SUMMARY OF MASTER'S DISSERTATION

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Title:

Analysis of the economic ripple effect caused by the spread of Clean Energy Vehicles

Abstract

Currently, vehicles accounted for a large percentage of the total CO2 emissions in Japan. Popularity of Clean Energy Vehicles (CEVs) are expected in order to reduce CO2 emissions to mitigate the global warming. However, the popularity provides not only environmental but also economic impacts. An Electric Vehicle (EV) requires a battery, but does not require the engine parts any more, which will bring a structural change of the auto parts industry. It is necessary to understand the characteristics of parts used in each CEV type and analyze the economic effects before considering the way for introducing CEVs. In this study, CEV types which have a battery or a fuel cell based powertrain system are considered as well as gasoline, diesel or natural gas engines. This paper proposes an economic ripple effect model using the Input-Output Table. Simulation results show economic impacts in Japan in 2020 and 2030 for the target sales of CEVs assumed by each scenario.

And there are various kinds of CEVs.The popularization of each CEV type provides different results on three dimensions of sustainability: environmental, economic, and social impacts. Therefore, it is necessary to consider the optimal mix before considering the policy for introducing CEVs. Most conventional studies do not consider the economic impacts to the industry, such as auto parts. This paper proposes a new optimization model considering the three dimensions. Simulation results show the optimal portfolio in 2030 as seen from the three dimensions. Effect by technological innovation on optimal portfolio in 2030 is also estimated.

Key Words : Clean Energy Vehicle, Optimization, Vehicle Mix, Input-Output Table