

On-Site Solar Energy & Real Estate – The Financial & Environmental Benefits for a Portfolio

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Speakers



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DOE Solar Energy Overview

WEBINAR On-Site Solar Energy & Real Estate –
The Financial & Environmental Benefits for a Portfolio
23 July 2021

Michele Boyd, Program Manager
Strategic Analysis & Institutional Support
Solar Energy Technologies Office

Solar Energy Technologies Office (SETO) Overview

MISSION

We accelerate the **advancement** and **deployment of solar technology** in support of an **equitable** transition to a **decarbonized energy system by 2050**, starting with a decarbonized power sector by 2035.

WHAT WE DO

Advance solar technology and drive soft cost reduction to make solar **affordable** and **accessible** for all Americans

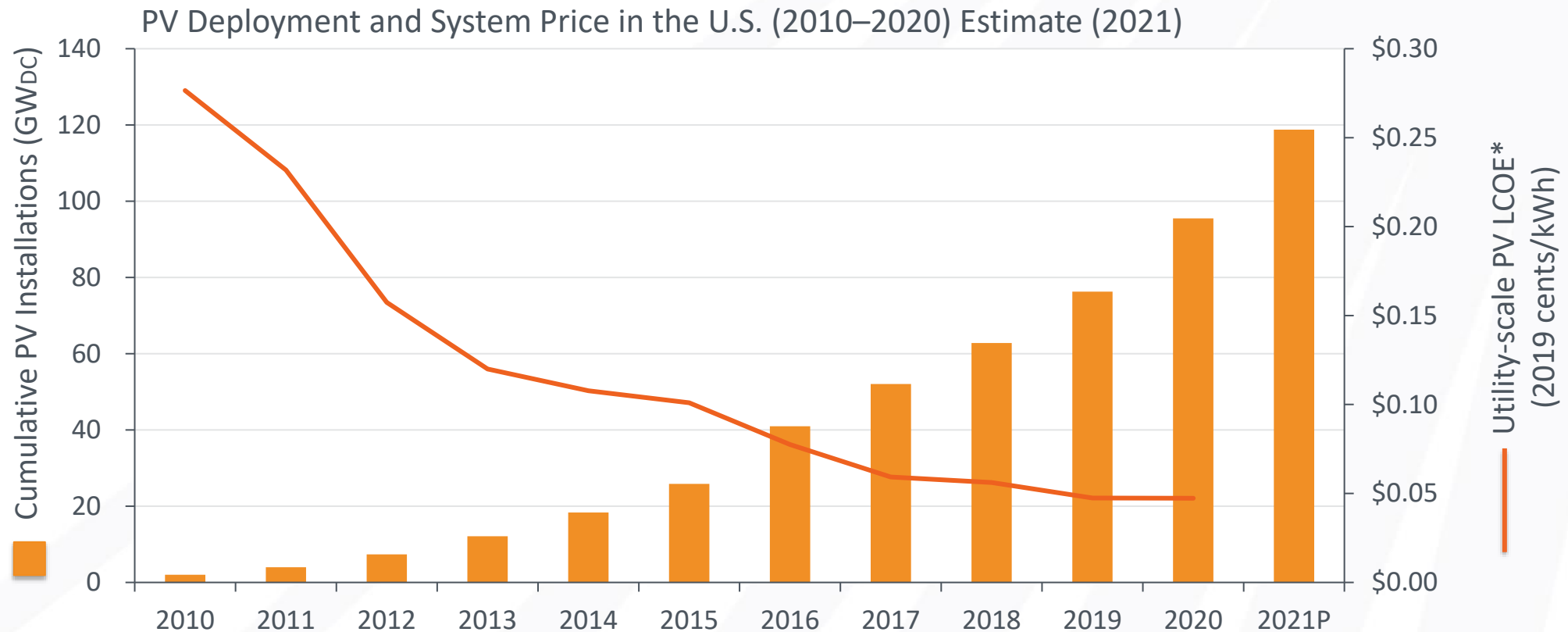
Enable solar to **support grid reliability** and pair with storage to provide new options for **community resilience**

Support **job growth**, **manufacturing**, and the **circular economy** in a wide range of applications



U.S. Solar: Falling Costs, Rising Deployment

The solar energy industry is one of the fastest growing industries in the nation. Driven by falling costs and state and federal policy, total solar PV installed capacity is now **95 GW** and is **projected to grow to 118 GW** by the end of 2021.

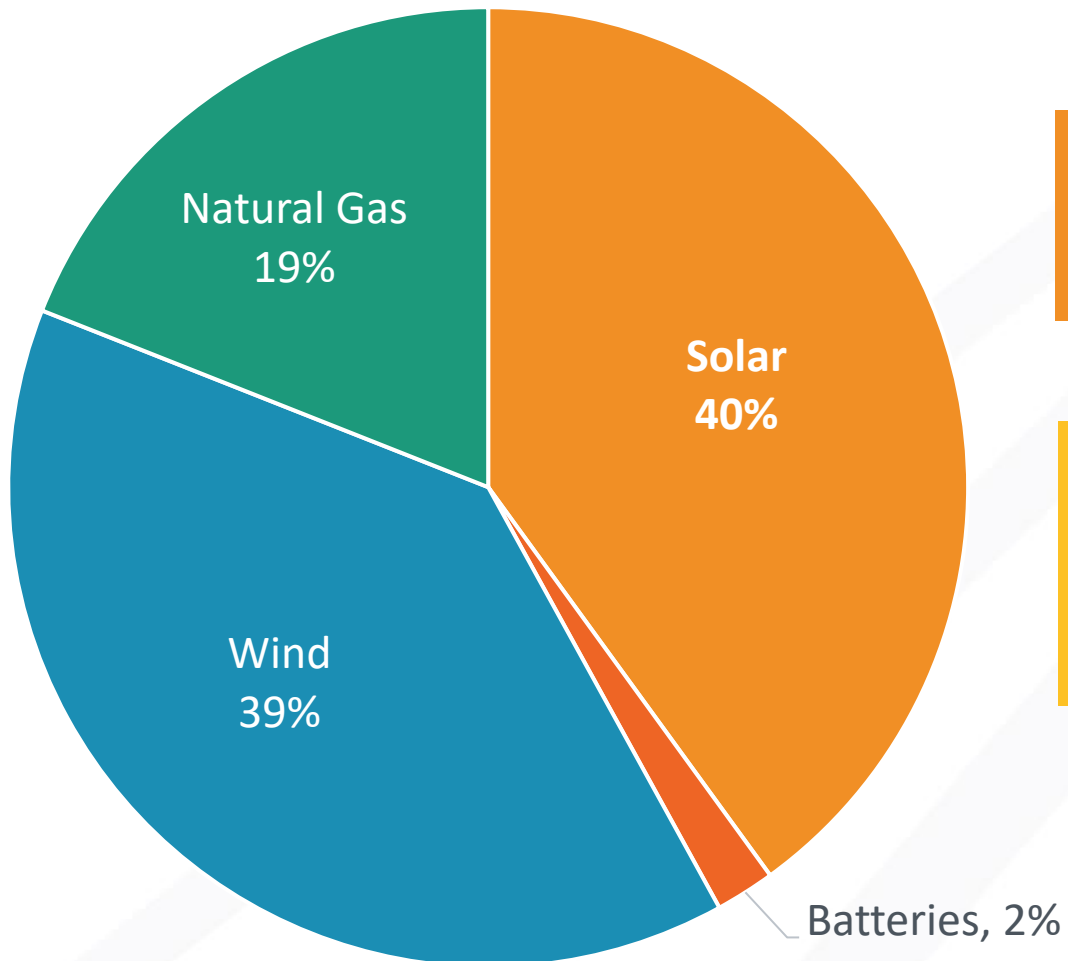


*Price is depicted as levelized cost of energy (LCOE)

Sources: National Renewable Energy Laboratory, "U.S. Solar Photovoltaic System Cost Benchmark: Q1 2019"; Wood Mackenzie Power & Renewables/SEIA U.S. Solar Market Insight.

Solar is One of the Fastest Growing Energy Sources in America

New Capacity in 2020



In 2020, solar PV represented **40%** of all new electricity capacity installed in the United States.

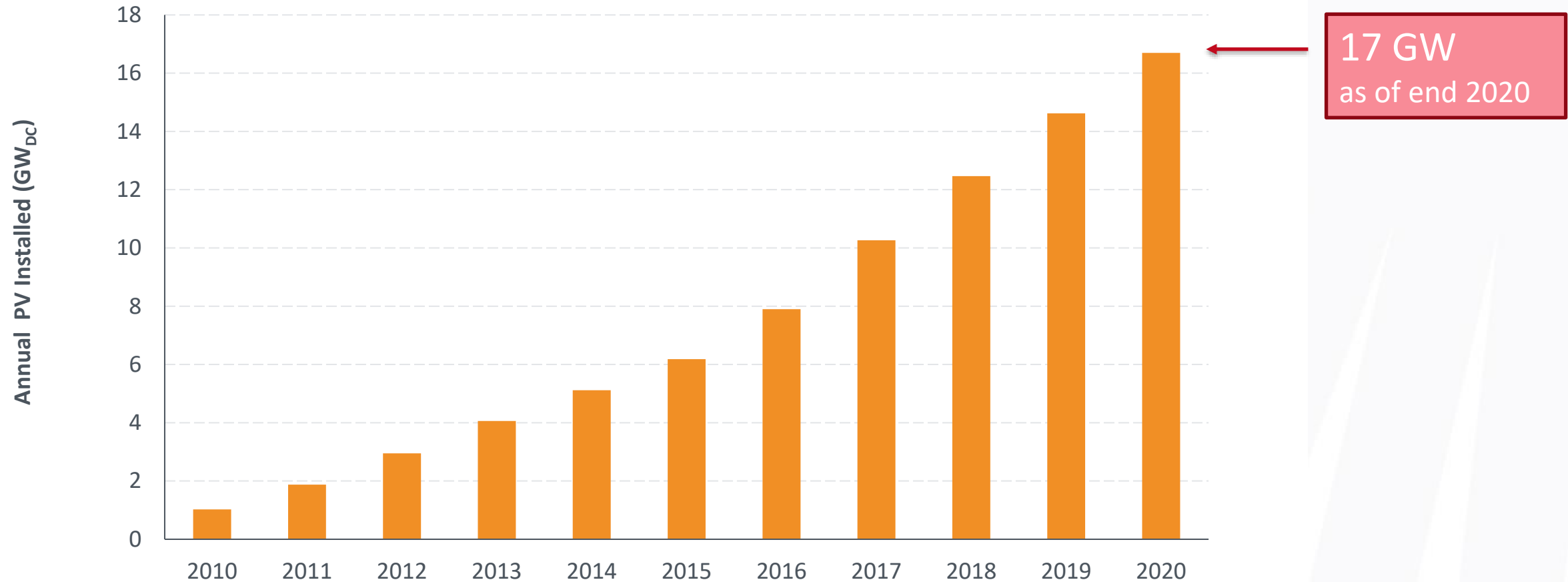
Solar energy represented **33%** of new capacity additions **over the past 5 years** and now supplies over 3% of the nation's annual U.S. electricity.

What *is* commercial-scale solar?

- Wide **range of solar customer use-cases** that are categorized as commercial:
 - Office buildings, retail shops, data centers, and hotels
 - Also: Hospitals, schools, universities, government and non-profit buildings
- Commercial-scale solar systems are generally between **100 kW and 2 MW**
- Commercial-scale solar can be deployed on a **rooftop or ground-mounted**
 - Average commercial **rooftop** system is around **200kW**
 - Average commercial **ground-mounted** system is around **500kW**
- Two types of **commercial-scale financing models**:
 - Owning the solar power generating system
 - Purchasing the solar power from a third-party

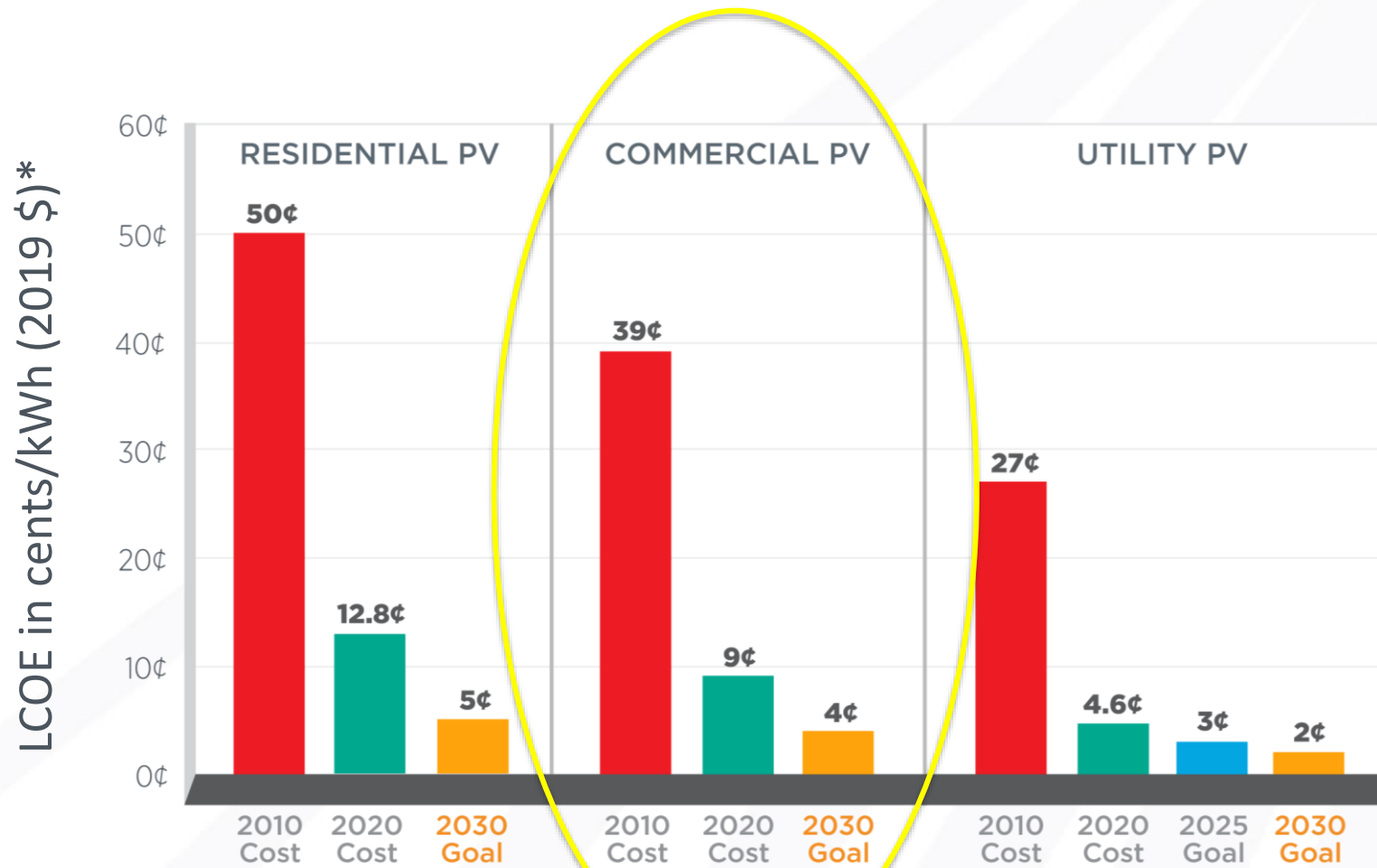
Total Commercial-Scale PV Installed (cumulative)*

* Includes community solar



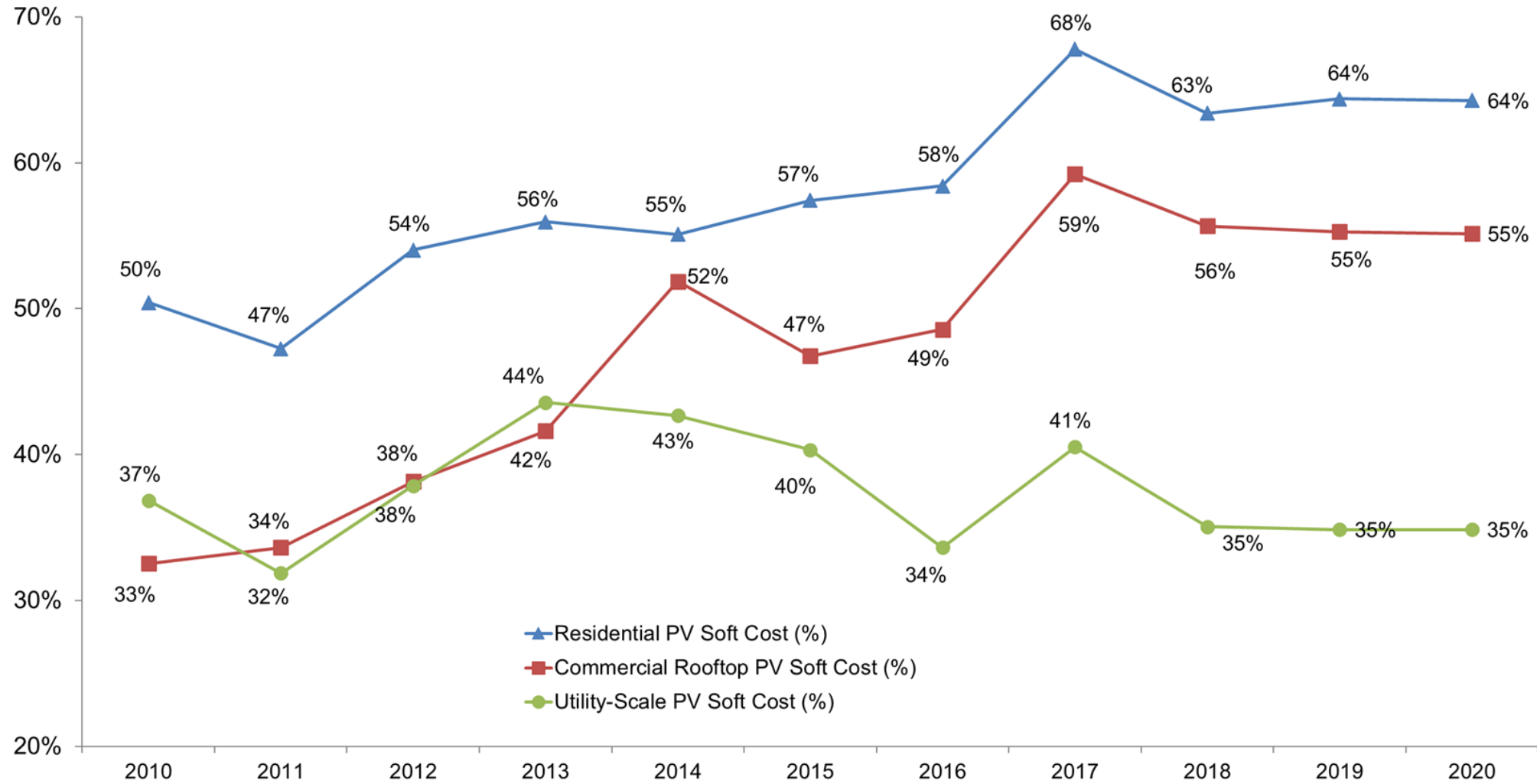
Progress and Goals: 2030 Photovoltaics Goals

The 2030 goal for Commercial PV is \$0.04/kWh.



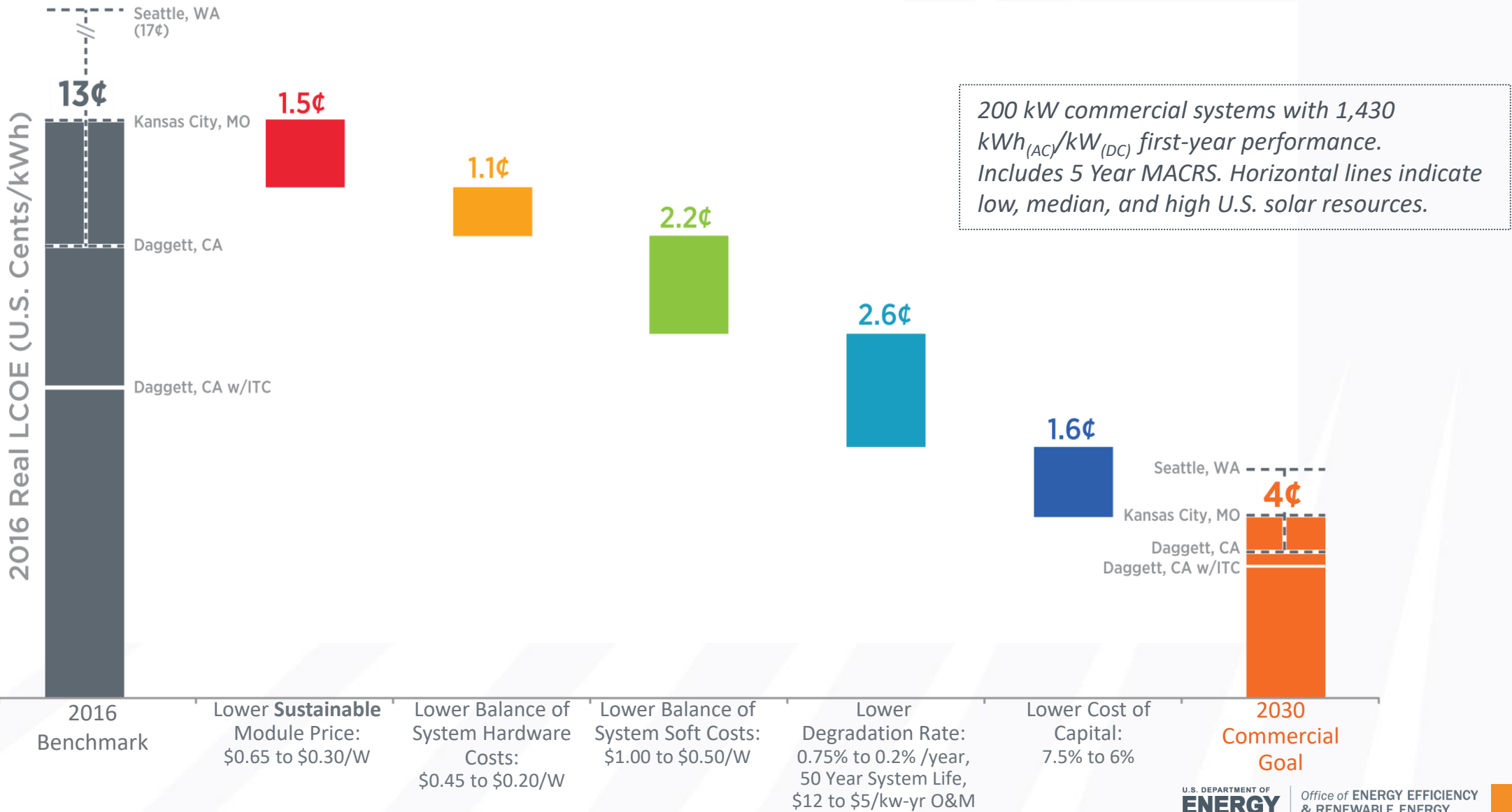
*Levelized cost of energy (LCOE) progress and targets are calculated based on average U.S. climate and without the ITC or state/local incentives. The residential and commercial goals have been adjusted for inflation from 2010-19.

Solar Soft Costs (as Percentage of Total Cost)

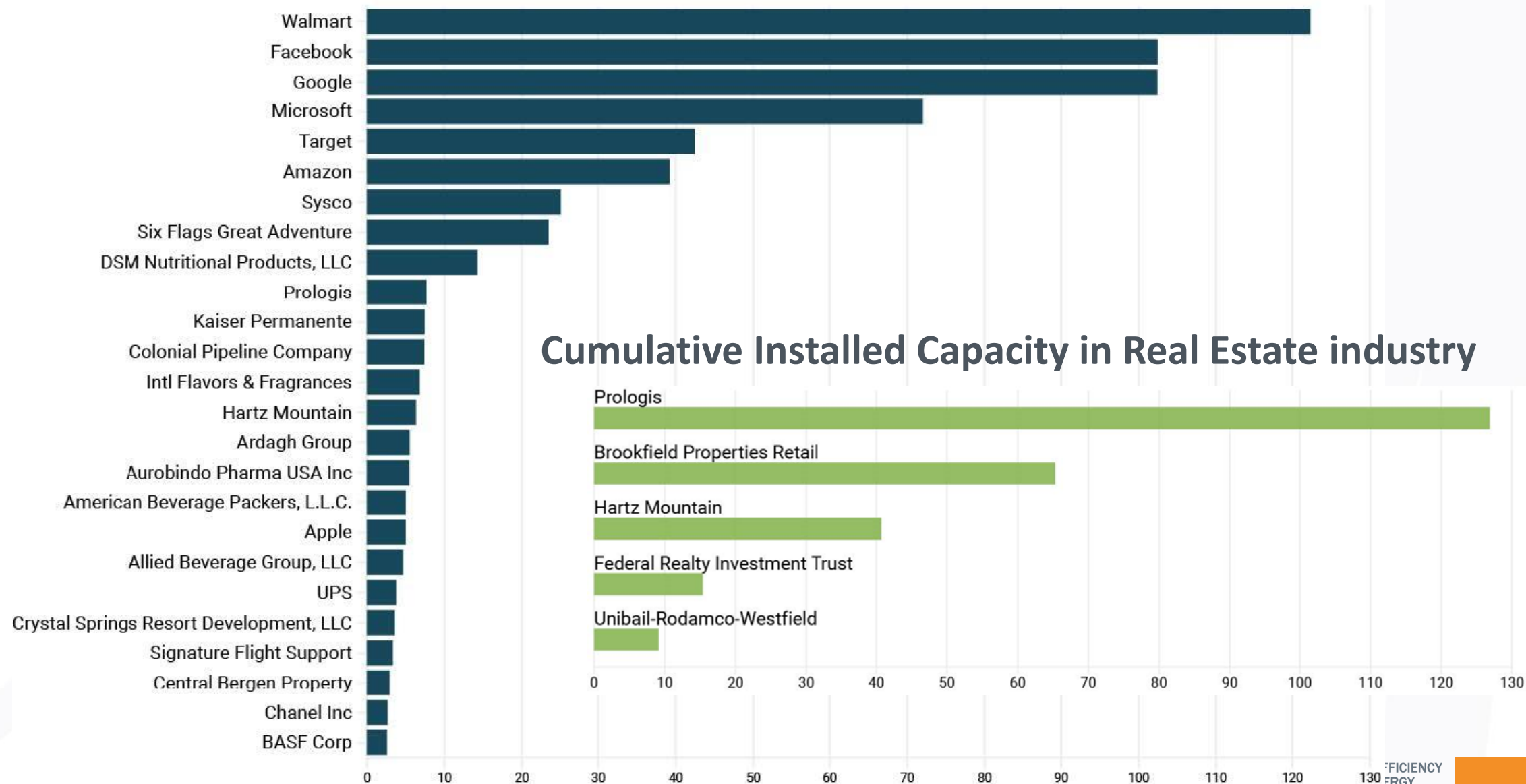


Source: National Renewable Energy Laboratory "U.S. Solar Photovoltaic System and Energy Storage Cost Benchmark: Q1 2020 ."

A Pathway To \$0.04 per kWh for Commercial PV

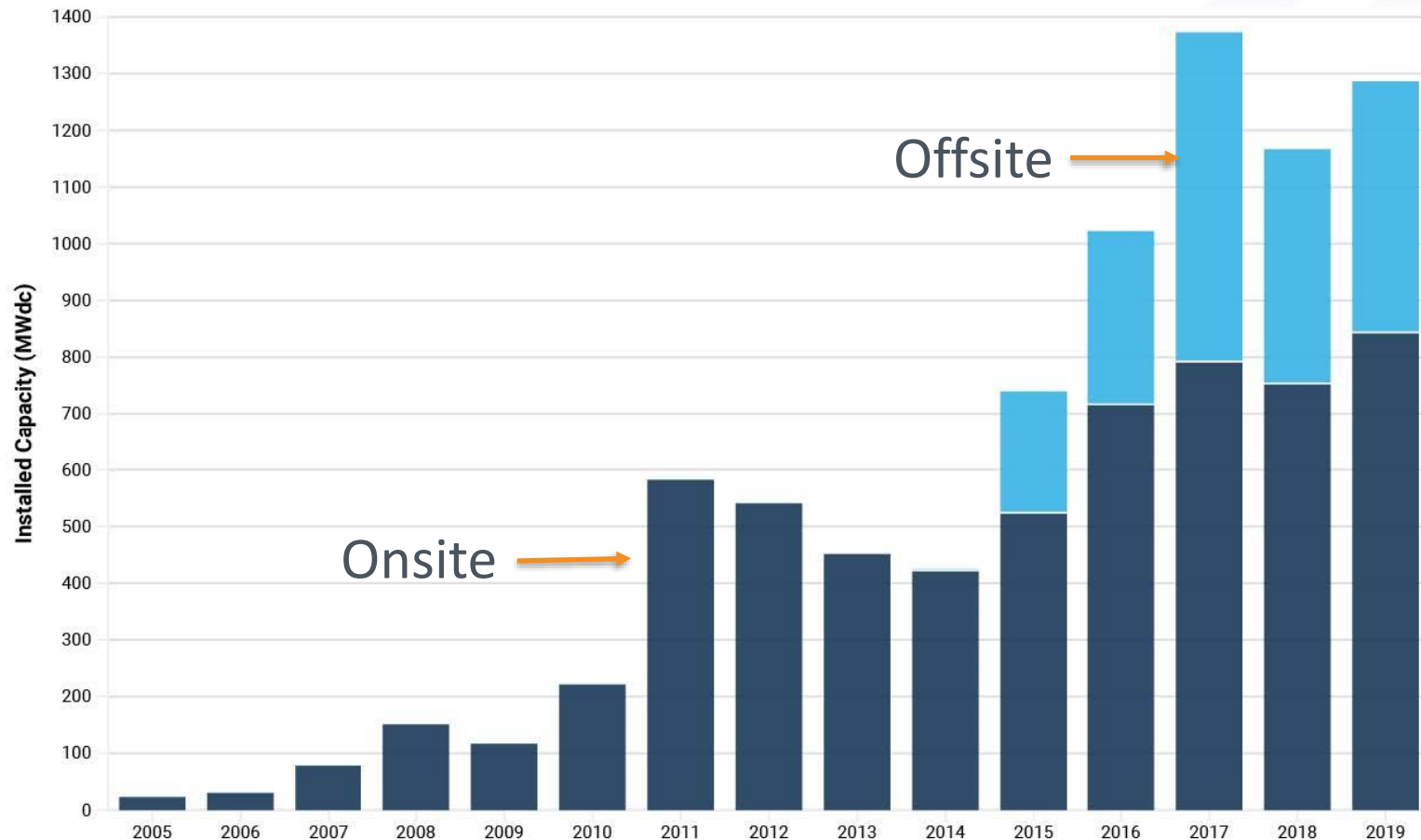


Top 25 Corporate Users by Solar Capacity Installed (2019)



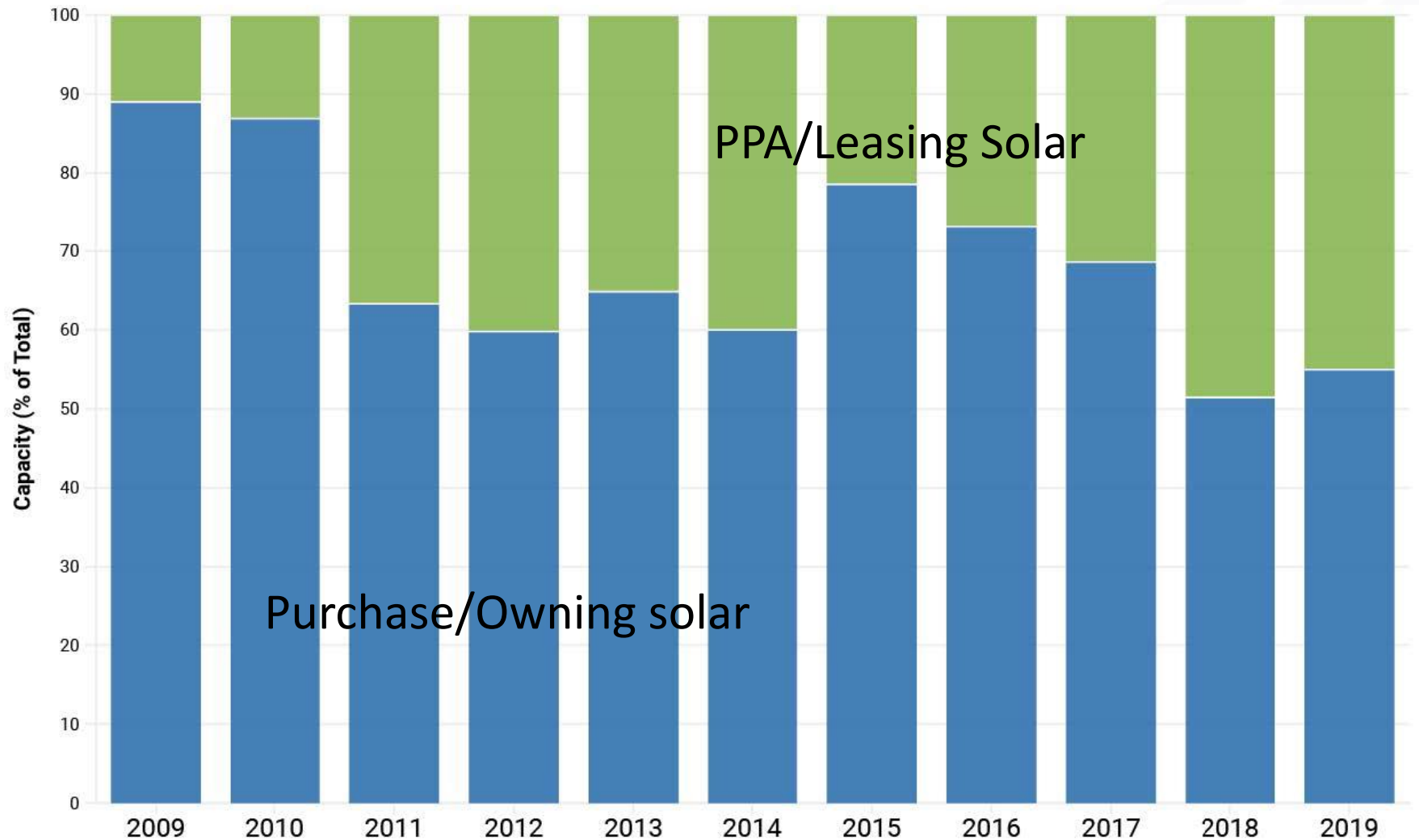
SEIA, "Solar Means Business." October 2020.

Corporate Solar Installations Over Time (Onsite vs Off)



Most corporate solar installations have been completed in the past 5 years, with about 1/3 of those systems located offsite

Corporate Solar Financing Types



PPAs offer value to businesses via the low upfront investment, limited risk, and predictable long-term electricity rates

Companies often choose to own solar (or solar credits) from their systems to meet policy commitments

Solar Energy Innovation Network

The Solar Energy Innovation Network is a collaborative program that supports multi-stakeholder teams to develop and share solutions to real-world challenges associated with solar energy deployment.

APPROACH

- Directly fund teams (up to \$200,000) to work on community-driven innovative ideas
- Technical assistance (TA) and facilitation support to test those innovative ideas
- Peer networking to facilitate participant learning and strengthen outcomes
- TA to enable replication of solutions in other locations

ROUND 3 TOPIC

- **Advancing equity in residential and commercial solar deployment** and overcoming barriers to solar adoption in underserved communities



**SOLAR ENERGY
INNOVATION
NETWORK**



Lawrence Berkeley
National Laboratory



Round 2 Project: Overcoming Barriers to Community Shared Solar Plus Storage on NYC Rooftops



SOLAR ENERGY
INNOVATION
NETWORK
U.S. DEPARTMENT OF ENERGY

TEAM

- **Lead organization:** City University of New York (CUNY) Smart DG Hub
- **Team members:** Con Edison, the New York Power Authority, the Electric Power Research Institute (EPRI), Underwriters Laboratories (UL), and the Real Estate Board of New York (REBNY)

PROJECT

- Develop a **blueprint for overcoming barriers** to the installation of community solar on commercial/ industrial rooftops in NYC and **modeling economics** of community solar from the perspective of host sites.

DELIVERABLES

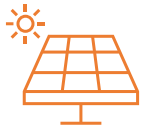
- **Identified barriers** for community shared solar and community shared solar+storage on NYC rooftops
- **Compiled solutions** for overcoming barriers: policy and regulation, economics and value streams, liability and risk management, and education and outreach.
- **Spreadsheet tool**, Evaluating Distributed Generation Economics (EDGE), that building owners can use to assess the benefits of hosting community shared solar/storage on their rooftops.

Project materials will be available at:

<https://www.nrel.gov/solar/solar-energy-innovation-network.html>

National Community Solar Partnership

Coalition of community solar stakeholders working to expand **access to affordable community solar** to every U.S. household by 2025 and enable communities to realize other benefits, such as increased resiliency and workforce development.



Network

Partners can access an online community platform, virtual/in-person meetings, webinars and other tools to engage with DOE, National Labs, and each other.



Community Engagement

Launching stakeholder engagement effort on 5/4, announcing a request for information, and series of convenings to take place in June/July. This process is to inform our goals and a pathway to achieve them.



Collaboration

Structured groups of partners form around specific topic areas and/or sectors to address common barriers and goals by learning from each other and sharing resources supported by DOE, and National Labs, and other external partners.



Opportunity

Through the stakeholder engagement process, we will clearly identify the barriers to rapid deployment and access, meaningful benefits, and community wealth building. Identify metric goals and partner commitments.



Technical Assistance

Partners have access to resources and direct technical assistance from DOE, National Labs, and third-party subject-matter experts to support local challenges.



Action Plan

Once input on challenges and opportunities for community solar has been collected, metric goals will be developed and finalized. An action plan that outlines a pathway to achieve goals will be announced.



Office of ENERGY EFFICIENCY
& RENEWABLE ENERGY

SOLAR ENERGY TECHNOLOGIES OFFICE

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Solar Energy Technologies Office

<https://www.energy.gov/eere/solar/solar-energy-technologies-office>

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HXE Partners

ESG and Solar: The Financial and
Environmental Benefits for a Portfolio

PREPARED FOR:



OUR STORY & APPROACH

A team of sustainability and Environmental, Social and Governance (ESG) veterans

OUR APPROACH:

WE HELP CLIENTS
DEVELOP & IMPLEMENT SUSTAINABILITY, ESG STRATEGIES
FOR THEIR STAKEHOLDERS

STRATEGY DEVELOPMENT **SET GOALS**

We start by figuring out where clients are on the sustainability spectrum and what is driving the demand to develop, maintain, or improve their sustainability programs.

IMPLEMENTATION & MANAGEMENT **EXECUTE**

We help clients get things done.
We work with them to develop the appropriate infrastructure and processes to implement their sustainability programs.

INVESTOR REPORTING & RECOGNITION **GET CREDIT**

We work with clients to maximize the credit they get for their achievements and communicate their successes to their internal and external stakeholders.

OUR MISSION & VALUES

With an aligned mission & values,
WE ARE PARTNERS IN OUR
CLIENTS' SUCCESS

OUR MISSION:

Help clients set and implement their
environmental, social, & governance
(ESG) goals and earn recognition
for their achievements

OUR VALUES



CLIENT SERVICE

Exceeding expectations is our baseline
for measuring success



MAKE THINGS BETTER

Always looking for ways to get better



OPENNESS

Open to always learning and receiving
feedback



RELIABILITY

Serve as a reliable and trusted partner



DILIGENCE

Be ready for anything that comes our way

WHAT IS ESG?

Environmental, Social and Governance (ESG) factors are industry and company specific

ESG is...

A holistic way to evaluate how a company manages relevant risks and opportunities from internal and external Environmental, Social and Governance factors

SAMPLE ESG FACTORS



ENVIRONMENTAL

RENEWABLE ENERGY

- Climate risk
- Environmental regulation
- Resource management
- Water conservation



SOCIAL

- Human capital management
- Diversity & inclusion
- Health & safety
- Community relations
- Supply chain



GOVERNANCE

- Board composition
- Executive compensation
- Shareholder rights
- Strategy and culture
- Cybersecurity

KEY FIGURES

\$23 TRILLION

Of global investment incorporating ESG strategy (1/4 of investments)²

73%

Of investors take ESG issues into account in their investment analysis and decisions³

2,945

Signatories to the United Nations Principles for Responsible Investment⁴

References

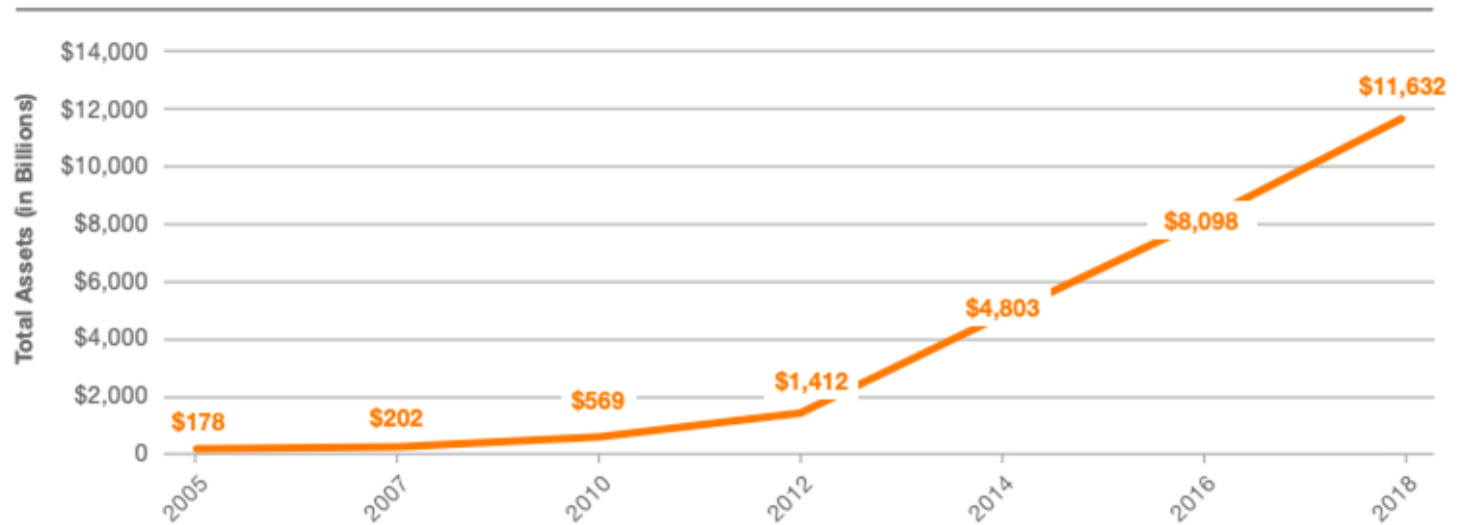
1. US SIF Sustainable and Impact Investing- [Money Managers 2018](#)
2. Morgan Stanley [Sustainability Signals 2018](#)
3. CFA Institute [Environmental, Social, & Governance \(ES&G\) Survey 2017](#)
4. [UNPRI signatories](#) as of Feb. 12, 2020

INVESTOR FOCUS ON ESG

Environmental, Social and Governance (ESG) Factors Can Identify Risks And Opportunities In Investments

INCREASED FOCUS ON ESG INCORPORATION BY US MONEY MANAGERS¹

Growth of ESG Incorporation by Money Managers 2005–2018



BlackRock

“Our investment conviction is that sustainability- and climate-integrated portfolios can provide better risk-adjusted returns to investors.”

LARRY FINK, BLACKROCK CEO
2020 Letter to CEOs

FRAMEWORKS & REPORTING LANDSCAPE

Disclosures & publicly available data are opportunities for differentiation



Companies disclose ESG data to build corporate reputations with customers, comply with regulatory agreements, respond to investor disclosure requests and demonstrate responsible risk management oversight.¹

REPORTING MOMENTUM

\$4.1 TRILLION

In Gross Asset Value (GAV), across 100,000+ properties from 903 entities, responded to the 2019 Global Real Estate Benchmark (GRESB)¹

80%

Increase in Fitwel certifications between 2017 and 2018²

References

1. 2018 GRESB Real Estate [Results](#)
2. Fitwel [Press Release](#), February 2019

REAL ESTATE REPORTING & RECOGNITION

Industry specific programs that cover a range of asset types

PORTFOLIO



ASSET



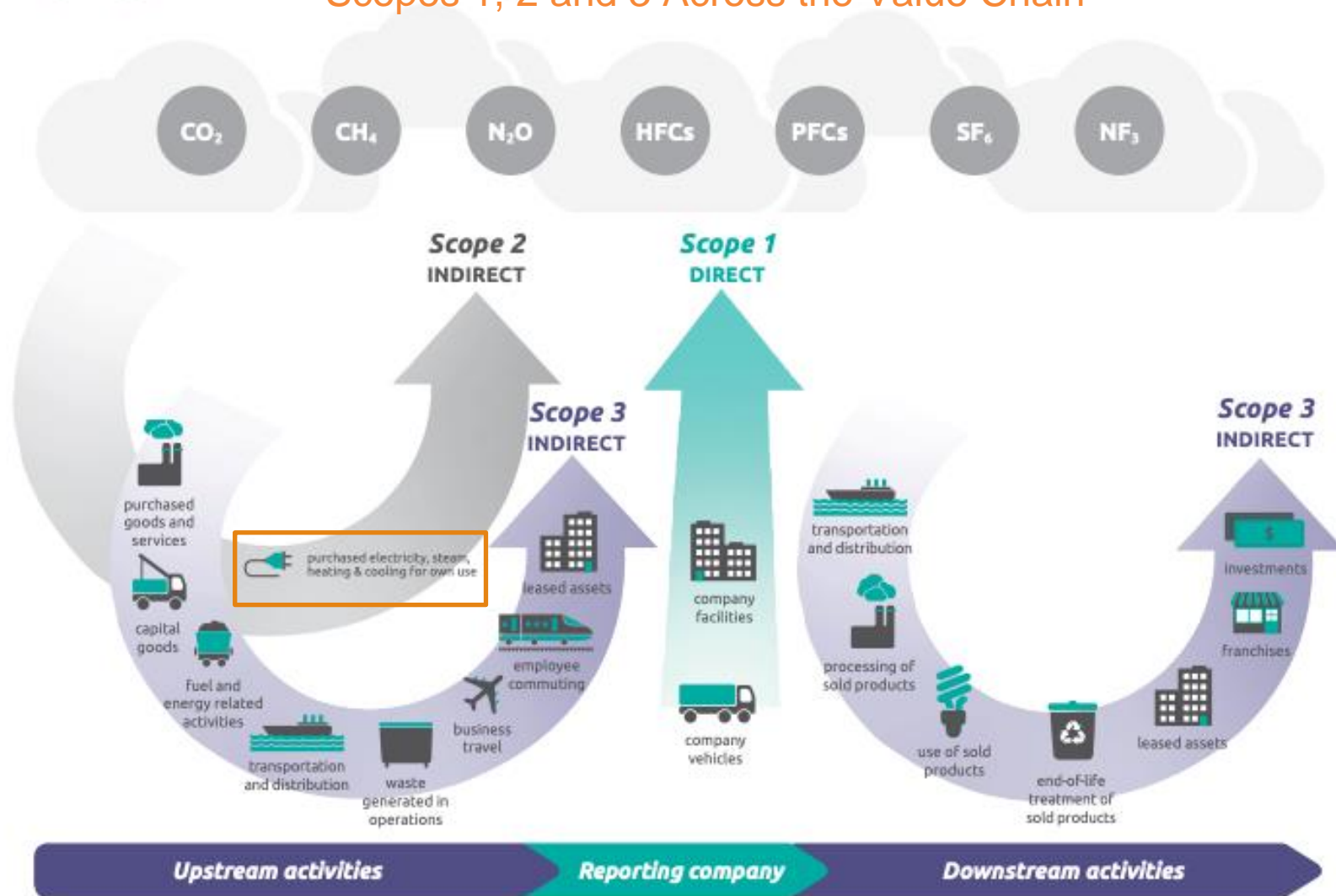


15 EMISSIONS CATEGORIES

1. Purchased Goods and Services
2. Capital Goods
3. Fuel & Energy Related Activities
4. Upstream Transportation and Distribution
5. Waste Generated In Operations
6. Business Travel
7. Employee Commuting
8. Upstream Leased Assets
9. Downstream Transportation and Distribution
10. Processing of Sold Products
11. Use of Sold Products
12. End-of-Life Treatment of Sold Products
13. Downstream Leased Assets
14. Franchises
15. Investments

OVERVIEW OF GREENHOUSE GAS EMISSIONS

Scopes 1, 2 and 3 Across the Value Chain



Source: Greenhouse Gas Protocol:
https://www.ghgprotocol.org/sites/default/files/ghgp/standards/Scope3_Calculation_Guidance_0.pdf

SOLAR BUSINESS MODELS

Financing strategies for implementing solar across your portfolio

Type	Benefits	Tradeoffs
Owner-Financed (Loan)	<ul style="list-style-type: none">• Full ownership of solar system• Fixed monthly payment• Remove exposure to energy price volatility	<ul style="list-style-type: none">• Responsible for maintenance expenses• Must be able to utilize tax credits• Requires upfront capex/bank financing
Operating Lease	<ul style="list-style-type: none">• Own solar system at end of lease term• Fixed monthly payment• Remove exposure to energy price volatility	<ul style="list-style-type: none">• Responsible for maintenance expenses• Requires credit check with lease provider
Roof Lease	<ul style="list-style-type: none">• Long-term secure revenue stream• Increase property value• No maintenance costs	<ul style="list-style-type: none">• Only available in certain markets; programs often limited and highly competitive
Power Purchase Agreement (PPA)	<ul style="list-style-type: none">• Save money from day one• No maintenance costs• Remove exposure to energy price volatility	<ul style="list-style-type: none">• Requires credit check with PPA Provider• Incentives go to the PPA Provider

Source: Provided by SolarKal, 2021.

SOLAR IMPROVES ESG SCORES

Solar Procurement Targets Satisfy Investor Sustainably Reporting Expectations

K I L R O Y

2020 SUSTAINABILITY REPORT



CARBON NEUTRAL OPERATIONS ACHIEVEMENT

“In 2020, we fulfilled the promise that KRC CEO John Kilroy announced at the 2018 Global Climate Action Summit: that we would achieve carbon neutral operations [...] by year end 2020. We focused on the following strategies to achieve carbon neutral operations...”



ON-SITE RENEWABLES

We have solar photovoltaics installed on 15 of our properties. These systems generated approximately 3% of the total energy consumed by the KRC portfolio in 2020, and we estimate that the solar will generate 2% of the total energy consumed after COVID-19 re-occupancy.



OFFSITE RENEWABLES

We entered into an agreement for a large offsite solar array currently under development that will, when complete in 2023, fully address the electricity consumption of our directly managed properties. We chose to enter an offsite power purchase agreement to ensure additionality. The concept of additionality indicates that this renewable power would not have been added to the grid in the absence of our intervention. We believe that focusing our strategy on additionality will produce the most positive environmental impact. In addition, we procured 100% Green-e certified renewable power for certain properties from several of our energy providers, including the Clean Power Alliance, San Diego Gas & Electric, and Peninsula Clean Energy.

Source: <https://kilroyrealty.com/sites/default/files/2020%20KRC%20Sustainability%20Report.pdf>

SOLAR IMPROVES ESG SCORES

Solar Procurement Targets Satisfy Investor Sustainably Reporting Expectations



Source: https://sustainablecampus.cornell.edu/sites/default/files/2020-08/2019-2020%20cornell%20university%20annual%20report%20-%20full%20media_0.pdf

Carbon Neutrality

Cornell University has successfully reduced greenhouse emissions, which lead to climate change, by a third since its original 2008 baseline. The annual greenhouse gas inventory details this progress, and new areas of consideration and reporting on Cornell's footprint.

In FY2019, students completed an initial survey of Cornell's purchasing emissions impact. This study will be used to continue understanding where our community can make the biggest impact to model climate mitigation and sustainability, in every part of our habits and supply chain.

Here are some highlights on our path to carbon neutrality:



**18%
increase**

in clean and renewable electricity since 2012.

Green energy accounts for 20% of Cornell's total electricity needs, compared to 2.3% in 2013.



North Campus Rooftop Solar Arrays

Cornell is constructing rooftop solar arrays on all five buildings of the North Campus Residential Expansion. The solar power from this project will reduce the university's carbon footprint by providing about 35% of the power needed for the new buildings.



Renewable Energy NY Consortium

The newly launched NY Higher Education LSRE Project, formed of 20 State University of New York and private NYS higher education institutions, joined together to lower financial barriers to renewable energy procurement through combined purchases of large scale renewable energy.

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HXE Partners

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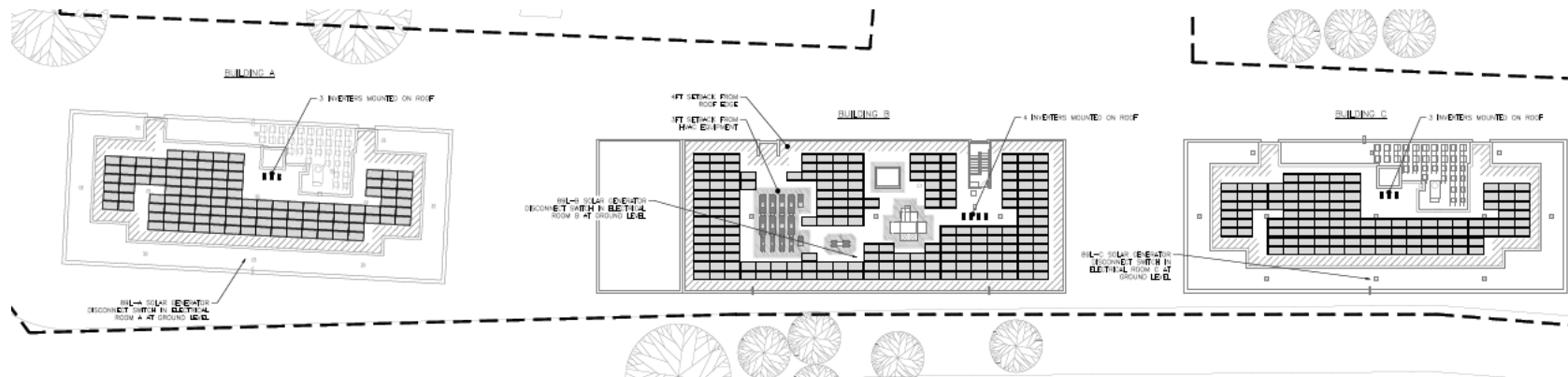
Solar Power in Commercial Development

Multifamily Case Studies

- **Why** Solar
 - Sustainability Goals
 - Cash Flow
 - Marketing
- **What** to consider
 - Local Utility Rates
 - State and Federal Incentives
 - Cash Purchase vs Operating Lease vs Power Purchase Agreement (PPA)
- **When** to implement
 - During Construction – Case Study: Mamaroneck
 - During Design – Case Study: Jersey City

Case Study: Mamaroneck

- Status: Completed
- 120 KW Mechanically Attached System
- Design challenges
- \$300,000 System cost
- 7-year payback
- \$20,000 annual utility savings



Case Study: Jersey City

- Status: Under Construction
- 250 KW Ballasted System
- Design Considerations
- Anticipated \$475,000 system cost
- 4-year payback
- \$35,000 annual utility savings
- Anticipated \$25,000 annual SREC revenue (local NJ incentive)



A photograph of the Cornell University tower at sunset. The sun is low on the horizon, creating a warm orange glow. The tower is silhouetted against the bright sky, with the sun partially visible through its arched windows. Trees are silhouetted in the foreground and background.

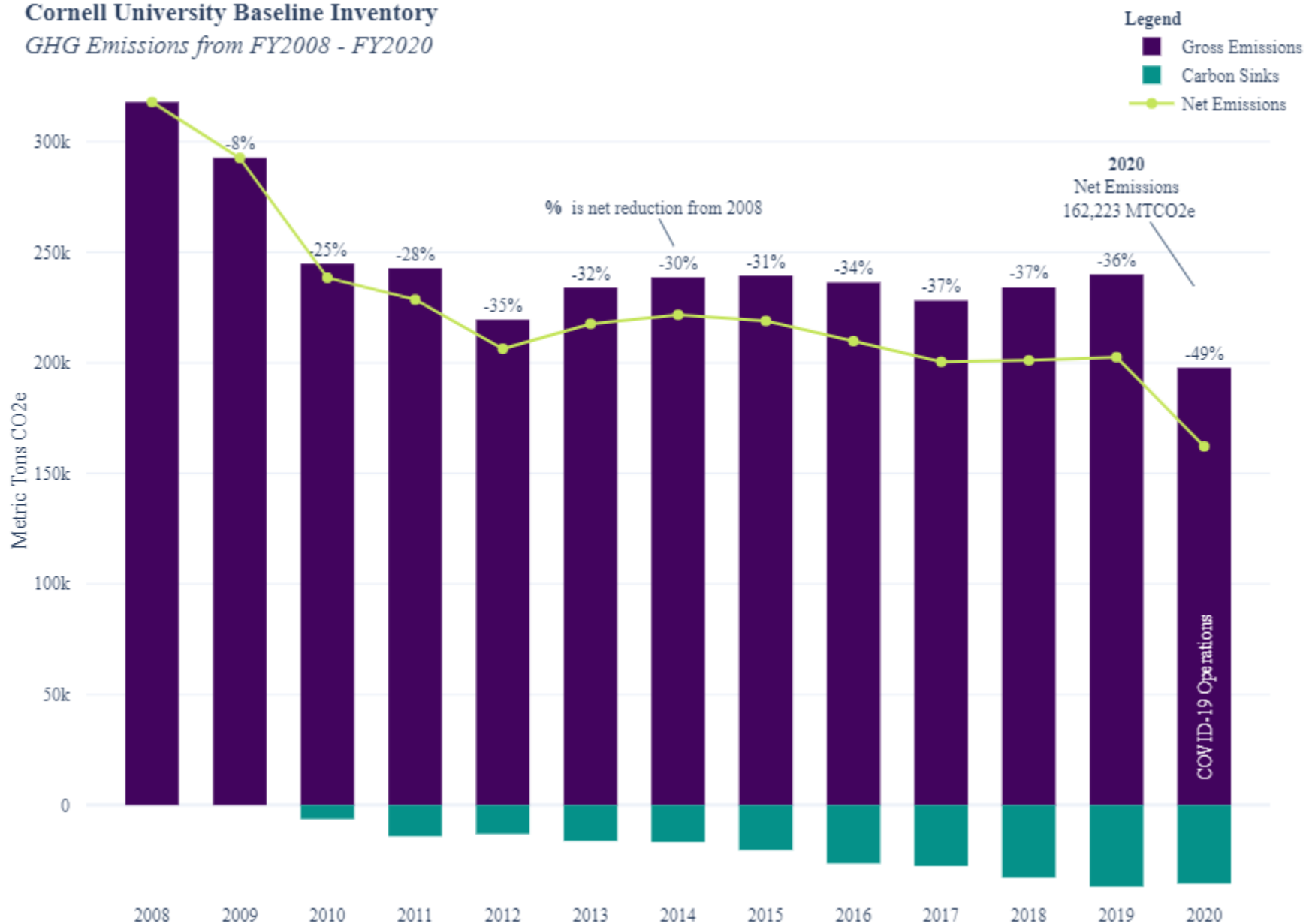
Cornell University Onsite Rooftop Solar

One of two founding principles of Cornell University was originally spoken by Ezra Cornell on October 7, 1868, at the official dedication of Cornell University:

“I would found an institution where any person can find instruction in any study.”



Cornell University Baseline Inventory GHG Emissions from FY2008 - FY2020



Climate Action Plan

AVOID



Avoid carbon-intensive activities

REDUCE



Reduce energy demand with aggressive energy conservation and engagement programs

REPLACE



Replace fossil fuels with low-carbon renewable energy

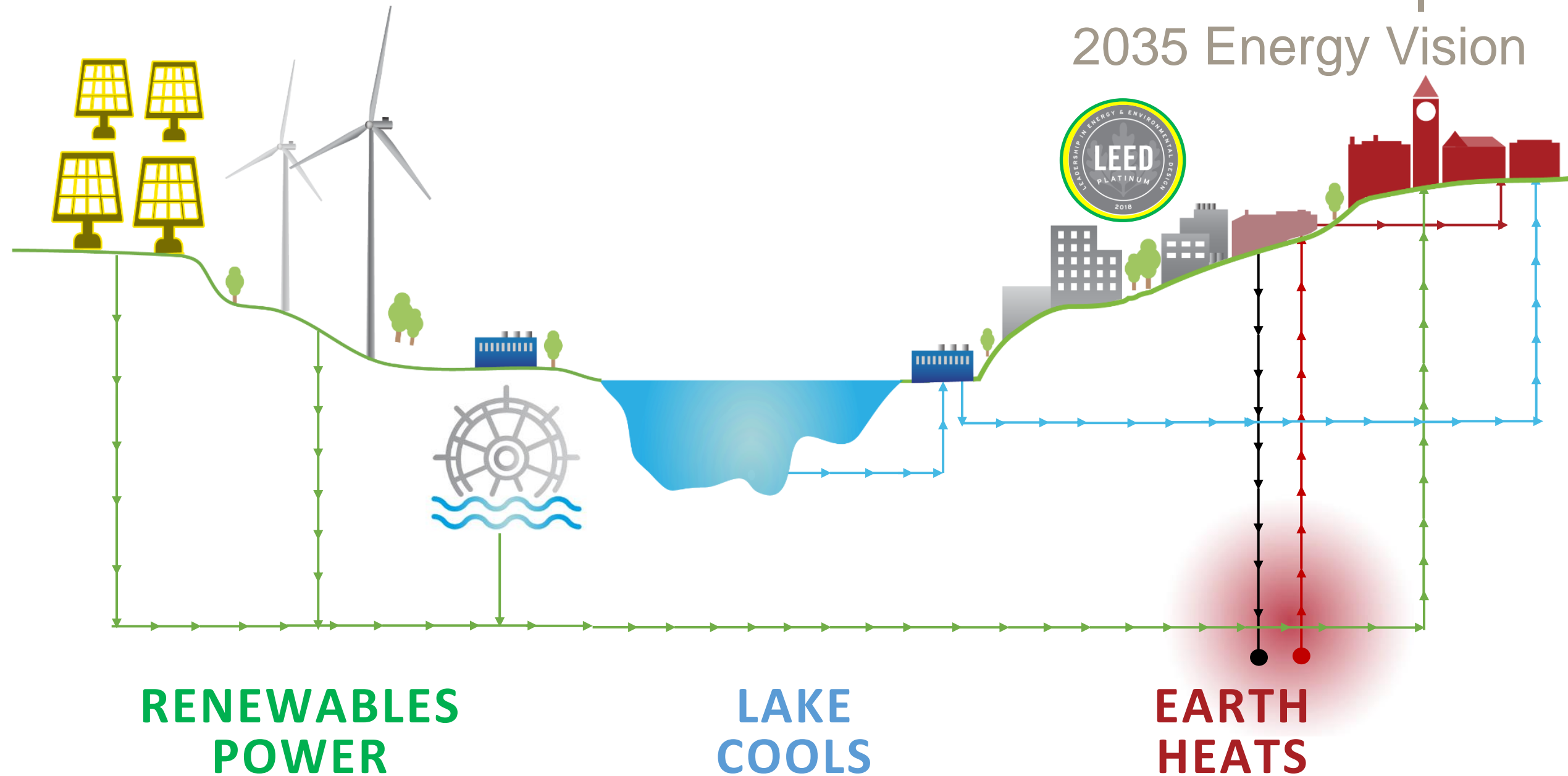
OFFSET



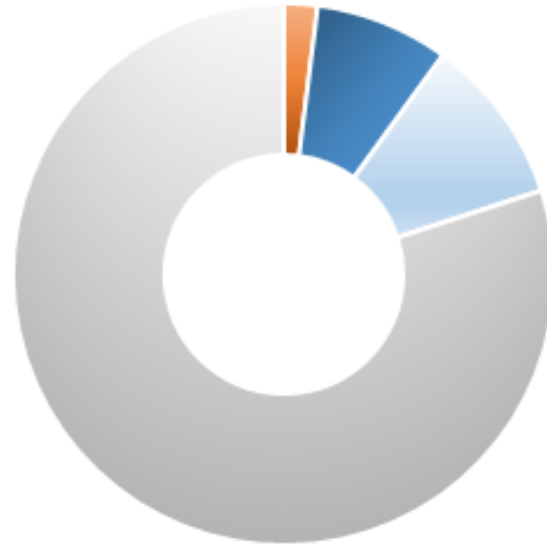
Offset what remains with actions connected to our mission

ENGAGEMENT PROGRAMS ARE THE KEY TO **AVOID** / **REDUCE**

Every member of the campus must help eliminate redundancy and waste as we invest in new technologies

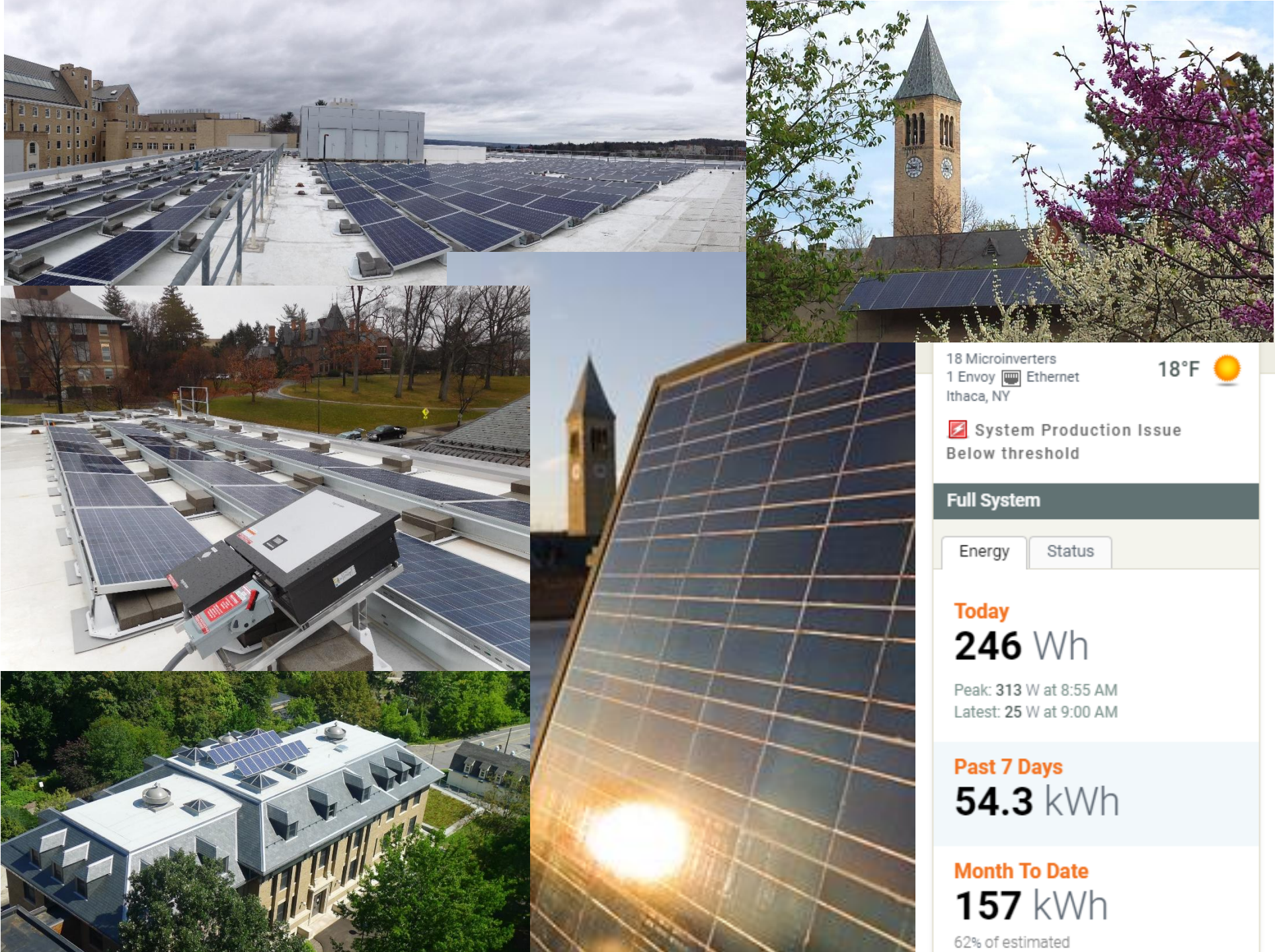


Progress Toward 100% Renewable Electricity



- Hydroplant
- Solar PV Farms and Campus Rooftop Arrays
- Cascadilla Community Solar Farm at Cornell University
- Remaining Need

Cornell Rooftop Solar PV

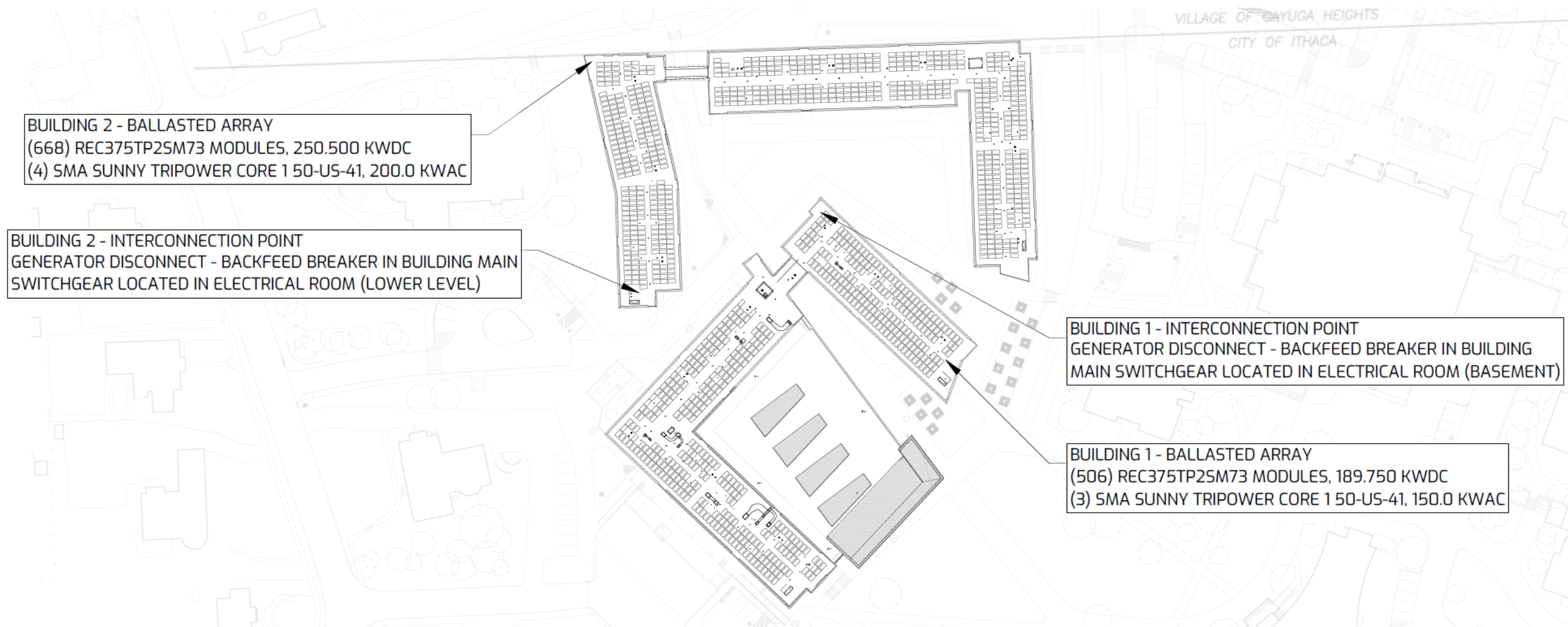


NCRE Rooftop Solar Case Study

- 1 MW = 1,280 MWh/yr
 - Equivalent to 35% of NCRE annual electric load
- Standard power purchase agreement (PPA)
 - Power and RECs sold to Cornell
 - Offsets campus power @ billed rate
 - Developer keeps O&M responsibility
- Five proposals received
 - 20-30 year terms
 - Flat, 1% and 2% annual escalators

Project Analysis & Selection Process

- How can we maximize the overall benefit?
 - Identify quadruple bottom line goals
 - Qualitative scoring and weighting criteria
- How can we minimize the risks?
 - Establish economic thresholds, deal breakers and fatal flaws
 - Quantitative analytics
 - Portfolio approach
 - PPA structure
 - Offset existing energy exposure
 - Commodity reserve







Q&A

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