Smart and Connected Kids for Sustainable Energy Communities

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Introduction

Despite increasing data availability about household energy use, households continue to largely ignore or have misconceptions about their energy consumption. This project works to improve energy data thinking through the development and testing of interventions designed to facilitate learning about energy data science and visualization for middle and high school youth.

Project Aims & Objectives

Equip youth and families in Fremont, California, with the skillset necessary to build a sustainable energy future by:
- Engaging youth in lifestyle-driven interventions to increase energy awareness.
- Building scalable energy data analysis interventions for youth and their family to influence energy management. (a)
- Utilizing community-based interventions and smart-meter household energy usage data to drive changes in household energy habits.

Intellectual Merit

The belief that energy behavior is rooted in an individual's environmental and/or cost concerns overlooks the sociological and psychological motivations of energy behavior. Our interventions and recommendations are guided by a unique data-driven understanding of household energy behavior.

Community Engagement

Energy use interventions employed by this project combine best practices of big data analytics and visualization from engineering with community-engaged intervention strategies from the behavioral sciences to enhance our knowledge of the pivotal role of big data, social science theory, and community-based methods in transforming local energy management and consumption.
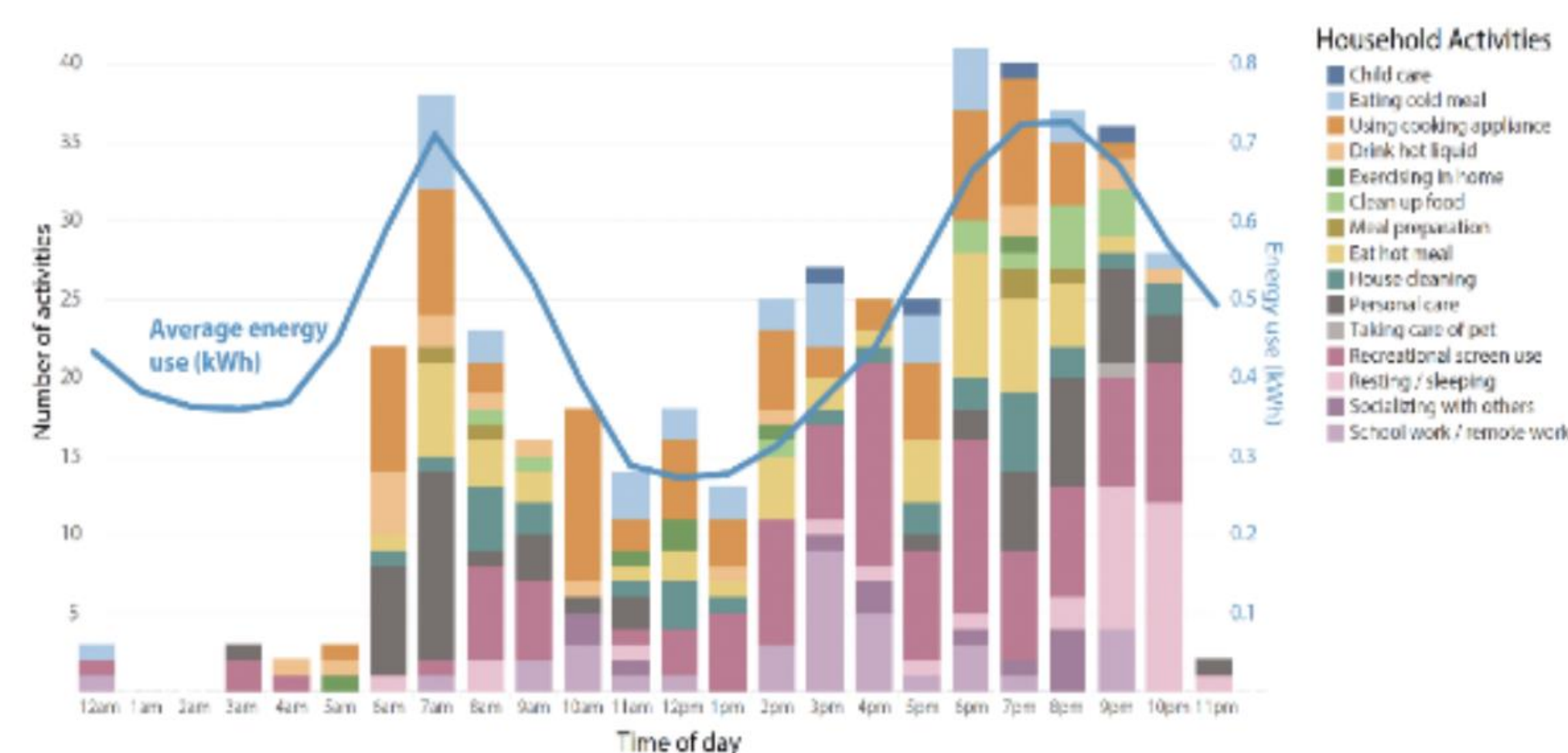
Accomplishments:
- Engaged 2,350+ community members while gathering input from interviews, focus groups, community events, and surveys to develop and pilot three youth-focused energy programs
- Trained 40 middle & high school student interns, project assistants, & community energy advocates
- Deployed 37 real-time energy data monitoring devices
- Collected 1036 days (~3 years) of real-time energy data **(b)**
- Developed a new website and Canvas platform for Summer 2021 remote learning pilot program
- Collected online survey + energy usage data from California residents to better understand the impacts of the pandemic on electricity demand, household activities and policy preferences
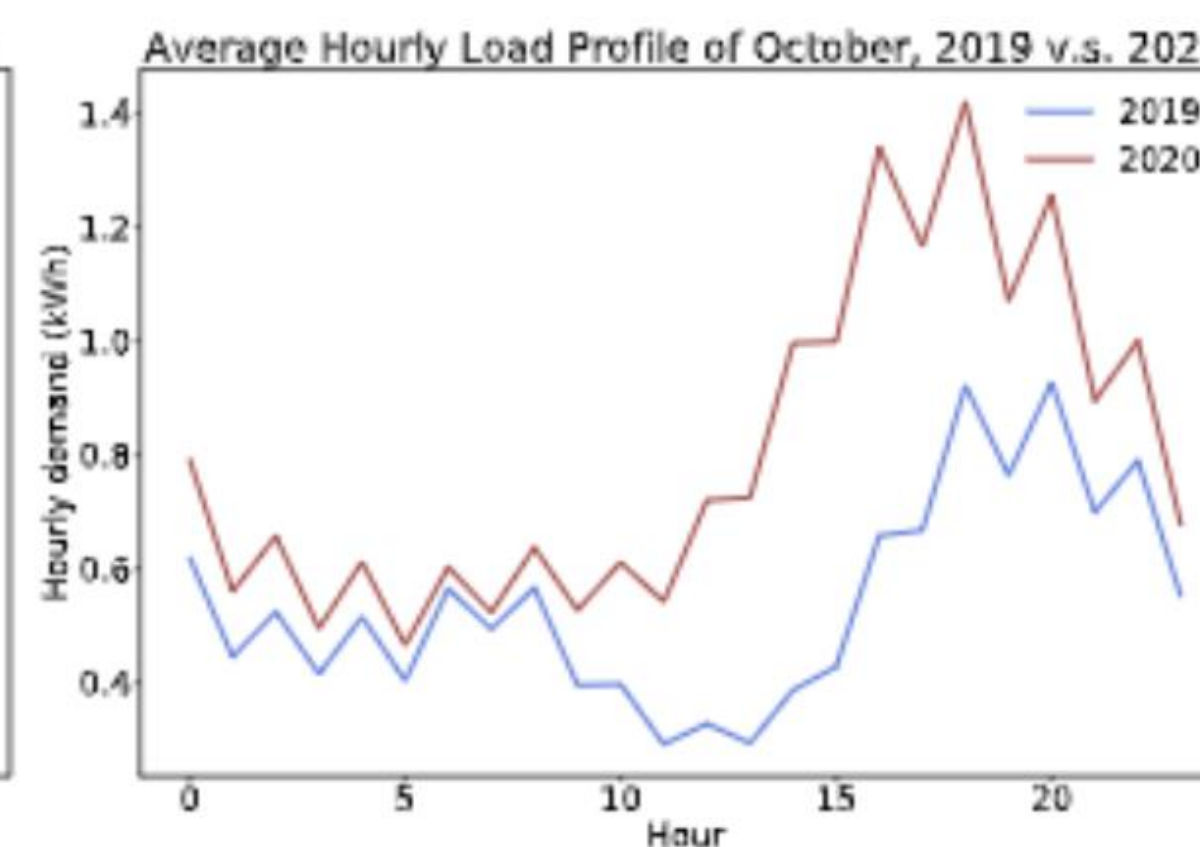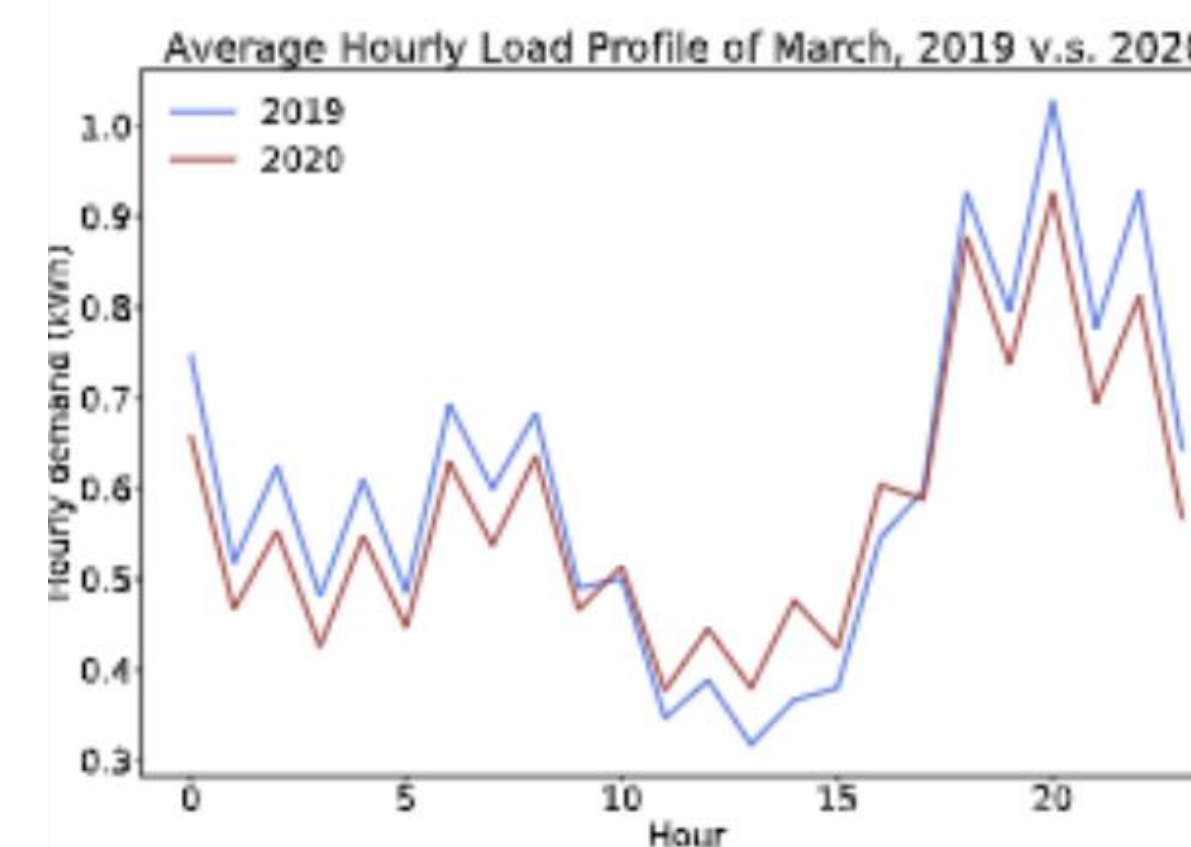

(a) Youth analyzing home energy data

(b) Aggregate average household energy usage from pilot programming

(c) Change in average hourly electric load profile from 2019 to 2020 for sample of California residents, March and October

Community Impact

Immediate Impact:
- Reduce household energy-usage and lower utility bills for Fremont resident participants
- Strengthen relationships by uniting family members towards a shared goal of decreasing energy usage

Long-term Impact:
- Decrease peak community energy demand for a more sustainable energy future

COVID-19 Impact:
- Shifted in-person educational programming to online remote environment
- Online surveys of community and California residents on pandemic's effects on electricity demand
- Building database of 200+ homes electricity and gas usage and reports on appliances, activities and COVID effects
- Investigating global impacts of COVID on electricity demand

Next Steps

- Complete transition of in-person course to remote learning environment
- Participate in Oregon State University Accelerator Program to explore commercialization pathways
- Continue to analyze and write-up results from data collection on the pandemic's impacts on electricity demand