

Guide to the Federal Investment Tax Credit for Commercial Solar Photovoltaics

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

Overview

- The solar investment tax credit (ITC) is a tax credit that can be claimed on federal corporate income taxes for 30% of the cost of a solar photovoltaic (PV) system that is placed in service during the tax year.¹ (Other types of renewable

The **U.S. Department of Energy Solar Energy Technologies Office** supports early-stage research and development to improve the affordability, reliability, and performance of solar technologies on the grid. The office invests in innovative research efforts that securely integrate more solar energy into the grid, enhance the use and storage of solar energy, and lower solar electricity costs.



Photo credit Dennis Schroeder, NREL

energy are also eligible for the ITC but are beyond the scope of this guidance.)

- In December 2020, Congress passed an extension of the ITC, which provides a 26% for systems commencing construction in 2020-2022, 22% for systems commencing construction in 2023, and 10% for systems commencing construction in 2024 or thereafter. Any PV system placed in service after 2025, regardless of when it commenced construction, can receive a maximum tax credit of 10%.²
- Typically, a solar PV system that is eligible for the ITC can also use an accelerated depreciation corporate deduction.

Eligible Projects

To be eligible for the business ITC (section 48 of the tax code), the solar PV system must be:

- Used by a business subject to U.S. federal income taxes (i.e., it cannot be used by a tax-exempt entity like a charity)
- Located in the United States or U.S. territories (though can only be used against federal income tax obligations)³
- Systems must use new and limited previously used equipment⁴
- Not used to generate energy for heating a swimming pool.

The eligible ITC percentage scales down over time as follows:

- 30% tax credit for projects commencing construction between January 1, 2006, and December 31, 2019, but placed in service before 2026 (before 2024 for projects commencing

construction in 2019 and which use the IRS continuity safe harbor. See below for further detail on “continuity safe harbor”).

- 26% tax credit for projects commencing construction between January 1, 2020, and December 31, 2022, but placed in service before 2026 (before 2025 for projects commencing construction in 2020 and which use the IRS continuity safe harbor. See below for further detail on “continuity safe harbor”).
- 22% tax credit for projects commencing construction between January 1, 2023, and December 31, 2023, but placed in service before 2026.
- 10% tax credit for projects commencing construction after December 31, 2023, or placed in service after December 31, 2025.⁵

A solar project is considered to have commenced construction if:

- At least 5% of final qualifying project costs are incurred. Expenses have to be “integral” to generating electricity, and equipment and services have to be delivered (or 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 has to 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 make 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 land⁶) 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.⁷

Eligible Expenses

The ITC is calculated by multiplying the applicable tax credit percentage (10%–30%) by the “tax basis,” which is the amount invested in eligible property. Eligible property includes the following:

- Solar PV panels, inverters, racking, balance-of-system equipment, and sales and use taxes on the equipment
- Installation costs and indirect costs
- Step-up transformers, circuit breakers, and surge arrestors
- Energy storage devices (if charged by a renewable energy system more than 75% of the time)⁸

Other Incentives and the ITC

For current 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

Under most circumstances, solar PV system rebates provided by a utility or state government are considered taxable income and do not affect 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 before December 31, 2019 and was placed in service before December 31, 2023, and the state government gives a one-time rebate of \$100,000, the ITC would be calculated as follows:

$$0.3 * \$1,000,000 = \$300,000^9$$

One exception is if the rebate is provided by a utility to a customer for purchasing or installing any “energy conservation measure,” including solar PV, at a residence.¹⁰ When this is the 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, and the project commenced construction before December 31, 2019 and was placed in service before December 31, 2023, the ITC would be calculated as follows:

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

Other Incentives

The following are some examples of incentives and policies associated with a solar PV system that typically do not reduce the tax basis related to the ITC (but some may be considered taxable income):

- Revenue from the sale of renewable energy credits or other environmental attributes associated with the electricity generated by the solar PV system¹¹
- 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
- Loan guarantees
- Tax-exempt and subsidized energy financing (in 2009 or after)
- Depreciation deductions (see below).

Accelerated Depreciation and the Depreciation Bonus

Accelerated Depreciation

A taxpayer who claims the commercial ITC for a solar PV system placed in service can typically also take advantage of accelerated depreciation (Modified Accelerated Cost-Recovery System, or MACRS) to reduce the overall cost of a PV installation. To calculate the income on which federal corporate taxes are owed, a business takes the difference between its revenues and expenses, plus

or minus any adjustments to income. Because depreciation is considered an expense, 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 commercial ITC¹² is claimed, accelerated depreciation rules allow the full tax basis minus half the ITC to be depreciated over a five-year MACRS depreciation schedule using a half-year convention¹³ (where any unused depreciation can be carried forward indefinitely)¹⁴. 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, 2008, and September 8, 2010, or between January 1, 2012, and December 31, 2017, can elect to claim a 50% depreciation bonus. Systems placed in service between September 9, 2010 and December 31, 2011 or 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 2027.¹⁵

Example of a Calculation

A generic example can help illustrate how each incentive could be calculated and applied at a business. Consider a business that commenced construction of a \$1,000,000 solar PV system in 2023, placed it in service in 2025, and uses the calendar year as its tax year. What is the net effect of claiming the ITC, bonus depreciation, and accelerated depreciation on its 2025 tax liability?

ITC Calculation

As indicated above for a solar PV property that commenced construction in 2023 and was eligible for a 22% ITC,

when the tax basis is \$1,000,000, the 22% ITC reduces tax liability by \$220,000.

Bonus Depreciation Calculation

Because the business is claiming the ITC, its depreciable basis for the system after applying the ITC is 89% (100% - 22%/2) of the tax basis:

$$0.89 * \$1,000,000 = \$890,000$$

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

$$0.4 * \$890,000 = \$356,000$$

Accelerated Depreciation Calculation

In the example, the business uses accelerated depreciation to determine what amount of depreciation it will deduct in 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:

$$0.20 * (\$890,000 - \$356,000) = \$106,800$$

Total Impact on Tax Liability

Assuming the business has a federal tax rate of 21%, the net impact of depreciation deductions is calculated as:

$$0.21 * (\$356,000 + \$106,800) = \$97,188$$

Therefore, the total reduced tax liability for 2023 from depreciation deductions and the ITC is:

$$\$220,000 + \$97,188 = \$317,188$$

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.¹⁶

Unused Tax Credits

Carryback and Carryforward Rules

Unused tax credits related to the commercial ITC may be carried back

1 year and forward 20 years. After 20 years, one-half of any unused credit can be deducted, with the remaining amount expiring.

Tax Equity Financing

When a business developing a solar project does not have a large tax liability, tax equity financing may be an option to take full advantage of federal tax benefits. The business can partner with a tax equity investor who has a relatively large tax appetite and can make use of the tax benefits. There are the following three commonly used models, although the specific arrangements can be quite complicated:

- **Sale-Leasebacks:** The developer sells the solar PV system to a tax equity investor who leases the system back to the developer.
- **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.
- **Inverted Leases:** The developer leases the system to the investor, structuring the agreement in a way that allows the investor to use the tax benefits.

Other Issues

Tax-Exempt Entities

Generally, if the solar PV system is used by a tax-exempt entity such as a school, municipal utility, government agency, or charity, the ITC may not be claimed.

In some states, a tax-exempt entity can indirectly benefit from federal tax benefits related to solar by entering into a *third-party ownership (TPO)* arrangement. Specifically, a tax-exempt entity can agree to purchase the electricity produced by a solar PV system owned and installed by a solar company (who claims the associated federal tax benefits) for an agreed-upon number of years at a set price. This type of TPO arrangement is called a *power purchase agreement (PPA)*. As of June 29, 2019, at least 28 states and Washington, D.C. authorize this type of TPO, 7 states prohibit them, and their legal status is

unclear in the rest.¹⁷ Additionally, the ITC cannot be claimed if a tax-exempt entity simply leases the solar equipment, which is another common type of TPO arrangement used in the residential and commercial sectors; thus, in states that do not allow PPAs, tax-exempt entities cannot use the TPO arrangement to capture tax benefits.

Financing

Eligible solar PV 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 PV 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 PV project as collateral. In general, the portion of the solar PV project paid through nonrecourse financing is not immediately included when calculating the ITC (although several exceptions exist); 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.

A Note on Recapture Rules

Though the ITC can be claimed in full for the year in which the solar PV 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 Department of the Treasury) 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 Department of the Treasury.

Structures and Building Integrated PV

Structures holding the solar PV system may be eligible for the ITC if the solar PV system is designed with the primary goal of electricity generation and other uses of the structure are merely incidental.¹⁸ 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.”¹⁹

Claiming the ITC

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).

More Information

Ask Questions

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

Find Resources

- The federal statute regarding the ITC: 26 U.S.C. § 48 at www.govinfo.gov.
- Updated information on the status of the ITC: DSIRE at www.dsireusa.org. ■

Endnotes

¹ 26 U.S.C. § 48, <https://www.govinfo.gov/content/pkg/USCODE-2011-title26/pdf/USCODE-2011-title26-subtitleA-chap1-subchapA-partIV-subpartE-sec48.pdf>.

² Solar PV systems that commenced construction on or before December 31, 2019 were eligible for a 30% tax credit.

³ 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://sipa.columbia.edu/sites/default/files/embedded-media/Reimagining%20Grid%20Solutions_Final%20SIPA%20REPORT_0.pdf).

⁴ No more than 20% of the eligible value of the PV system can be classified as used equipment.

⁵ Tax Cuts and Jobs Act of 2017; Consolidated Appropriations Act, 2021.

⁶ “Beginning of Construction for Sections 45 and 48; Extension of Continuity Safe Harbor for Offshore Projects and Federal Land Projects.” IRS. Notice 2021-05.

⁷ “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>

⁸ Additional considerations apply when the energy storage device is also used to store energy generated from a source other than the solar PV system. For more information, see:

- IRS. 2013, February 22. IRS private letter ruling 121432-12. <http://www.irs.gov/pub/irs-wd/1308005.pdf>.
- Elgqvist, Emma, Kate Anderson, and Edward Settle. 2018. *Federal Tax Incentives for Energy Storage Systems*. Golden, CO: National Renewable Energy Laboratory. NREL/



Aerial view of solar panels on the rooftop of a building in Rancho Cordova, California. Photo credit Michele Parry.

FS-7A40-70384. <https://www.nrel.gov/docs/fy18osti/70384.pdf>.

⁹ If the project commenced construction between January 1, 2020, and December 31, 2022, and it was placed in service before 2026, the ITC is calculated as $0.26 * \$1,000,000 = \$260,000$.

¹⁰ 26 U.S.C. § 136, <https://www.govinfo.gov/app/details/USCODE-2011-title26/USCODE-2011-title26-subtitleA-chap1-subchapB-partIII-sec136>.

¹¹ IRS. 2010, September 3. IRS private letter ruling 201035003. <https://www.irs.gov/pub/irs-wd/1035003.pdf>.

¹² For projects claiming a 30% ITC, project owners can depreciate 85% of the tax basis, or $100\% - 30\%/2 = 85\%$ (26 U.S.C. § 168, <https://www.govinfo.gov/app/details/USCODE-2017-title26/USCODE-2017-title26-subtitleA-chap1-subchapB-partVI-sec168>).

¹³ 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.

¹⁴ 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/>).

¹⁵ 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>).

¹⁶ IRS. 2015. *How to Depreciate Property*. Publication 946, Cat. No. 13081F. <http://www.irs.gov/pub/irs-pdf/p946.pdf>.

¹⁷ DSIRE (Database of State Incentives for Renewables and Efficiency). 2019. *Third-Party Solar PV Power Purchase Agreements*. Updated June 2019. <https://www.dsireusa.org/resources/detailed-summary-maps/> (“Detailed Summary Maps”).

¹⁸ Meehan, Chris. “Solar Carports, Incentives and the Investment Tax Credit: It’s Complicated, Kinda.” Solar-Estimate. Last updated August 1, 2019: <https://www.solar-estimate.org/news/solar-carports-incentives-investment-tax-credit-113017>.

¹⁹ IRS. 2010, October 29. IRS private letter ruling 201043023. <https://www.irs.gov/pub/irs-wd/1043023.pdf>.

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