Better Plants®
U.S. DEPARTMENT OF ENERGY

Virtual Training: Onsite Energy Generation and Storage

Considerations for Onsite Energy and Supply Options

Session #6
July 8, 2025
10:00am – 12:00pm EST

U.S. DEPARTMENT OF ENERGY

General Information

- Schedule: Every Tuesday (June 3rd – July 8th) morning @ 10am ET
- Sessions will be recorded
- We want these VT to be interactive!
- We're hoping you finish the VT with some big progress
- There will be homework – just try your best!
  - "You'll get out what you put in!"

Links:
https://bptraining.ornl.gov/
http://betterbuildingssolutioncenter.energy.gov/better-plants
https://measur.ornl.gov

Training Overview

1. 06/03: Introduction to Onsite Energy Generation
2. 06/10: Exploring Onsite Energy For Your Facility
3. 06/17: Evaluating an Onsite Energy System
4. 06/24: Onsite Energy Success Stories and Overview Of Geothermal Systems
5. 07/01: Overview of Combined Heat and Power, Onsite Biomass, and Small Modular Reactors
6. **07/08: Considerations for Onsite Energy and Renewable Energy Supply Options**

Agenda

1. Homework Review
2. Siting Considerations For an Onsite Energy Project
   - *Paul Lemar, ORNL*
3. Other Renewable Energy Supply Options
   - *Indraneel Bhandari, ORNL*
4. Q&A

Review of Session #5 Homework

1. Which prime movers are better suited to provide high pressure steam for a Combined Heat and Power System?

- Combustion Turbines
- Reciprocating Engines
- Fuel Cells

Ans: Combustion Turbines

Review of Session #5 Homework

2. What are some of the sources for sourcing Renewable Natural Gas or RNG? (Select all)

- Municipal Solid Waste (MSW) Landfills
- Municipal WWTP (using Anaerobic Digesters or AD)
- Livestock farms (using AD)
- Stand-alone organic waste management operations (using AD)

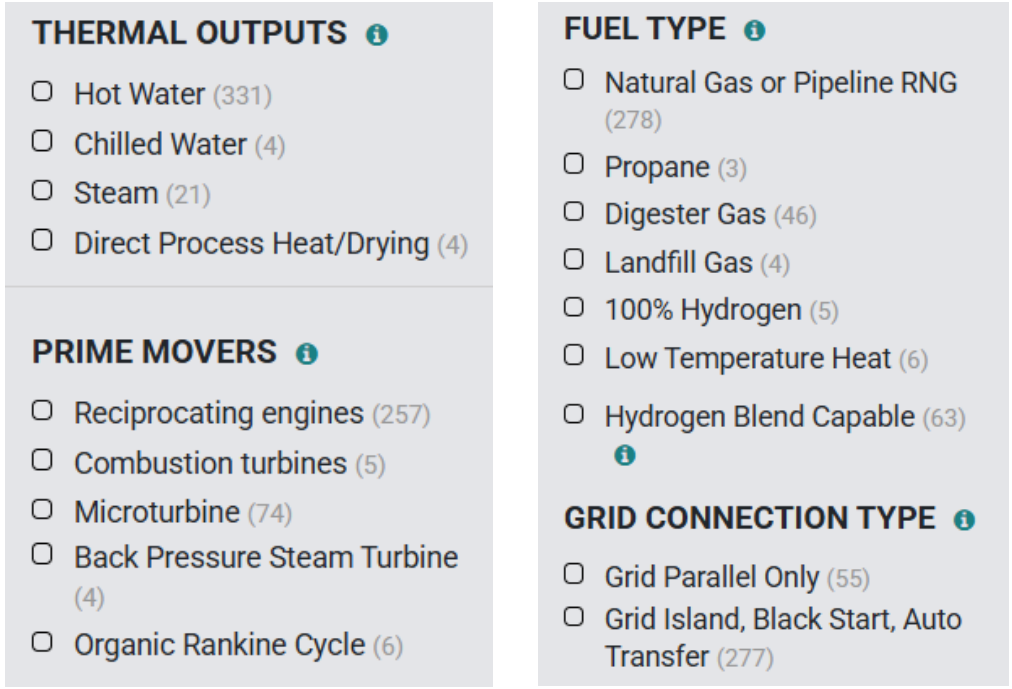
Ans: All

Review of Session #5 Homework

3. In the DOE CHP eCatalog, list two of the four thermal outputs and three of the five prime movers available as search functions. [DOE-CHP eCatalog]

Ans:

- Thermal Outputs (2 of 4)
  - Steam
  - Hot Water
- Prime Movers (3 of 5)
  - Reciprocating Engines
  - Gas Turbines
  - Fuel Cells



Review of Session #5 Homework

4. CHP provides multiple attributes that increase energy resilience for manufacturers, utilities and communities. One such attribute is that CHP provides a continuous supply of electric and thermal energy. Which of the following additional attributes of CHP support energy resilience

- CHP can be configured to island from the grid and black start without grid power.
- CHP can operate without grid power support for multiple days.
- CHP enhances grid stability and relieves grid congestion.
- CHP supports a hybrid microgrid deployment for balancing renewable power and providing a diverse generation mix;
- CHP systems maintain critical facilities such as hospitals and emergency services operating and are responsive to community needs (any four of these).
- ✓ All the above

Review of Session #5 Homework

5. When compared to a back-up generation source, CHP systems typically have a higher initial capital cost but over time they represent better capital investment. Why is that?

Ans: This is due to CHP's ability to run continuously (with or without grid power) compared to backup generation that operates only when the grid is down. This typically results in CHP having a lower payback when compared to backup systems that sit idle for most of the year

Review of Session #5 Homework

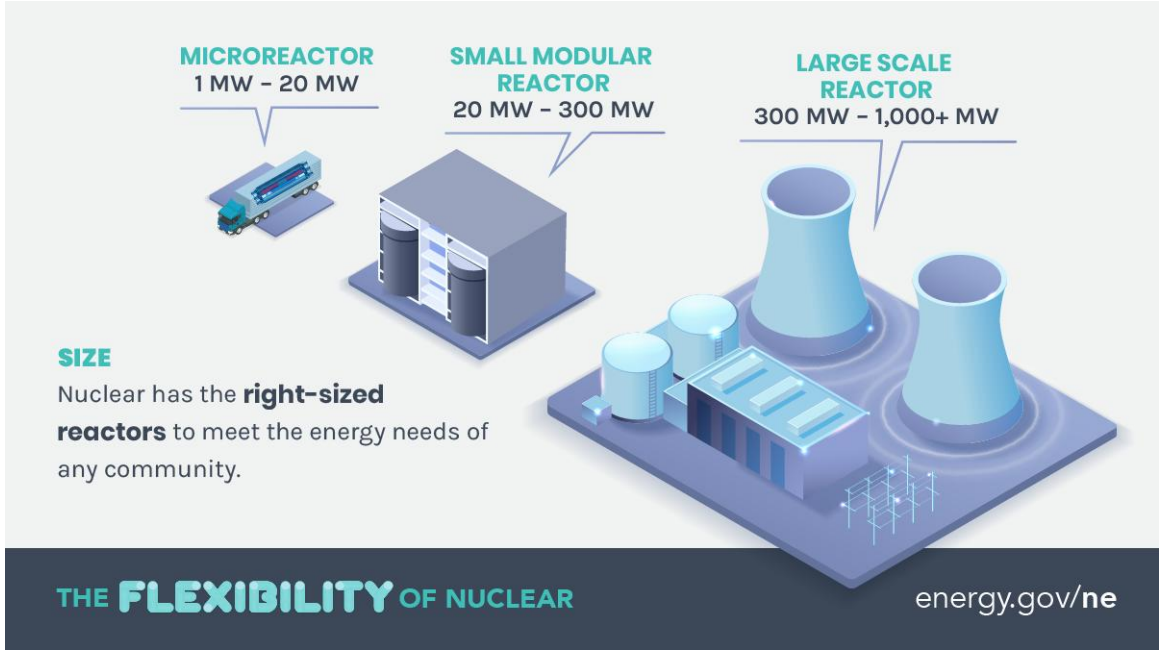
6. What does SMR stand for in nuclear technology?

- Small Mass Reactor
- Standard Modular Reactor
- ✓ Small Modular Reactor
- Simplified Medium Reactor

Review of Session #5 Homework

7. SMRs are typically designed to generate how much power?

- ✓ Less than 300 MW
- 1,000 MW
- 10,000 MW
- Over 5,000 MW



Review of Session #5 Homework

8. How do SMRs enhance safety compared to traditional nuclear reactors?

- By using fossil fuels
- By eliminating all radioactive waste
- ✓ Through passive safety systems
- By operating at higher pressures

Today's Speakers

Paul Lemar

Technical Account Manager,
Oak Ridge National Laboratory

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Siting Considerations For an Onsite Energy Project

Paul Lemar
Indraneel Bhandari
Oak Ridge National Laboratory

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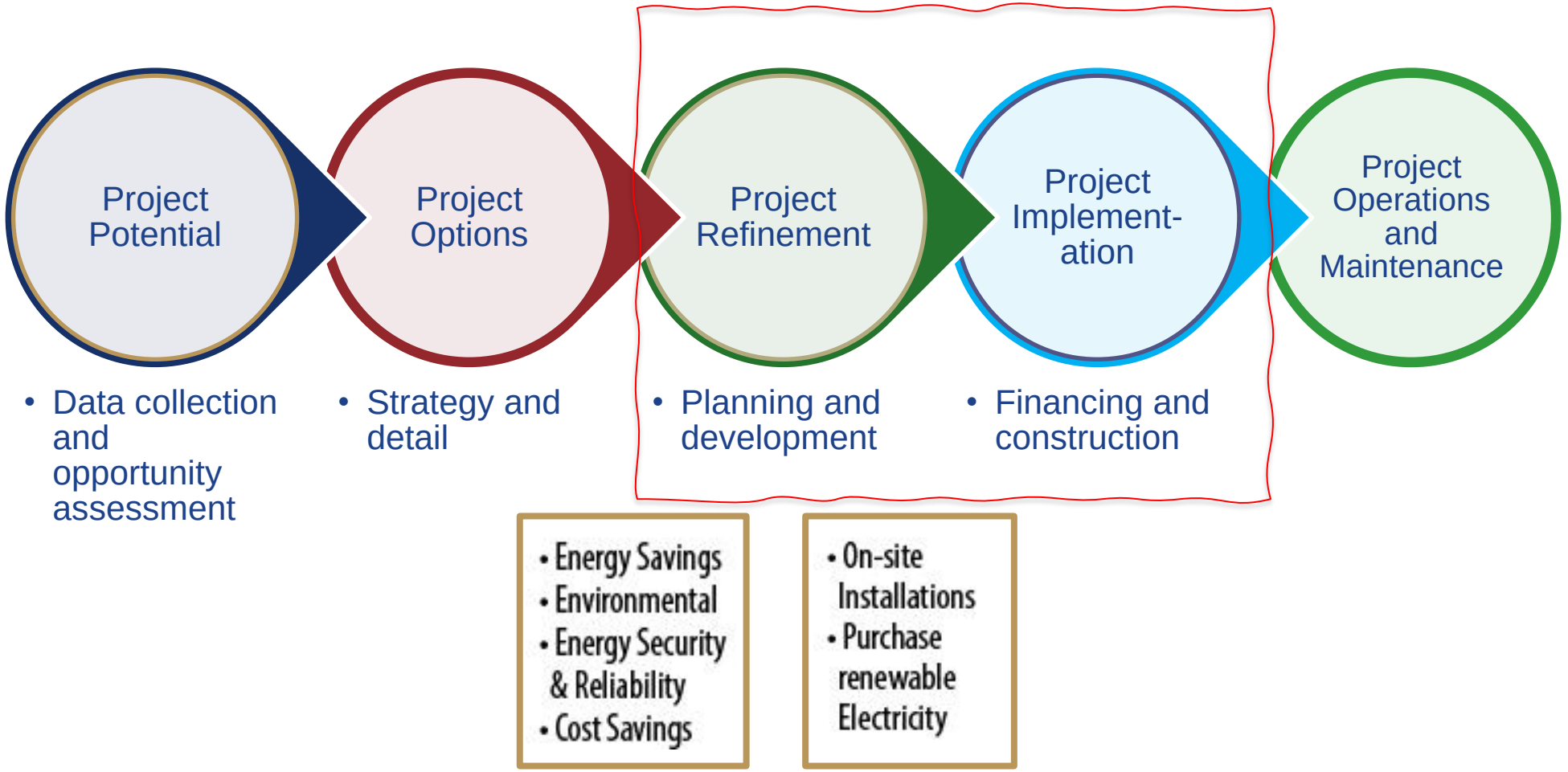
Roadmap for Implementing Renewable Energy Projects



Source: U. S. Department of Energy, The Five-Step Process Framework for Project Development, 5-Step Project Development

Project Checklist

- Potential Team Members
  - Leadership, staff, community
  - Engineers, energy team
  - Utility, legal, regulatory
  - Government, local entities

- Selection Criteria
  - Project cost effectiveness
  - Technical approach/system design
  - Implementation schedule
  - Experience and preferences

Source: U. S. Department of Energy, The Five-Step Process Framework for Project Development, 5-Step Project Development

Financing Navigator – Industrial Sector

The industrial sector is a significant consumer of energy, accounting for nearly a third of energy consumption in the US. Industrial facilities are often energy intensive due to their size and the energy consumption of process and cross-cutting industrial technologies such as furnaces and compressed air systems. There are important opportunities to save energy by implementing best practices and energy saving technologies. Manufacturers are using a variety of financing strategies to fund energy efficiency, some of them quite innovative.

SEE CASE STUDIES ⌄

CONNECT WITH PROVIDERS ›

Financing Options Included

COLOR KEY

- ENERGY EFFICIENCY (EE)
- RENEWABLE EFFICIENCY (RE)
- BOTH RE AND EE

Energy Efficiency and Renewable Energy Financing

- **Traditional Financing**
  - **Leases**
    - Capital Lease
    - Operating Lease
    - Tax-Exempt Lease
    - Solar Lease
  - **Loans**
    - Commercial Loan
    - Below-Market Loan
- Internal Funding
- Green Bonds
- **Specialized Financing**
  - **On-Bill**
    - On-Bill Financing (OBF)
    - On-Bill Repayment (OBR)
  - **Property Assessed Clean Energy (PACE)**
    - Commercial PACE
    - Residential PACE (not included in Navigator)
  - **Energy Services**
    - Efficiency-As-A-Service
    - Energy Savings Performance Contract (ESPC)
    - Power Purchase Agreement

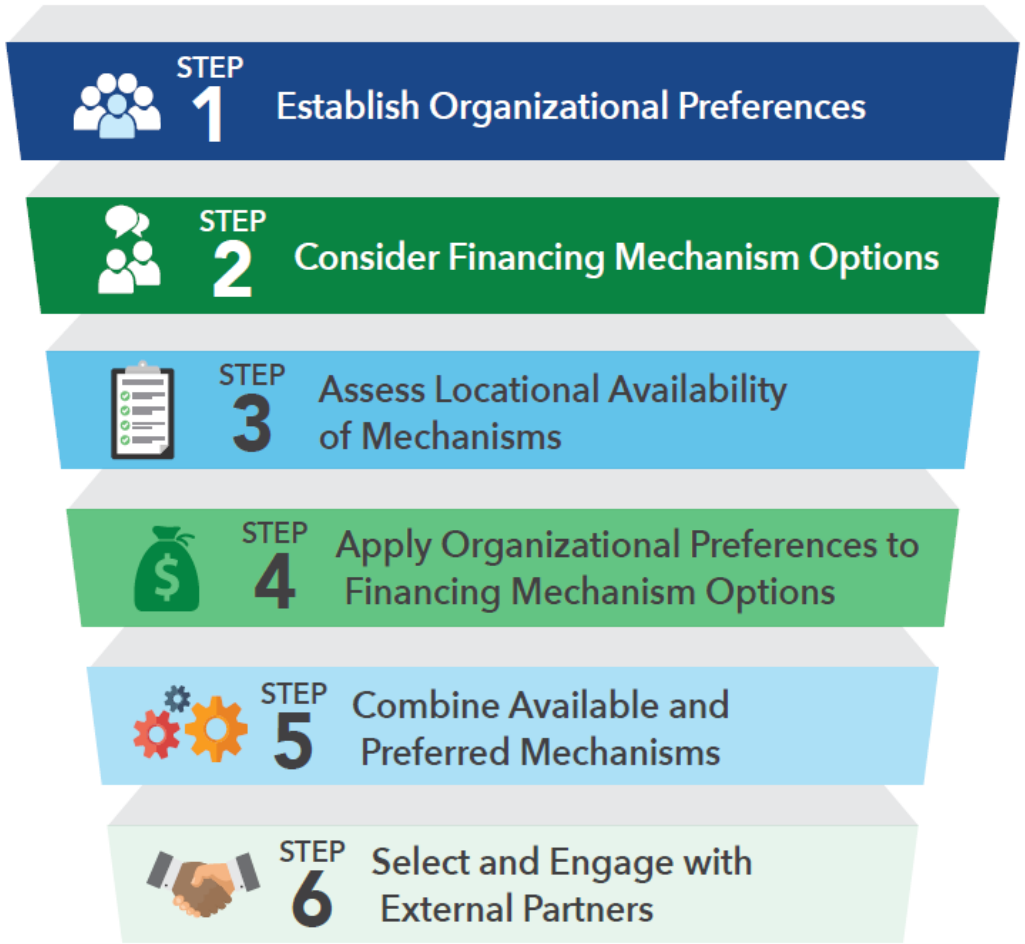
Source: https://betterbuildingssolutioncenter.energy.gov/financing-navigator/explore

Financing Navigator – Example of Financing Options (250 kW renewable energy, $1million project size, minimal complexity)

		OPTION 1	OPTION 2	OPTION 3	OPTION 4	OPTION 5	OPTION 6	OPTION 7	OPTION 8
		COMMERCIAL LOAN	POWER PURCHASE AGREEMENT	SOLAR LEASE	CAPITAL LEASE	OPERATING LEASE	COMMERCIAL PROPERTY ASSESSED CLEAN ENERGY	ON-BILL FINANCING / REPAYMENT	GREEN BONDS
		CONNECT WITH PROVIDERS ›	CONNECT WITH PROVIDERS ›	CONNECT WITH PROVIDERS ›	CONNECT WITH PROVIDERS ›	CONNECT WITH PROVIDERS ›	CONNECT WITH PROVIDERS ›	CONNECT WITH PROVIDERS ›	CONNECT WITH PROVIDERS
BASIC ATTRIBUTES	Applicable Sectors	✓	✓	✓	✓	✓	✓	✓	✓
	Building Ownership	✓	✓	✓	✓	✓	✓	✓	✓
	Typical Project Size	✓	✓	✓	✓	✓	✓	○	X
	Project Type	✓	✓	✓	✓	✓	✓	○	✓
CONTRACT STRUCTURE	Contract Complexity	✓	✓	✓	✓	✓	✓	✓	X
	Performance Risk	–	–	–	–	–	–	–	–
TAX & BALANCE SHEET	Balance Sheet Treatment	✓	✓	✓	✓	✓	✓	✓	✓
	Tax Deductions	–	–	–	–	–	–	–	–
CONTRACT TERMS	Typical Duration	–	–	–	–	–	–	–	–
	Typical Close Time	✓	✓	✓	✓	✓	✓	✓	✓

✓ MATCH ○ PARTIAL MATCH X NOT A MATCH – NOT IMPORTANT

Financing Options – Industrial Sector

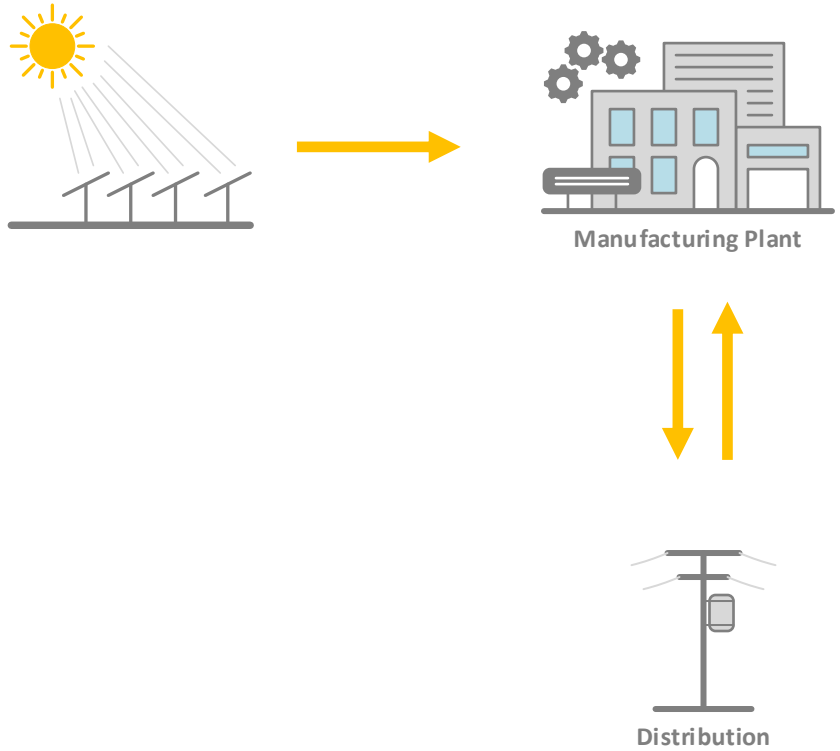


Capital Stack:	A layered representation of the different sources of capital that contribute to a project.
Performance Agreements:	Refers to agreed requirements on the energy performance of a project.
Cash-flow Positive:	A positive cash flow results when the project savings exceed the expenses.
Energy Service Companies (ESCO):	These companies provide a range of services for energy efficiency and renewable energy projects including design and implementation.
Green Bank:	A bank that provides financing mechanisms for energy efficiency and renewable energy projects.
ITC, PTC:	Investment Tax Credit (one-time) and Production Tax Credit (available annually, based on performance).
Off-taker:	The purchaser of energy from installed generation assets.

Source: DOE Better Plants Financing Options For Onsite Generation, Energy Storage, and Energy Efficiency Projects

Financing Options: Direct Ownership

- System fully purchased and owned by the organization
  - Internal capital or financing
  - Grants
  - Incentives and depreciation
- Organization utilizes energy
  - Over time, investment is recouped from utility savings and/or renewable attributes
  - Utility provides remaining energy needs
- O&M responsibilities fall to organization as owner (can enlist third party)



Financing Options for Direct Ownership

Equity

- Critical for preconstruction
- Owner takes risks
- At-risk capital raised through equity

Tax Equity

- ITC and PTC
- US Specific
- Cash for credits
- Expanded to Tax Credit Transfer

Debt

- Assets are collateral
- Construction phase liquidity

Financing Options: Third-Party Ownership

- Third-Party developers install and owns the system
  - Customer agrees to “off-take” power at fixed price over time
- Power Purchase Agreements and Financial agreements
  - No up-front capital
  - Long-term price certainty
  - Contractual obligations
- Capital Leases, Operating Leases
  - Customer leases the system from a third party, with or without option to own
  - No Up-front costs

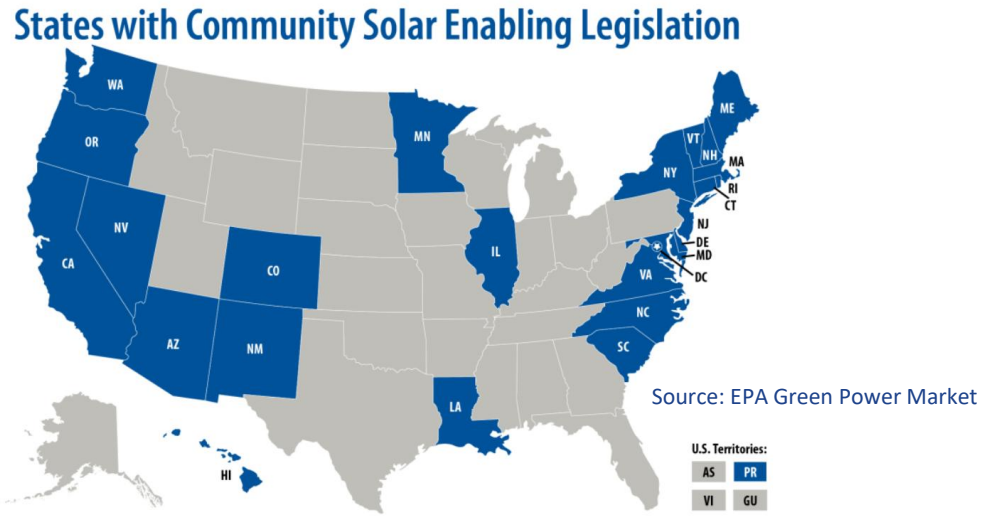
Financing Options

- Special Purpose Vehicles/Entities (SPV/SPEs)
  - Dedicated Entity: Formed solely to own and operate a specific renewable energy project
  - Risk Isolation: Shields parent companies from project-related financial and legal risks
  - Simplifies Financing: Enables project-specific debt and equity investment
  - Holds Assets & Contracts: Owns the project’s assets, PPA, permits, and liabilities
  - Captures Incentives: Facilitates use of tax credits and depreciation benefits
  - Revenue Channel: All project revenues and payments flow through the SPV
  - Limited Liability: Creditors' claims are restricted to the SPV’s assets only

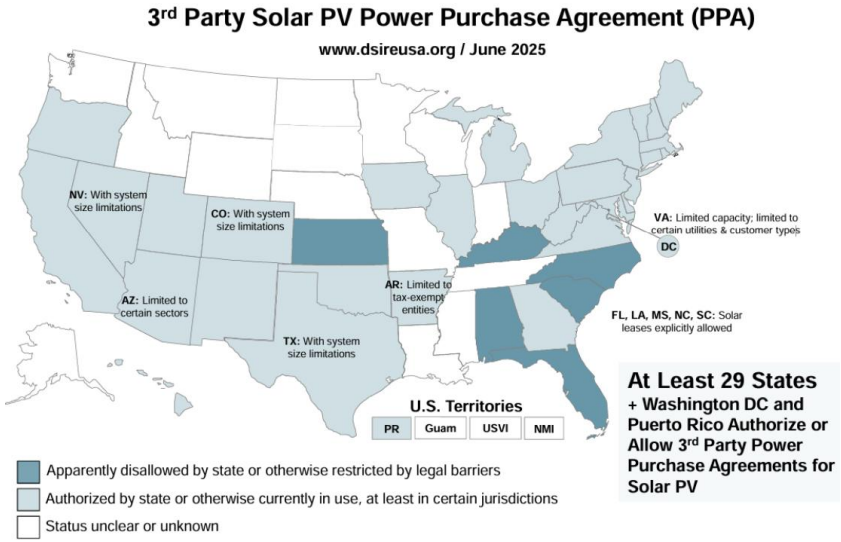
Solar Power Purchase Agreement (PPA)

- Large customers can often serve as “anchor” to community solar projects

- Check with state utility commission for confirmation on Third Party PPA



Source: EPA Green Power Market



Source: www.dsireusa.org

Financing Options: Specialized Financing Solutions

- Green Tariffs
  - Utility offers a special rate for renewable electricity sourced from a dedicated project
- Energy-as-a-Service (EaaS)
  - Turnkey service model where a provider designs, finances, owns, and operates energy systems, delivering outcomes (e.g., cost savings, emissions reduction)
  - Performance based
  - Offloads technical complexity
  - Longer contracts

Financing Options: Specialized Financing Solutions

- Commercial PACE (C-PACE)
  - Long-term funding source that can be used for projects with long payback periods
  - Payback mechanisms are linked to the property tax assessments for a specific facility (they remain with the building, not the owner).
- On Bill Financing/Repayment
  - Utility or private lender supplies capital to a customer to fund energy projects and is repaid through regular payments on an existing utility bill
- Green Bonds
  - Bonds that specifically fund environmental projects
  - Have a flexible term to serve a wide range of project payback periods

Industrial Sector: Material Financing Considerations

Industry Sub-sector
The life expectancy of an asset affects the volume of potential energy savings from an energy measure and that can affect its return on investment and how it can be financed.

Facility Ownership
Privately held companies often have greater flexibility in return-on-investment requirements than publicly traded companies.

Savings Opportunities
Energy-intensive or outdated equipment and systems are often good opportunities for alternative financing.

Bundling Projects
Rather than fund only projects with the greatest return on investment, bundle a mix of high- and low-return projects to create a portfolio with an acceptable average return.

Incentives and Rebates
State and utility energy efficiency programs may be available to support financing or provide other services (technical assistance, etc.) based on jurisdiction.

Industrial Sector: Common Barriers to Energy Financing

Competing Budget Priorities
Competing priorities that all seek funding from operating and capital budgets, and executives may place a higher priority on capital investments that increase production and sales.

Balance Sheet Concerns
Industrial companies may be hesitant to add liabilities to the balance sheet, particularly if they already have a heavy debt load.

High Hurdle Rates
Industrial companies may require a high minimum rate of return on certain investments (including energy improvements) because they could also deploy the capital into other high-return investments.

Limited Staff Bandwidth
Limited staff capacity and/or lack of financing/technical expertise in energy efficiency and renewable energy may prevent industrial companies (especially those smaller in size) from exploring potential projects.

Planning Cycle Timing
Lengthy and complex capital planning cycles can make it difficult to leverage incentives, rebates, or tax credits that may change or expire over time.

Case Study

- Cummins Rocky Mount Engine Plant Solar Project
  - 3.62 MW solar farm installed on 14 acres at the Rocky Mount Engine Plant in North Carolina
  - Powered the plant operations with 1,800+ employees, directly reducing grid energy consumption
  - Generates ~5.6 million kWh/year

Source: Cummins

Poll Time

Federal Tax Credits

1. Tax credits expanded in 2022 but recently modified by OBBBA
2. Investment Tax Credit (ITC)
3. Production Tax Credit (PTC)
   - Available for projects **placed in service in 2022 and until 2027 (wind/solar) or 2036 (other)**.
   - Project owners **cannot claim both tax credits** for the same system.
   - **Bonus** credits for:
     I. **Domestic Content**
     II. Low-Income Communities
   - Additional incentives: **Depreciation deductions** (Accelerated and Bonus Depreciation)

ITC	PTC
30% of the system cost	2.75 ¢/kWh of total annual production
One time tax credit for the tax year when the system was installed	Annual tax credit for electricity generated for the first 10 years (until 2027)
Reduces the federal income tax liability	Reduces the federal income tax liability and adjusted annually for inflation.
10%+ Bonus eligible	0.3+ ¢ Bonus eligible

Source: https://www.energy.gov/eere/solar/federal-solar-tax-credits-businesses

Prevailing Wage and Apprenticeship Requirements

Increased tax benefits are available for businesses satisfying certain prevailing wage and apprenticeship requirement:

- **Prevailing Wage Requirements**
  - Any laborers and mechanics employed by the taxpayer, or any contractor or subcontractor are paid wages at rates not less than the prevailing rates
- **Apprenticeship Requirements** –
  - Apprenticeship Labor Hour Requirements
  - Apprenticeship Ratio Requirements
  - Apprenticeship Participation Requirement

One Big Beautiful Bill Act (OBBBA) Impact on Wind and Solar Project Tax Credits

- Clean electricity tax credits (PTC 45Y and ITC 48E) generally would be unavailable for wind and solar projects placed in service after December 31, 2027
- Grandfather rule preserves eligibility of credits for wind and solar clean electricity projects that start construction before 12 months following Bill enactment
- Non-wind/solar clean electricity projects will begin to phase out after 2032 (nuclear, geothermal, and clean-hydrogen, potentially energy storage technology, qualified biogas property, and microgrid controllers)
- Applies more restricted conditions regarding application of domestic content bonus
- Transfers of credits to SPEs are not permitted, but transferability conditions are generally otherwise preserved
- Restrictions on foreign entities of concern (FEOC) are in place
- More details to follow, pending Treasury/IRS guidance

Other Incentives

- Database of State Incentives for Renewables & Efficiency - DSIRE Database

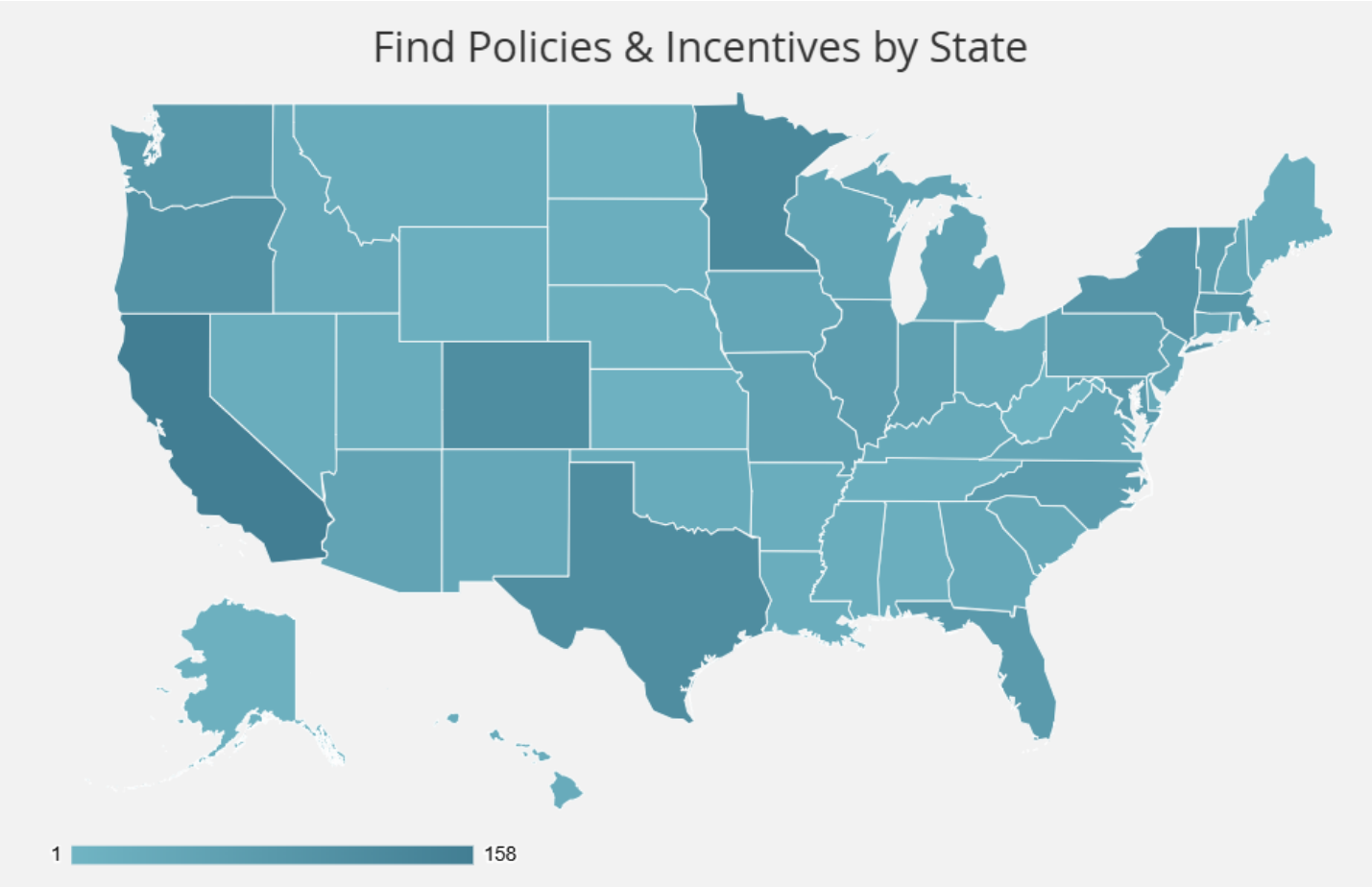


Image Source: https://www.dsireusa.org/

Policy and Market Factors

1. State Renewable Portfolio Standards
    1. Other State level targets
2. Federal Policies
    1. Investment Tax Credit (ITC) and Production Tax Credit (PTC) for renewable developers.
    2. **Public Utility Regulatory Policies Act 1978 (PURPA)**
        1. Encouraging non-utility generation and clean energy development.
        2. Laid the groundwork for competition in electricity markets
3. FERC Order 2222
4. Other State Level Program and Incentives

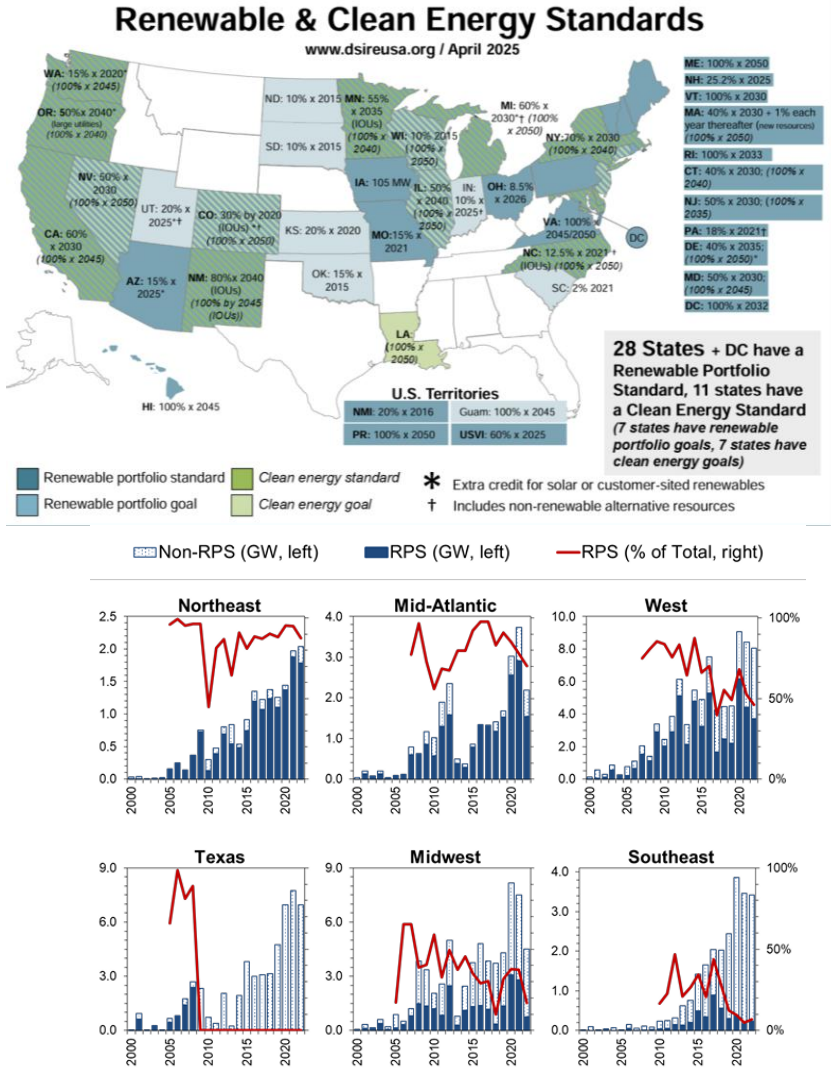


Image Source: https://www.dsireusa.org/

Lawrence Berkeley National Laboratory: U.S. State Renewables Portfolio & Clean Electricity Standards: 2023 Status Update

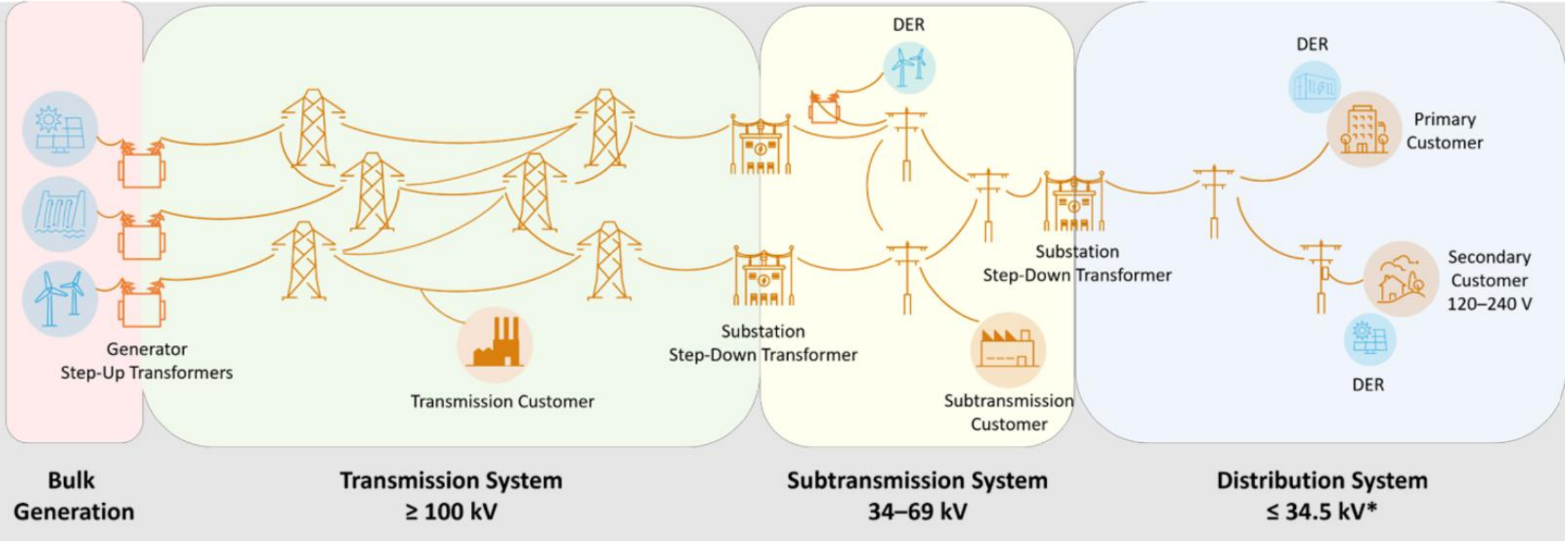
Policy and Market Factors: PURPA 1978

- **Public Utility Regulatory Policies Act 1978 (PURPA)**
  1. Encouraging non-utility generation and clean energy development.
  2. Laid the groundwork for competition in electricity markets by allowing non-utility generators
  3. Promoted independent power generation by requiring utilities to purchase power from qualifying facilities (QFs) at avoided cost rates
  4. Avoided cost pricing ensured QFs received fair compensation without burdening ratepayers

- Key Additions
  - Energy Policy Act of 2005
    - Eased mandatory purchase obligations for utilities if competitive markets existed
  - FERC Order 872 (2020)
    - Allowed states more control over QF and avoided costs calculations

Source: FERC, Public Utility Regulatory Policies Act of 1978

Traditional Representation of the Power System



This is a representation. Other voltage levels may vary.

Source: U.S. DOE Distributed Energy Resource Interconnection Roadmap

Qualifying Facilities

- **Qualifying Facility (QF)** is a generation facility that meets requirements specified by federal law under the PURPA
- QFs obtain certain rights
  1. The right to sell energy or capacity to a utility
  2. The right to purchase certain services from utilities
  3. Relief from certain regulatory burdens
- Two general classifications of QFs:
    - Cogeneration facilities which sequentially produce electric energy and another form of energy, such as heat or steam, using the same fuel source
    - Small Power Production (SPP) facilities which use biomass, waste, renewable resources (water, wind or solar), Energy Storage System (ESS) or geothermal as a primary energy source
- QFs may be created by self certifying with FERC if 1MW or greater, smaller generators may not file
- **Non-Qualifying Facility** is a generation facility that does not qualify under the provisions of PURPA, such as the typical merchant power plants that **sell their output on the wholesale market** or enter into Power Purchase Agreements with a local utility or industrial customer. Independent Power Producers frequently fall into this category.

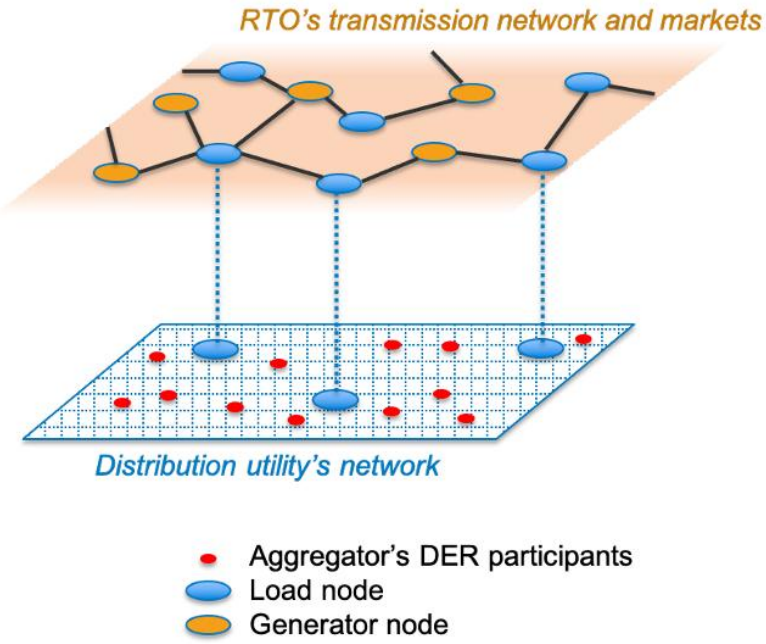
Source: ComEd DER Interconnection Guidelines for Interconnection Customers

Policy and Market Factors: FERC 2222

- **Traditional Use:** Distributed resources have mainly provided individual benefits to the customers who own them

Distributed Energy Resource - FERC 2020b

- **FERC Order No. 2222:**
  - Enables participation of distributed resources in wholesale markets (capacity, energy, ancillary)
    - Potentially reduce cost for bulk power system
  - Allows aggregation of onsite resources
    - Utilize these resources virtually in combination, conditional to physical and operational characteristics
  - Value is based on the total reliable MW output/input, not the specific type of DERs

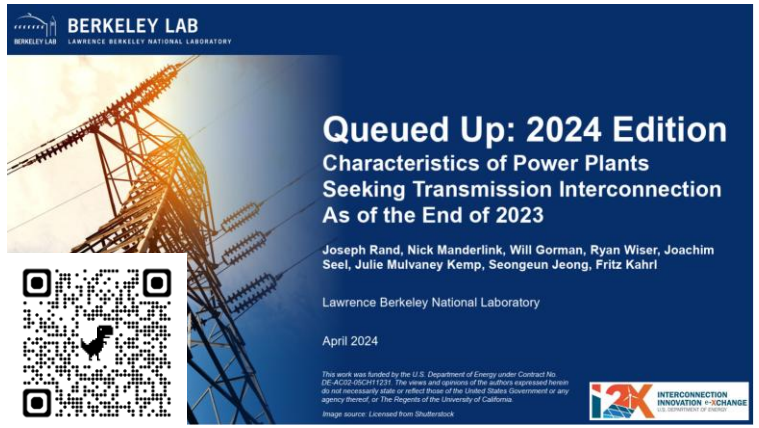


DER aggregation in the RTO/ISO network

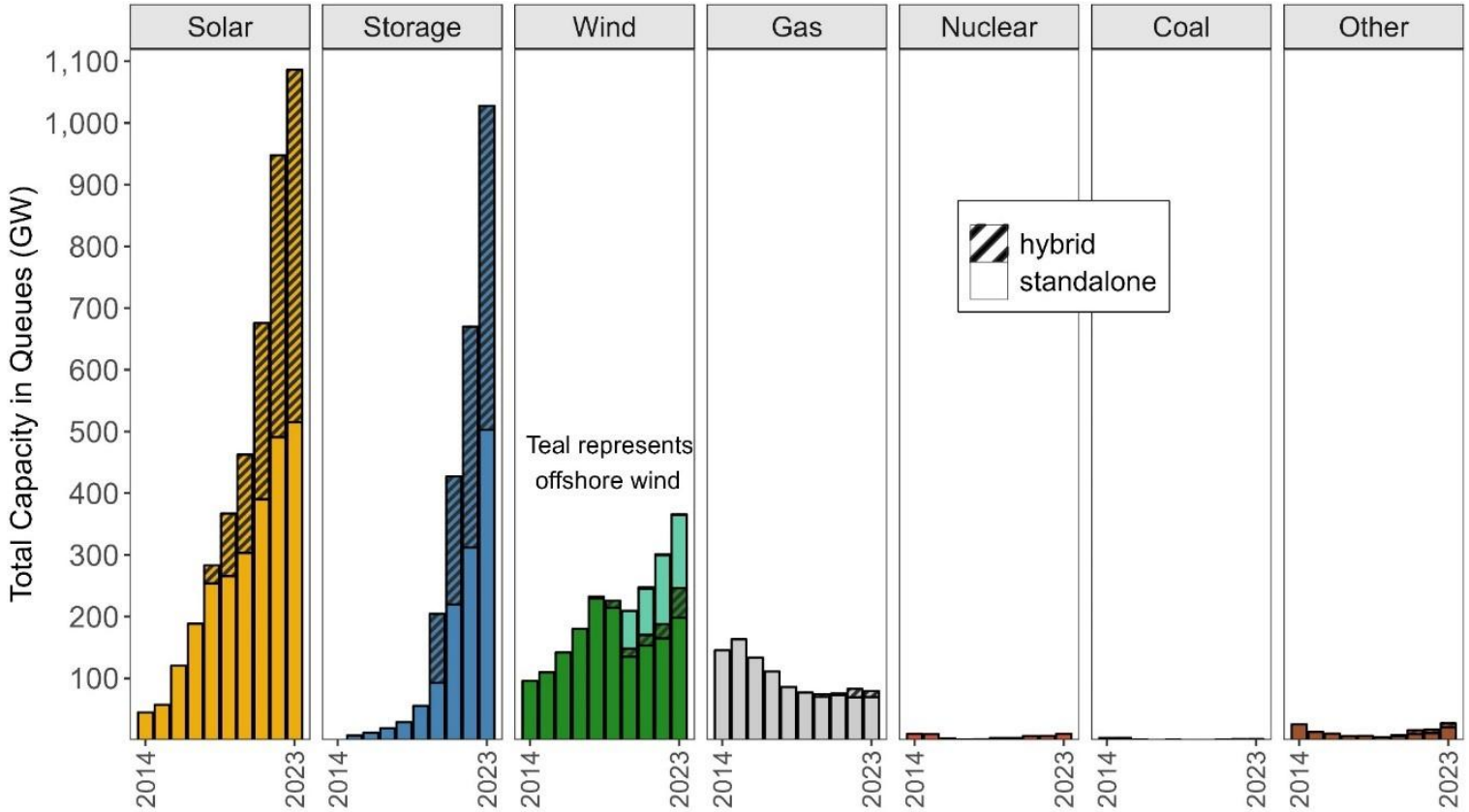
All major RTOs have filed compliance plans

Image Source: FERC; Zhou, Ella, David Hurlbut, and Kaifeng Xu. 2021. A Primer on FERC Order No. 2222: Insights for International Power Systems. Golden, CO: National Renewable Energy Laboratory. NREL/ TP-5C00-80166. https://www.nrel.gov/docs/fy21osti/80166.pdf.

Forecasted Growth in PV, Wind, and Storage continues



- Developers are still interested in solar, wind, and battery storage
  - Approximately 11,600 projects seeking interconnection
- Completion rates are generally low (~20%); wait times seen increasing
  - ~14% for solar
  - ~11% battery
- FERC Order 2023 included queue reform measures



Source: Rand, Joseph, et al. "Queued Up: 2024 Edition, Characteristics of Power Plants Seeking Transmission Interconnection As of the End of 2023 [Slides]." , Apr. 2024. https://doi.org/10.2172/2335720

Interconnection

- **Interconnection** is an agreement required to connect your generation system to the grid

- Distribution-level interconnection is largely the domain of state policy
  - Rules are variable amongst states

- Involve your utility early and often in the project development
  - Many utilities have their interconnection procedures, and the necessary contacts posted on their website

- **Time, Technical Requirements and Cost**

Source: U.S. DOE

Example Levels of Generator Interconnection

- Capacity “breakpoints” for various review standards

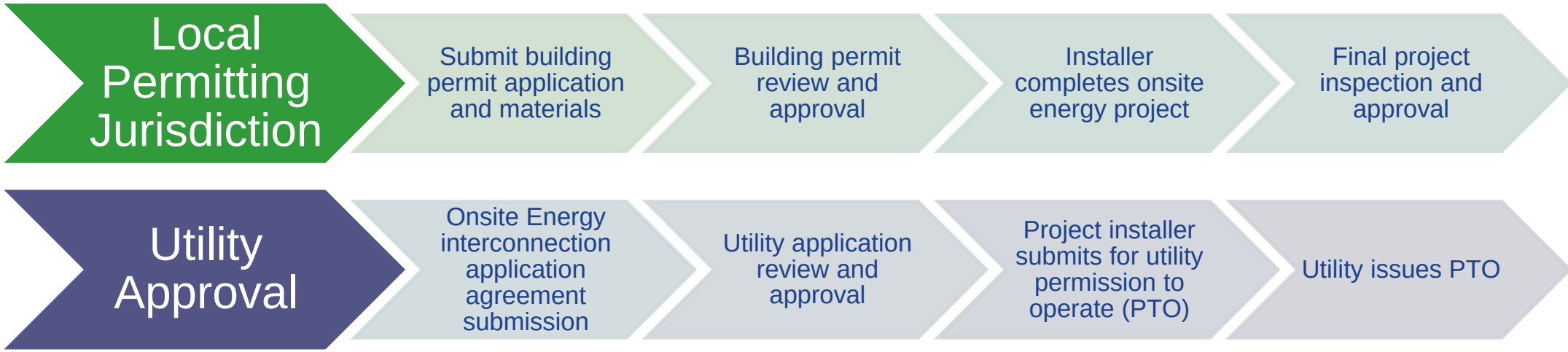
Standard of Review	FERC Order 792 (Small Generators)
10 kW Inverter Process	Up to 10 kW
Fast-Track Process	Voltage-Differentiated (see below)
Study Process	Through 20 MW
≥ 30 kV and ≤ 69 kV	4 MW

- Voltage-differentiated breakpoints for the newly-adopted "fast track" process in FERC 792

Applicable Delivery System Voltage Levels for Fast Track Process (FERC Order 792)	Applicable System Size (Regardless of Location)	Applicable System Size (Location-Specific*)
< 5 kilovolt (kV)	500 kW	500 kW
≥ 5 kV and < 15 kV	2 MW	3 MW
≥ 15 kV and < 30 kV	3 MW	4 MW
≥ 30 kV and ≤ 69 kV	4 MW	5 MW

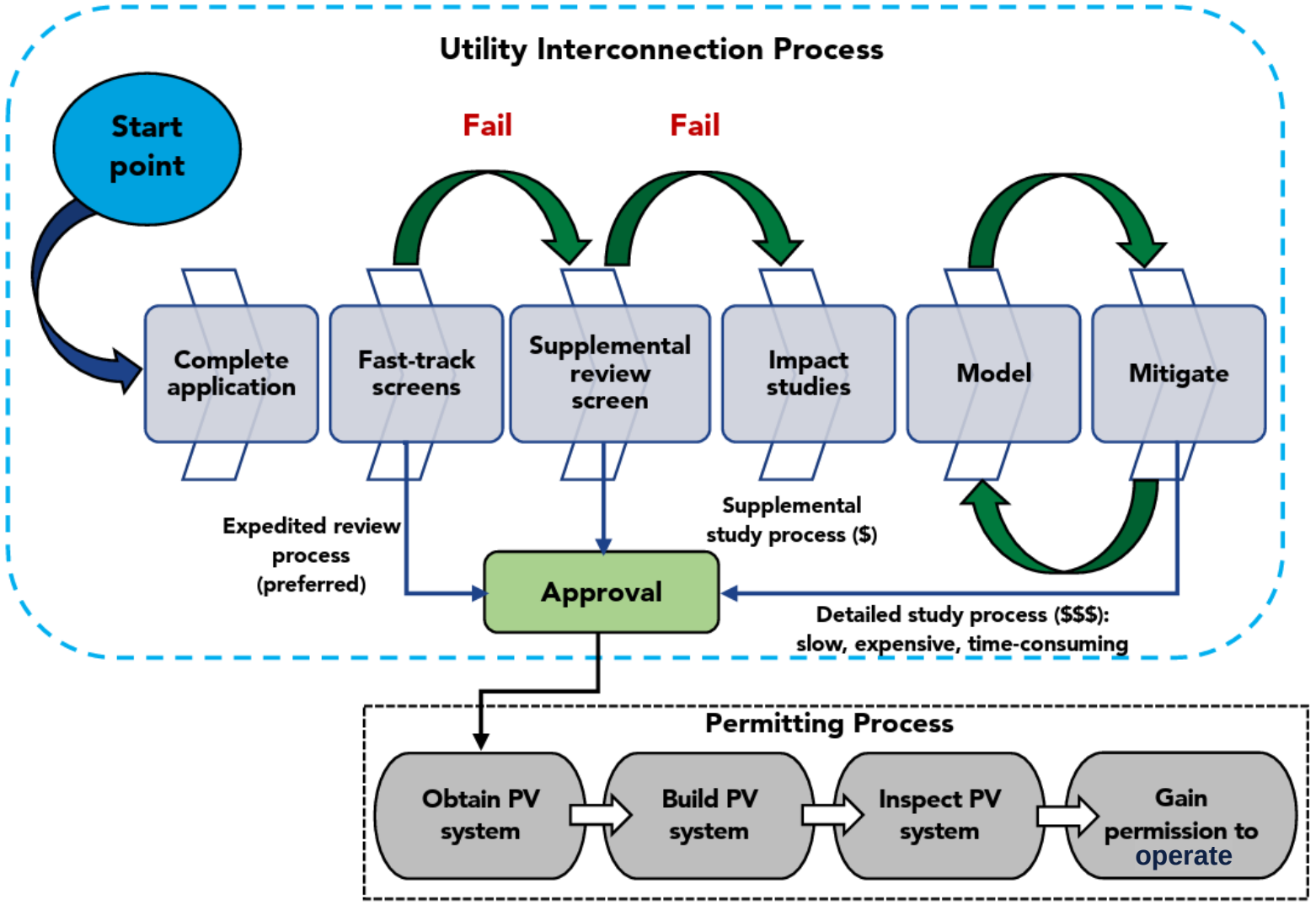
Source: DSIRE: Standard Interconnection Agreements and Procedures for Small Generators

Utility Interconnection Process



Source: U. S. Department of Energy, The Five-Step Process Framework for Project Development, 5-Step Project Development

Utility Interconnection Process



Source: Abbas, A., Price, C., Nandy, P., Wenning, T., 2022, Renewable Energy Guidance for Industry, ORNL/SPR-2021/2026, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Utility Interconnection Process

System Information

- Technology Type
- Rate Capacity (kW or MW)
- Storage Capacity (kWh or MWh)
- IEEE 1547 Reactive Power Category
- IEEE Std 1547 Disturbance Category
- Location

Utility Generated Information

- Queue Position
- Agreement Date
- System Impact Study Start/End Dates
- Commissioning Date or COD
- Operational Status
- Technical Screen Results
- Cost of Study
- Cost of Utility Upgrades
- Final Cost of Interconnection

Source: U.S. DOE Distributed Energy Resource Interconnection Roadmap

Interconnection Standards and Procedures

- *State Small Generator Interconnection Procedures* provides procedures for interconnecting with utility systems
  - FERC, IREC, and PJM have published model rules with best practices for states to adopt
  - Includes references to other standards
    - IEEE (Institute of Electrical and Electronics Engineers) 1547 Standard
    - IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces
    - UL 1741 standards for inverters and converter equipment
    - *National Electric Code (NEC)* ensures compliance with safety and operational standards

LINE VOLTAGE	FAST TRACK ELIGIBILITY	
	Regardless of location	**On ≥ 600-amp line and ≤ 2.5 miles from substation**
≤ 5 kV	< 1 MW	< 2 MW
5 kV – ≤ 15 kV	< 2 MW	< 3 MW
15 kV – ≤ 30 kV	< 3 MW	< 4 MW
30 kV – 69 kV	≤ 4 MW	≤ 5 MW

Fast Track review is available to any DER that has an Export Capacity that does not exceed the limits identified in the table.

Source: IREC Model Interconnection Procedures 2023

Other Provisions and Requirements

- Technical interconnection requirements may vary by state
  - States like **California (Rule 21)**, **New York (NY-Sun Interconnection)**, and **Massachusetts (SIR)** have developed detailed interconnection procedures
- Anti-islanding protection, voltage regulation, and grounding are typically required
- Rely heavily on standards such as IEEE 1547
- Thresholds evaluated to comply with these requirements (see figure)

Thresholds

Criteria	Description	Threshold
Primary Over-Voltage	High voltage exceeds nominal voltage by threshold	105%
Primary Voltage Deviation	Change in Voltage from no DER to full DER	3%
Regulator Voltage Deviation	Change in bandwidth from no DER output to full DER output at a regulated node	50%
Thermal for Discharging DER	Element rating	100%
Additional Element Fault Current	Deviation in feeder fault currents	10%
Breaker Relay Reduction of Reach	Deviation in breaker fault current	10%

Source: Xcel Energy

Interconnection Cost Responsibility Issues

- Total associated costs with interconnection can include interconnection facilities and system upgrades
- “Cost-Causer-Pays” model is conventional approach to determine who bears costs
  - Entity responsible for causing a cost is the one that should bear the financial burden
  - Generator that triggers the distribution upgrade may be liable to pay for interconnection costs and distribution upgrade costs
  - Prevent DER costs to not be distributed amongst other customers
- Some states have initiated cost-sharing mechanisms, developments are evolving
- Impact to system reliability and deferring capacity investments may be a factor

Source: Powermag.com; IREC

Developments in Interconnection Standards

- States are continuing to update and improve interconnection standards, based on their experience and best practices of others
  - State Level interconnection rules and regulations continue to evolve and improve
  - IREC Model Interconnection Rules are foundational
  - FERC and PJM Small Resource Interconnection Process also serves as baseline
- Focus on making the application process less time consuming, costly, and complex
  - Timeframes have decreased
  - Fees are being reduced or waived (fast-tracked)
  - Screens are better understood and making process more transparent
  - Costly studies are being avoided
- Results show improvement in terms of approval rates and times
- Utilities becoming more adept at evaluating impact on distribution system

Capacity Hosting Maps

- Some regions may have capacity hosting maps
- Gives an indication of how much generation (expressed in kW) can be added to a feeder before the feeder reaches capacity or other limitations that reduce the reliability of service to electric customers on the feeder

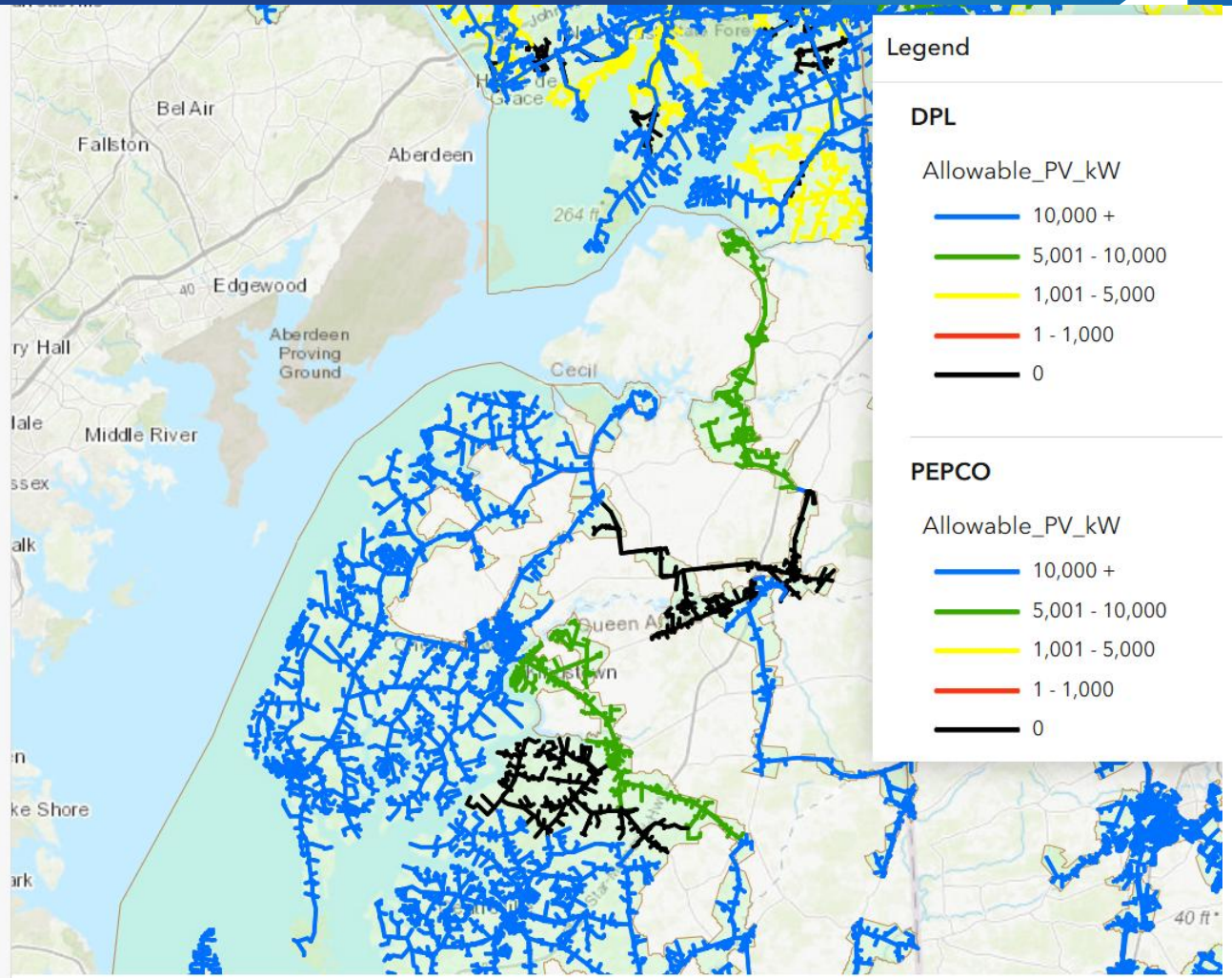
pepco holdings℠
AN EXELON COMPANY

Distribution Feeder Hosting Capacity

PHI defines large DER systems by feeder primary voltage class:

4-13.8kV: 250kW and greater
23-25kV: 500kW and greater
33-34.5kV: 1MW and greater

Feeder restrictions can be confirmed via the Restriction Map.



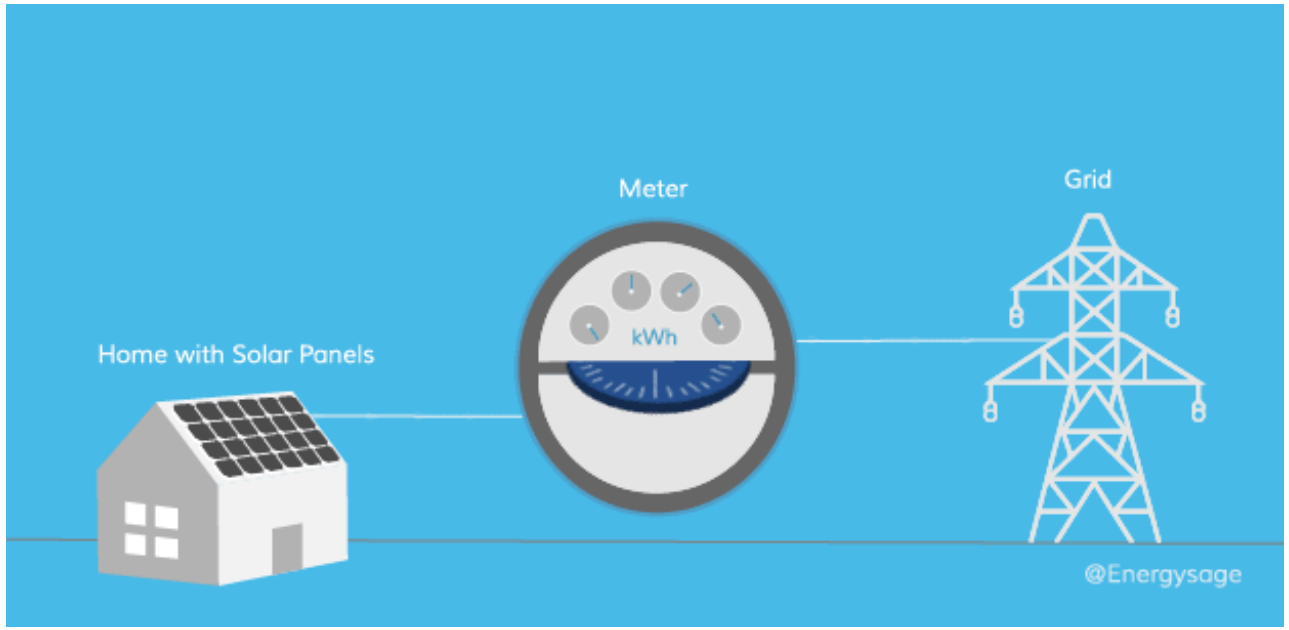
Source: PepCo

Evolution in Interconnection Standards

- Many current standards based on 15% of circuit peak load as proxy for circuit capacity
  - Actual circuit capacity may be more or less, but often requires detailed modelling and analysis of distribution system to determine specific circuit limits
  - As penetration increases, the 15% screen becomes limiting factor as screens are failed and costly studies can be triggered
- Power flow analyses can be employed to improve the process
  - Map circuit capacity for potential project developers
  - Evaluate individual projects in lieu of traditional screens
  - Utilities have become more practiced and can speed the analysis process
  - Can be employed to identify lower cost circuit upgrades to accommodate higher levels of DER
- Potential changes in *cost-causer-pays* model

Net-Metering

Net Metering: Uses one or more bidirectional meters that tracks net usage and sometimes both usage and generation. Consumers may be credited at retail rates, making this method more financially beneficial. Sometimes they may be credited at wholesale.



Source: Energysage

Net-Metering

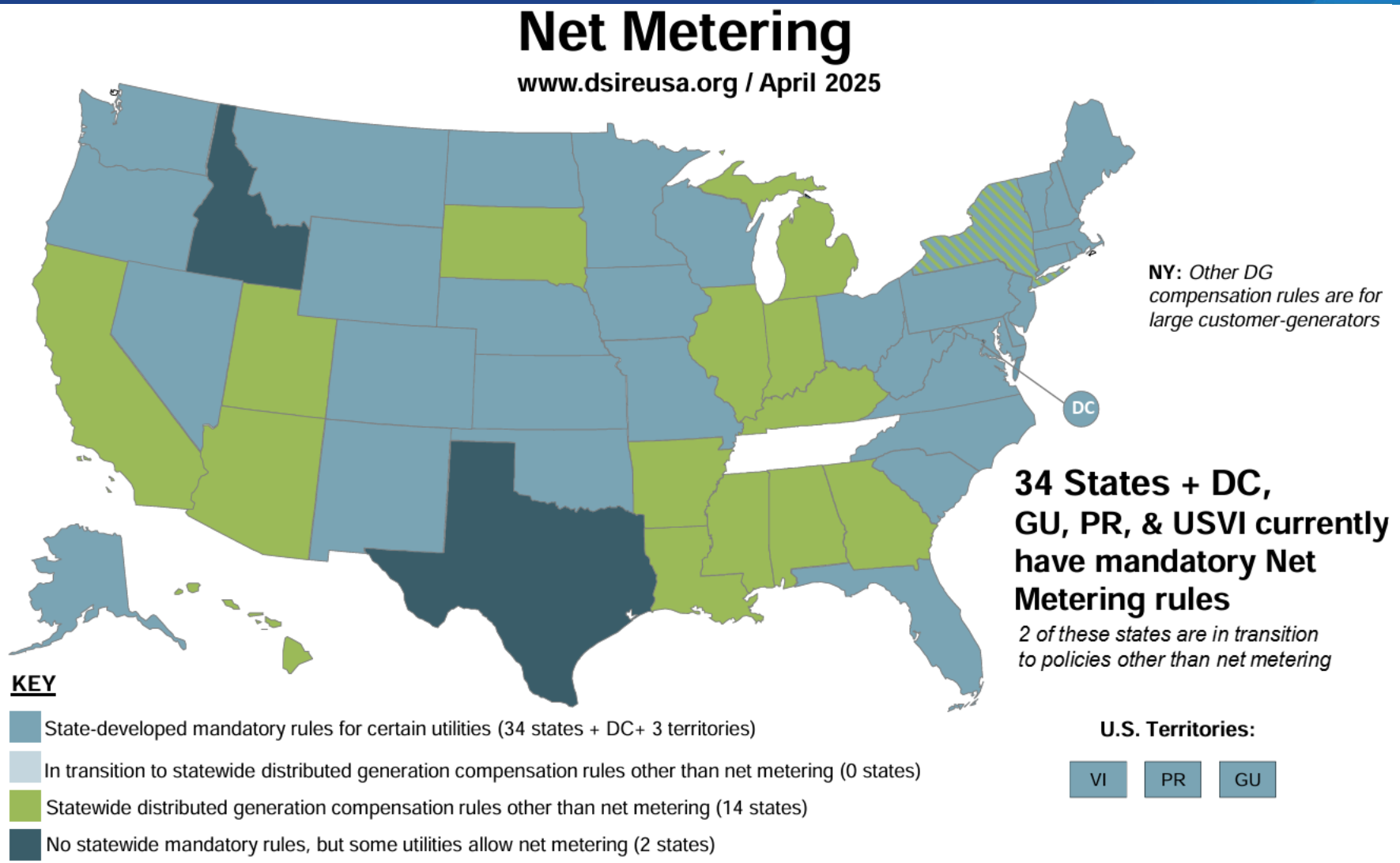
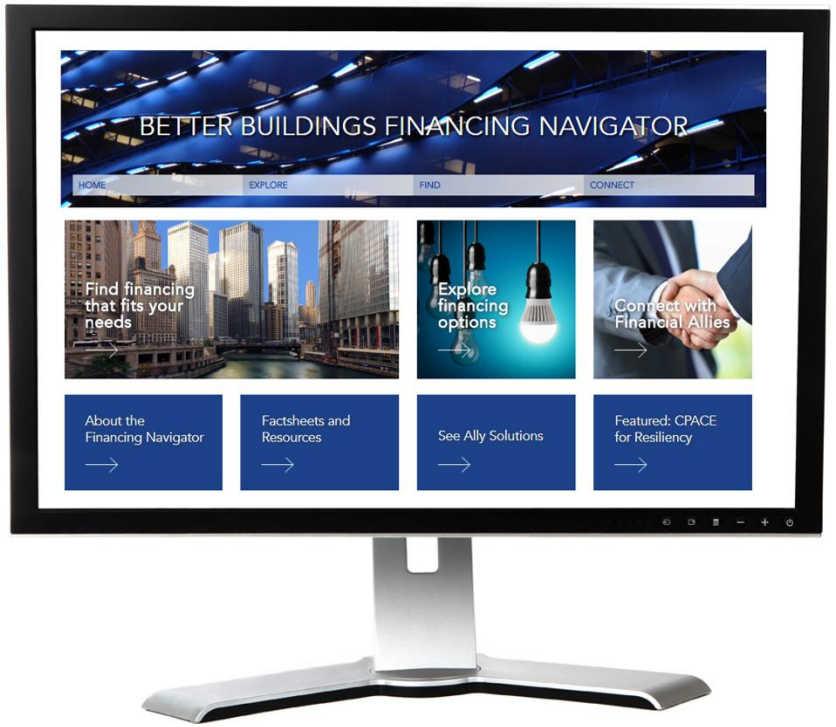


Image Source: https://www.dsireusa.org/

Wrap Up

The Better Buildings Financing Navigator

The Better Buildings Financing Navigator is an online tool that helps public and private organizations find financing solutions for energy efficiency and renewable energy projects.

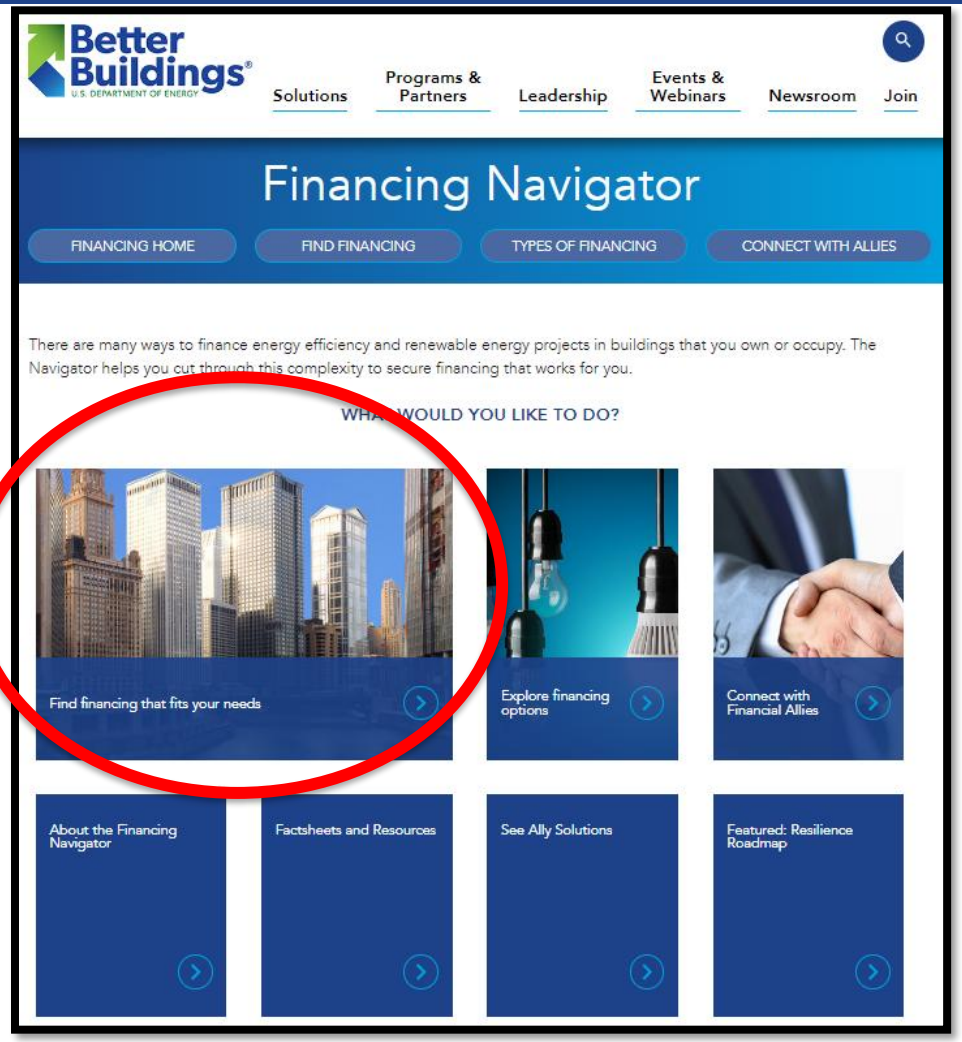


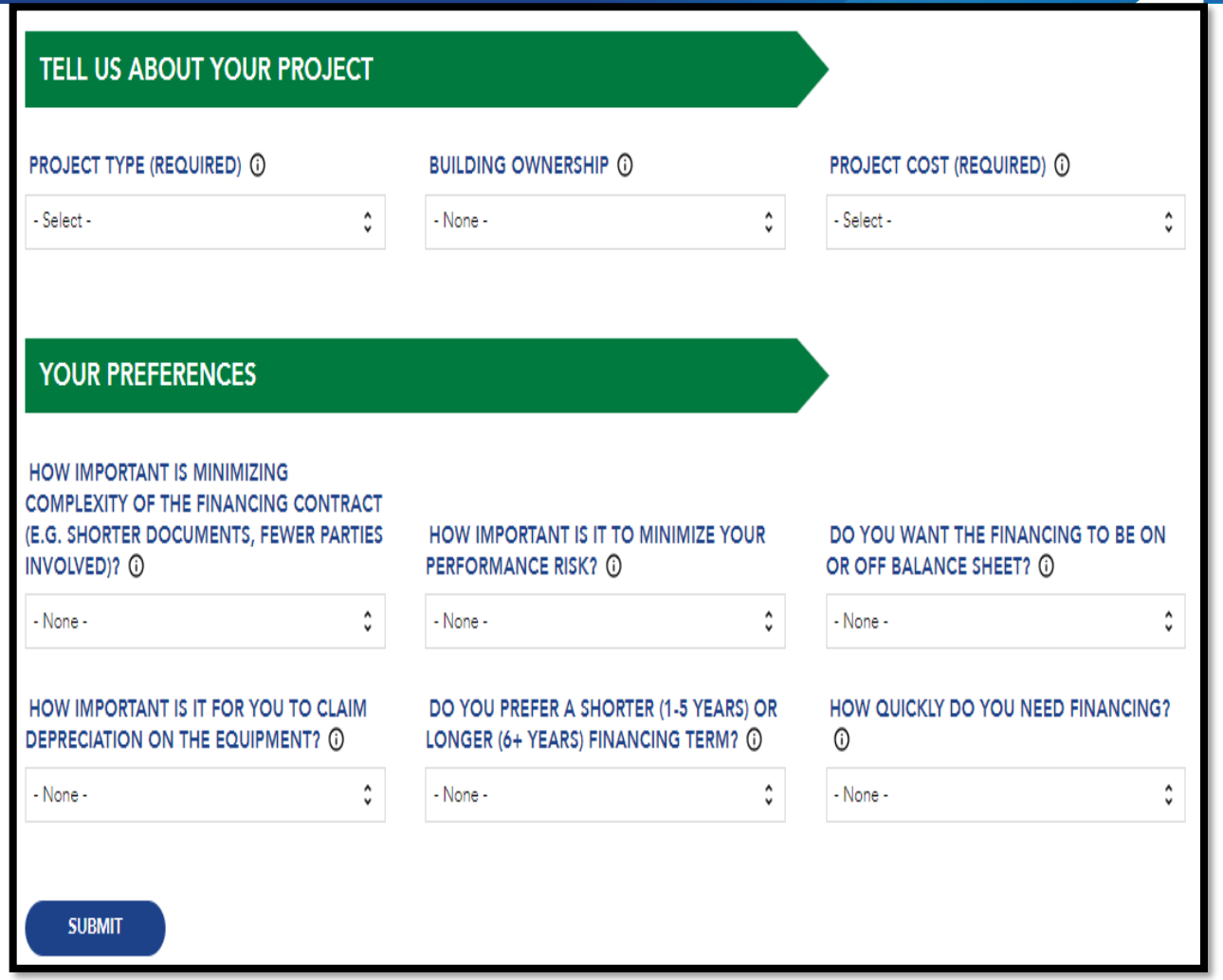
The Navigator at a glance:

- Explore options and find solutions
- Dozens of case studies, fact sheets, resources
- Connect with Financial Allies
- 25,000+ users since launch

Available at: https://betterbuildingssolutioncenter.energy.gov/financing-navigator

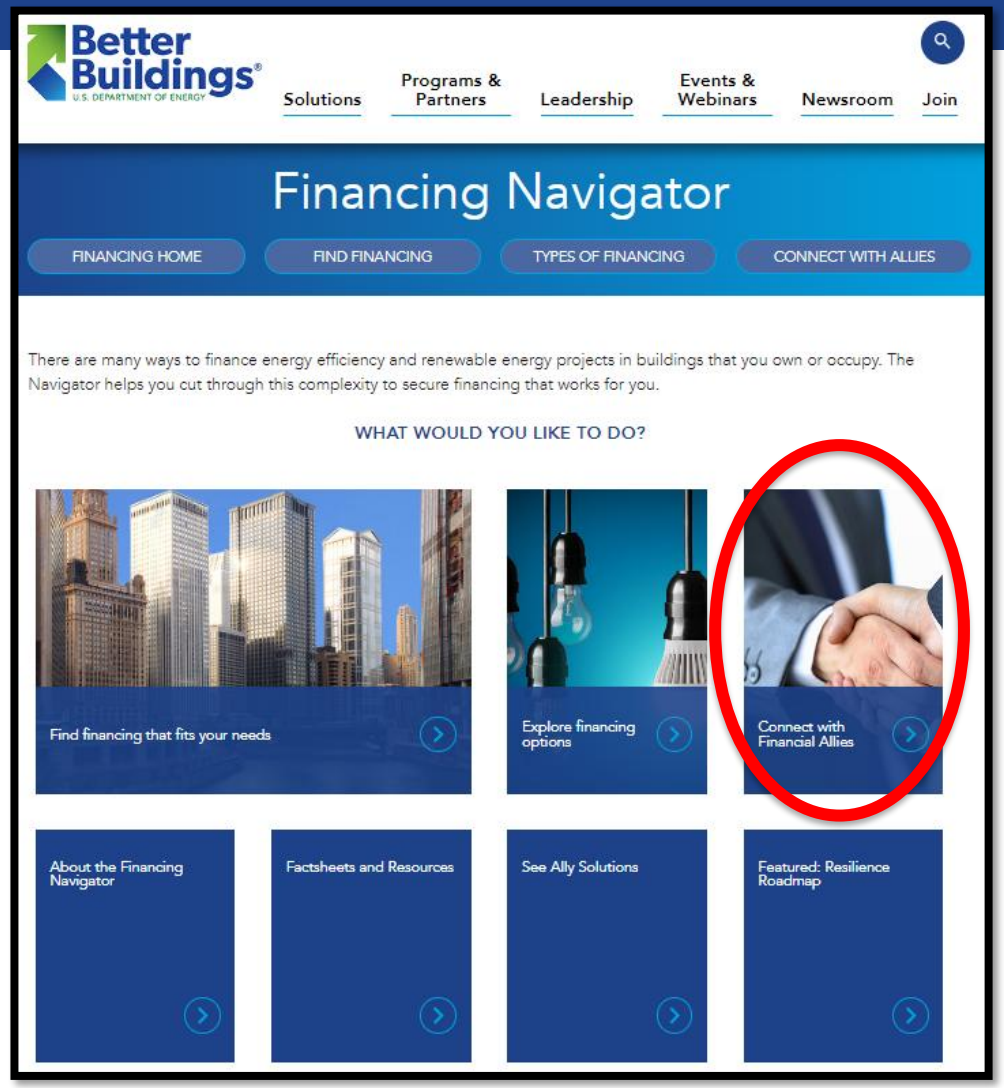
Connect with Financial Allies





Available at: https://betterbuildingssolutioncenter.energy.gov/financing-navigator/find

Connect with Financial Allies



Available at: https://betterbuildingssolutioncenter.energy.gov/financing-navigator/allies

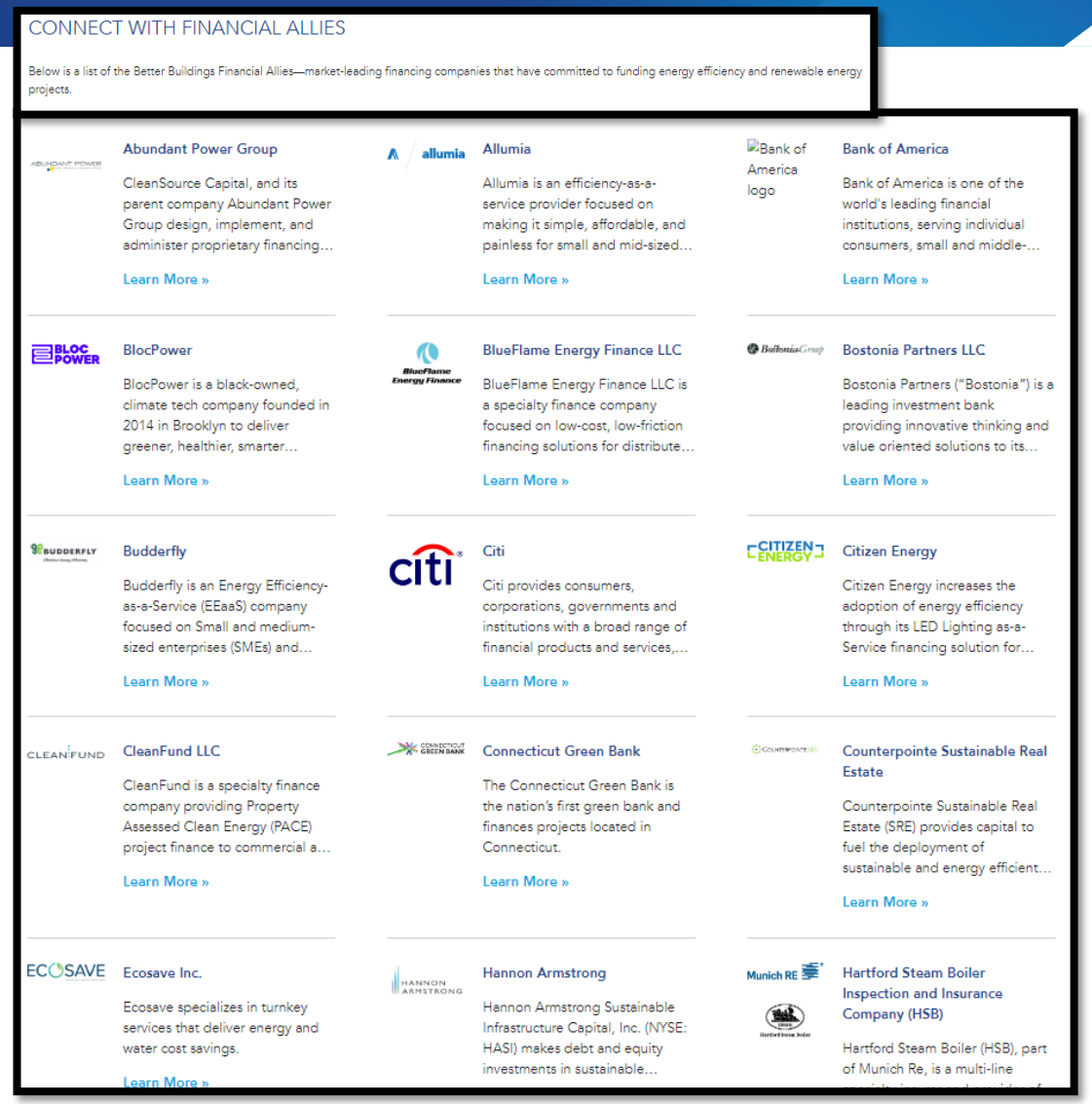
Additional Resources

- Better Plants Financing Navigator
- US Interconnection Queues by Region, State, and County
- A Guide to Residential Energy Storage and Rooftop Solar: State Net Metering Policies and Utility Rate Tariff Structures – Database
- FERC - Standard Interconnection Agreements and Procedures for Small Generators
- Toolkit & Guidance for the Interconnection of Energy Storage & Solar-Plus-Storage - IREC Toolkit
- State and Local Policy Database
- Statutory References for Legality of 3rd Party Solar PV PPAs
- U.S. Atlas of Electric Distribution System Hosting Capacity Maps

Interested in Learning More?

- You can access the Better Buildings Solution Center at the following link:

- Questions?
  - betterbuildings@ee.doe.gov



CONNECT WITH FINANCIAL ALLIES

Below is a list of the Better Buildings Financial Allies—market-leading financing companies that have committed to funding energy efficiency and renewable energy projects.

Abundant Power Group
CleanSource Capital, and its parent company Abundant Power Group design, implement, and administer proprietary financing…
Learn More »

Allumia
Allumia is an efficiency-as-a-service provider focused on making it simple, affordable, and painless for small and mid-sized…
Learn More »

Bank of America
Bank of America is one of the world's leading financial institutions, serving individual consumers, small and middle-…
Learn More »

BlocPower
BlocPower is a black-owned, climate tech company founded in 2014 in Brooklyn to deliver greener, healthier, smarter…
Learn More »

BlueFlame Energy Finance LLC
BlueFlame Energy Finance LLC is a specialty finance company focused on low-cost, low-friction financing solutions for distribute…
Learn More »

Bostonia Partners LLC
Bostonia Partners ("Bostonia") is a leading investment bank providing innovative thinking and value oriented solutions to its…
Learn More »

Budderfly
Budderfly is an Energy Efficiency-as-a-Service (EEaaS) company focused on Small and medium-sized enterprises (SMEs) and…
Learn More »

Citi
Citi provides consumers, corporations, governments and institutions with a broad range of financial products and services,…
Learn More »

Citizen Energy
Citizen Energy increases the adoption of energy efficiency through its LED Lighting as-a-Service financing solution for…
Learn More »

CleanFund LLC
CleanFund is a specialty finance company providing Property Assessed Clean Energy (PACE) project finance to commercial a…
Learn More »

Connecticut Green Bank
The Connecticut Green Bank is the nation's first green bank and finances projects located in Connecticut.
Learn More »

Counterpointe Sustainable Real Estate
Counterpointe Sustainable Real Estate (SRE) provides capital to fuel the deployment of sustainable and energy efficient…
Learn More »

Ecosave Inc.
Ecosave specializes in turnkey services that deliver energy and water cost savings.
Learn More »

Hannon Armstrong
Hannon Armstrong Sustainable Infrastructure Capital, Inc. (NYSE: HASI) makes debt and equity investments in sustainable…

Hartford Steam Boiler Inspection and Insurance Company (HSB)
Hartford Steam Boiler (HSB), part of Munich Re, is a multi-line

Onsite Energy Technical Assistance Partnerships (TAPs)

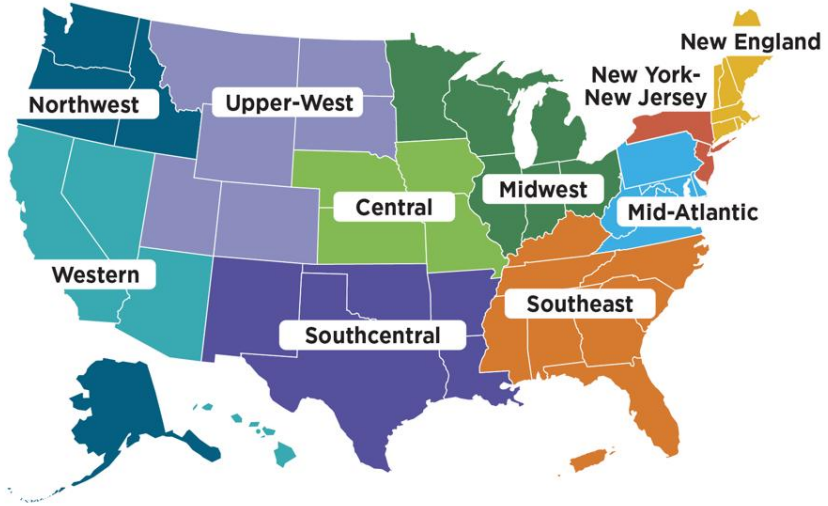
DOE's 10 regional Onsite Energy TAPs provide technical assistance to end users and other stakeholders about technology options for achieving clean energy objectives. Key services include:

Technical Assistance: Screen sites for opportunities to implement onsite energy technologies and provide advanced services to maximize economic impact and reduce risk from initial screening to installation to operation and maintenance.

End-User Engagement: Partner with organizations representing industrial and other large energy users to advance onsite energy as a cost-effective way to transition to a clean energy economy.

Stakeholder Engagement: Engage with strategic stakeholders, including utilities and policymakers, to identify and reduce barriers to onsite energy through fact-based, unbiased education.

Onsite Energy Technical Assistance Partnerships
U.S. DEPARTMENT OF ENERGY



https://betterbuildingssolutioncenter.energy.gov/onsite-energy/taps

Questions?

5 Minute Break

Today's Speakers

Indraneel Bhandari

R&D Associate Staff Member
Oak Ridge National Laboratory

bhandarii1@ornl.gov
(865) 341-4259

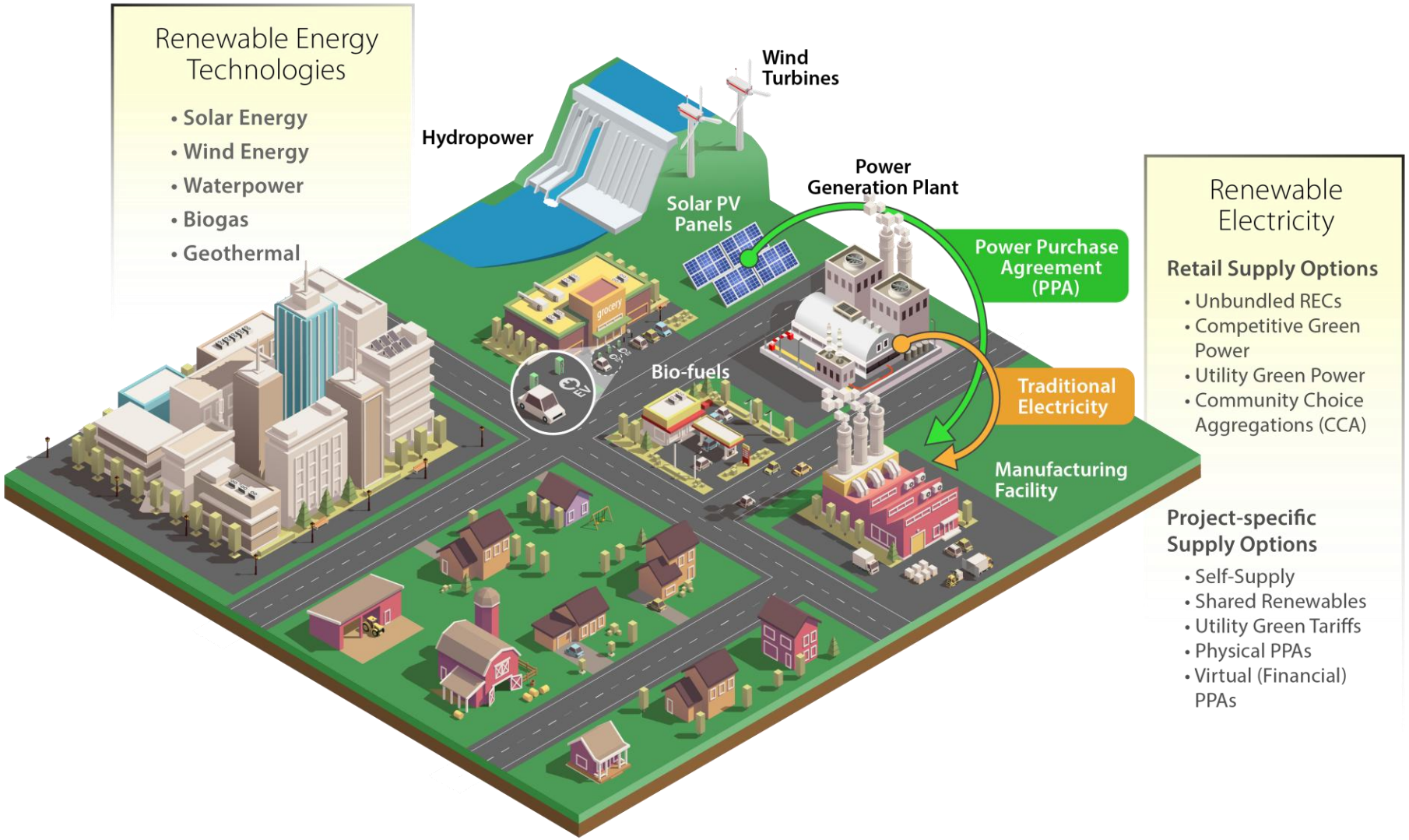
Other Renewable Supply Options

Indraneel Bhandari
Oak Ridge National Laboratory

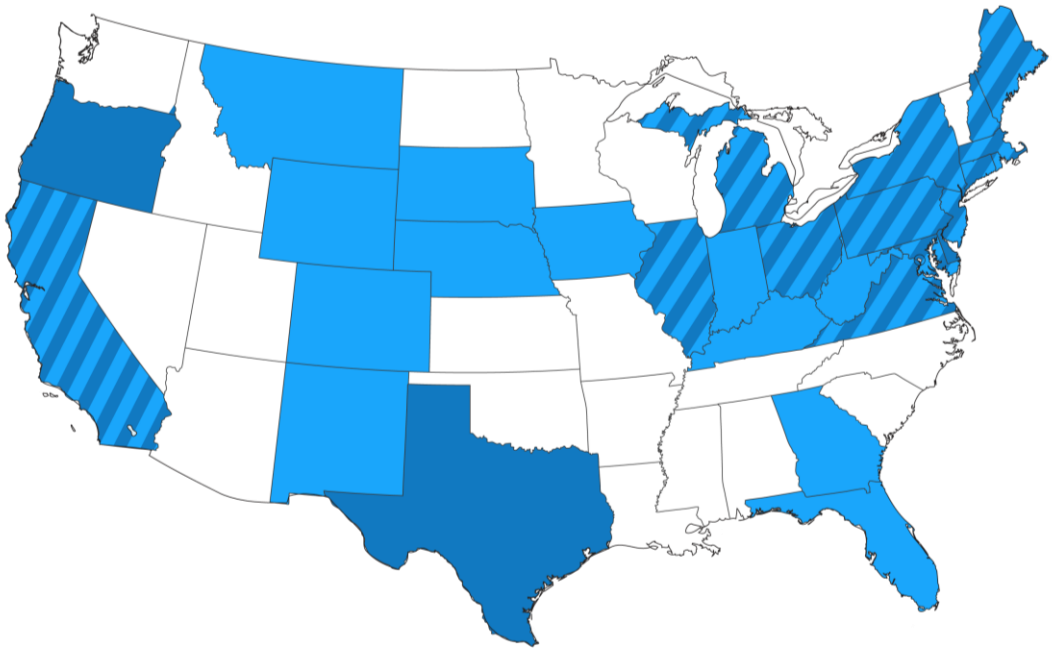
Overview

- Energy Attribute Certificates (EACs)
- Renewable Electricity Supply Options
- Resources

Renewable Energy Mechanisms

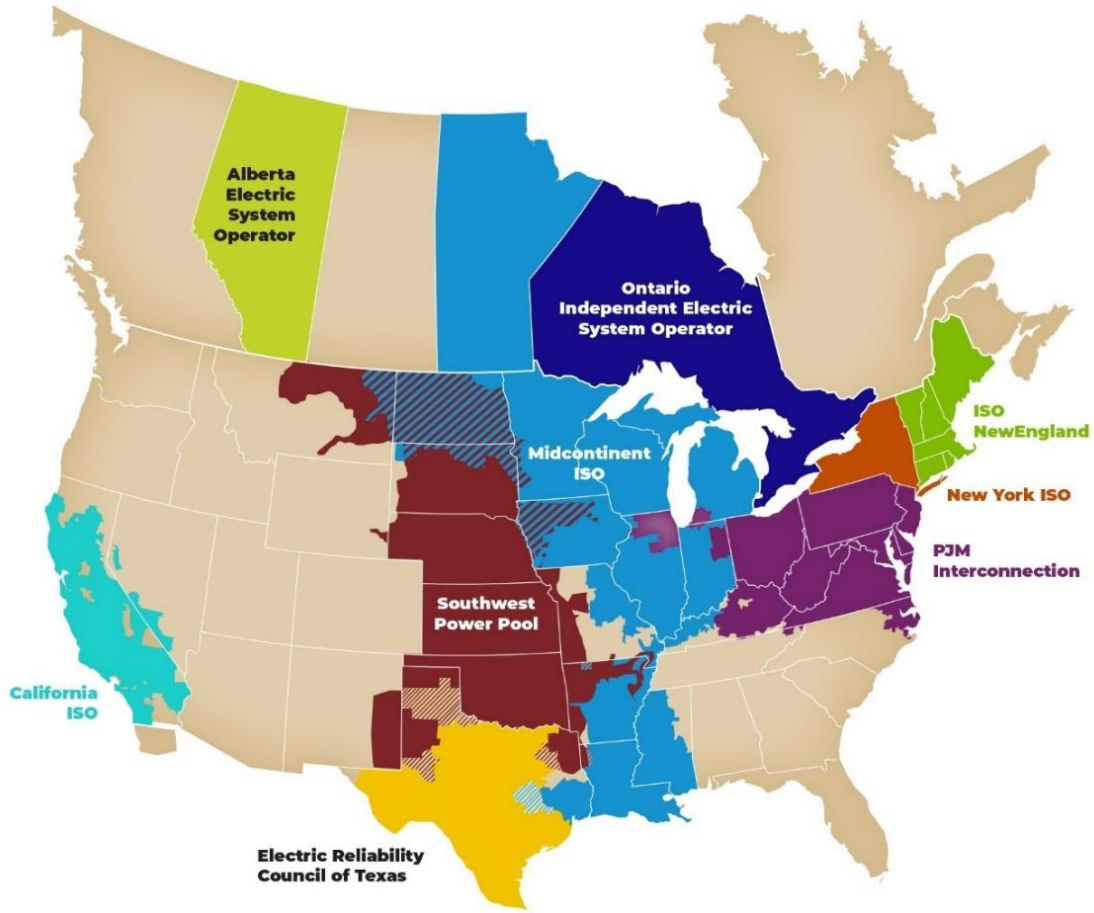


Electricity Markets



Status of electricity markets by state

Note: States may be partially regulated/deregulated, regulated only in some utility markets, or deregulated for industrial consumers. Additional information is available at the American Coalition of Competitive Energy Suppliers



Wholesale electric power markets (ISOs/RTOs)
Source: ISO/RTO Council (IRC)

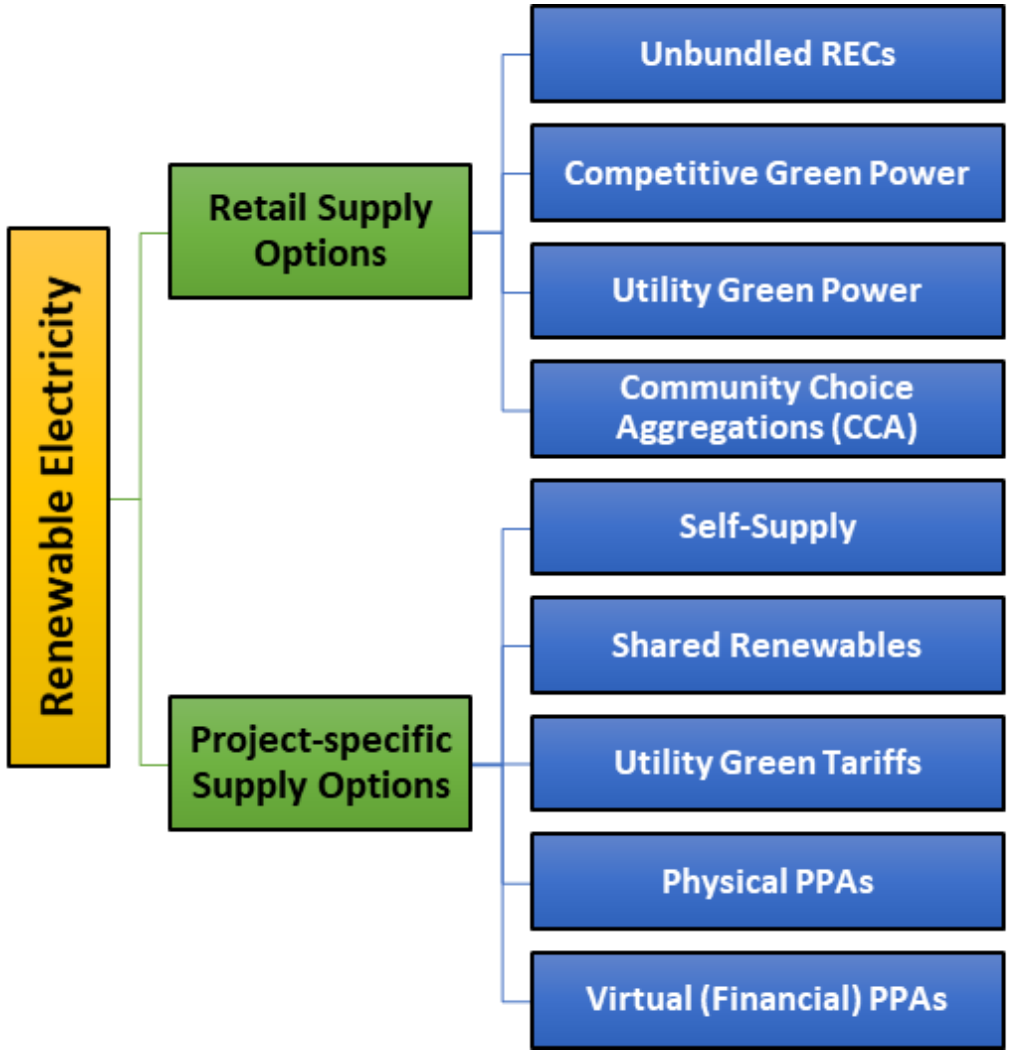
Image Source: Electric Choice https://www.electricchoice.com/map-deregulated-energy-markets/

Renewable Electricity Supply Options

On-site Generation

Unbundled RECs

Off-site Energy Market Offerings



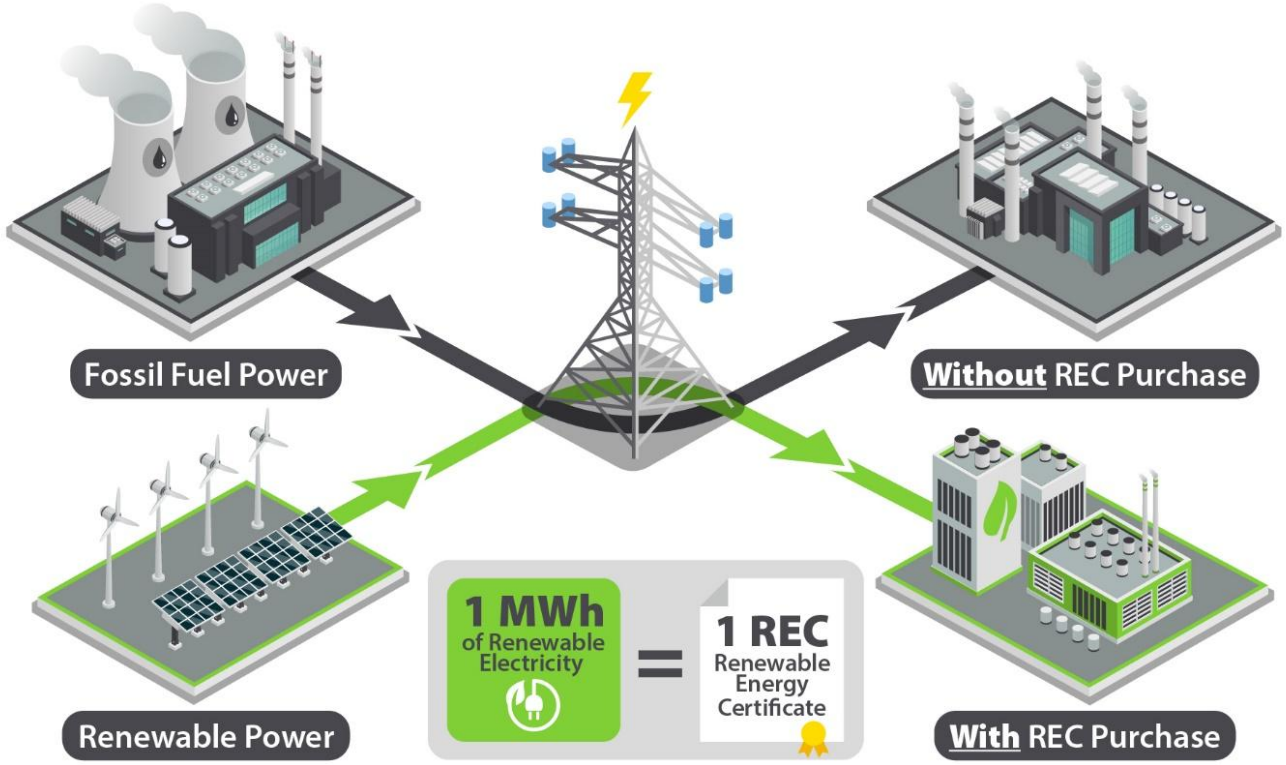
Renewable Energy Certificates (RECs)

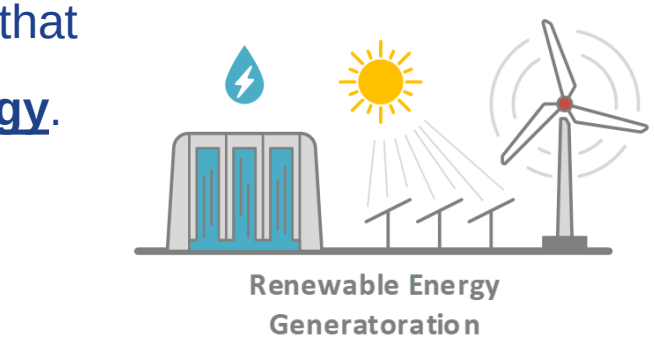
U.S. DEPARTMENT OF ENERGY

Renewable Energy Certificates/Credits (RECs)

Also know as: Green Tags or Renewable Energy Credits

RECs are tradable, non-tangible commodities in the energy market that represent the benefits associated with **1 MWh of generated renewable energy**.





Power Purchase Agreements (PPAs)

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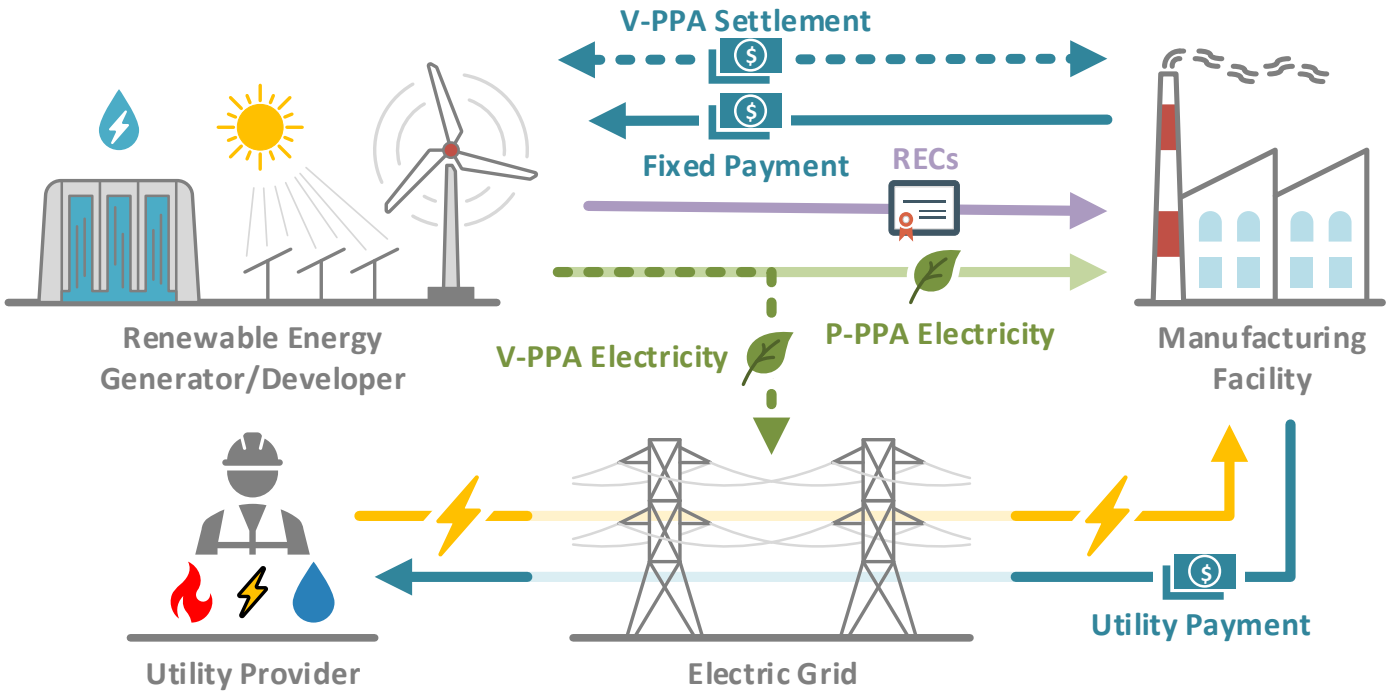
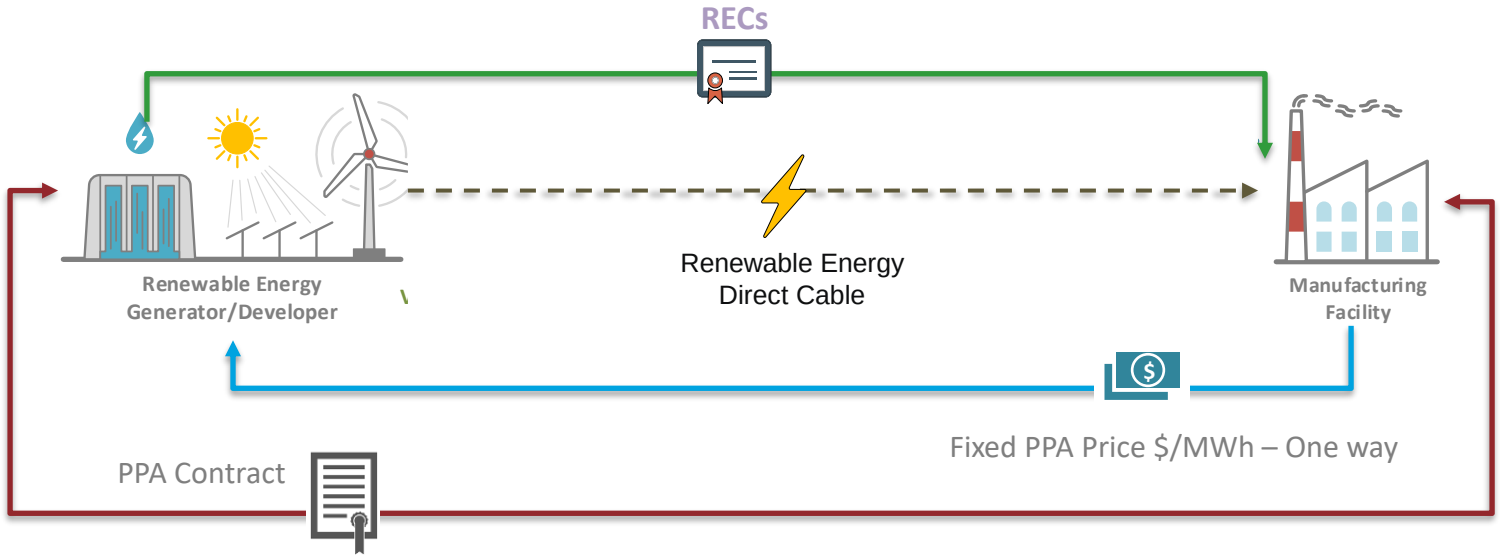
Power Purchase Agreements: PPAs & VPPAs

- PPAs are agreement to purchase energy from a third party
- Consumer buys electricity at a set rate and the associated RECs
- Benefits include reduce energy costs, shifted O&M costs, and renewable energy
- There are two main types of PPAs:
  - **Physical PPA:** Energy is delivered directly to consumer
  - **Virtual PPA:** Energy is delivered to the grid through wholesale market
- PPAs are location dependent
  - State regulations can affect your ability to enter into PPAs

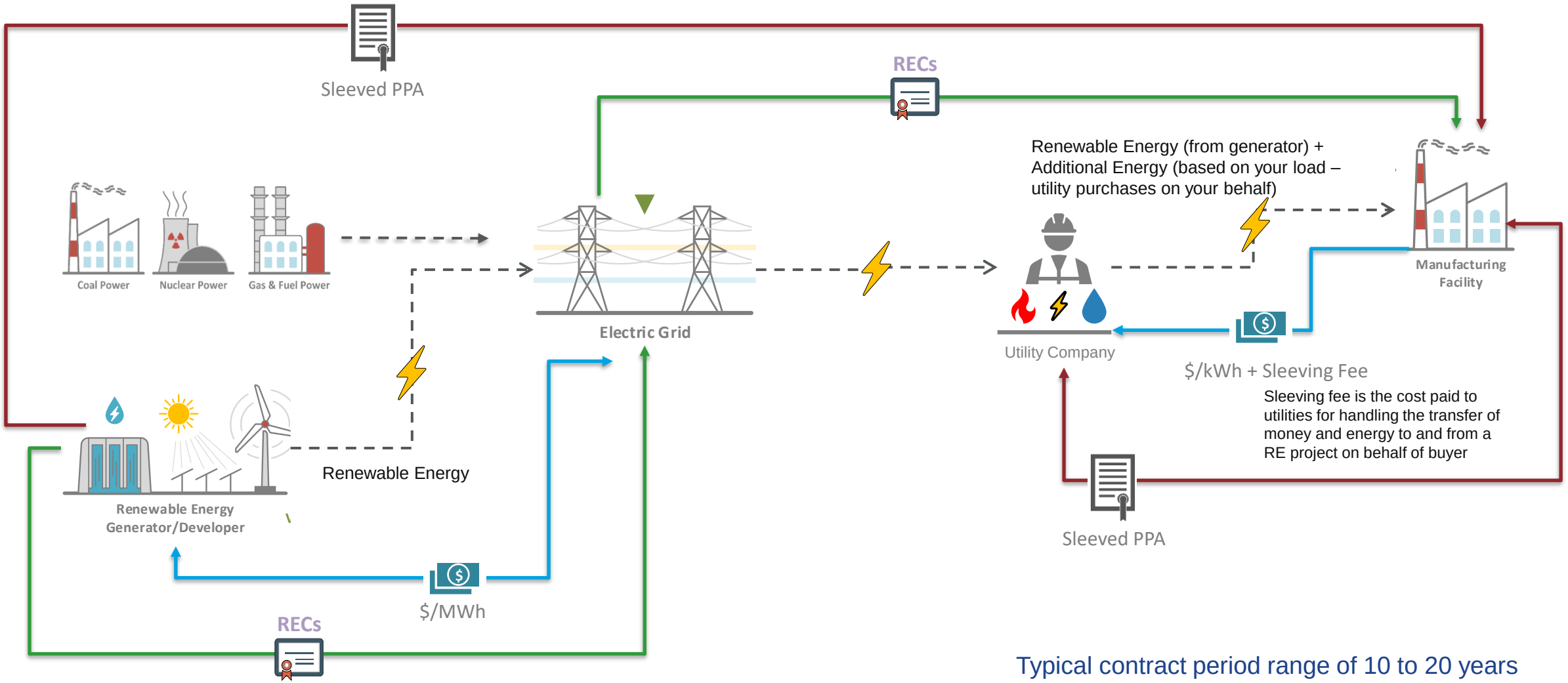


Onsite Power Purchase Agreements (PPAs)

- When space available
- Generator is a third party
- Direct cable connection to the facility
- PPA price does not include grid fee which makes it cheaper than offsite PPA



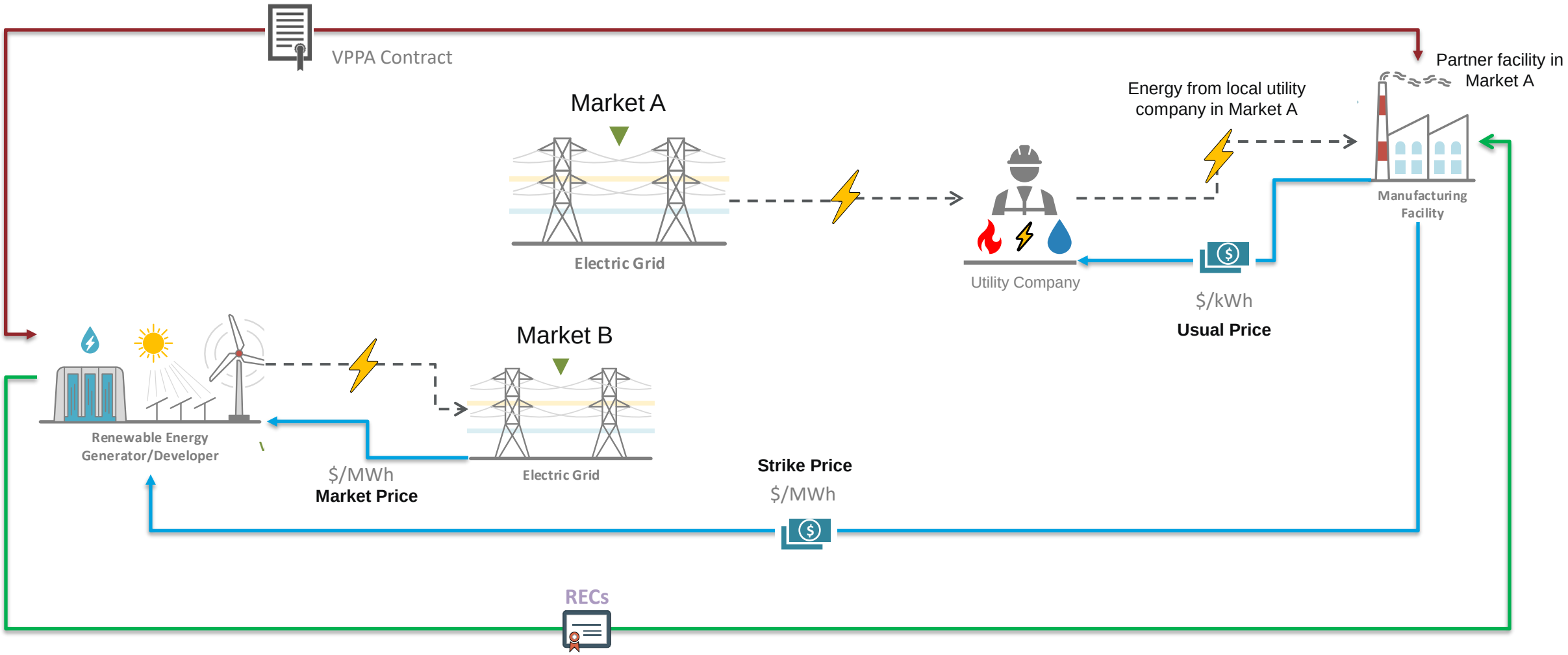
Offsite Power Purchase Agreements (PPAs) – Direct/Sleeved PPA



Typical contract period range of 10 to 20 years

In a Direct/Sleeved PPA, the generator and partner company must be on the same grid

Virtual Power Purchase Agreements (VPPAs)



Green Tariffs and Green Power Products

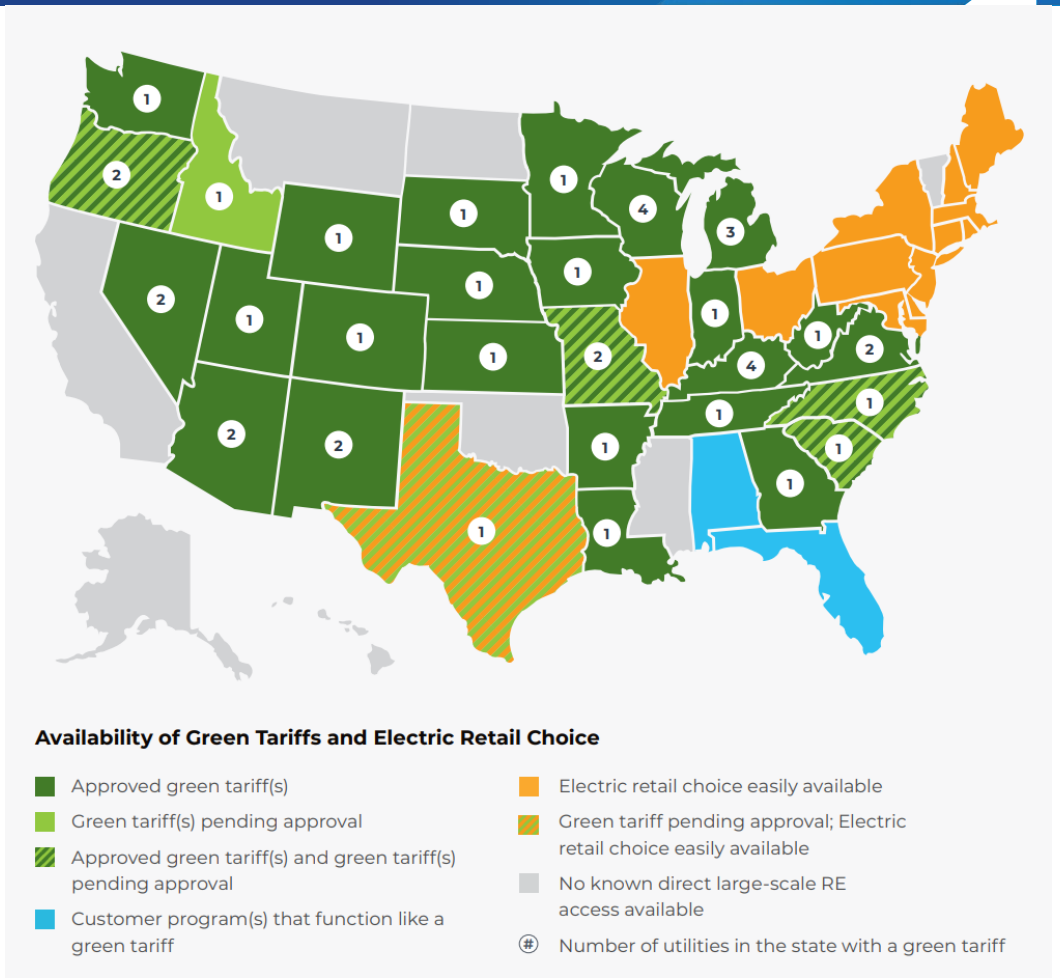
U.S. DEPARTMENT OF ENERGY

Green Power/Tariffs

1) **Competitive Green Power Products**
2) **Utility Green Power Products**
3) **Utility Green Tariffs**

Utility Green Tariff versus Utility Green Power Products:

- Both offered by utilities in **regulated** markets
- Consumer receives **bundled** green power through both
- Green Tariff attached to a **specific project** through utility (long-term agreement)
- Green Power Products, customers pay premium for extra line item on bill to support “off-the-shelf” renewable electricity product from a **mix of renewable energy resources**.

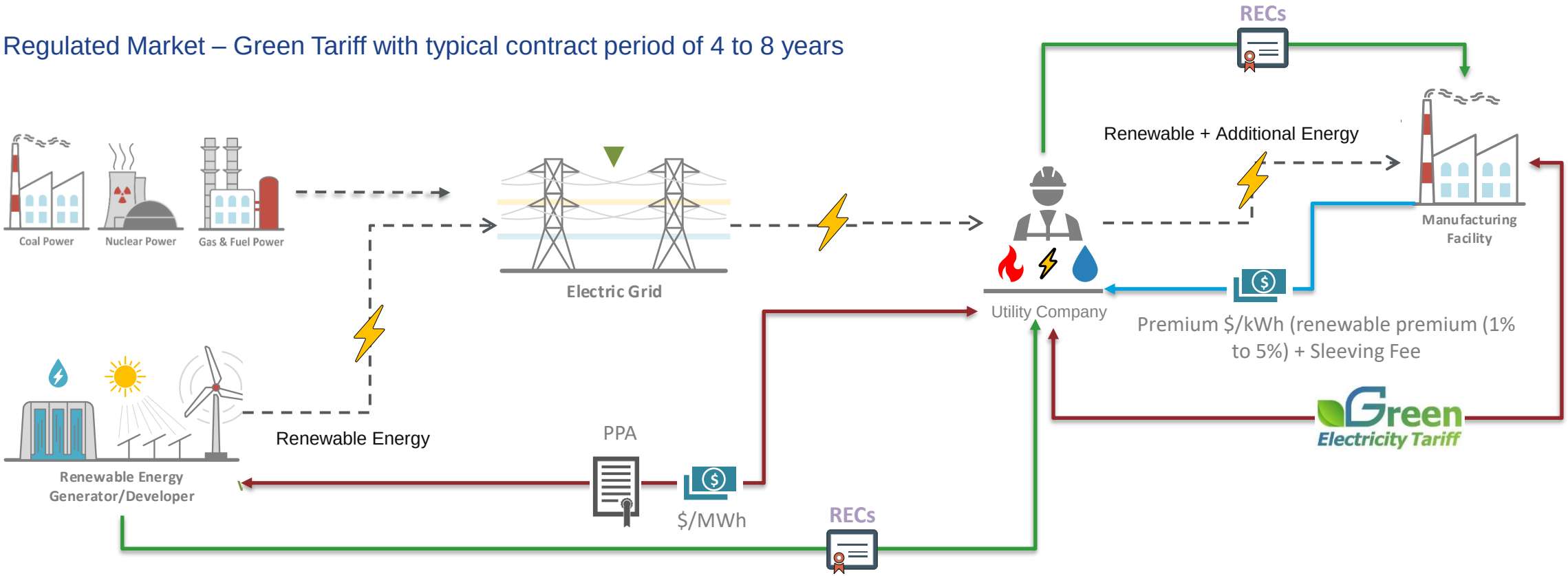


States with Utility Green Tariff Programs, January 2023

Source: CEBA, U.S Electricity Markets: Utility Green Tariff Update, https://cebuyers.org/us-electricity-markets-utility-green-tariff-update/; U.S. Utility Green Tariff Report, January 2023, https://interconnect.cebuyers.org/resources/u-s-utility-green-tariff-report-january-2023-update

Green Tariff – Program offered by Utilities

Regulated Market – Green Tariff with typical contract period of 4 to 8 years



Green Tariff – Customer may have a say on RE source, Typical contract period of 4 to 8 years
Green Power – Utility determines the RE source, Shorter contract period (sometimes month to month)

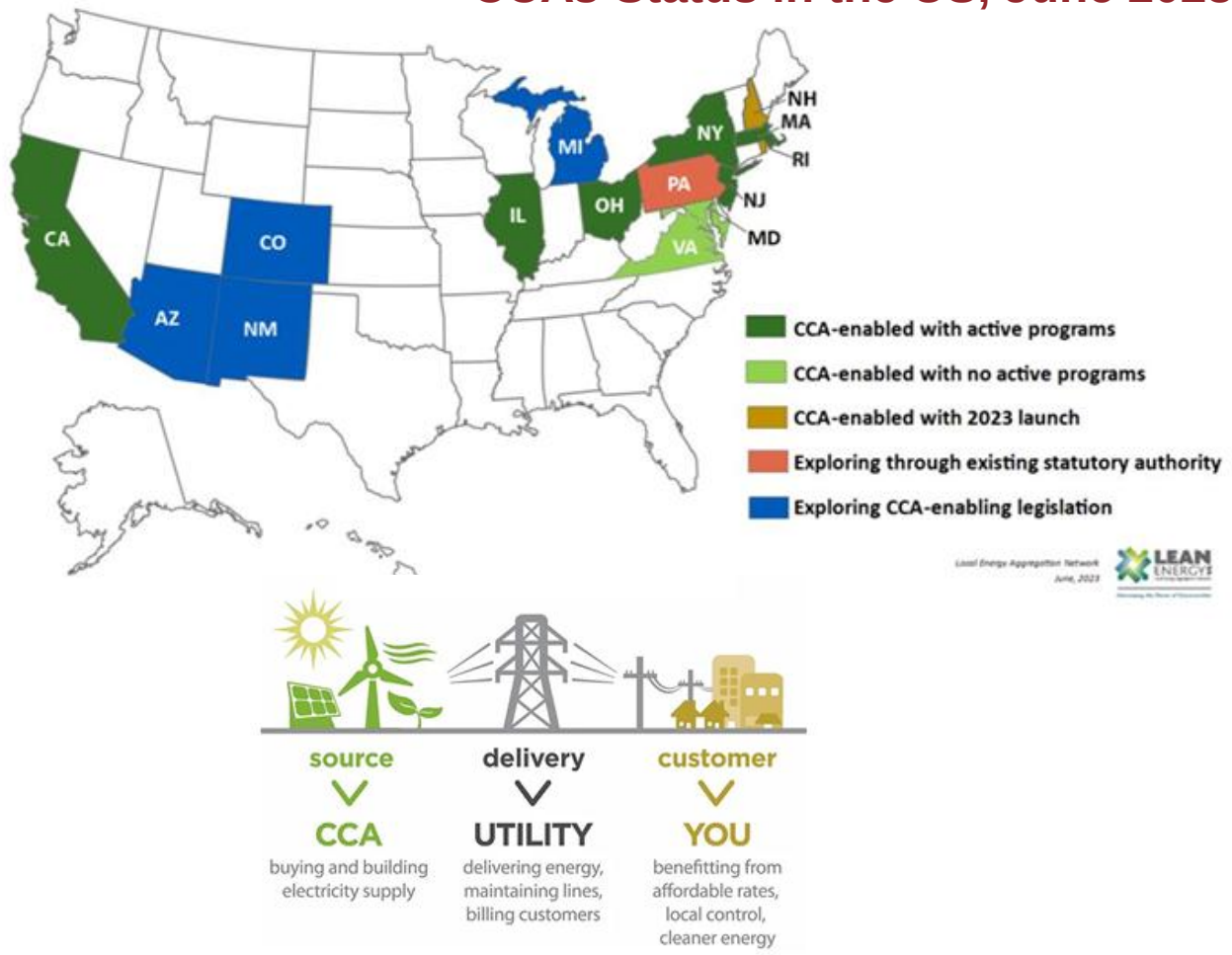
In a Green tariff, the utility delivers power from a defined set of power projects within the grid region serving the partner facility

Other Common Supply Options

Community Choice Aggregations (CCAs)

- Also known as **Municipal Aggregation**: Programs that **allow local governments to procure power on behalf of their residents, businesses, and municipal accounts** from an alternative supplier while still receiving transmission and distribution service from their existing utility provider.
- CCAs are an attractive option for **communities that want more local control over their electricity sources**.
- CCAs are currently authorized in California, Illinois, Ohio, Maryland, Massachusetts, New Jersey, New York, Rhode Island, New Hampshire, and Virginia.

CCAs Status in the US, June 2023

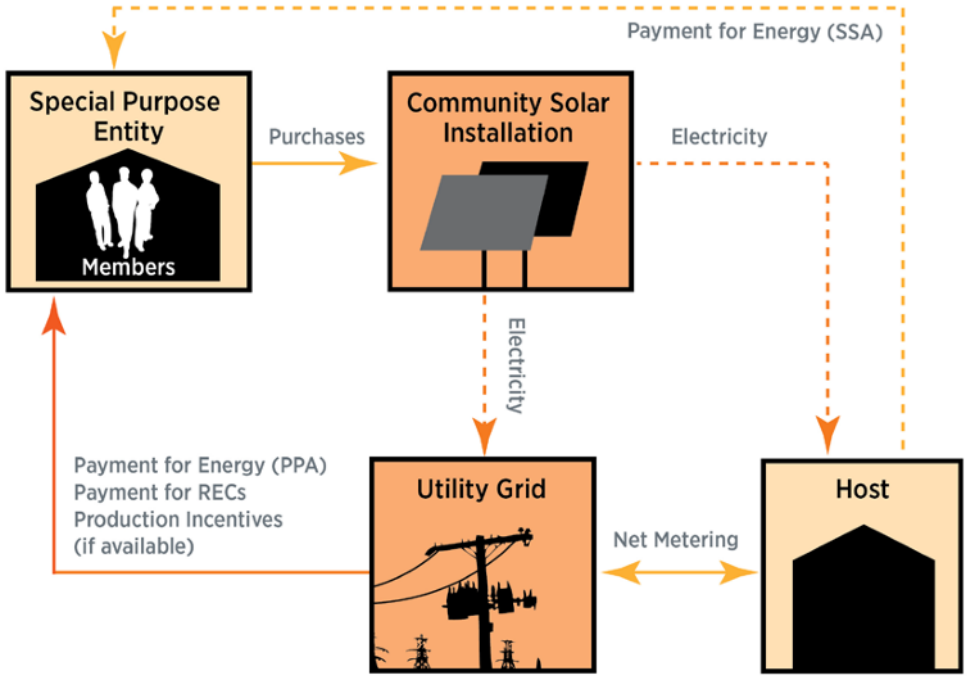


Source: Local Energy Aggregation Network (LEAN) Energy US, https://www.leanenergyus.org/cca-by-state

Shared Renewables (Community Renewables or Community Solar)

Shared Renewables, also known as or Community Renewables or **Community Solar**

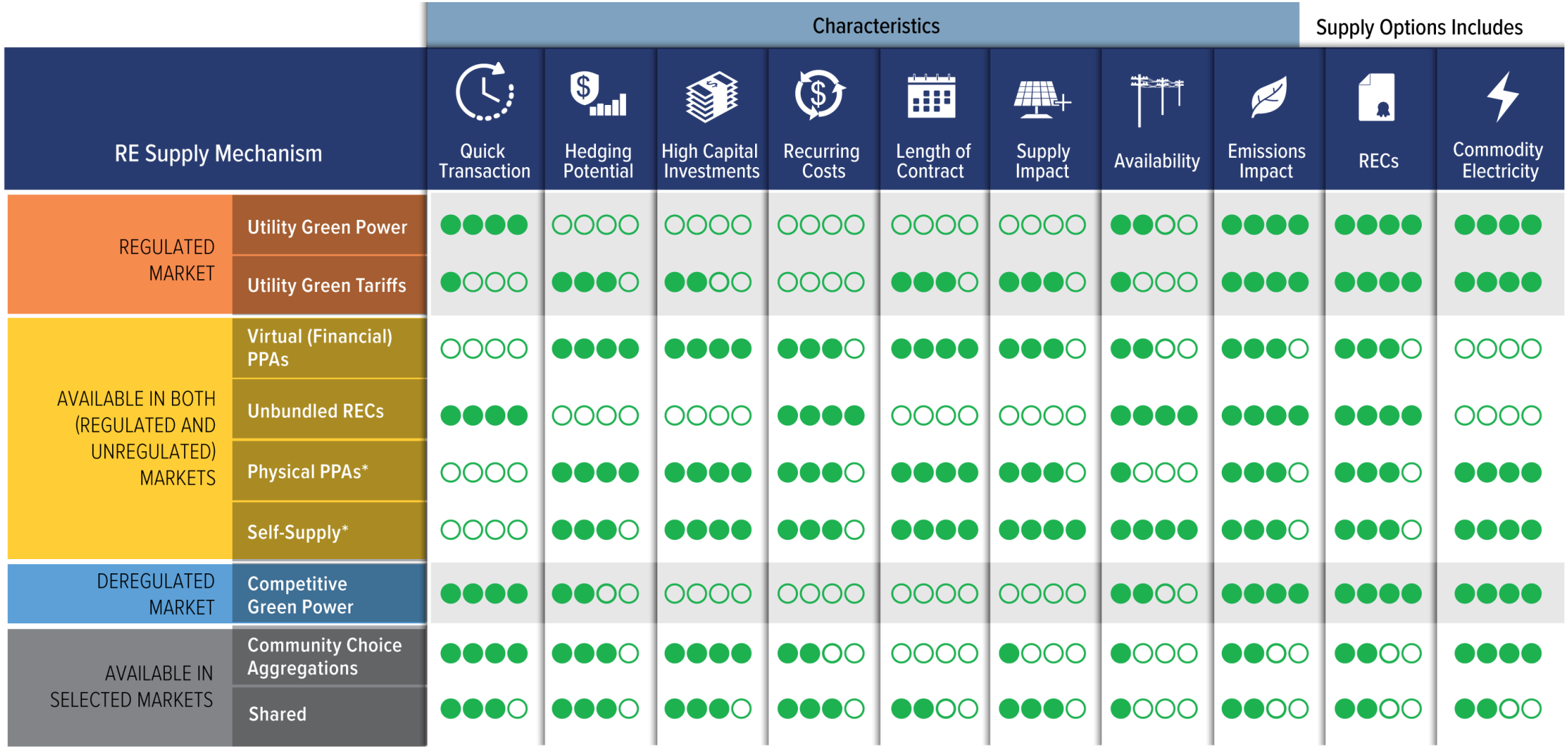
- A procurement model **allowing multiple customers to buy, lease, or subscribe to a portion of a shared green power system** that is usually located away from their home or business.
- Shared renewables legislation, specifically community solar legislation, has been enacted in 24 states (AZ,CA, CO, CT, DE, HI, IL, LA, MA, MD, ME, MN, NC, NJ, NH, NM, NV, NY, OR, RI, SC, VA, VT, and WA), Washington D.C., and Puerto Rico.



Community Shared Solar Installation

Source: NREL, 2012: https://www.nrel.gov/docs/fy12osti/54570.pdf

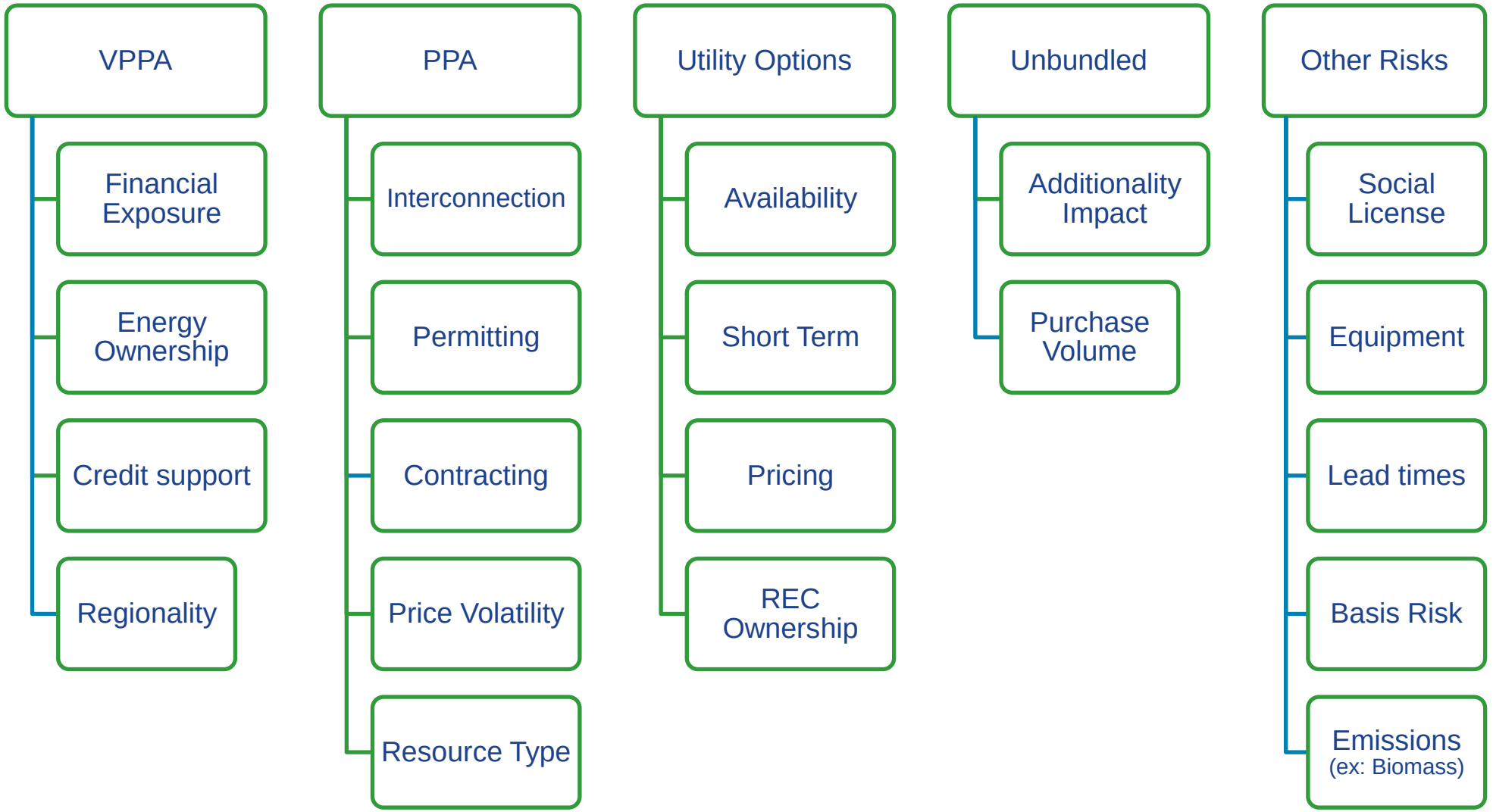
Comparison of Renewable Electricity Supply Options



RE Supply Mechanism		Quick Transaction	Hedging Potential	High Capital Investments	Recurring Costs	Length of Contract	Supply Impact	Availability	Emissions Impact	RECs	Commodity Electricity
		Characteristics								Supply Options Includes	
REGULATED MARKET	Utility Green Power	●●●●	○○○○	○○○○	○○○○	○○○○	○○○○	●●○○	●●●●	●●●●	●●●●
	Utility Green Tariffs	●○○○	●●●○	●●○○	○○○○	●●●○	●●●○	●○○○	●●●●	●●●●	●●●●
AVAILABLE IN BOTH (REGULATED AND UNREGULATED) MARKETS	Virtual (Financial) PPAs	○○○○	●●●●	●●●●	●●●○	●●●●	●●●○	●●○○	●●●○	●●●○	○○○○
	Unbundled RECs	●●●●	○○○○	○○○○	●●●●	○○○○	○○○○	●●●●	●●●●	●●●●	○○○○
	Physical PPAs*	○○○○	●●●●	●●●●	●●●○	●●●●	●●●○	●○○○	●●●○	●●●○	●●●●
	Self-Supply*	○○○○	●●●○	●●●●	●●●○	●●●●	●●●●	●●●●	●●●○	●●●○	●●●●
DEREGULATED MARKET	Competitive Green Power	●●●●	●●○○	○○○○	○○○○	○○○○	○○○○	●●○○	●●●●	●●●●	●●●●
AVAILABLE IN SELECTED MARKETS	Community Choice Aggregations	●●●●	●●●○	●●●●	●●○○	○○○○	●○○○	●○○○	●●○○	●●○○	●●●●
	Shared	●●●○	●●●○	●●●○	●●●○	●●○○	●●●○	●○○○	●●○○	●●○○	●●○○

* Direct or via utility

Key Considerations



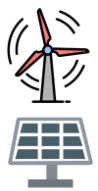
Reporting for Better Climate Challenge Program

- The Better Climate Challenge program
  - RECs are allowed
  - Does not recognize the use of offsets
- Reduced carbon footprint by lowering Scope 2 emissions
  - RECs count towards Scope 2 reduction; **important to retain the RECs** (and retire)
  - On-site PPAs reduce the site-to-source energy multiplier from 3.0 to 1.0 in a company's energy baseline
  - VPPAs count towards Scope 2 reduction; however, VPPAs are excluded from energy baselines
- Additionality is more commonly accepted for certain REC procurements, as more information is known about the nature of the REC generation

Partner Case Studies

AstraZeneca

100%, 272 GWh/year



LOCKHEED MARTIN

20%, 301 GWh/year

Johnson Controls

100%, 281 GWh/year

SUSTAIN ABILITY DC

100%, 434 GWh/year

General Mills

100%, 1,007 GWh/year

ARLINGTON VIRGINIA

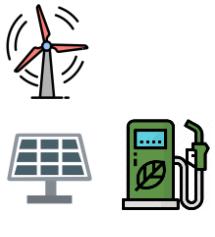
100%, 84 GWh/year

Northwestern University

39%, 100 GWh/year

gm

52%, 1,795 GWh/year



Better Plants U.S. DEPARTMENT OF ENERGY

Source: U.S. EPA's Green Power Partnership (www.epa.gov/greenpower) and https://betterbuildingssolutioncenter.energy.gov/

U.S. DEPARTMENT OF ENERGY

Tools and Resources

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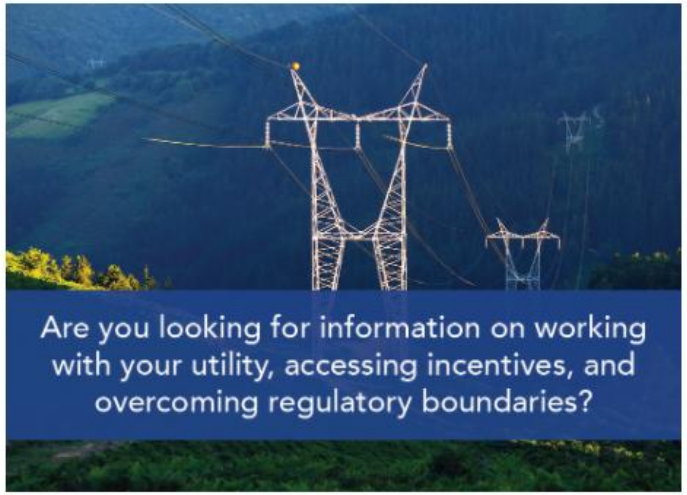
Better Buildings Renewable Energy Resource Hub

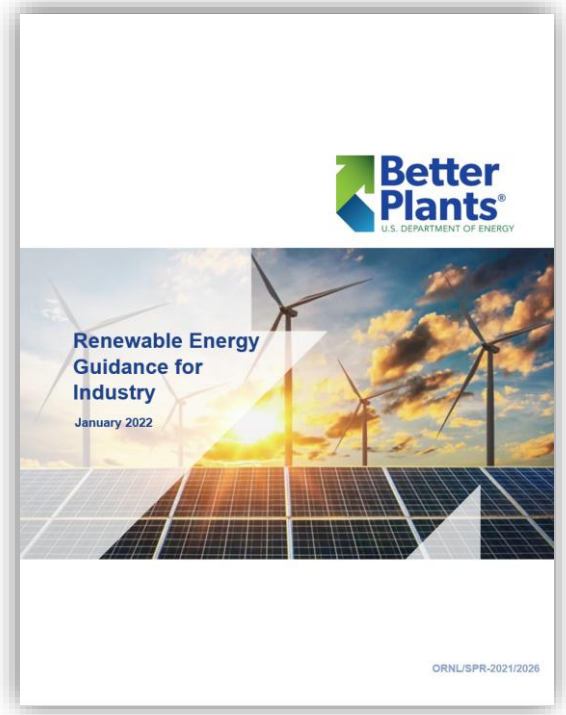


https://betterbuildingssolutioncenter.energy.gov/renewables

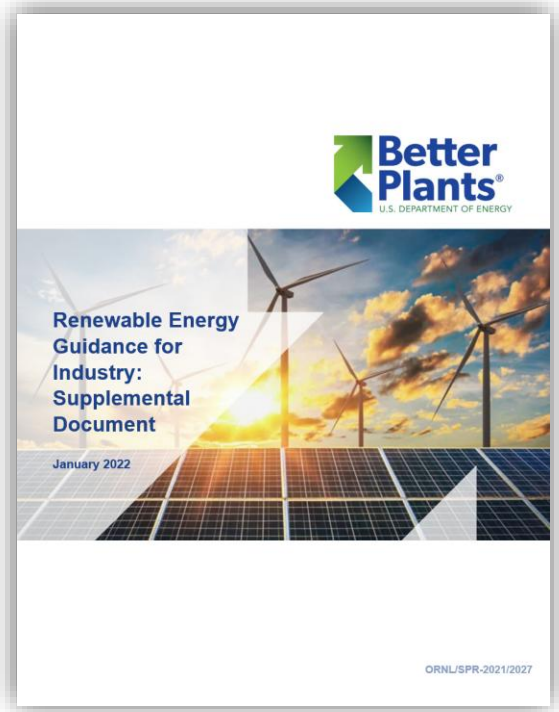
Renewable Energy for Industry Guidance Documents

- Access the full main document here.

- Access the supplemental document here.



Main Document



Supplemental Document

Renewable Energy Purchasing Factsheets

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Overview

RENEWABLE ENERGY CERTIFICATES

This document is designed as an overview of renewable energy certificates in the US renewable energy market. For more information about renewable energy technologies (e.g., solar energy, wind power, water power) and other renewable electricity supply options (e.g., power purchase agreements, green tariffs), please reference the Renewable Energy Guidance for Industry 2022[1] and the Renewable Energy Guidance for Industry 2022: Supplemental Document.[2]

1. What Are Renewable Energy Certificates?

A renewable energy certificate (REC), also known as a renewable energy credit or a green tag, is a tradable, nonphysical commodity in the US energy market that represents certain attributes associated with 1 MWh of generated renewable energy, including the type of renewable energy, the emissions rate associated with that energy, and the grid to which the energy was delivered.[3,4]

▸ **How are RECs created and tracked?**
Renewable power has two key aspects: (1) the generated electricity itself and (2) the environmental attributes of that electricity, which may then be monetized and sold separately on the open market. Generated electricity is sold to the grid or can be delivered directly to consumers. The environmental attributes can be sold as RECs. They may be sold with the electricity as ***bundled*** RECs or sold independently as ***unbundled*** RECs.

[1] Abbas, A., Price, C., Nandy, P., and Wenning, T. 2022. *Renewable Energy Guidance for Industry.* ORNL/SPR-2021/2026. Oak Ridge National Laboratory, Oak Ridge, TN. https://doi.org/10.2172/2251662.
[2] Abbas, A., Price, C., Nandy, P., and Wenning, T. 2022. *Renewable Energy Guidance for Industry: Supplemental Document.* ORNL/SPR-2021/2026. Oak Ridge National Laboratory, Oak Ridge, TN. https://doi.org/10.2172/2251661.
[3] US Environmental Protection Agency. 2024. *Renewable Energy Certificates (RECs).* Green Power Markets. Retrieved January 29, 2024, from https://www.epa.gov/green-power-markets/renewable-energy-certificates-recs.
[4] National Renewable Energy Laboratory. 2015. *Renewable Electricity: How do you know you are using it?* https://www.nrel.gov/docs/fy15osti/64558.pdf.

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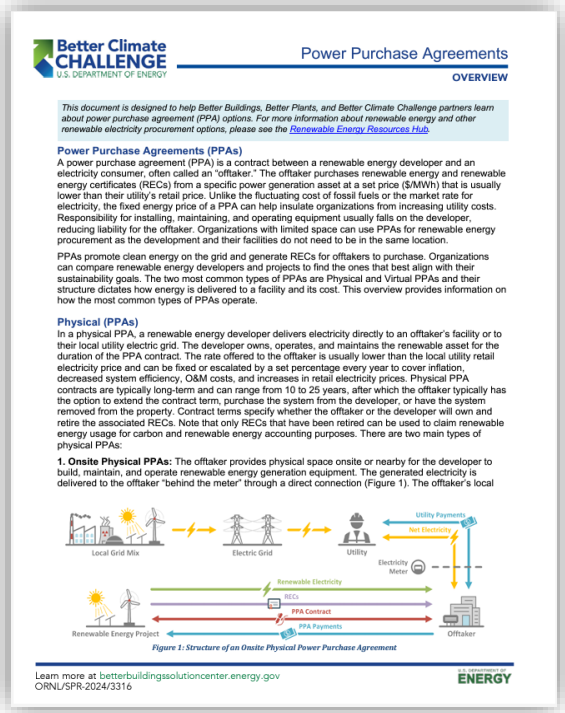
[Renewable Energy Certificates]



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Power Purchase Agreements

OVERVIEW

This document is designed to help Better Buildings, Better Plants, and Better Climate Challenge partners learn about power purchase agreement (PPA) options. For more information about renewable energy and other renewable electricity procurement options, please see the Renewable Energy Resources Hub.

Power Purchase Agreements (PPAs)

A power purchase agreement (PPA) is a contract between a renewable energy developer and an electricity consumer, often called an "offtaker." The offtaker purchases renewable energy and renewable energy certificates (RECs) from a specific power generation asset at a set price ($/MWh) that is usually lower than their utility's retail price. Unlike the fluctuating cost of fossil fuels or the market rate for electricity, the fixed energy price of a PPA can help insulate organizations from increasing utility costs. Responsibility for installing, maintaining, and operating equipment usually falls on the developer, reducing liability for the offtaker. Organizations with limited space can use PPAs for renewable energy procurement as the development and their facilities do not need to be in the same location.

PPAs promote clean energy on the grid and generate RECs for offtakers to purchase. Organizations can compare renewable energy developers and projects to find the ones that best align with their sustainability goals. The two most common types of PPAs are Physical and Virtual PPAs and their structure dictates how energy is delivered to a facility and its cost. This overview provides information on how the most common types of PPAs operate.

Physical (PPAs)

In a physical PPA, a renewable energy developer delivers electricity directly to an offtaker's facility or to their local utility electric grid. The developer owns, operates, and maintains the renewable asset for the duration of the PPA contract. The rate offered to the offtaker is usually lower than the local utility retail electricity price and can be fixed or escalated by a set percentage every year to cover inflation, decreased system efficiency, O&M costs, and increases in retail electricity prices. Physical PPA contracts are typically long-term and can range from 10 to 25 years, after which the offtaker typically has the option to extend the contract term, purchase the system from the developer, or have the system removed from the property. Contract terms specify whether the offtaker or the developer will own and retire the associated RECs. Note that only RECs that have been retired can be used to claim renewable energy usage for carbon and renewable energy accounting purposes. There are two main types of physical PPAs:

1. Onsite Physical PPAs: The offtaker provides physical space onsite or nearby for the developer to build, maintain, and operate renewable energy generation equipment. The generated electricity is delivered to the offtaker "behind the meter" through a direct connection (Figure 1). The offtaker's local

Figure 1: Structure of an Onsite Physical Power Purchase Agreement

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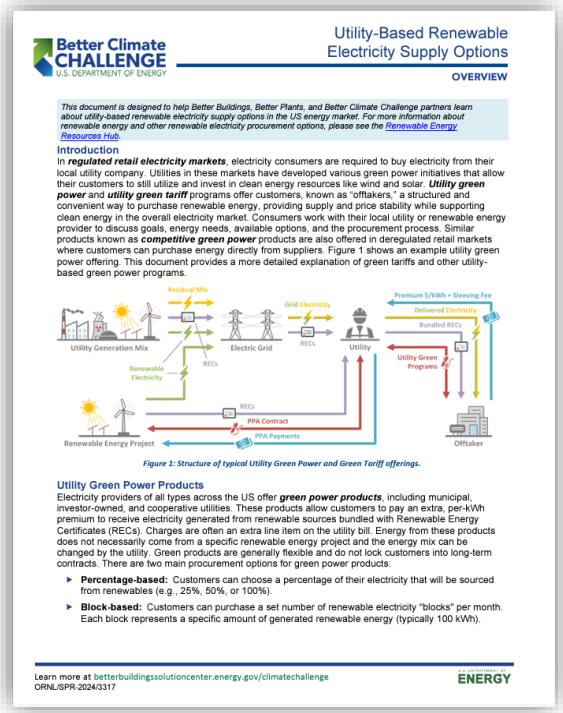
[Power Purchase Agreements]



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Utility-Based Renewable Electricity Supply Options

OVERVIEW

This document is designed to help Better Buildings, Better Plants, and Better Climate Challenge partners learn about utility-based renewable electricity supply options in the US energy market. For more information about renewable energy and other renewable electricity procurement options, please see the Renewable Energy Resources Hub.

Introduction

In ***regulated retail electricity markets***, electricity consumers are required to buy electricity from their local utility company. Utilities in these markets have developed various green power initiatives that allow their customers to still utilize and invest in clean energy resources like wind and solar. ***Utility green power*** and ***utility green tariff*** programs offer customers, known as "offtakers," a structured and convenient way to purchase renewable energy, providing supply and price stability while supporting clean energy in the overall electricity market. Consumers work with their local utility or renewable energy provider to discuss goals, energy needs, available options, and the procurement process. Similar products known as ***competitive green power*** products are also offered in deregulated retail markets where customers can purchase energy directly from suppliers. Figure 1 shows an example utility green power offering. This document provides a more detailed explanation of green tariffs and other utility-based green power programs.

Figure 1: Structure of typical Utility Green Power and Green Tariff offerings.

Utility Green Power Products

Electricity providers of all types across the US offer ***green power products***, including municipal, investor-owned, and cooperative utilities. These products allow customers to pay an extra, per-kWh premium to receive electricity generated from renewable sources bundled with Renewable Energy Certificates (RECs). Charges are often an extra line item on the utility bill. Energy from these products does not necessarily come from a specific renewable energy project and the energy mix can be changed by the utility. Green products are generally flexible and do not lock customers into long-term contracts. There are two main procurement options for green power products:

- **Percentage-based:** Customers can choose a percentage of their electricity that will be sourced from renewables (e.g., 25%, 50%, or 100%).
- **Block-based:** Customers can purchase a set number of renewable electricity "blocks" per month. Each block represents a specific amount of generated renewable energy (typically 100 kWh).

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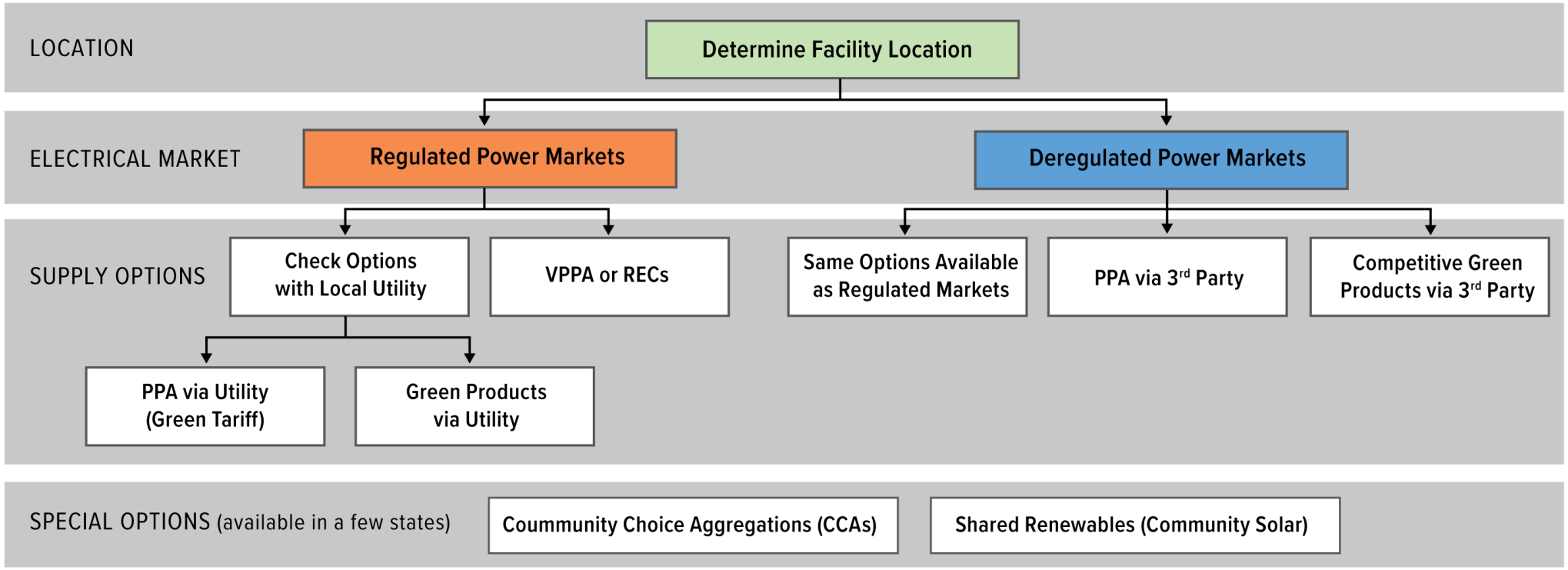
[Utility Supply Options]

Other Programs and Platforms for Renewable Energy

EPA's Green Power Partnership (GPP) [https://www.epa.gov/greenpower]	EPA GREEN POWER PARTNERSHIP	Center for Resource Solutions (CRS) [https://resource-solutions.org]	CRS
Clean Energy Buyers Association (CEBA) [https://cebuyers.org]	CEBA Clean Energy Buyers Association	Green-e Energy and Green-e Marketplace [https://green-e.org/programs/energy]	Green-e
Database of State Incentives for Renewables & Efficiency (DSIRE) [https://www.dsireusa.org]	DSIRE® | NC CLEAN ENERGY TECHNOLOGY CENTER	GHG Protocol Scope 2 Guidance [https://ghgprotocol.org/scope_2_guidance]	GREENHOUSE GAS PROTOCOL
RE100 [https://www.there100.org]	RE100 | CLIMATE GROUP | CDP	The Renewable Thermal Collaborative (RTC) [https://www.renewablethermal.org]	RENEWABLE THERMAL COLLABORATIVE
Solar Energy Industries Association (SEIA) [https://www.seia.org]	SEIA Solar Energy Industries Association®	American Council on Renewable Energy (ACORE) [https://acore.org]	ACORE AMERICAN COUNCIL ON RENEWABLE ENERGY

Takeaway Notes



Considerations:

1) For BP energy reporting purposes, as long **renewable electrons are being delivered** to the plant the site-to-source multiplier is reduced from 3 to 1.

2) Regarding carbon emissions and per SBT, **PPAs, RECs**, and other renewable electricity purchases can help reducing **Scope 2 emissions**.

3) An energy stream is **"green" only** if you have the associated **RECs**.

4) Where you are, can affect the availability of renewable electricity supply options.

Questions?

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Utility Bill Analysis Virtual Training

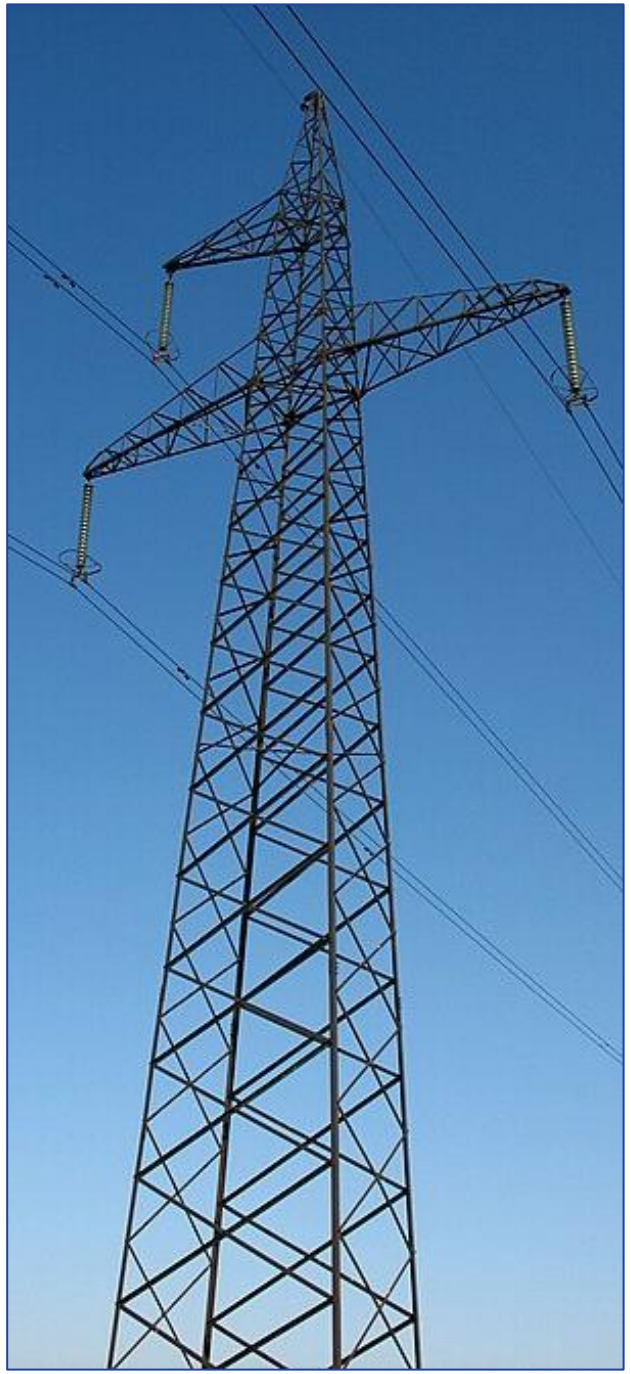
July 30 – September 3, 2025

Wednesdays from 10AM – 12:30PM ET

This training is designed to help manufacturers read, understand, and save money on their utility bills. Over this 6-week course, participants will learn about electricity, natural gas, and water billing. Detail on how each utility is produced, distributed, and sold provides context for rate structures and markets. Additional topics include metering, consumption, demand, demand response, power factor, billing, and analysis. Participants will also learn how to use DOE software tools including MEASUR and VERIFI as they collect and analyze their utility bills.

Week 1 – Electricity Markets, Rate Tariffs, and Consumption
Week 2 – Electricity Demand, Power Factor, and Load Factors
Week 3 – Electricity Demand Interval Data, Demand Management, and Cost
Week 4 – Natural Gas Billing and Markets
Week 5 – Water Billing and the True Cost of Water
Week 6 – Training Review and Case Studies

Register here!



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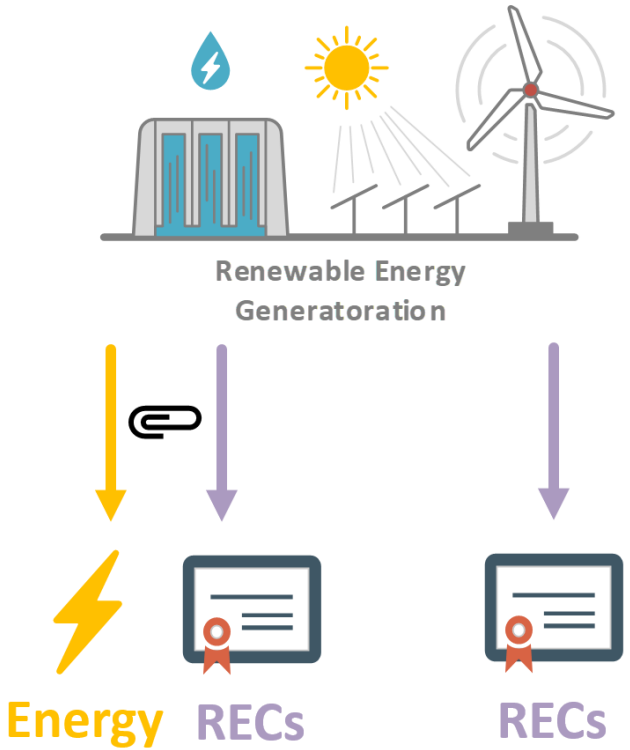
Renewable Energy Contracting Options and RECs Virtual Training

Aug 5 – September 9, 2025, | Tuesdays from 10AM – 12PM ET

This training is intended to help participants learn about the renewable energy markets and procurement strategies by providing background on renewable electricity technologies and inventory, as well as a wide range of products and purchasing options available to manufacturers. It explores purchasing options like PPAs and VPPAs, guidance on navigating voluntary markets, best practices from real-world case studies, and financing models for renewable electricity projects. Participants will also learn about the Procurement Analysis Tool (PAT).



Week 1 – Fundamentals Of Renewable Electricity And Emissions Inventory
Week 2 – Understanding The U.S. Electricity Markets And Procurement Roadmap
Week 3 – Purchasing Renewable Electricity: PPAs, VPPAs, and Other Supply Options
Week 4 – Navigating Voluntary Electricity Markets
Week 5 – Purchasing Renewable Electricity: Best Practices and Success Stories
Week 6 – Renewable Electricity Supply Options: Financing Models and Strategies

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Register here!

Workforce Development: Bootcamps

Sign up for 2025 Bootcamps here: https://bpebootcamp.ornl.gov/

Thank you!