



# Energy Project Finance

Energizing Rural Communities  
Prize: Training #3

National Renewable Energy Laboratory  
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# Obtaining Capital

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AMERICAN  
**MADĒ**  
U.S. DEPARTMENT OF ENERGY



# Agenda

1. Financing Sources
2. Investment and Production Tax Credits
3. Bonus Credit Programs
4. Tax Credit Monetization
5. Tax Equity Investment
6. Q & A

# Financing Sources

	Funding	Complexity	Providers	Potential Instruments
1. Grants	Low	Low - Medium	Governments, Private Entities, Development Banks	Grants, contingent grants, loan forgiveness <ul style="list-style-type: none"> <li>• Often require matching funds and/or have restricted uses</li> <li>• Good in early stage or limited scope applications (i.e. feasibility study, pilot)</li> </ul>
2. Equity	Varies	Medium - High	Project Sponsor, Private Investors	Ordinary or preferred shares, Tax equity <ul style="list-style-type: none"> <li>• Private investors may purchase stakes in projects or assets</li> <li>• Sponsor equity often finances early development activities</li> </ul>
3. Debt	High	High	Governments, Capital Markets, Commercial Lenders	<i>Public:</i> Municipal & Green Bonds, CDFIs , DOE Loan Programs <i>Private:</i> Loans, mezzanine debt, private placement, on-bill financing, property assessed clean energy <ul style="list-style-type: none"> <li>• Generally available from financial close through project lifetime</li> </ul>
4. Credit Enhancement	Medium	High	Governments, Development Banks	Loan Loss Reserves, Loan Guarantees, Debt Service Reserves, Interest Rate Buy-down <ul style="list-style-type: none"> <li>• Reduces risk for traditional lenders</li> </ul>
5. 3rd Party Contracting	Medium	Varies	Energy Service Providers	Energy as a Service, Equipment Leases, Privatization <ul style="list-style-type: none"> <li>• Shifts upfront cost to 3rd party provider</li> <li>• Can also shift operating responsibility to 3rd party</li> <li>• Provides long term predictability to sponsor/host</li> </ul>

Source: NREL Vision and Approach for Community Technical Assistance, May 12, 2023. Internal presentation.

# Investment and Production Tax Credits: Overview

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- The Investment Tax Credit (ITC) and Production Tax Credit (PTC) allow taxpayers to deduct a percentage of the cost of renewable energy systems from their federal taxes.
- These credits are available to taxable businesses entities and certain tax-exempt entities eligible for direct payment of tax credits.
- Generally, project owners cannot claim both the ITC and the PTC for the same property.

Sources: <https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy#EJ>  
<https://www.energy.gov/eere/solar/federal-solar-tax-credits-businesses>

# Investment and Production Tax Credits: Program Goals

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- The ITC is a tax credit that reduces the federal income tax liability for a percentage of the cost of an eligible clean energy system that is installed during the tax year.
- The PTC is a per kilowatt-hour (kWh) tax credit for electricity generated by solar and other eligible technologies for the first 10 years of a system's operation.
  - The PTC reduces the federal income tax liability and is adjusted annually for inflation.
  - The PTC is based on energy produced, not system cost

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

# Investment and Production Tax Credits: Technology Eligibility

Eligible for ITC or PTC	Eligible for ITC	Eligible for PTC
<p>multiple solar and wind technologies, municipal solid waste, geothermal (electric), and tidal</p>	<p>energy storage technologies, microgrid controllers, fuel cells, geothermal (heat pump and direct use), combined heat &amp; power, microturbines, and interconnection costs</p>	<p>biomass, landfill gas, hydroelectric, marine and hydrokinetic</p>

Source: <https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy#EJ>



# Domestic Content Bonus Credit Program: Eligibility (must meet both)

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- To qualify for the domestic content bonus, all structural steel or iron products used must be produced in the United States, and
- A “required percentage” of the total costs of manufactured products (including components) of the facility need to be mined, produced, or manufactured in the United States.
  - 40% for all projects beginning construction before 2025,
  - 45% for projects beginning construction in 2025,
  - 50% for projects beginning construction in 2026, and
  - 55% for projects beginning construction after 2026.

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



# Energy Community Bonus Credit Program: Eligibility (must meet one)

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- A brownfield site;
- An area that, after 2009, had a 0.17% or more direct employment or 25% or more local tax revenues related to the extraction, processing, transport, or storage of coal, oil, or natural gas, **and** has an unemployment rate at or above the national average for the previous year; or
- A census tract in which a coal mine closed after 1999 **or** a coal-fired electric generating unit has retired after 2009.
- Check your status: [Energy Community Tax Credit Bonus](#)

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

# ITC or PTC?

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- Three primary considerations:
  - Expected project capacity factor
  - Investment costs
  - Bonus eligibility

# Low-Income Communities Bonus Credit Program: Eligibility (must meet all)

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- Projects must be less than 5MW<sub>AC</sub>
- Requires allocation by the U.S. Department of the Treasury
  - Capped at 1.8 GW<sub>DC</sub> per year
- Projects cannot be placed in service before receiving allocation from the IRS
- [Low-Income Communities Bonus Credit Program | Department of Energy](#)

Source: <https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy#EJ>

# Low-Income Communities Bonus Credit Program: Categories and Caps

Category and Application Option	MW
(1) Located in a Low-Income Community - Eligible Residential Behind-the-Meter (BTM)	245
(1) Located in a Low-Income Community - Eligible Residential BTM – <b>Additional Selection Criteria</b>	245
(1) Located in a Low-Income Community - Other Eligible LI Community Project	105
(1) Located in a Low-Income Community - Other Eligible LI Community Project – <b>Additional Selection Criteria</b>	105
(2) Located on Indian Land	100
(2) Located on Indian Land - <b>Additional Selection Criteria</b>	100
(3) Qualified Low-Income Residential Building Project	100
(3) Qualified Low-Income Residential Building Project - <b>Additional Selection Criteria</b>	100
(4) Qualified Low-Income Economic Benefit Project	350
(4) Qualified Low-Income Economic Benefit Project - <b>Additional Selection Criteria</b>	350

Source: <https://www.energy.gov/sites/default/files/2023-12/48e%20Program%20overview%20Slides%20%28508%29.pdf>

# Summary of ITC and Bonus Credits

			Start of Construction						
			2006 to 2019	2020 to 2021	2022	2023 to 2033	The later of 2034 (or two years after applicable year <sup>a</sup> )	The later of 2035 (or three years after applicable year <sup>a</sup> )	The later of 2036 (or four years after applicable year <sup>a</sup> )
ITC	Full rate (if project meets labor requirements <sup>b</sup> )	Base Credit	30%	26%	30%	30%	22.5%	15%	0%
		Domestic Content Bonus				10%	7.5%	5%	0%
		Energy Community Bonus				10%	7.5%	5%	0%
	Base rate (if project does not meet labor requirements <sup>b</sup> )	Base Credit	30%	26%	6%	6%	4.5%	3%	0%
		Domestic Content Bonus				2%	1.5%	1%	0%
		Energy Community Bonus				2%	1.5%	1%	0%
	Low-income bonus (1.8 GW/yr cap)	<5 MW projects in LMI communities or Indian land				10%	10%	10%	10%
		Qualified low-income residential building project / Qualified low-income economic benefit project				20%	20%	20%	20%

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

# Summary of PTC and Bonus Credits

			Start of Construction						
			2006 to 2019	2020 to 2021	2022	2023 to 2033	The later of 2034 (or two years after applicable year <sup>a</sup> )	The later of 2035 (or three years after applicable year <sup>a</sup> )	The later of 2036 (or four years after applicable year <sup>a</sup> )
PTC for 10 years (\$2022)	Full rate (if project meets labor requirements <sup>b</sup> )	Base Credit			2.75 ¢	2.75 ¢	2.0 ¢	1.3 ¢	0.0 ¢
		Domestic Content Bonus				0.3 ¢	0.2 ¢	0.1 ¢	0.0 ¢
		Energy Community Bonus				0.3 ¢	0.2 ¢	0.1 ¢	0.0 ¢
	Base rate (if project does not meet labor requirements <sup>b</sup> )	Base Credit			0.55 ¢	0.55 ¢	0.4 ¢	0.3 ¢	0.0 ¢
		Domestic Content Bonus				0.1 ¢	0.0 ¢	0.0 ¢	0.0 ¢
		Energy Community Bonus				0.1 ¢	0.0 ¢	0.1 ¢	0.0 ¢

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

# Tax Credit Monetization for Tax-Exempt Organizations

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- **Elective (Direct) Pay**
  - Allows certain non-taxable entities to directly monetize certain tax credits.
  - Applicable entities may elect to treat these tax credits as refundable payments of tax.
  - Such entities are eligible to receive a direct payment from the IRS for any amount paid in excess of their tax liability for credits.
- **Transfer of Credit**
  - The IRA allows eligible taxpayers that are not tax-exempt entities to transfer all or a portion of certain tax credits to an unrelated party.

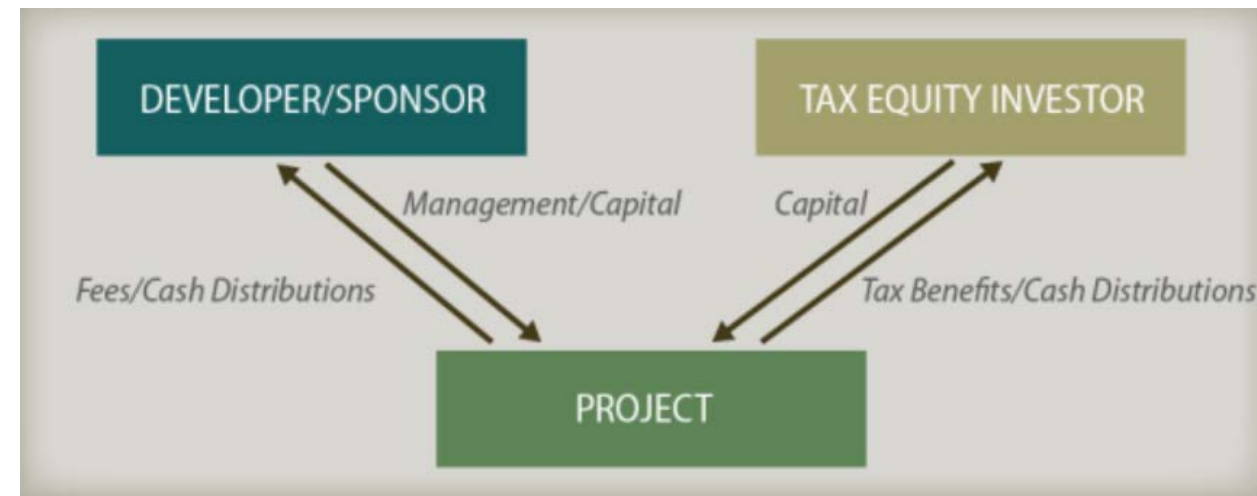
Source: <https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy#EJ>



# Tax Equity Investment

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- Identifies transactions that pair the tax credits generated by a qualifying physical investment with the capital financing associated with that investment.
- Developers can form partnerships directly with investors who are typically large corporations with predictable tax liabilities
- Tax equity investors will serve as the "limited" partners
- Other considerations: financing the equity gap



Source: [Tax Equity Financing: An Introduction and Policy Considerations - EveryCRSReport.com](https://www.everycrsreport.com/2015/05/12/tax-equity-financing-an-introduction-and-policy-considerations/)

# Q&A

# Recovering the Investment and Generating Revenue

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# Agenda

1. Power Purchase Agreements
2. Net Metering
3. Renewable Energy Certificates
4. Tax Credits (and elective payments)
5. Accelerated Depreciation
6. On-Bill Finance Payments
7. Q & A

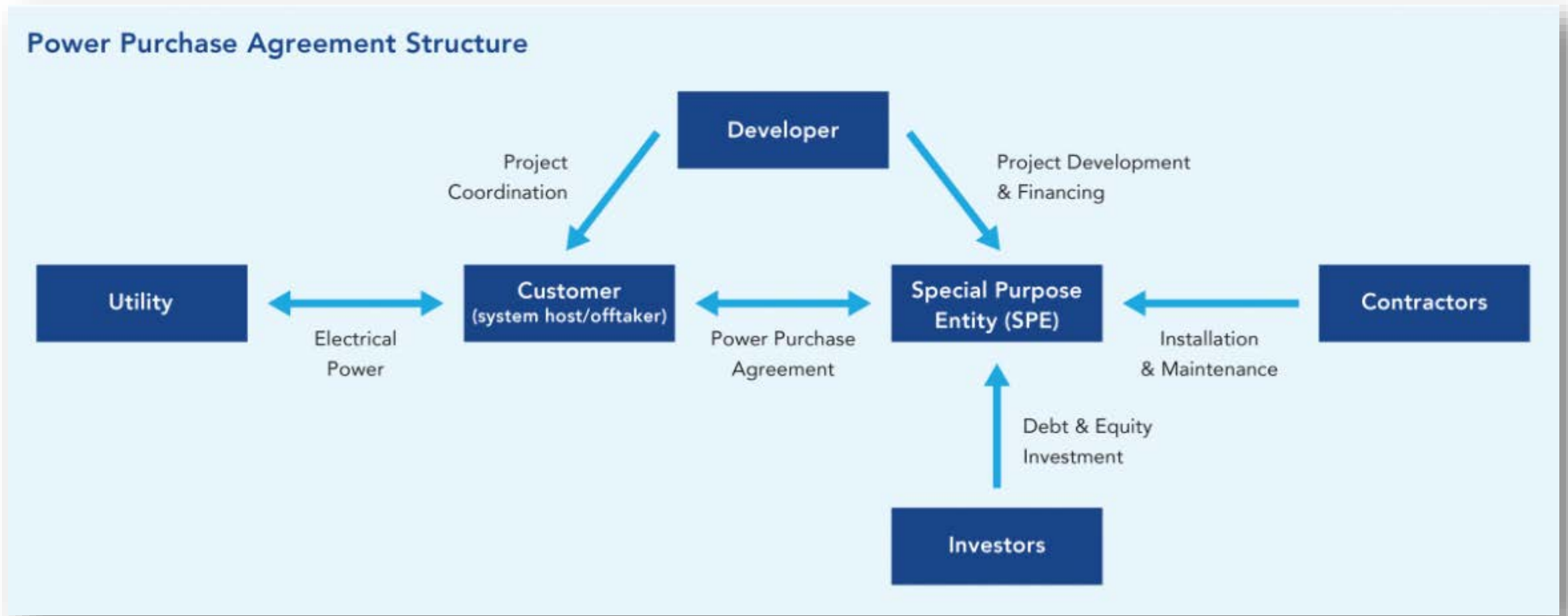
# Third-Party Power Purchase Agreements (PPAs): Overview

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- **Definition:** "An arrangement in which a third-party developer installs, owns, and operates an energy system on a customer's property. The customer (or utility) then purchases the system's electric output for a predetermined period" (10-25 years) at a fixed price or price that escalates each year.
- **Benefits:**
  - Good tool for meeting clean energy needs and goals
  - No upfront **capital** cost for community/customer (might be legal or admin costs)
  - Potential for lower energy costs and provides a hedge against price increases
  - Tax credits and renewable energy credits can be monetized by developer/owner, and developer/owner receives revenue from selling electricity
  - Developer (not community) responsible for installation, operation and maintenance

Source: <https://betterbuildingssolutioncenter.energy.gov/financing-navigator/option/power-purchase-agreement>

# Third-Party Power Purchase Agreements (PPAs): One Example Structure



Source: <https://betterbuildingssolutioncenter.energy.gov/financing-navigator/option/power-purchase-agreement>

# Third-Party Power Purchase Agreements: Things to Watch For

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## 1. Risk of overpayment (if you're the customer/utility)

- a. Price of electricity under a PPA w/ a contracted escalator may end up being more costly in the long-run compared to utility rates or other power contracts/PPAs

## 2. Limited availability – Third-party PPAs aren't allowed in all states

- a. Must be authorized by state legislature or Public Utility Commission
- b. 29 states + DC and Puerto Rico authorize some level of third-party PPAs

## 3. Contract complexity

- a. PPAs can have complex contracts and higher transaction costs than buying a system outright

Sources: <https://betterbuildingssolutioncenter.energy.gov/financing-navigator/option/power-purchase-agreement>  
[https://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2023/11/DSIRE\\_3rd-Party-PPA\\_Nov\\_2023.pdf](https://ncsolarcen-prod.s3.amazonaws.com/wp-content/uploads/2023/11/DSIRE_3rd-Party-PPA_Nov_2023.pdf)



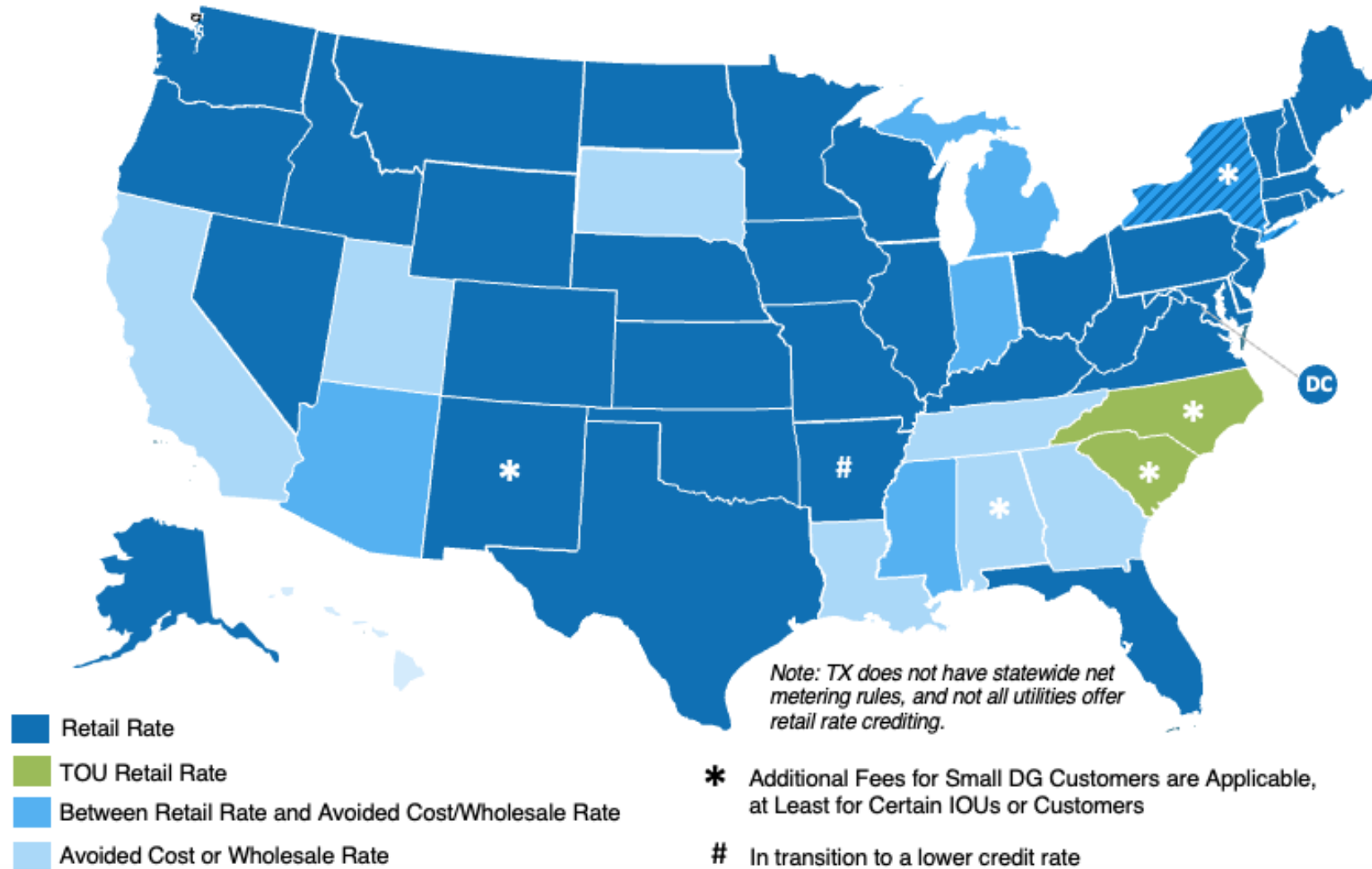
# Compensation for Distributed Energy

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- **Structure:**
  - Utilities set compensation rates/values for small-scale distributed energy via net metering, net billing, avoided cost ("buy all, sell all") or similar tariffs
- **Benefits:**
  - Higher compensation rate from utility (e.g. net metering) = greater financial value
  - Savings on energy bills contributes to project cost recovery
- **To consider:**
  - Some states allow “aggregated” or “virtual” net metering
  - Many states are revising compensation rates/tariffs, and current or future rates may dilute project value (and thus cost recovery)

# Distributed Generation Customer Credit Rates for Excess Generation

www.dsireusa.org / November 2023



Source: <http://www.dsireusa.org/resources/detailed-summary-maps/>

# Renewable Energy Certificates (RECs)

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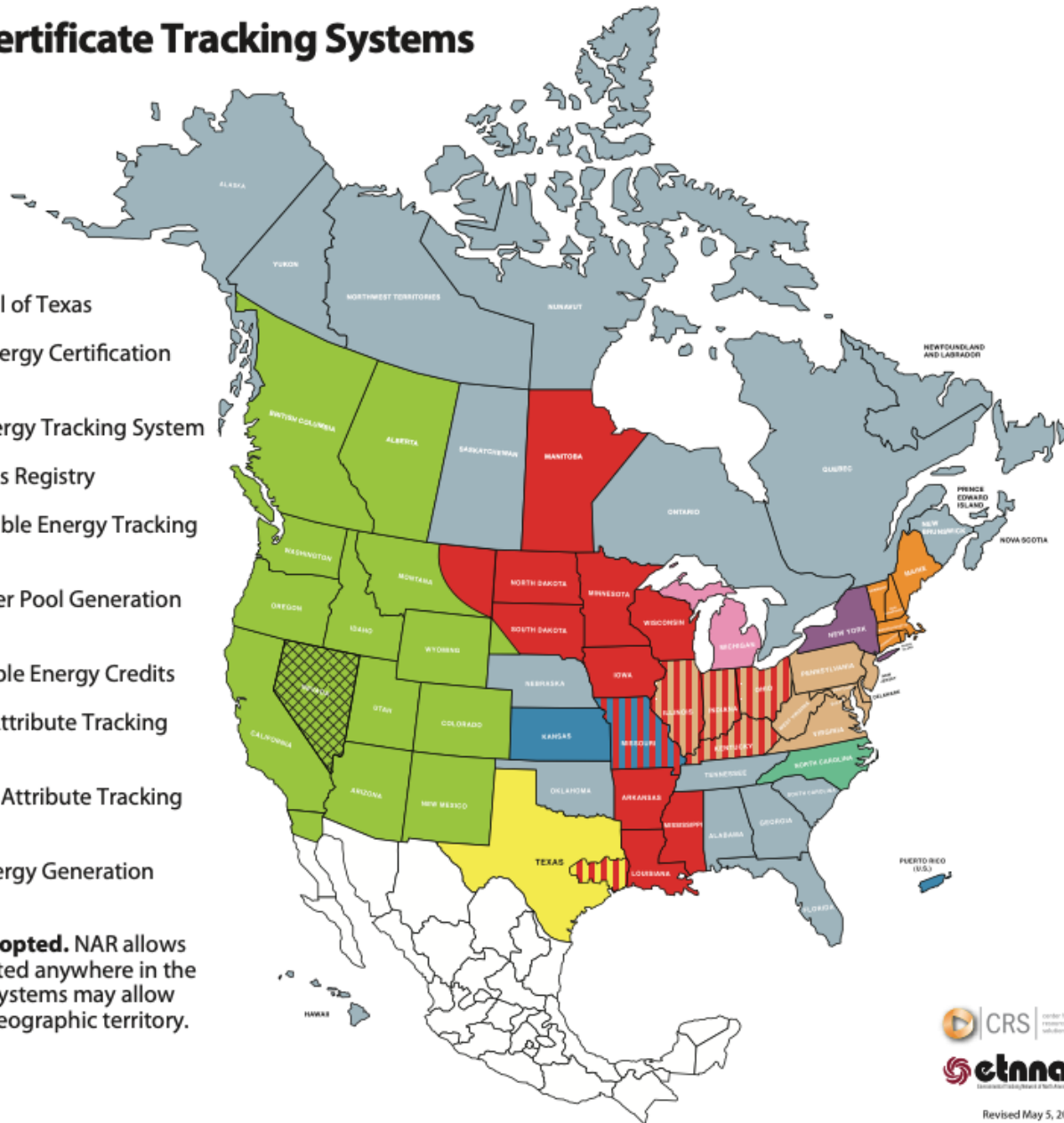
- **Definition:** Market-based instrument that represents the property rights to the environmental, social, and other non-power attributes of renewable electricity generation
- **Operation:**
  - States typically create REC markets when they adopt Renewable Portfolio Standards
  - Issued for every one megawatt-hour (MWh) of electricity **generated and delivered**
  - Ownership and value of RECs typically accrue to project owner/developer
  - REC prices vary by state, technology and location of resource
- **Benefit:** Can generate additional project revenue due to REC value
- **Caution:** Benefit may not be significant or relied upon for long-term cost recovery planning

Source: <https://www.epa.gov/green-power-markets/renewable-energy-certificates-recs>

# Renewable Energy Certificate Tracking Systems in North America

## KEY

- ERCOT:** Electric Reliability Council of Texas
- MIRECS:** Michigan Renewable Energy Certification System
- M-RETS:** Midwest Renewable Energy Tracking System
- NAR:** North American Renewables Registry
- NC-RETS:** North Carolina Renewable Energy Tracking System
- NEPOOL-GIS:** New England Power Pool Generation Information System
- NVTREC:** Nevada Tracks Renewable Energy Credits
- NYGATS:** New York Generation Attribute Tracking System (in development)
- PJM-GATS:** PJM EIS's Generation Attribute Tracking System
- WREGIS:** Western Renewable Energy Generation Information System
- No tracking system formally adopted.** NAR allows registration from generators located anywhere in the U.S. and Canada. Other tracking systems may allow registrations from outside their geographic territory.



Revised May 5, 2015

As of 2015, so may not be up to date

Source: <https://www.nrel.gov/docs/fy15osti/64558.pdf>

# Tax Credits and Cost Recovery

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- **Benefit:**
  - Credit value may be used to pay off debt financing / recoup project investment; therefore, may also be considered as part of **cost recovery**
  - Or, might just reduce taxes you already owe (so not available to pay off upfront cost)
  - Unused tax credits may be carried back three years and forward 22 years for projects placed in service in 2023 or later
- **To consider:**
  - Without a large enough tax appetite, may have to "carry over" tax credit claim for multiple years unless credits are transferred
  - Impacts projection for cost recovery, revenue generation

# Accelerated and Bonus Depreciation: Example Calculation

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
<b>ITC</b>	ITC	\$300,000									
	Bonus depreciation	\$340,000									
	5-year MACRS	\$102,000	\$163,200	\$97,920	\$58,752	\$58,752	\$29,376				
	Net impact of depreciation deductions	\$92,820	\$34,272	\$20,563	\$12,338	\$12,338	\$6,169				
	Total Tax Benefits	\$392,820	\$34,272	\$20,563	\$12,338	\$12,338	\$6,169	\$0	\$0	\$0	\$0
<b>PTC</b>	Electricity generation (kWh) <sup>a</sup>	876,000	871,620	867,262	862,926	858,611	854,318	850,046	845,796	841,567	837,359
	PTC <sup>b</sup>	\$24,090	\$24,569	\$25,057	\$25,555	\$26,063	\$26,581	\$27,109	\$27,648	\$28,198	\$28,758
	Bonus depreciation	\$400,000									
	5-year MACRS	\$120,000	\$192,000	\$115,200	\$69,120	\$69,120	\$34,560				
	Net impact of depreciation deductions	\$109,200	\$40,320	\$24,192	\$14,515	\$14,515	\$7,258				
	Total Tax Benefits	\$133,290	\$64,889	\$49,249	\$40,070	\$40,578	\$33,839	\$27,109	\$27,648	\$28,198	\$28,758

**a** Assumes PV system performance degrades 0.5% per year.

**b** Assumes the PTC increases at an inflation rate of 2.5% per year.

Source: <https://www.energy.gov/eere/solar/federal-solar-tax-credits-businesses#:~:text=The%201.8%20GW%20program%20cap,annual%20allocation%20for%20three%20years.>



# Tariff On-Bill Finance Payments

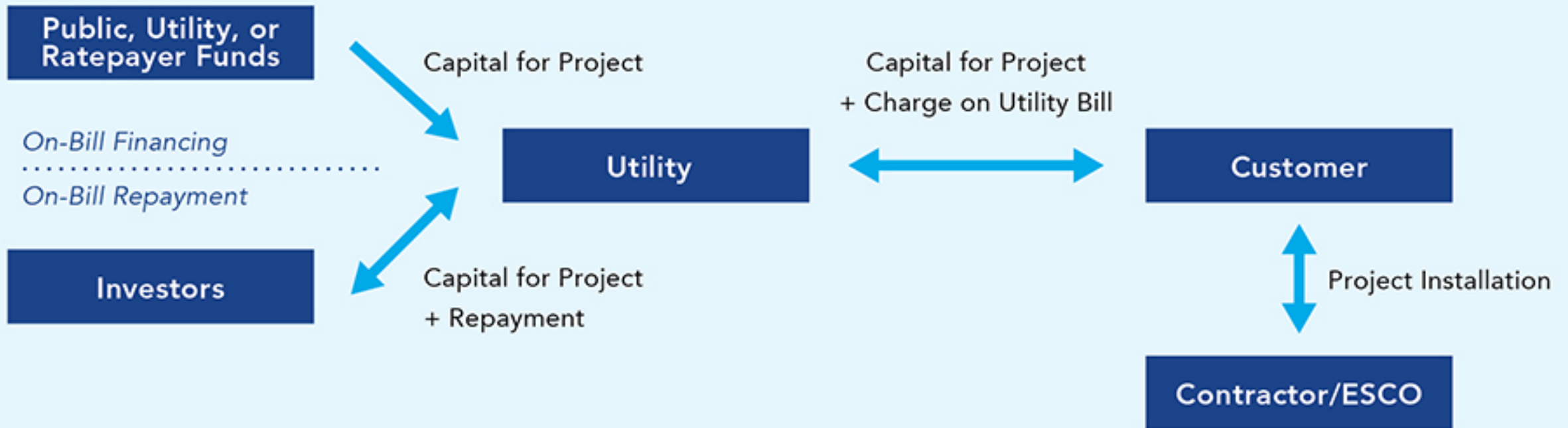
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- **Definition/Function:**
  - Utility on-bill finance programs eliminate up-front costs for energy efficiency and/or renewable energy investments
  - Utility (or third party) pays the upfront costs and **recovers those costs through monthly charges (tariffs)** on bills of customers receiving the upgrades
- **Benefits:**
  - Enhances access to efficiency/renewables for customers at a lower finance cost
    - Potentially including renters, multi-family, credit constrained residents
  - Customers benefit from lower energy bills and healthier homes/buildings, utilities/administrators benefit from reduced risk and grid savings
  - Federal programs available to rural utilities to capitalize on-bill finance programs



# Tariff On-Bill Finance Payments

## Typical On-Bill Financing or Repayment Structure



Sources: <https://www.nrel.gov/docs/fy22osti/81838.pdf>  
<https://www.ncsl.org/research/energy/on-bill-financing-cost-free-energy-efficiency-improvements>

# Q&A

# Group Sharing and Learning Exercise



# What Finance Tools Are Available in Your State?

Finance tool	Offeror	Technologies	Eligibility
Grant	State government	Solar PV	Local government
Loans, Green Bonds	Local government	Battery storage	Utilities
Rebate	Bank/Credit union	Wind	Businesses
Tax Credit	Utility	Hydro	Residents
REC's	Community-based org	Geothermal	Non-profit orgs
PPA's	Contractor/Business	Energy efficiency	Tribes
On-Bill Finance	Philanthropic entity	Electric vehicles	Housing developments
Net Metering	Other?	EV charging	Other?
Other?		Grid/Microgrid	

Thank you / Q&A



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