

Chapter 1

Background and Objective of the Study

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Chapter 1

Background and Objective of the Study

Demand for passenger and freight transportation in the Association of Southeast Asian Nations (ASEAN) is great and automobile use is rapidly spreading. The adverse effects are traffic congestion, traffic accidents, and air pollution, especially in urban areas. As demand for petroleum as automobile fuel has increased, oil self-sufficiency has declined greatly whilst CO₂ emissions have increased. Greater automobile penetration is expected as the economy grows, increasing energy security and environmental concerns.

To tackle these issues, ASEAN countries have announced policies to promote electric vehicles (xEVs), including hybrid (HEVs), plug-in hybrid (PHEVs), and battery electric vehicles (BEVs), and to develop infrastructure. For example, Indonesia will ban the sale of internal combustion engine vehicles (ICEVs) by 2040. Malaysia is planning to increase the number of passenger electric vehicles (EVs) to 100,000 by 2030 and establish 125,000 charging bases. Thailand has announced BEV investment incentives and the conversion of all 22,000 tuk-tuks to BEVs by 2025.

These measures will reduce oil consumption and air pollution but increase demand for electricity. Depending on their power generation sectors (generation mix, input fuels, etc.), countries might not become energy self-sufficient or solve their environmental problems.

This study analyses EV deployment effects and side effects by around 2040 on the economy, energy, and environment (3Es) – the basic principle of energy policy. The study analyses qualitative and quantitative information on energy supply and demand structure, impacts on CO₂ emissions, and the macroeconomy to contribute to ASEAN members' automobile and energy policy planning.

1. Objective of the Research

- ✓ Analyse the effect of EV penetration on ASEAN countries' 3Es.
- ✓ Estimate the benefits and costs of EVs in ASEAN countries.
- ✓ Determine the implications for energy policy and supply industries in ASEAN countries.

2. Methodologies of the Project

This study uses a macroeconomic energy model, in which the macroeconomy and the energy supply–demand structure are interdependent, to consistently evaluate the impacts on the 3Es (including energy structure, macroeconomy, and CO₂ emissions) by the diffusion of xEVs, including HEVs, PHEVs, and BEVs, through scenario analysis.

- ✓ Target countries: Indonesia, Malaysia, Thailand, and Viet Nam
- ✓ Scenario plan: 1) xEV penetration pattern (sales share x%, etc.)
 - 2) Power generation mix (increase in thermal power and renewables)
- ✓ Analysis scope: 1) Influence on energy self-sufficiency
 - 2) Influence on CO₂ emissions
 - 3) Influence on the macroeconomy (gross domestic product [GDP], trade, subsidies, etc.)

This study is unique because it is comprehensive: it analyses not only the reduction of CO₂ emissions from automobiles but also the impacts on energy self-sufficiency and the macroeconomy. Depending on national circumstances, reducing direct CO₂ emissions from automobiles might not necessarily lead to better energy security or macroeconomy. We therefore depict a different future landscape and perform a multifaceted analysis that is not limited to the automobile sector to identify the advantages and disadvantages of each scenario.

3. Report Structure

Chapter 1 presents the study background, objectives, and methodologies.

Chapter 2 presents the modelling framework and the reference scenario as a baseline for evaluating the effects of alternative scenarios.

Chapter 3 presents impacts of shifting towards xEVs on 3Es, including energy mix, self-sufficiency, CO₂ emissions, GDP, energy trade, and subsidy amounts to xEVs.

Chapter 4 reviews the literature on the current situation, how infrastructure is rolled out in different regions, and policy measures that might achieve the purposes of deploying PEVs.

Chapter 5 presents policy implications.