



Battery Storage Basics

July 28

The Webinar will begin shortly

For Tech Support call (707) 572-7779

Type your questions into the Q&A *(not the chat)* and we'll do our best to answer them at the end of the presentation.



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Battery Energy Storage Systems: Uses and Benefits

Emergency Backup Power

Power Critical Site Loads

- Refrigeration
- Medical Devices
- Lights
- Pumps

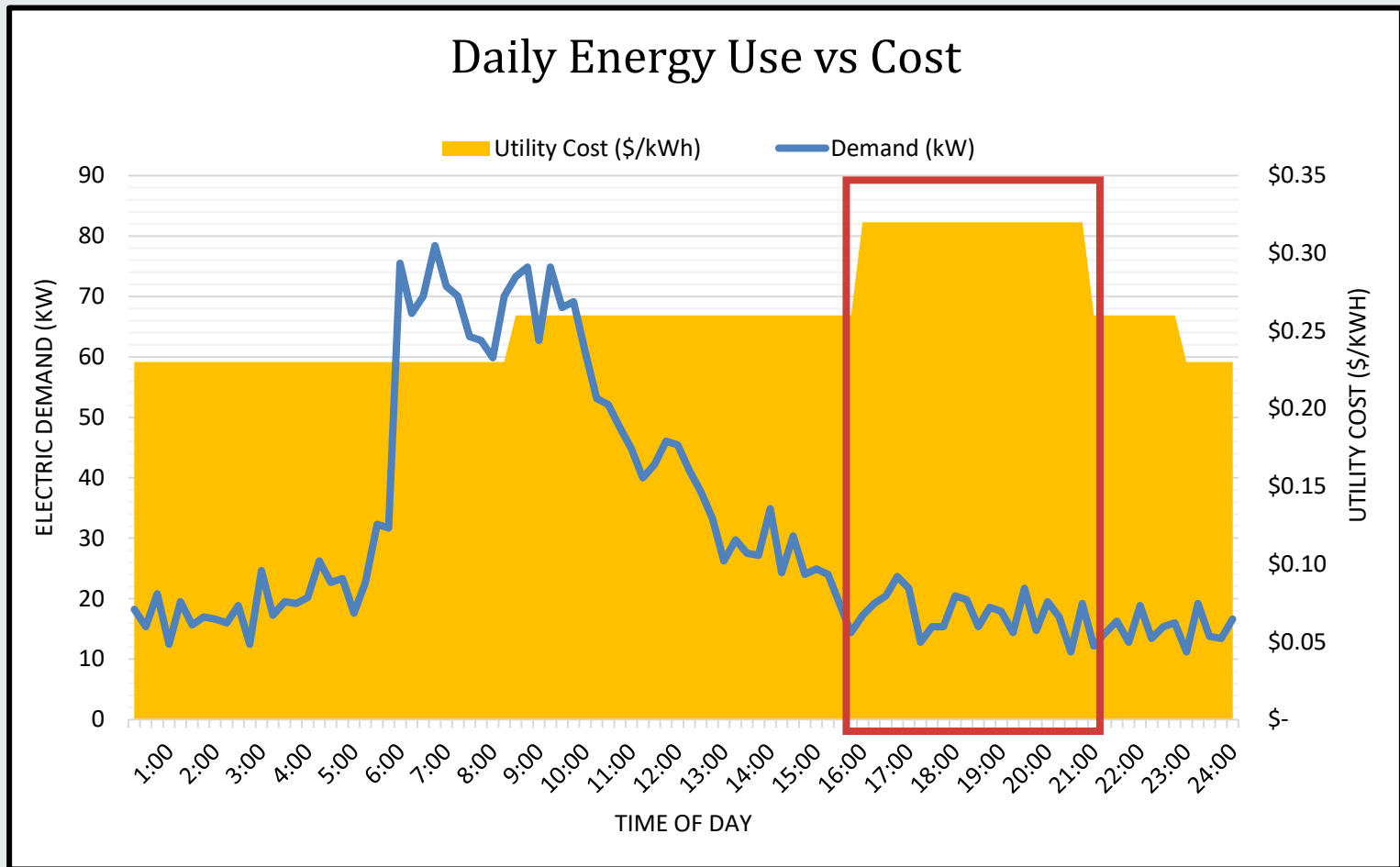
Power Critical Facilities

- Water/Wastewater
- Police/Fire
- Municipal Facilities
- Communications
- Hospitals
- Food/Fuel



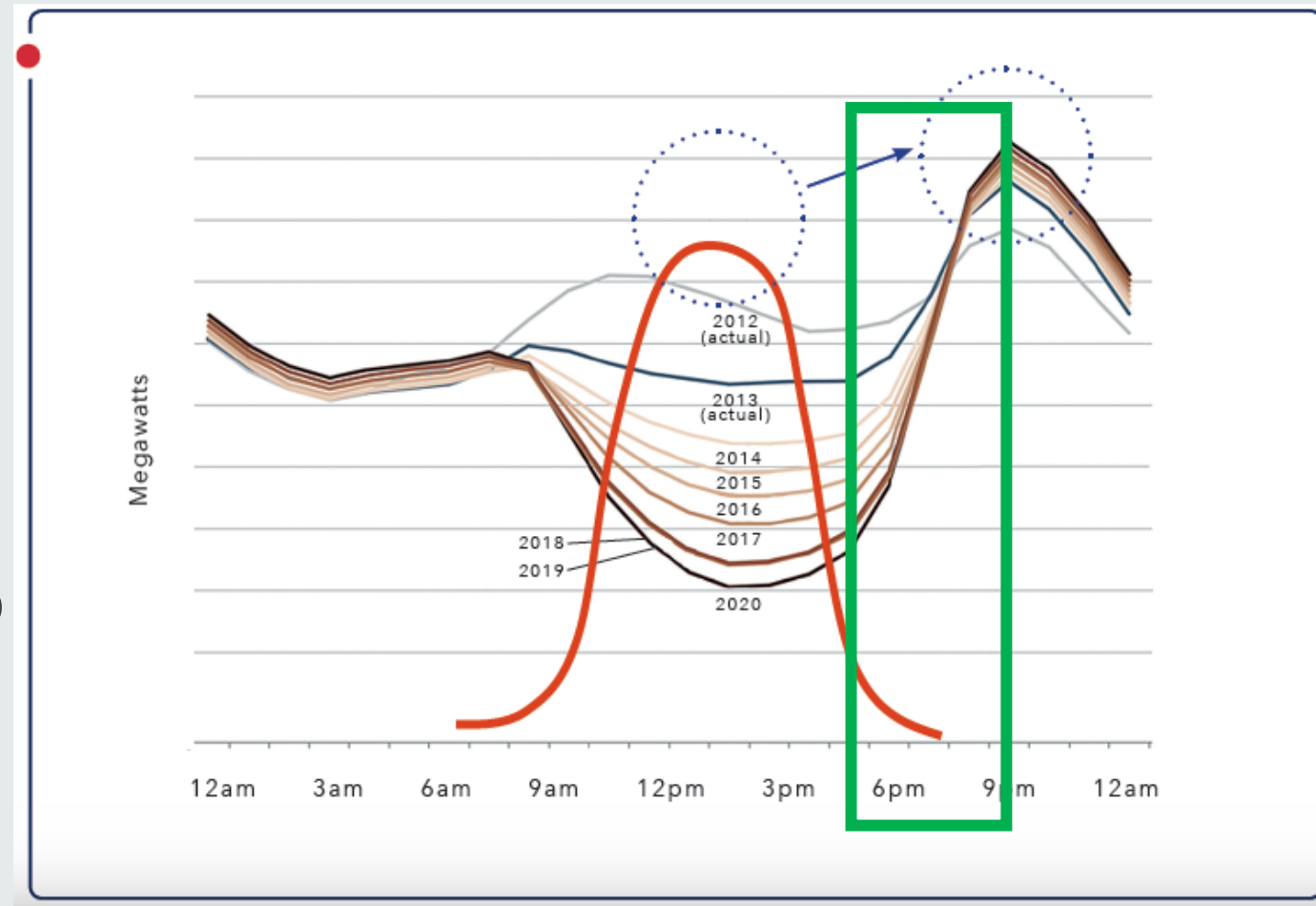
Customer Benefit- Energy Management

Rate Arbitrage/ Load Shifting/ Peak Shaving



Grid Benefit-Energy Management

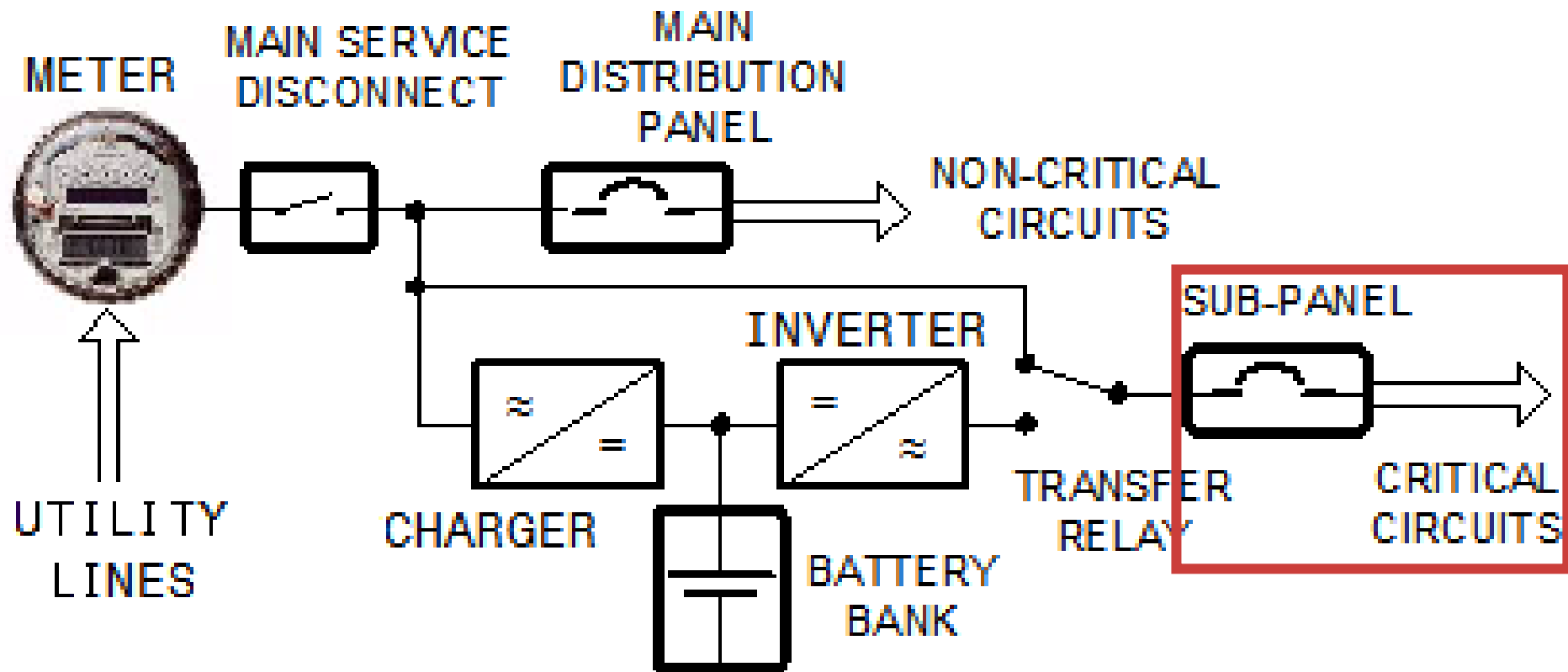
- Duck Curve
- Midday Solar Glut
- Evening Ramp Up
- GHG Benefits



Battery Energy Storage Systems: System Types

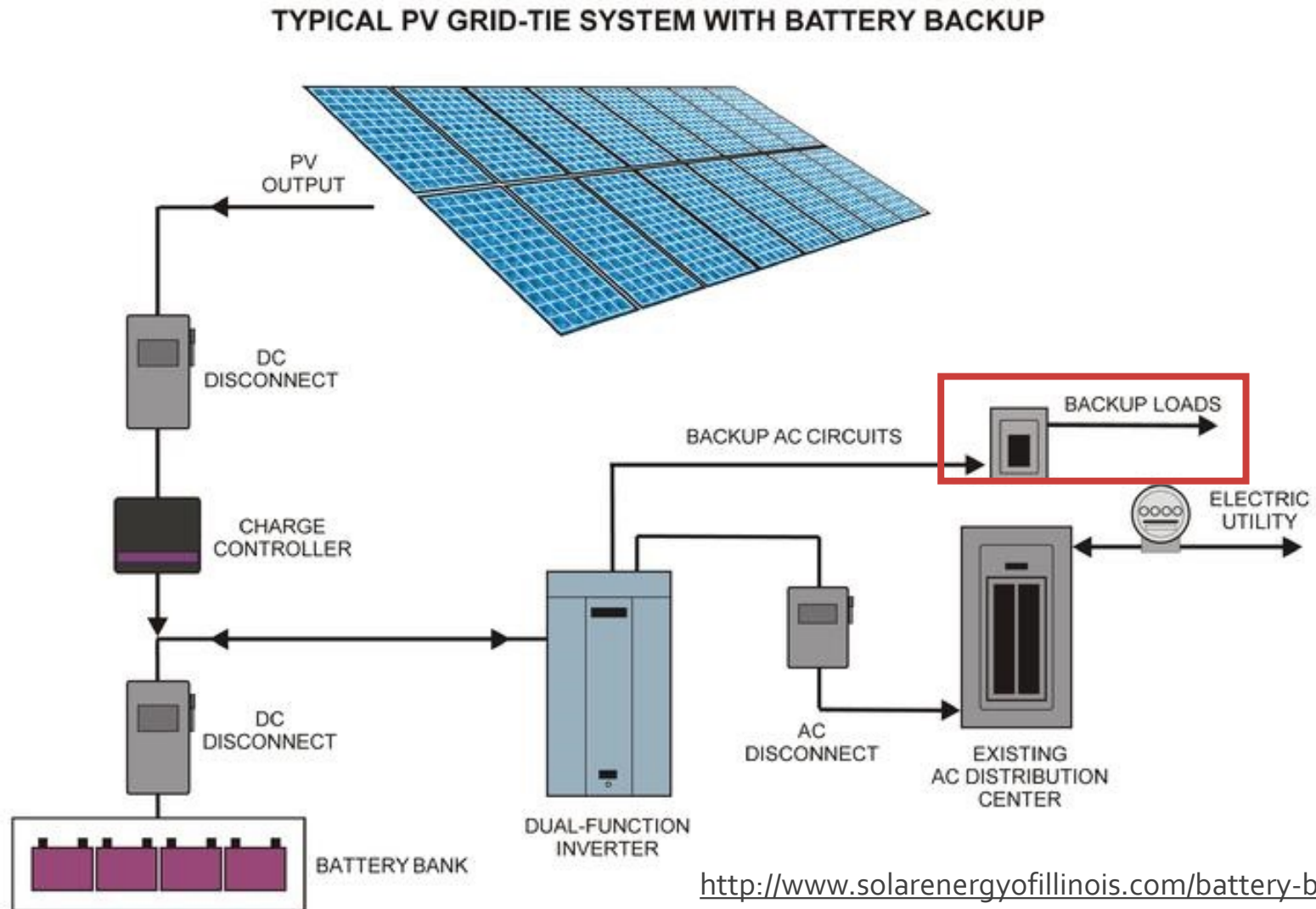
System Types:

Stand Alone System



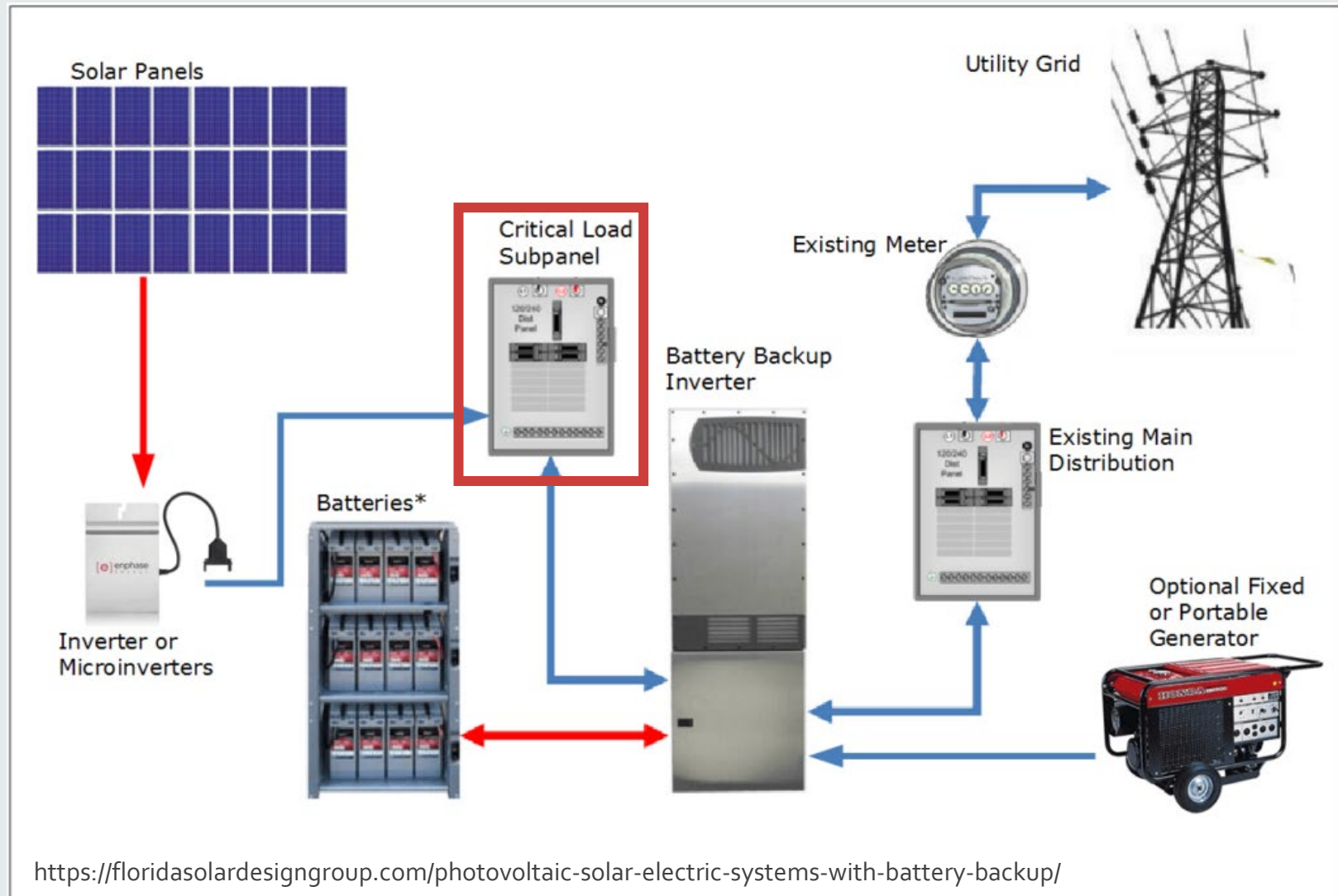
System Types:

Grid Tied w/ Emergency Backup-DC Coupled



System Types:

Grid Tied w/ Emergency Backup-AC Coupled



System Types:

Grid Tied Emergency Backup with Energy Management

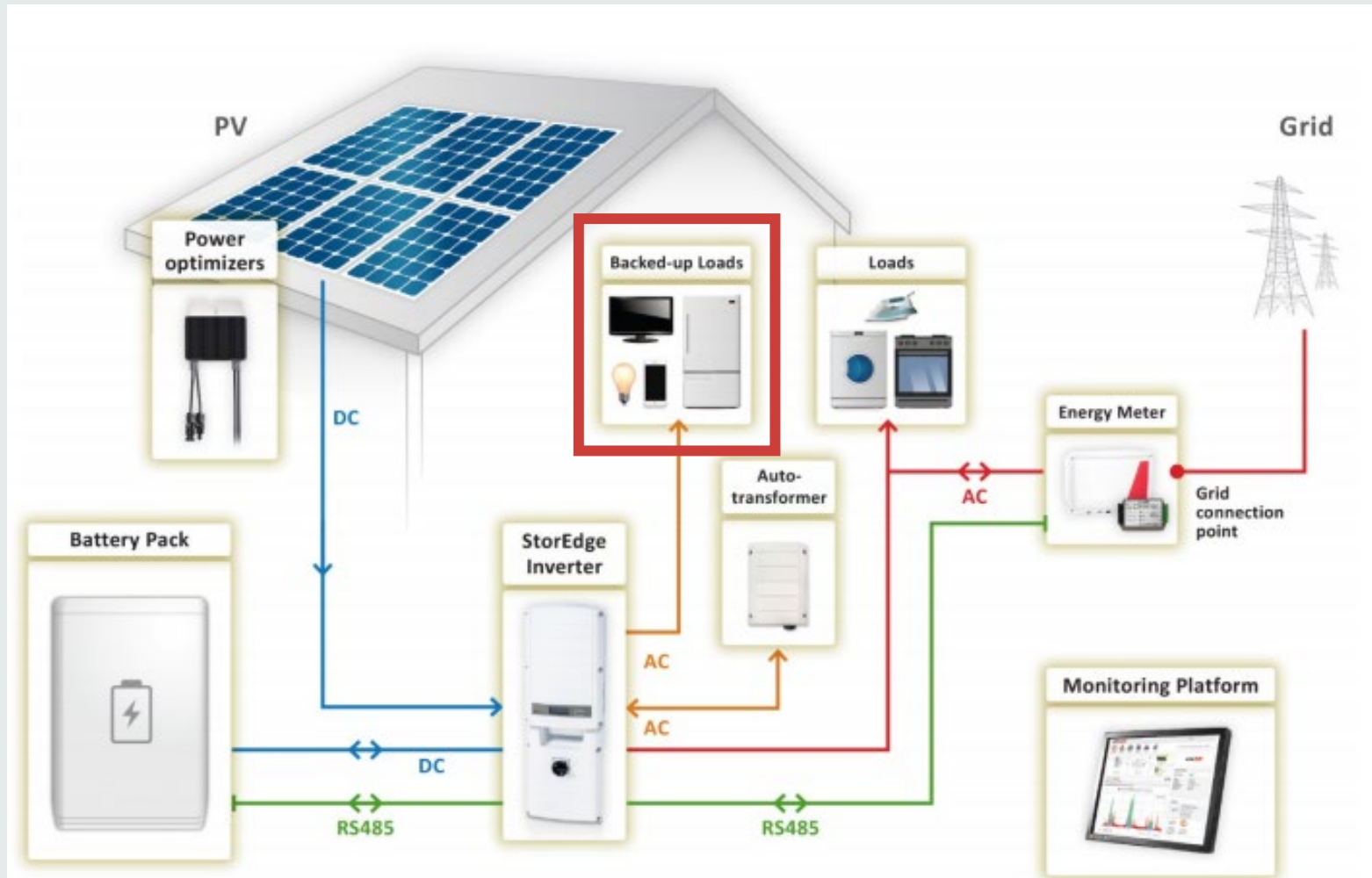
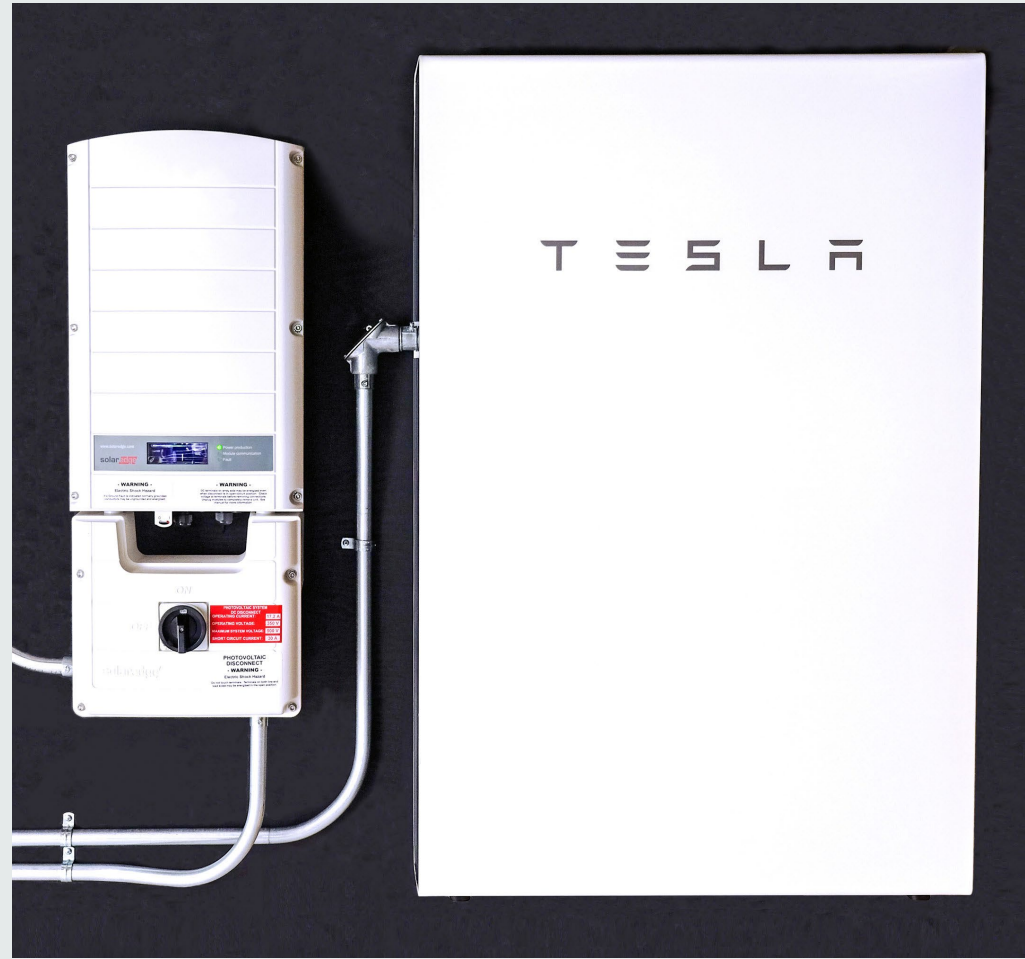


Figure 1: Smart Energy Management with Backup Power

Battery Energy Storage Systems : Common Battery Metrics

Common Battery Metrics

- Allowable Depth of Discharge (%)
- Warranted Number of Cycles
- Roundtrip Efficiency
- Capacity Watt-hours (kWh or Wh)
- Discharge Rate (kW)
- Cost



Battery Types: Lithium-Ion Batteries

- 90%-95% Allowable Depth of Discharge
- 2,000 – 3,000 Warranted Cycles
- 90%-95% Roundtrip Efficiency
- 9.8 kWh Capacity
- 9.3 kWh Available
- 350-450 Volt Nominal Voltage
- Cost: ~Varries



Battery Energy Storage Systems:

Example:

| | |
|---|-----------|
| Annual Energy Use (From Utility Data) | 4,674 kWh |
| Daily Energy Use (4,674 kWh/365 days) | 12.8 kWh |
| Estimate of Critical Loads (50% of Daily Use) | 6.4 kWh |
| Max Site Demand (From Utility Data) | 4 kW |
| Average Site Demand (From Utility Data) | 2 kW |

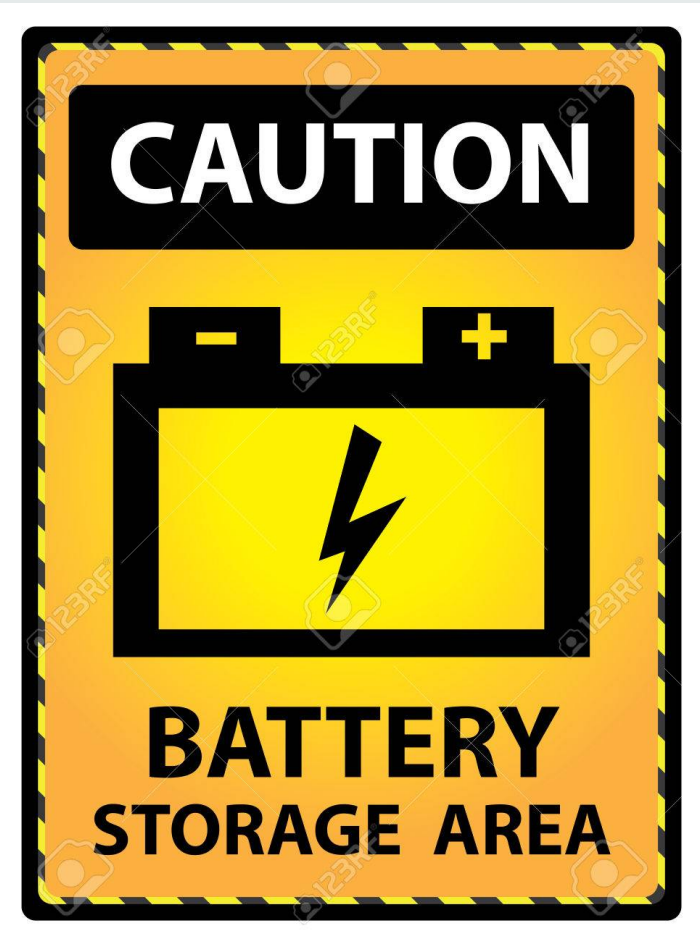
| | |
|--------------------------------------|---------|
| Battery Capacity (From Spec Sheet) | 9.8 kWh |
| Available Capacity (From Spec Sheet) | 9.3 kWh |
| Max Power (From Spec Sheet) | 5 kW |

| | |
|---|------------|
| Whole House Backup ($9.3\text{kWh}/12.8\text{kWh} \times 24$) | 17.4 Hours |
| Critical Loads Backup ($9.3\text{kWh}/6.4\text{kWh} \times 24$) | 34.9 Hours |

Battery Energy Storage Systems : Codes and Safety

General Safety Considerations

- Facility Signage
- Safety Data Sheets
- Emergency Response Plan
- Disconnect and Shutdown Capability
- Ventilation
- Fire Suppression



NFPA 70 National Electric Code (NEC)

- **Section 706:** *Energy Storage Systems*
- **Section 705:** *Interconnected Electric Power Production Sources*
- **Section 712:** *Direct Current Microgrids*
- **Section 750:** *Energy Management Systems*
- **Section 690:** *Solar Photovoltaic (PV) Systems*

Other Codes Referenced In NFPA 70

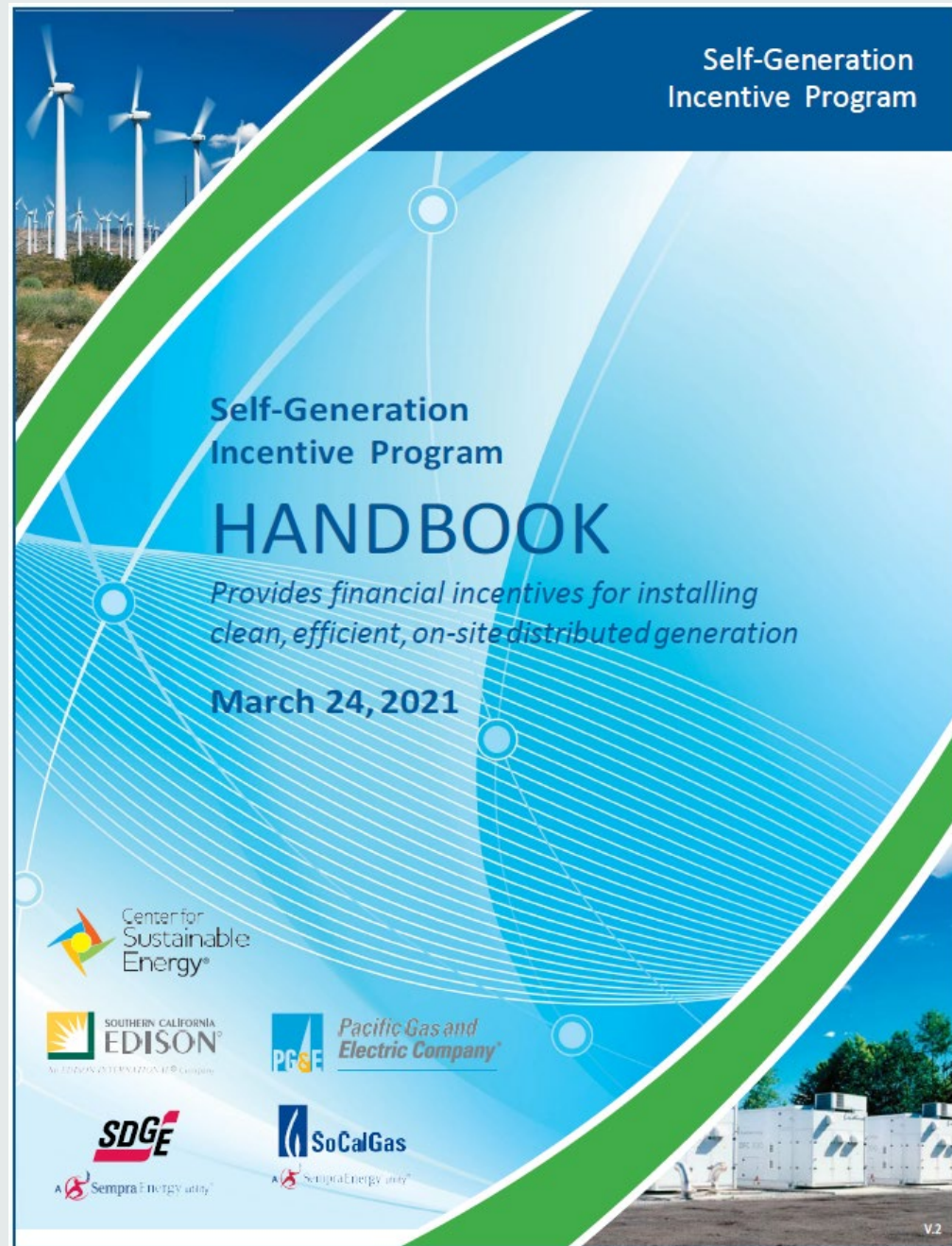
- **NFPA 111-2013**, *Standard on Stored Electrical Energy Emergency and Standby Systems*
- **IEEE 484-2008** *Recommended Practice for Installation and Design of Vented Lead-Acid Batteries for Stationary Applications*
- **UL 1989**, *Standard for Standby Batteries*
- **UL Subject 9540**, *Safety of Energy Storage Systems and Equipment*

Battery Energy Storage Systems: Incentives and Eligibility

The Self Generation Incentive Program (SGIP)

SGIP provides incentives for battery energy storage systems.

<https://www.selfgenca.com/home/resources/>



Incentive Levels

- Large Scale Storage (> 30 kW):
\$0.30/Wh (\$300/kWh)
- Small Residential Storage (<30 kW)
\$0.20/Wh (\$200/kWh)
- Residential Storage Equity
(Waitlisted): **\$0.85/Wh (\$850/kWh)**
- Non-Residential Storage Equity
(Waitlisted): **\$0.85/Wh (\$850/kWh)**
- Equity Resilience (Waitlisted):
\$1.00/Wh (\$1000/kWh)



Residential Equity Eligibility

- Multifamily, deed-restricted
 - At least five rental housing units
 - 80% of households at or below 60% area median income
- Single-family homes subject to resale restrictions
- MASH, SASH and DAC-SASH customers

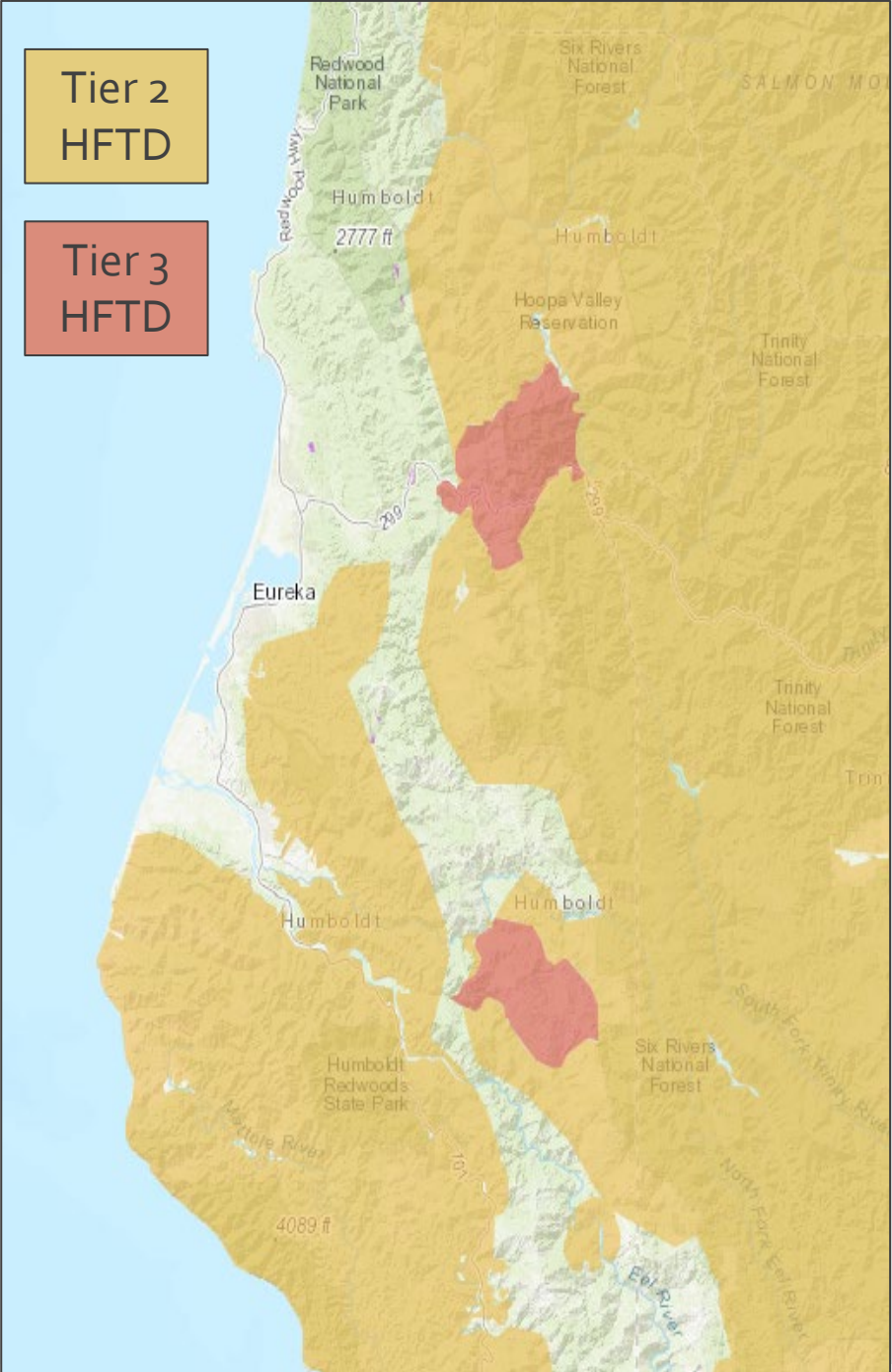


Residential Resiliency Eligibility

In Tier 2 or Tier 3 HFTD

And one of the following

- Equity Budget eligible
- Medical baseline program eligible
- Notified utility of life-threatening illness/condition



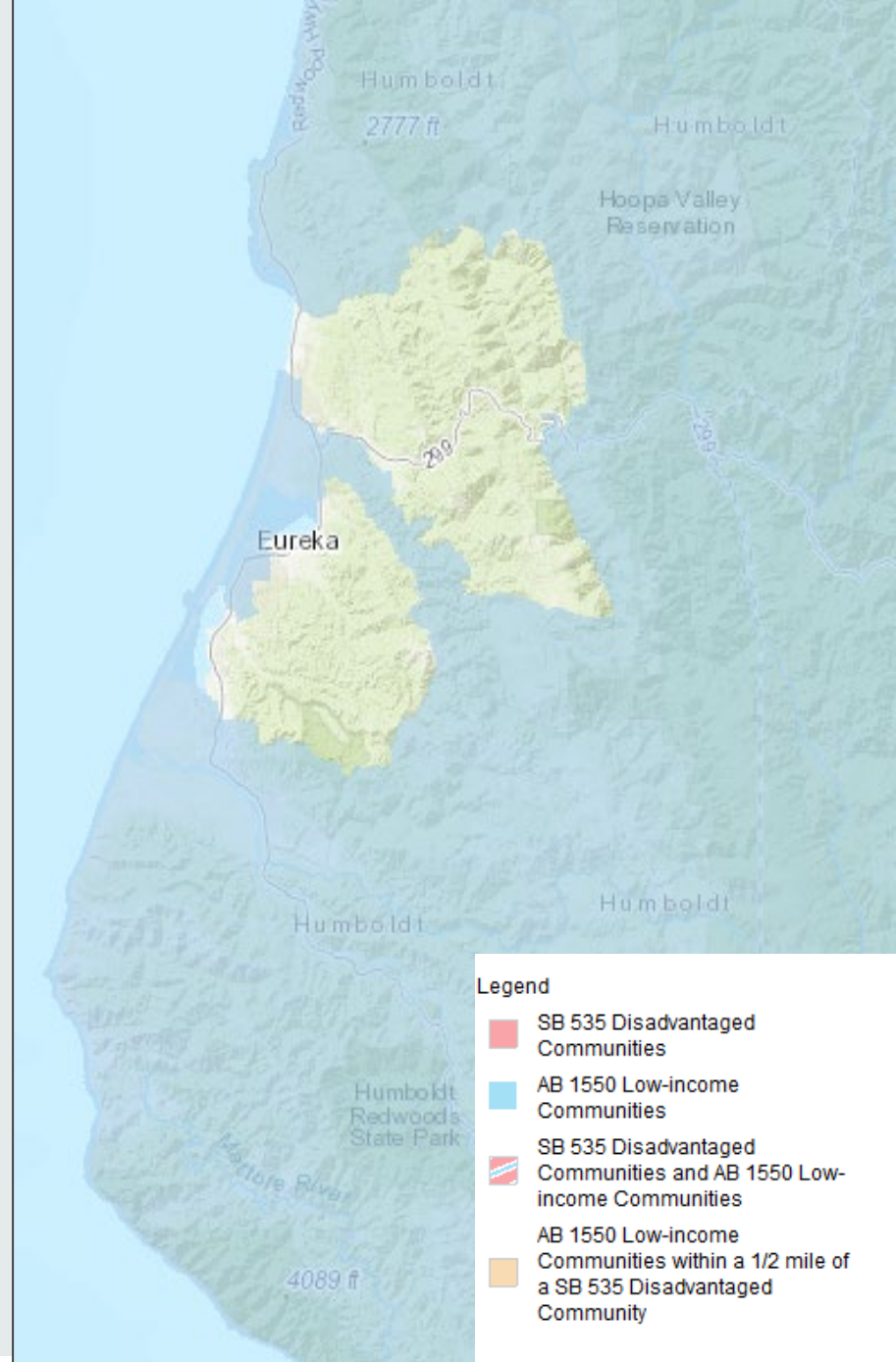
Non-Residential Equity Budget Eligibility

Non-Residential Criteria

- Local and State Agencies
- Small Businesses and Non-profits
- Educational Institutions

And located in low-income area

- AB 1550 Map for Reference



Non-Residential Equity Resilience

- Located in Tier 2 or Tier 3 HFTD
 - And located in community eligible for equity budget
 - And is a critical facility provider
- Where critical facilities and services are defined as:
 - Emergency services, medical facilities, gas stations, water/wastewater treatment, public utilities, grocery stores, and food banks, etc.



Summary of Incentives

| Incentive Type | New Incentive Rate |
|---|------------------------|
| Small Residential Storage (<30 kW) | \$0.20/Wh (\$200/kWh) |
| Large Scale Storage (>30 kW) | \$0.30/Wh (\$300/kWh) |
| Residential/Non-Residential Storage Equity (Waitlisted) | \$0.85/Wh (\$850/kWh) |
| Equity Resiliency (Waitlisted) | \$1.00/Wh (\$1000/kWh) |

Equity Budget Discharge Duration Step-Down

| Discharge Duration (hours) | Percent of Base Incentive |
|----------------------------|---------------------------|
| 0-2 | 100% |
| 2-4 | 100% |
| 4-6 | 50% |
| 6+ | 0% |

More SGIP Considerations

- Customers must work with an “Approved” Developer or apply as a “Developer” to process the rebate themselves.
- SGIP Approved Developer List can be found here:
<https://www.selfgenca.com/documents/developer/approved>
- Rebates can be paid to customer or installer
- For Non-Residential customers 1/2 of the rebate will be paid upon verification of installation, the remainder will be paid annually over 5 years as a Performance Based Incentive
- Consult with your tax professional about implications of incentives

Other requirements

- For PBI purposes, all non-residential projects must install metering and monitoring equipment that measures net electrical output or offset from the system(s).
- Residential and non-residential equity resiliency and equity budget storage projects must cycle a minimum of 52 and 104 times per year respectively
- Ineligible equipment:
 - Backup systems intended solely for emergency purposes.
 - Equipment that has been interconnected for more than 12 months.
 - Rebuilt, refurbished or relocated equipment (e.g. second life batteries).

SGIP References and Links

CPUC Equity-Resiliency SGIP Decision – September 18th 2019

- <http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M313/K975/313975481.PDF>

CPUC Proposed SGIP Decision – December 11th 2019

- <http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M321/K658/321658813.PDF>

CPUC High Fire Threat District (HFTD) Map (SGIP Resiliency Eligibility)

- <https://ia.cpuc.ca.gov/firemap/>

AB 1550 low-income map (SGIP Equity Budget Eligibility)

- <https://ww3.arb.ca.gov/cc/capandtrade/auctionproceeds/lowincomemapfull.htm>

SGIP 2019 Handbook

- <https://www.selfgenca.com/documents/handbook/2019>

SGIP Approved Developer List

- <https://www.selfgenca.com/documents/developer/approved>

SGIP FAQ and Documentation

- <https://www.selfgenca.com/home/resources/>



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Thank you

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July 28

Grid Services and RCEA's Community Grid Program



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Submit your questions in the Q&A and we will answer them after the presentation.