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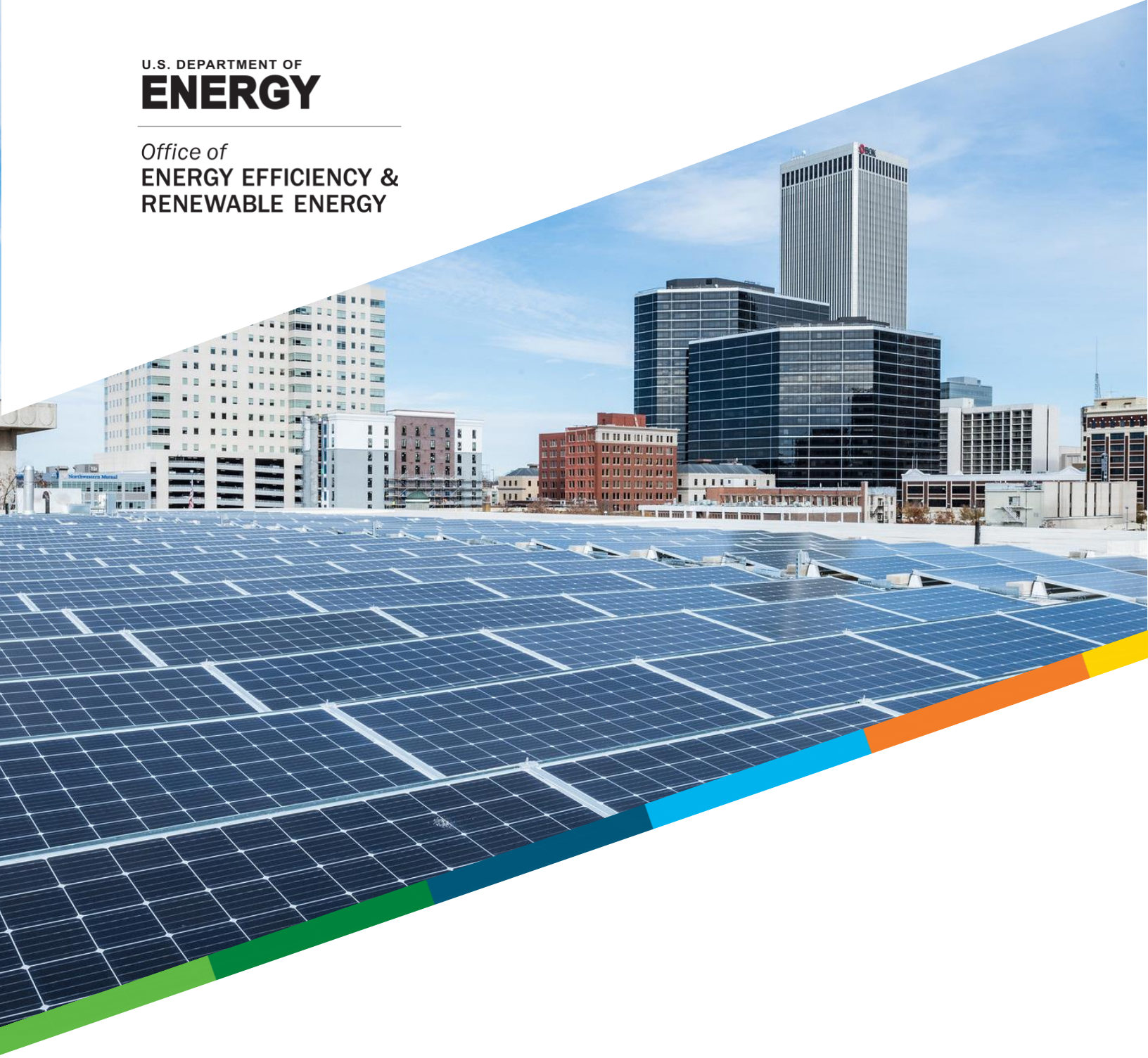

Federal Solar Tax Credits for Businesses

February 2024

Disclaimer

This resource from the U.S. Department of Energy (DOE) Solar Energy Technologies Office (SETO) provides an overview of the federal investment and production tax credits for businesses, nonprofits, and other entities that own solar facilities, including both photovoltaic (PV) and concentrating solar-thermal power (CSP) energy generation technologies. It does not constitute professional tax advice or other professional financial guidance and may change based on additional guidance from the Treasury Department.[1] It should not be used as the only source of information when making purchasing decisions, investment decisions, tax decisions, or when executing other binding agreements.

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Solar PV panels atop the Tulsa Central Library provide energy in downtown Tulsa, Oklahoma.
Photo courtesy of Jared Heidemann.

Overview

There are two tax credits available for businesses and other entities like nonprofits and local and tribal governments that purchase solar energy systems (see the Homeowner's Guide to the Federal Tax Credit for Solar Photovoltaics[2] for information for individuals):

- The investment tax credit (ITC) is a tax credit that reduces the federal income tax liability for a percentage of the cost of a solar system that is installed during the tax year.[3]
- The production tax credit (PTC) is a per kilowatt-hour (kWh) tax credit for electricity generated by solar and other qualifying technologies for the first 10 years of a system's operation. It reduces the federal income tax liability and is adjusted annually for inflation.[4]

Generally, project owners cannot claim both the ITC and the PTC for the same property, although they could claim different credits for co-located systems, like solar and storage, based on proposed rules issued by the Internal Revenue Service (IRS). Other types of renewable energy and storage technologies are also eligible for the ITC but are beyond the scope of this fact sheet.

Solar systems that are placed in service in 2022 or later and begin construction before 2034 are eligible for a 30% ITC or a 2.75 ¢/kWh[5] PTC if they meet labor requirements issued by the Treasury Department[6] or are under 1 megawatt (MW)[7] in size.

Summary of Investment Tax Credit (ITC) and Production Tax Credit (PTC) Values Over Time

			Start of Construction						
			2006 to 2019	2020 to 2021	2022	2023 to 2033	The later of 2034 (or two years after applicable year[a])	The later of 2035 (or three years after applicable year[a])	The later of 2036 (or four years after applicable year[a])
ITC	Full rate (if project meets labor requirements[b])	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[b])	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%
PTC for 10 years ($2022)	Full rate (if project meets labor requirements[b])	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[b])	Base Credit			.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 ¢	.01 ¢	0.0 ¢

a "Applicable year" is defined as the later of (i) 2032 or (ii) the year the Treasury Secretary determines that there has been a 75% or more reduction in annual greenhouse gas emissions from the production of electricity in the United States as compared to the calendar year 2022.

b "Labor requirements" entail certain prevailing wage and apprenticeship conditions being met.

What projects are eligible for the ITC or PTC?

To be eligible for the business ITC or PTC, the solar system must be:

- Located in the United States or U.S. territories.[8]
- Use new and limited previously used equipment.[9]
- Not leased to a tax-exempt entity (e.g., a school), though tax exempt entities are eligible to receive the ITC themselves in the form of a direct payment.[10]

Which is right for me, the ITC or the PTC?

The ITC is an upfront tax credit that does not vary by system performance, while the PTC can provide a more attractive cash flow, as the tax credits are earned over time. Whether to choose the ITC or the PTC depends largely on the cost of the project, the amount of sunlight available, and whether it is eligible for any bonus tax credits. See an example calculation below.

In general, large-scale PV projects will receive more value if they opt for the PTC in sunny places, while projects located in less sunny areas, that incur high installation costs, or that qualify for bonus tax credits, are more likely to benefit from the ITC.

Smaller-scale PV projects and CSP projects generally receive more value utilizing the ITC, particularly if they can utilize a low-income bonus, which is not available with a PTC. However, as installed PV and CSP system costs reduce over time (or generate more electricity), the PTC may become more attractive for all sectors.

What expenses are eligible for the ITC?

While the PTC is calculated based on the electricity produced by a system, the ITC is calculated based on the cost of building the system, so understanding what expenses are eligible to include is important in determining how much of a tax credit the system is eligible for.

To calculate the ITC, you multiply the applicable tax credit percentage by the "tax basis," or the amount spent on eligible property. Eligible property includes the following:

- Solar PV panels, inverters, racking, balance-of-system equipment, and sales and use taxes on the equipment.
- CSP equipment necessary to generate electricity, heat or cool a structure, or to provide solar process heat.
- Installation costs and certain prorated indirect costs.
- Step-up transformers, circuit breakers, and surge arrestors.
- Energy storage devices that have a capacity rating of 5 kilowatt hours or greater (even if not charged with solar).[11]
- For projects 5 MW or less, the tax basis can include the interconnection property costs spent by the project owner to enable distribution and transmission of the electricity produced or stored by the system—this can include costs that are incurred beyond the point at which the energy property interconnects to the distribution or transmission systems. [12]

The cost of a roof installation is generally *not* eligible, except for incremental costs, or the amount over what you would have spent if the roof was not used for solar.[13] These costs could include solar shingle, solar tiles, or the incremental cost of installing a reflective roof membrane that increases electricity generation.

Structures and Building-Integrated PV

Structures holding the solar PV system may be eligible for the ITC when the solar PV system is designed with the primary goal of electricity generation and other uses of the structure are merely incidental. Though structural components typically do not qualify for the ITC, the IRS noted an exception for components "so specifically engineered that it is in essence part of the machinery or equipment with which it functions."[14] Therefore, building-integrated PV, like solar windows, shingles, or facades, which provide a dual function are eligible for the ITC.

What are the labor requirements for projects?

To qualify for the full ITC or PTC, projects which commenced construction prior to January 31, 2023, must satisfy the Treasury Department's labor requirements: all wages for construction, alteration, and repair—for the first five years of the project for the ITC and the first ten years of the project for the PTC—must be paid at the prevailing rates of that location.[15] In addition, a certain percentage of the total construction labor hours for a project must be performed by an apprentice. The percentage increases over time, starting at 10% for projects beginning construction in 2022, 12.5% for projects beginning construction in 2023, and 15% for projects beginning construction after 2023.

Projects can correct the prevailing wage requirements, if they were originally not satisfied, by paying the affected employees the difference in wages plus interest and paying a $5,000 fee to the Labor Department for each impacted individual. The apprenticeship requirements also can be satisfied if a good faith effort was made to comply or if a penalty is paid to the Treasury in the amount of $50/hour of non-compliance. Both penalties increase if the requirements are intentionally disregarded.[16]

For more information, see Treasury's Proposed Regulations.[17]

What are the bonus credits?

The ITC and the PTC offer additional credits on top of the credits the project qualifies for based on their labor requirements.

Domestic Content Bonus

To qualify for the domestic content bonus, all structural steel or iron products[18] 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. The percentage is calculated by dividing the cost of all domestically manufactured products and components by the total cost of all manufactured products.

Projects that meet domestic content minimums[19] are eligible for a 10 *percentage point* increase in value of the ITC (e.g. an additional 10% for a 30% ITC = 40%) or 10 *percent* increase in value of the PTC (e.g., an additional 0.3 ¢/kWh for a 2.75 ¢/kWh).

The required percentage of manufactured products starts at 40% for all projects beginning construction before 2025, increases to 45% for projects beginning construction in 2025, 50% for

projects beginning construction in 2026, and 55% for projects beginning construction after 2026.[20]

On May 12, 2023, IRS issued guidance[21] on the domestic content bonus. Within the guidance, the IRS provides a non-exhaustive list of utility-scale solar PV steel products, manufactured products, and components of manufactured products, which taxpayers may rely on for classification purposes. These include:

- Steel/Iron products: steel photovoltaic module racking; pile or ground screw; steel or iron rebar in foundation (e.g., concrete pad).
- Manufactured products: PV module; PV tracker; inverter.
- Components of a PV module (if applicable): photovoltaic cells, mounting frame or backrail, glass, encapsulant, backsheet, junction box (including pigtails and connectors), edge seals, pottants, adhesives, bus ribbons, and bypass diodes.

The May 12 guidance also provides more clarity on how to classify a product as either domestic or a non-U.S. manufactured product, which will help to determine if a project qualifies for a domestic content bonus. According to the new guidance, the total cost of a manufactured product is only classified as domestic if it was manufactured in the United States and all its components are of U.S. origin. It does not, however, consider the origin of its subcomponents. For example, PV cell origin is considered because they are a component of a PV module, but the origin of the PV wafer used to produce the PV cell is not considered. If the product—or one or more of its components—was manufactured or mined outside the United States, then the product is considered a "non-U.S. manufactured product." Only the cost of its domestically manufactured or mined components can be included for purposes of meeting the domestic content bonus requirements, but not the labor to manufacture the product.

The guidance also states that only the direct costs, as defined in § 1.263A-1(e)(2)(i),[22] that are paid or incurred by the manufacturer to produce the manufactured product can be included in the calculation. Direct costs are defined as direct labor costs and direct material costs,[23] but do not include any indirect costs incurred by the manufacturer such as electricity, depreciation, repairs and maintenance, overhead, and profit (i.e., direct costs do not include all the costs incurred to produce a product and most likely do not represent the price of a manufactured product paid by the taxpayer).

The following example, adapted from the IRS guidance, illustrates how to calculate the domestic content percentage for a project:

- A PV system has two manufactured products, both manufactured in the United States: Manufactured Product 1 and Manufactured Product 2 (see Table below).
- Both components of Manufactured Product 1 (Component 1A and 1B) are produced in the United States. The total cost of Manufactured Product 1 is $100.

- Manufactured Product 2 has three components, but only Component 2A and 2B are produced in the United States. Component 2C is produced internationally. The total cost of Manufactured Product 2 is $200, but together, Component 2A and 2B are $80.
- The total direct cost of Manufactured Product 1 & 2 is $300.
- The total direct cost of **domestic** manufactured products and components is $180. That includes all of the costs of Manufactured Product 1 ($100) because all of its components are of U.S. origin, and the direct costs of Component 2A & 2B ($80).
- The domestic content percentage of this project is therefore 180/300, or 60% and therefore would satisfy the adjusted percentage rule.

Direct Costs of Manufactured Products 1 and 2

Asset	Cost
Manufactured Product 1	$100
Component 1A	30
Component 1B	45
Manufactured Product 2	$200
Component 2A	30
Component 2B	50
Component 2C	100

A taxpayer must submit to the IRS a statement certifying that each applicable project for which the taxpayer is reporting a domestic content bonus credit amount meets the steel, iron and manufactured product requirements and must keep records substantiating the assertion.

This guidance is valid until 90 days after the date of publication of forthcoming proposed regulations on domestic content (no publication timeline for future regulations was provided).

Energy Community Bonus

An energy community is one of three things:

1) A brownfield site – specifically, a site that has been contaminated by the presence of a hazardous substance, pollutant, or contaminant (excluding petroleum), including certain mine-scarred lands.[24]
2) 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.
3) A census tract in which a coal mine closed after 1999 (including any adjoining census tract), or a coal-fired electric generating unit has retired after 2009.

Projects sited in an energy community are eligible for a 10-*percentage-point* increase in value of the ITC (e.g., an additional 10% for a 30% ITC = 40%) or 10 *percent* increase in value of the PTC.[25] For more information, please see Treasury's most recent guidance and their map.[26]

Low-Income Bonus

The U.S. Department of Energy (DOE) Office of Energy Justice and Equity[27] is administering the Low-Income Communities Bonus Credit Program in partnership with Treasury and the IRS. DOE will review applications and make recommendations to the IRS, which will allocate up to 1.8 GW_{dc} of eligible solar and wind capacity per year (and any unallocated capacity from previous years). This bonus provides projects using the ITC that are under 5 MW_{ac} either:

1) an additional 10% ITC for being located in a low-income community as defined by the New Markets Tax Credit[28] (Category 1) or on Indian land (Category 2); or
2) an additional 20% ITC for being classified as a "qualified low-income residential building project"[29] (Category 3) or "qualified low-income economic benefit project"[30] (Category 4). To qualify for the credit, the financial benefits of the solar facility must be allocated equitably between the residents.

The 1.8 GW program cap will be allocated to projects by the IRS, which can carry over any unused annual allocation for three years.

For 2023, the IRS has proposed to allocate capacity according to the following table.

Category 1: Located in a Low-Income Community	700 megawatts
Category 2: Located on Indian Land	200 megawatts
Category 3: Qualified Low-Income Residential Building Project	200 megawatts
Category 4: Qualified Low-Income Economic Benefit Project	700 megawatt

They also plan to set aside 560 MW of Category 1 for residential behind-the-meter facilities. For the 2023 program year, at least 50% of the capacity of each category will be reserved for projects meeting certain ownership and/or geographic selection criteria.[31]

DOE began accepting applications[32] across all four categories of the Low-Income Communities Bonus Credit Program on October 19, 2023. The initial 30-day application window for the Low-Income Communities Bonus Credit Program has closed; however, application submissions continue to be accepted and will be evaluated on a rolling basis until the IRS allocates all capacity limitation in a program year. Updates on available capacity by category can be accessed via the Program Capacity dashboard.[33]

Only the owner of the project can apply; projects cannot apply to more than one category; and artificially dividing up projects to be below the 5 MW_{ac} cap is not allowed. Projects must be completed within four years after receipt of the allocation and cannot be placed in service prior to receiving an allocation. There are also strict requirements on what (if any) changes to project size, location, ownership, and benefits distributions are allowed after allocation.[34]

For more information, please see Treasury's most recent guidance for 2023[35] and the Office of Energy Justice and Equity's webpage on the Low-Income Communities Bonus Credit Program.[36]

When do the ITC and PTC phase out?

Unless Congress decides to renew them, the ITC, PTC, and associated bonuses begin to phase out for projects that commence construction in 2032 or the year the Treasury Secretary determines that there has been a 75% or more reduction in annual greenhouse gas emissions from the production of electricity in the United States as compared to the calendar year 2022 (whichever is later).

- In 2033, or the first year *after* the beginning year of the phaseout, the credits and bonuses for projects entering construction remain at 100% of their full value (with the exception of 1.8 GW low-income program, which ends).
- Projects entering construction in 2034, or the second year after the beginning year of the phaseout, qualify for 75% of their full value. Example calculations:
  - ITC: 75% x 30% = 22.5%.
  - PTC: 75% x 2.75 ¢/kWh (inflation-adjusted) = 2.0 ¢/kWh (inflation-adjusted).
- Projects entering construction in 2035, or the third year, qualify for 50% of their full value.
- Projects entering construction after the third year are ineligible for the ITC and PTC.
- Systems greater than 1 MW that begin construction 60 days or more after Treasury's labor guidance and do *not* meet the labor requirements are subject to an 80% reduction, including the domestic content and energy community bonuses. Example calculations:
  - ITC: (30% + 10%) / 5 = 8%.
  - PTC: (2.75¢/kWh + 0.3¢/kWh) / 5 = 0.6¢/kWh).

How can tax-exempt organizations benefit?

Organizations that don't pay federal taxes, like non-profits or local governments, can take advantage of the tax credits through either direct pay or a transfer of credit.

Direct Pay

Tax-exempt organizations (i.e., non-profits), states, counties, municipalities, instrumentalities (like school districts), the Tennessee Valley Authority, Indian Tribal governments, any Alaskan Native Corporation, and any rural electric cooperative can receive a refund from the IRS for tax credits on projects placed in service after 2022.[37] Partnerships, even if all the partners are eligible, are not allowed, but certain ownership arrangements such as a tenancy-in-common are allowed.[38]

Organizations that wish to receive direct pay, also known as elective pay, must pre-register with the IRS before the tax return is due and receive a registration number.[39] More information about the electronic pre-filing registration process will be available when the process is launched later

in 2023, including advice for filers without internet access. Registration is required every year for each applicable property, i.e., for every year of the PTC, however pre-registration does not confirm eligibility.

If tax-exempt grants or forgivable loans were used to finance a project, they can be included in the basis for the tax credit. However, the total credit amount cannot exceed the difference between the project cost and the tax-exempt funds that were granted specifically for this project. The following examples, adapted from the IRS guidance, illustrates how to this calculation works:

- School A receives a tax-exempt grant in the amount of $400,000 from a federal agency for the purchase of a solar array to cover their parking lot, which cost $400,000. School A's basis for the ITC is $400,000. The hypothetical direct pay amount would then be $400,00 x 30% = $120,000. However, the direct pay amount cannot exceed:
    - $400,000 (project cost) - $400,000 (tax-exempt funds granted specifically for this project) = $0.
    - Thus, School A cannot receive any money via direct payment.
- School B receives a tax-exempt grant in the amount $250,000 for the purchase of a $400,000 solar array to cover their gymnasium and uses $150,000 in unrestricted funds to make up the difference. The basis for the ITC is still $400,000 and the hypothetical direct pay amount is still $120,000. In this case, the direct pay amount cannot exceed:
    - $400,000 (project cost) - $250,000 (tax-exempt funds granted specifically for this project) = $150,000.
    - $120,000 is less than $150,000 so School B can take the full direct pay amount of $120,000.
- School C receives a tax-exempt grant in the amount of $350,000 for the purchase of a solar array to be installed in a pasture next to its football field and uses $50,000 in unrestricted funds to make up the difference. The basis for the ITC is still $400,000 and the hypothetical direct pay amount is still $120,000. In this case, the direct pay amount cannot exceed:
    - $400,000 (project cost) - $350,000 (tax-exempt funds granted specifically for this project) = $50,000.
    - $120,000 is greater than $50,000, so School C can only receive $50,000 in direct payment.

Projects starting construction in 2024 and 1 MW or above must meet domestic content requirements or may only receive a refund of 90% of the tax credit. This percentage lowers to 85% for projects starting construction in 2025 and 0% for projects starting construction after 2025. The IRS released initial guidance on how project owners can claim the statutory exception for projects beginning construction in 2024, which include if domestic content is not available or would increase the cost of a project by more than 25%.[40] The IRS plans to issue further guidance on exceptions to this requirement in the future.

A penalty of 20% may apply where excess payments are requested and made by the IRS.[41] Individuals and for-profit corporations eligible for the ITC and PTC may only use them against federal taxes owed in a given year and therefore the credits are not refundable (though they may be rolled forward).

For more information, please see IRS's initial guidance.[42]

Transfer of Credit

Taxpayers who are not eligible for direct payment, may sell all, or a portion, of the tax credits for a given year to an unrelated[43] eligible taxpayer. Taxpayers may not transfer just the bonus credit amount of a tax credit.[44] Portions of credits from a single property can be sold to multiple buyers in the same tax year.

Organizations that wish to transfer their tax credits must pre-register with the IRS before the tax return is due and receive a registration number.[45] More information about the electronic pre-filing registration process will be available when the process is launched later in 2023, including advice for filers without internet access. Registration is required every year for each applicable property, i.e., for every year of the PTC, however pre-registration does not confirm eligibility. The registration number must be provided on the tax return of both the seller and the buyer of the tax credits. If the credits from a single property have multiple buyers, the same registration is used.

Payments for the credit must be made in cash and are not considered gross income, for federal purposes (i.e., no federal taxes are owed on receiving the payment and no deduction is available to the tax credit buyer for making the payment). The buyer and seller must together complete a transfer election statement covering the details of the transfer, which is submitted by both the seller and the buyer with their tax returns.

Depreciation deductions do not transfer. A penalty of 20% may apply where excess credits are claimed.[46] Transfer credits are ineligible for direct pay.

For more information, please see IRS's initial guidance.[47]

What does "commence construction" mean?

The IRS has issued guidance[48] that the definition of commenced construction in the context of new IRA provision is the same as that issued before IRA, namely:

- At least 5% of final qualifying project costs are incurred ("Five Percent Safe Harbor"). Expenses must be "integral" to generating electricity, and equipment and services must be delivered (or anticipated to be delivered within 3.5 months after payment); or
- "Physical work of significant nature" is commenced on the project site or on project equipment at the factory ("Physical Work Test"). Physical work must be "integral" to the project. Preliminary activities on site (e.g., clearing the site or building a fence or an access road) do not count as "integral."

Both tests require that the project makes continuous progress towards completion once construction has begun, which the IRS considers satisfied automatically if the project is **placed in service no later than four calendar years** (or ten years, for projects that meet the definition of being constructed on federal land[49]) after the calendar year in which construction began (these four-and ten-year time periods are known as "continuity safe harbor"). Projects can still potentially satisfy the continuity safe harbor beyond four years, depending on their individual facts and circumstances, however, because this is not guaranteed, owners may bear additional risk.[50]

Are there other incentives for solar purchases? How do they change tax credit calculations?

For information on incentives, including incentive-specific contact information, see the Database of State Incentives for Renewables and Efficiency (DSIRE) at www.dsireusa.org.

Electric Utility and State Government Rebates

Most solar system rebates provided by a utility or state government are considered taxable income and do not change the tax basis when calculating the ITC. For example, if the tax basis is $1,000,000 for a PV system installed at a retail business that commenced construction in 2022, is placed in service within four years, and the state government gives a one-time rebate of $100,000, the ITC would be calculated as follows:

0.3 * $1,000,000 = $300,000

One exception is a utility rebate for purchasing or installing solar PV at a residence.[51] In this case, the utility rebate is subtracted from the tax basis, reducing the amount of the ITC claimed; however, the rebate is not considered taxable income. For example, if the tax basis is $1,000,000 for a PV system installed at an apartment complex and the utility gave a one-time rebate of $100,000, the project commenced construction in 2022, and was placed in service within four years, the ITC would be calculated as follows:

0.3 * ($1,000,000 - $100,000) = $270,000

Other Incentives

Solar incentives and policies that do not reduce the tax basis—although some may be considered taxable income— include:

- Revenue from the sale of renewable energy certificates or other environmental attributes.[52]
- Payments for a state performance- based incentive.
- State and local income tax credits.
- State and local property tax exemptions on the equipment.
- Taxable state or nonprofit grants (tax-exempt organizations wishing to take direct pay should see examples in that section of how to handle tax-exempt grants and loans).

- Loan guarantees.
- Depreciation deductions (see below).

Accelerated Depreciation

Most taxpayers who claim the business solar ITC can use an accelerated depreciation schedule[53], which allows for a greater depreciation expense in the early years of the life of an asset, and effectively reducing the overall cost of a solar installation.[54] Depreciation is considered an expense, so having a larger amount to depreciate during the tax year results in a smaller overall tax liability.

Note that while the ITC is a tax *credit*—a dollar-for-dollar reduction in taxes owed—depreciation is a *deduction*, meaning it only reduces a business's taxes by the depreciation amount multiplied by the business's tax rate (see below for an example).

When the business ITC is claimed, accelerated depreciation rules allow the full tax basis minus half the ITC[55] to be depreciated over a five-year depreciation schedule using a half-year convention.[56] Any unused depreciation can be carried forward indefinitely.[57] Under the rules of this depreciation schedule, taxpayers are allowed to deduct a larger portion of this amount in earlier years, giving them the benefit of a greater immediate reduction in federal tax liability.

Bonus Depreciation

A business with a solar PV system placed in service between January 1, 2018, and December 31, 2022, can elect to claim a 100% bonus depreciation. Starting in 2023, the percentage of capital equipment that can be expensed immediately drops 20% per year (e.g., 80% in 2023 and 60% in 2024) until the provision drops to 0% in 2027.[58]

Example Calculations

To illustrate how each incentive could be calculated and applied at a business, consider a business that commenced construction of a solar PV system in 2023, placed it in service in 2025, and uses the calendar year as its tax year. The 500-kW system cost $1,000,000 and has a capacity factor of 20% in the first year. What is the net effect of claiming the ITC, bonus depreciation, and accelerated depreciation on its 2025 tax liability versus the PTC, bonus depreciation, and accelerated depreciation on its 2025 tax liability?

ITC Calculation

A solar PV property that commenced construction in 2023 is eligible for a 30% ITC, so when the tax basis is $1,000,000, the 30% ITC reduces tax liability by $300,000.

Bonus Depreciation Calculation

Because the business is claiming the ITC, its depreciable basis for the system after applying the ITC is 85% (100% - 30%/2) of the tax basis:

0.85 * $1,000,000 = $850,000

To calculate the bonus depreciation for a solar PV property placed in service in 2025, the business multiplies the depreciable basis by 40%:

0.4 * $850,000 = $340,000

Accelerated Depreciation Calculation

In the example, the business uses accelerated depreciation to determine what amount of depreciation it will deduct each year from 2025 to 2030. Assuming this five-year recovery period, a half-year convention, and a 200% declining balance method, IRS Publication 946 Table A-1 lists the depreciation rate as 20% for Year 1. The business calculates its accelerated depreciation deduction by taking the difference between the original depreciable basis and the amount claimed for the bonus depreciation and multiplying by the depreciation rate:

0.20 * ($850,000 - $340,000) = $102,000

Total Impact on Tax Liability Assuming the business has a federal corporate tax rate of 21%, the net impact of depreciation deductions is calculated as:

0.21 * ($340,000 + $102,000) = $92,820

Therefore, the total reduced tax liability for 2025 from depreciation deductions and the ITC is:

$300,000 + $92,820 = $392,820

The business will continue to claim accelerated depreciation deductions for tax years 2026, 2027, 2028, 2029, and 2030—but the specific depreciation rate will vary by year.[59]

PTC Calculation

A 500-kW solar PV property that commenced construction in 2023 is eligible for a 2.75 ¢/kWh PTC for the first ten years of a project. A first-year capacity factor of 20% would mean it generates 876,000 kWh in year one (500 kW x 24 hours/day x 365 days/year x 20% = 876,000). Therefore, in year one it generates $24,090 in tax credits (876,000 x $0.026/kWh = $24,090).

Bonus Depreciation Calculation

Because the business is claiming the PTC, instead of the ITC, its depreciable basis for the system is not reduced.

To calculate the bonus depreciation for a solar PV property placed in service in 2025, the business multiplies the depreciable basis by 40%:

0.4 * $1,000,000 = $400,000

Accelerated Depreciation Calculation

In the example, the business uses accelerated depreciation to determine what amount of depreciation it will deduct each year from 2025 to 2030. Assuming this five-year recovery period, a half-year convention, and a 200% declining balance method, IRS Publication 946 Table A-1 lists the depreciation rate as 20% for Year 1. The business calculates its accelerated

depreciation deduction by taking the difference between the original depreciable basis and the amount claimed for the bonus depreciation and multiplying by the depreciation rate:

0.20 * ($1,000,000 - $400,000) = $120,000

Total Impact on Tax Liability Assuming the business has a federal corporate tax rate of 21%, the net impact of depreciation deductions is calculated as:

0.21 * ($400,000 + $120,000) = $109,200

Therefore, the total reduced tax liability for 2025 from depreciation deductions and the ITC is:

$24,090 + $109,200 = $133,290

Comparison of ITC and PTC with bonus depreciation

The following provides a summary of the tax benefits associated with choosing either the ITC and depreciation or the PTC and depreciation for a utility-scale PV system. As noted above, system upfront cost, capacity factor (i.e., net energy generation), and discount rate, will be integral in determining which choice is best for a particular project.

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
ITC	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
PTC	Electricity generation (k/Wh)[a]	876,000	871,620	867,262	862,926	858,611	854,318	850,046	845,796	841,567	837,359
	PTC[b]	$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.

What happens to unused tax credits?

Carryback and Carryforward Rules

Unused tax credits related to the project may be carried back three years and forward 22 years for projects placed in service in 2023 or later (projects placed in service before 2023 can carry the tax credits back one year and forward 20 years). After 20 or 22 years, one-half of any

unused credit can be deducted, with the remaining amount expiring. Tax credits carried backward or forward are not eligible for "transferability" (i.e., cannot be sold).

Tax Equity Financing

If a business does not have a large tax liability, tax equity financing may allow the business to take full advantage of federal tax benefits for a solar system. The business can partner with a tax equity investor that has a relatively large tax appetite and can make use of the tax benefits. While solar developers can now transfer tax credits, a tax equity investor may help them take advantage of accelerated depreciation. There are two commonly used models, although the specific arrangements can be quite complicated:

- **Partnership Flips:** The developer and investor form a partnership, and the economic returns "flip" from the investor to the developer after the investor makes use of the tax benefits and achieves target yields.
- **Sale-Leasebacks:** The developer sells the solar system to a tax equity investor who leases the system back to the developer.

How does financing impact ITC calculations?

Eligible solar equipment purchased through debt financing qualifies for the ITC. However, individuals (including partnerships or limited liability companies), S corporations, and closely-held C corporations financing a solar project by borrowing on a "nonrecourse basis" face additional rules that may delay claiming of the ITC. Borrowing on a nonrecourse basis means the borrower is not personally liable to repay the loan, and the lender primarily relies on the solar project as collateral. In general, the portion of the solar project paid through nonrecourse financing is not immediately included when calculating the ITC (although several exceptions exist that are commonly satisfied[60]); instead, in future tax years, the taxpayer can claim the ITC on the portion of the loan principal (but not the interest) as it is repaid.

The amount of both the PTC and ITC may be reduced by up to 15% if tax exempt bonds are used to finance a facility after August 17, 2022. The reduction is the lesser of: i) 15% or ii) the fraction of the proceeds of the tax-exempt bond used to provide financing for the facility over the aggregate amount of additions to the capital account for the qualified facility.[61]

How do I claim the ITC and PTC?

To claim the ITC, a taxpayer must complete and attach IRS Form 3468 to their tax return. Instructions for completing the form are available at http://www.irs.gov/pub/irs-pdf/i3468.pdf ("Instructions for Form 3468," IRS).

To claim the PTC, a taxpayer must complete and attach IRS Form 8962 to their tax return. Instructions for completing the form are available at http://www.irs.gov/pub/irs-pdf/i8962.pdf ("Instructions for Form 8962," IRS).

A Note on Recapture Rules

Though the ITC can be claimed in full for the year in which the solar system is placed in service, the business claiming the ITC must retain ownership of the system until the sixth year of the system's operation, or the business will be required to repay a portion of the tax credit. Because the ITC "vests" at a rate of 20% per year over five years, any "unvested" portion is recaptured (i.e., repaid to the IRS if something happens during the five years that would have made the project ineligible for the ITC in the first place). For example, if the business claims the ITC and then sells the system a year later, after it has only vested 20%, it will have to repay 80% of the amount it claimed from the ITC to the IRS. PTCs are not subject to recapture. If the tax credit has been transferred, the buyer bears the responsibility for recapture.[62]

More Information

Ask Questions

Internal Revenue Service (IRS), 1111 Constitution Avenue, N.W., Washington, D.C. 20224, (800) 829-1040.

Find Resources

The federal statutes regarding the ITC: 26 U.S.C. § 48 and § 48E. The federal statutes regarding the PTC: 26 U.S.C. § 45 and § 45Y at www.govinfo.gov.

Endnotes

[1] See: https://www.irs.gov/inflation-reduction-act-of-2022 for all updates/announcements/news.

[2] See: https://www.energy.gov/eere/solar/homeowners-guide-federal-tax-credit-solar-photovoltaics.

[3] 26 U.S.C. § 48 & 48E. Projects must begin construction before January 1, 2025, to be eligible for the § 48 investment tax credit. Projects beginning construction on January 1, 2025 or later are only eligible for the § 48E Clean Electricity Investment Tax Credit (which is only available to projects placed in service after December 31, 2024).

[4] 26 U.S.C. § 45 & 45Y. Projects must begin construction before January 1, 2025 to be eligible for the § 45 production tax credit. Projects beginning construction on January 1, 2025 or later are only eligible for the § 45Y Clean Electricity Production Tax Credit (which is only available to projects placed in service after December 31, 2024).

[5] The PTC, as written, has a full value of 1.5 ¢/kWh in 1992 dollars, but is adjusted each year using "GDP implicit price deflator" published by the Department of Commerce. The reduced "base rate" offered to solar systems starting construction in 2022 through 2024 that do not meet the prevailing wage and apprenticeship requirements has a value of 0.3 ¢/kWh in 1992 dollars; the full value is determined by multiplying the base credit amount of 0.3 cent by the inflation adjustment factor, rounding to the nearest multiple of 0.05 cents, and then multiplying by 5. The Internal Revenue Service published a 2022 value of 2.75 ¢/kWh in November, 2022 (see: https://www.irs.gov/pub/irs-drop/a-22-23.pdf). The calculation of the PTC for projects eligible for the Clean Electricity Production Credit (45Y, for projects placed in service in 2025 or later) does not involve a multiplication factor; those that meet the prevailing wage and apprenticeship requirements are eligible for a PTC of 1.5 ¢/kWh in 1992 dollars and those that do not are eligible for a credit of 0.3 ¢/kWh in 1992 dollars. Because of this subtle difference, the 45Y credit would

have a 2022 value of 2.6¢/kWh.

[6] Projects are also eligible if they began construction prior to January 30th, 2023. For more information see https://www.federalregister.gov/documents/2022/11/30/2022-26108/prevailing-wage-and-apprenticeship-initial-guidance-under-section-45b6bii-and-other-substantially.

[7] All megawatts and gigawatts numbers use AC.

[8] The IRS has ruled the ITC can be claimed by U.S. corporations, citizens, or partnerships that own solar in U.S. territories; however, companies and individuals are not eligible to receive the tax benefits if they do not pay federal income tax, which means most Puerto Ricans and Puerto Rican companies are ineligible. Therefore, solar assets in U.S. territories would most likely need to be owned by outside U.S. investors to take advantage of the ITC (Farrell, Mac, Lindsay Cherry, Jeffrey Lepley, Astha Ummat, and Giovanni Pagan. 2018. Reimagining Grid Solutions: A Better Way Forward for Puerto Rico. Prepared for the Global Collaboratory Panel. https://dpny8pxabs9qx8.devcloud.acquia-sites.com/sites/default/files/2022-10/Reimagining%20Grid%20Solutions_Final%20SIPA%20REPORT_0.pdf).

[9] No more than 20% of the eligible value of the solar system can be classified as used equipment.

[10] 26 U.S.C. § 50(b)(3).

[11] 26 U.S.C. § 48(a)(6).

[12] 26 U.S.C. § 48(a)(8).

[13] https://www.irs.gov/pub/irs-wd/201523014.pdf.

[14] IRS. 2010, October 29. IRS private letter ruling 201043023. https://www.irs.gov/pub/irs-wd/1043023.pdf.

[15] As determined by the Secretary of Labor, in accordance with 40 U.S.C. § 3141-3148, see www.sam.gov.

[16] For more information see Section 13101(f) of the Inflation Reduction Act of 2022.

[17] See: https://www.federalregister.gov/documents/2023/08/30/2023-18514/increased-credit-or-deduction-amounts-for-satisfying-certain-prevailing-wage-and-registered

[18] "The Steel or Iron Requirement does not apply to steel or iron used in Manufactured Product Components or subcomponents of Manufactured Product Components. For example, items such as nuts, bolts, screws, washers, cabinets, covers, shelves, clamps, fittings, sleeves, adapters, tie wire, spacers, door hinges, and similar items that are made primarily of steel or iron but are not structural in function are not subject to the Steel or Iron Requirement" (see IRS guidance).

[19] For more information see 26 U.S.C. § 45Y(g)(11)(C).

[20] 26 U.S.C. § 45Y(g)(11)(C).

[21] See: https://www.irs.gov/pub/irs-drop/n-23-38.pdf

[22] See: https://www.law.cornell.edu/cfr/text/26/1.263A-1

[23] Direct material costs of a component to a manufacturer would either include the cost of purchasing the component or the direct labor and material used to produce the component.

[24] For more information on what qualifies as a brownfield for the energy community bonus, see https://www.irs.gov/credits-deductions/frequently-asked-questions-for-energy-communities#brownfield.

[25] For more information, see 26 U.S.C. § 45(b) (11)(B).

[26] See: https://www.irs.gov/newsroom/irs-treasury-update-notice-2023-29-related-to-energy-community-bonus-credit-amounts-under-the-inflation-reduction-act for more information on the energy community

bonuses as well as https://arcgis.netl.doe.gov/portal/apps/experiencebuilder/experience/?id=a2ce47d4721a477a8701bd0e08495e1d for a map of energy communities hosted by the Interagency Working Group on Coal & Power Plant Communities & Economic Revitalization, U.S. Department of Energy, and U.S. Department of Treasury.

[27] See: https://www.energy.gov/justice/office-energy-justice-and-equity

[28] See: https://www.cdfifund.gov/sites/cdfi/files/documents/nmtc-target-areas-qa.pdf for more information on New Markets Tax Credits definition of low-income communities.

[29] A "qualified low-income residential building project" is defined as a residential rental building which participates in a covered housing program (i.e. HUD-assisted housing for groups in need. See: 24 CFR § 5.2003 for the full definition).

[30] A solar project is treated as a part of a "qualified low-income economic benefit project" if at least 50% of the financial benefits of the solar electricity are provided to households with incomes i) less than 200% of the poverty line (as defined in section 26 U.S. Code §36B(d)(3)(A)) applicable to a family of the size involved, or (ii) less than 80% of area median gross income (as determined under section 26 U.S. Code §142(d)(2)(B)). Category 4 projects are required to provide at least a 20% bill credit discount rate for all low-income households, defined as the value of the financial benefits like bill credits minus costs such as subscription fees, divided by the financial benefits.

[31] At least 50% of each category is reserved for projects that are either (1) owned by a Tribal enterprise, Alaskan Native Corporation, renewable energy cooperative (where 51% of the owners are low-income households), qualified renewable energy company (an entity serving low-income communities and provides pathways for clean energy adoption for those households), or a tax-exempt entity (including states, tribes, and rural electric cooperatives) or (2) located in a persistent poverty county (where more than 20% of the population have experience high rates of poverty over the past 30 years) or a census tract designated in the Climate and Economic Justice Screening Tool (CEJST) (link: https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5) as disadvantaged in terms of energy burden, $PM_{2.5}$ exposure. In the event of over-subscription to given category, priority will be given to applications meeting one or both of the above criteria.

[32] See: https://eco.energy.gov/ejbonus/s/

[33] See: https://eco.energy.gov/ejbonus/s/

[34] After allocation, a project may not: change location (although there is a grandfather provision should a given location no longer meet location requirements at the time of allocation), increase in size to be greater than 5 MW_{ac} or decrease in size by the larger of 2 kW or 25% of project size, fail to meet financial benefits requirements as verified by required documentation, or fail to meet ownership requirements unless the original owner had the right of first refusal to purchase the project after the recapture period. See Treasury's proposed rules for additional information: https://www.federalregister.gov/documents/2023/06/01/2023-11718/additional-guidance-on-low-income-communities-bonus-credit-program.

[35] See: https://www.irs.gov/newsroom/treasury-and-irs-provide-proposed-rules-on-energy-projects-for-low-income-communities for more information on the low-income bonuses.

[36] See: https://www.energy.gov/justice/low-income-communities-bonus-credit-program

[37] 26 U.S.C. § 6417.

[38] See https://www.irs.gov/credits-deductions/elective-pay-and-transferability-frequently-asked-questions-elective-pay Q12 for a discussion of what ownership structures are allowed.

[39] See https://www.irs.gov/credits-deductions/elective-pay-and-transferability-frequently-asked-questions-elective-pay Q18 for a list of steps for receiving a direct payment.

[40] See https://www.irs.gov/credits-deductions/elective-pay-and-transferability-frequently-asked-questions-elective-pay Q15 for a discussion of domestic content requirements.

[41] An exemption to the domestic content provision applies if i) it would increase the cost of the system by more than 25%, ii) the project is under 1 MW in size, or iii) the domestic content is not produced in sufficient quantities or of a satisfactory quality.

[42] See: https://www.irs.gov/newsroom/irs-releases-guidance-on-elective-payments-and-transfers-of-certain-credits-under-the-inflation-reduction-act.

[43] U.S.C. § 6418. The transferee taxpayer must be "not related to the eligible taxpayer," where a relationship is defined as either that described in 26 U.S.C. § 267(b) or 26 U.S.C. § 707(b)(1).

[44] See https://www.irs.gov/credits-deductions/elective-pay-and-transferability-frequently-asked-questions-transferability Q3 for a discussion of the non-transferability of the bonus credit amount.

[45] See https://www.irs.gov/credits-deductions/elective-pay-and-transferability-frequently-asked-questions-transferability Q4 for a list of steps for transferring tax credits.

[46] 26 U.S.C. § 6418. The transferee cannot further transfer any credits it received in the transfer.

[47] See: https://www.irs.gov/newsroom/irs-releases-guidance-on-elective-payments-and-transfers-of-certain-credits-under-the-inflation-reduction-act.

[48] See: https://www.federalregister.gov/documents/2022/11/30/2022-26108/prevailing-wage-and-apprenticeship-initial-guidance-under-section-45b6bii-and-other-substantially

[49] "Beginning of Construction for Sections 45 and 48; Extension of Continuity Safe Harbor for Offshore Projects and Federal Land Projects." IRS. Notice 2021-05.

[50] "Beginning of Construction for the Investment Tax Credit under Section 48." IRS. Notice 2018-59. https://www.irs.gov/pub/irs-drop/n-18-59.pdf. The IRS provided a one-year extension to the Continuity Safe Harbor for projects that began in 2016 or 2017, and a new safe harbor for satisfying the 3.5 month rule for property or services purchased after September 15, 2019 and received by the taxpayer no later than October 15, 2020. "Beginning of Construction for Sections 45 and 48; Extension of Continuity Safe Harbor to Address Delays Related to COVID-19." IRS. Notice 2020-41. https://www.irs.gov/pub/irs-drop/n-20-41.pdf.

[51] 26 U.S.C. § 136(a) states that "gross income shall not include the value of any subsidy provided (directly or indirectly) by a public utility to a customer for the purchase or installation of any energy conservation measure." Solar PV is considered an "energy conservation measure", per 26 U.S.C. § 136(c)(1). https://uscode.house.gov/view.xhtml?path=/prelim@title26/subtitleA/chapter1/subchapterB/part3&edition=prelim.

[52] 19 IRS. 2010, September 3. IRS private letter ruling 201035003. https://www.irs.gov/pub/irs-wd/1035003.pdf.

[53] Generally, owners of property placed in service after 1986 use the Modified Accelerated Cost-Recovery System (MACRS) in the U.S. tax code to calculate asset depreciation.

[54] Stand-alone storage is not eligible for 5-year MACRS until 2025, but can qualify for bonus depreciation before then.

[55] 26 U.S.C. § 168, https://www.govinfo.gov/app/details/USCODE-2017-title26/USCODE-2017-title26-subtitleA-chap1-subchapB-partVI-sec168.

[56] A half-year convention is a tax principle that treats equipment as if it were installed in the middle of the tax year (regardless of when it was actually installed), allowing half a year's depreciation for the first tax year. The half-year convention effectively spreads the five-year MACRS depreciation over six years, with the first year being calculated as half of the 200% declining-balance basis.

[57] Before 2018, any unused depreciation could be carried back 2 years and forward 20 years, but that changed with the passage of the Tax Cuts and Jobs Act of 2017 ("Who Needs Sec. 179 Expensing When 100% Bonus Depreciation is Available?" Thomson Reuters Tax and Accounting. October 5, 2018. https://tax.thomsonreuters.com/news/who-needs-sec-179-expensing-when-100-bonus-depreciation-is-available/).

[58] The bonus depreciation, after 2018, is available for purchased new and used equipment. (Martin, Keith. 2017, December. "How the US Tax Changes Affect Transactions." Norton Rose Fulbright Project Finance Newswire. https://www.nortonrosefulbright.com/en-us/knowledge/publications/68becf68/how-the-us-tax-changes-affect-transactions).

[59] IRS. 2015. How to Depreciate Property. Publication 946, Cat. No. 13081F. http://www.irs.gov/pub/irs-pdf/p946.pdf.

[60] 26 U.S.C. § 49.

[61] 26 U.S.C. §§ 45(b)(3), 48(a)(4).

[62] See https://www.irs.gov/credits-deductions/elective-pay-and-transferability-frequently-asked-questions-transferability Q13 for a discussion of financial responsibility for recapture.

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