CLIMATE ACTION WEBINAR

08.17.2023

USING MICROGRIDS FOR RESILIENCE

AIA California

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Learning Objectives

Using Microgrids for Resilience

Understand how utilizing microgrids promotes clean energy and **zero net carbon design.**

Discuss how microgrids can foster **resilience** in case of a natural disaster or utility shutoff.

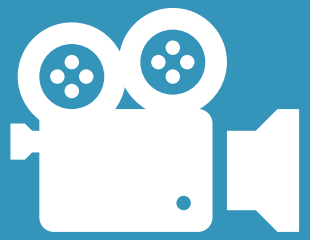
Cite two specific examples of how microgrids can be utilized in **Community Resilience Centers**.

Name at least 3 examples of how microgrids can support **disadvantaged communities.**

Identify key **financial considerations** affecting installation and operation of microgrids at community and building scale.

AIA Continuing Education Provider

Housekeeping Reminders



A recording of today's presentation will be made available on our website

Today's session qualifies for 1.5 AIA HSW/LU & 1.5hrs of ZNCD

Please use the Q&A function to ask questions for today's presenters

Cultivate a positive learning environment

MODERATOR/ SPEAKER

DAVID KANEDA, FAIA

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SPEAKER

SEAN ARMSTRONG

MANAGING PRINCIPAL |
REDWOOD ENERGY

SPEAKER

ALEX KAFFKA

CEO & SR. PRINCIPAL | VERDERA

Off-Grid Apartment Design

Sean Armstrong

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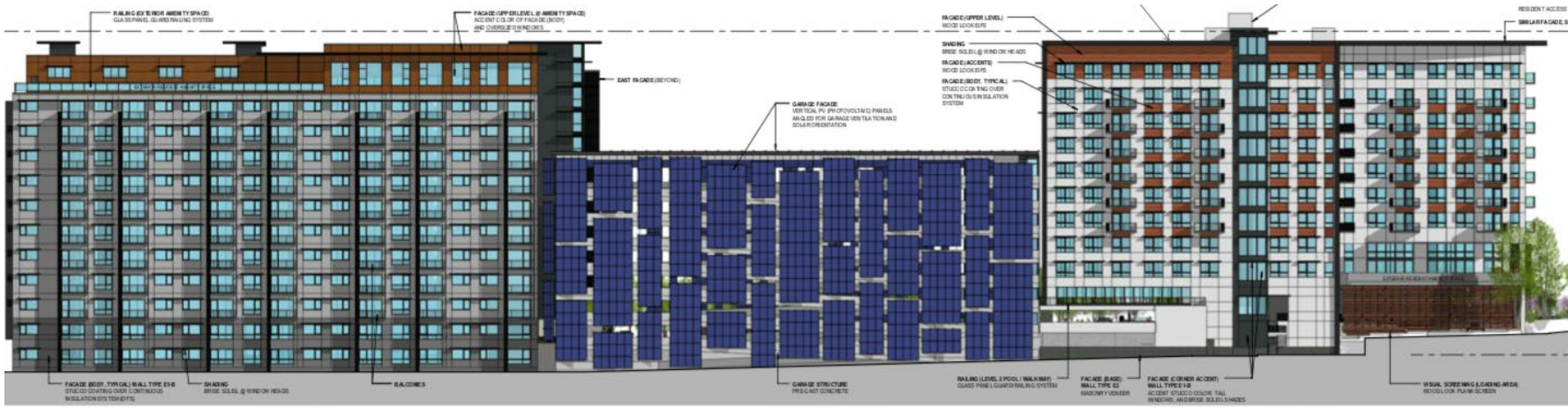
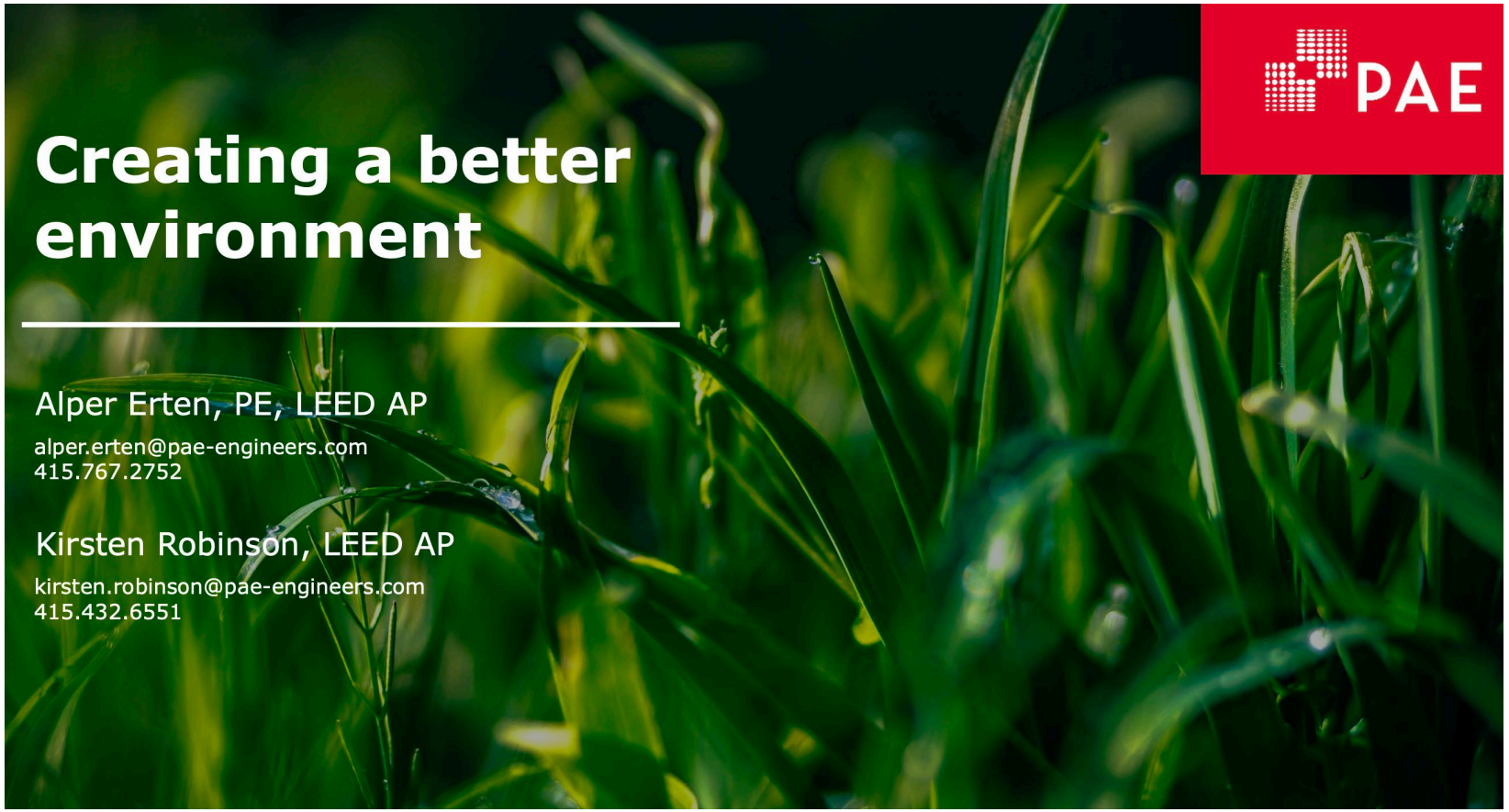
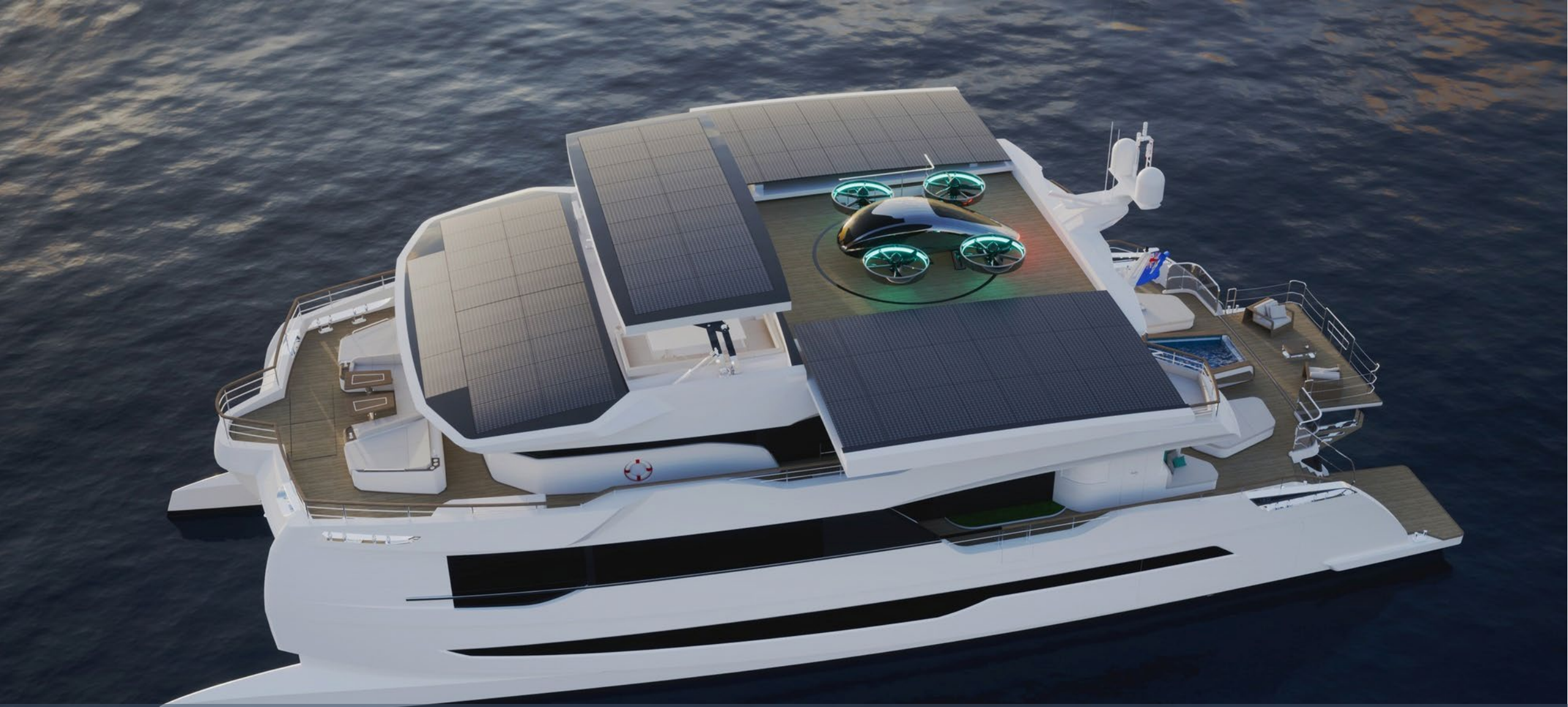
- **1995-2019** The Campus Center for Appropriate Technology
- **2002-2005** High School Science Teacher
- **2005-2011** Affordable Housing Project Manager, Pacific West Communities
- **2011-Today** Redwood Energy's Managing Principal. ZNE Design and Research.





Redwood Energy

Our Client's Question: "Can you make it off-grid? PG&E is the #1 problem for all our developments."- Dan Johnson, Danco



Yes! For example, the Silent 120 Yacht. All-Electric and 100% Solar Powered

Silent Jet Skis

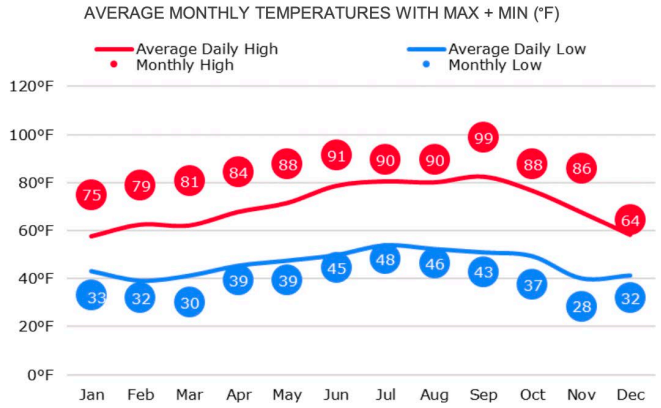
Max Speed→65 mph

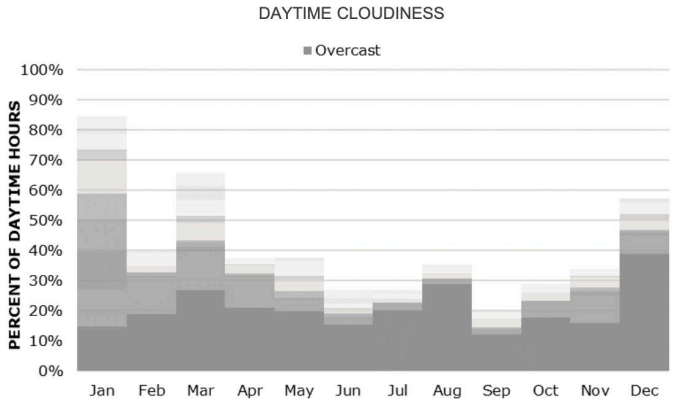
Taiga, Electrojet, eDolphin, Narke, etc.

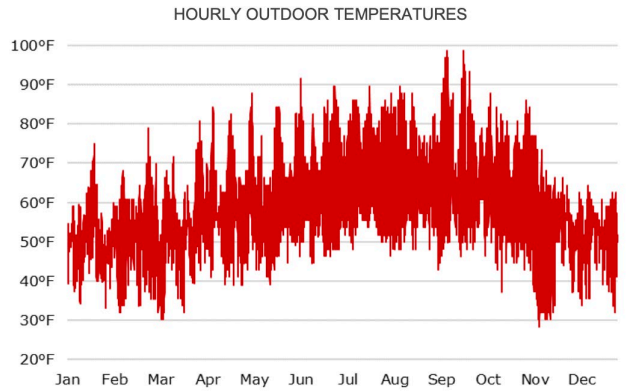

Luxurious, All-Electric,
Extremely Energy Efficient

Utrecht, Netherlands is targeting 100% Vehicle-To-Grid Sustainability by 2030. 1000 chargers so far, 14,000 to go….

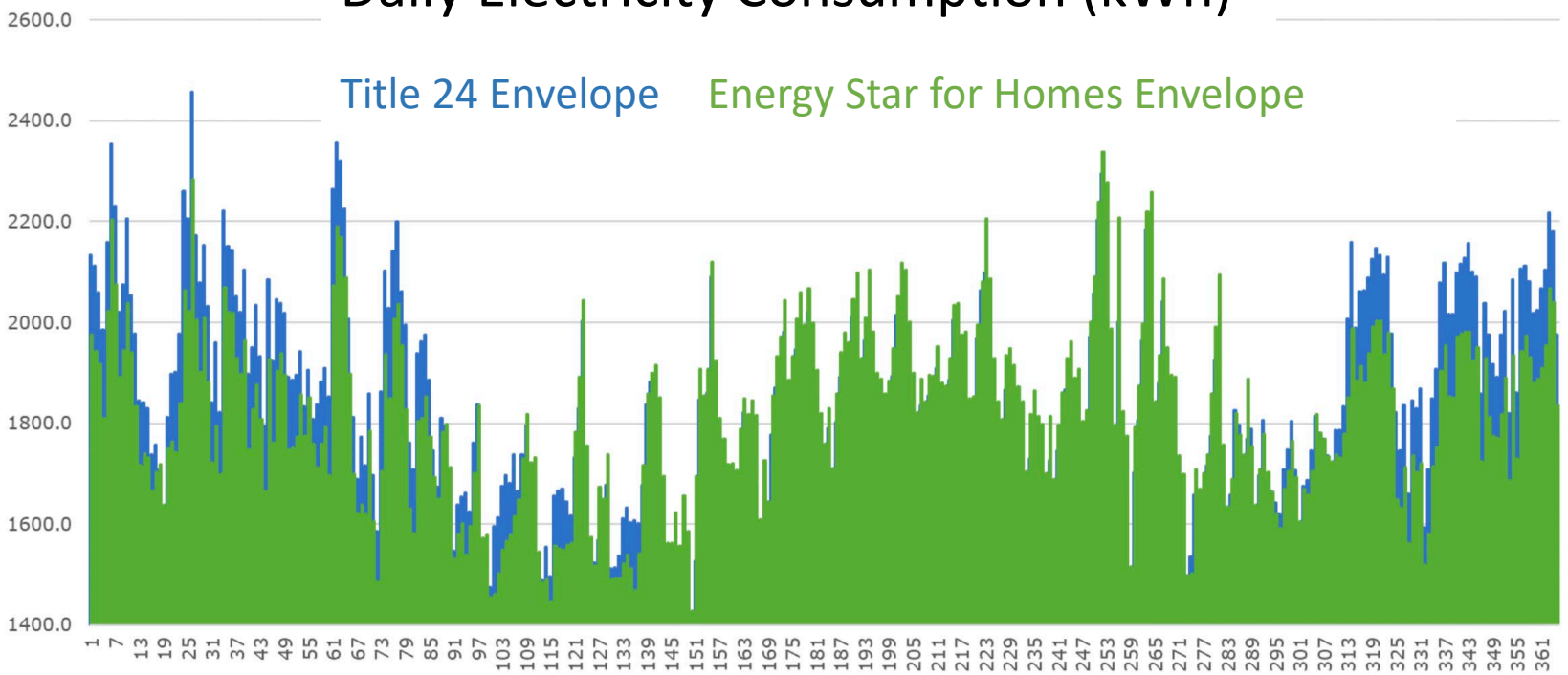
Petaluma Local Weather







Daily Electricity Consumption (kWh)



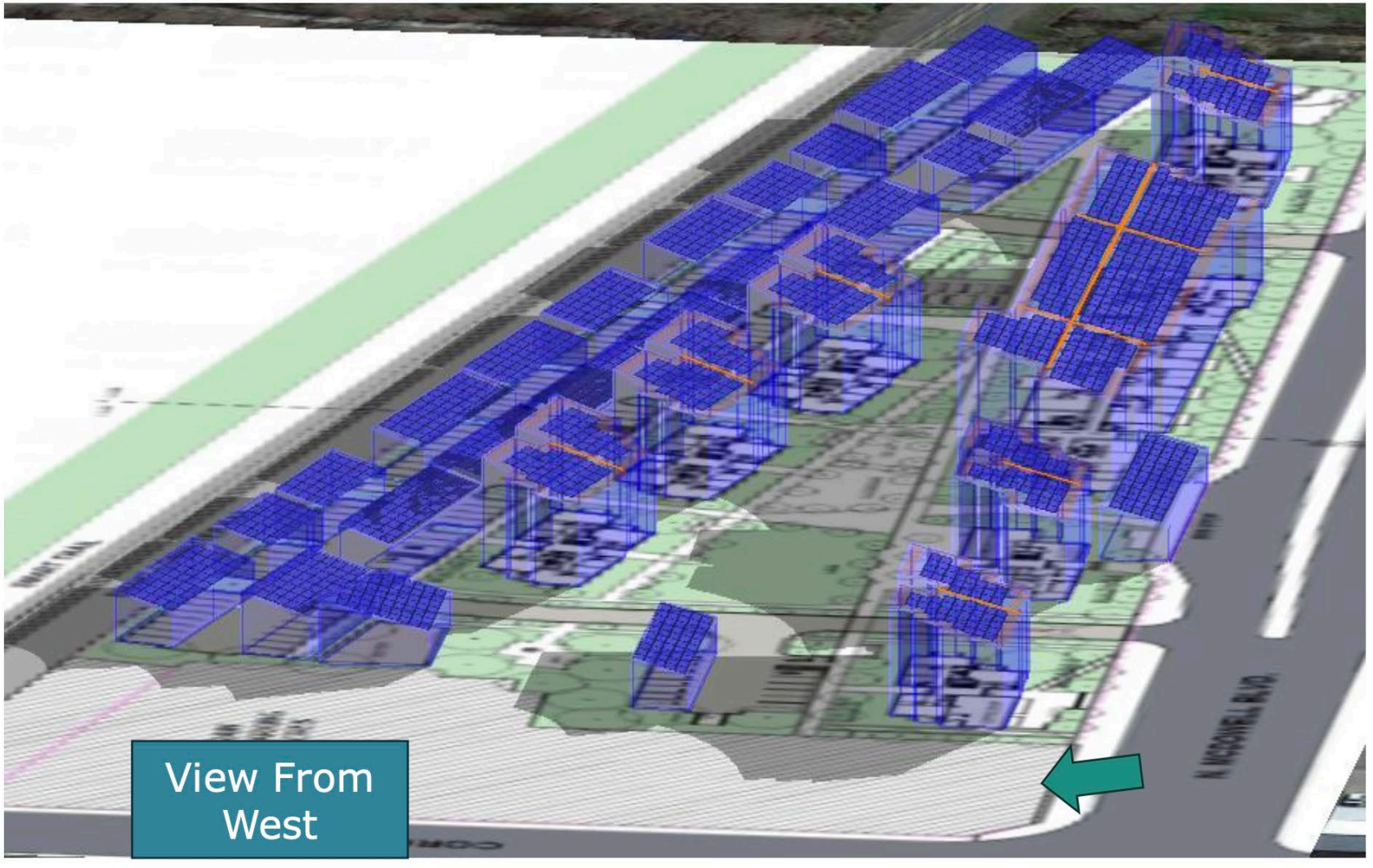
120V Power Efficient Appliances

1200W	500W	1400W	1090W
LG 4.5cf Condensing W/D	Rheem Proterra	Innova HPAC 2.0	LG LS-120HXV
			

Maximum Fire Code Compliant PV Array, Including PV Siding, Carports and Roofs

PV on rooftops, carports and solar facade

	Capacity (kW)	Annual Production (kWh)
Rooftop (15° tilt)	400	660,807
Carport (15° tilt)	580	964,461
Solar Façade	350	416,839
Total	1330	2,042,107



Purchasing New (or lightly used) Ford F-150 Lightnings Cuts Battery Costs Roughly in Half

$130,000 for 100kWh Installed

2023 Ford F-150 Lightning Pro

Price: $56,998 $945/mo est.

GREAT VALUE **$3,642 below** $60,640 CARFAX Value

No Accident or Damage Reported	CARFAX 1-Owner	Personal Use	Service History

Dealer: Bill Kay Chevrolet
Location: Lisle, IL

Mileage: 555 miles
MPG: 76 city / 61 hwy

Color: Blue
Body Style: Pickup

Engine: Electric 2.0 L
Transmission: Automatic

Description: Used 2023 Ford F-150 Lightning Pro with AWD, Alloy Wheels, Navigation System, Keyless Entry, Heated Seats, 18 Inch Wheels, and Independent Suspension

$67,000 for 100kWh V2B Installed

Bidirectional Charging: Exporting Solar in Vehicles And Eliminating the Last 3% of Grid Back-up

Tenants with V2B EVs will be offered free charging during daylight hours--when the project's solar panels are producing more than the system can handle—in return for small amounts of power leading up to, and during, prolonged bad weather events.

System Cost Summary
20 year – Simple Cost

	PV Capacity	Battery Capacity	% Grid Energy Use	PV Cost	Battery Cost	Grid Electricity Cost (20yr)	PV Cost w/ Incentive	Other Microgrid Cost	Battery Cost w/Incentive	Total 20-year Cost w/ Incentive
Base Option (T-24)	236 kW	-	54.0%	$ 672,600	-	$ 1,688,407	$336,300	-	-	$ 2,024,707
Option 1	1330 kW	2600 kWh	3.3%	$ 3,790,500	$ 2,730,000	$ 114,732	$ 1,895,250	$ 250,000	$ 1,365,000	$ 3,624,982
Option 1B	1330 kW	1800 kWh	5.0%	$ 3,790,500	$ 1,950,000	$ 168,476	$ 1,895,250	$ 250,000	$ 975,000	$ 3,288,726
Option 1C	1330 kW	3900 kWh	2.3%	$ 3,790,500	$ 4,160,000	$ 80,808	$ 1,895,250	$ 250,000	$ 2,080,000	$ 4,306,058
Option 2 (no grid connection)	1330 kW	9000 kWh	0%	$ 3,790,500	$ 9,750,000	-	$ 1,895,250	$ 250,000	$ 4,875,000	$ 7,020,250

Assumptions: Battery Cost: $1300/kWh; PV Cost: $2.85/W; Electricity Cost: $0.26/kWh; Tax Incentive: 50% rebate on total installed cost; Excludes Annual Maintenance Costs

Assumptions:

- Option 1 assumes a 200amp/208V one way connection to the grid (~72kW charging capacity)
- Battery sizing includes a 1.2 sizing factor (expecting 20% derating on batteries over time).