ENERGY-SAVING AND CO2 EMISSION REDUCTION BY INTRODUCTION PEFC (POLYMER ELECTROLYTE FUEL CELL) CO-GENERATION INTO RESIDENCE AND CONVENIENCE STORES

N. Arashi[1], N. Kitagawa[2], S. Shimada[2]

[1]*Research Center for LCA, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan*

[2]*Institute of Environmental Studies, Graduate School of Frontier Sciences, The University of Tokyo, Tokyo, Japan*

Fuel cell co-generation systems now draw attention from the standpoint of energy-saving and reduction of CO2 emission in urban areas. This study made clear the effects on energy-saving and reduction of CO2 emission by PEFC installation to single-family houses, apartment houses, and joint installation to houses and convenience stores. The results shouwed that the energy-saving by substituting PEFC co-generation for a conventional system of which energy is supplied with grid electricity and boiler, was very much influenced by the pattern of energy use attributed to family types, and the heat to electricity demand ratio of object building. Sharing co-generation system with residence and convenience store is effective on energy-saving, because of its capability of timely transfer of surplus heat from convenience store to residences lacking heat. Installation to a single-family house demonstrated -15 to 17% range energy saving in accordance with family types. It was suggested that for small family, PEFC co-generation required more primary energy than that of coventional system. For large family consisting of multi generation, a large energy saving was attained. Joint installation to apartment houses and convenience stores demonstrated 8 to 20% range energy-saving. Up to 10-12% CO2 emission reduction was also acieved by substituing PEFC co-generation for conventional system.