

# Reducing Barriers to Residential Energy Security

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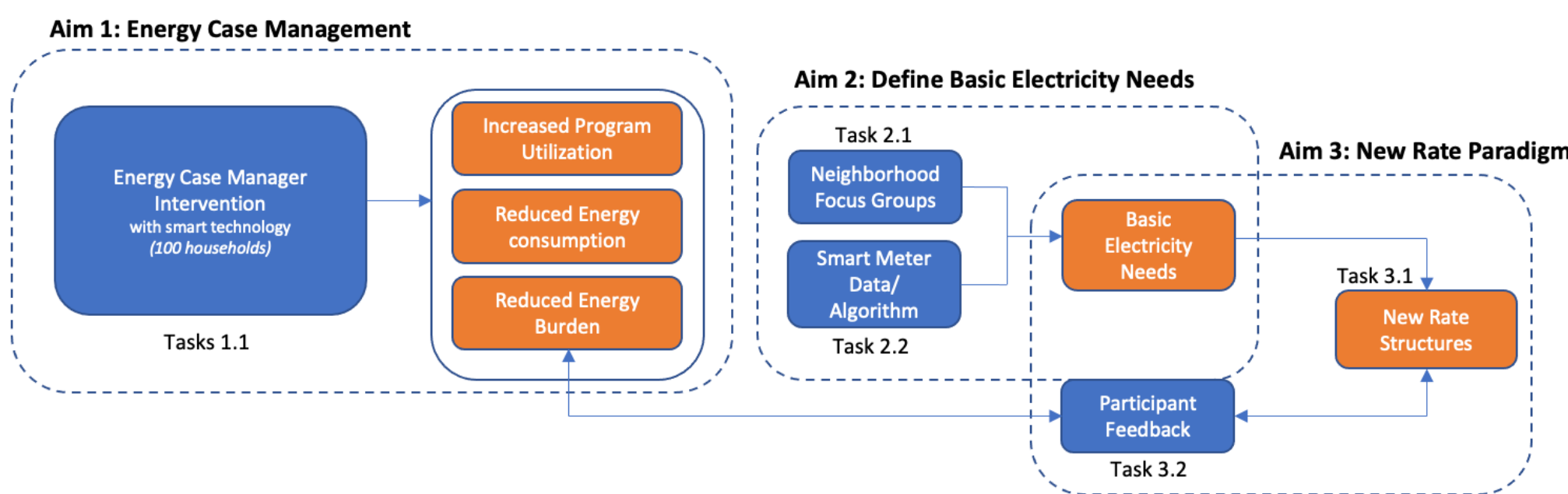


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**Community Need:** The goal of this project is to reduce energy insecurity, improve residents' comfort, and measure health outcomes in low-to-moderate income (LMI) households in three neighborhoods in Detroit, Michigan, which is one of the top ten highest energy burdened metros in the US, where LMI households spend 15 - 30% of their income on energy costs (6% or less is considered affordable).

The three neighborhoods are:

- **Jefferson Chalmers:** A predominantly Black homeowner community on Detroit's east side.
- **Southwest Detroit:** A predominantly Latinx homeowner community.
- **The Villages at Parkside:** A predominantly Black multi-family renter community.



**Figure 1: A summary of our research approach.** The blue boxes represent research inputs, and the orange boxes represent research outputs.

## Work to Date

- Designed an Energy Case Manager (ECM) intervention.
- Recruitment workshops have begun. Participants are provided with energy education and an explanation of the study from the UM team. Surveys are also administered.
- 64 participants have been recruited and initial home visits by the ECM have been conducted for approximately 30% of them.
- Temperature monitors for residents at the the Village's and energy efficiency literature have been distributed. Some residents have received energy efficient installs including low-flow shower heads, pipe wrapping, LED light bulbs, faucet aerators, Wi-Fi enabled thermostats, and Energy Star refrigerators.
- Creation of ECM Tool that processes demographic, socioeconomic, major appliance ownership/usage, and smart meter data to make recommendations for relevant assistance, energy efficiency, weatherization, and electricity rate programs.
- 50 electricity submeters have been installed throughout SW Detroit and in Jefferson Chalmers through a partnership with Pecan Street.

**ENERGY SMART Sample Bill (Back)**

**TERMS**  
**ELECTRICITY CHARGES**  
**NW:** The way electricity is measured  
 1000 watt hours = 1kWh  
 # of Watts (Power) x # of Hours Used (Time)  
 # of Watts x # of Hours Used

**Power Used x Time Used**  
**Power Supply Charges:** The cost to generate electricity  
**Distribution:** The cost to maintain power lines and to deliver electricity to the customer  
**Service Charges:** Monthly service charge for administrative costs

**GAS CHARGES**  
**CCF:** 100 cubic feet - a way to measure gas  
**Distribution:** The cost to maintain power lines and to deliver gas to the customer  
**Gas Cost Recovery (GCR):** The actual cost of gas

**Customer Charge:** Monthly service charge for administrative costs

**Figure 2: Energy education material.** This was used at the workshop. This highlights common things to look out for on utility bills as well as defines some terms.

## Intellectual Merit:

- **Geographical/Demographic Targeting:** Developing a neighborhood-embedded energy case management intervention that acknowledges community/cultural differences across energy insecure areas.
- **Uniqueness of Recommendation:** ECMs create unique energy improvement plans (EIP) for participants based on their smart meter data and house/household characteristics that are aimed at reducing energy burden and improving energy efficiency and/or home comfort.
- **Combinational:** Develop social-technological methods to help quantify household-specific energy needs and use this information in conjunction with community.
- **Energy Justice:** The goal of Aim 3 is to develop a new electricity rate paradigm that seeks to achieve the following objectives: i) a free level of basic electricity, ii) supplemental electricity priced to cover utility provider costs, iii) dynamic stability, and iv) rates that encourage energy efficiency and renewable energy investments.

	Villages at Parkside	Jefferson-Chalmers	Mexicantown-Southwest Detroit	Detroit, MI	Michigan
Population	1,347	7,705	11,355	690,074	9,900,571
% Black (non-Hispanic)	95.4	85.2	6.5	79.8	13.8
% White (non-Hispanic)	2.6	10.1	14.7	9.1	75.9
% Hispanic	2.0	1.4	76.9	7.7	4.7
Total housing units	491	4,104	4,144	365,528	4,539,838
Home ownership rate	15.3	52.5	50.4	49.4	71.0
Median year built	1963	1958	1939	1947	1969
Median house value	\$33,600	\$69,500	\$32,950	\$42,300	\$122,400
Median household income	\$11,909	\$28,117	\$26,670	\$25,765	\$49,576
% Below poverty	82.5	39.3	42.4	40.3	16.7
Unemployment rate	48.8	17.8	17.0	24.9	9.8
Internet access*	<40%	<60%	<50%	50.4%**	75%**

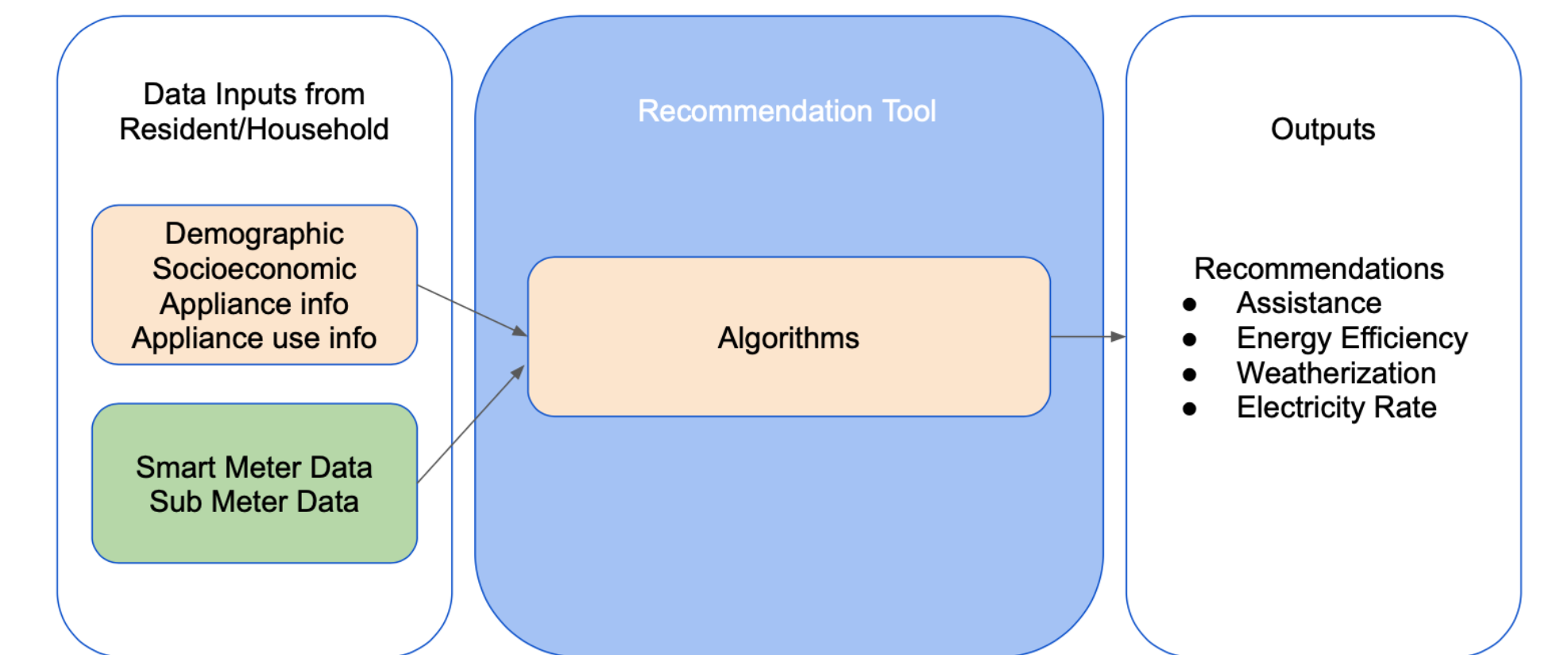
Sources: US Census ACS 5year 2017; \*Federal Communications Commission; \*\*ACS 1year 2017

**Table 1: Demographic and housing characteristics** in the three Detroit neighborhoods the study takes place in compared to the city and state.

All Assistance Programs	Recommendation	Program Requirement Check
Active Military Protection		FALSE
Michigan Veterans Trust Fund		FALSE
Shutoff Protection Plan		FALSE
Winter Protection Plan	Winter Protection Plan	TRUE
Senior Winter Protection Plan	Senior Winter Protection Plan	TRUE
Double Notice Protection Plan		
State Emergency Relief		FALSE
Michigan Energy Assistance Program		FALSE
Payment Agreement		FALSE
Residential Income Assistance Credit	Residential Income Assistance Credit	TRUE
Low-Income Weatherization Assistance Program	Low-Income Weatherization Assistance Program	TRUE
Critical Care Protection		FALSE
Medical Emergencies		
Energy Efficiency Assistance Program		FALSE
Water Residential Assistance Program	Water Residential Assistance Program	TRUE
Home Heating Credit		FALSE
Low Income Self-Sufficiency Plan	Low Income Self-Sufficiency Plan	TRUE

**Figure 3: Assistance program recommendations.** Example of utility and state assistance programs a person may qualify for given socioeconomic and demographic data. These recommendations are interpreted by the ECM and incorporated into the EIP.

## Energy Case Manager Tool



**Figure 4: The case management intervention tool** will provide the ECM with recommendations unique to the home based on data about participants and their appliances, as well as their smart meter and, if present, submetering data.

## Broader Impact: Immediate

- Reduced energy insecurity and burden for disadvantaged urban populations.
- Study if a community-based approach to energy efficiency is linked to reduced energy consumption and improved health and comfort.
- Increased LMI participation in energy efficiency and renewable energy programs.
- Advancement of meaningful academic-community engagement.
- The participation of women and underrepresented minorities in interdisciplinary research.

## Broader Impact: Lasting

- Energy efficiency will be used to maximize health and comfort in LMI housing and to identify how residents, community initiatives, public housing management, government, and nonprofits can fuse their efforts to reduce the energy burden on resource-constrained communities.
- The knowledge created by this project can improve the design of future utility energy programs, increase equity in electricity rates, and lower overall U.S. energy consumption, thereby reducing our dependence on foreign energy sources and the overall environmental impact of the electricity sector.
- 50 submeters have been installed in partnership with Pecan Street to capture high-frequency (1 sec resolution) electricity use data from LMI homes, a group currently underrepresented in data sets available to energy researchers.

## Next Steps: Planned Activities for the Coming Year

- Continue house visits by ECMs and fully implement the EIP designed for each home.
- Further implement and refine algorithms that process smart meter and submetering data, and make recommendations for new assistance and utility programs.
- Begin developing algorithms to use smart and sub-metered data to identify basic energy needs, a goal of Aim 2.
- Conduct deliberative workshops within the communities to help define community consensus around basic energy needs, a goal of Aim 2.
- Design new electric rates using the information gathered from the the algorithms and workshops, a goal of Aim 3.