

# Analysis on Incorporating Household Lifestyle into EXSS model

Biying Yu and Yuzuru Matsuoka

Department of Environmental Engineering, Kyoto University

Decarbonising the energy sector is an unprecedented challenge which is closely related to the industrial, commercial, residential, and transport sectors, and is further complicated by a heterogeneous set of additional policy goals on energy security, equitable access to energy, technology and fuel competition in energy markets, and the sector interactions. As a result, it is broadly accepted that to meet ambitious decarbonization targets requires an integrative energy system analysis. Here, an accounting type model named Extended Snapshot (ExSS) is presented for showing a quantitative future snapshot and designing the low carbon society, by uniting the industrial structure, residential consumption, transportation demand, and power generation within one framework. In addition, unlike the other sectors, residential and private transport consumption is directly determined by consumers' behaviors, suggesting the sustainability in the household sector to a large extent relies on whether energy efficient behavior is adopted or not. Furthermore, household behaviors are closely related to the industrial outputs, transport demand, and residential and commercial energy service demand (e.g., space heating, cooling, lighting, etc.), implying an intertwined effect of household lifestyle on the whole energy system. Subsequently, we propose an integrated methodological framework to link the household behavior with the ExSS model, building on the concept of lifestyle indicated as time use and household expenditure. This integrated energy system analysis greatly reduce the uncertainty caused by the human behavior, which can better contribute to find out the effective countermeasures for achieving the idea low carbon society in the future.