Net Zero Building Design

Great Lakes Indian Housing Association- Quarterly Meeting

May 13, 2021

ELEVATE

What We Believe

- Equity Through Climate Action
- Elevate seeks to create a world in which everyone has clean and affordable heat, power, and water in their homes and communities — no matter who they are or where they live.

ELEVATE
Equity through climate action

What We Do

We support properties and portfolios at every stage to achieve a higher performance and generate operational savings by providing:

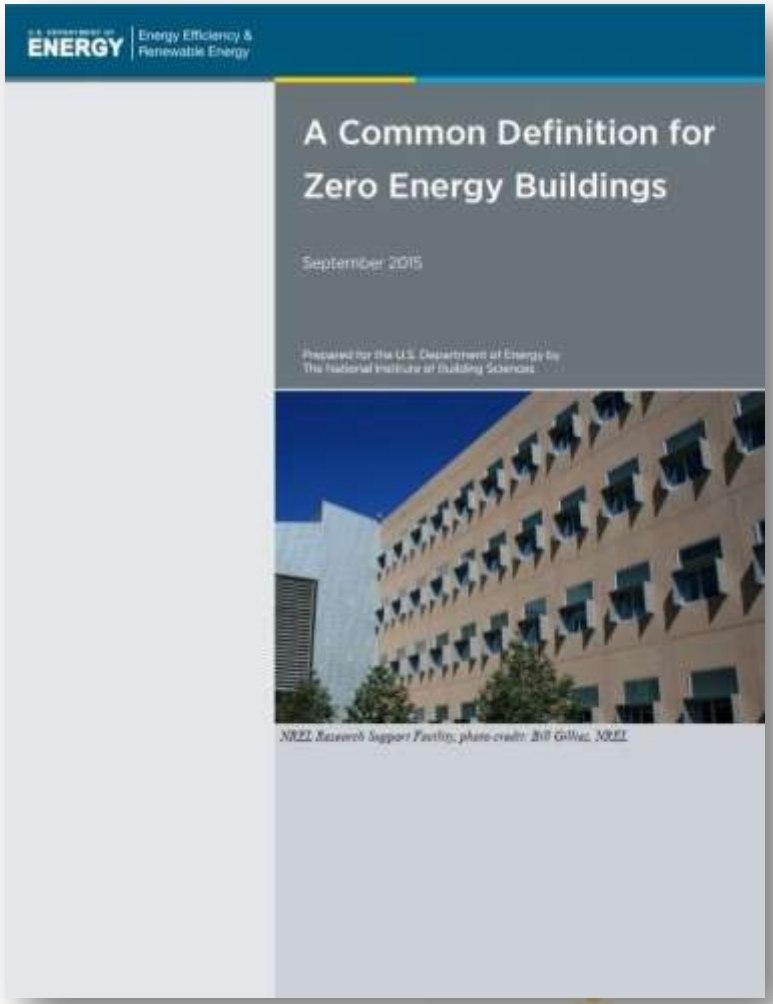
- Portfolio planning
- Energy and water use tracking and remote monitoring
- Energy, water, resiliency, and healthy homes property assessments
- Integrated design support and plan & specification reviews
- Energy modeling of existing and new developments
- Solar and net-zero energy feasibility evaluation
- Financing and incentive coordination
- Installation project management, quality inspections, testing, and verification
- Green certification

Our Partners

- Multifamily affordable housing owners and managers
- Homeowners and renters
- Nonprofits (community-based and direct services organizations)
- State and local government and public agencies
- Investor owned, municipal, and cooperative utilities
- Financial institutions

Getting to Zero

A zero energy building (ZEB) produces enough renewable energy to meet its own annual energy consumption requirements, thereby reducing the use of non-renewable energy in the building sector. – NREL



Getting to Zero

- Reduce plug loads
- Implement passive energy saving strategies
- Install/upgrade efficient systems
- Energy recovery systems
- Energy generation

Individual and Community Benefits

St Regis Mohawk Tribe: Elder Housing Sunrise Acres

- Low or no energy costs for residents
- Energy independence and sufficiency
- Economic development and employment
- Carbon and greenhouse gas reduction
- Community resiliency

Net Zero Design Process

Establish goals and objectives

- Building efficiency levels for both new construction and existing building upgrades
- Energy use intensity targets
- Consider labeling/ certification/ recognition options
- Solar + storage for resiliency
- Workforce

Develop your approach

- Integrated design

Stakeholder input

Funding strategy

Net zero or net zero ready?

Design Team- internal and external partners

Procurement process that incorporates goals

Document your process

Articulate and incorporate efficiency goals into design

Maintain zero energy throughout the design process and verify through modeling

Support zero energy in ongoing operations via ops manuals and training

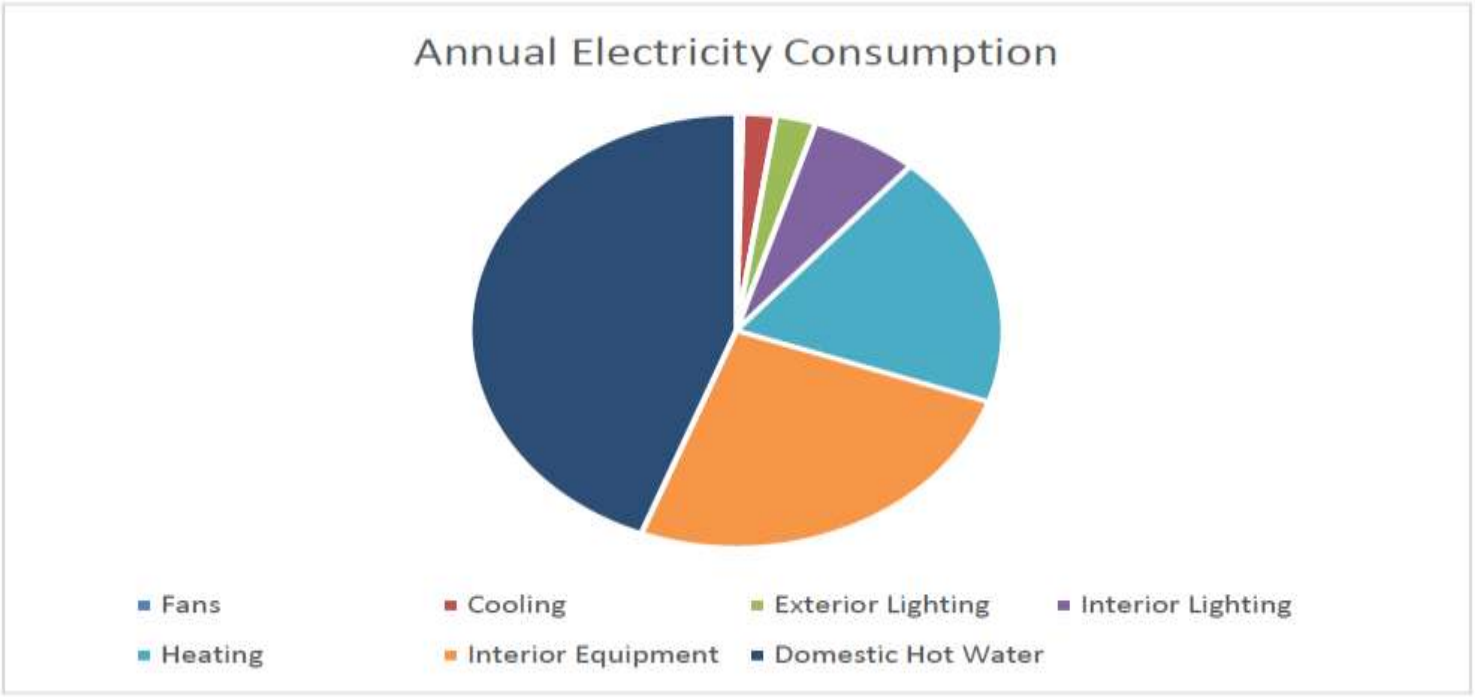
Perform commissioning

Verify and track

Educate residents

Title: Advanced energy design guide for small to medium office buildings : achieving zero energy / ASHRAE, The American Institute of Architects, Illuminating Engineering Society, U.S. Green Building Council, U.S. Department of Energy.

Modeling Case Study

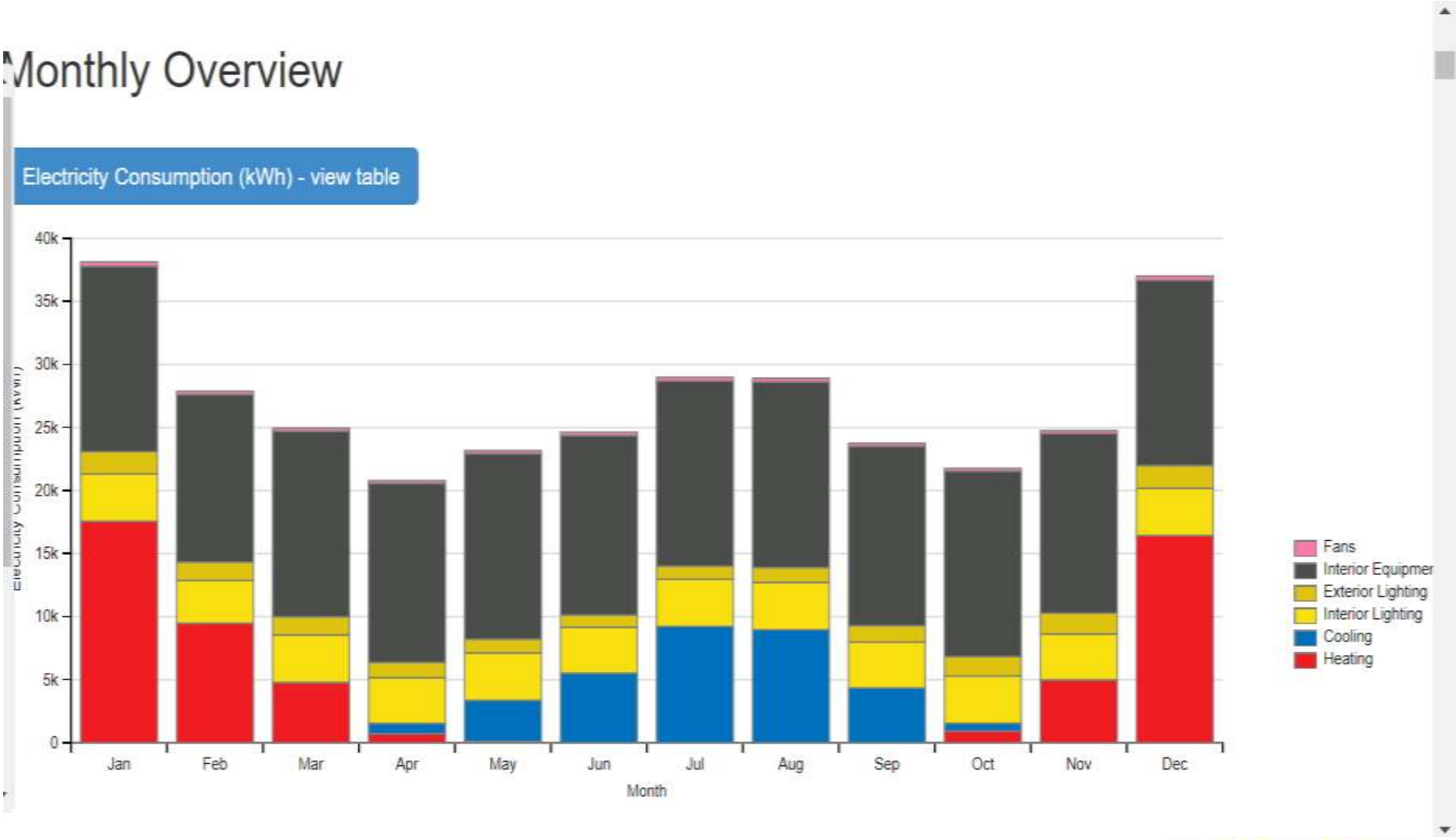


End Use	Consumption (kWh)
Fans	2,606
Cooling	13,486
Exterior Lighting	16,483
Interior Lighting	44,203
Heating	129,267
Interior Equipment	173,114
Domestic Hot Water	300,218
Total	**679,377**

Energy Use Intensity (EUI): 28.54 kBtu/ft2

Energy Use per Apartment: 8,492 kWh/year

Modeling Case Study



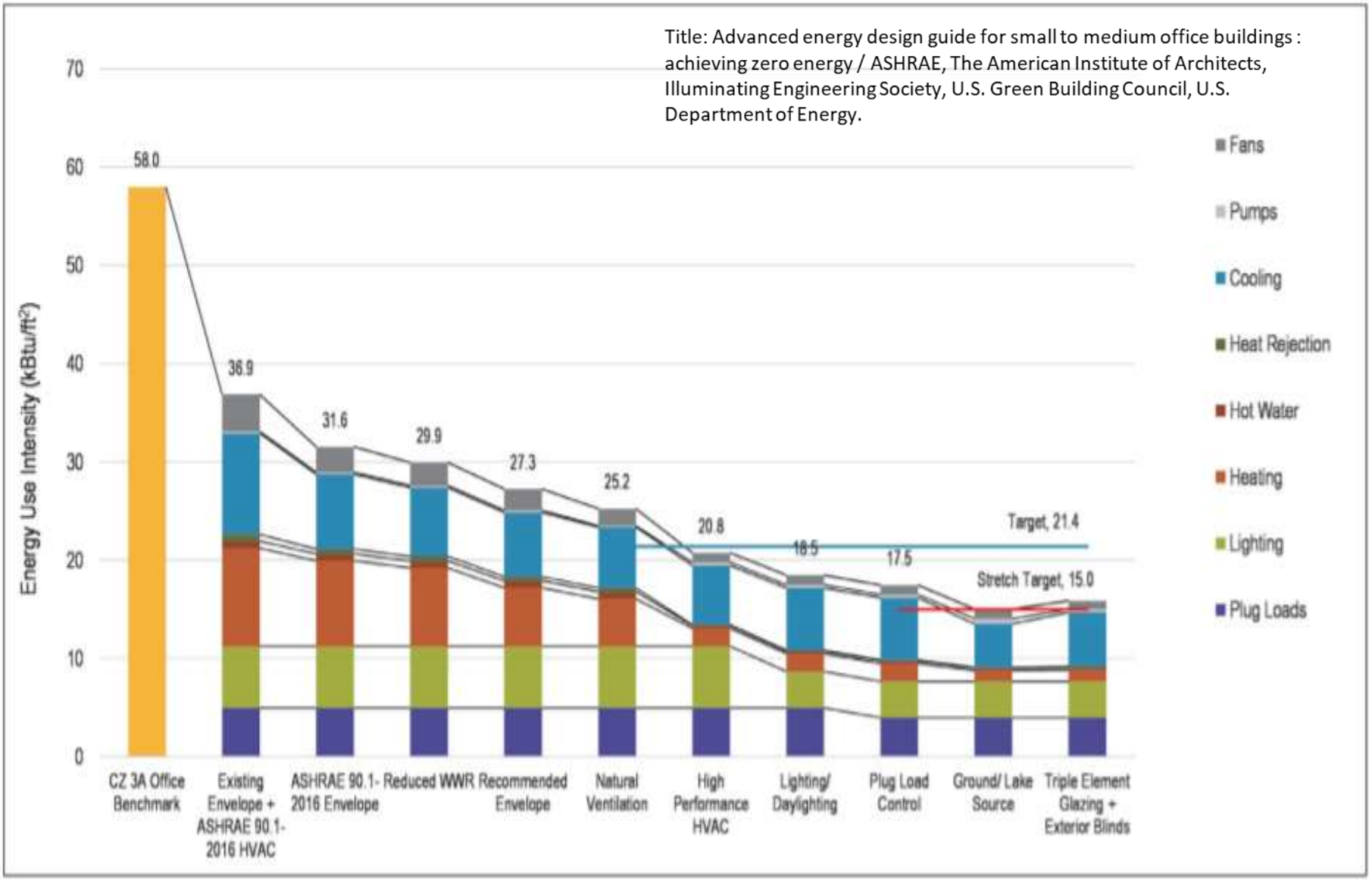
Modeling Case Study

Energy Use Intensity (EUI): 28.54 kBtu/ft2
Energy Use per Apartment: 8,492 kWh/year

Wildflower Apartments Energy Efficiency Scenarios Summary

Scenario	Annual Electricity (kWh)	EUI (kBtu/ft^2)	Annual Electricity per unit (kWh)	Annual Savings (kWh)	Annual Savings (%)	Notes
Baseline	679,377	28.54	8,492	N/A	N/A	Estimated performance of property as designed based upon ISSUE SET dated 05 MAR 2021
Wall Insulation	663,746	27.88	8,297	15,631	2.3%	Addition of 2" Polyisocyanurate continiuous Insulation to exterior wall assembly
Slab Insulation	647,580	27.21	8,095	31,797	4.7%	R-10 below entire floor slab
High Performance Windows	675,338	28.37	8,442	4,039	0.6%	High performance windows and sliding glass doors (U:0.26/SHGC:0.3)
All Envelope Measures	624,909	26.25	7,811	54,468	8.0%	Inclusion of all three envelope measures above
Centralized Electric Water Heaters	624,599	26.24	7,807	54,778	8.1%	80 and 100 gallon electric resistance water heaters serving 4-5 units each
Individual Heat Pump Water Heaters	509,310	21.40	6,366	170,067	25.0%	40 and 50 gallon heat pump water heaters serving each unit individually (UEF≥3.42)
Centralized Heat Pump Water Heaters	466,566	19.60	5,832	212,811	31.3%	80 and 100 gallon heat pump water heaters serving 4-5 units each (UEF≥3.42)
All Envelope Measures and Centralized Heat Pump Water Heaters	412,098	17.31	5,151	267,279	39.3%	Inclusion of all envelope measures and centralized heat pump water heaters

Modeling


Title: Advanced energy design guide for small to medium office buildings : achieving zero energy / ASHRAE, The American Institute of Architects, Illuminating Engineering Society, U.S. Green Building Council, U.S. Department of Energy.
Energy Use Intensity (kBtu/ft²)
70
60
50
40
30
20
10
0
58.0
36.9
31.6
29.9
27.3
25.2
20.8
18.5
17.5
Target, 21.4
Stretch Target, 15.0
Fans
Pumps
Cooling
Heat Rejection
Hot Water
Heating
Lighting
Plug Loads
CZ 3A Office Benchmark
Existing Envelope + ASHRAE 90.1-2016 HVAC
ASHRAE 90.1-2016 Envelope
Reduced WWR
Recommended Envelope
Natural Ventilation
High Performance HVAC
Lighting/ Daylighting
Plug Load Control
Ground/ Lake Source
Triple Element Glazing + Exterior Blinds

Building and Community Net-zero approach

Zero Energy Building

- Harder to get to Net Zero especially for existing buildings
- Manageable size and scale

Zero Energy Community

- Mix of building types give flexibility
- Options for community solar
- Zero energy districts also have the potential to dramatically improve the economic competitiveness, resiliency, environmental quality, and energy independence of communities

Solar + Storage Case Study

Eastside Community Network

4401 Conner Street, Detroit, MI

The Organization

Eastside Community Network develops people, places and plans for sustainable growth on Detroit's east side. ECN envisions the east side of Detroit as a community of choice where residents can live, work, play and thrive. ECN spearheads initiatives that promote social cohesion, neighborhood sustainability, community participation, and resident empowerment, including Climate Equity, Community Organizing and Planning, Business and Economic Development, and Youth Development.

80 kW Rooftop Solar

126 kW / 111 kWh Lithium ION Battery

$365,254 Project Cost

$15,861 Annual Savings

$396,527 Lifetime Savings

The Project

An integrated energy system will be developed that includes energy efficiency measures, 80 kW of installed rooftop solar, and 126 kW/111kWh Lithium Ion Battery Storage. The system will reduce costs, increase organizational sustainability, and provide resilient critical services to staff and community members served in the case of an outage for 48 hours or more. This integrated system will pay for itself in 13 years and provide resilient energy management for more than 25 years.

Resilience

During cold weather climate emergencies or outages, the atrium is a main gathering space. During cold weather outages, residents can shelter at ECN and access internet that is powered by solar as well as stay warm inside the atrium doors with zoned space heating. Power to the rest of the building would be shut off and diverted to the atrium. During warm weather climate emergencies or outages, residents can go to the lower levels to stay cool in the lunchroom. Food and water are accessible for up to 50 people.

48+ Hours Critical Load

Up to 200 People Served

Emergency Heating/Cooling

Food Storage

Medical/Healthcare

33%	55.7 tons	1,030,294	10,660	1,187
of CO_2, SO, & NO_2	Avoided CO_2 per year	Annual Care Miles Avoided	Trees Planted	Long Haul Flights Avoided

Let's Stay Connected

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