020	Policy Dialogue in Yogyakarta, Indonesia
13 March 2020	Policy Dialogue in New Delhi, India