

# Downtown La Crosse Microgrid Feasibility Study & Resilience Planning

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energy challenges.



## Introduction

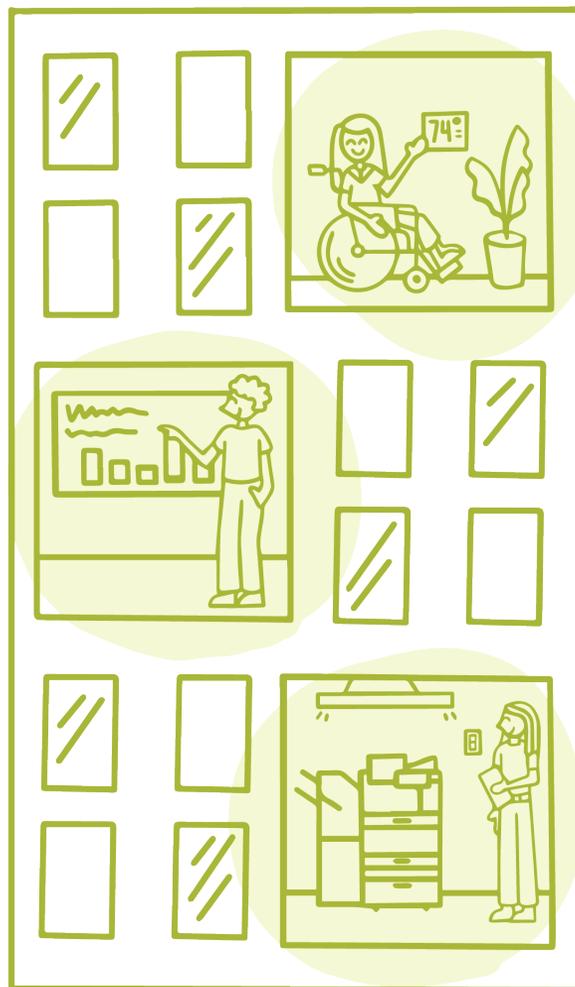
- Why Microgrids for La Crosse?
- Project Overview & Goals

## Resilience Planning Framework

- Three-layer resilience framework
- Community Resilience Centers (CRCs)

## Microgrid Concepts & Scenarios Evaluated

- Technologies considered
- Individual-building vs small campus microgrids
- Overview of scenarios



## Key Results

- Financial Findings
- Looking beyond utility bill savings
  - Value of resilience
  - Value of emissions reductions & health benefits

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- Key design and implementation considerations

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# Introduction

# Why Microgrids for La Crosse?

La Crosse, like many Midwest communities, is facing **increasing climate-driven risks**:

- Extreme heat and cold
- Intense storms and flooding
- Growing strain on aging electrical infrastructure

Microgrids are a **resilience strategy** that allows critical facilities to:

- Maintain power during outages
- Continue serving the community during emergencies
- Advance emissions reduction goals



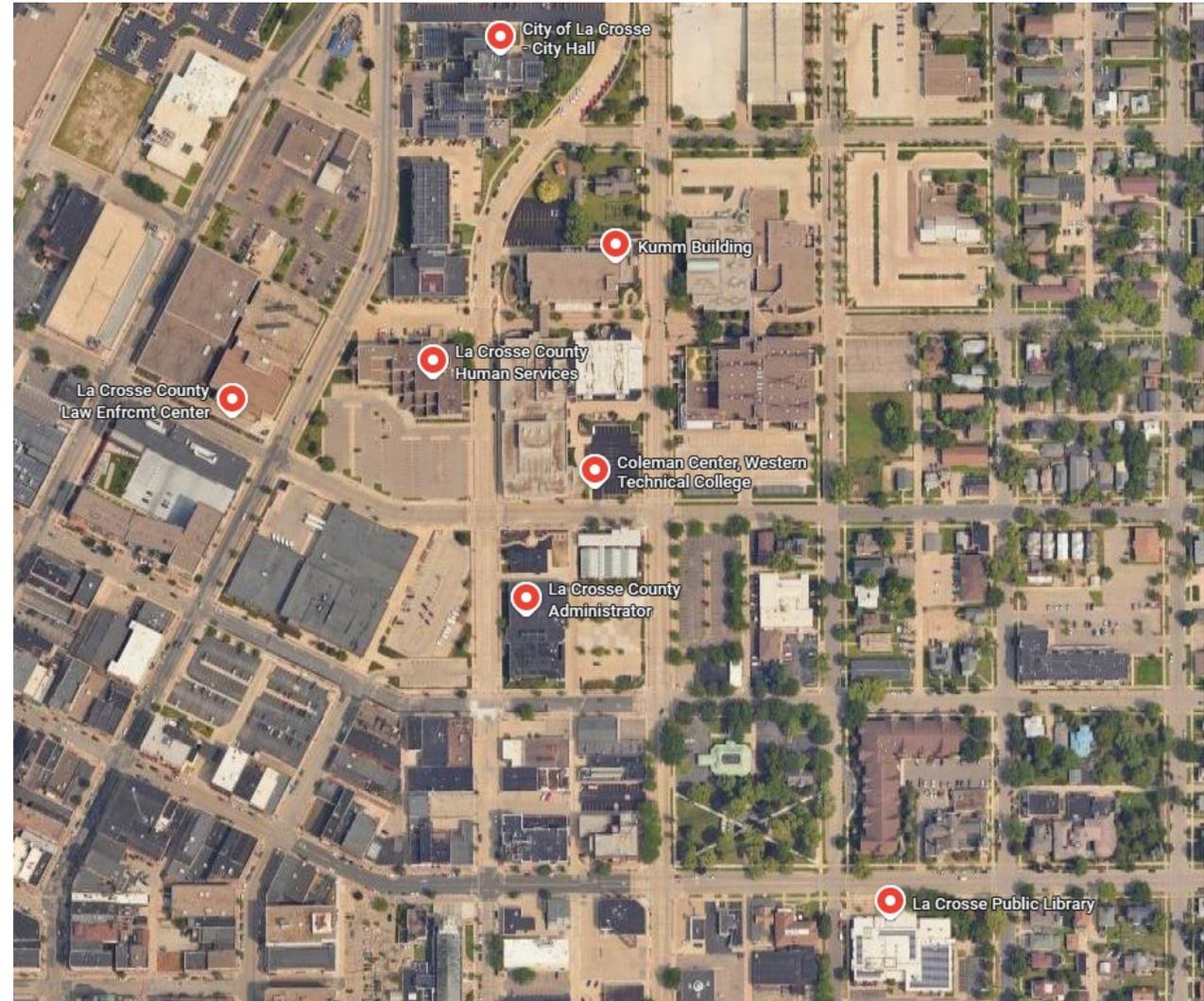
# Project Overview and Goals

This study evaluated **seven downtown facilities** considered **community lifelines**:

- Support public safety and detention
- Health services
- Sheltering
- Emergency coordination and operations
- Information access

Our **goals** were to:

- Assess the **technical feasibility** of microgrids
- Understand **economic performance**, including non-traditional benefits
- Evaluate **resilience outcomes**, not just utility bill savings
- Provide **actionable guidance** for next steps





# Resilience Planning Framework

# Three-layer resilience framework

## Engineering-designed Resilience

### Robustness of physical infrastructure

- **Critical load support by DERs during extended power outage.** The capability of using local Distributed Energy Resources (PV, BESS, and/or generator) to support critical loads.

## Operational Resilience

### Management strategies and responsiveness during disruptions

- **Recovery time objectives (RTOs).** Ensure critical systems and community services are restored within target recovery timeframes following an outage or disruption.

## Community Resilience

### Social factors and community engagement

- Critical service availability
- Community accessibility and equity
- Community engagement
- Communication services reliability
- Community safety and essential services
- Community health benefits

# Community Resilience Centers (CRCs)

CRC's are facilities designed to provide:

- Heating and cooling
- Refrigeration for food and medicine
- Charging for phones and medical equipment
- Basic shelter and services during outages



Based on site characteristics, accessibility, and existing programs, Western Technical College's Kumm Center emerged as a strong candidate for a CRC.

The Main Public Library was also identified as a potential **secondary or short-term resilience site**, especially for daytime support and information access.



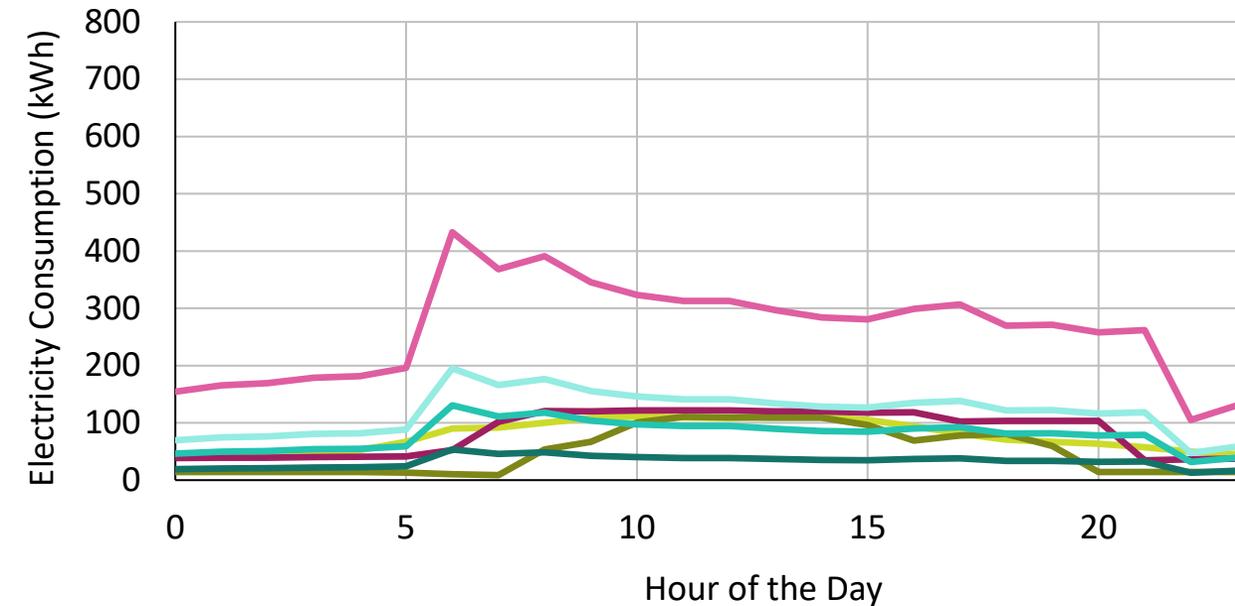
# **Microgrid Concepts & Scenarios Evaluated**

# Microgrid Concepts

## Load Profiles

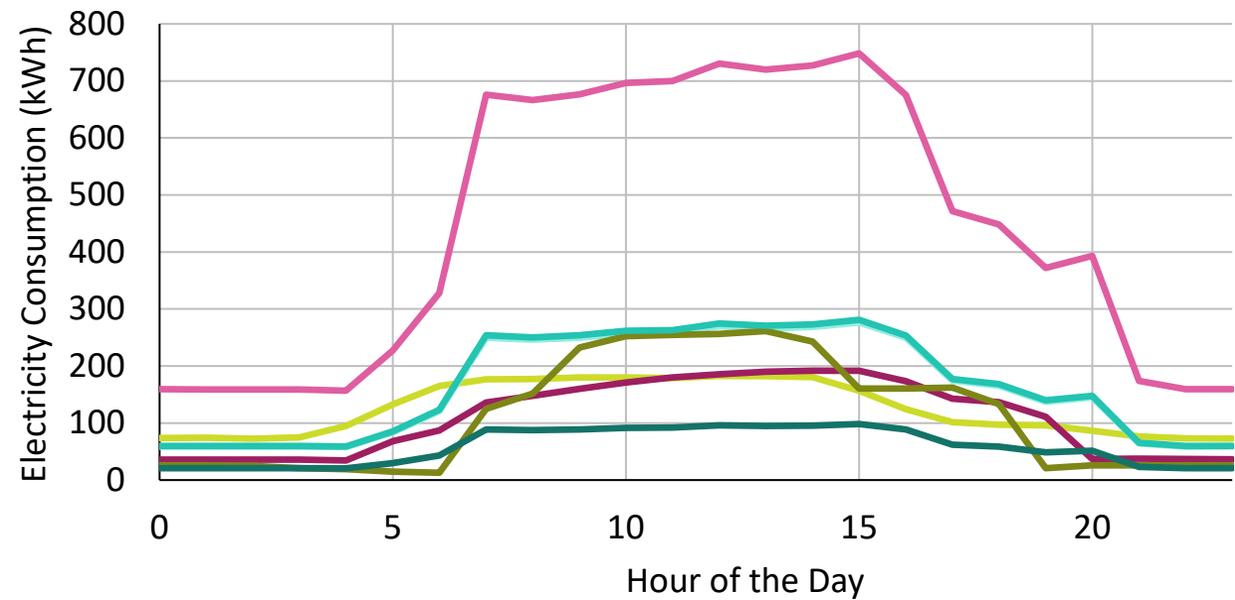
Built using a combination of real consumption data, standard load profiles, and energy models.

### Winter Day



- Coleman Center
- City Hall
- Law Enforcement Center
- County Administration
- Kumm Center
- Main Library
- Health & Human Services

### Summer Day



- Coleman Center
- City Hall
- Law Enforcement Center
- County Administration
- Kumm Center
- Main Library
- Health & Human Services

# Microgrid Concepts

## Technologies considered

- Existing and new solar PV
- Battery energy storage systems (BESS)
- Existing backup generators

Building name	Existing PV panels capacity (kW)	Annual Production (kWh/year)	Renewable electricity	Existing generator capacity (kW)
County Administrative Center	133	167,190	47%	60
Law Enforcement Center	255	321,553	11%	600
Health and Human Services	100	125,707	14%	350
City Hall	113	142,439	12%	80
Main Public Library	112	141,164	21%	15
Kumm Center	N/A	N/A	N/A	125
Coleman Center	N/A	N/A	N/A	130

# Microgrid Scenarios

## Individual-building vs small campus microgrids

Early in the project, we explored whether all seven buildings could be connected into a single downtown microgrid.

However, due to regulatory constraints multi-owner microgrids are currently difficult to implement in Wisconsin.

As a result, we focused on:

- **Individual-building microgrids**
- **Small campus microgrids**, where buildings share ownership and a meter

The campus approach proved to be both more feasible and cost-effective.

# Microgrid Scenarios

## Western Technical College

Building	Rooftop area for PV (ft <sup>2</sup> )	PV capacity (kW)	BESS power capacity (kW)		
Coleman Center	19,017	142	65	130	
Kumm Center	14,238	190	75	125	230
Small Campus	33,255	333	135	255	290

## La Crosse County

Building	Existing PV capacity (kW)	Potential added PV capacity (kW)	BESS power capacity (kW)	
County Admin	133	0	60	
LEC	255	246	400	600
HHS	100	0	100	350
LEC + HHS Campus	355	246	500	950

## City of La Crosse

Building	Existing PV capacity (kW)	BESS power capacity (kW)	
City Hall	112	80	150
Main Library	113	35	135

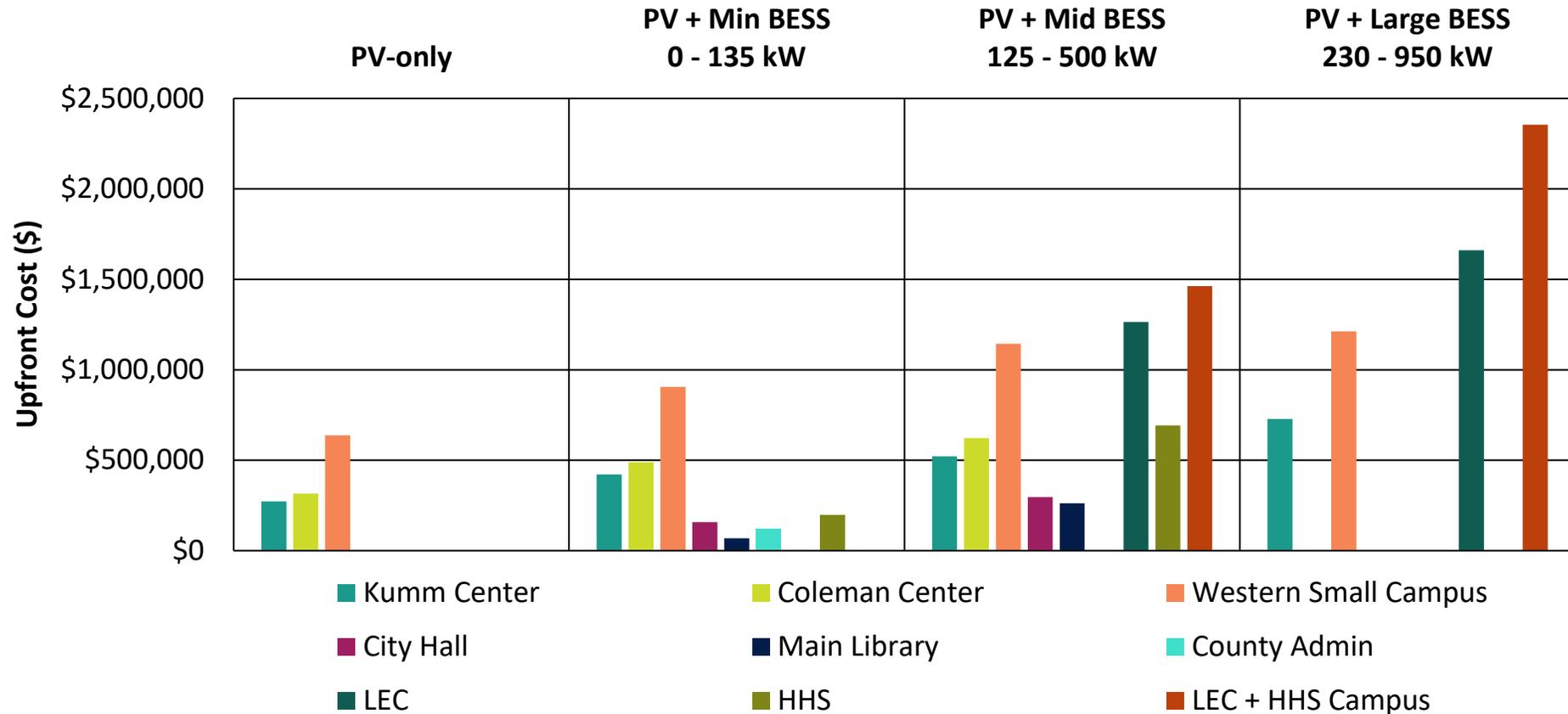
**BESS energy capacity (kWh)**  
sized to 4 and 8 hours of resilience.



# Key Results

# Financial Results

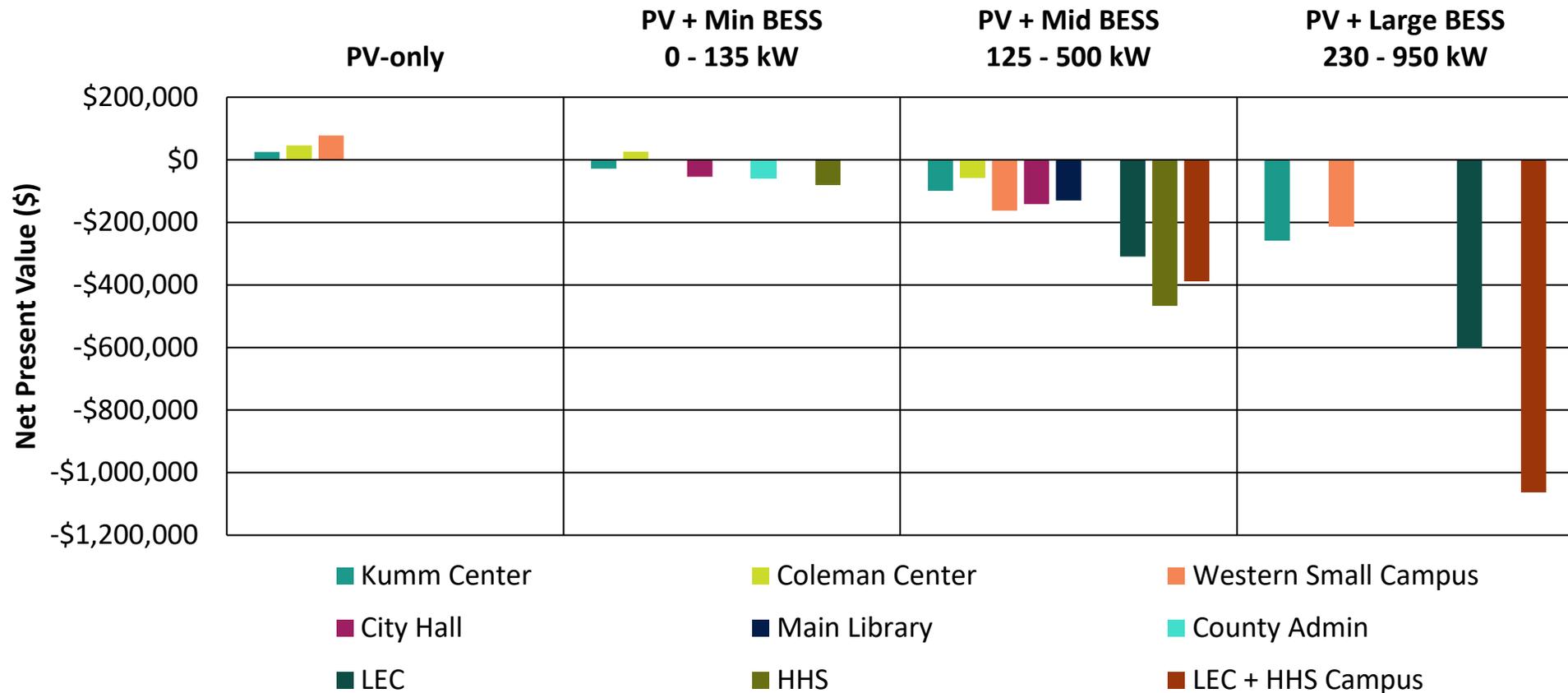
As additional PV and battery energy storage are incorporated to meet resilience objectives, upfront cost increases and traditional financial metrics weaken.



\*All for four-hour capacities

# Financial Results

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\*All for four-hour capacities

# Value of Resiliency Measures

Based on a study from LBNL, the estimated cost per average kW (cost per event normalized by average demand) of a **one-hour outage for large commercial buildings is \$21.8 per kilowatt.**

For each scenario:

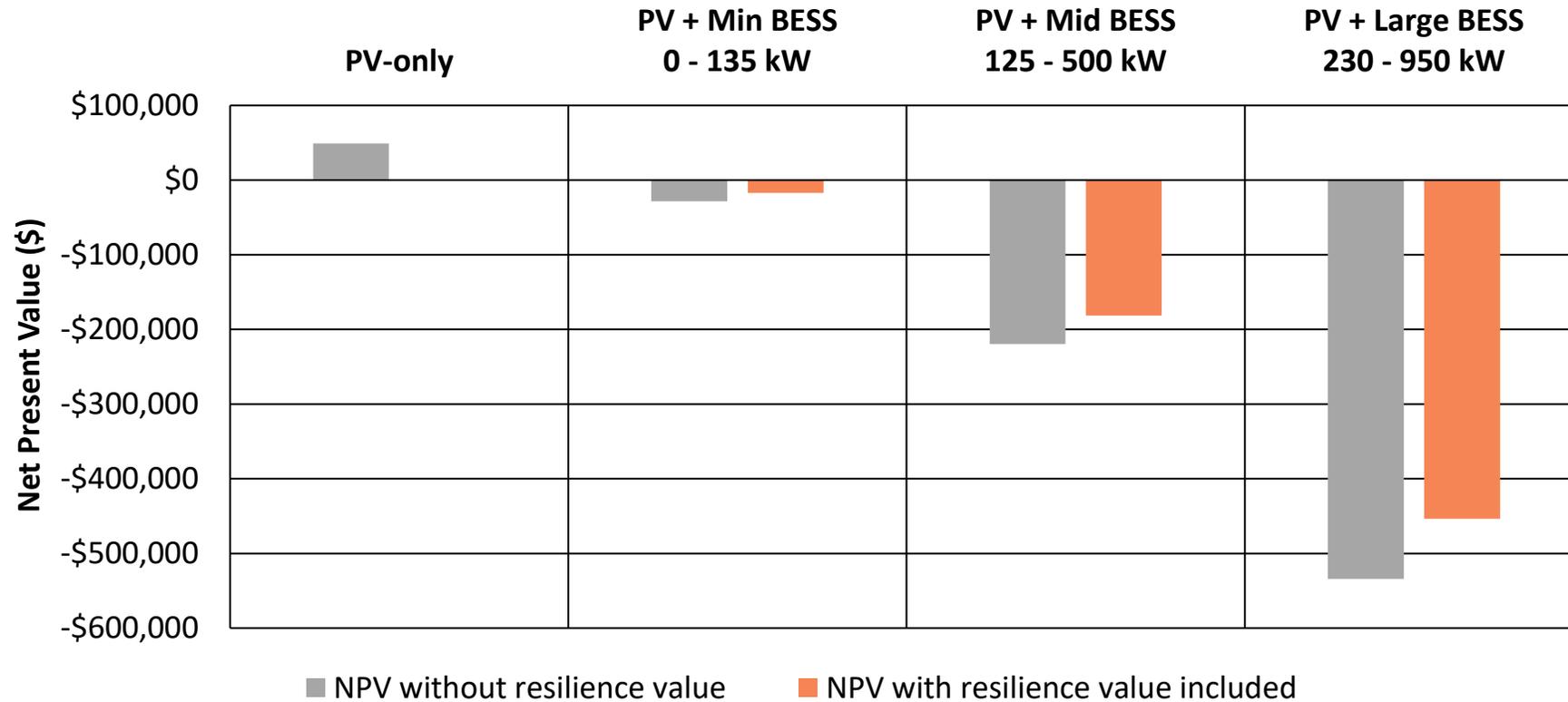
- The average critical load supported by the microgrid was calculated
- The assumed outage duration of 1-hour was applied
- The resulting avoided outage cost was aggregated over the project lifetime

This resilience value was then incorporated into the net present value analysis alongside traditional utility cost savings.

Resilience Value = Average Critical Load (kW) × Outage Duration (hrs) × Cost per kW-hour of outage



# Value of Resiliency Measures



# Value of Emissions Reduction and Public Health Benefits

Microgrids with solar PV and battery storage reduce emissions of carbon dioxide (CO<sub>2</sub>) as well as harmful air pollutants such as nitrogen oxides (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), and fine particulate matter (PM<sub>2.5</sub>).

Reductions in criteria pollutants are associated with:

- Fewer asthma attacks and respiratory hospitalizations
- Reduced cardiovascular stress and premature deaths
- Lower public health system costs
- Improved quality of life, particularly for vulnerable populations

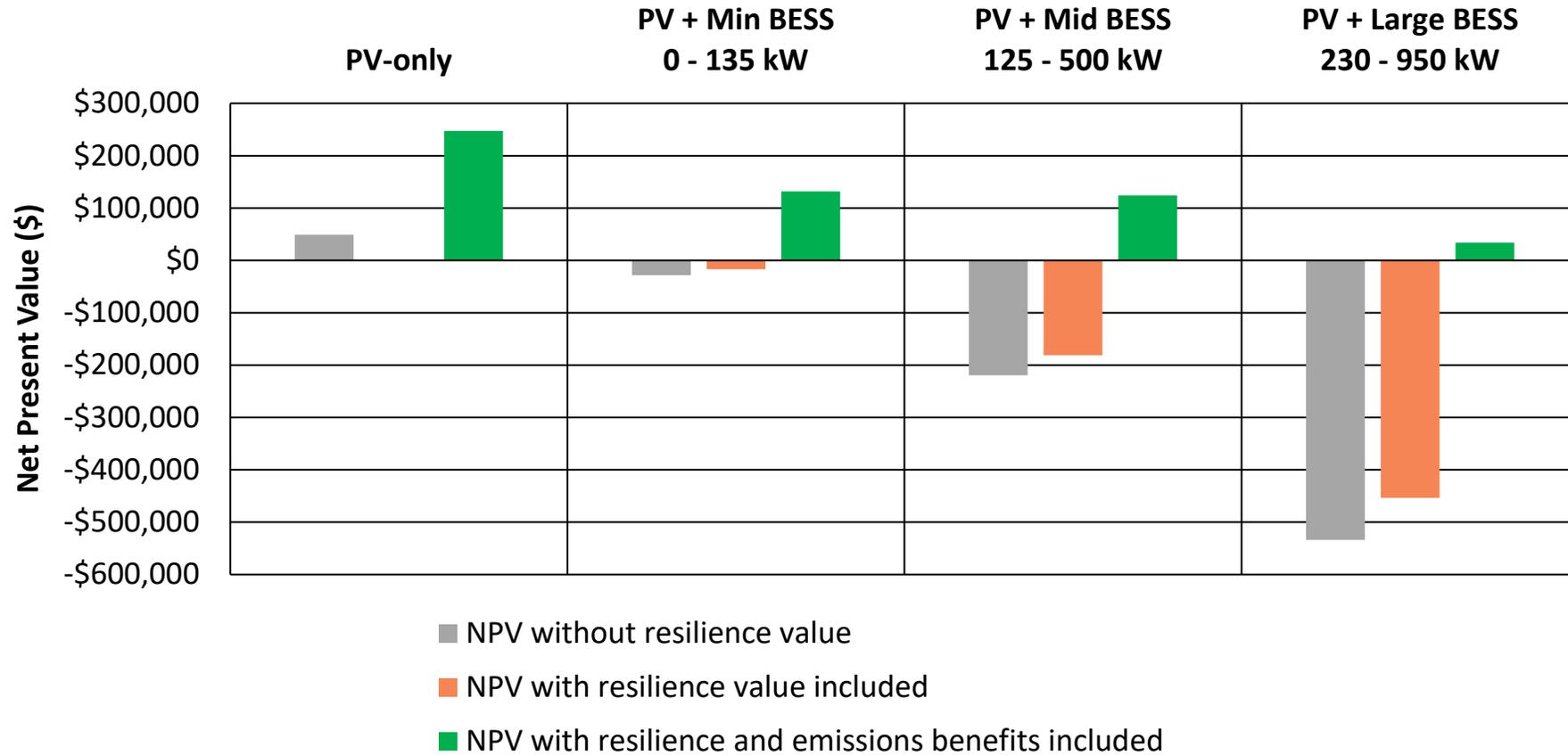
These benefits represent real societal value, even if they do not appear on a utility bill.

The values used in the analysis were selected from sources such as:

- The Interagency Working Group (IWG) on the Social Cost of Greenhouse Gases
- The Estimating Air Pollution Social Impact Using Regression (EASIUR) model from the Center for Air, Climate and Clean Energy Solutions (CACES)

Pollutant	Removal cost per ton
Carbon dioxide (CO <sub>2</sub> )	\$51
Nitrogen oxides (NO <sub>x</sub> )	\$20,505
Sulfur dioxide (SO <sub>2</sub> )	\$48,835
Particulate matter (PM <sub>2.5</sub> )	\$147,978

# Value of Emissions Reduction and Public Health Benefits





## **Next Steps, Funding Opportunities, and Key Takeaways**

# Design and Implementation Considerations

- Design **microgrid-ready systems** during renovations
- Prioritize and clearly define **critical loads**
- Integrate **existing generators** strategically
- Plan for **battery replacement** or augmentation
- Conduct early **site surveys** and interconnection discussions



# Funding Opportunities

- **Inflation Reduction Act tax credits**, using direct pay for public entities
  - Solar PV projects must generally begin construction by July 4, 2026, or be placed in service by December 31, 2027, to qualify for the ITC or PTC.
  - BESS are eligible under the ITC and are not subject to the same placed in service deadline that applies to solar generation.
- Potential future rounds of the **PSC Energy Innovation Grant Program**
- **Focus on Energy** incentives for solar and efficiency measures



# Key Takeaways

- Microgrids are **technically feasible** across downtown La Crosse
- Traditional financial metrics alone **undervalue resilience projects**
- Campus-scale systems offer the strongest pathways
- When resilience and emissions benefits are included, the value proposition improves substantially
- This study provides a **replicable framework** for future resilience planning





**Discussion / Q&A**



## Contact Information



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