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Title: Development of an Integrated Model System of Transport and Residential Energy Consumption

Abstract: The energy footprint of households is inextricably tied to the amount of travel undertaken by households. In addition, the travel energy footprint of a household is dependent on the mix of vehicles owned and used by members of the household, and the extent to which different vehicles in a household are driven. Integrated models of activity-travel demand and transport energy consumption often do not consider the mix of vehicle types owned and used by households, thus making it difficult to assess the energy implications of shifting vehicle/fuel type choices particularly in a rapidly evolving marketplace. More importantly, integrated models of activity-travel demand and transport energy consumption do not consider the residential energy consumption implications of travel. If people travel more (and spend more time outside the home), they may consume more travel energy, but consume less in-home residential energy. Thus, an integrated model system that tightly connects activity-travel demand, travel energy consumption (sensitive to vehicle fleet/fuel type), and residential energy consumption (sensitive to activity-travel choices) is needed to obtain a holistic picture of household energy footprint. The presentation describes an integrated transport energy model system that connects these three entities. The model is developed by fusing information between two survey data sets, namely, the 2017 National Household Travel Survey (NHTS) data set and the 2015 Residential Energy Consumption Survey (RECS) data set. The integrated model system is applied to a synthetic population of New York City to illustrate the efficacy of the model system.