Sharing the Sun: Community Solar Deployment and Subscriptions (as of June 2024)

Kaifeng Xu, NREL
Gabriel Chan, University of Minnesota
Sudha Kannan, NREL

September 2024

Contents

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 are conducted by the National Renewable Energy Laboratory (NREL) as part of its support for implementation of the NCSP+.
  - NREL first released a dataset of community solar projects in 2018 and updates it annually (at minimum). The June 2024 release and the data collection methodology are available from NREL's Data Catalog: https://data.nrel.gov/submissions/244.
  - The dataset presents project-level information such as location, capacity, operating utility, and year of interconnection. The dataset is created from multiple data sources such as 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, Sharing the Sun: Community Solar Deployment and Subscriptions (as of June 2023).
  - Dr. Gabriel Chan at 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

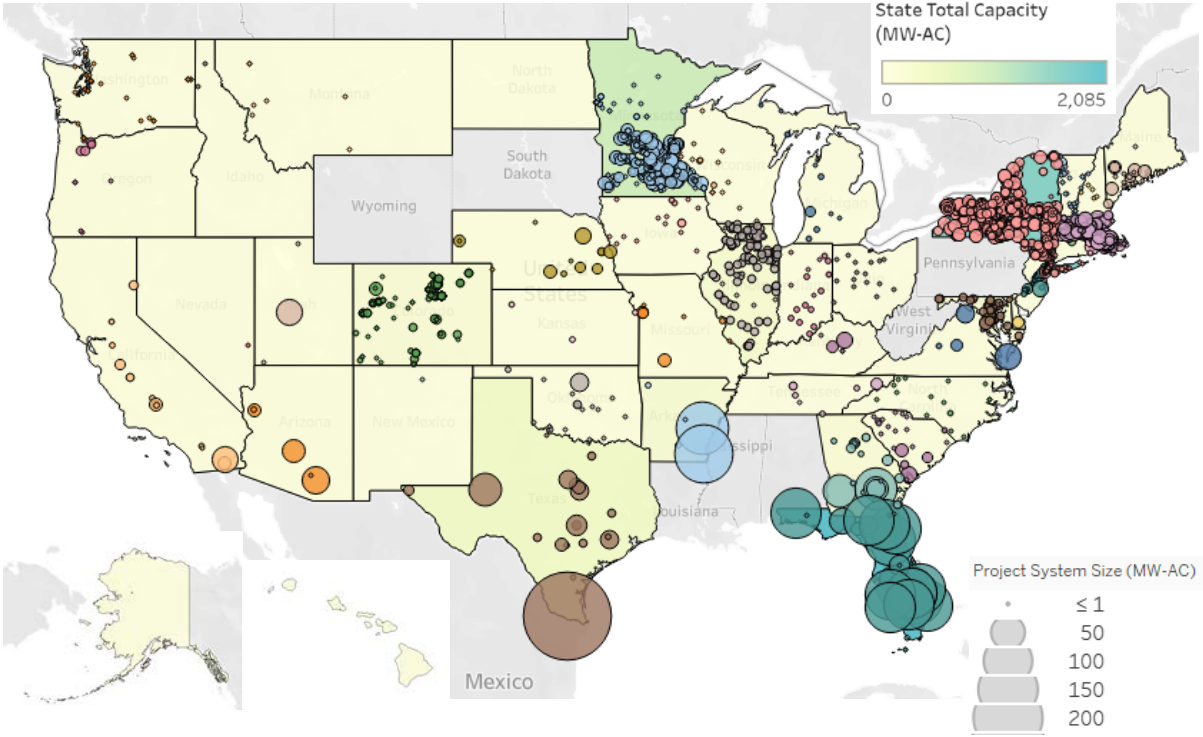
What Is Community Solar?

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.

Source: DOE, Community Solar Basics.

Community Solar Capacity by State



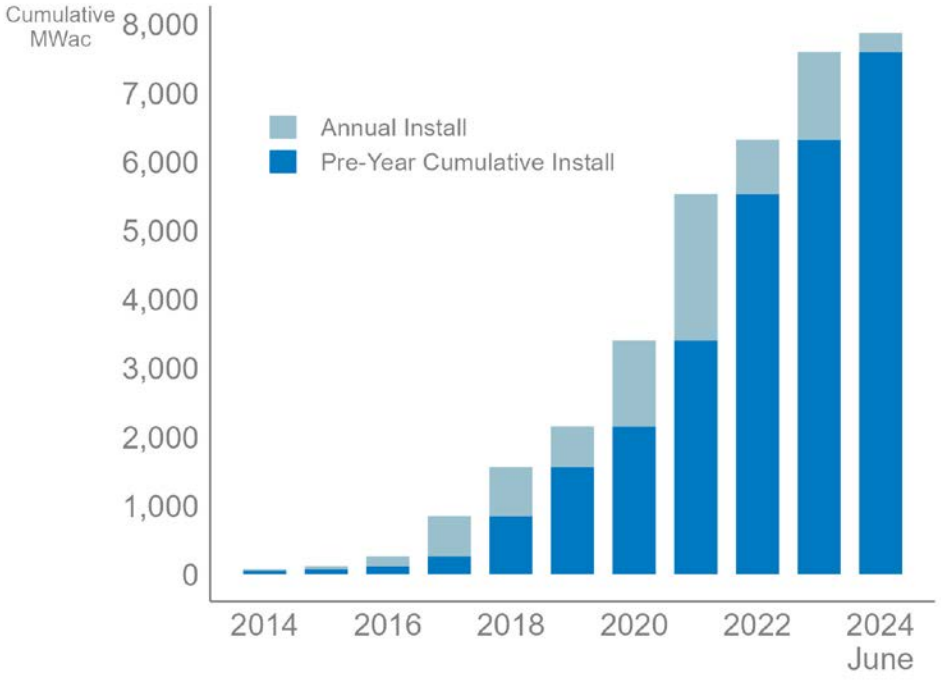
- **Total Community Solar Capacity:** As of June 2024, we estimate total community solar capacity of 7,870 megawatts-alternating current (MW_{ac}) across 3,404 projects in 44 states and localities, including the District of Columbia.
- **State Variability:** The distribution of community solar capacity among states ranges from 0 to 2,085 MW_{ac}. Notably, Florida claims the top position in terms of community solar deployment capacity.
- **Visual Representation:** The bubbles on the chart represent individual project sizes, ranging from less than 1 MW_{ac} up to 200 MW_{ac}. In Texas and Arkansas, projects over 100 MW_{ac} have partial capacity dedicated to community solar. The bubbles for each state are the same color, allowing for differentiation between states.

Data Source: NREL, Sharing the Sun Project List 2024.

The Rapid Growth of Community Solar

- The capacity of community solar installations has grown rapidly since 2016. On average, 0.9 gigawatt-alternating current (GW_{ac}) (900 MW_{ac}) of capacity has been installed annually since 2016.
- In 2021, more than 2 GW_{ac} (>2000 MW_{ac}) of community solar were installed, the greatest annual installation amount to date.
- 0.3 GW_{ac} (300 MW_{ac}) of new capacity came online in the first half of 2024 (H1 2024). The frequency with which states update their lists of operational community solar projects varies, with some updating capacity annually, contributing to the lower installation capacity reported through H1.

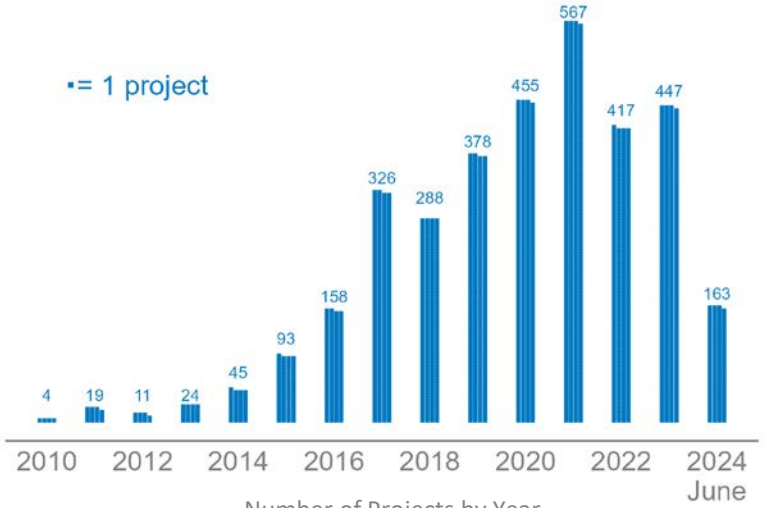
Community Solar Capacity (MWac) by Year



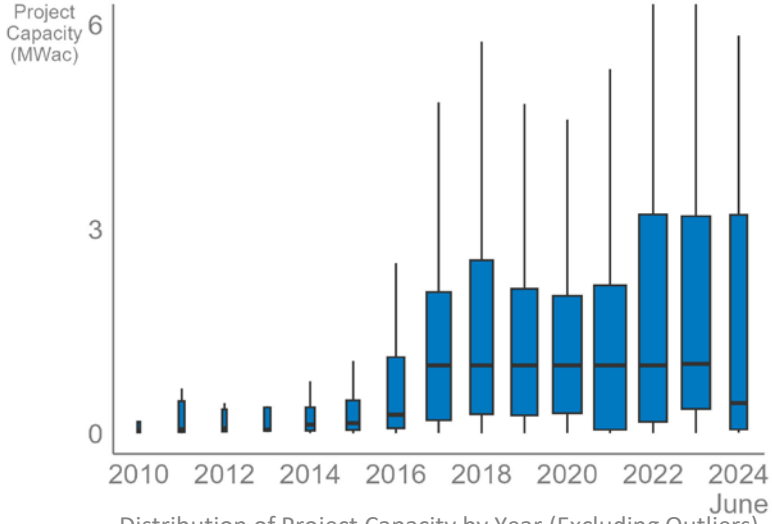
Data Source: NREL Sharing the Sun Project List June 2024.

Trends in Community Solar Project Numbers and Sizes; Project Median Capacities Increased to 1.2 MW_{ac}

- The number of community solar projects installed annually surged from 300 in 2017 to a peak of more than 550 in 2021, remaining significantly higher than pre-2017 levels. The average number of projects per year since 2017 is approximately 375.
- Through 2016, projects generally became larger each year. In 2017, the average project size jumped up to around 1 MW_{ac} and remained largely the same through 2022. In 2023, the average size increased to 1.2 MW_{ac}
- This increase aligns with the rising project size limits in many community solar markets.



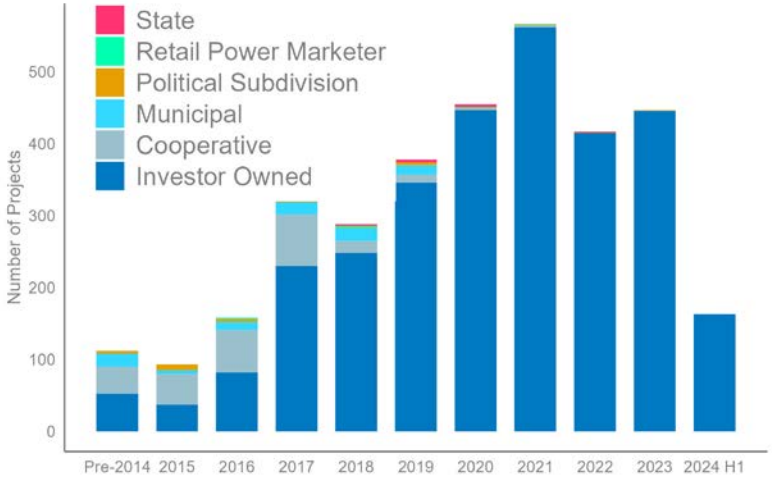
Number of Projects by Year



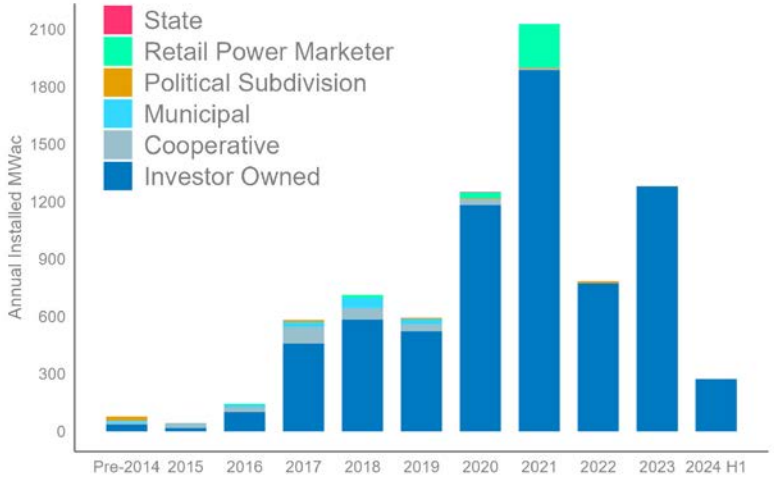
Distribution of Project Capacity by Year (Excluding Outliers)

Community solar operated in investor-owned utility service area contributes to 90% of installed capacity

- Community solar projects are operated in the service areas of different utility types. As of the end of 2018, community solar in the service area of investor-owned utilities, cooperatives, and municipals contributed 77%, 13%, and 6% of the market share, respectively.
- Since 2019, community solar in the service area of investor-owned utilities have led the market.
- As of the 2024 H1, projects in the service area of investor-owned utilities total 90% of installed community solar capacity cumulatively.



Number of Projects Installed by Year

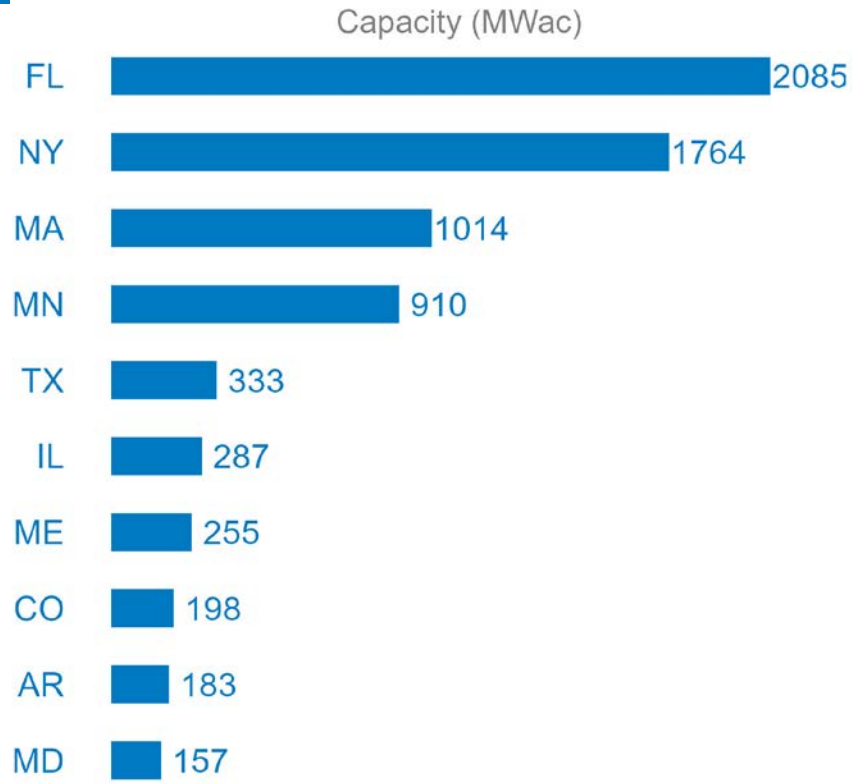


Capacity Installed (MW_{ac}) by Year

Note: Utility types align with those reported on EIA Form 861

A Few Key States Lead the Community Solar Market

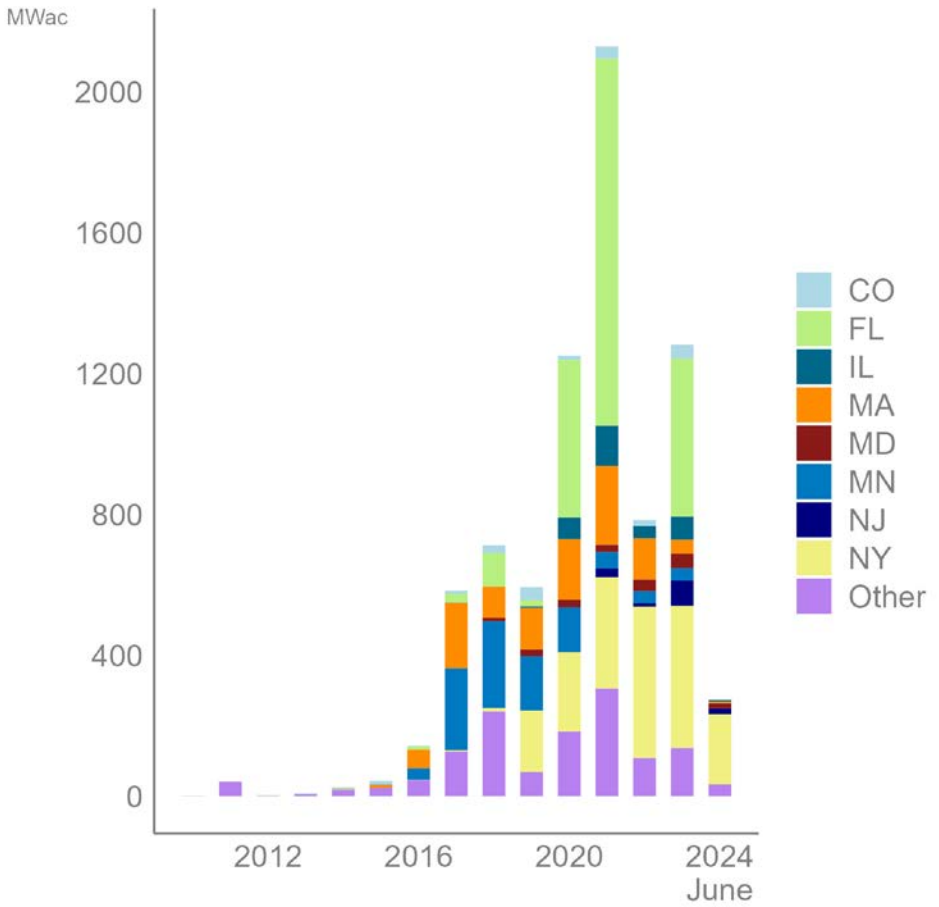
- About 91% of cumulative community solar capacity is located in 10 states.
- About 73% of cumulative capacity is located in just four states: Florida, New York, Massachusetts, and Minnesota.
- Twenty-six states have more than 10 MW_{ac} of installed capacity.



Cumulative Community Solar Capacity (MWac) by State

Community Solar Capacity Has Been Installed in Waves in Key Markets

- **Massachusetts' and Minnesota's Growth (2016–2021):** Massachusetts and Minnesota witnessed substantial community solar capacity expansions during the years 2016 to 2021, adding about 840 MW_{ac} each. Cumulative capacity installed in Massachusetts reached the 1 GW_{ac} milestone in 2023.
- **Florida's Remarkable Capacity Surge (2020–2023):** Florida experienced a significant surge in capacity from 2020 to 2023, with a cumulative 2.1 GW_{ac} of capacity coming online.
- **New York's Emerging Market (2019–2023):** New York has emerged as a pivotal market in recent years, having added 1.56 GW_{ac} of capacity during the past 5 years.
- **New Jersey:** New Jersey has built more than 100 MW_{ac} of community solar projects since 2021.



New Community Solar Capacity (MWac) by Year and State

Impact of Policy and Market Drivers

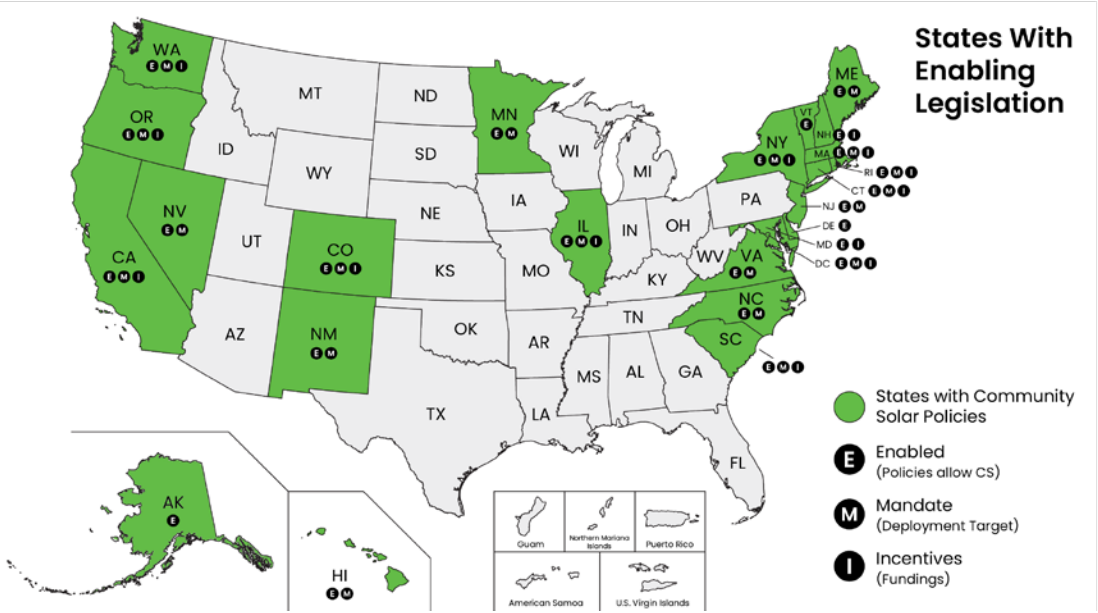
A discussion of various policy and market factors that have shaped community solar deployment

Community Solar State Policies (slide 1 of 2)

- Twenty-four states and localities, including 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.
- States that have enacted new legislation or made changes since 2023 include Alaska, Colorado, Maryland, Minnesota, and New Jersey.
- 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.

State-Level Community Solar Enabling Legislation*

* Legislation applies to at least one utility in the state.

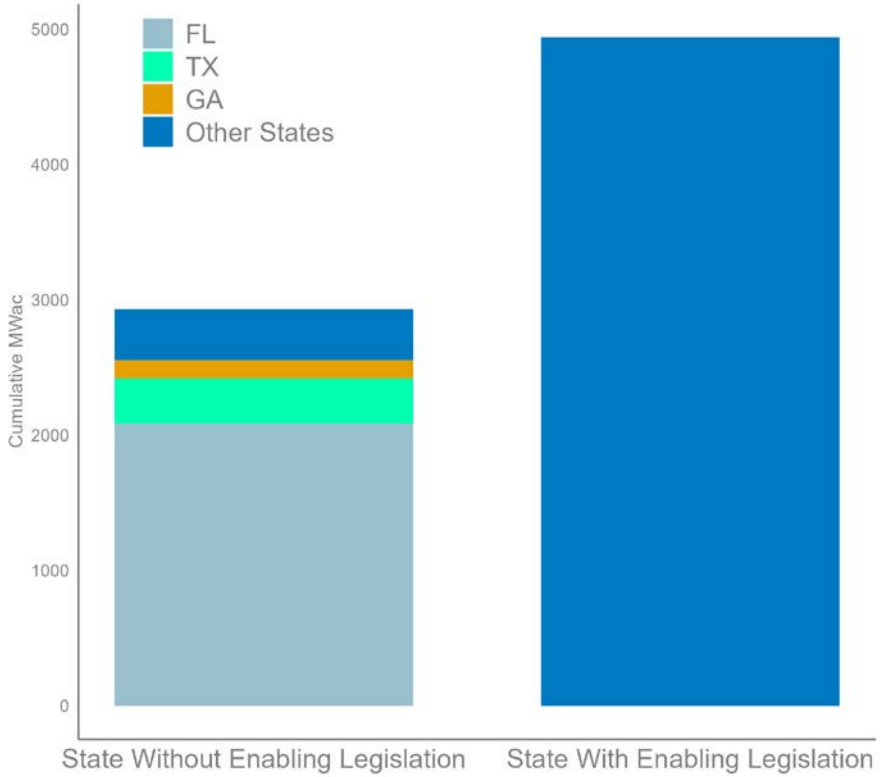


Source: NREL State Policies and Programs for Community Solar (2024 Q3 Update).

Note: Alaska enabled community solar policies in Aug 2024 through the Senate Bill 152.

Community Solar State Policies (slide 2 of 2)

- As of June 2024, 62.8% of community solar installations were developed in states with enabling legislation, whereas 37.2% of community solar installations were in states without enabling legislation.
- Florida, Texas, and Georgia were the key drivers of capacity in states without enabling legislation, contributing to 87.2% of developed capacity among states without enabling legislation.

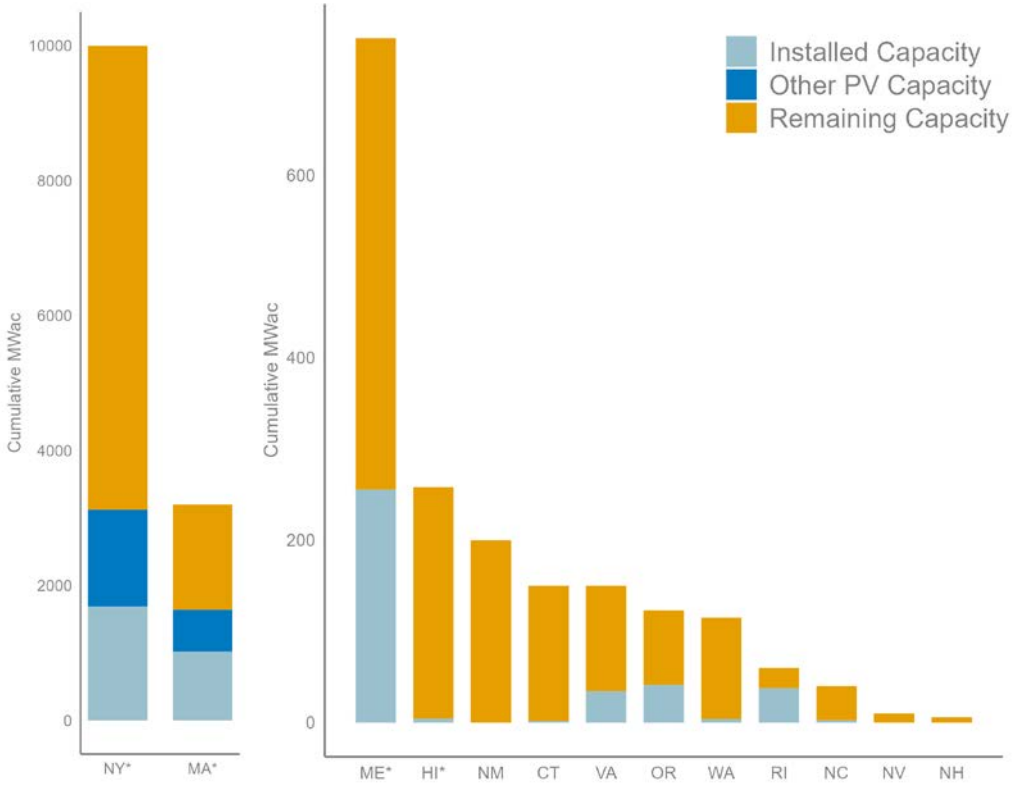


Cumulative Installed Capacity in States With and Without Enabling Legislation

Most States With Program Caps Have Large Amounts of Remaining Capacity

At least 22 states and localities, including the District of Columbia, have some cap-related requirements on community solar programs.

- Thirteen states have community solar program caps, shown in the graphs at right.
- In addition, California and Illinois have multiple programs.
- The District of Columbia does not have a cap but set the target to provide solar access to 100,000 low- and moderate-income households.
- Florida, South Carolina, and Wisconsin have utility-led programs with capacity targets.
- Minnesota, Maryland, and New Jersey have revised their programs and will implement annual procurement targets and caps.



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.

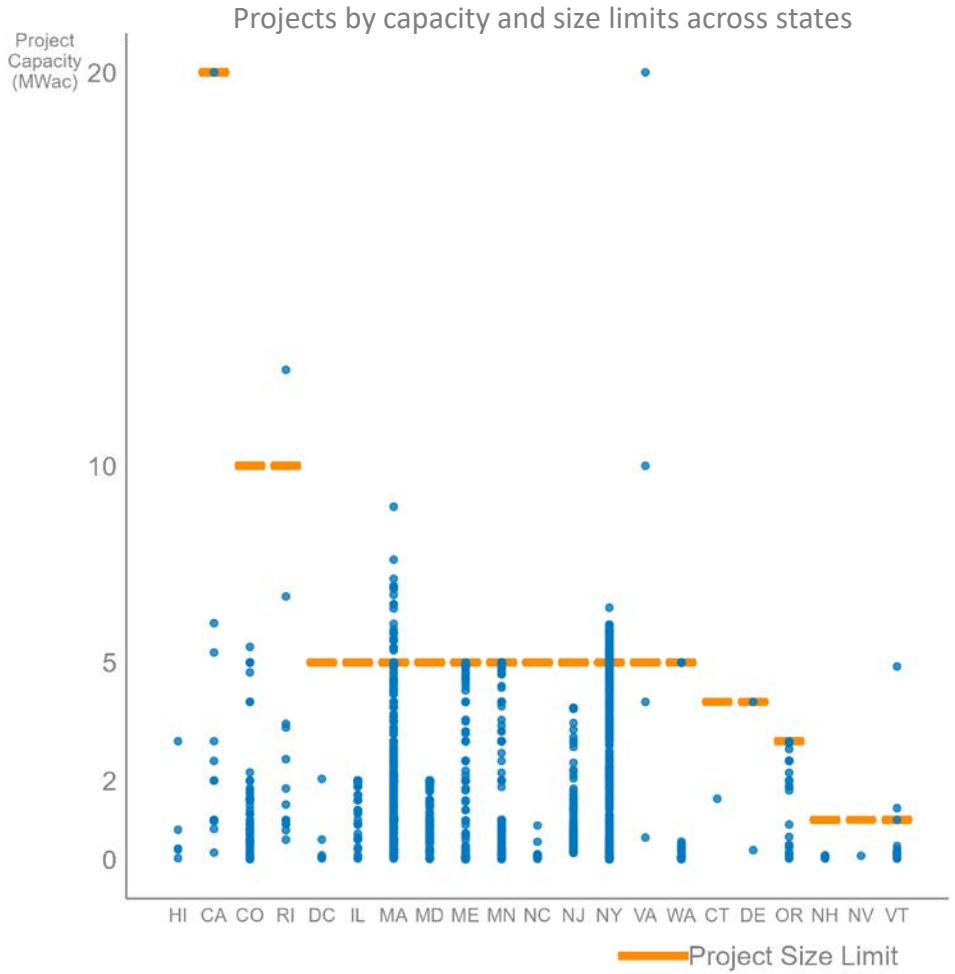
^ New Jersey made the community solar program permanent and removed the cap in 2024.

Source: Updated from NREL, Status of State Community Solar Program Caps (2022), State Policies and Programs for Community Solar (2024 Q3 Update). In addition, New Hampshire Electric Assistance Program Low-Moderate Income (EAP LMI) Community Solar Program *is accepting applicants in February 2024*

Most States Have Project Size Limits of 5 MW

At least 21 states and localities, including the District of Columbia, have max size limits on community solar projects.

- Eleven states have project size limits of 5 MW_{ac}, including leading markets for community solar, such a Massachusetts, Maryland, Minnesota, and New York.
- Colorado increased the project size cap to 10 MW_{ac} in 2023.
- California operates several distinct programs, each with its own project limitations to facilitate communit renewables. The Enhanced Community Renewables program has established a project cap of 20 MW_{ac}.
- In Hawaii, capacity limits for individual projects vary b location. The largest shared renewable project cannot exceed 75 MW.

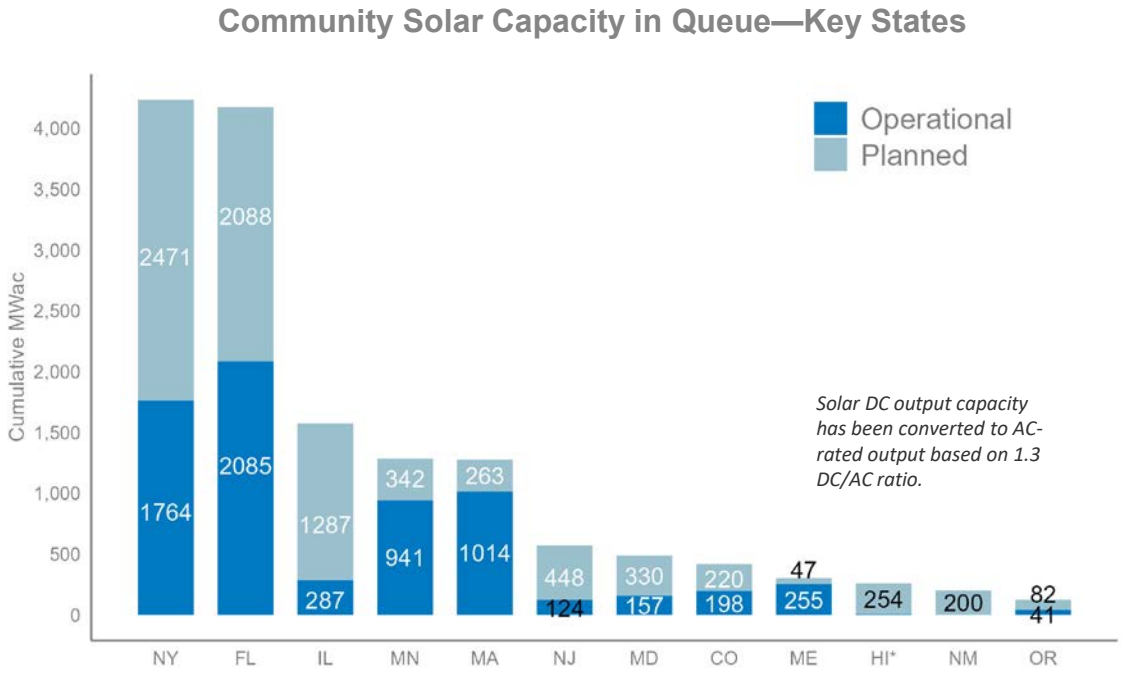


Source: Up
(2024 Q4 Update). HI programs do not specify AC/DC in their capacity

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

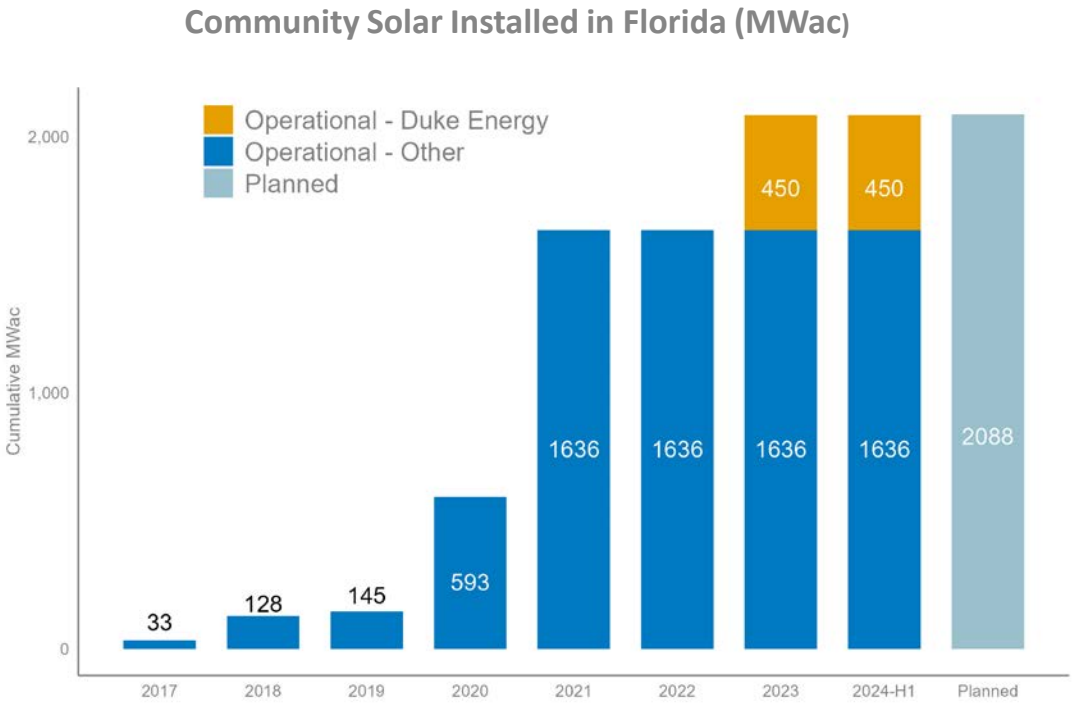


As of the first half (H1) of 2024, about 8.0 GW_{ac} of community solar capacity are planned:

- "Planned" in this study refers to projects that are awarded, under construction, and likely to come online in the next few years.
- This figure includes states with planned capacity of at least 50 MWac.
- About 6.8 GW_{ac} of projects are in operation for these 12 states.
- Florida and New York led the market, with about 4.5 GW_{ac} combined in the queue.

*Operational data from the NREL Sharing the Sun Project List 20224. FL: Planned capacities include Florida Power & Light (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; ME: Net Energy Billing 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, and the awarded permanent 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.*

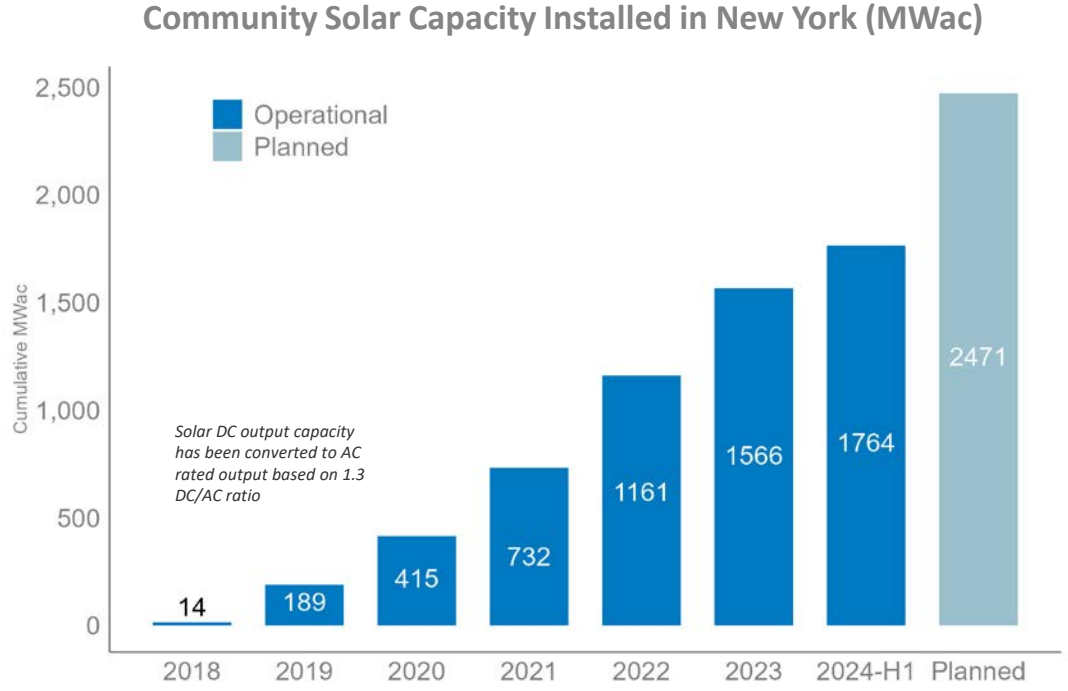
Capacity in Florida Is Driven by Florida Power & Light's SolarTogether Program



Data Source: 2017–2024: Sharing the Sun Project List 2024; Planned: Florida PSC Docket 20200176 , FPL Solar Together Program and Duke Energy program. The light blue represents planned capacity to be installed in H1 2024 and thereafter.

- **Florida Power & Light SolarTogether:**
  - Florida Power & Light (FPL) has deployed the nation's largest community solar program, with 1,490 MW_{ac} of operational project capacity.
  - Twenty-four new utility-owned projects with a total capacity of 1,788 MW_{ac} are planned.
- **Duke Energy:**
  - Six projects were completed (450 MW_{ac}) by June 2024.
  - 300 MW_{ac} additional capacity are planned in the shared solar program

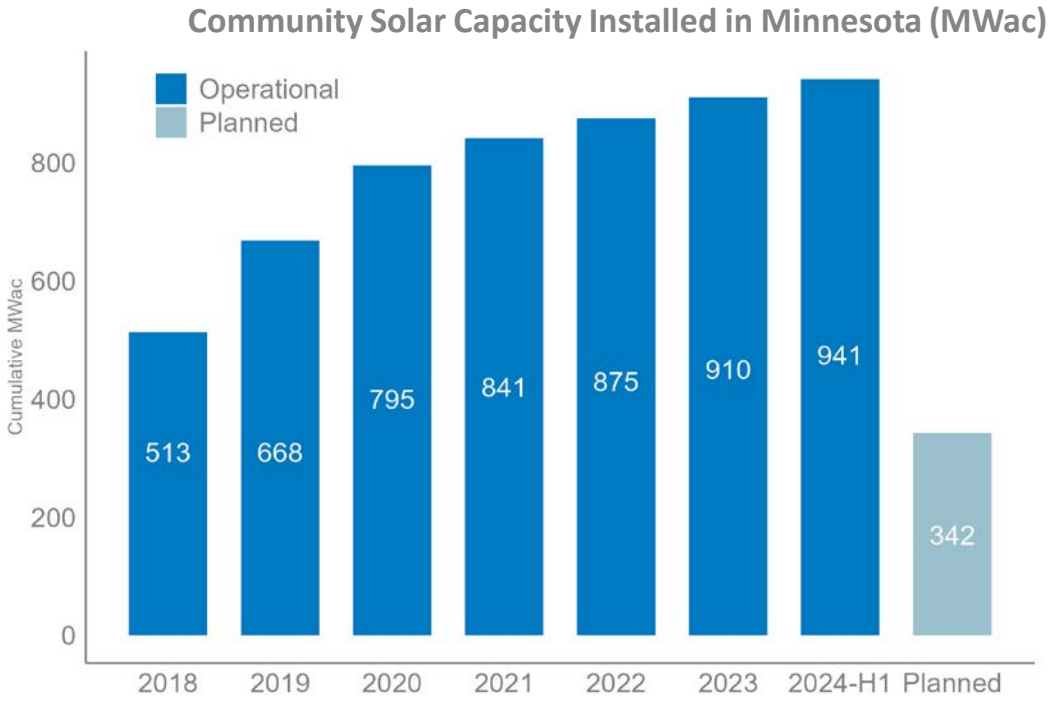
New York's Thriving Community Solar Landscape: About 1.7 GWac in Operation With a Robust Pipeline



Data Source: 2018–2023: Sharing the Sun Project List 2024; 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 H1 2024 in NY. The light blue represents the installed capacity (MWac) of planned community solar projects to be installed in H1 2024 and thereafter.

- As of H1 2024, a cumulative total of 1,764 MW_{ac} of community solar projects were operational in New York, which is enough to power nearly 400,000 homes.
- New York has ambitious plans for community solar, with a planned capacity nearly 2,500 MW_{ac}.
- The state's goal for deployment of distributed solar, which includes community solar, is 6,000 MW by 2025 and 10,000 MW by 2030. This is a significant driver behind the increasing planned capacity for community solar projects.

Minnesota's Market has been Making a Strong Comeback since 2023



Minnesota's Community Solar Program has installed more than 900 MWac.

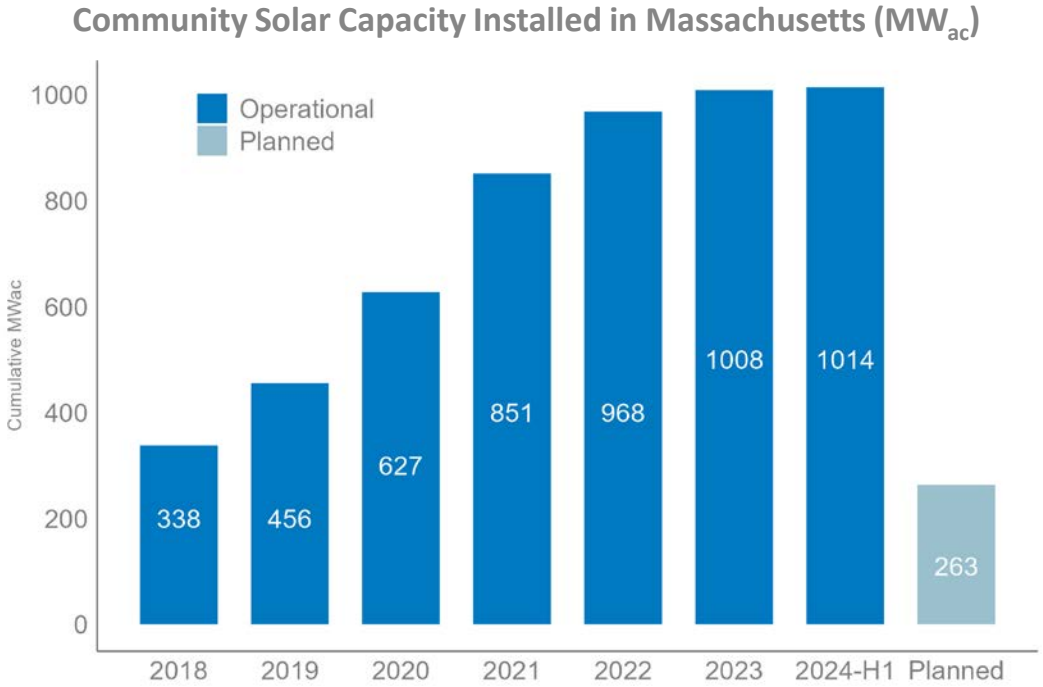
- By the end of 2023, the program had approximately 900 MW_{ac} of operational capacity, serving around 34,000 customers across more than 490 cities.
- In the first half of 2024, about 31 MW_{ac} of additional capacity were installed, with approximately 342 MW_{ac} planned.

In May 2023, legislation was passed marking the closure of Xcel Energy's Solar*Rewards Community Program for applications not approved before January 1, 2024.

- This program is experiencing the transition from the Legacy Community Solar Garden (CSG) program to the Non-Legacy CSG program.

Data Source: 2018–2024: Sharing the Sun Project List 2024; Planned: Xcel Compliance Filling 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 H1 2024 and thereafter.

Massachusetts SMART Program Contributes 594 MW_{ac}, 59% of the State's Community Solar Cumulative Deployment



Data Source: 2018–2024: Sharing the Sun Project List 2024; Planned: Solar Massachusetts Renewable Target (SMART) Application Update SMART projects only. The "planned" status includes approval/pending/under construction. The darker blue is 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 H1 2024 and thereafter. Projects tagged "under review" and "waitlist" were not included.*

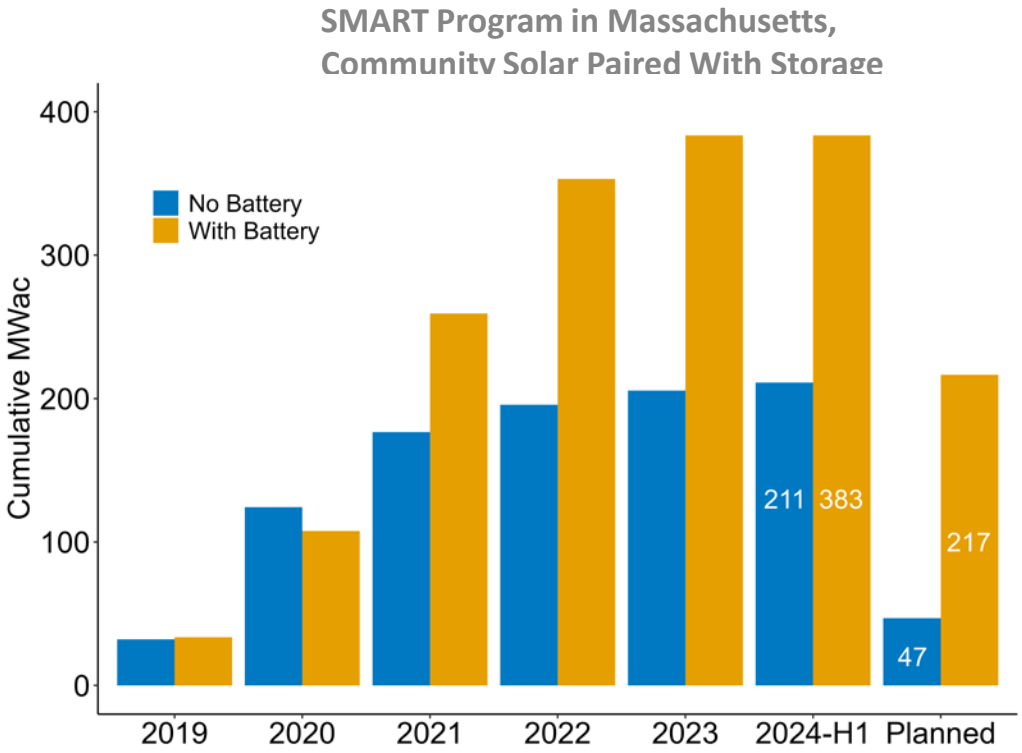
In 2018, Massachusetts started the Solar Massachusetts Renewable Target (SMART) Program (after the Solar Carve-Out II Program closed in 2017).

- By H1 2024, 1,014 MW_{ac} of community solar capacity were in operation.
- Via the SMART program, 594 MW_{ac} were installed, contributing 59% of the community solar installation in Massachusetts.
- Under the SMART program, 263 MW_{ac} are planned.

Despite the recent slowdown, a planned addition of 263 MWac indicates potential for a significant increase in future capacity.

- The cumulative capacity increased from 338 MW_{ac} in 2018 to 851 MW_{ac} in 2021, showing significant annual growth rates of approximately 34.9% (2019), 37.5% (2020), and 35.8% (2021).
- From 2021 to H1 2024, the capacity grew from 851 MW_{ac} to 1,014 MW_{ac}, with reduced annual growth rates of approximately 13.7% (2022), 4.1% (2023), and 1.0% (H1 2024).

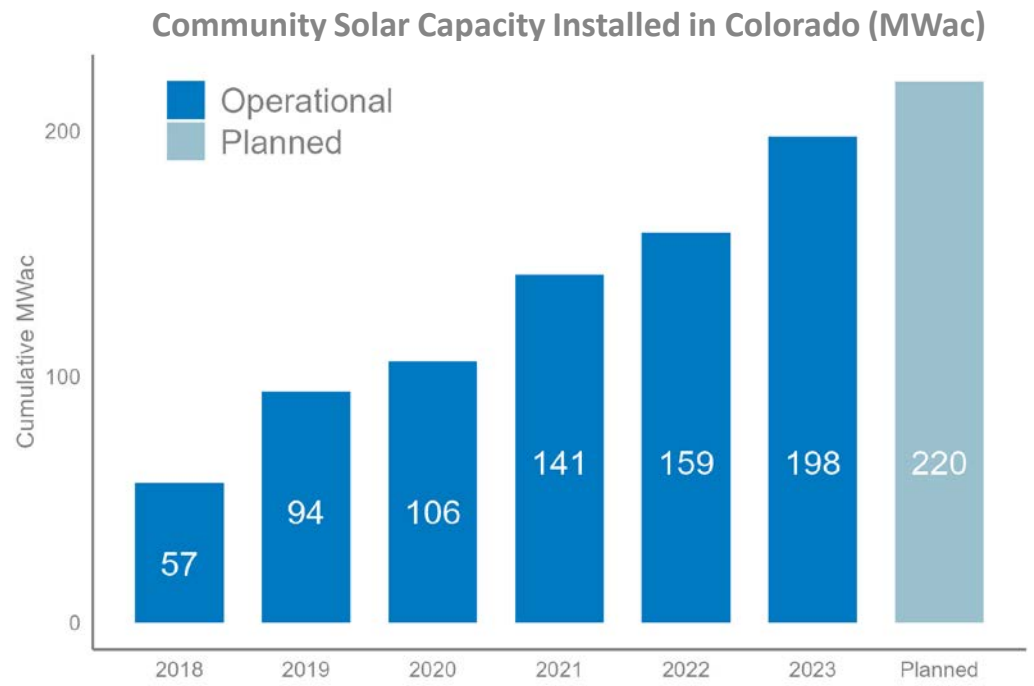
Of 594 MW_{ac} Operational in the SMART Program, 383 MW_{ac} Are Paired With Energy Storage



Data Source: Solar Massachusetts Renewable Target (SMART) Application Update.

- **The SMART program enables solar-plus-storage configuration.**
  - As of H1 2024, 37.1% (111/299) of operational community solar projects are paired with storage. This represents 64.5% (383/594) of cumulative community solar capacity in the SMART program.
  - 81 solar-plus-storage projects and 78 photovoltaic (PV)-only projects are planned, as of H1 2024.
- Since 2019, the capacity of solar-plus-storage projects has been increasing, in contrast to the slowdown in installations of PV-only projects.

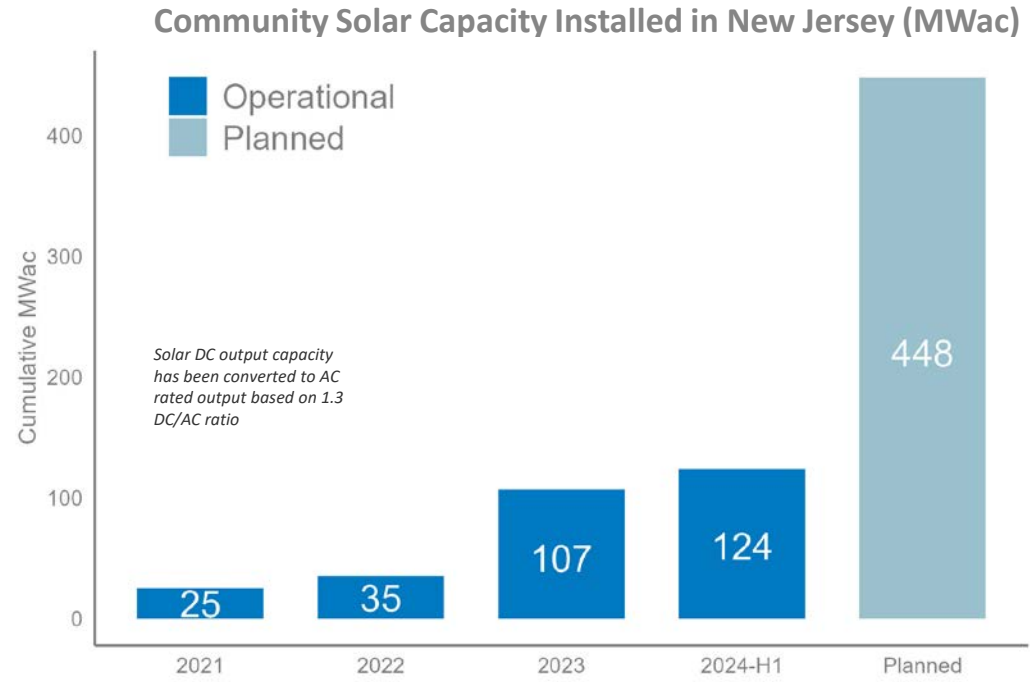
Colorado Market Interconnects Nearly 200 MWac Projects, Potential to Double



- Most community solar deployment in Colorado is through Xcel Energy's Solar*Rewards Community Program.
  - Xcel Energy releases the data on an annual basis. As of December 2023, 175 MWac have been installed under the Solar*Rewards Community program.
  - This program makes up 88% (175/198) of the state's total installed community solar capacity.
- Solar*Rewards Community program reports program status annually. As of the end of 2023, there are about 220 MW_{ac} capacity in development.

Data Source: 2018–2023 Sharing the Sun Project List 2024; Planned: Xcel Energy Renewable Energy Standard Compliance Report and Xcel Energy Interconnection Monthly Update.. 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 2024 and thereafter.*

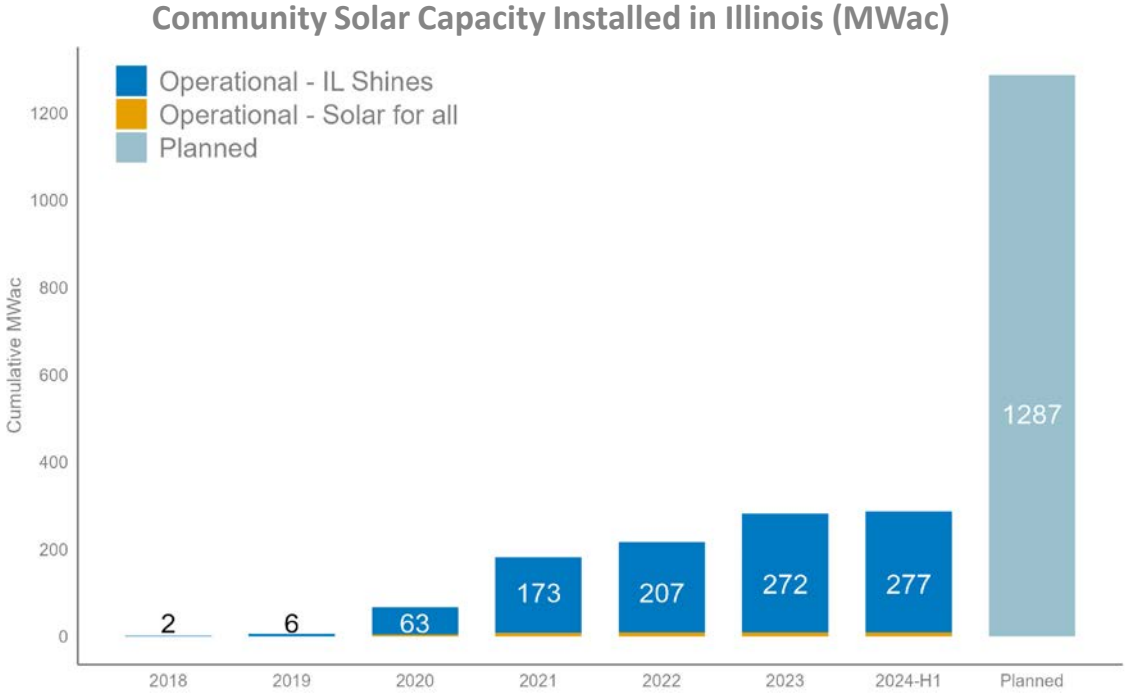
New Jersey Has Made the Pilot Program Permanent Increasing the total Planned Capacity to 448-MW_{ac}



Data Source: 2021–2024: Sharing the Sun Project List 2024; 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 H1 2024 and thereafter.

- The New Jersey Community Solar Energy Pilot Program has awarded more than 180 MW_{ac} of projects.
  - By H1 2024, 124 MW_{ac} of community solar projects were in operation.
- In 2023, New Jersey made its community solar pilot program permanent.
  - The permanent community solar energy program opened with a capacity block of 385 MW_{ac} (500 megawatts-direct current [MW_{dc}]) in total for 2024.
  - In total, the planned capacity is nearly 450 MW_{ac}.

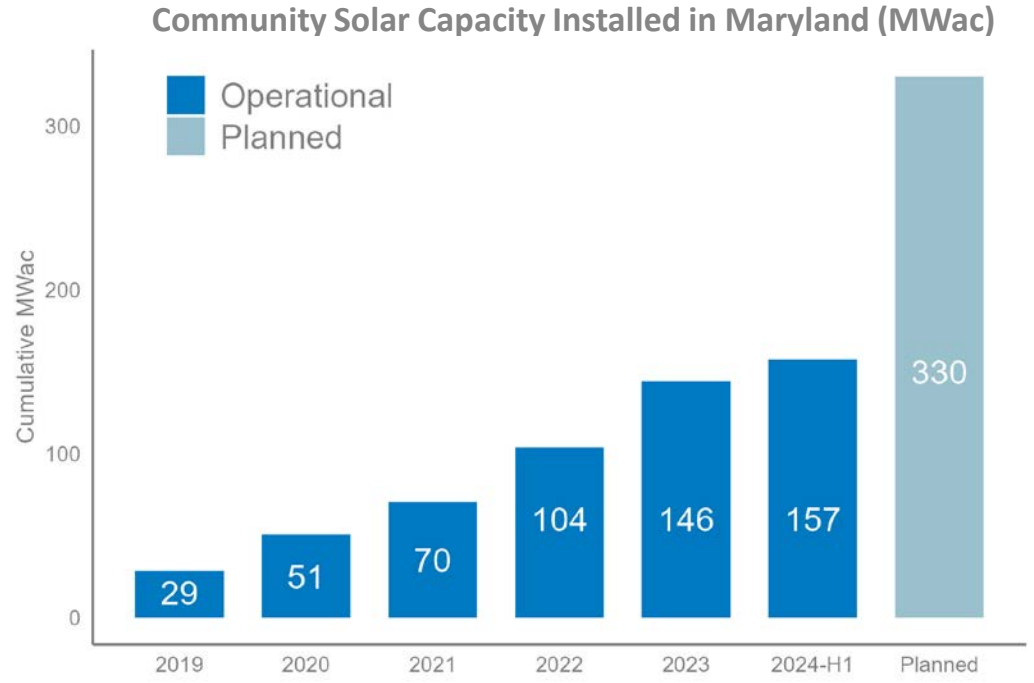
Illinois Adjustable Block Program (IL Shines) Contributes the Most to Illinois Community Solar Growth



- Illinois has multiple community solar-related programs. IL Shines is currently leading the market growth.
  - About 287 MW_{ac} are complete as of H1 2024 across all programs.
  - 1,258 MW_{ac} are scheduled to come online in under the IL Shines program.
- In addition, the Illinois Solar for All: Community Solar program is dedicated to low-income customers. This program has about 9 MW_{ac} in operation and added 29 MW_{ac} of planned projects as of H1 2024.

Data Source: 2018–2024: Sharing the Sun Project List 2024; 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 H1 2024 and thereafter.

Maryland Expanded Its Community Solar Program



Data Source: 2019–2024: Sharing the Sun Project List 2024; 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 H1 2024 and thereafter.

- In May 2023, Maryland passed House Bill 0908, which makes the community solar energy generating system pilot program permanent.
- The community solar program currently has 157 MW_{ac} of projects online.
  - There are 330 MW_{ac} planned, referring to capacity reserved. Projects on the waitlist are not included in the planned capacity.

Other Emerging Markets

- Oregon launched its 160-MWac community solar program in 2019. As of H1 2024, 41 MWac are in operation, and 82 MWac are expected to come online by Q3 2025.
- Maine's Net Energy Billing Program enables community solar enrollment. As of H1 2024, 255 MWac are in operation and 47 MWac are planned.
- 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 12 to 18 months after the selection.
- The Hawaii Public Utilities Commission approved the Hawaiian Electric Community-Based Renewable Energy Program* 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.

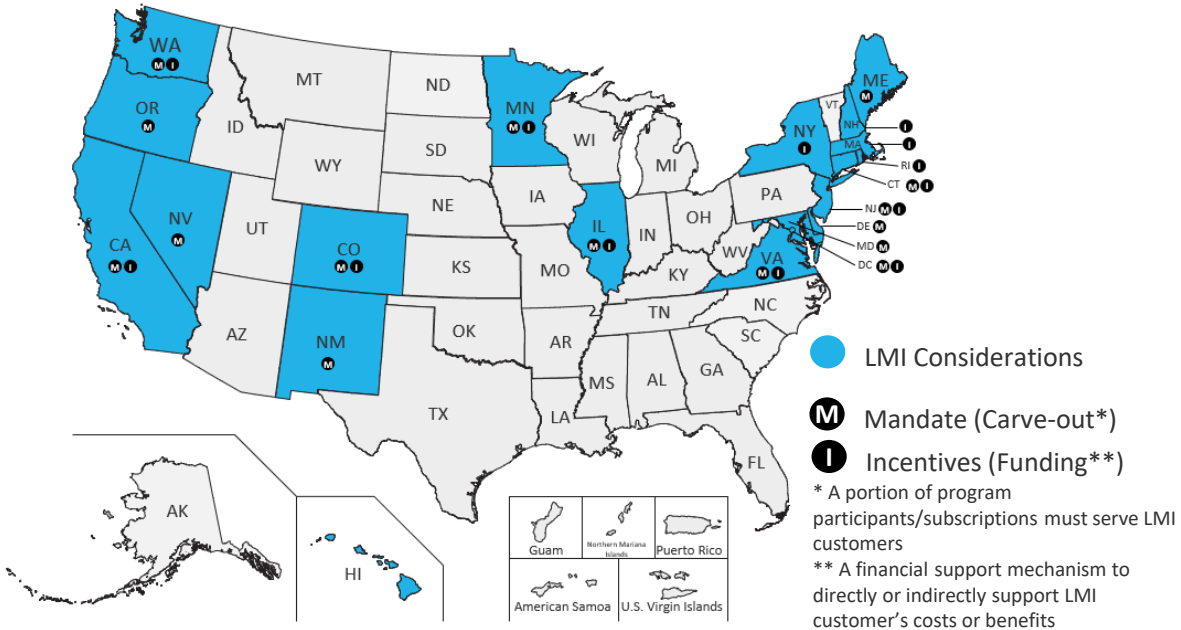
* HI programs do not specify AC/DC in their capacity

Low- and Moderate-Income Community Solar

Discussion of states with available low-income or low- and moderate-income (LMI) community solar capacity and projects in the queue as of H1 2024

States With Legislation That Expands Community Solar Access for LMI Households

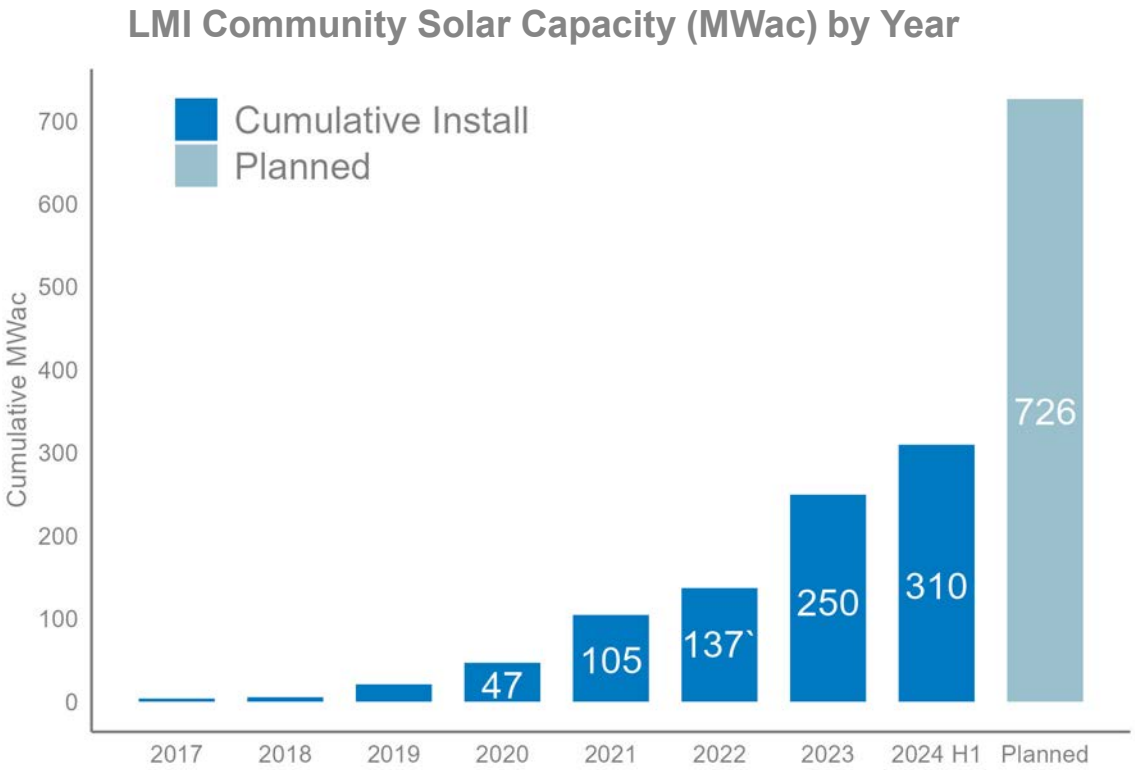
State-Level LMI Community Solar Legislation



- At least 20 states and localities including 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. For example, the program will allocate a certain amount of funding, or offer higher incentives as an adder, to ensure expanded solar access.

***Source**: State Policies and Programs for Community Solar (2024 Q3 Update).*

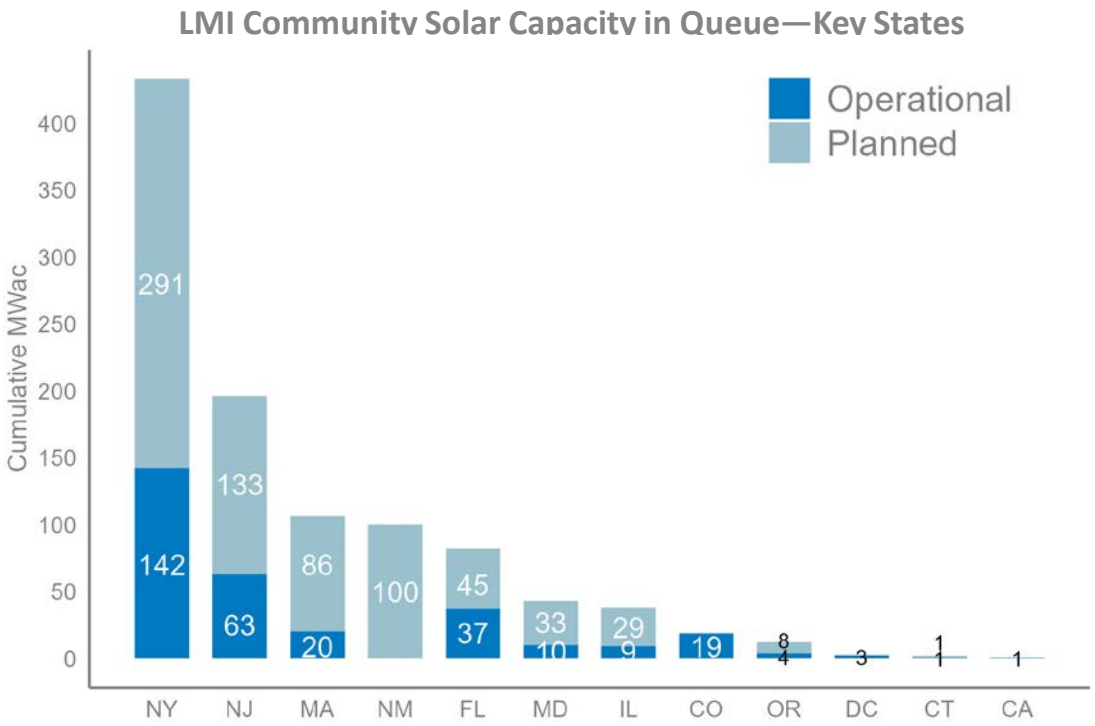
LMI Community Solar Is Growing Quickly



- The LMI community solar market was small until 2019.
- LMI community solar contributes to 4% (310 MW/ 7870 MW) of the whole community solar market as of H1 2024.
- The figure to the left captures the conservative LMI dedicated capacity based on program carve-outs.
  - For instance, if a 1-MW_{ac} project requires at least 51% to be reserved for LMI customers, the LMI capacity is calculated as 0.51 MW_{ac}.

Source: Sharing the Sun Project List 2024; In addition, the New Mexico 200 MWac state community solar program currently has no projects in operation, but requires at least 50% of its capacity to be dedicated to LMI (Low-to-Moderate Income) customers, adding 100 MWac to the planned capacity

LMI Community Solar Capacity Planned in Key States



- **As of H1 2024, at least 310 MW_{ac} of community solar capacity are dedicated to LMI customers for these 12 key states.**
  - State programs typically require 10% to 51% capacity to be set aside for LMI customers.
  - At least 726 MW_{ac} of community solar dedicated to LMI households are planned.

Operational and planned data come from the NREL Source: Sharing the Sun Project List 2024; In addition, the New Mexico 200 MWac state community solar program currently has no projects in operation, but requires at least 50% of its capacity to be dedicated to LMI (Low-to-Moderate Income) customers, adding 100 MWac to the planned capacity

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 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) (dollars per watt [$/W]) and an annuity equivalent ($/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%

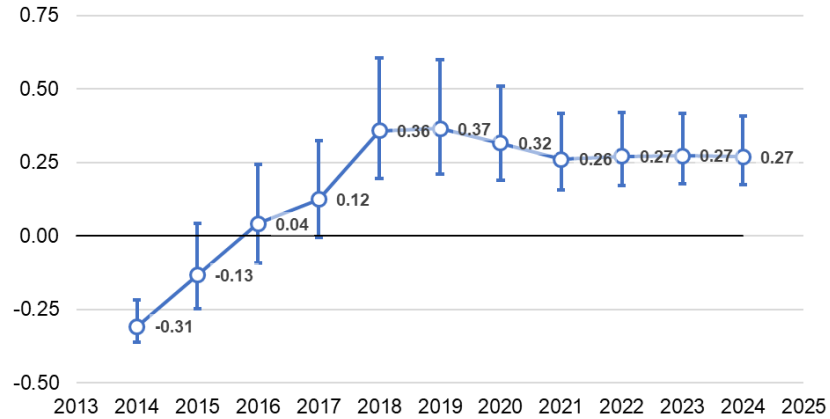
Assumptions Used in NPV Calculation Methodology

- 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 kilowatt-hour 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 sensitivity analysis around these factors, which are presented in the following slides.

NPVs Are Increasing and Stabilizing Over Time

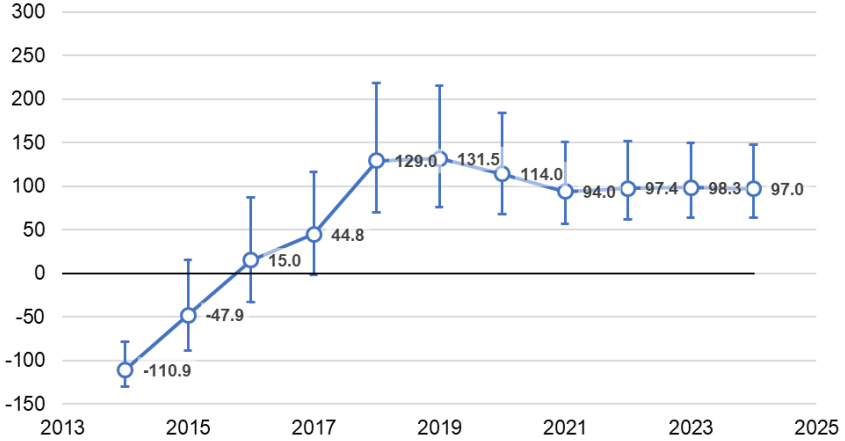
- The average NPV of subscription contracts has been positive since 2016, when state-legislated programs began to rapidly expand.
- Large policy-driven programs in CO, MN, MA, and NY established after 2017 also increased the overall NPVs.
- NPVs stabilized after 2021 as mature markets built capacity under established subscription contract structures. Values have continued to generally level off in 2023-2024(H1).

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)

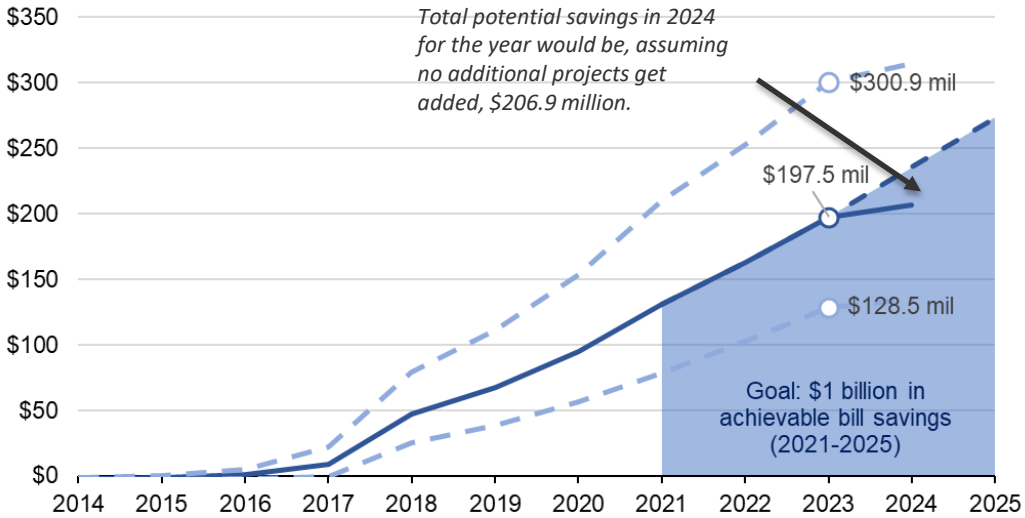


Capacity-weighted average annuity equivalent in 2021 $ per W-AC of community solar subscriptions, shown by cumulative installed projects by year. Error bars represent sensitivity under three scenarios that assume an annual retail rate escalation factor of 2.5% (base), 1.5% (low), 3.5% (high); real discount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

Estimated Achievable Bill Savings Are on Track for NCSP+ Goal

- Achievable bill savings are based on an annuity equivalent of the NPV of a residential subscription contract multiplied by the project's total installed capacity.
- Achievable bill savings have grown steadily from 2018 to 2023 as capacity has grown and NPVs have stabilized.
- Total potential savings through the end of 2023 was $197.5 million.
- Achieving a cumulative $1 billion in potential savings from 2021 to 2025 is possible with continued deployment at growth rate consistent with the rate from 2020 to 2023. In absolute terms, this requires adding 10% greater capacity-weighted savings potential per year in 2024-2025.

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 are available, the state average NPV is used. Average NPVs 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

www.nrel.gov

NREL/PR-6A20-91361

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.