Home Battery Systems: A Component of Resiliency for Grid Infrastructure Challenged Communities

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Michigan Housing Vintage

Detroit

VINTAGE	% OF MI HOUSING	% UP TO 200% OF FPL	% HOUSING TYPES WITHIN VINTAGE
Before	14%	39%	Single-family: 86% Small multi-unit: 8% Medium to large multi-unit: 6%
1940 - 59	23%	34%	Single-family: 92% Small multi-unit: 3% Medium to large multi-unit: 5%
1960 - 79	28%	31%	Single-family: 73% Small multi-unit: 5% Medium to large multi-unit: 18% Mobile homes: 4%

Gas to Electric: Equitable Home Electrification Policy In Michigan, Michigan Environmental Justice Coalition (MEJC), 2023

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High Electric Rates vs. EE + Elec. Ready Prep

- *"space heating and **air conditioning accounts for 56%** of energy use in Michigan"*
- *"Michigan homes use almost **40% more energy** per home than the U.S. average and Michiganders spend 6% more for energy than the U.S. average."*
- Time of Day Rate: 3pm - 7pm (Default for Residential Customers-DTE)
  - Low daily avg. (Low occupants) **~10%** of Monthly bill attributable to **On-Peak Load**
    - **Energy insecure and homes in need of EE measures like (ductwork, insulation, etc.,) will see significant ~20-30% if supplementing heating with electric heaters**
- *"Of the Michigan homes built before 1940, almost 40 percent are occupied by Michiganders living at up to 200% of the FPL."*
  "Of the single-family homes in Michigan built before 1940, 60 percent are occupied by Michiganders living at up to 200% of the FPL."

Current Utility Incentive - Rebate for EE (DTE)

Central Air SEER 15-16 + Furnace, AFUE 95-96% - $9000

Central Air - $5000

Furnace - $3750

Hybrid Heat Pump Water Heater (120V) - **NA**

Water Heater gas (UEF .68) - $1300

Refrigerator - $1300

Currently, no rebates at utility but state incentives are coming for potentially....

- Whole house battery only
- Whole house battery + solar PV
- Portable generators (federal, yes)
- Load panel upgrade (200 amp)
- Load panel/breaker and outdoor risers and/or can upgrade (Elec. Contractor ~80% needed)
- Sub Panel addition (emergency/critical)
- Generator NEMA 3R Power Inlet Box

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Resident: Battery Example (Case Studies)

CASE 1

PROBLEM: Poor Service and Requirement for Non-AMI Smart Meter alternative with fee
Goals: Add Additional Solar PV module
Highland Park, MI

Single-Family: 2 Story
Off Grid Since 2018
Donated: Stove, Refrigerator, Washer, Dryer, and TV.
Primary Plug Loads:
1. Cell Phone 2. IPAD 3. Solar Radio+Flashlight 4. Lamp-Single LED Lamp 5. Hot Spot (Library)
Food Preparation (outdoor) Wood Burning Stove and barbeque
400Wh Solar Inverter/Generator

CASE 2

PROBLEM: Frequent Power Outages and concerned with loss of food in chest freezer

Goal: Increase to 2000Wh to Bluetti AC200 or larger

Detroit, MI

Apt Unit: ~1200 sq ft.
Primary Plug Loads:

1. Wifi Router
2. 2. Phone Charger

Brand: Bluetti
EB55 537Wh (700W max)

CASE 3

PROBLEM: 2023 Brownouts (3) & Power Outages (3)

Goals: Refrigerator extension for at least 2-3 days. Will require another 1000Wh
Detroit, MI

Single Family: 2 Story Colonial

1189 sq ft

Critical Loads:
Wifi Router, Chromecast, DTE Insight, Hubitat, Soundbar

Brand: Bluetti
EB3A 236Wh

Brand: EcoFlow
Refrigerator -
Delta Max Pro 2024Wh - $1750 ($.87/kWh)

CASE 4

PROBLEM: Brownouts & Power Outages

Goals: 3-4 Days

Detroit, MI

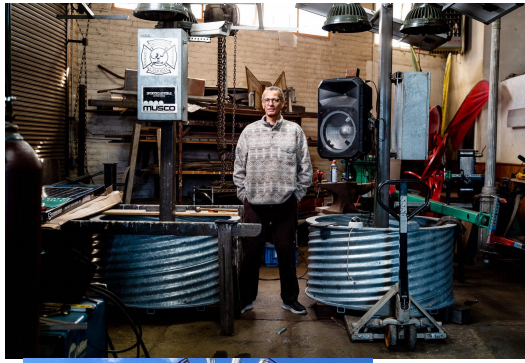
Single Family:1 Story Bungalow, 750 sq ft.

Critical Loads
Brand: Bluetti
AC500 (10kW max)-5000W (inverter)
B300S - 3.1kW (Battery)

Community Charging: Bi-Directional Charging

- Allows individuals residents, like renters, homeowners, electric scooters, solar/inverter battery generator backup systems to be charged during emergencies or when elec. service is shut-off or outage event.

C.A.N. Art Handworks



Urban Wind Turbine Generators (Upcycled)

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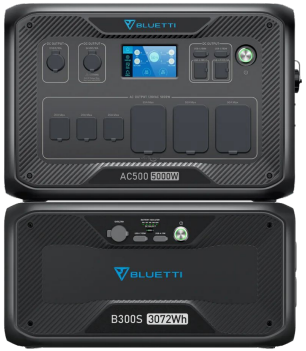

Range of Battery Backup Solutions

Short Battery Backup (1-3 days)

- Communications (phone, laptop, wifi router, radio, lamp)

Intermediate Battery Backup (3-5 days)

- Medical and Health challenged usually will need refrigeration requirements (insulin, etc.,)
- Min. 700Wh but ideal 1kWh

Long Battery Backup (5-7 days)

- 4 - 6 kW
- A possible price point of $4000 installed for 5kW would make battery a resiliency option for those <200% FPL and disabled/seniors “aging in place”/medically challenged