Understanding Your Electric Grid: Policy and Incentives

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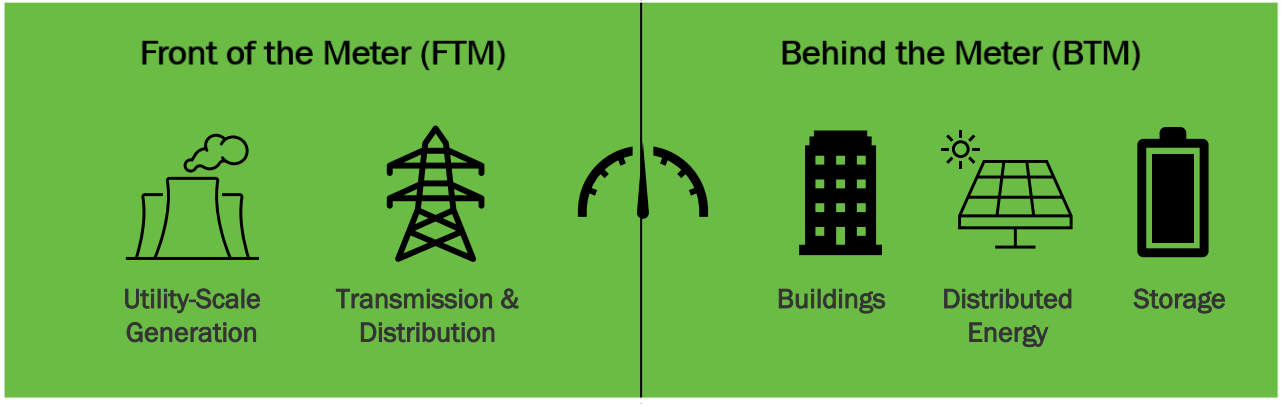
Photo by Dennis Schroeder, NREL 55200

Agenda

1. Federal Policies and Incentives
2. State Policies and Incentives
3. Utility Rates

Project Types

Interconnection Options



- Most renewable energy projects are connected to an existing utility grid.
- For safety, grid reliability, and economic reasons, the serving utility has a set of requirements for customers installing new projects on their grid.
- Behind the meter (BTM) systems are most common, although some very large systems are installed in front of the meter.

Federal Policies & Incentives

Public Utility Regulatory Policies Act (PURPA)

- Congress passed PURPA in 1978, which established rules for generating facilities, called Qualifying Facilities (QFs) to be allowed to sell electricity back to their utility.
  - This set the precedent for non-utility entities to sell power to the grid.
- Although QFs are allowed to sell power, PURPA rates tend to match utility wholesale prices (often less than $0.05/kWh).

State Renewable Portfolio Standard (RPS) Targets

- Many states have set binding or voluntary targets for their electric utilities to obtain a specified percentage of electricity from renewable resources.
- **RPS targets are a major driver of demand for renewable energy projects**

Ingram, Michael, Akanksha Bhat, and David Narang. *A Guide to Updating Interconnection Rules and Incorporating IEEE Standard 1547* (2021). Web.

Federal Solar Investment Tax Credit (ITC)

- Provides a tax credit as a percentage of the total eligible project cost
- ITC only available for taxable business entities
- Recent legislation extended the ITC phase-down schedule by two years
  - 26% before 2023
  - 22% before 2024
- ITC amount based on “commence-construction” year
  - See IRS Notice for additional detail


U.S. DEPARTMENT OF ENERGY
Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Guide to the Federal Investment Tax Credit for Commercial Solar Photovoltaics

Disclaimer: This guide provides an overview of the federal investment tax credit for those interested in commercial solar photovoltaics, or PV. It does not constitute professional tax advice or other professional financial guidance. And it should not be used as the only source of information when making purchasing decisions, investment decisions, or tax decisions, or when executing other binding agreements.

Overview

ACT NOW!

Access DOE’s commercial ITC fact sheet guide here

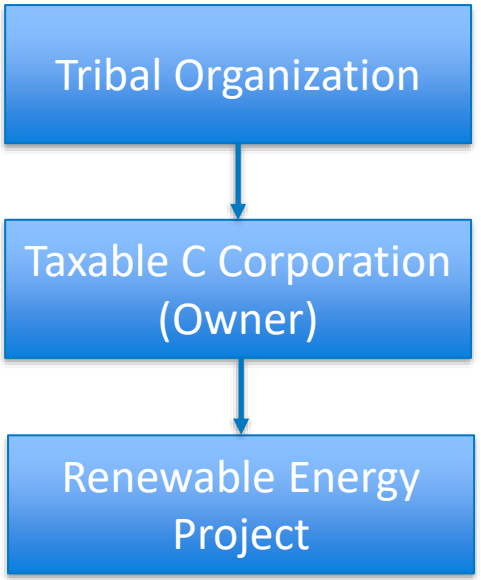
Production Tax Credit (PTC)

- The PTC is a kilowatt-hour tax credit for electricity generated by qualified energy resources such as large-scale wind.
- PTC-eligible projects must have “commenced construction” by the end of 2021. **This option is not currently available for new projects.**

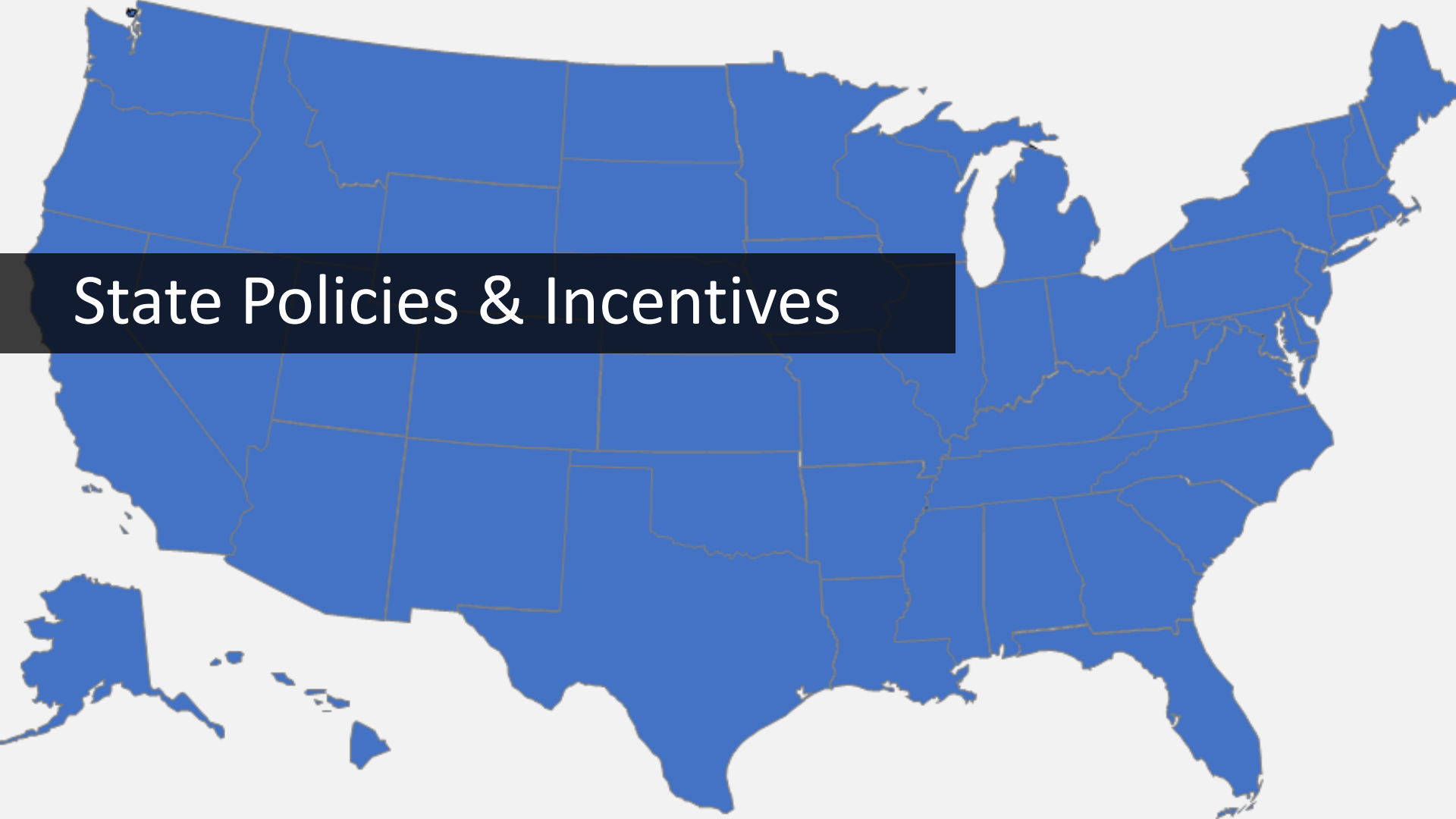
Photo by Werner Slocum / NREL 65323

Tribal Ownership and Tax Incentives

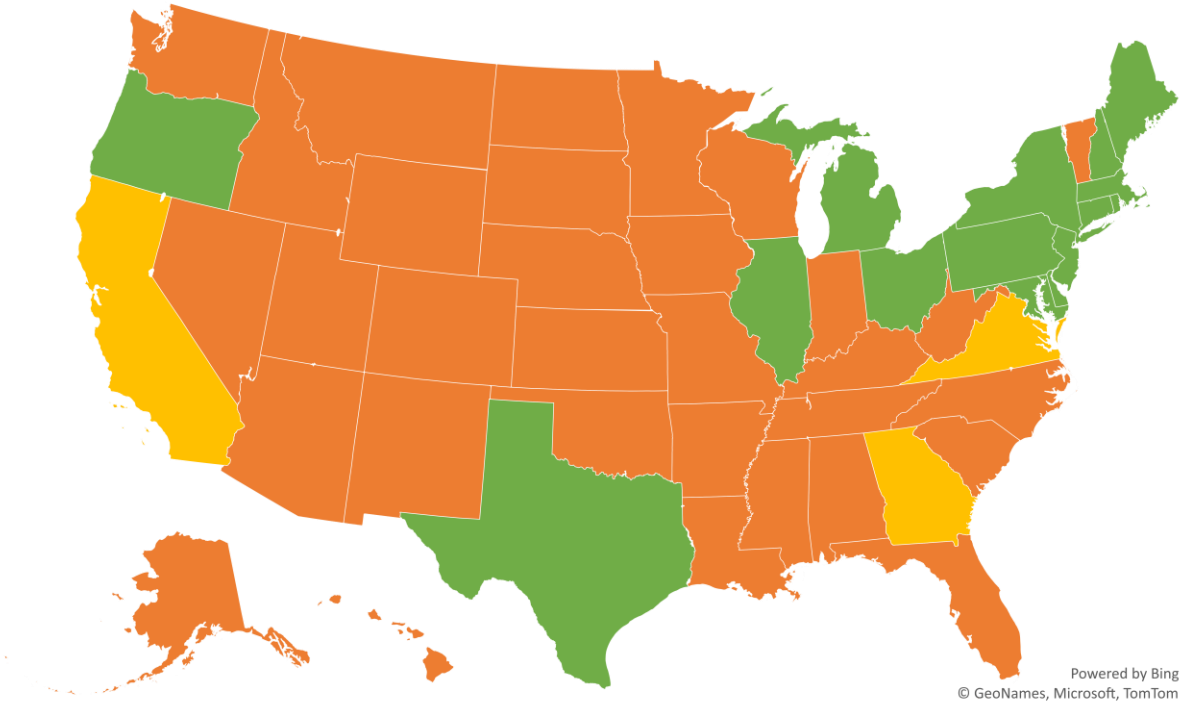
- Only eligible taxable business entities can receive federal tax incentives
  - Tribes may develop the project through a federally taxable business entity (typically C corporation), or
  - Enter into a Power Purchase Agreement with a taxable third-party owner who can pass on the tax incentive benefit in the form of a lower electricity price.
- **Consult qualified tax counsel prior to starting a project**



Illustrative Example


State Policies & Incentives

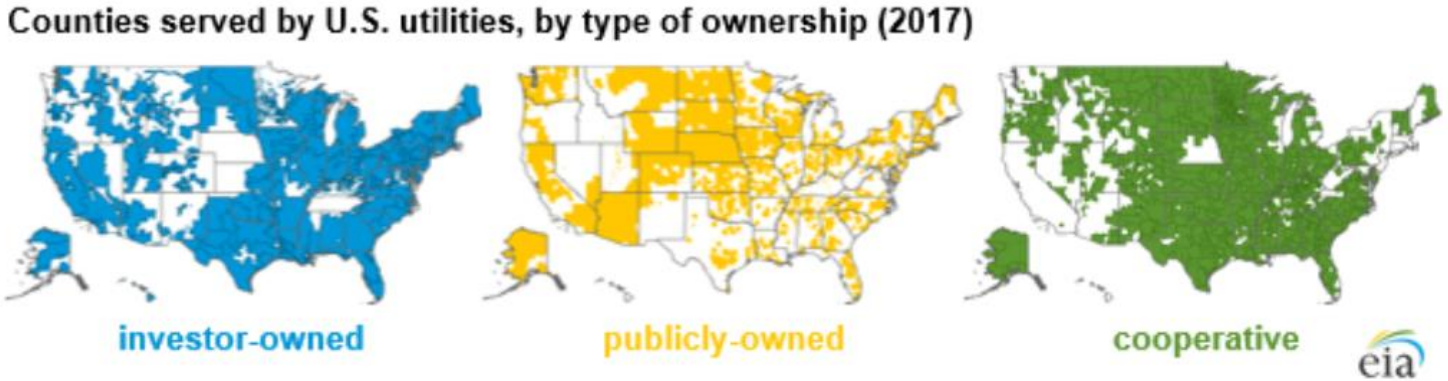
Electricity Market Status by State



Note: States in competitive markets also contain certain utilities that may be traditionally regulated.

- Regulated
- Selectively Deregulated
- Competitive Market

Source: American Coalition of Competitive Energy Suppliers, https://competitiveenergy.org/consumer-tools/state-by-state-links/

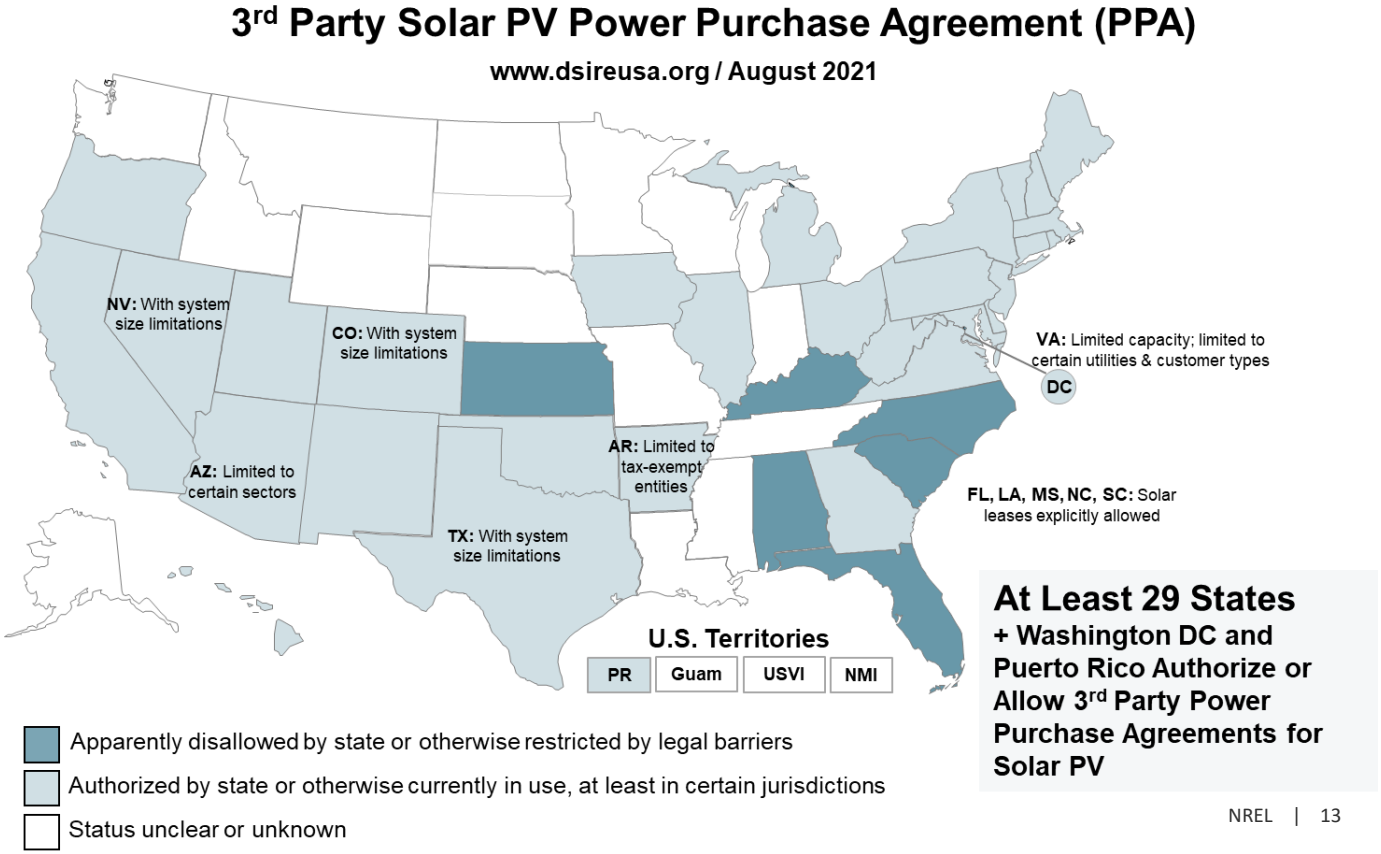


Utility Types

- **Investor-Owned Utility (IOU)**-Large shareholder-owned utilities, typically heavily regulated by elected public utility commissions. Serve the majority of U.S. customers.
- **Publicly-owned**-Federal, state and municipal-run utilities, management often publicly elected.
- **Cooperatives**-Non-profit member-owned utilities, typically smaller and serve rural customers. Not necessarily regulated by state public utility commissions.

Third-Party Sales Restrictions

- Check the Database of State Incentives for Renewables and Efficiency (DSIRE) website for state policies
- Discuss planned project with your utility to confirm legal/regulatory considerations



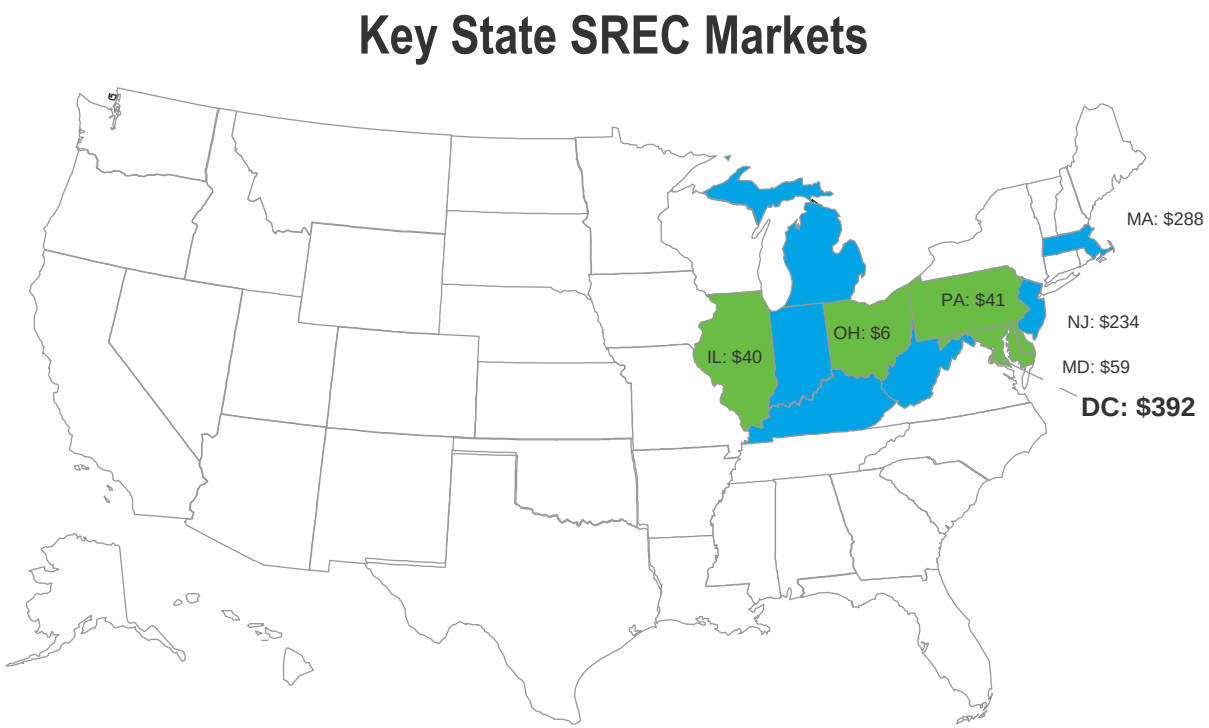
Renewable Energy Certificates

- **Renewable Energy Certificate (REC) :** "RECs are a tradeable, market-based instrument that represents the legal property rights to the "renewable-ness"- or all non-power attributes – of renewable electricity generation.
- The REC owner has exclusive rights to make claims about "using"… the renewable electricity associated with that REC.
- A REC is issued for every megawatt-hour (MWh) of electricity generated and delivered to the electric grid from a renewable energy resource."[1]

Environmental Protection Agency Definition:

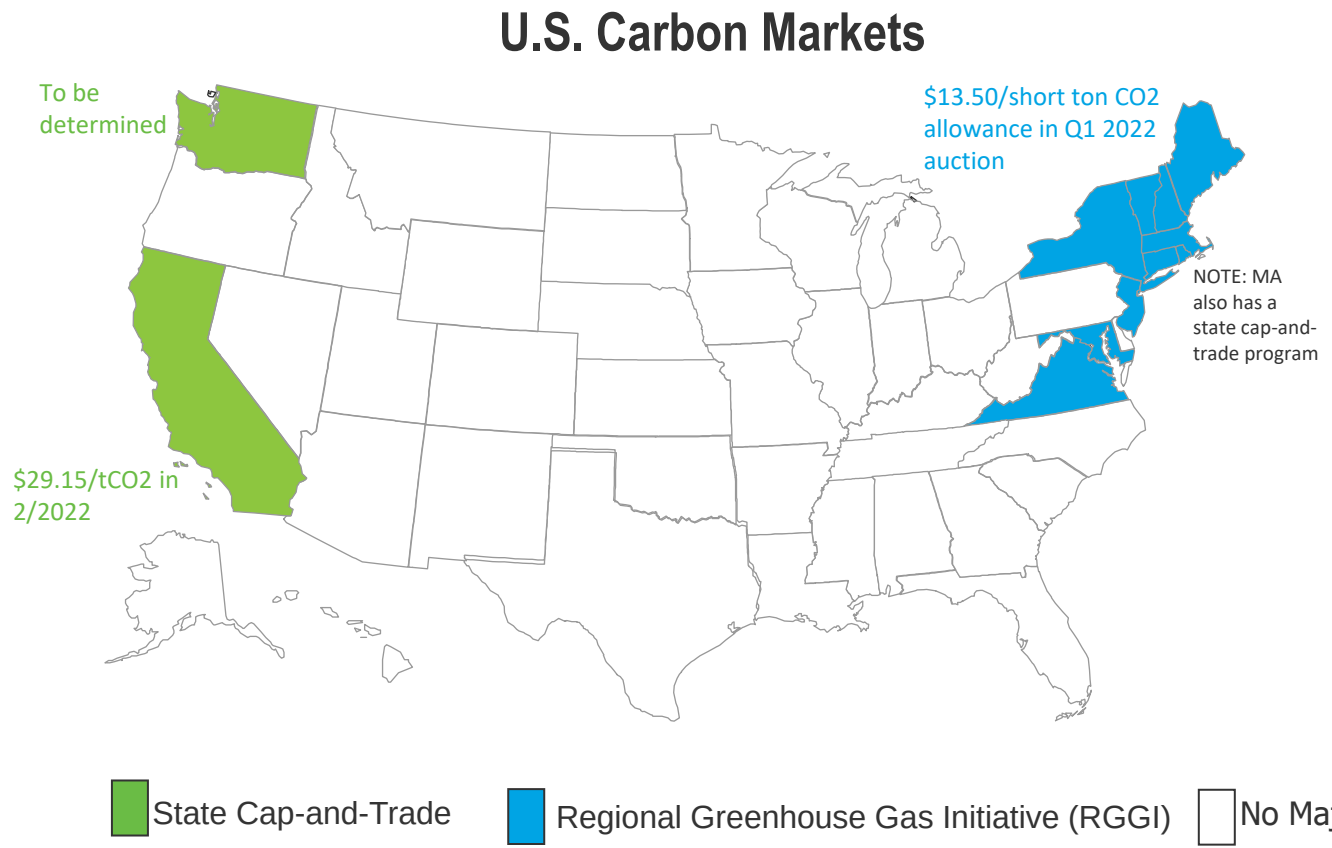
1. https://www.epa.gov/repowertoolbox/renewable-energy-certificate-monetization

State Solar REC Markets



- SRECs can be a major project driver in certain markets such as Maryland, New Jersey and DC
- Voluntary REC markets exist in many other states, but prices are much lower (typically less than $5/MWh)
- Other important state/local incentives:
  - Property/sales tax exemptions
  - Utility incentives
  - Ancillary market revenues

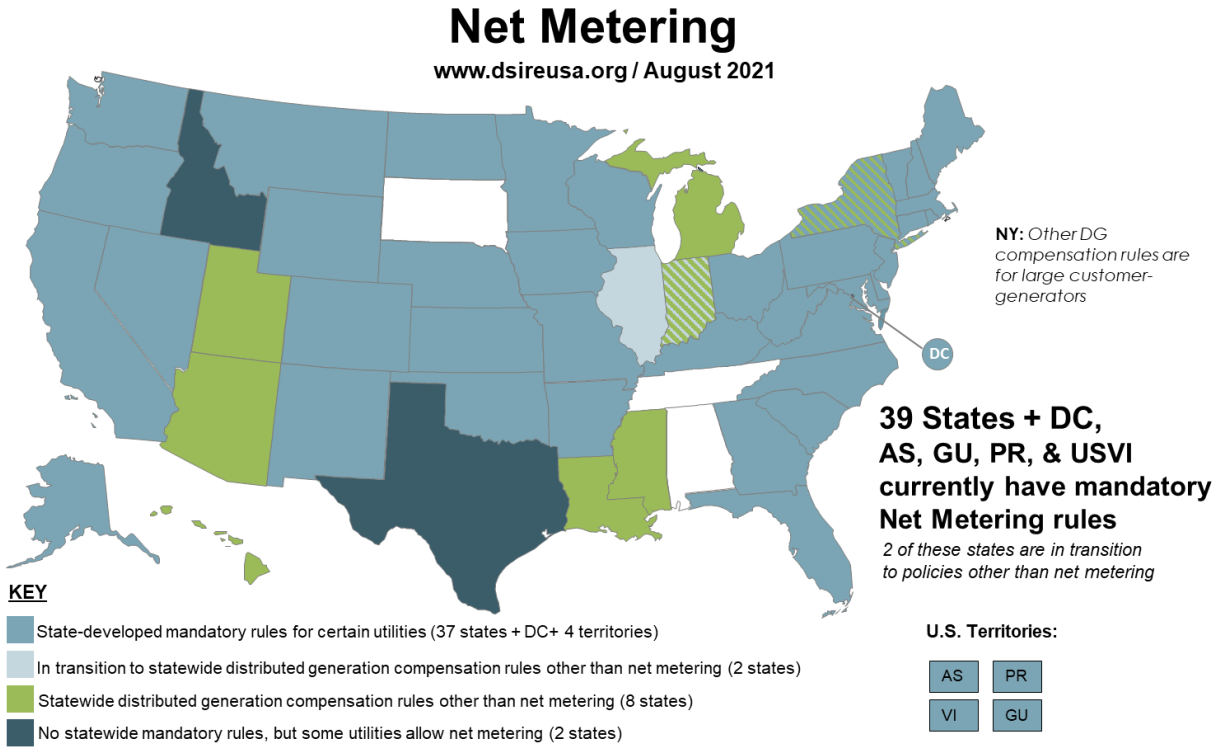
State Carbon Markets



- Cap-and-trade is the primary carbon market mechanism in the U.S.
- Businesses are allowed to either buy allowances or reduce emissions to meet ever-tightening emission caps.
- Several states have implemented individual carbon cap-and-trade programs to achieve greenhouse gas (GHG) reduction targets
- 11 states in the Northeast participate in a regional cap-and-trade program (RGGI).

Net Metering

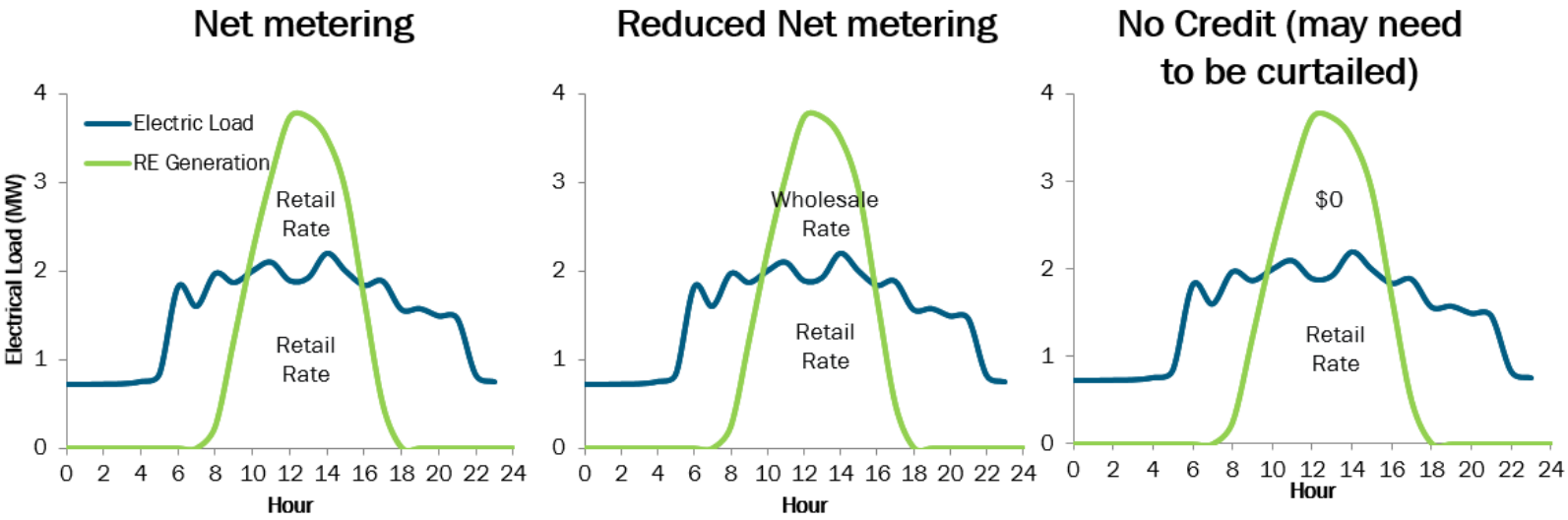
- Net metering can be a major economic driver of behind the meter projects, particularly where utility rates are high.
- Visit your utility's website to confirm availability and net metering details
- Net metering rates are undergoing revision in many key markets, such as California.



Net Metering Compensation

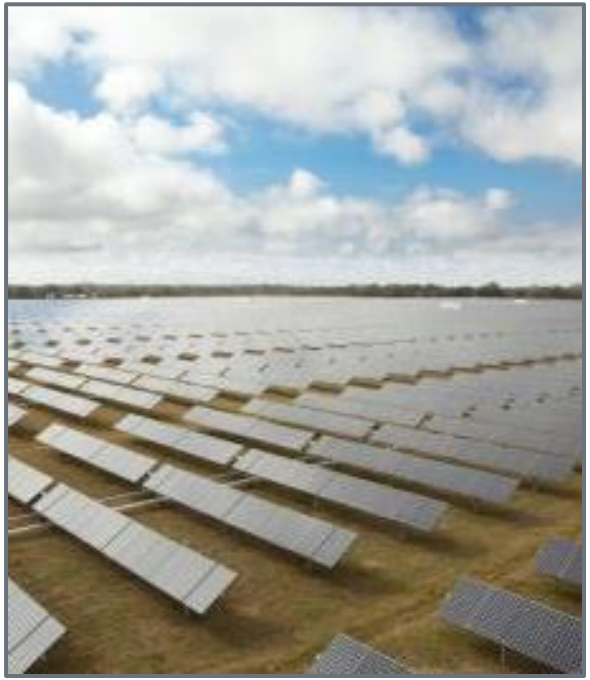
Net metering is a billing arrangement in which the utility credits a customer for excess electricity from an onsite DE project that is fed onto the utility grid.

- **What is your site load compared to estimated DE project generation?**



What is Community Solar?

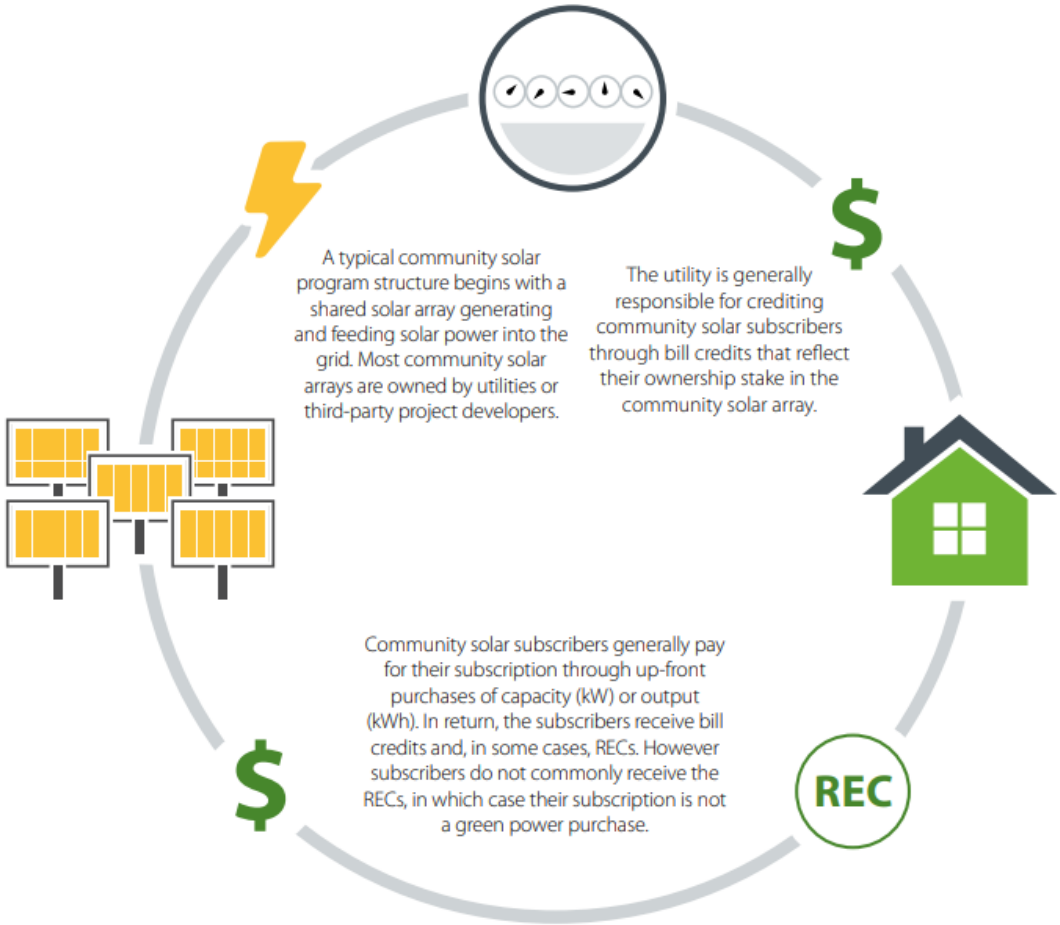
- A *third-party*-owned system to offset multiple individual businesses' or households' consumption participating in the program (DOE/NREL 2015)
- Participants ("subscribers") purchase a *share of the total energy produced* by the site and receive the benefits on their electric bill (GTM 2015).
- Upfront payment or pay-as-you go, monthly payments
- Emerging vehicle for including low-income customers in solar projects
- Facilitated by community solar legislation and/or virtual net metering regulations
- Also known as solar gardens, shared solar or roofless solar



NREL Image Credit: 23816

Community Solar Diagram

- Utility-sponsored community solar is the most common structure used in the U.S.
- The solar developer owns and maintains the solar project
- Subscribers can pay upfront or monthly

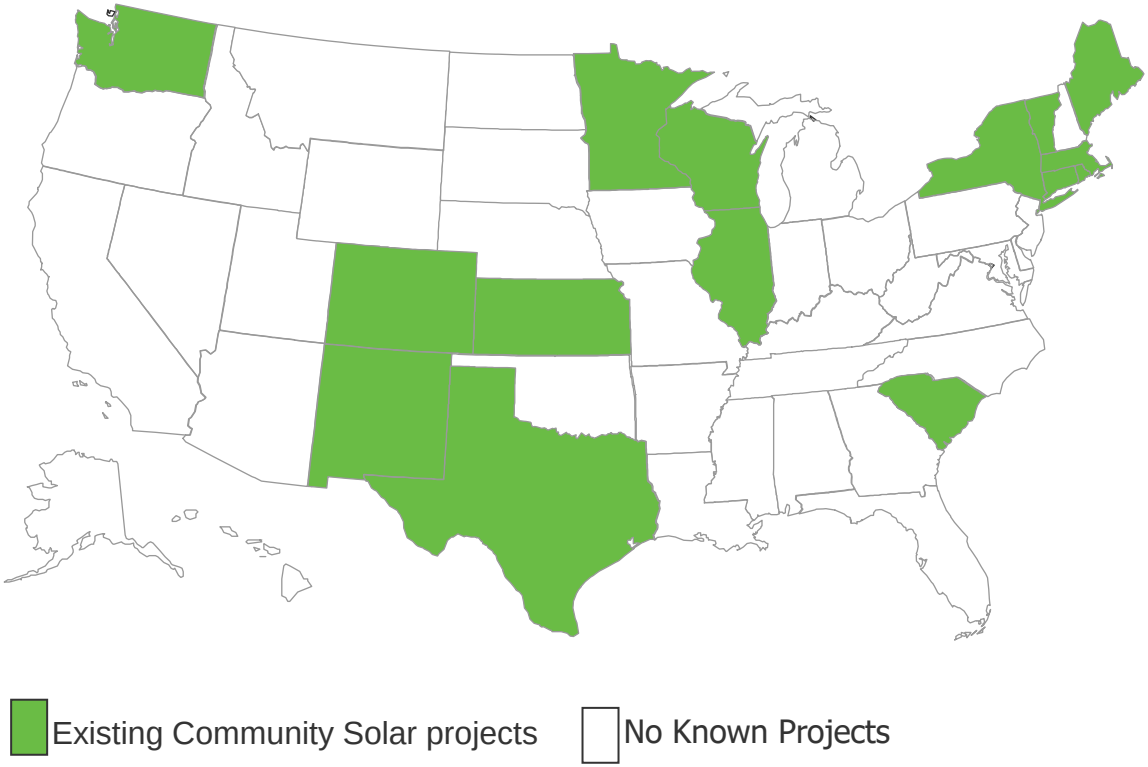


This figure provides a general overview of the structure of community solar programs, but the details of each program can vary substantially.[5] *Illustration by NREL*

Community Solar Project Locations

- The largest community solar markets are currently:

1. New York
2. Massachusetts
3. Maine
4. New Jersey
5. Minnesota

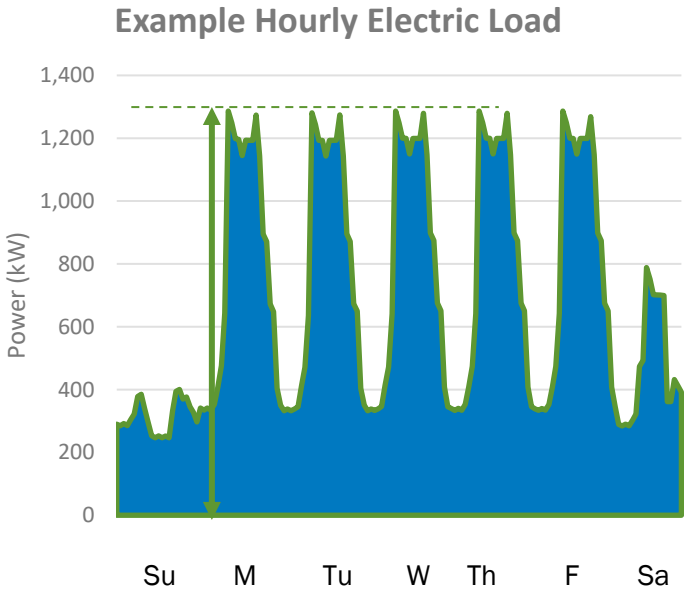


Citation: Wood Mackenzie. Community Solar Market Outlook 2021. July 2021. Subscription only.

Utility Rates

Electricity Usage Overview

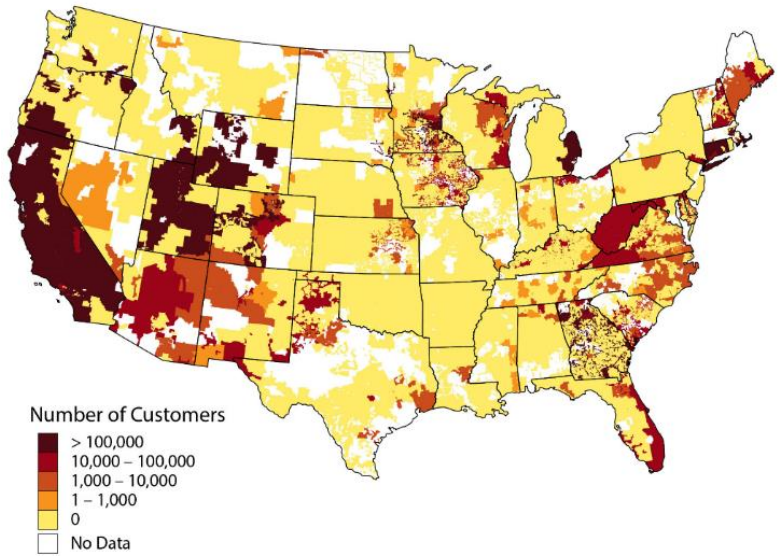
- A site's electric load is characterized by the amount of electricity consumed (load magnitude) and when that electricity is consumed (load shape)
- Advanced meters typically track a site's electricity consumption on an hourly or 15-minute basis; this is referred to as interval data
- Common characteristics include total electricity consumption (kWh, blue shaded area) and electricity consumption at a given time (instantaneous demand in kW, green line)



Typical Electricity Bill Components

Bill Component	How It's Billed	Typical Unit	How to Lower this Charge
Energy Charges	• Based on amount of electricity consumed • Cost can vary by **time of use** and by season	$/kWh	• Reduce overall consumption • Shift usage from high- to low-cost periods
Demand Charges	• Based on maximum demand during a given period, typically each month	$/kW	• Curtail usage during peak demand period • Shift usage to different period
Fixed Charges	• Fixed cost billed monthly • Determined by rate schedule, not consumption	$/month	• Can be reduced by consolidating meters

Number of commercial customers who can subscribe to tariffs with demand charges over $15/kW

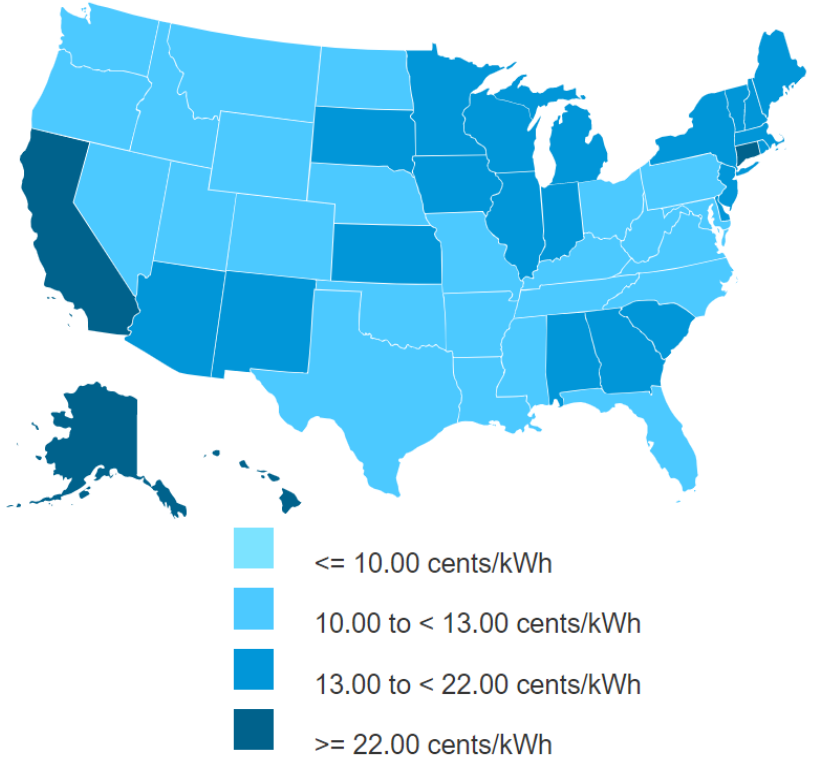


Identifying Potential Markets for Behind-the-Meter Battery Energy Storage:
A Survey of U.S. Demand Charges
https://www.nrel.gov/docs/fy17osti/68963.pdf

Drivers of Cost-Effective Solar Projects

- Solar PV projects are most cost-effective for sites with high energy charges ($/kWh).
- Time-variable rates can be beneficial for solar PV if on-peak charges align with daytime hours, but peaks are shifting to the afternoon and evening.
- PV projects may reduce demand charges if peak demand aligns with daytime hours, but this is not guaranteed due to PV output variability
- Pairing PV with storage can improve savings considerably.

Average Retail Price of Electricity to Residential Sector



U.S. Rankings: Average Retail Price of Electricity to Residential Sector, May 2021 EIA. https://www.eia.gov/state/rankings/#/series/31 Accessed 9/13/2021.

Drivers of Cost-Effective Energy Storage Projects

Energy storage projects tend to be most cost effective at sites with:

- State and local storage incentives (CA, MA, NY)
- High demand charges
- Time-variable pricing with large differences between on-peak and off-peak rates
- Demand response programs

Site resilience needs are another common driver of energy storage projects