CleanEnergyGroup

An Introduction to Solar+Storage

September 19, 2024

www.cleanegroup.org

Webinar Logistics

We are using the newly updated version of GoToWebinar!
Thank you for your patience as we get used to this new platform. We encourage you to provide feedback in the post-webinar survey or via email.

All attendees are in **“listen only” mode** – your webcam and microphone are disabled.

Submit questions and comments via the Questions panel 

Speaker bios available in the “Materials” section 

Automated **captions** are available 

This webinar is being recorded. We will email you a webinar recording within 48 hours. This webinar will be posted on CESA’s website at **www.cleanegroup.org/webinars**

Webinar Speakers

An Introduction to Solar+Storage

Seth Mullendore

President and Executive Director
Clean Energy Group

Marriele Mango

Project Director
Clean Energy Group

CleanEnergyGroup

Clean Energy Group

Affordable, reliable, clean energy for all.

Climate Resilience and Community Health

Distributed Energy Access and Equity

Energy Storage and Flexible Demand

Fossil Fuel Replacement

www.cleanegroup.org

CleanEnergyGroup

Resilient Power Project

Building the foundation for energy resilient communities.

USDN urban sustainability directors network

footprintproject.org™

AMERICAN MICROGRID SOLUTIONS

ELEVATE

GEMINI ENERGY SOLUTIONS

Rooftop solar installation in Dorchester, MA. Credit: Resonant Energy

www.resilient-power.org

CELEBRATING 10 YEARS TECHNICAL ASSISTANCE FUND

CleanEnergyGroup

TECHNICAL ASSISTANCE FUND

Providing Support to Build Local Resilience

CleanEnergyGroup

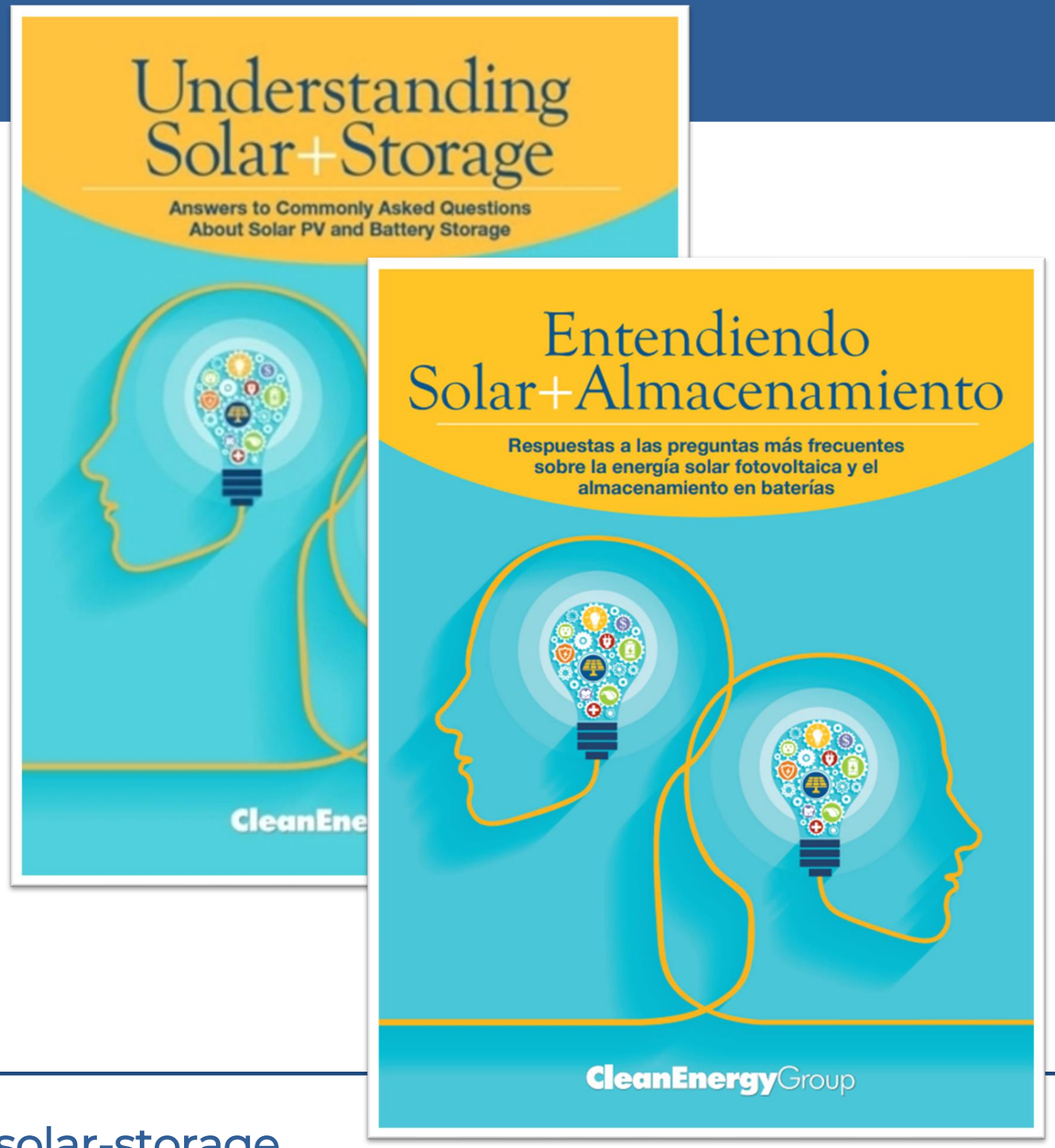
JULY 2024

Understanding Solar+Storage:

Answers to Commonly Asked Questions about Solar PV and Battery Storage

Seth Mullendore and Marriele Mango
Clean Energy Group

Available in English and Spanish



www.cleanegroup.org/publication/understanding-solar-storage

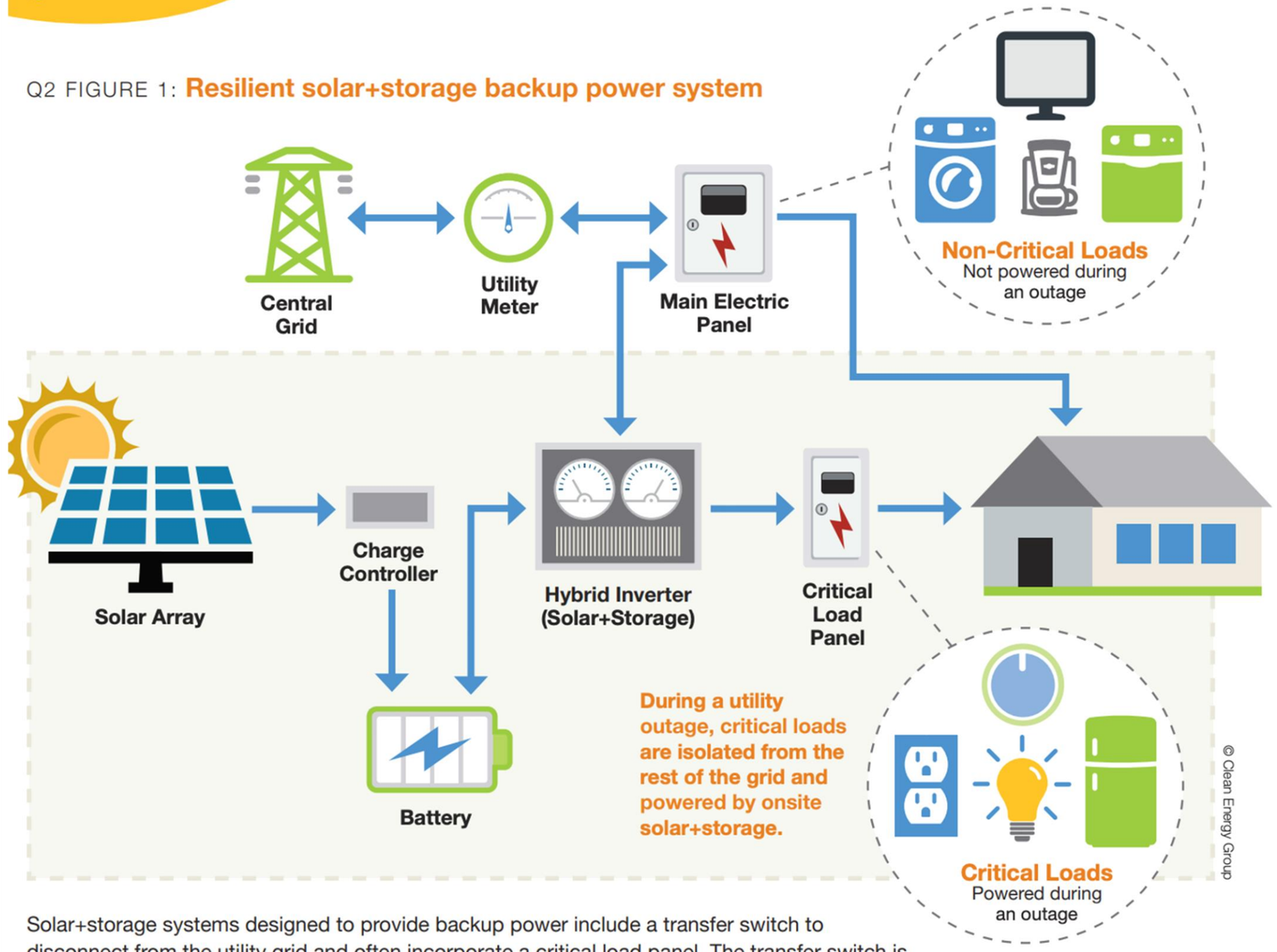
Is solar+storage an effective backup power solution?

Consider: Solar+Storage versus Fossil-Fuel Generators

- Economic Benefits
- Maintenance
- Reliability and Resilience
- Health and Safety
- Flexibility: Hybrid and Mobile systems

QUESTION 2

Q2 FIGURE 1: **Resilient solar+storage backup power system**



Solar+storage systems designed to provide backup power include a transfer switch to disconnect from the utility grid and often incorporate a critical load panel. The transfer switch is typically incorporated as a component of the system's hybrid inverter, shown here in a DC-coupled configuration. When an outage occurs, the transfer switch isolates the solar+storage system from the grid along with the critical load panel. Any devices served by the critical load panel will continue to be powered by solar+storage, while those served by the main electric panel will not be powered during an outage.

How do I determine the value of solar+storage?

Traditional Economic Values:

- Lower utility bills
- Grid services programs (for battery storage)

Additional Opportunities:

- Avoided Outage Costs

Consider: Value streams that are harder to monetize

- Health and Safety
- Environment and Emissions

Solar array at California Indian Museum and Cultural Center. CIMCC was a TAF awardee.
Credit: CIMCC

CleanEnergyGroup

Case Study: Boulder Housing Partners

How to Value Solar+Storage Benefits

CASE STUDY: **Boulder Housing Partners**
LOCATION: **Boulder, Colorado**

SUMMARY: In addition to being a leading affordable housing developer and the housing authority for the City of Boulder, Boulder Housing Partners (BHP) also provides command-post services to over 3,000 low-income residents during emergencies. BHP explored solar+storage as an option for its North Boulder headquarters, with the goal of remaining open and operational through a power outage.

The total cost of the solar+storage installation was $143,476. After factoring in various value streams, the estimated payback was approximately 19 years.

The items listed below highlight the value streams BHP considered when evaluating the benefits of solar+storage. Some benefits had a monetizable value, while others did not.

More information and resources related to the BHP solar+storage project are contained in an extensive case study, found at https://www.cleanegroup.org/initiatives/technical-assistance-fund/featured-installations/boulder-housing-partners.

Monetizable Benefits

Utility bill savings from solar
$1,145 in electric bill savings annually

Utility bill savings from battery storage and smart control system
Demand charge electric utility savings of $456 for a single month

Avoided cost of outages
Estimated $6,295 saved each year by maintaining services, rather than having to cease operations during an outage

Nonmonetizable Benefits

Emissions reduction
Solar+storage offset 40,000 pounds of CO_2 emissions over the life of the system

Resilience
Reliable and automatic backup power in the event of an outage

Avoided emissions
BHP was able to install a smaller gas generator that runs less often by prioritizing solar+storage

How do I determine the value of solar+storage?

Can solar+storage be developed to benefit low-income communities?

Yes!

LMI communities must combat:

- Higher energy burdens
- “First and worst” impacts of climate change
- Grid vulnerability from years of neglect & disinvestment

2023 UPAL Community Resiliency Hub launch event in Petersburg, VA. UPAL was a TAF recipient in 2020. Credit: Queen Shabazz, UPAL

Can solar+storage be developed to benefit low-income communities?

Barrier		Opportunity
Expense	→	Targeted Incentives & Finance
Technology Awareness	→	Knowledge & capacity building programs
Pre-development support	→	Technical Assistance programs

Federal Tax Credits: 2024 Investment Tax Credit

Baseline: 30%

Stackable 10% bonus credits: Projects located in an energy communities and/or domestic manufacturing

10% LMI Bonus Credits: Projects located in a LMI community or Tribal Land

20% LMI Bonus Credits: For projects supporting qualified low-income residential projects and low-income economic benefits projects.

Final commissioning of the Vieques Emergency Management Trailer at the Puerto Rico Science, Technology and Research Trust. Credit: Footprint Project

Case Study: Targeted Incentive & Technical Assistance

Program: Connecticut Battery Storage Solutions Program

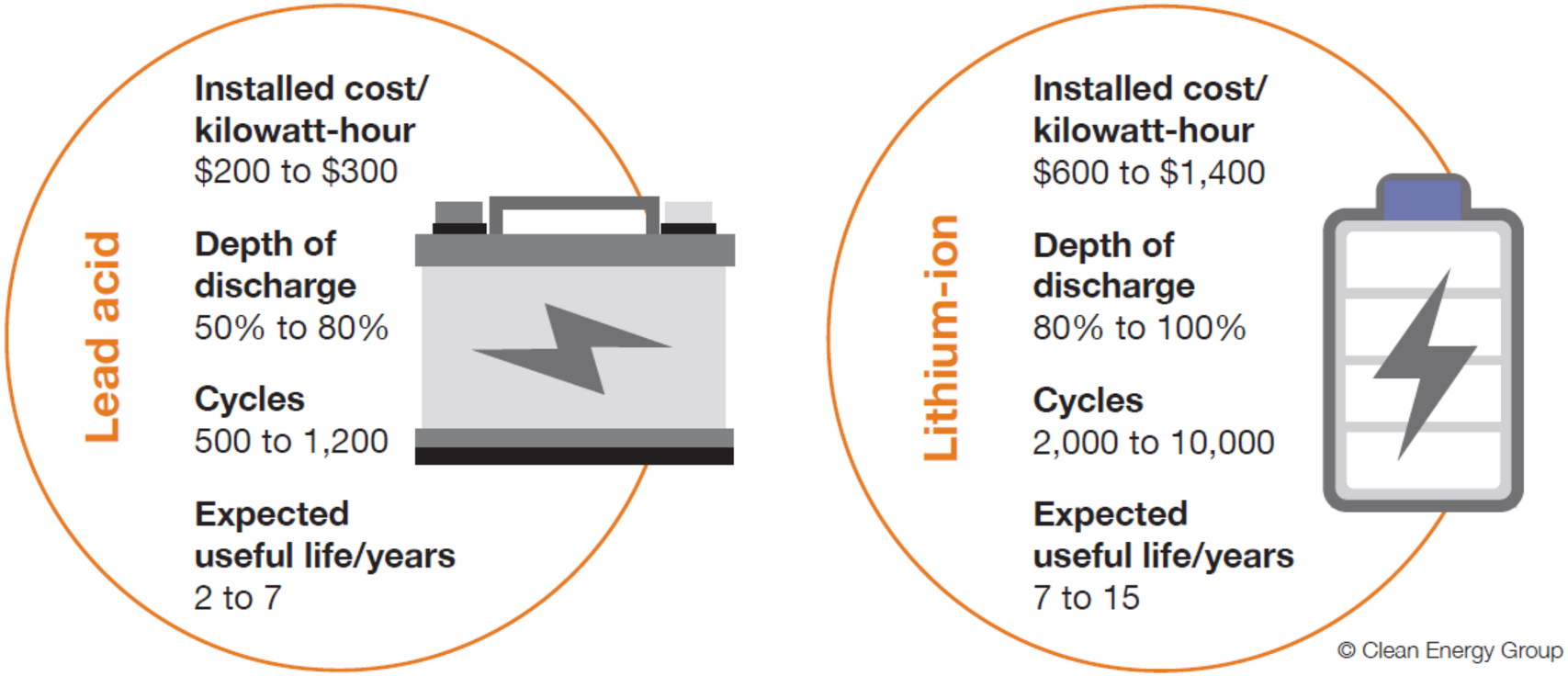
Overview: Lowers the cost of buying a battery by providing upfront and performance-based incentives to customers. Program design includes carveouts for low-to-moderate income populations, nonprofits, and increased incentives for affordable housing providers. Solar programs can be paired with battery storage incentives.

Obstacles: Low enrollment in residential low-income programs. In a survey about for solar + storage access, CT found that price and lack of information and understanding of benefits were the biggest barriers to adoption

To build awareness, CT Green Bank partnered with Clean Energy Group to offer **technical assistance** to affordable housing.

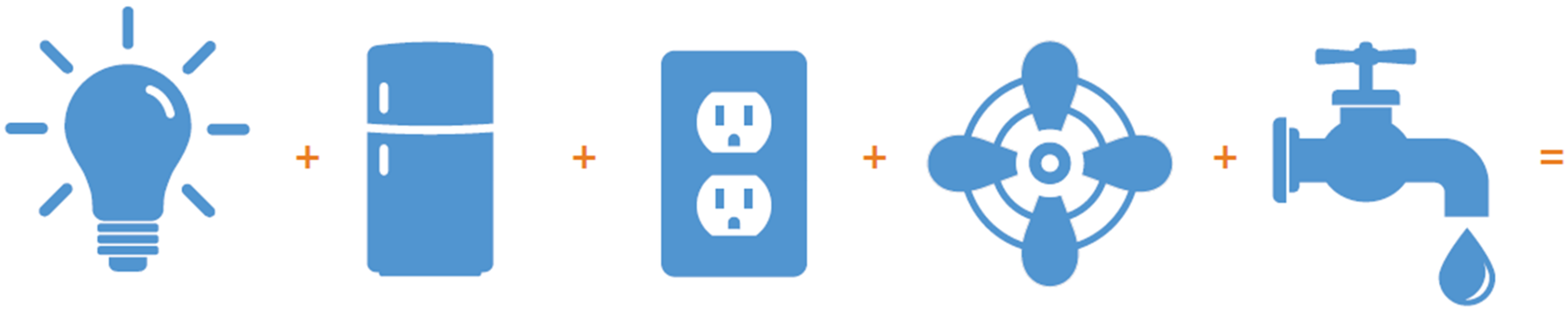
Comprehensive resilient power effort in that CT Green Bank provides tiered battery and solar incentives for low-to-moderate income and energy communities, as well as finance opportunities.

What different types of batteries are available (and which one is right for me)?



What size battery do I need?

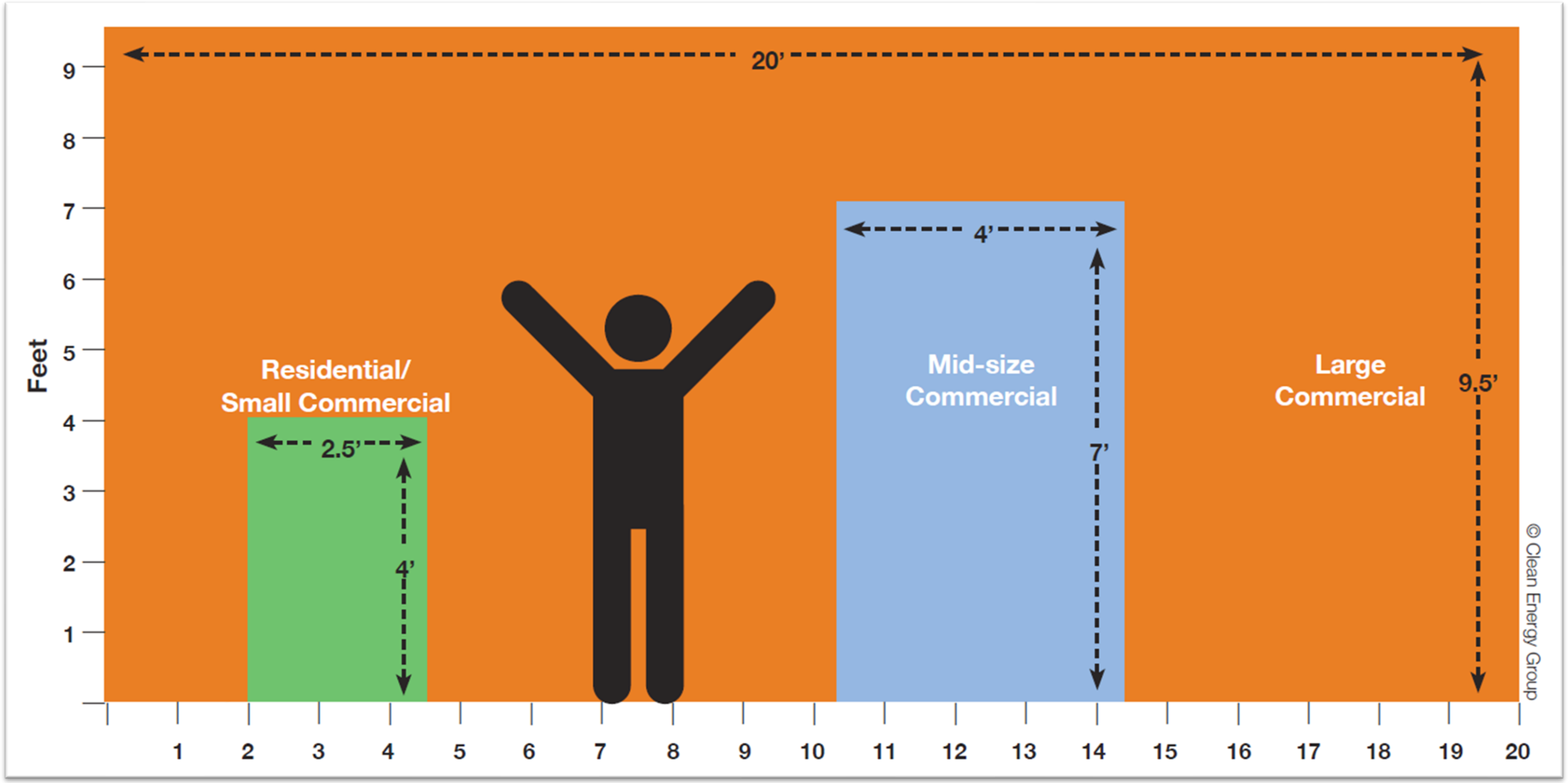
Q8 FIGURE 1: **Examples of Critical Loads to Calculate Power Rating**



Lighting	Refrigerator	Plug Loads	Fans	Water Pump	Maximum Power Demand	Average Power Demand
200 W	500 W (starting) 170 W (running)	300 W	200 W	4,000 W (starting) 1,000 W (running)	**5,200 W**	**1,870 W**

CleanEnergyGroup

What size battery do I need?



CleanEnergyGroup

Is battery storage safe?

Environmental Hazards

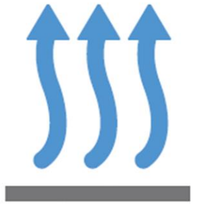
Battery storage safety begins with proper siting to ensure the battery system is insulated from potential environmental hazards, such as extreme weather and flooding.

Temperature Controls

Some storage systems may require dedicated heating and/or cooling systems to regulate temperatures and operate properly.

Codes and Standards

Follow the most up-to-date codes and standards and implement safety best practices when installing a storage system.



Venting

Battery systems contained in enclosed areas may require venting to avoid the buildup of explosive gases during a system failure.

Awareness

Areas containing battery storage systems should be clearly marked and onsite staff should be made aware of any potential safety hazards. Warning systems should immediately alert staff and first responders of system failures.

Fire Suppression

Effective fire suppression equipment should be installed in case a fire does occur. Local and regional first responders should be informed of potential hazards and receive relevant training.

CleanEnergyGroup

What are the environmental impacts of battery storage?

Lithium-ion Batteries	
Pros	**Cons**
Mining: Less environmental impact Lithium-ion batteries require significantly less raw materials than lead acid.	**Mining: Exploitative labor practices** Cobalt, a necessary component of some common lithium-ion battery chemistries, is tied to exploitative labor practices and human rights abuses internationally.
Mining and Manufacturing: Less health and environmental contamination risk Lithium-ion battery components are less hazardous than lead; contamination concerns are less of an issue.	**Mining: Environmentally invasive practices** Invasive extraction processes that require a significant amount of water.
Mining and Manufacturing: Alternative options Some battery vendors use lithium-ion chemistries that do not contain cobalt.	**Recycling: Limited recycling industry** Less than 5% of lithium-ion batteries are recycled. The number of battery compounds makes recycling challenging. Recycling also requires expensive, energy intensive facilities, which makes the process less cost effective.
Recycling: Battery life Lithium-ion batteries last longer than other battery chemistries; systems therefore require fewer battery replacements.	**Recycling: Polluting facilities** Recycling typically requires expensive facilities that operate with energy intensive, polluting processes. This process is also wasteful, so less of the battery is recycled.
Reuse: EV batteries EV batteries can be recycled, remanufactured, and reused in stationary battery storage systems.	

Thank You

Seth Mullendore
President and Executive Director
Clean Energy Group
Seth@cleanegroup.org

Marriele Mango
Project Director
Clean Energy Group
Marriele@cleanegroup.org

Upcoming Webinars

Emerging Public Health Needs for Climate Smart Technology in Connecticut Affordable Housing (10/1)

An Assessment of Equity in Massachusetts' Energy Storage Programs (10/8)

Sharing Solar Benefits with Multifamily Renters: A Mississippi Case Study (10/30)

Read more and register at www.cleanegroup.org/webinars

CleanEnergyGroup

www.cleanegroup.org | info@cleanegroup.org