

Community-Led Data Collection Approach for Neighborhood Energy Modeling

Sudipta Debnath, Noushad Ahamed Chittoor Mohammed, and Kuljeet Singh Grewal

Future Urban and Energy Lab for Sustainability (FUEL-S), Faculty of Sustainable Design Engineering (FSDE),
University of Prince Edward Island, 550 University Ave, Charlottetown, PE, C1A 4P3, Canada

Abstract

The imperative shift towards achieving net-zero energy consumption demands a nuanced understanding of local energy dynamics and active community engagement. In Georgetown, Prince Edward Island, Canada, a pioneering research effort has been launched to employ a community-led approach to data collection to develop a baseline bottom-up neighborhood energy model. This participatory initiative aims to evaluate the energy efficiency of buildings, commencing with comprehensive data collection on construction and energy-related information. Residents, businesses, and building owners are encouraged to voluntarily participate, utilizing tools such as infrared thermal cameras, hygrometers, and questionnaires to gather critical data on building insulation, heating, hot water, and equipment usage. The collected data will inform comprehensive energy modeling, facilitating the identification of energy conservation measures and the estimation of hourly energy profiles. By engaging the community in data collection, this initiative not only enhances the accuracy and relevance of findings but also fosters energy efficiency education among citizens, enabling co-creation in a living lab environment. Through this collaborative technique, insights into Georgetown's energy landscape, and sustainability challenges are anticipated, guiding the development of tailor-made techniques for transitioning toward net-zero energy status. To enhance the analysis, the research incorporates outside thermal imaging to examine variations under dynamic environmental conditions. Additionally, data from energy audits will be compared to community-led data collection information and further correlated with thermal imaging of buildings. Machine learning algorithms will be integrated to refine the analysis and model development as an overarching goal of this research. The ultimate goal of the research is to develop data-driven retrofitting strategies for the community.

Keywords: Community-led data collection, energy efficiency, sustainability, net-zero, building energy modeling.

Themes for the research: Clean Tech Innovation - Smart communities, big data, energy efficiency.

Research advisor: Dr. Kuljeet Singh Grewal

Email: kgrewal@upei.ca