

Scenario Making and Policy Planning for Energy Reduction in Residential and
Non-residential Buildings towards a Low Carbon Society

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[Abstract]

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Japanese commercial/residential sector experiences a persistent increase in energy consumption. It is a pressing task not only for Japan, but also for all countries around the world to put the brakes on the ever-increasing energy consumption in residential and non-residential buildings. In order to propose an effective countermeasure against this problem, it is necessary to forecast the nationwide energy demand in the commercial/residential sector and calculate the efficacy of the countermeasures in terms of reducing energy consumption. However, there have not been sufficient data to facilitate the high accuracy of these predictions. Additionally, the validation of prediction accuracy has not been extensively discussed in these researches. Therefore, surveys on the current energy consumption status and information regarding buildings are conducted in order to provide the necessary information on which to base political decisions.

In this study, we propose scenarios and a feasible policy for a drastic reduction in energy consumption in residential and non-residential buildings from a middle- to long-term perspective based on highly accurate energy demand projections; this will be done by using updated information such as information on energy consumption, information from databases of residential and non-residential buildings, future population, social systems, energy performances of buildings, penetration rate of energy-saving equipments and energy consumption behavior data.

As a result of this study, a new database was obtained by the survey of the current energy consumption in Tokyo, Osaka, and Sendai City. The energy consumption at communal area, especially the energy for lighting, in superhigh-rise apartment building was too large to disregard. It was also showed that the energy consumption in small and medium-size retail stores was dependent on the type of their commercial products. Energy consumption in grocery was larger

than other retail stores because of the larger energy consumption at refrigerated display case of foods. The survey in Sendai city indicated that the developed model in this study can forecast future energy consumption and CO₂ emission in Japan with high accuracy. The result of model simulation by 2050 indicated that the political support for information providing of low-carbon-technology and low-energy-lifestyle could contribute to the CO₂ reduction in a middle term around 2030. To achieve the governmental goal of CO₂ reduction, which is 25% reduction of CO₂ by 2020 and 80% reduction of CO₂ by 2050 compared with CO₂ emission in 1990, it was indicated that the rapid and large-scale spread of low-carbon-technology is necessity.