CleanEnergyGroup

Resilient Solar+Storage Training: Introducing a Free Course for Community-Serving Facilities

March 6, 2025

Webinar Logistics

We are now using Zoom Webinars!
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All attendees are in **“listen only” mode** – your webcam and microphone are disabled. The Chat function is also disabled.

Submit questions and comments via the Q&A panel 

Automated **captions** are available 

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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

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

CleanEnergyGroup

Technical Assistance Fund

Providing technical support to build local resilience.

GEMINI ENERGY SOLUTIONS

footprintproject.org™

ELEVATE

AMERICAN MICROGRID SOLUTIONS

Clean Coalition

USDN urban sustainability directors network

Solar installation in Puerto Rico. Credit: Solar Responders

www.cleanegroup.org/initiatives/technical-assistance-fund

Webinar Speakers

Resilient Solar+Storage Training: Introducing a Free Course for Community-Serving Facilities

Nik Kroushl
Training Program Officer, Center for Resiliency and Clean Energy, Inclusiv

Eric Hangen
Director of Climate Finance, Center for Impact Finance at University of New Hampshire

Chris Keast
Technical Consultant

Becky Regan
Chief Executive Officer, Capital Link

Seth Mullendore
President and Executive Director, Clean Energy Group

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University of New Hampshire

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CleanEnergyGroup

Thank You

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Upcoming Webinars

45V Clean Hydrogen Production Tax Credit: A Windfall for the Fossil Fuel Industry? (3/26)

Energy Storage and Cybersecurity (4/1)

Energy Resilience for Medically Vulnerable Multifamily Affordable Housing Residents: A Technoeconomic Analysis for Connecticut (4/10)

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

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Resilient Solar+Storage Training (*Solar y Almacenamiento Resiliente)*

Introducing a Free Course for Community-Serving Facilities

March 6, 2025

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Agenda:

- Welcome & Intro
- Course overview & goals
  - Eric Hangen, Center for Impact Finance, UNH
  - Nik Kroushl, Inclusiv
- Featured Panelists
  - Seth Mullendore, Clean Energy Group
  - Christopher Keast, CK Sustainable Energy Consulting
  - Becky Regan, Capital Link
- Q&A

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Course Purpose & Learning Objectives

Eric Hangen, Director of Climate Finance, Center for Impact Finance at UNH

Nik Kroushl, Training Program Officer, Inclusiv

Course Objectives

1. Learn about how solar + storage enable resilience and continuity of services
2. Understand the physical components of solar + storage
3. Conduct a preliminary evaluation for solar + storage on a building
4. Make informed choices about project design
5. Evaluate whether a solar + storage project is financially worth it
6. Find and vet a developer or installer
7. Manage key risks during development and beyond
8. *For lenders (extra module):* Incorporate the unique aspects of solar + storage into your loan process

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About this course

PURPOSE

FORMAT

AUDIENCE

REGISTRATION

Link to Register

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Resilient Solar + Storage Guidebook

Seth Mullendore

President and Executive Director, Clean Energy Group

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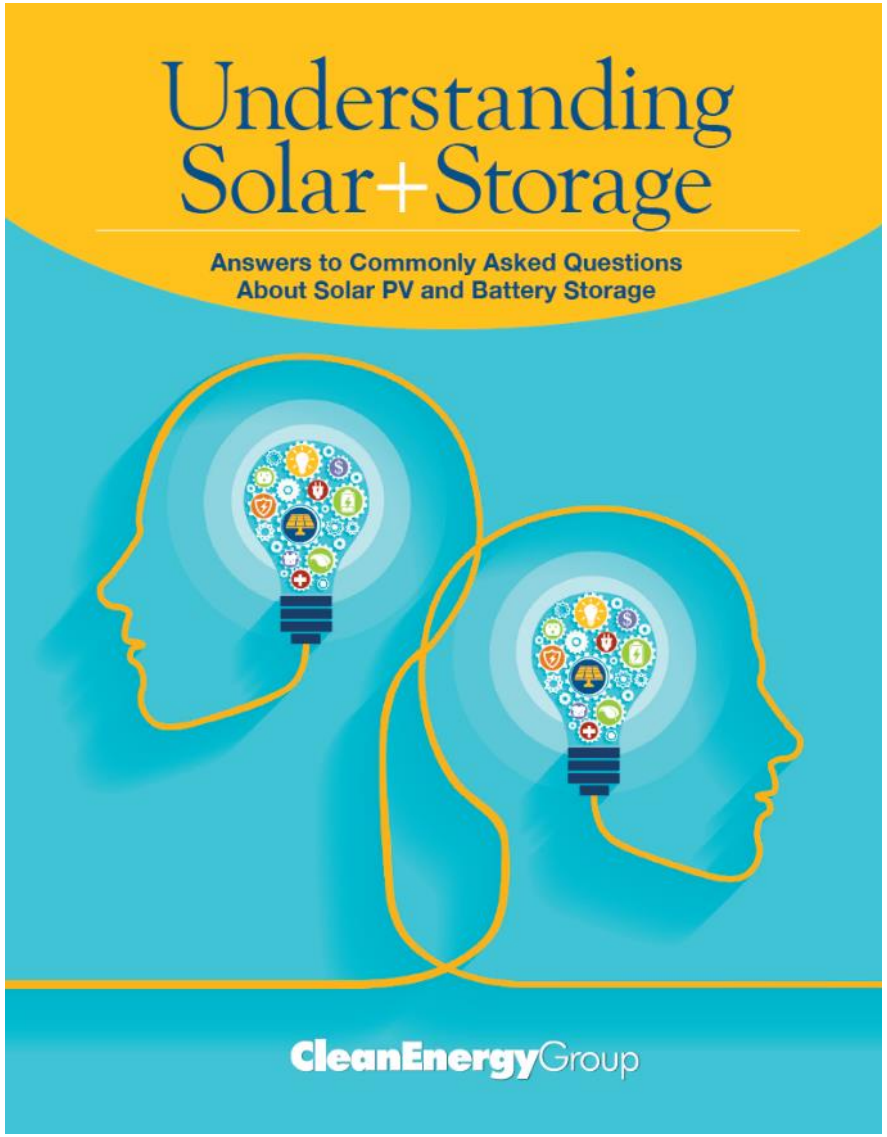

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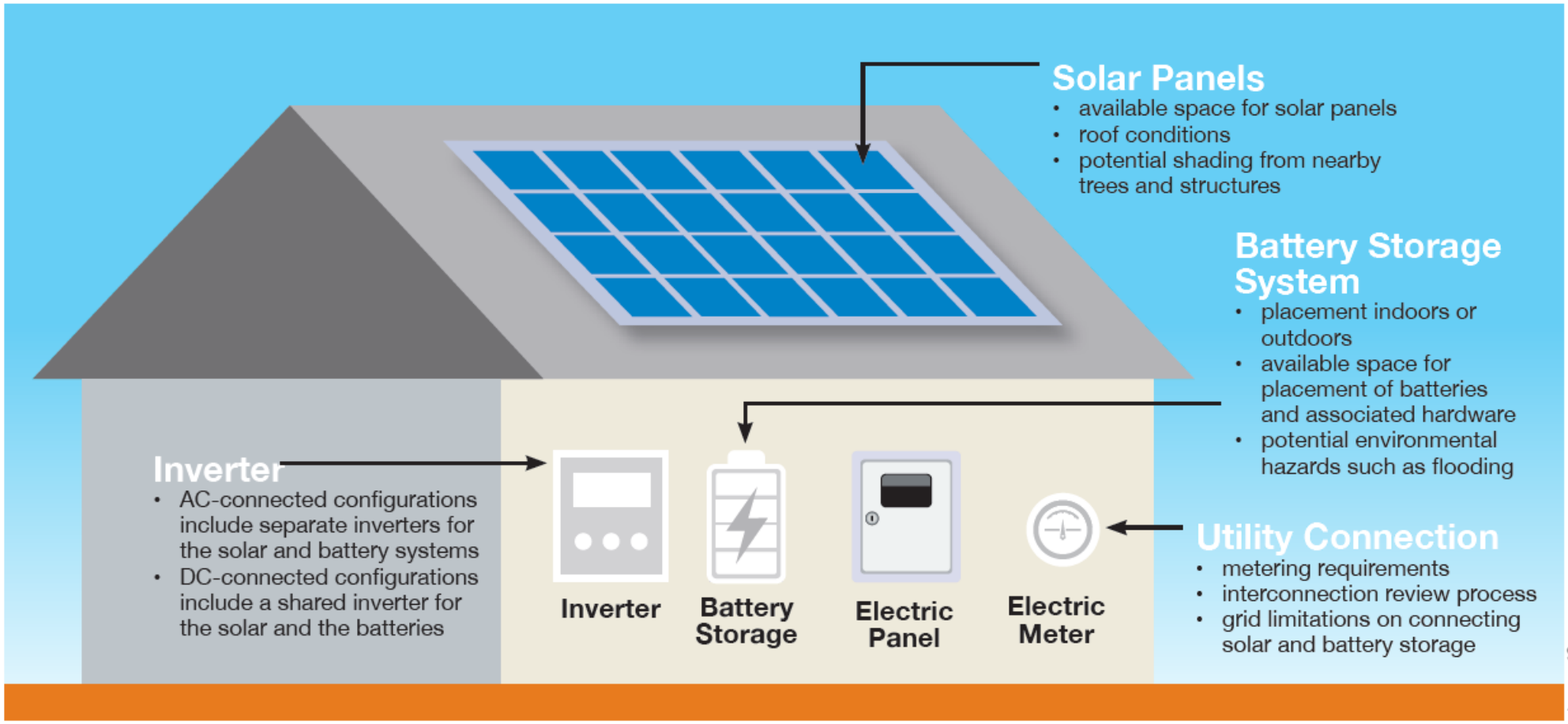
Q1 FIGURE 1: **Factors to consider when planning a solar+storage system**



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

Get to know your utility bill

Becoming more familiar with your building's energy needs and utility rate structure is a good first step in thinking about a solar+storage system. Your electric utility may be able to assist you in answering the following questions.

QUESTIONS TO CONSIDER

- ☐ What is your monthly/annual energy use (kWh)?
- ☐ Are you subject to demand charges? If so, how much are they ($/kW)?
- ☐ Are you on a time-of-use rate structure that may reward you for shifting loads to off-peak periods? If not, does your utility offer a time-of-use rate option?

Seek out expert advice

Connect with professionals who have experience and technical expertise in solar+storage to help you evaluate your options and examine potential solutions. A bit of guidance can help your project move forward and ensure you'll benefit from the experience of others.

If you are working on a community-serving solar+storage project and could use some assistance, explore our Technical Assistance Fund initiative, or contact us at TAF@cleanegroup.org.

QUESTIONS TO CONSIDER

- ☐ Who is the point person at your facility for the solar+storage process?
- ☐ Do you have access to building and electrical system plans for your building?
- ☐ Is resilience your main goal or are you primarily concerned about economic benefits, such as utility bill savings?
- ☐ Have you considered ownership preferences for the system (such as direct ownership or third-party financing)?
- ☐ Are you in need of external expertise to act only as an advisor or to provide a full range of options and solutions?

Research utility policies and state and local interconnection standards

Reach out to your utility, local permitting authorities, and any experienced solar+storage developers in your area to find out what you'll need to do to get your system permitted and connected to the grid.

QUESTIONS TO CONSIDER

- ☐ What are the local zoning and permitting requirements for solar and battery storage?
- ☐ Are there any utility interconnection issues and/or costs you should be aware of?
- ☐ Is net metering available for your solar+storage system?
- ☐ Are there any policies that restrict the addition of storage to a net metered solar system?
- ☐ What market opportunities are open to your system for possible revenue streams?
- ☐ Can your system generate revenue by providing grid services, such as frequency regulation, or by participating in demand response programs?

  See Understanding Solar+Storage, "Question 3: How do I determine the value of solar+storage (savings, revenue, resilience)?" to learn more about potential solar+storage revenue streams.

Evaluate critical loads

One of the first steps in designing a resilient solar+storage system is to determine what critical electric loads your system will cover. Start with the devices that absolutely must have power during an emergency and build out a list from there. Research what the maximum power draw is for each device you'd like to keep running. Power requirements may be specified directly on the device or available online. Then think about how long you'll realistically need to power each device in an emergency situation.

QUESTIONS TO CONSIDER

- ☐ What services are absolutely critical to your facility during a power outage?
- ☐ How long will you need to run the devices that support these services?
- ☐ Will you be relying solely on solar+storage, or will these technologies complement additional resources, such as a gas or diesel generator?
- ☐ For facilities with existing sources of backup power, how will incorporating solar+storage affect the operation and capabilities of these resources?
- ☐ Are your critical loads isolated in a separate electric sub-panel?

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Assessing the Solar Potential of a Building

INK

Why perform a solar potential assessment?

Get an idea of the constraints you're working within.

- Will you be able to produce enough solar onsite to meet your goals?

Begin thinking about design considerations.

- Will shading be an issue?
- How old is your roof? Is it designed to support the weight of a solar system?
- What else is on the roof that may limit placement of solar panels?

Explore your solar options.

- Rooftop
- Carport
- Ground mount

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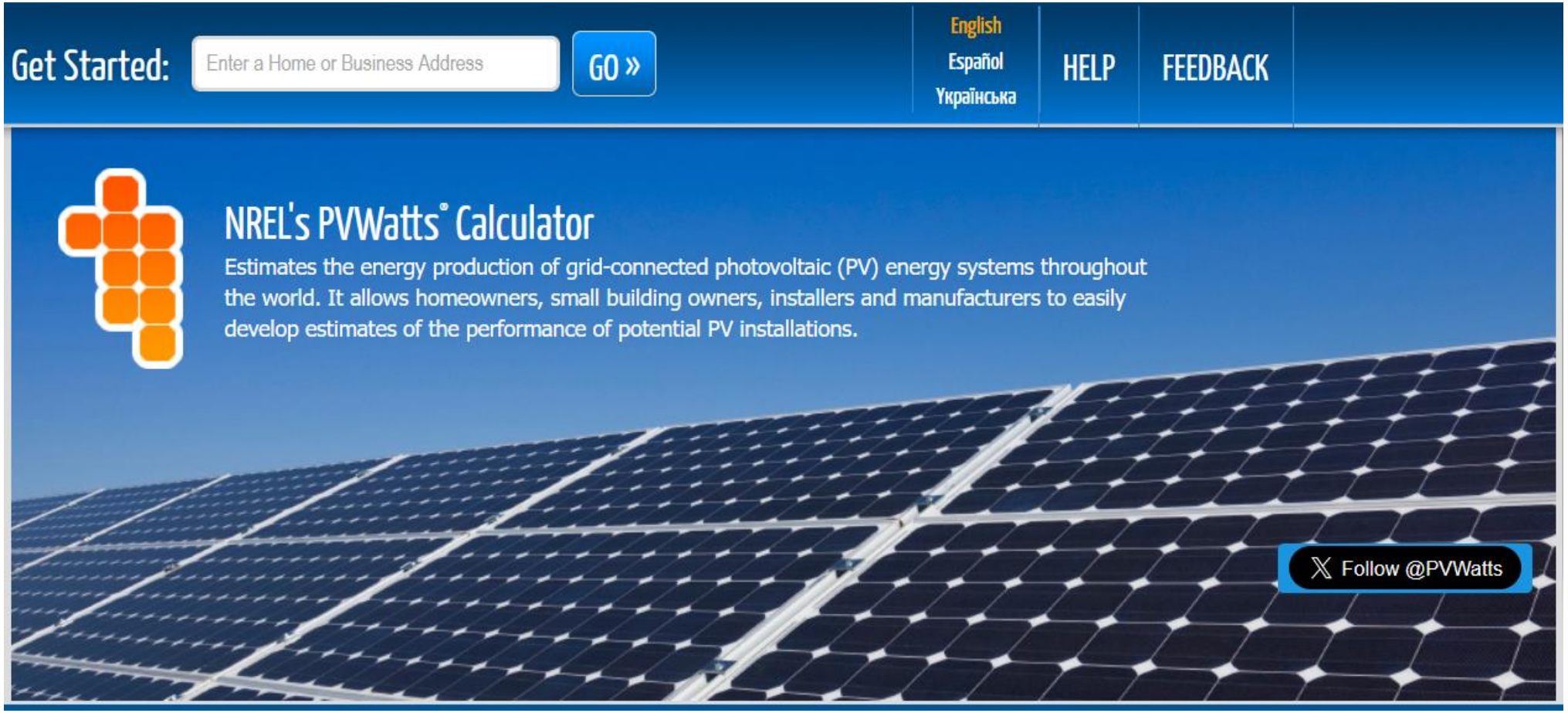
Example assessment with PVWatts

https://pvwatts.nrel.gov/



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Resilient Solar and Storage Course Overview

Christopher Keast
CK Sustainable Energy Consulting

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What is Resilience?

"The ability of the grid, buildings, and communities to withstand and rapidly recover from power outages and continue operating with electricity, heating, cooling, ventilation, and other energy-dependent services and appliances"

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Why is Energy Resilience important?

- Climate-related power outages impacts communities
- 128 billion-$ disasters from 2011 to 2020
- More Cat 4 and 5 hurricanes in 2010s than any other decade
- Increased frequency of flooding, heat waves, and large wildfires

Damage to Infrastructure and Housing

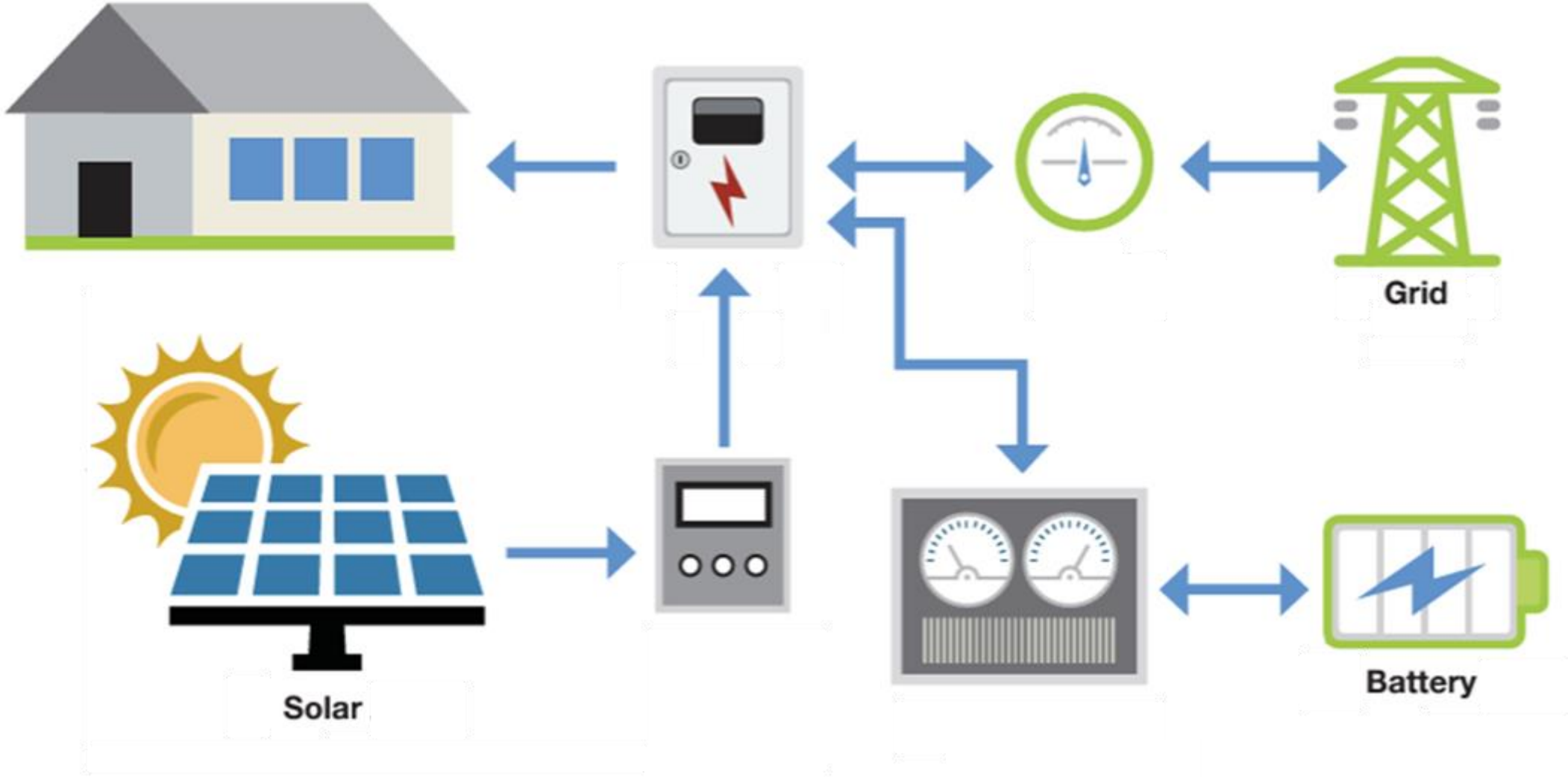
Public Safety Hazards

Strain on Emergency Services

Displacement & Fragmentation

Environmental and Health Risks

What is Solar and Storage?



How does Solar and Storage help achieve Resilience?

How do we determine if Solar and Storage is the right fit?

Simple Solar+Storage Calculator

University of New Hampshire

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Inputs

Geographic Region	South West
Monthly Electric Bill ($/month)	1000
Select Electricity Usage Input Method	I have annual usage data
Select Critical Loads Input Method	Critical Loads % of total
Critical Loads % of total	50%
Input Solar PV System Size (kW)	I don't know
Input Annual Solar PV Generation (kWh)	I don't know
Days of Energy Autonomy	1.00
Grants, Rebates & Other Incentives ($)	$55,000
Input Annual Value of Energy Resilience ($)	$80,500

Enter Annual kWh Used	50,000

Results

- Solar and battery system sizes
- Electricity bill savings
- Days of energy autonomy
- … among many others!

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How do we determine the value of Solar and Storage?

Incentives, tax credits, rebates

Electricity bill savings

Property value increase

Nonmonetizable Benefits

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Resilience

Emissions reduction

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Last thoughts…

- How to design systems to be lasting, reliable, and high-quality
- Downloadable version of the Simple Solar+Storage Calculator
- Sample solar and battery permitting plan set package
- System interconnection and net metering
- Installation process look like, operations and maintenance
- Financial pro formas, installer agreements, O&M contracts, and financial agreements
- Find and vet an installer for your project
- Other tools, tips, and resources!

THANK YOU!

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Solar + Storage for Lenders

Becky Regan
Chief Executive Officer, Capital Link

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Commercial Lending and Community Facilities

- Financing through loans, PPAs, leases
- PPAs and leases = lower up-front costs
- Direct loan = system ownership & Investment Tax Credit (ITC), state incentives
- Secured vs unsecured – Depends on ownership structure, existing debt
- Unsecured loans or UCC agreements

Financing Structures

Direct ownership

- Monthly savings repay debt

3rd Party financing

- Sale of energy repays debt

Other Topics

- Cash flow evaluation – solar only vs. solar + storage
- Underwriting considerations
- Considerations to close
- Incentives and RECs

Q&A

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