Coldwater Solar Carport Pilot Project
advancing sustainable infrastructure

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Deliverables

Main Report

The Main Report includes the technical and economic feasibility of pilot solar carport systems, including scalability across different site types.

Solar Carport Guide

Outlines technical guidelines and decision-making tools needed for designing and deploying solar carports.

Outreach Material

Materials to engage the community and raise awareness about solar carport benefits.

Personalized Innovations

City of Detroit

City of Ann Arbor

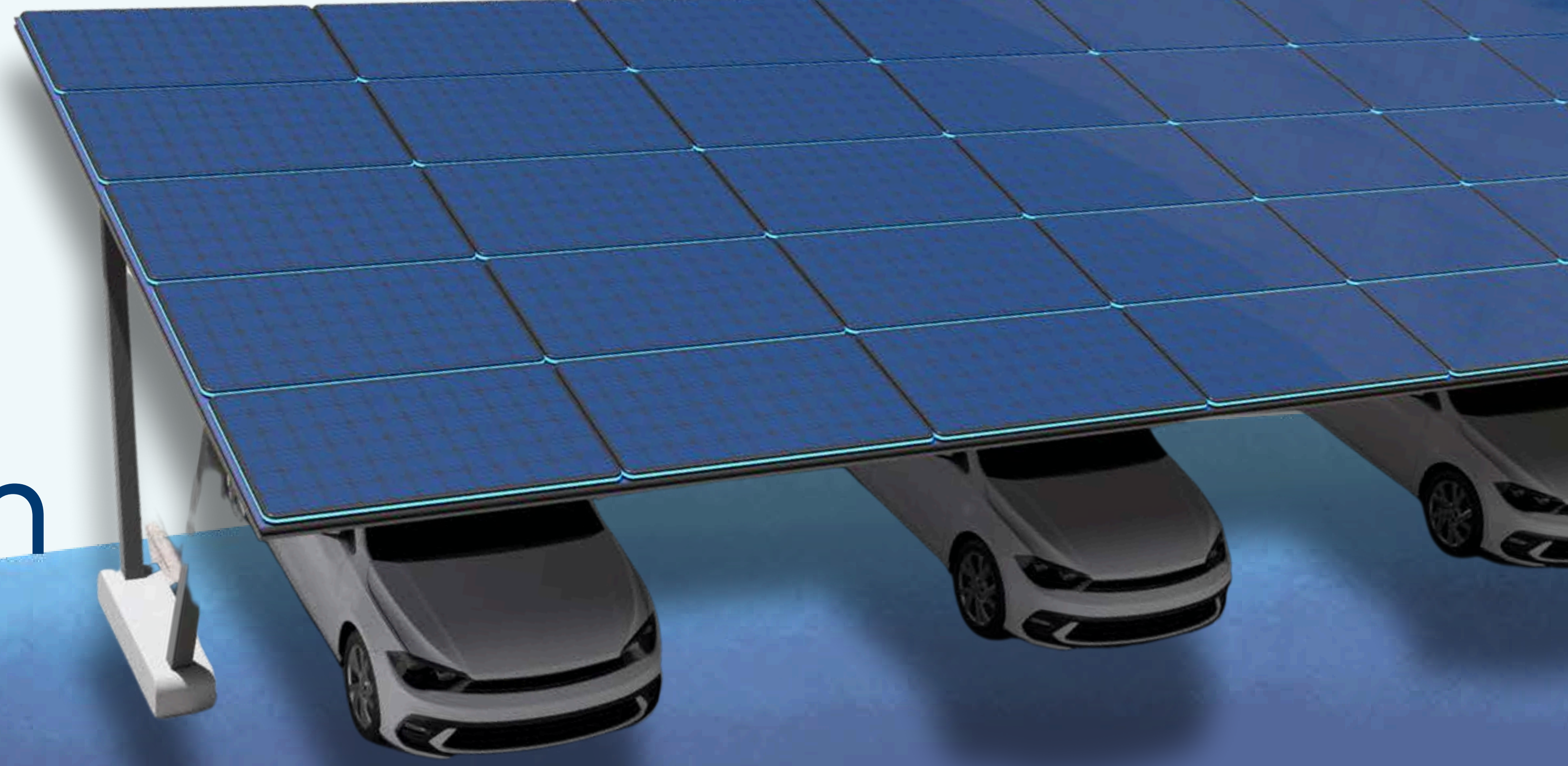
Personalized Innovations

Scio Township

Michigan State University

Personalized Innovations

Solar Carports:
Strategic Clean Energy Solution



What are Solar Carports?

Elevated solar PV structures installed over parking areas utilize existing developed land which is Ideal for civic and urban settings

Key Benefits

- Land Preservation
- Urban Heat Mitigation
- Weather Protection
- Visual Integration
- EV-Ready Infrastructure

Solar Carport Planning Guide
Solar Carport Planning Guide:
A Step-by-Step Guide for
Michigan Municipalities & Institutions
HENRY L. BROWN
MUNICIPAL BUILDING
WELCOME TO
COLDWATER
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CATALYST COMMUNITIES
GRAHAM SUSTAINABILITY INSTITUTE
CENTER FOR EMPOWERING COMMUNITIES
UNIVERSITY OF MICHIGAN
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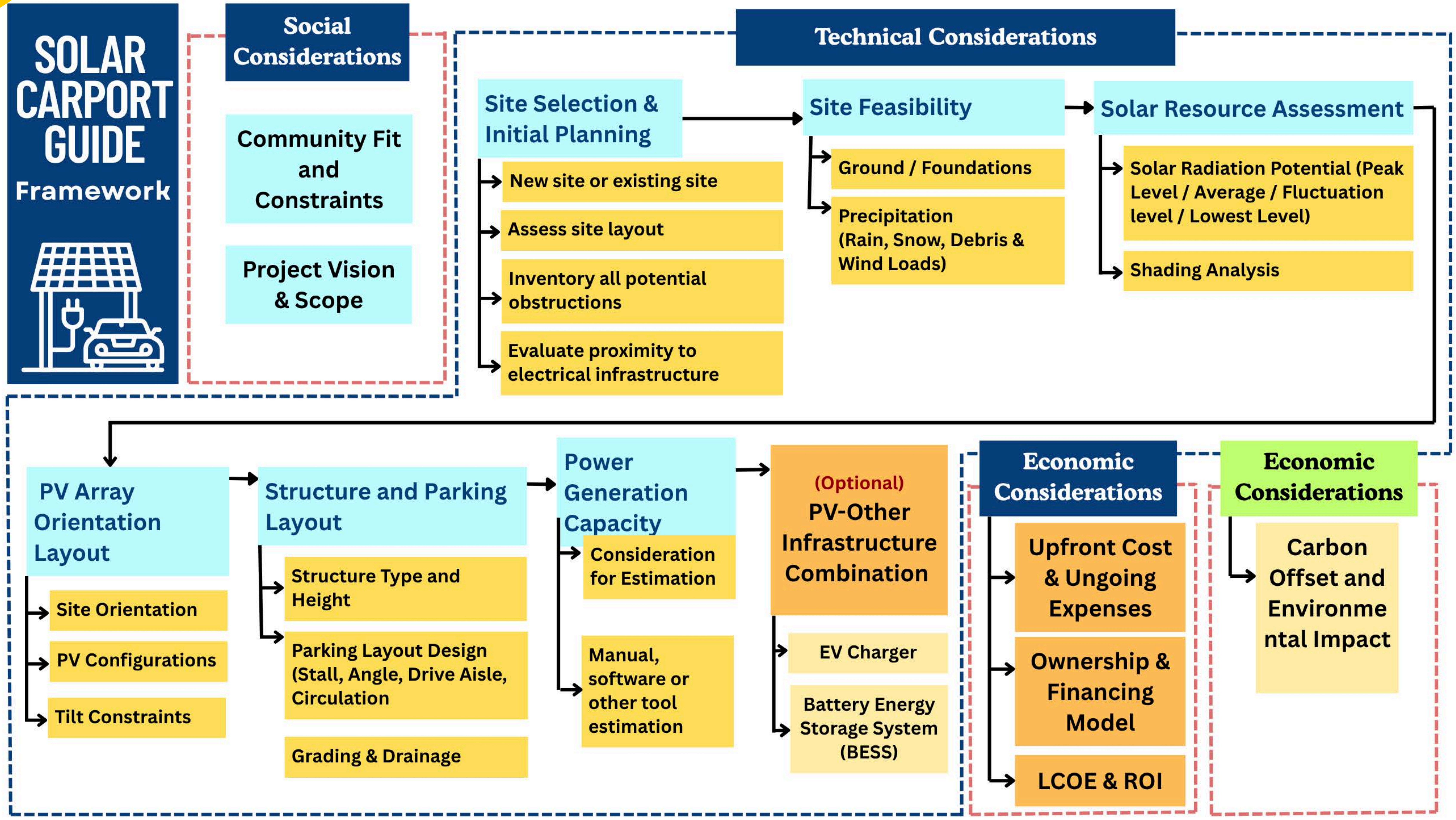
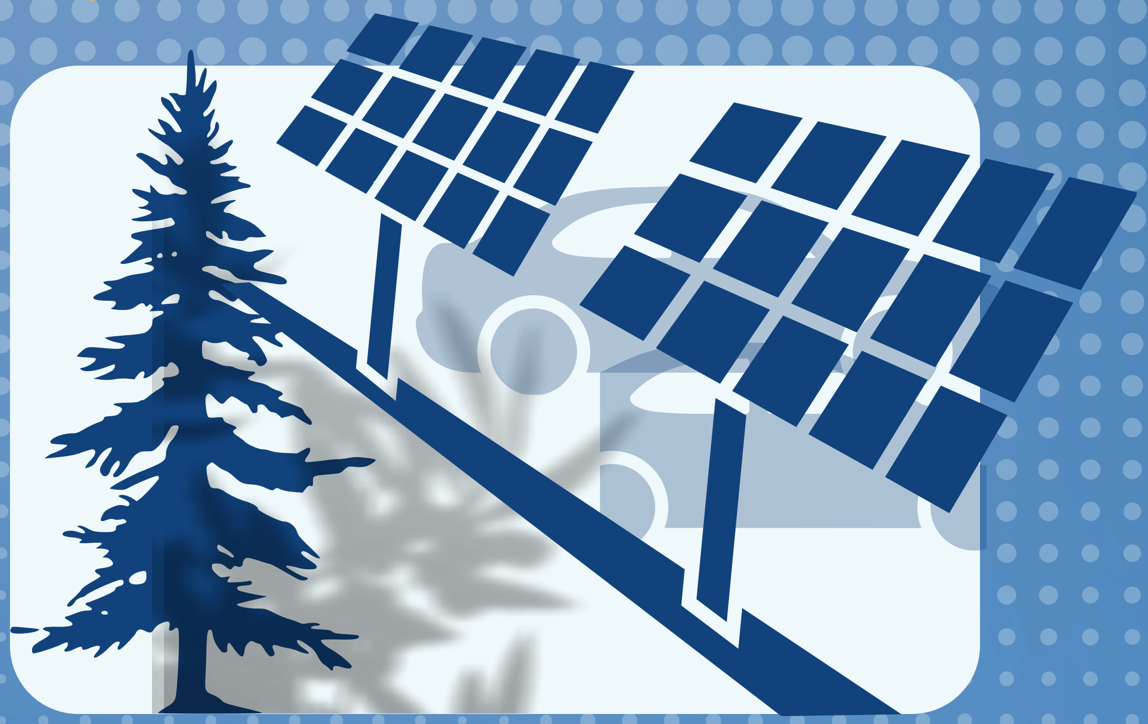
Social Considerations
Step 1: Community Fit and Constraints
Before identifying a location or technical approach, think about how the solar carport aligns with your or your community's values, visibility, and practical limitations. These social considerations help ensure the project earns support and meets real needs. There are several key questions that could guide your decision such as:
• Who will benefit? Will it serve you, the general public, specific residents, staff, or underserved groups?
• Will it be visible and accessible? Sites like city halls, libraries, or schools can spark awareness and pride.
• Does it reflect community values? Could it double as a site for EV charging, farmers' markets, or emergency hubs?
• Are there physical or social constraints? Consider zoning rules, space competition, shading from trees, or local concerns.
• Will it support broader goals like resilience or public education?
Step 2: Project Vision and Scope
Once the community context is considered, define the purpose and size of the project. Knowing the technical intention will guide key planning decisions like layout and design.
Clarify the project's main objectives:
• Maximize renewable energy generation,
• Provide shaded or weather-protected parking,
• Support or incorporate EV charging infrastructure,
• Act as a public education tool or a visible commitment to sustainability.
Determine the project's size based on your goals, budget, and available space:
• Small-scale installation, such as a single canopy or part of a parking lot,
• Mid-scale installation, for a particular building or high-traffic area,
• Larger-scale or phased project, with the potential to expand coverage over time based on need, funding, or public support.
Page
6
duo-pitch canopy
barel-arch canopy
mono-pitch canopy
figure 2. Type of PV Configurations

Assesment Flowchart



Site and Structural Considerations

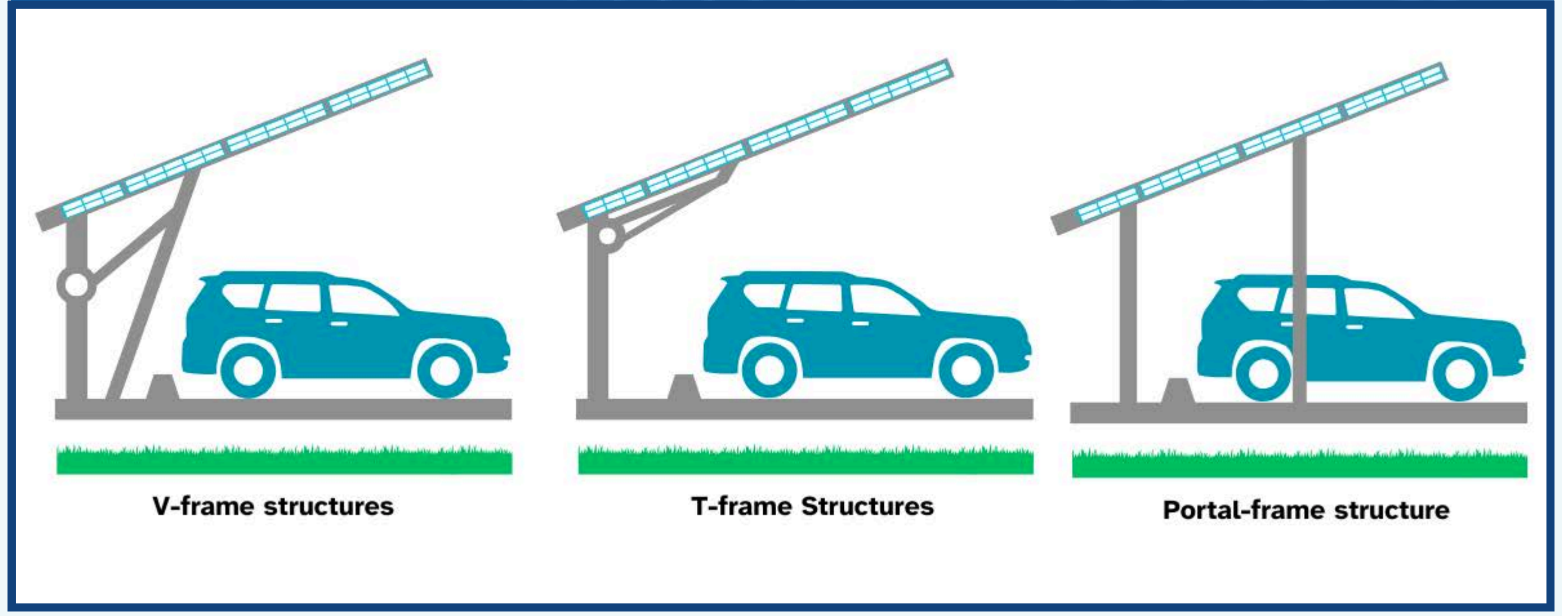


Shading: Avoid shading from trees or structures, as even partial shade greatly reduces energy output.

Foundation & Subsurface Conditions: Perform a geotechnical survey and check utility maps to ensure foundation stability and avoid underground lines.

Snow & Wind Loads: Structure and Design frames, spacing, and tilt suited for the environmental conditions.

Parking Layout



Parking Stall Dimensions: Standard stalls prioritize accessibility; compact stalls save space; angled stalls improve maneuverability but must align with aisle and canopy layout.

Drive Aisles & Turning: Width varies by parking angle and traffic flow to allow safe entry and exit.

Parking Angles & Efficiency: Stall angles impact both land use efficiency and ease of vehicle movement.

Solar Resources & Adjustment

HOMER PRO

pvPlanner

RETScreen

System Advisor Model

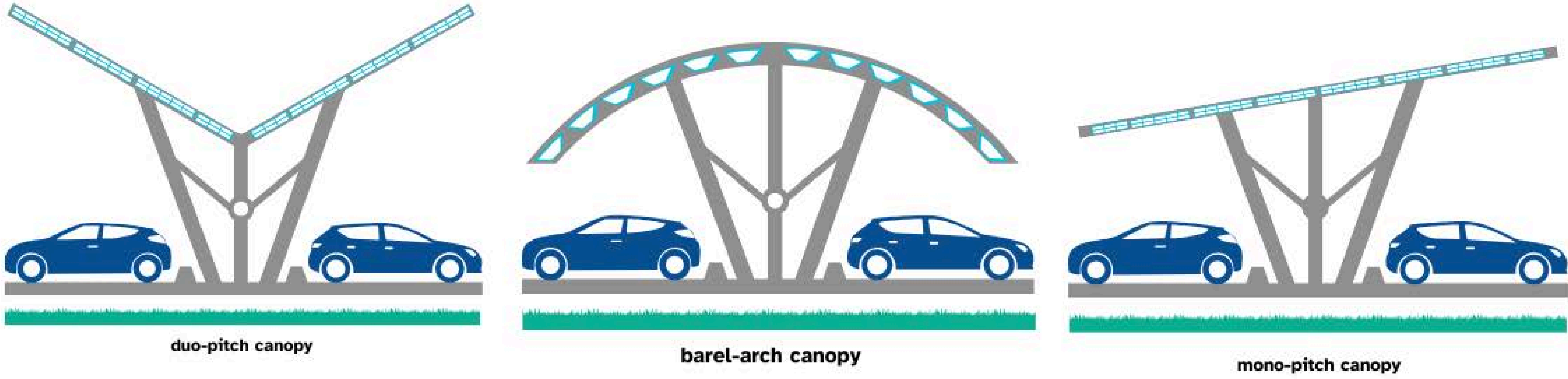
PV F-CHART Photovoltaic Systems Analysis

Solar Pro 4.3

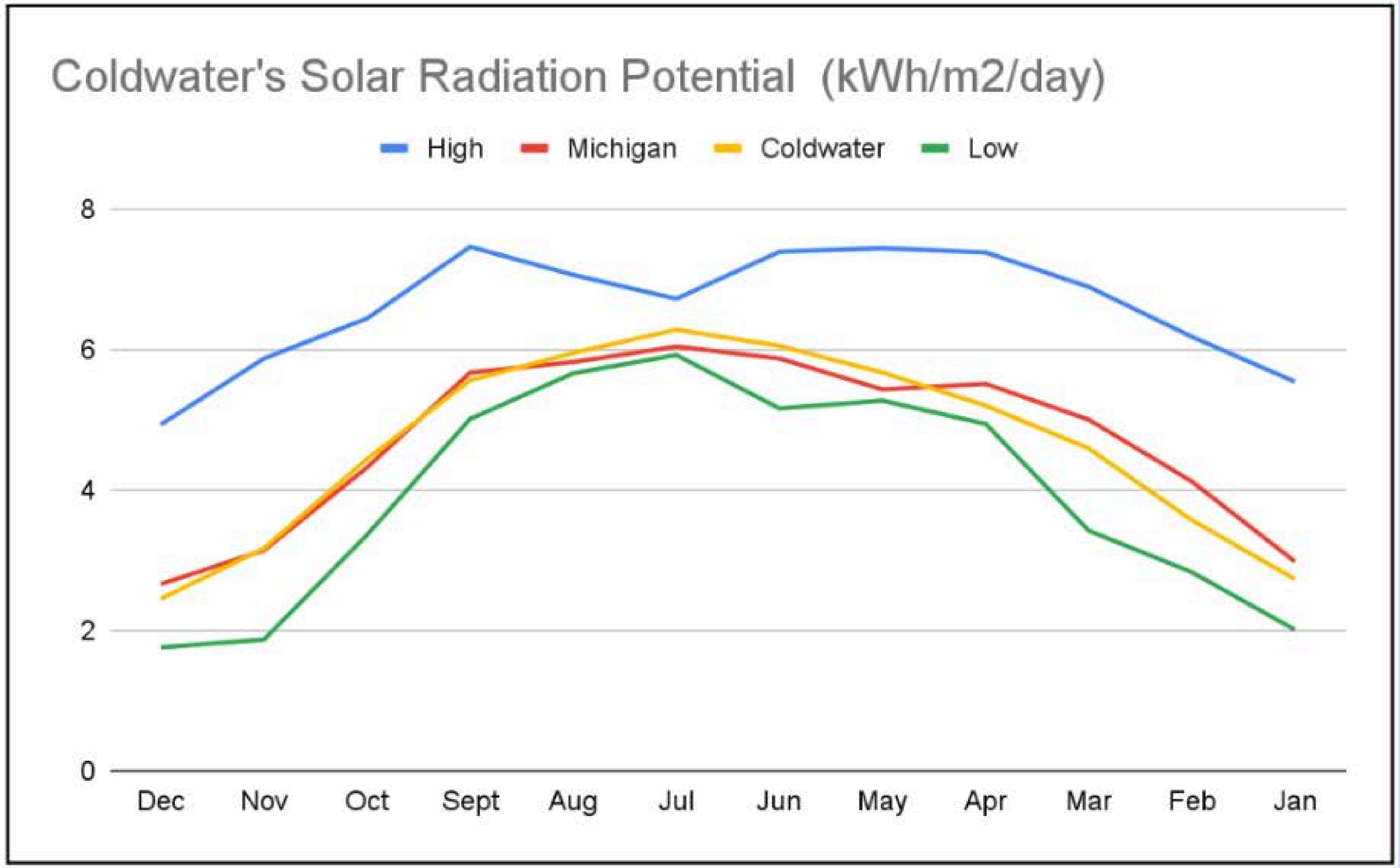
PVsyst PHOTOVOLTAIC SOFTWARE

HelioScope

aurora



IS THERE A POTENTIAL FOR SOLAR IN COLDWATER ?



- Year-round solar radiation ranges from **2.7 to 6.2 kWh/m²/day**
- Peak solar months: May to August **(over 6 kWh/m²/day)**
- Winter generation still viable with **~2.7 kWh/m²/day**
- Well-balanced solar profile supports **consistent energy output**

Main report

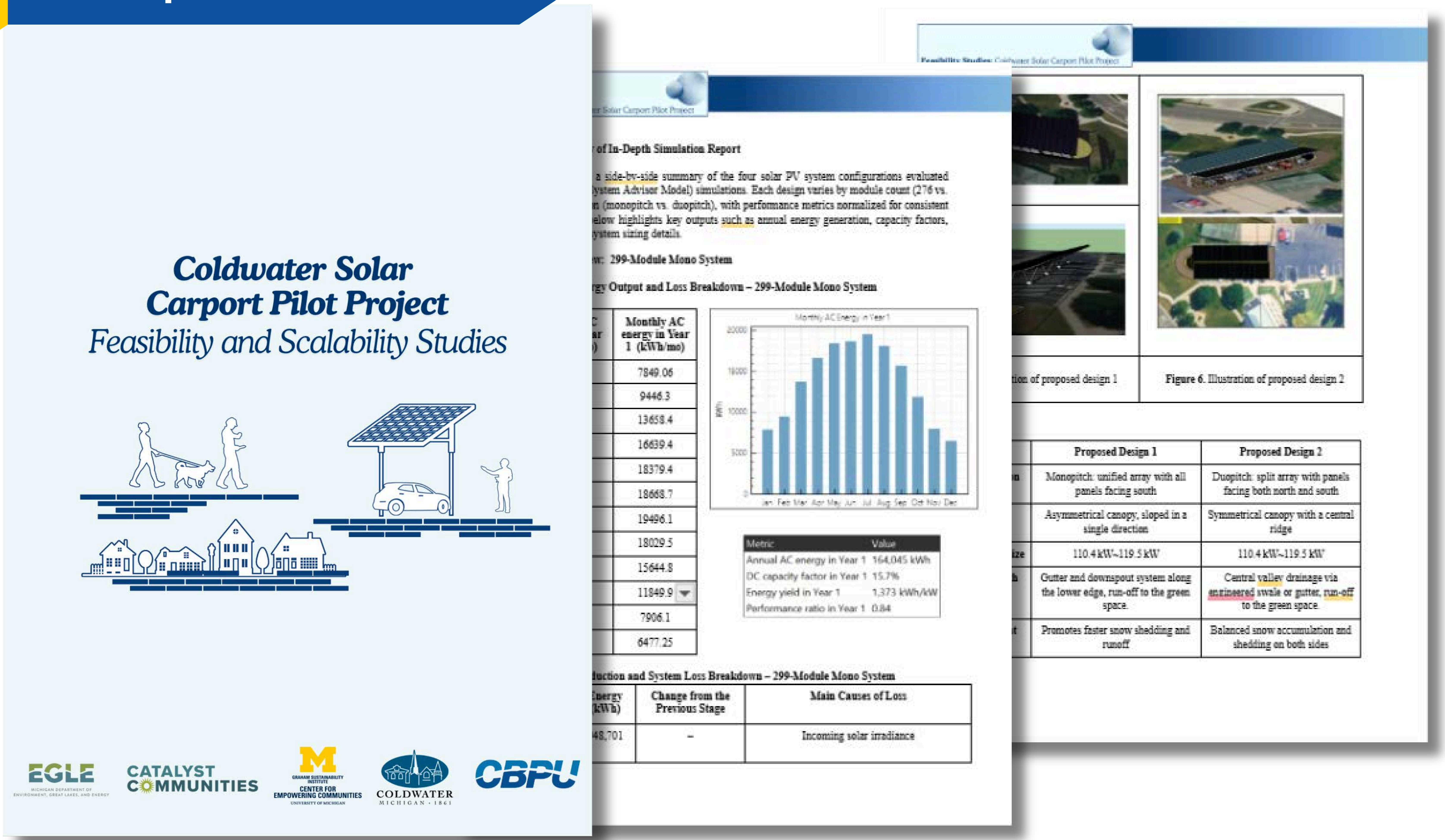

Coldwater Solar
Carport Pilot Project
Feasibility and Scalability Studies
EGLE
CATALYST COMMUNITIES
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Figure 6. Illustration of proposed design 2
Proposed Design 1
Proposed Design 2

Coldwater site scalibility

Coldwater Pilot Project

Site Overview

- Two parking rows (24 total spaces),
- Lot supports a 50–200 kW PV system, depending on panel layout and structure.

Monopitch (All South-Facing)

- Pros: Maximizes solar yield, simple structure, efficient snow and water runoff.
- Cons: Uneven canopy height, less symmetrical coverage.

Parking Layout & Structural

- 30° vs. 45° angled parking analyzed for efficient flow (one-way traffic only).
- Turnaround loop at the end recommended for smooth circulation and plow/service access.

Duopitch (North-South Split)

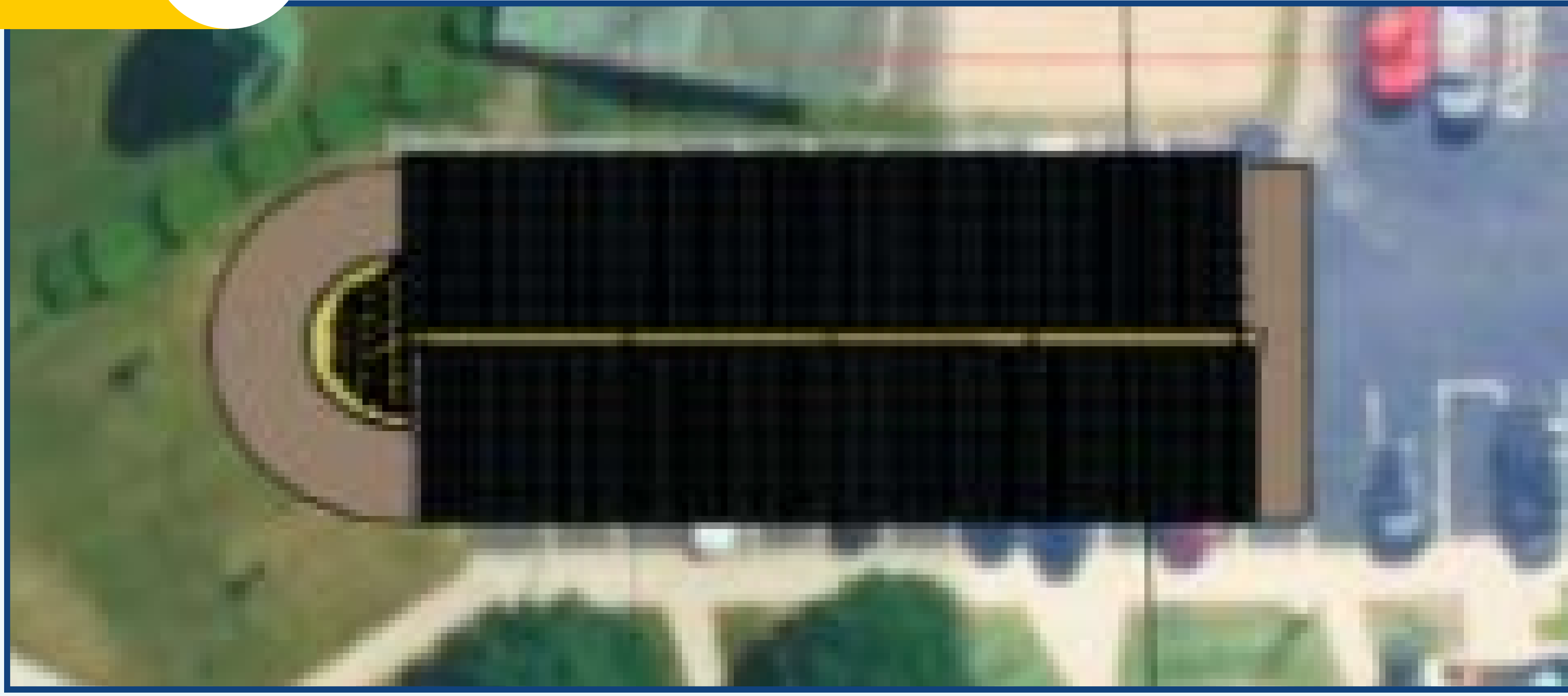
- Pros: Balanced appearance, generates across morning and afternoon periods, even coverage.
- Cons: ~5–10% lower annual energy than optimized south-facing design

Coldwater Pilot Project

Metric	Value
Annual AC energy in Year 1	131,559 kWh
DC capacity factor in Year 1	13.6%
Energy yield in Year 1	1,193 kWh/kW
Performance ratio in Year 1	0.84

Metric	Value
Annual AC energy in Year 1	143,980 kWh
DC capacity factor in Year 1	13.8%
Energy yield in Year 1	1,205 kWh/kW
Performance ratio in Year 1	0.84

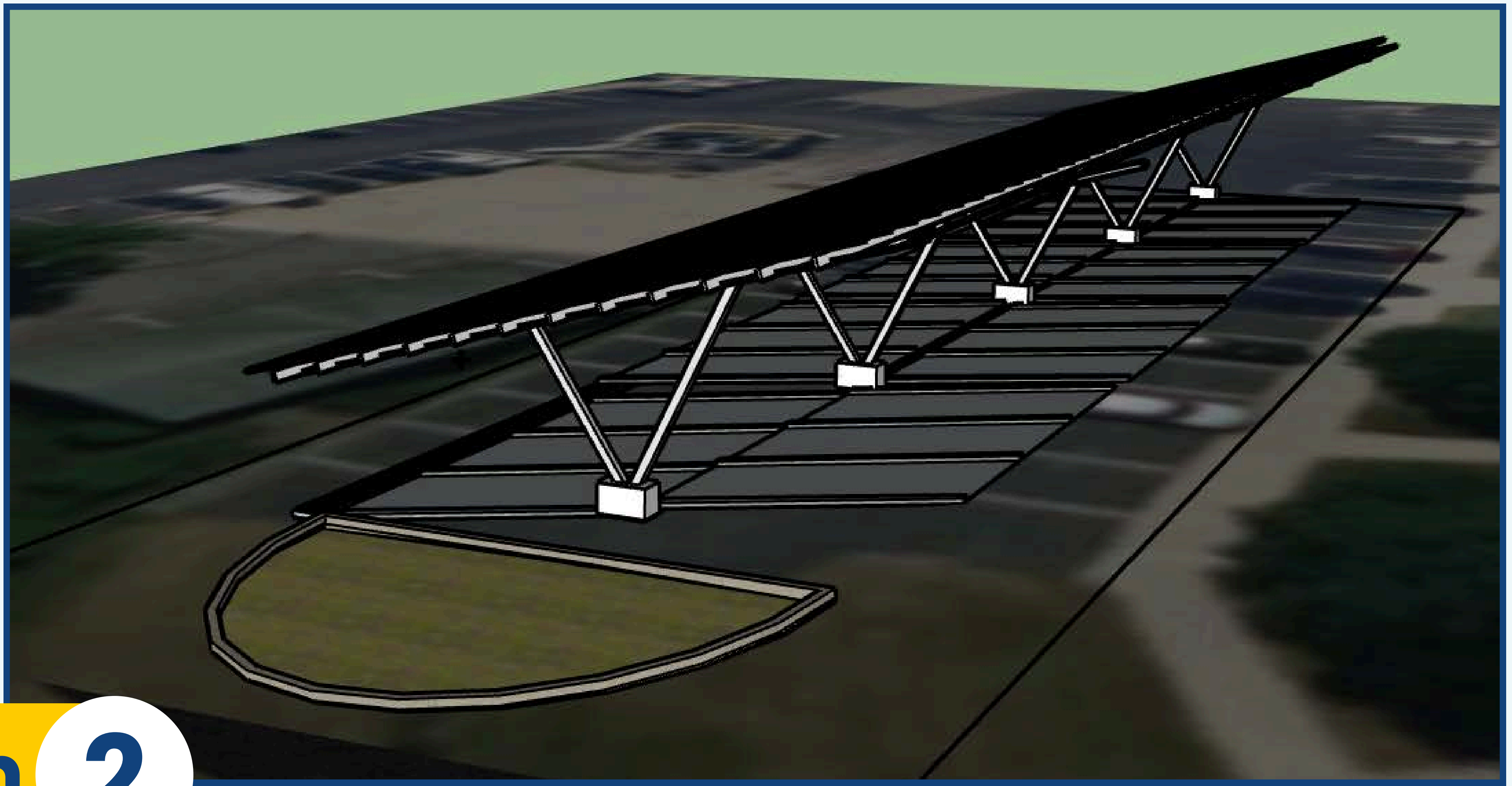
option 1



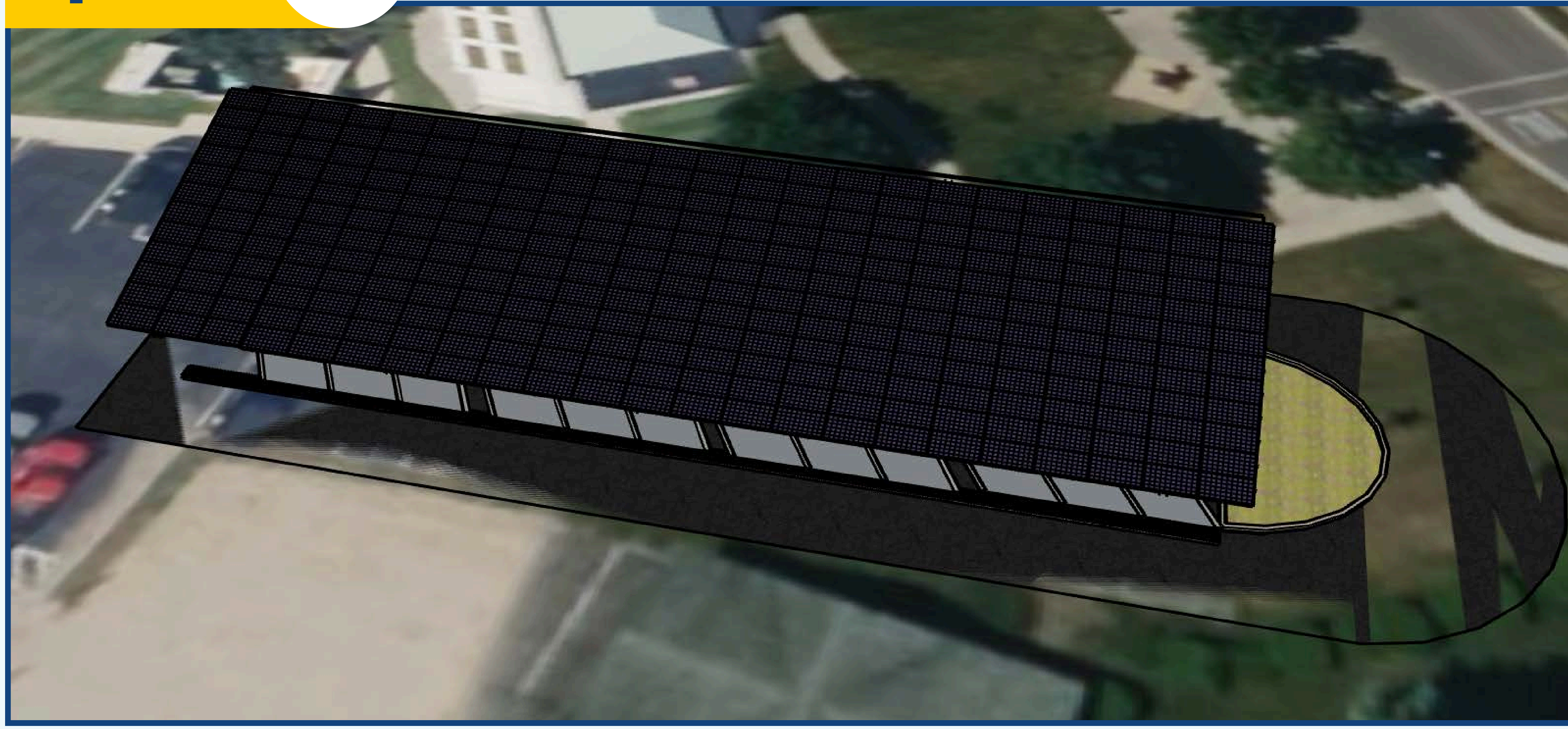
Coldwater Pilot Project

Metric	Value
Annual AC energy in Year 1	151,278 kWh
DC capacity factor in Year 1	15.7%
Energy yield in Year 1	1,372 kWh/kW
Performance ratio in Year 1	0.84

Metric	Value
Annual AC energy in Year 1	164,045 kWh
DC capacity factor in Year 1	15.7%
Energy yield in Year 1	1,373 kWh/kW
Performance ratio in Year 1	0.84



option 2



Coldwater site scalibility

3 Upson Plaza

2 Milnes Plaza

4 Chandler Plaza

5 Chandler Plaza

Coldwater Project Combined

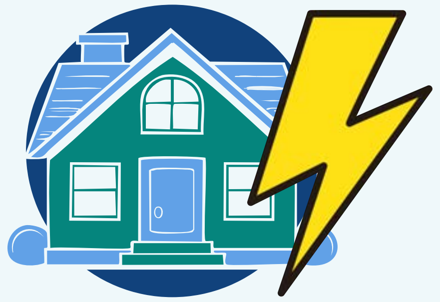
Site	Capacity (kW DC)	Annual Output (kWh)
HLB	119.6	164,045
Milnes Plaza	312	360,000
Chandler Plaza	288	395,000
Upson Plaza	172	324,000
Randall Plaza	280	500,000
Output	**1171.6**	**1,743,045**

Phase 1: HLB Pilot Project

$13.5–13.8k/year

At 164,000 kWh/year, this system will offset roughly 38% of the HLB building's annual energy use

Phase 1 & Phase 2

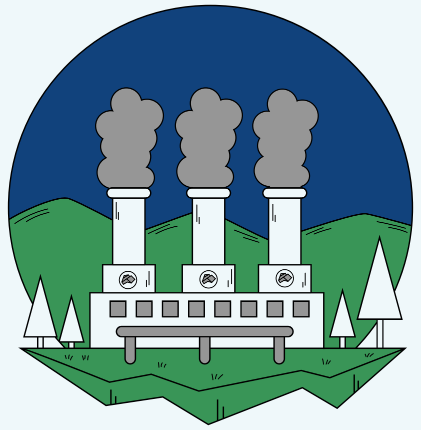


Homes powered for one year

188 homes (electricity use)

Environmental Impacts

Gasoline-powered passenger vehicles removed	310 vehicles
Gallons of gasoline avoided	149,777 gallons
Tree seedlings grown for 10 years (carbon uptake)	22,009 seedlings
Acres of U.S. forests preserved (carbon uptake)	1,335 acres



Pounds of coal not burned	739 tons
Barrels of oil not consumed	3,082 barrels

THANK YOU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