San Pasqual Band of Mission Indians Microgrid

Tribal DOE Conference | November 15, 2022

Project Team

SPBMI

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Owner's Representatives

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OurEnergy

Design Build Contractor

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Green Realities

Vipul Gore

Gridscape Solutions

Code Compliance

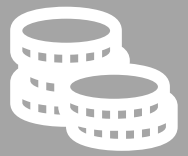
EsGil Corporation

San Pasqual General Information

- Reservation was established in 1910
- The Reservation encompasses approximately 3,143 acres
- 152 enrolled tribal members and over 1,600 lineal descendants
- Reservation population is 2,100
- 450 homes on the reservation
- 93 homes have solar
  - 55 GRID
  - 23 Tribal DOE Grant (Tribal Energy Collaborative 2016)
  - 15 private solar companies

SPBMI Needs and Microgrid Goals

Resilience: Maintain electric power during outages



Economic: Reduce electricity costs

Environmental:
100% renewables, reduce emissions

Power Supply Threats & Impacts

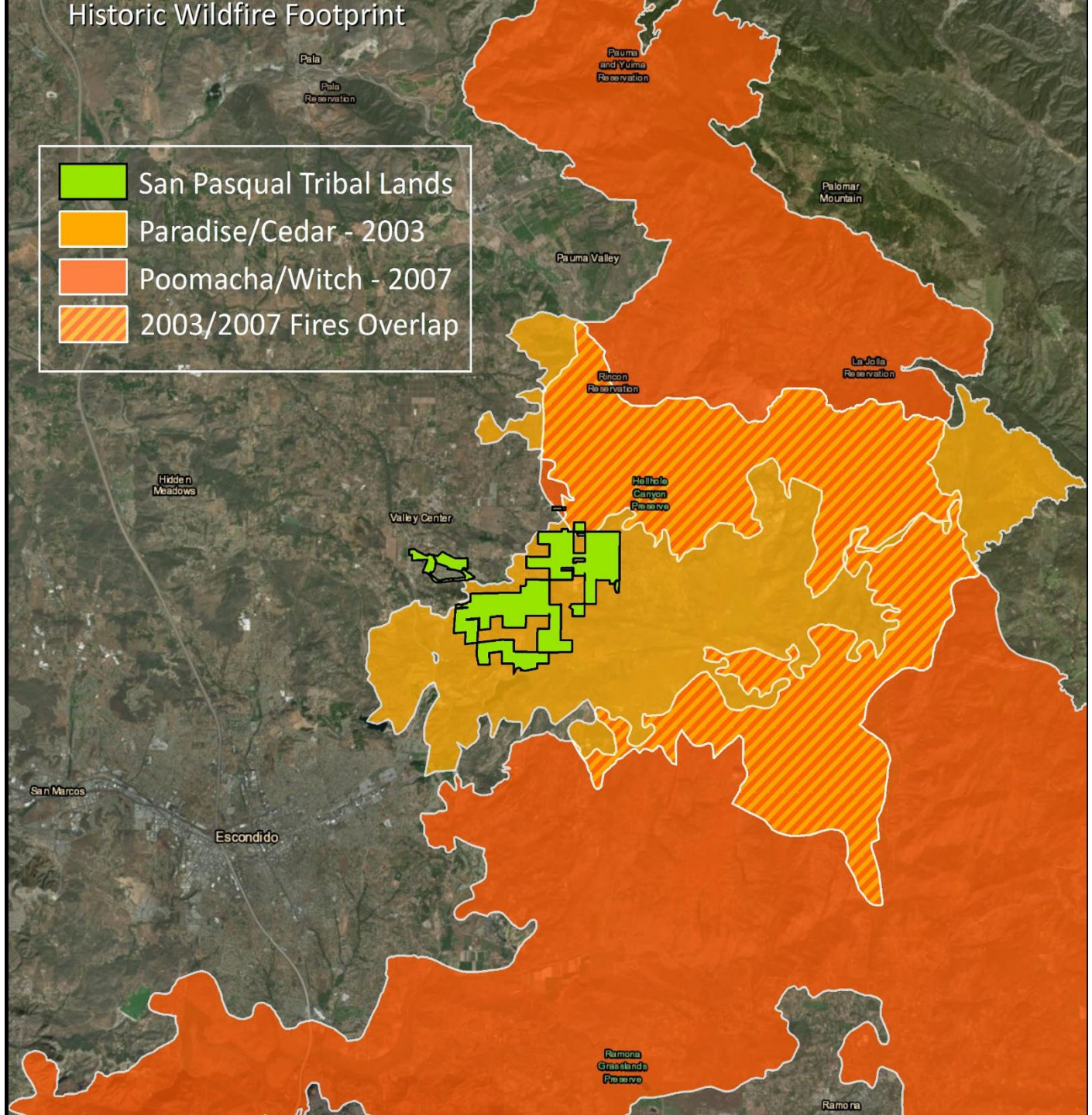
THREATS

- Severe weather
- High winds
- Wildfires
- Earthquakes
- Localized physical damage to utility distribution systems
- SDG&E system upgrades (planned outages)

IMPACTS

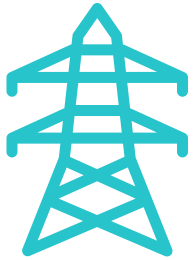
- Inability to Use Facilities
- Lost Productivity & Revenues
- Equipment Damage

San Pasqual and Wildfire



Reduced Costs and Emissions

Energy Costs Saved:
$1.1 million over 25 years



Grid Power Displaced:
272,000 kWh (Year 1)

GHG Footprint: Reduced
by 193 metric tons (Year 1)

Resilient Microgrids

Definition: A group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid (*U.S. DOE*)

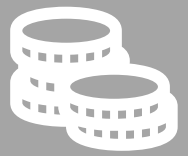
A true microgrid serves **multiple facilities** with a single power system; A typical battery backup or standby generator is NOT a microgrid

An advanced microgrid integrates **multiple types of energy supplies**, actively **manages demand**, and performs other functions

Most modern microgrids use **renewable energy** and battery storage

Microgrid Project Goals

Resilience: Maintain electric power during outages



Economics: Reduce electricity costs

Environmental Benefits: Zero net energy consumption, reduced emissions

Priority/Critical Electricity Loads

Facility	Emergency Purpose	Critical Electric Loads
Tribal Administration	Red Cross evacuation center; emergency public shelter; tribal command and control; first aid	HVAC, lighting, telecom/IT, food storage, food service
Housing & Security	First response (police); public safety and security monitoring	Telecom/IT, security camera monitoring, lighting
Fire Department	First response (residential fire station); 911 emergency dispatch	Telecom/IT, lighting, overhead door operation
Education Building	Emergency public shelter	HVAC, food storage, food service, lighting
Preschool	Emergency public shelter	HVAC, lighting

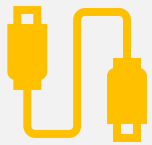
SPBMI Microgrid Components

	Solar PV Systems	157 kW DC (new) 24 kW DC (existing)
	Propane Generator (planned)	
	Battery Energy Storage Systems (BESS)	240 kW / 480 kWh
	Microgrid Controls (onsite + remote)	
	Energy Management Controls (HVAC)	
	EV Chargers (six chargers, three locations)	

Changes in Service and Configuration

Upgrade utility service from single-phase to three-phase

Remove existing utility meters and install master meter and building submeters



New underground cables tie site together

Funding Sources

- U.S. DOE Office of Indian Energy: $703,716 grant
- CA Self Generator Incentive Program (SGIP): $600,000 battery rebate
- Grid Alternatives: $150,000 Solar Accelerator Grant
- Indian Water Authority: $703,716

Lessons Learned

COVID impacts

- Process delays
- Supply chain delays

Interconnection Process

- Complexities
- Delays

Technical Issues

- Functional testing
- Shakedown testing

San Pasqual Tribal Government Complex Microgrid Project OVERVIEW

- Master Meter (Added)
- Utility Meters (Removed)
- New Solar PV Carports
- Existing Solar PV Panels
- BESS Location
- LP Genset Location (planned)
- Point of Interconnection
- Underground Cable Run
- Building Cable Run
- Existing Propane Tank
- New Propane Tank

Project Status & Accomplishments

Contracted Design Build Contractor

Completed SDGE applications for 3-phase service and interconnection; attained Permission to Operate (PTO) in August 2022

Completed design engineering

Construction activities complete
(minus propane generator and final interconnection)

Government center tied into microgrid December 31, 2021

Pending Milestones

Install back up propane generator

Complete tests on fully integrated microgrid

Continue to monitor microgrid

Microgrid Functionality

On-Grid Functions:

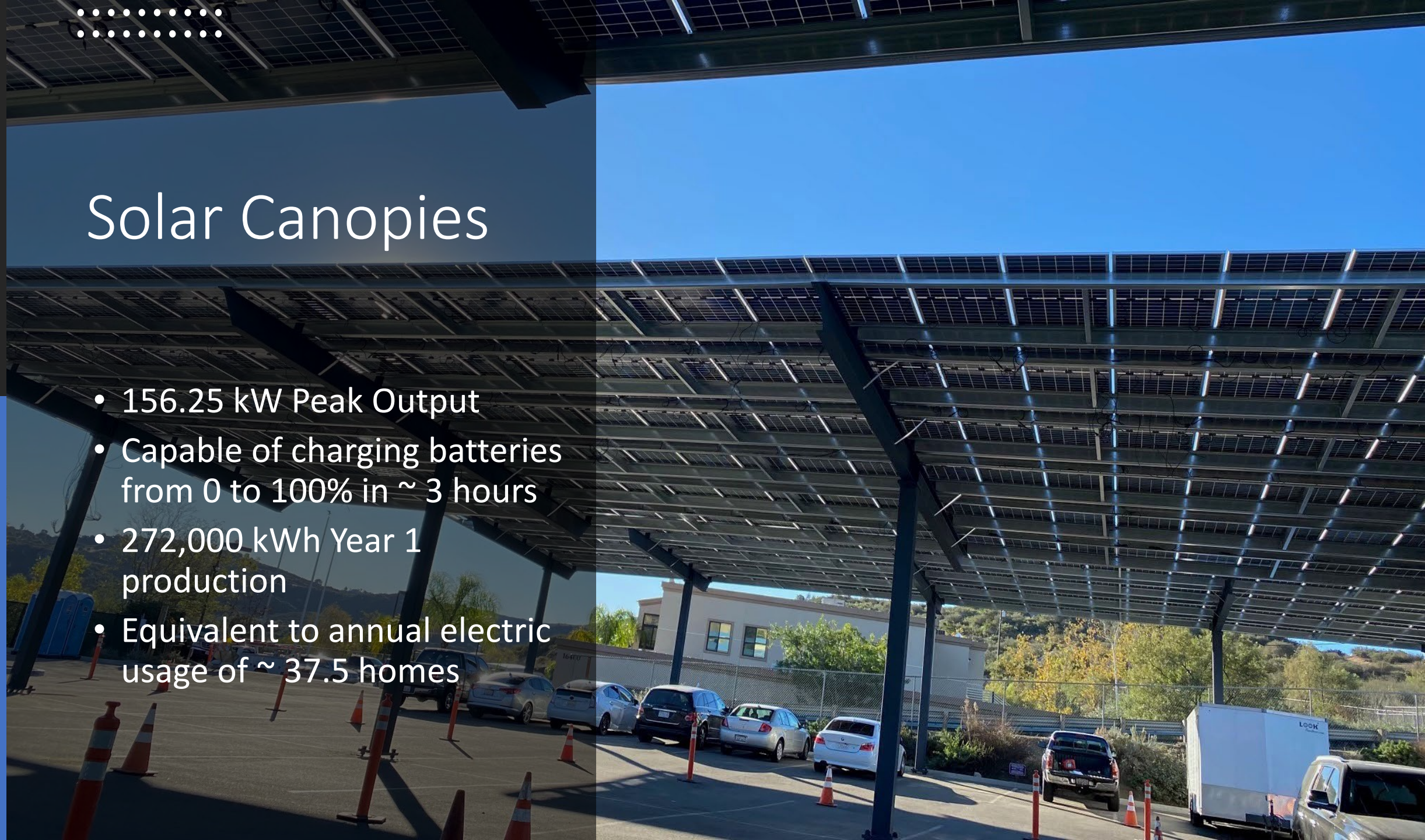
- Offset utility power consumption w/solar energy
- Store excess solar production in batteries
- Optimize use of stored renewable energy for cost savings and resilience

Off-Grid Functions:

- Automatic islanding and re-connection to grid
- Autonomous operation w/solar, storage, and HVAC control
- Seamless synchronization of (planned) LP generation

Solar Canopies

- 156.25 kW Peak Output
- Capable of charging batteries from 0 to 100% in ~ 3 hours
- 272,000 kWh Year 1 production
- Equivalent to annual electric usage of ~ 37.5 homes



PV Lighting under the canopy

6 BTCPower EV Charging Stations

- Installed 3 units (6 EV charging ports) at Administration, Education, and Tribal Hall
- Charging is free of charge, all power to the EV charging stations provided by PV and battery storage
- If you build it, they will come...

SDGE Transformer

Installed on October 29, 2021

Battery Storage

- GridScape EnergyScope microgrid in a box system
- Onsite and remote controls
- Lithium ferro-phosphate (LFP) batteries
- 240 kW/ 480 kWh (~4 hours at average load)

Microgrid Portal Demonstration

https://energyscope.grid-scape.com:443/rest/home/login.jsp

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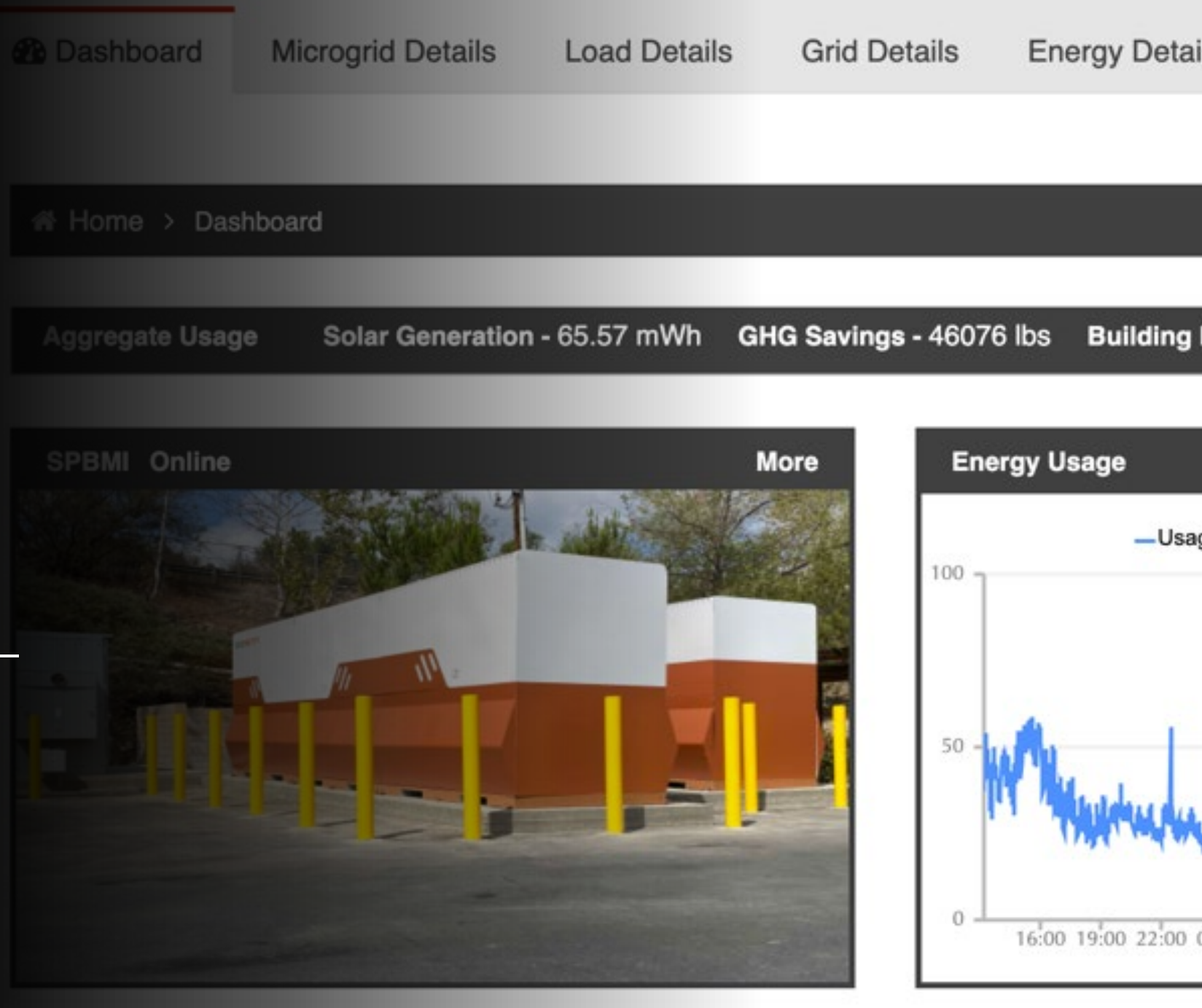

Q&A

Closing Remarks

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