



Sharing the Sun: Community Solar Deployment and Subscriptions (as of June 2023)

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November 2023

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Introduction

- The community solar market analysis presented here is based primarily on data collected through Sharing the Sun, an initiative of the [National Community Solar Partnership \(NCSP\)](#).
- Sharing the Sun data collection and analysis is conducted by the National Renewable Energy Laboratory (NREL) as part of its support for implementation of the NCSP.
 - NREL first released a data set of community solar projects in 2018 and updates it annually (at minimum). The July 2023 release and the data collection methodology is available from NREL's Data Catalog at <https://data.nrel.gov/submissions/220>.
 - The dataset presents project level information such as location, capacity, operating utility, and year of interconnection. The dataset is created from multiple data sources like utility data, public utility commissions, project developer websites, media releases, primary data collection by NREL, and data provided by developers under nondisclosure agreements.
 - This presentation builds on a previous analysis of the community solar project dataset, [Community Solar Deployment, Subscription Savings, and Energy Burden Reduction](#) (2021).
 - The University of Minnesota contributes to this effort.
- NCSP is led and funded by the U.S. Department of Energy Solar Energy Technologies Office.

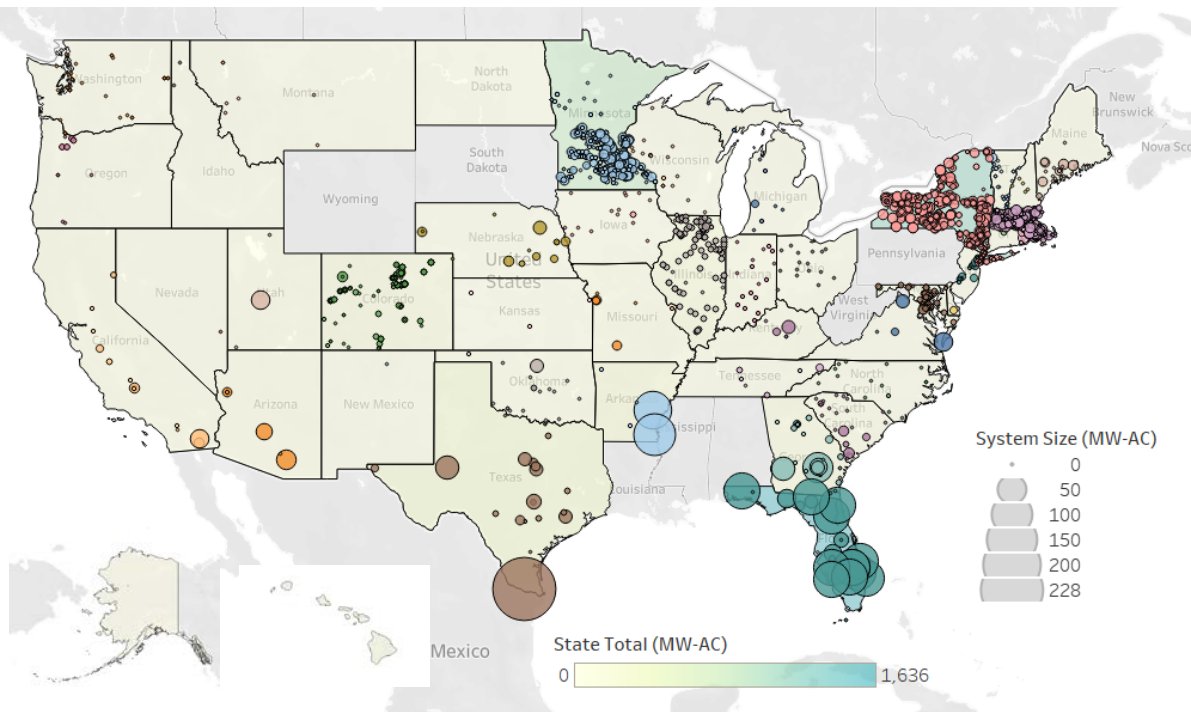
Market Status

A summary of data on community solar deployment over time, by state, and by project characteristics.

What is Community Solar?

The U.S. Department of Energy (DOE) defines community solar as:
Any solar project or purchasing program, within a geographic area, in which the benefits flow to multiple customers such as individuals, businesses, nonprofits, and other groups. In most cases, customers benefit from energy generated by solar panels at an off-site array.

Community Solar Capacity by State



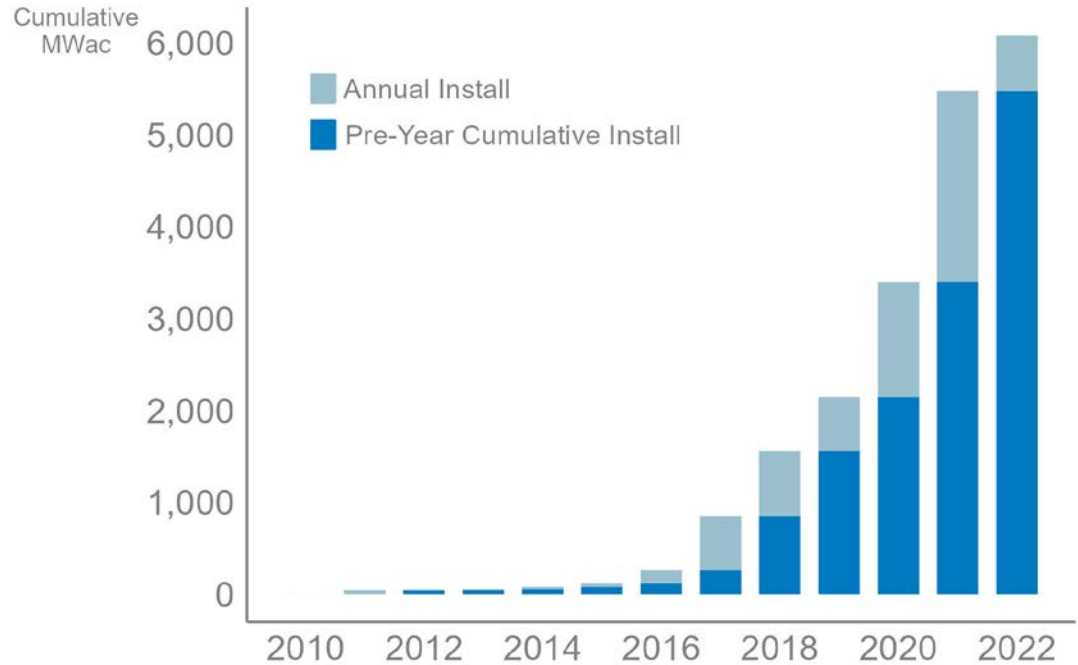
- **Total Community Solar Capacity:** As of the close of 2022, our estimate indicates a total community solar capacity of 6,081 MWac, distributed across 2,550 projects in 43 states and the District of Columbia.
- **State Variability:** The distribution of community solar capacity among states ranges from 0 to 1,636 MWac. Notably, Florida claims the top position in terms of community solar deployment.
- **Visual Representation:** The bubbles on the chart represent individual project sizes, ranging from 0 to 228 MWac. Each state is distinguished by a unique color, allowing for clear differentiation.

Community solar projects in the United States

Data Source: NREL [Sharing the Sun Project List 2022](#)

The Rapid Growth of Community Solar

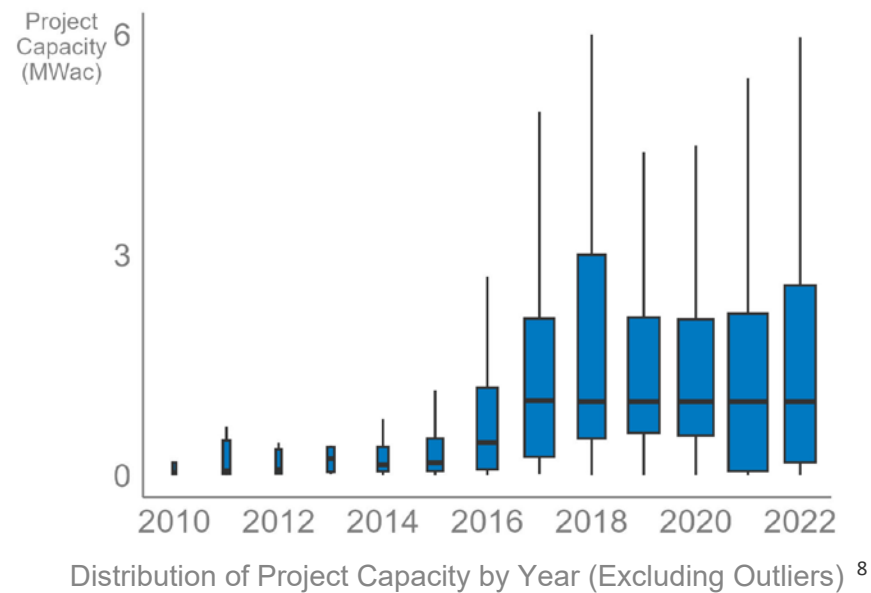
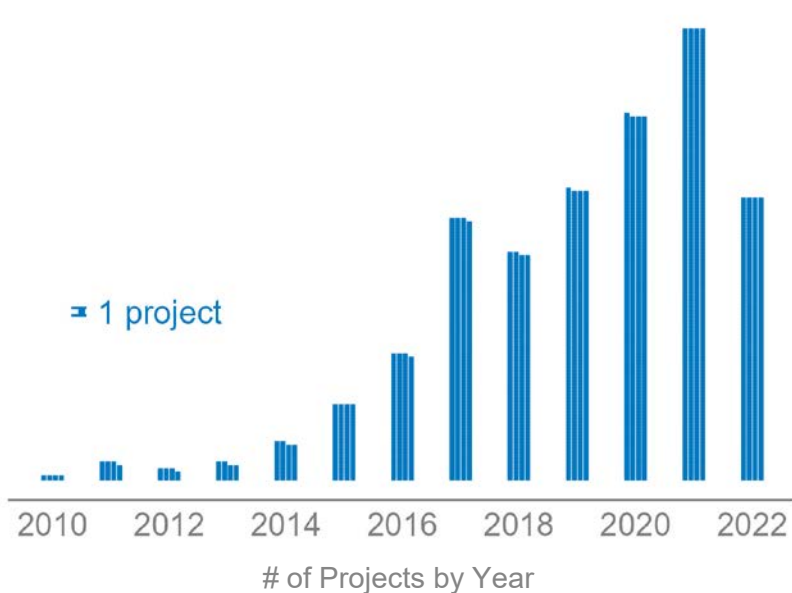
- The capacity of community solar installations has grown rapidly since 2016. In 2021, over 2 GWac were installed, the greatest annual installation amount to date.
- About 604 MWac of new community solar projects came online in 2022.
- Growth in 2021–2022 was 111%, compared to 161% in 2020–2021, likely due to the impact of COVID-19, the supply chain slowdown, siting, and interconnection challenges.



Community solar capacity (MWac) by year

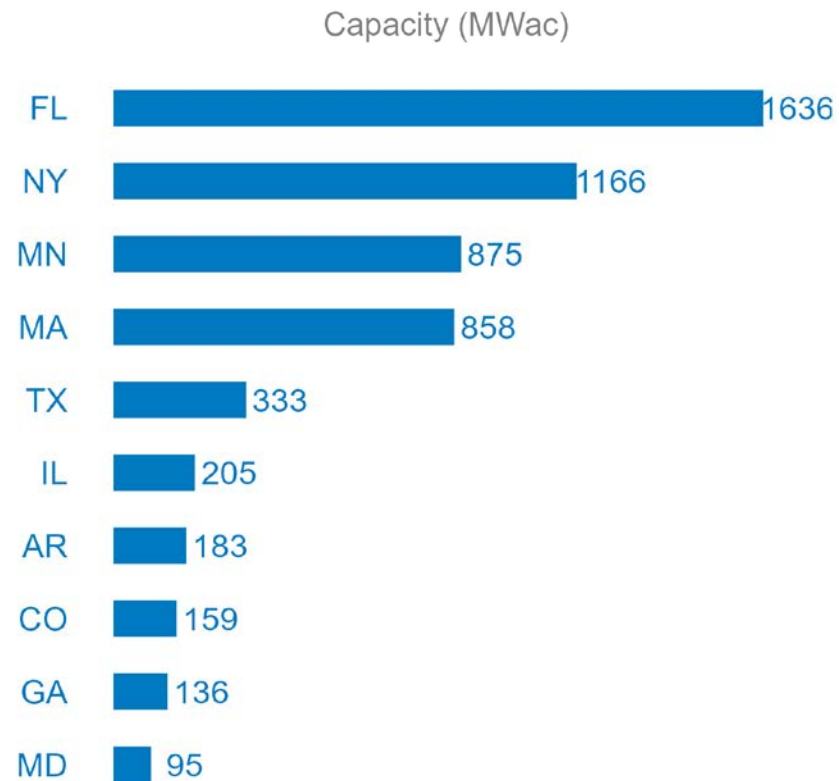
Fewer Projects Deployed in 2022; Project Median Capacities Continue to Hover Around 1 MW

- Fewer community solar projects were deployed in 2022 than previous years.
- Until 2017, projects generally became larger each year, but in recent years, project size medians have stayed largely the same.
- Meanwhile, more considerably larger projects (greater than 5 MW) have been installed. For example, Florida Power & Light built 20 projects at 74.5 MWac each in 2021.



A Few Key States Lead the Community Solar Market

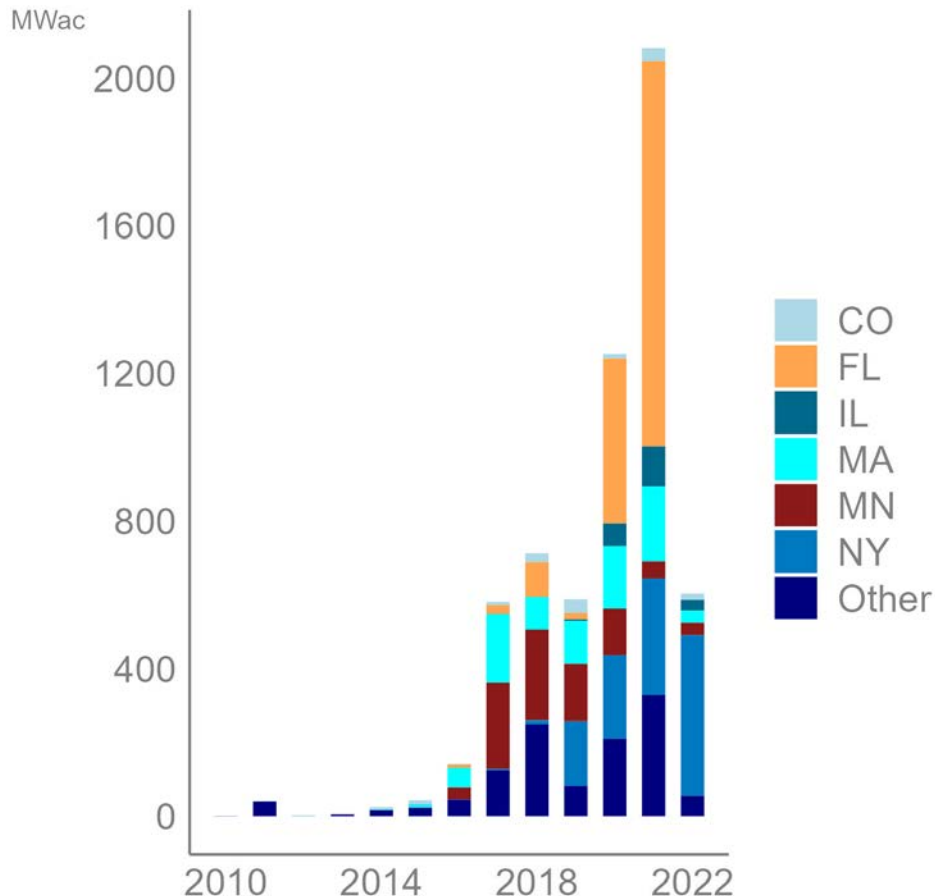
- About 93% of cumulative community solar capacity is located in 10 states.
- About 75% of cumulative capacity is located in just four states: Florida, New York, Minnesota, and Massachusetts.
- 24 states have projects adding up to more than 10 MWac in size.



Cumulative community solar capacity (MWac) by state

Community Solar Capacity Has Been Installed in Waves in Key Markets

- **Massachusetts and Minnesota Growth (2016-2020):** Massachusetts and Minnesota witnessed substantial capacity expansions during the years 2016 to 2020, adding 613 MWac and 794 MWac, respectively.
- **Florida's Remarkable Capacity Surge (2020-2021):** Florida experienced a significant surge in capacity from 2020 to 2021, with a cumulative 1.49 GWac of capacity coming online.
- **New York's Emerging Market (2019-2022):** New York has emerged as a pivotal market in recent years, particularly from 2019 to 2022, adding 717 MWac of capacity during this period.



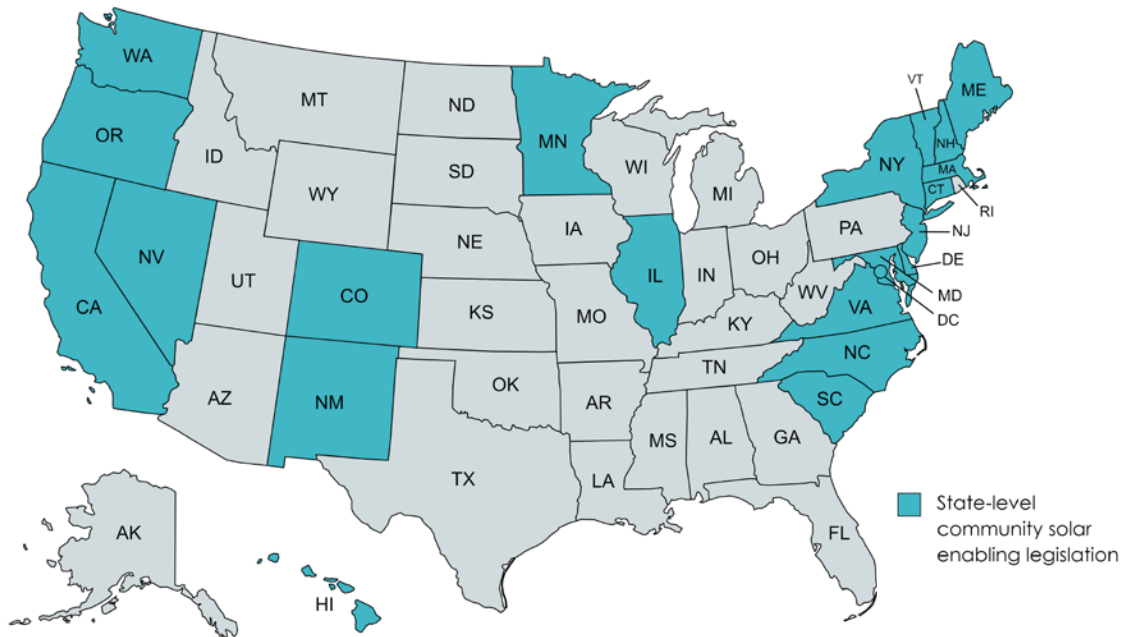
New community solar capacity (MWac)
by year and state

Impact of Policy and Market Drivers

A discussion of various policy and market factors have shaped community solar deployment

Community Solar State Policies (slide 1 of 2)

- 22 states and the District of Columbia have passed some form of legislation enabling community solar, either through state-required programs or by authorizing a limited number of pilot projects.
- These programs vary in scope, but generally allow for some form of virtual net metering that enables subscribers to benefit from their community solar subscriptions.



Created with mapchart.net

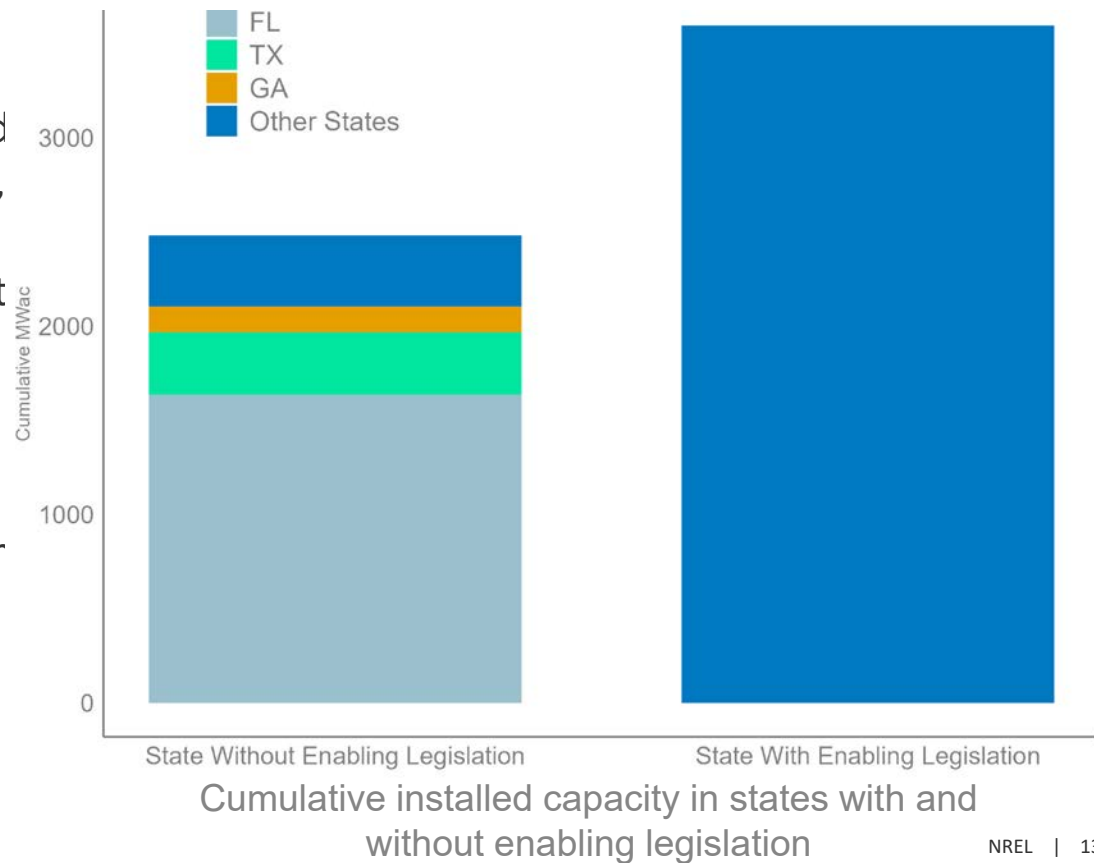
State-level community solar enabling legislation*

* Legislation applies to at least one utility in the state

Source: NREL [Expanding Solar Access: State Community Solar Landscape \(2022\)](#)

Community Solar State Policies (slide 2 of 2)

- As of 2022, 59% of community solar installations were developed in states with enabling legislation, while 41% of community solar installation were in states without enabling legislation.
- Florida, Texas, and Georgia were the key drivers of capacity in states without enabling legislation contributing to 85% of developed capacity among states without enabling legislation.

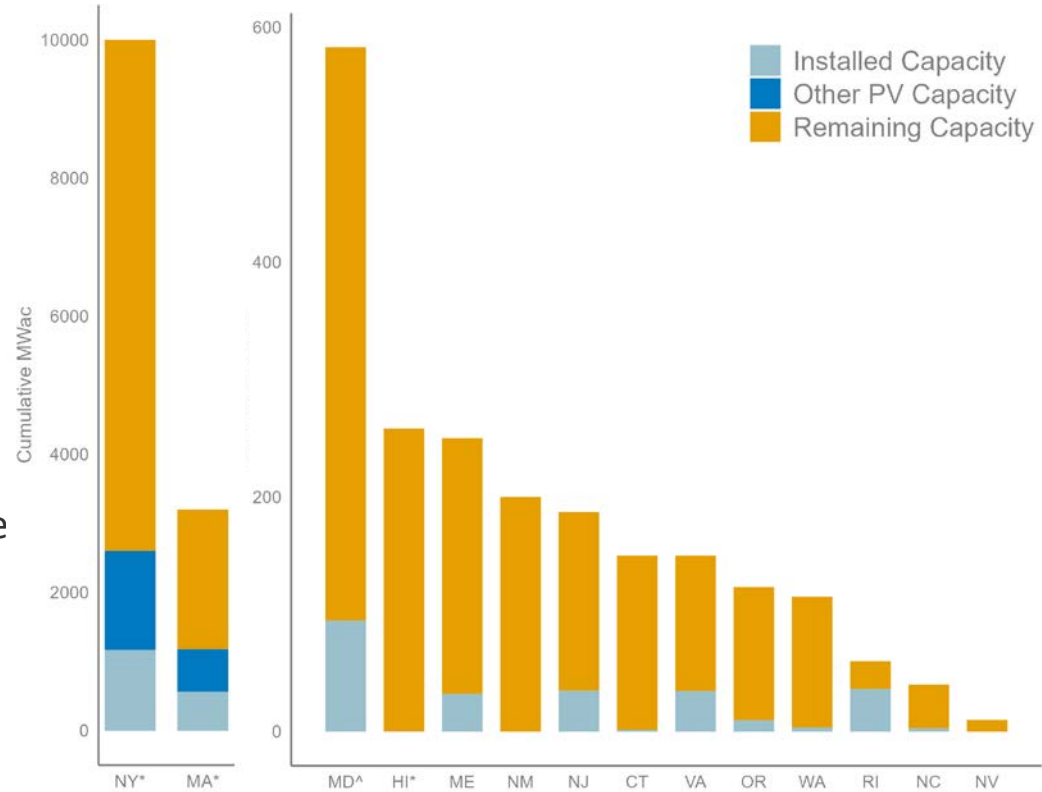


Some States Impose System Size Maximum

- 21 states and the District of Columbia set a maximum size for community solar projects.
- Some states have revised project caps over time.
 - In Colorado, the amended [HB 1003](#) (effected in 2019) increased the project size cap from 2 MW to 5 MW, and then to 10 MW after July 1, 2023.
 - In Illinois, the [2022 Procurement Plan](#) increased the maximum project size from 2 MW to 5 MW
 - In Maryland, [HB 1039 and HB 440](#) (effected in 2022) increased the maximum community solar project size to 5 MW.
 - In Minnesota, the [HF 2310](#) (effected in 2023) expands the maximum project size from 1 MW to 5 MW.
 - In Maine, [LD 1711](#) (effected in 2019) lifted the capacity cap on distributed generation resources from 660 kW to 5 MW.
 - In Delaware, [SB 2](#) (effected in 2021) increased the maximum project size from 2 MW to 4 MW.
 - In Hawaii, capacity limits for individual projects vary [by location](#). The largest shared renewable project cannot exceed 75 MW.

States With Program Caps Have Large Amounts of Remaining Capacity

- At least 19 states and the District of Columbia included some cap-related requirements on community solar programs.
 - 14 community solar program caps are listed in the figure.
 - California and Illinois have multiple programs. D.C.'s community solar target is household-related.
 - In addition, Florida, South Carolina, and Wisconsin have utility-led programs with capacity targets.



Installed and remaining capacity in states with state-level program size caps

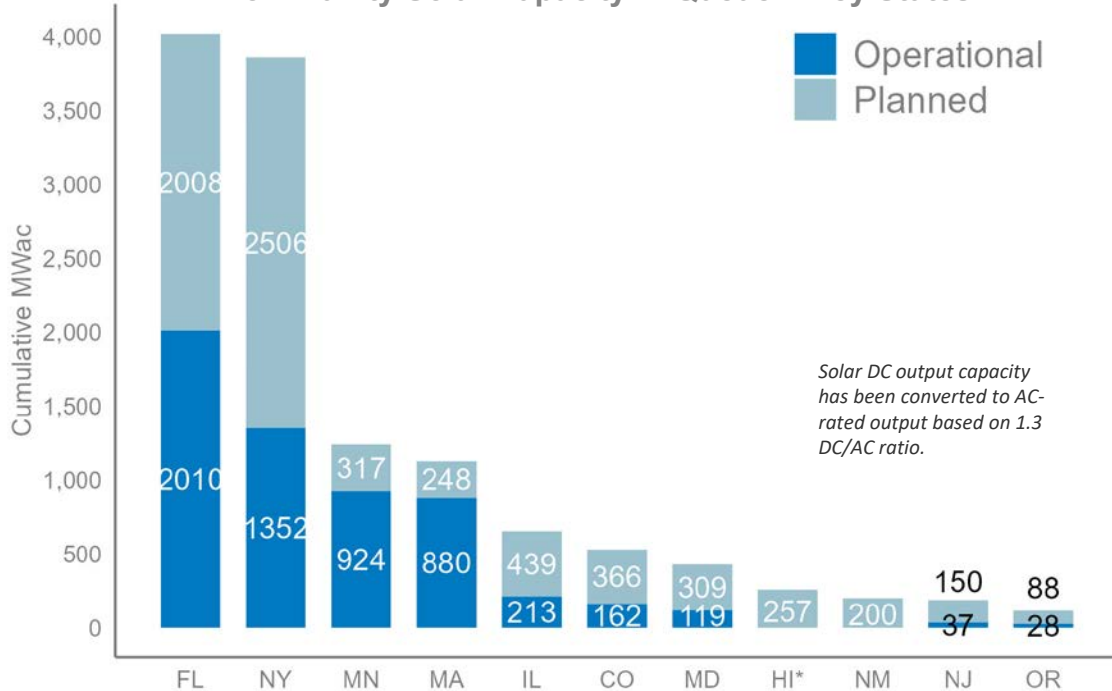
* Program size cap for financial incentives, includes installed capacity of all eligible solar projects
 ^ Maryland expanded the community solar program to permanent and excluded the cap in May 2023

Leading Community Solar States

Discussion of states with a high installed capacity of community solar

Community Solar Capacity in Operation and Planned in Top States

Community Solar Capacity in Queue – Key States



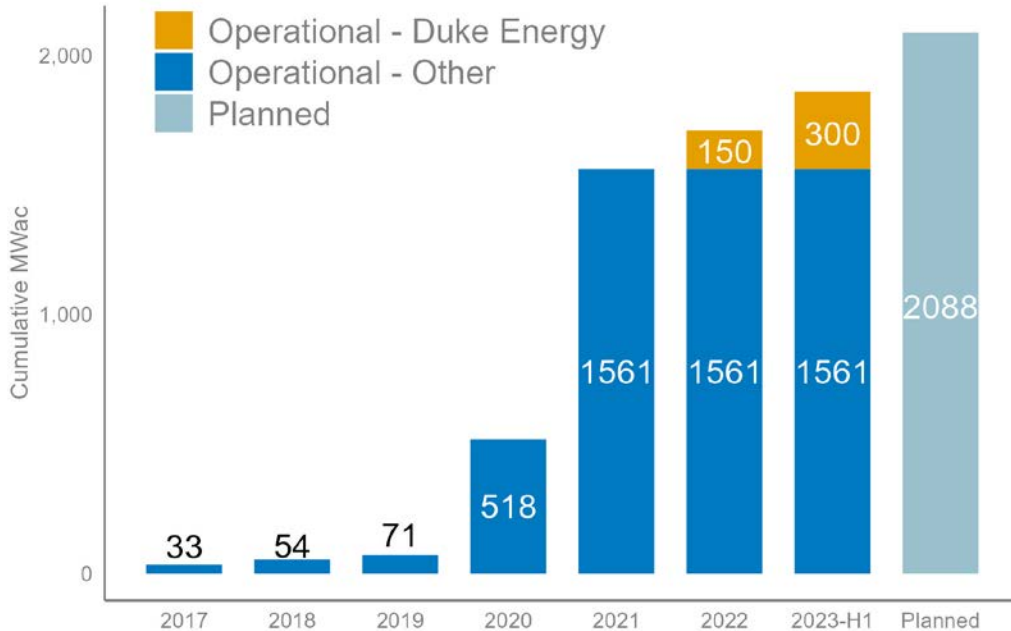
As of the 1st half (H1) of 2023, at least 6.9 GWac of community solar capacity is planned

- “Planned” in this study refers to projects that are awarded, under construction, and likely to come online in the next few years.
- In the top states with planned community solar projects, planned projects add up to over 50 MWac.
- 5.7 GWac of projects are in operation for these 11 states
- Florida and New York led the market, with more about 4.5 GWac combined in the queue.

Operational data come from the NREL [Sharing the Sun Project List 2022](#). FL: Planned capacities include FPL and Duke Energy Program; NY: Planned capacities were collected via NYSERDA; MN: Planned capacities include projects under the Solar*Reward program; MA: Planned capacities include the SMART program; IL: Planned capacities include Adjustable Block Program only; CO: Planned solar capacities include projects under the Solar*Reward program; MD: Planned capacities only include reserved projects under the MD Community Solar Pilot Program; HI*: Planned capacities include Hawaiian Electric community-based renewable energy program (this program is designed for shared renewables and is not limited to community solar); NJ: Planned capacities include Phase 1 and Phase 2 Community Solar Pilot Program; OR: Planned capacities include the awarded projects under the OR community solar program. The dark blue represents the cumulative rated AC power output (MW) for community solar in operation by the corresponding year in the corresponding state. The light blue represents the planned capacity.

Capacity in Florida is Driven by Florida Power & Light's SolarTogether Program

Community Solar Installed in Florida (MWac)

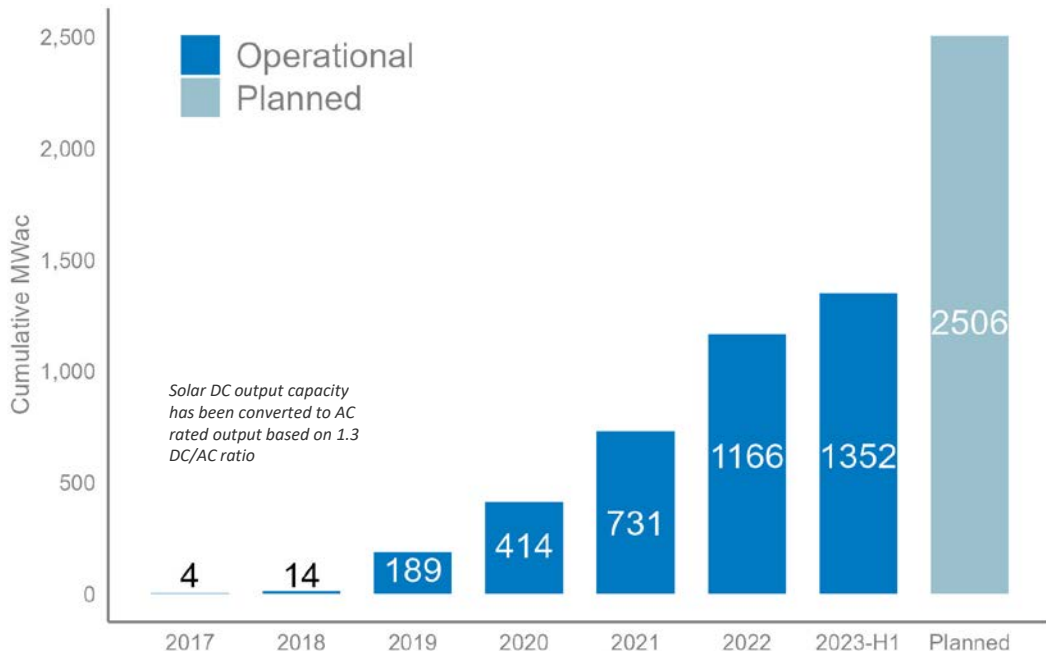


Data Source: 2017–2022: [Sharing the Sun Project List 2022](#); Planned: [Florida PSC Docket 20200176](#), [FPL Solar Together Program](#) and [Duke Energy program](#). The light blue represents planned capacity to be installed in 2023 H1 and thereafter.

- **Florida Power & Light SolarTogether:**
 - Florida Power & Light (FPL) has deployed the nation's largest community solar program, with 1,490 MWac of operational project capacity
 - [Twenty-four new utility-owned projects](#) with a total capacity of 1,788 MWac are planned.
- **In addition, the Florida Public Service Commission approved a stipulated agreement on building Duke Energy's 750 MWac shared solar program.**
 - Community solar projects are expected to be in service between 2022 and 2024.
 - Six projects were completed (450 MWac) by March 2023.

New York's Thriving Community Solar Landscape: Over 1.3 GWac in Operation with a Robust Pipeline

Community Solar Capacity Installed in New York (MWac)

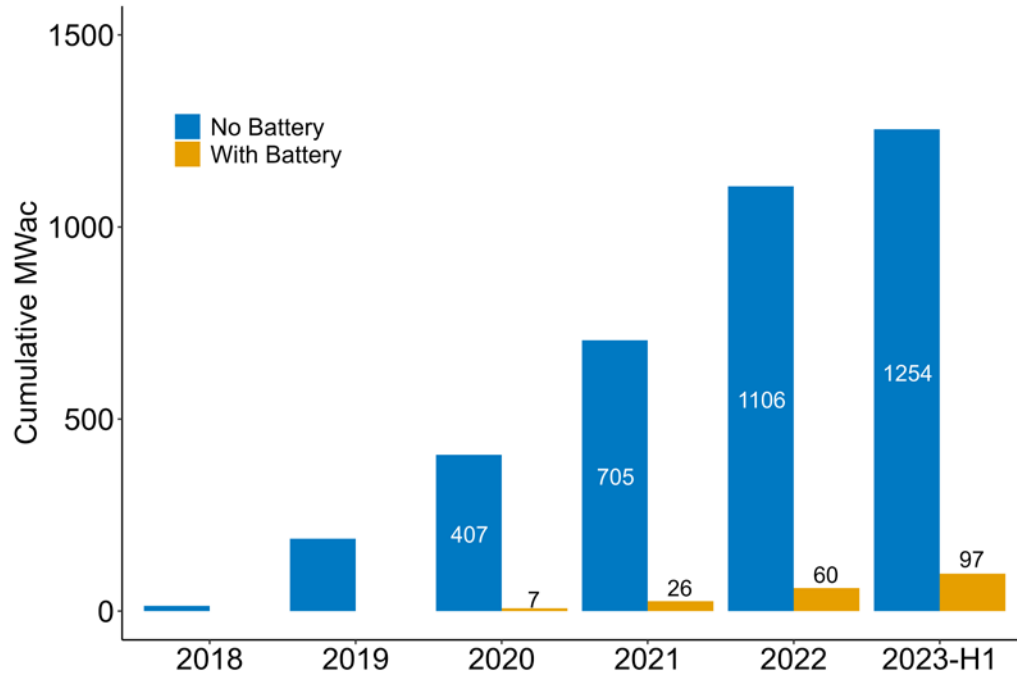


Data Source: 2017–2022: [Sharing the Sun Project List 2022](#); Planned: [New York Solar Electric Programs Reported by NYSERDA](#) The “planned” status includes approved, pending approved, received, and submitted projects. The darker blue represents the cumulative installed capacity (MWac) for community solar in operation by 2020 in NY. The light blue represents the installed capacity (MWac) of planned community solar projects to be installed in 2023 H1 and thereafter.

- As of H1 2023, a cumulative total of 1,352 MWac in community solar projects were operational in New York.
- New York has ambitious plans for community solar, with a planned capacity exceeding 2,500 MWac.
- The state's goal of achieving 10 GW in solar PV installations in 2030.
- A significant driver behind the increasing planned capacity for community solar projects.

Pairing Community Solar With Energy Storage in New York

Community Solar in New York, Paired with Storage



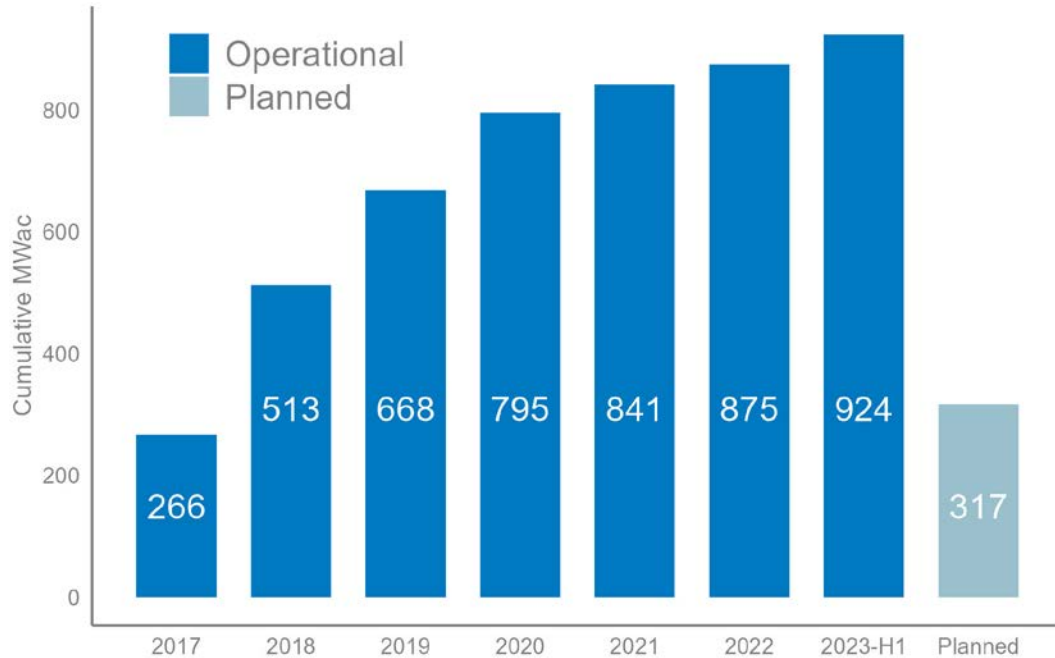
Data Source: 2017–2022: [Sharing the Sun Project List 2022](#); Planned: [New York Solar Electric Programs Reported by NYSERDA](#); Energy Storage: [NYSERDA Statewide Distributed Solar Projects](#). Community solar projects paired with storage were matched based on interconnection date, zip code, contractor, and nameplate capacity. In addition, 2,506 MWac community solar projects planned, but the energy storage information is unknown.

The contribution of solar-plus-storage projects is small but increasing in the New York community solar market.

- As of 2023 H1, 3.2% (28/870) of operational community solar projects in New York are paired with storage. This represents 7.2% (97/1352) of cumulative community solar capacity in New York.

Minnesota's Market is Making a Strong Comeback in 2023

Community Solar Capacity Installed in Minnesota (MWac)

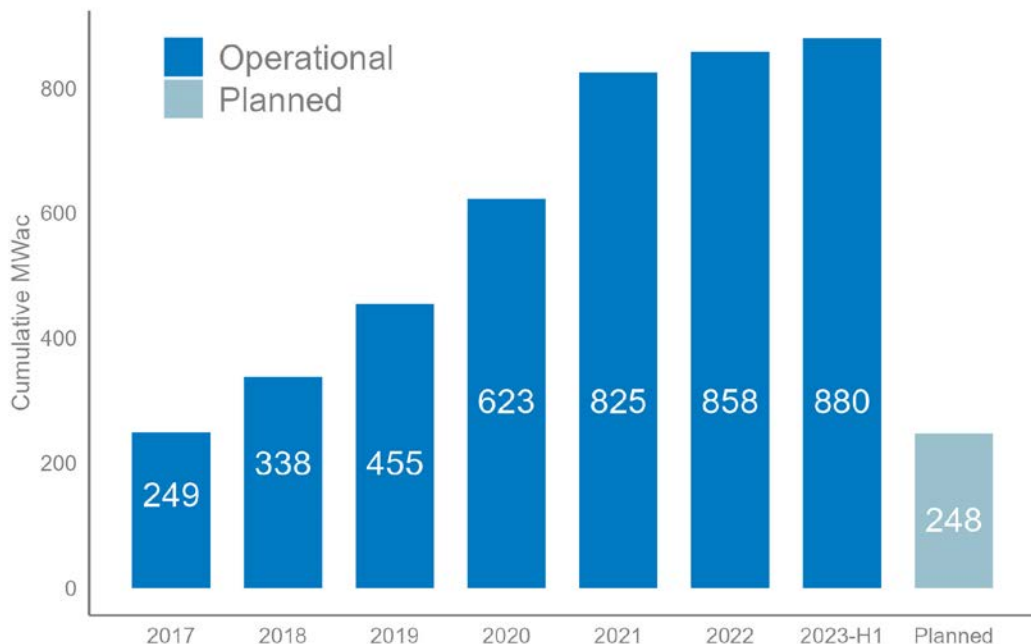


- **Minnesota's installed capacity is ramping up in 2023 H1**
 - Cumulative installed capacity increased from 795 MWac in 2020 to 875 MWac in 2022, representing a total addition of 85 MWac over two years.
 - By H1 2023, the cumulative installed capacity had reached 924 MWac, with an additional 49 MWac added in the first six months of the year.
- **Community solar deployment in Xcel Energy's service territory contributed to the majority of the deployment in Minnesota. As of 2023 H1, projects in Xcel Energy's territory totaled:**
 - 917 MWac in operation.
 - 317 MWac planned.

Data Source: 2016–2022: [Sharing the Sun Project List 2022](#); Planned: [Xcel Compliance Filing Monthly Update, DOCKET No. 13-867](#), and [Xcel Interconnection Monthly Update](#). The "planned" status includes in construction, in study analysis and in application stage. The darker blue represents the cumulative installed rated AC power output (MW) for community solar in operation by the corresponding year in Minnesota. The light blue represents the capacity planned to be installed in 2023 H1 and thereafter.*

Massachusetts SMART Program Contributes 560 MWac - 64% of State's Community Solar Cumulative Deployment

Community Solar Capacity Installed in Massachusetts (MWac)

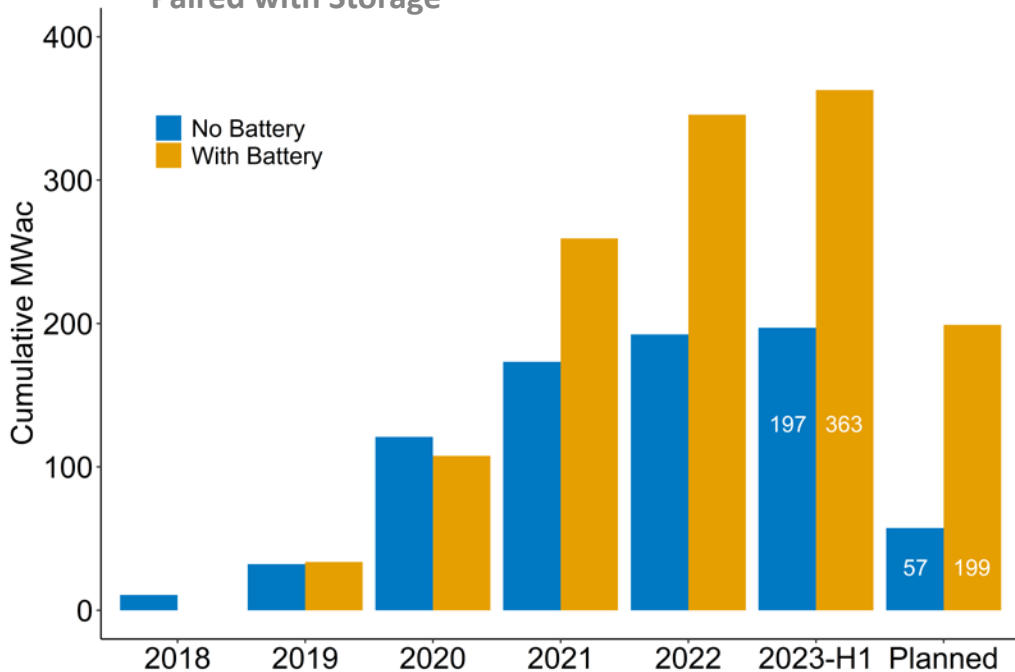


Data Source: 2015–2020: [Sharing the Sun Project List 2022](#); Planned*: [Solar Massachusetts Renewable Target \(SMART\) Application Update SMART projects only](#). The “planned” status includes approval/pending/under construction. The darker blue categorized as the cumulative AC output (MW) for community solar in operation by the corresponding year in Massachusetts. The light blue represents the AC output (MW) of planned (qualified) community solar projects to be installed in 2023 H1 and thereafter. Projects “under review” and “waitlist” were not included.

- In 2018, Massachusetts started the Solar Massachusetts Renewable Target (SMART) Program (after the Solar Carve-Out II Program closed in 2017).
- By 2023 H1, 880 MWac of community solar projects were in operation.
 - 560 MWac installed via the SMART program, contributing 64% of the community solar installation in Massachusetts.
 - 248 MWac planned under SMART.
- Community solar annual installations have dropped since 2022.
 - 55 MWac installed since 2021.
 - Growth rates in 2020-2021, 2021-2022 are 32% and 4%, respectively.

Of 560 MWac Operational in the SMART Program, 363 MWac are Paired with Energy Storage

SMART Program Community Solar in Massachusetts, Paired with Storage

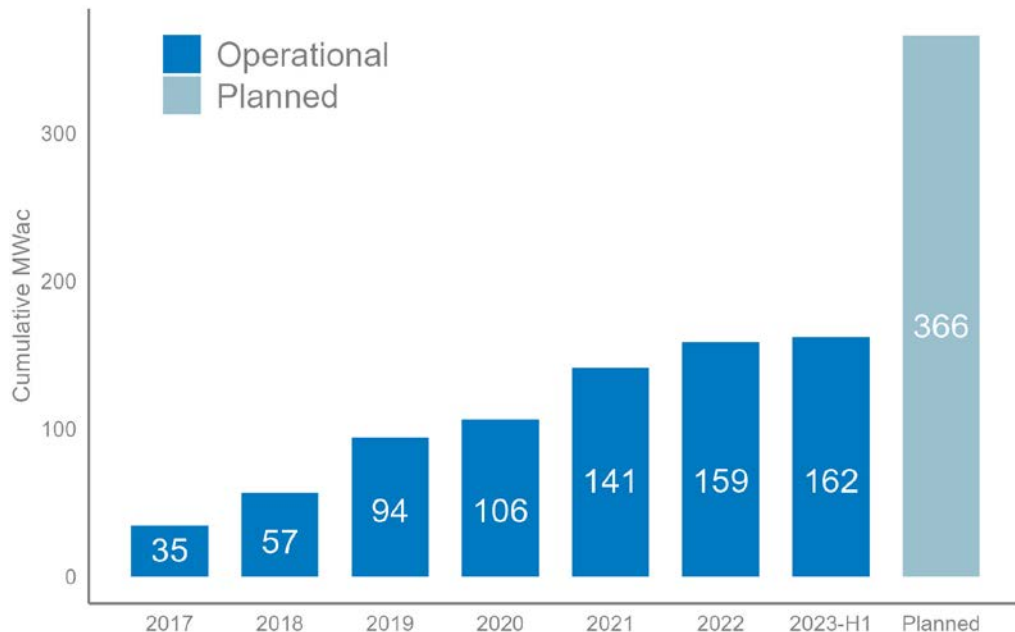


Data Source: [Solar Massachusetts Renewable Target \(SMART\) Application Update](#)

- **The SMART program enables solar-plus-storage configuration.**
 - As of 2023 H1, 38% (104/276) of operational community solar projects are paired with storage. This represents 65% (363/560) of cumulative community solar capacity in the SMART program.
 - 84 solar-plus-storage projects and 101 non-storage projects are planned, as of 2023 H1.
- **Despite the total annual installation rate drop, solar-plus-storage projects have increased significantly since 2020.**

Colorado Market Grows Steadily, With High Potential

Community Solar Capacity Installed in Colorado (MWac)

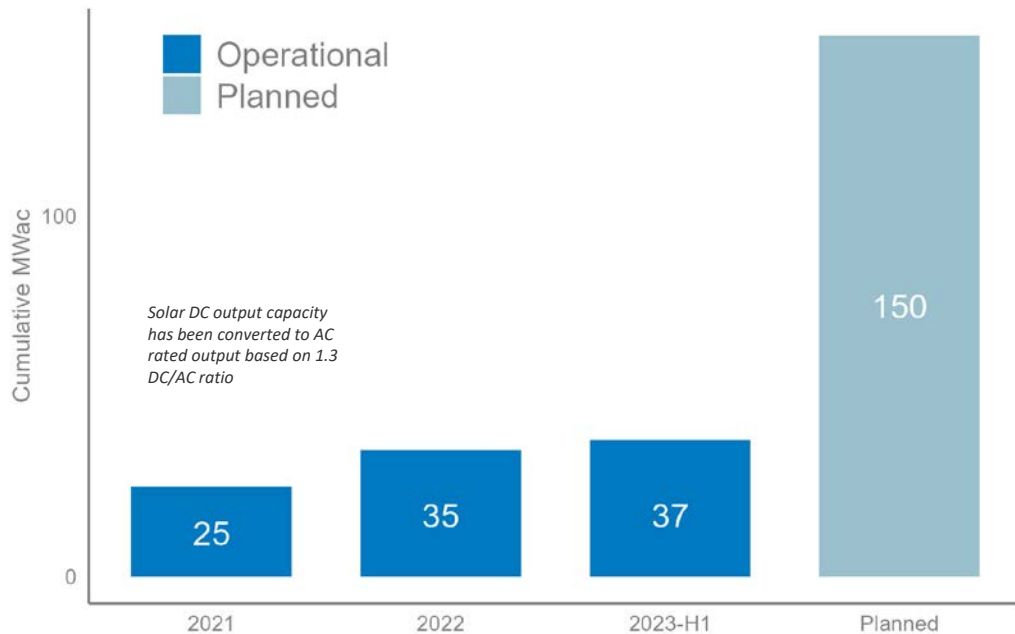


Data Source: 2017–2022: [Sharing the Sun Project List 2022](#); Planned*: [Solar*Rewards Renewable Energy Standard Compliance Report](#); Xcel projects only. The “planned” status includes approval/pending/under construction. The darker blue represents the cumulative installed capacity (MWac) for community solar in operation by the corresponding year in Colorado. The light blue represents the capacity (MWac) of planned community solar projects to be installed in 2023 H1 and thereafter.

- Most community solar deployment in Colorado is through Xcel Colorado’s Solar*Rewards Program.
 - As of 2023 H1, 136 MWac has been installed under the Solar*Rewards Program.
 - This program makes up 86% of the state’s total installed community solar capacity.
- The Solar*Rewards Community Program has 366 MWac of planned projects as of 2023 H1.

New Jersey Has a Large Amount of Planned Community solar, with 150 MWac Planned Projects

Community Solar Capacity Installed in New Jersey (MWac)

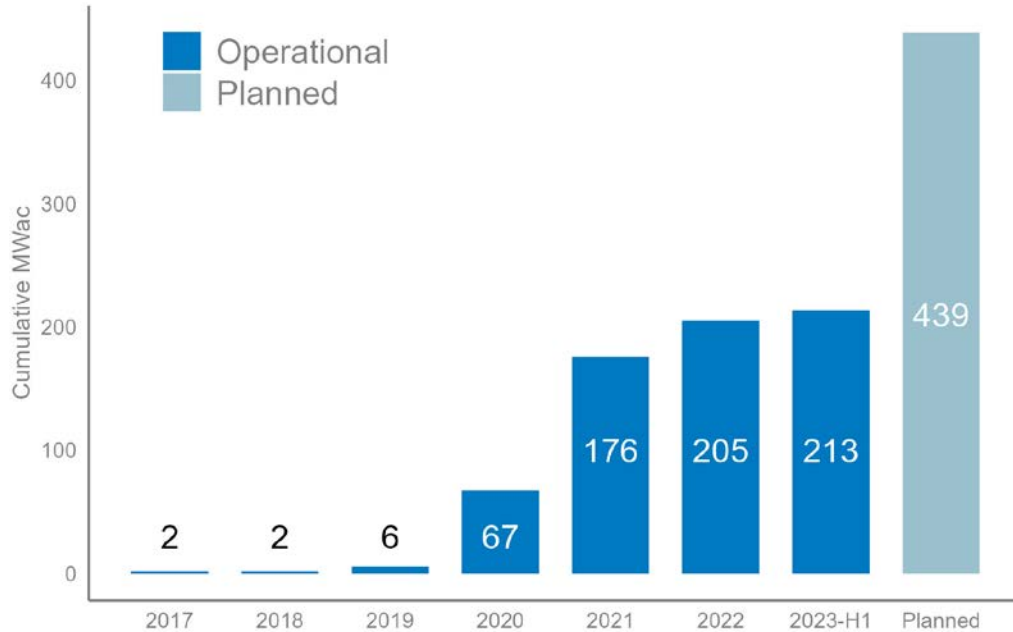


Data Source: 2017–2022: [Sharing the Sun Project List 2022](#); Planned: NJ Community Solar Program [Phase 1](#) and [Phase 2](#). The “planned” status includes approval/pending/under construction. The darker blue represents the cumulative installed capacity (MWac) for community solar in operation by the corresponding year in New Jersey. The light blue represents the capacity (MWac) of planned community solar projects to be installed in 2023 H1 and thereafter.

- The New Jersey Community Solar Energy Pilot Program has awarded more than 180 MWac of projects.
 - By 2023 H1, 35 MWac of community solar projects were in operation.
 - While only a few projects have been completed in 2023 H1, New Jersey has [set a completion deadline](#) of November 2023 for the Pilot Year 2 project (105 projects with 127 MWac (165 MWdc) in total).
- This program has 152 MWac of planned projects as of 2023 H1.
- In 2023, New Jersey [made its community solar pilot program permanent](#), which may increase the community solar potential in the future.

Illinois Adjustable Block Program (IL Shines) Contributes the Most to Illinois Community Solar Growth

Community Solar Capacity Installed in Illinois (MWac)

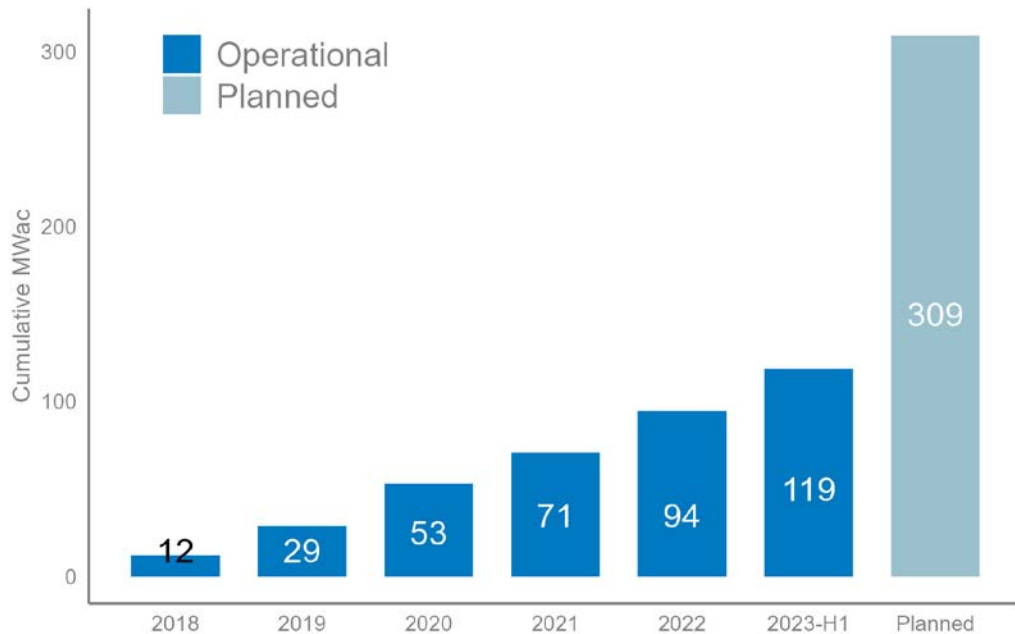


Data Source: 2017–2022: [Sharing the Sun Project List 2022](#); Planned: [IL Shines Program](#) and [Solar for All Program](#). The “planned” status includes approval/pending/under construction. The darker blue represents the cumulative installed capacity (MWac) for community solar in operation by the corresponding year in Illinois. The light blue represents the capacity (MWac) of planned community solar projects to be installed in 2023 H1 and thereafter.

- Illinois has multiple community solar related programs. IL Shines is currently leading the market growth.
 - 207 MWac complete as of 2023 H1.
 - 421 MWac pending.
- [The Illinois Solar for All community solar program](#) is dedicated to low-income customers. This program has less than 10 MWac in operation and added 18 MWac of planned projects as of 2023 H1.

Maryland Expanded Its Community Solar Program

Community Solar Capacity Installed in Maryland (MWac)



Data Source: 2017–2022: [Sharing the Sun Project List 2022](#); Planned: [Community Solar Pilot Program](#). The “planned” status includes approval/pending/under construction. The darker blue represents the cumulative nameplate installed (MWac) for community solar in operation by the corresponding year in Maryland. The light blue represents the capacity (MWac) of planned community solar projects to be installed in 2023 H1 and thereafter.

- Maryland expanded its community solar pilot program from 418 MWac to 583 MWac in 2021.
 - 119 MWac complete as of 2023 H1.
 - 309 MWac planned.
- In May 2023, Maryland passed House Bill 908 ([HB 908](#)), which makes the community solar energy generating system pilot program permanent.

Other New Markets

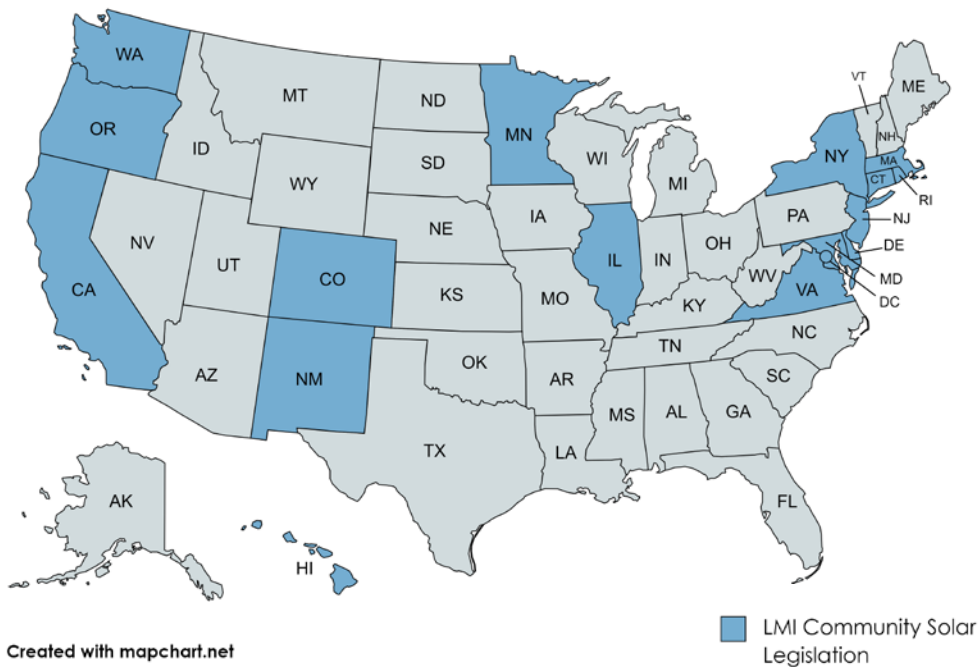
- Oregon launched its 160-MW [community solar program in 2019](#). As of 2023 H1, 27.5 MWac are in operation, and 88.4 MWac are pending.
- New Mexico Community Solar Program has [a capacity of 200 MWac](#). Projects were selected in mid 2023 and are planned to be built over the next year to 18 months
- The Hawaii Public Utilities Commission approved the Hawaiian Electric Community-Based Renewable Energy Program ("[CBRE](#)") in 2018.
 - Phase 1: **8 MW** of capacity have been allocated and are under construction. [Two projects](#) with a total capacity of about 0.3 MW achieved commercial operation.
 - [Phase 2](#): About 250 MW of shared solar projects are in planning.

LMI Community Solar

Discussion of states with available low-income or low- to moderate-income (LMI) community solar capacity and a large number of projects in the queue as of 2023 H1

States With Legislation that Expands Community Solar Access for LMI Households

State-Level LMI Community Solar Legislation

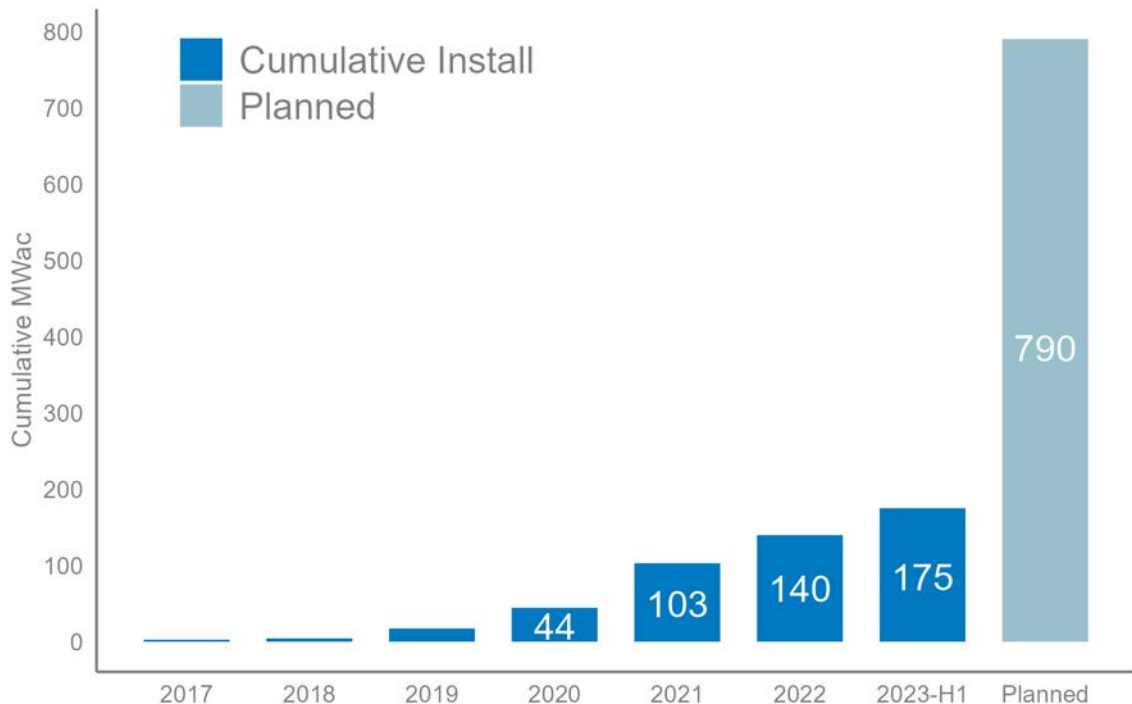


- At least 17 states and the District of Columbia have passed legislation with stipulations that expand community solar access for LMI households.
- There are two main types of enabling policies for LMI community solar:
 - Carve-outs in community solar programs for projects for LMI subscribers. For example, the program can set aside a certain percentage of capacity dedicated to LMI subscribers.
 - Financial incentives and LMI adders.

Source: 2011–2022: [State Community Solar Landscape \(2022\)](#); ^MN 2023: [HF 2310](#) was signed into law, which opens the state's community solar program up to more residential subscribers, specifically low- to moderate-income (LMI) households. ^MD 2023 [HB 908](#) was signed into law, which requires 40% of community solar project outputs dedicated to LMI customers.

LMI Community Solar Is Growing Quickly

LMI Community Solar Capacity (MWac) by Year

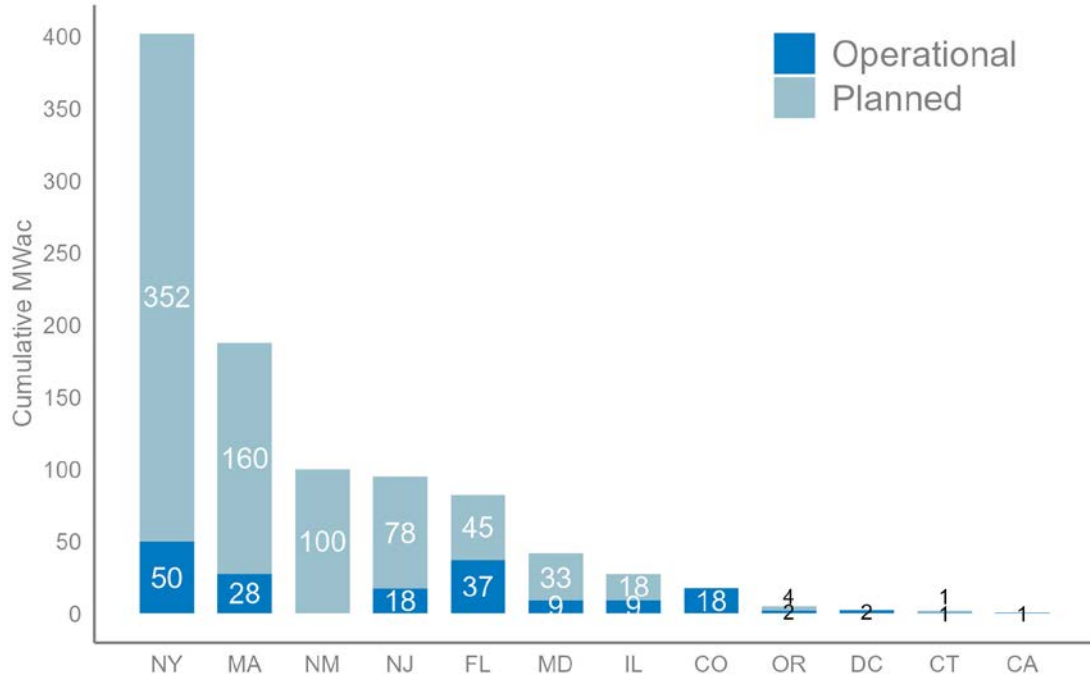


- The LMI community solar market was small until 2019.
- LMI community solar contributes to 2.3% (140 MW/ 6081 MW) of the whole community solar market as of December 2022.
- The figure to the left captures the conservative LMI dedicated capacity based on program carve outs.
 - For instance, if a 1-MWac project requires at least 51% to be reserved for LMI customers, the LMI capacity is calculated as 0.51 MWac.

Source: New York: [New York Solar Electric Programs Reported by NYSERDA](#), for community solar projects receive expanded solar for all or Inclusive Community Solar adder. New Mexico: [New Mexico Community Solar Program](#). Other states: [Sharing the Sun Project List 2022](#)

LMI Community Solar Capacity Planned in Key States

LMI Community Solar Capacity in Queue – Key States



- **As of 2023 H1, at least 175 MWac of community solar are dedicated to LMI customers for the 12 states.**
 - State programs typically require 10% to 51% capacity to be set aside for LMI customers.
 - At least 790 MWac are pending of community solar dedicated to LMI community solar.

Operational and planned data come from the NREL [Sharing the Sun Project List 2022](#). In addition, New York: [New York Solar Electric Programs Reported by NYSERDA](#), for community solar projects receive expanded solar for all or Inclusive Community Solar adder. New Mexico: [New Mexico Community Solar Program](#). The dark blue represents the cumulative rated AC power output (MW) for community solar in operation by the corresponding year in the corresponding state. The light blue represents the planned capacity. Projects under review and waitlisted were not included in the figure.

The Subscriber Value Proposition

Summary of the results of analysis of subscription contract value. Estimated subscriber value shows that most subscribers now save money with community solar

Net Present Value (NPV) Calculation Methodology

- Residential subscriber contract data were matched individually to 2,500+ projects offered within the same utility and/or state.
- For each available contract, a cash flow model was built to calculate the net present value (NPV) (\$/W) and an annuity equivalent (\$/W-year).
- Key assumptions to determine the financial value of a subscription contract include:

	Low Scenario	Base Scenario	High Scenario
Solar Degradation	0.75%	0.5%	0.3%
Utility Retail Rate Escalation	1.5%	2.5%	3.5%
Discount Rate	8.4%	6.4%	4.4%

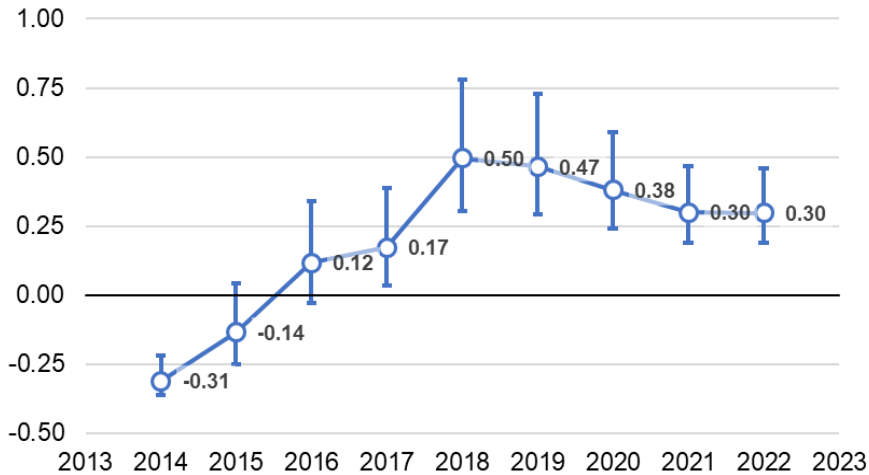
Assumptions Used in NPV Calculation Methodology

- Additional assumptions included:
 - Standard subscription contract assumptions: This study assumed standardized subscription contract terms when the contracts did not specify or were flexible within a wide range.
 - Retail rates: This study estimated retail rates based on average residential revenue per kWh sold and assumed customer charges.
 - PV capacity factors: This study estimated state-average PV capacity factors using NREL's [System Advisor Model](#).
- This methodology is sensitive to future retail rate changes, solar production, and economic variables. We performed sensitivities around these factors, which are presented in the following slides.

NPVs Are Increasing and Stabilizing Over Time

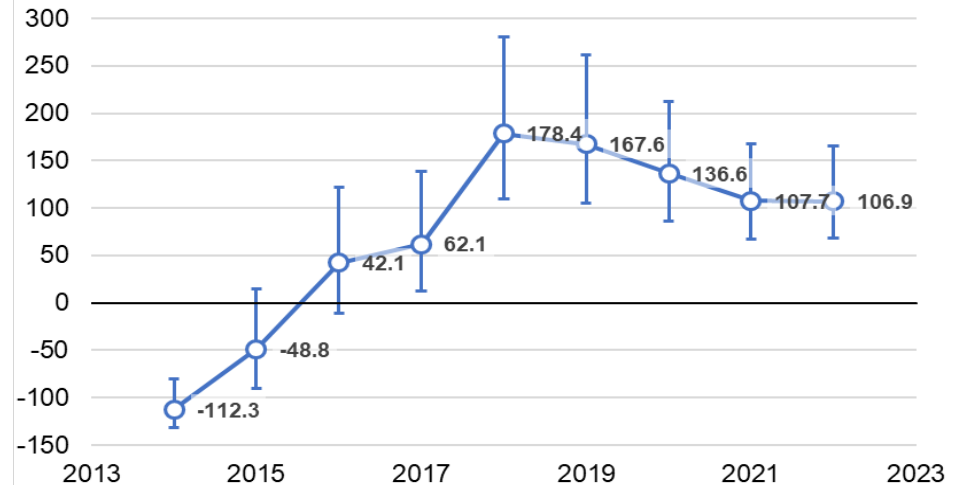
- The average NPV of subscription contracts has been positive since 2016, when state-legislated programs began to rapidly expand.
- Large policy-driven programs in CO, MN, MA, and NY established after 2017 also increased the overall NPVs.
- NPVs stabilized after 2021 as mature markets built capacity under established subscription contract structures.

Average Unit NPV of Subscription (2021 \$/W-AC)



Capacity-weighted average net present value (NPV) in 2021 \$ per W-AC of community solar subscriptions, shown by cumulative installed projects by year. Error bars represent sensitivity under three scenarios that assume an annual retail rate escalation factor of 2.5% (base), 1.5% (low), 3.5% (high); real discount rate of 8.4% (base), 6.4% (low), 4.4% (high); and an annual solar PV degradation rate of 0.5% (base), 0.75% (low), 0.30% (high).

Average Annuity Equivalent of a 4 kW Subscription (2021 \$/4kW-AC*yr)

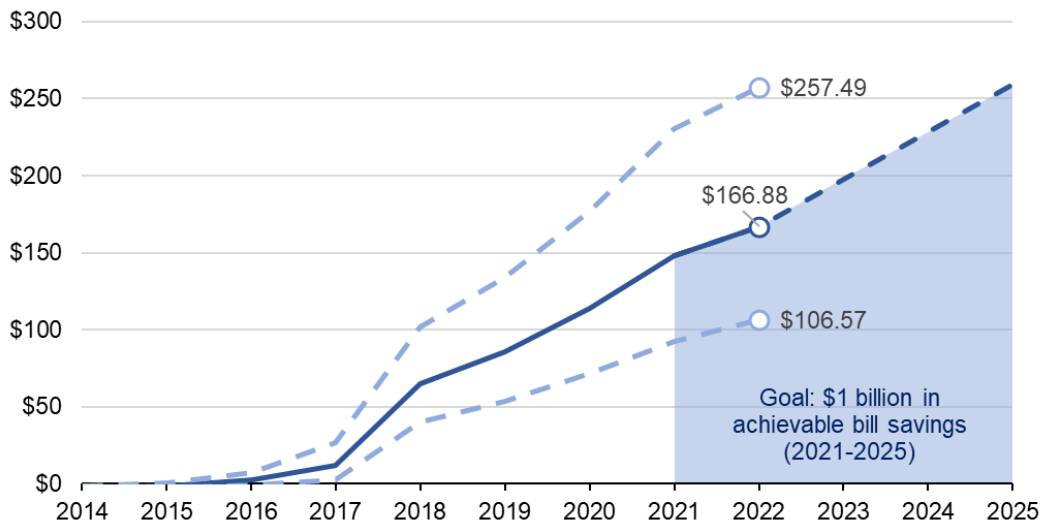


Capacity-weighted average annuity equivalent in 2021 \$ per W-AC of community solar subscriptions, shown by cumulative installed projects by year. Error bars represent sensitivity under three scenarios that assume an annual retail rate escalation factor of 2.5% (base), 1.5% (low), 3.5% (high); real discount rate of 8.4% (base), 6.4% (low), 4.4% (high); and an annual solar PV

Estimated Achievable Bill Savings Are on Track for NCSP Goal

- Achievable bill savings are based on an annuity equivalent of the NPV of a project multiplied by installed capacity.
- Achievable bill savings have grown steadily from 2018–2022 as capacity has grown and NPVs have stabilized.
- Achieving a cumulative \$1 billion in potential savings from 2021–2025 is possible with sustained growth at a rate of deployment 15% greater than the rate from 2020-2022.

Estimated Annual Achievable Savings of Deployed Community Solar Capacity (\$mil per year)



Notes: Achievable bill savings is calculated by finding the net present value (NPV) of residential community solar subscription contracts based on the assumptions and methodology developed in NREL's *Sharing the Sun* project. NPV of subscriptions are averaged for each utility, and where insufficient data is available, the state average NPV is used. Average NPV's are then converted to an annuity equivalent over 20 years (the constant revenue that would produce the same NPV). Annuity equivalents are then multiplied by project capacity (available to all rate classes). The three scenarios shown (base, low, high) assume an annual retail rate escalation factor of 2.5% (base), 1.5% (low), 3.5% (high); real discount rate of 8.4% (base), 6.4% (low), 4.4% (high); and an annual solar PV degradation rate of 0.5% (base), 0.75% (low), 0.30% (high).

Thank you

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NREL/PR-6A20-87235

This work was authored in part by the National Renewable Energy Laboratory, operated by Alliance for Sustainable Energy, LLC, for the U.S. Department of Energy (DOE) under Contract No. DE-AC36-08GO28308, with contributions from the University of Minnesota. Funding provided by the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy Solar Energy Technologies Office. The views expressed in this presentation do not necessarily represent the views of the DOE or the U.S. Government. The U.S. Government retains and the publisher, by accepting the presentation for publication, acknowledges that the U.S. Government retains a nonexclusive, paid-up, irrevocable, worldwide license to publish or reproduce the published form of this work, or allow others to do so, for U.S. Government purposes.

