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The Section 45X Advanced Manufacturing Production Credit

P.L. 117-169, commonly known as the Inflation Reduction Act of 2022 (IRA), enacted a new tax credit for the production of component parts and critical minerals used in clean energy equipment. The credit is referred to as either the *Advanced Manufacturing Production Credit* or the *45X credit* based on the credit's Internal Revenue Code section (26 U.S.C. §45X). This In Focus summarizes the 45X credit and policy issues that have arisen following its creation.

Credit Description

The 45X credit subsidizes the production of five types of goods: solar energy components, wind energy components, battery components, inverters, and critical minerals. Businesses may only claim the credit for goods produced in the United States or its territories. Goods produced from recycled materials qualify for the credit. While Section 45X provides credits for many different clean energy goods, there are three general methods that are used to calculate the credit values for different goods:

- *Goods used to produce, transmit, or store energy* receive credits proportional to their output, transmission, or energy storage capacities. For example, solar modules are eligible for a credit equal to 7 cents multiplied by the module's capacity per direct-current watt; commercial inverters are eligible for a credit equal to \$2 multiplied by the inverter's alternating-current-watt capacity; and battery cells are eligible for a credit of \$35 multiplied by the maximum kilowatt-hour capacity of the cell.
- *Subcomponent goods* are eligible for either flat credits or credits proportional to the subcomponents' size or weight. Blades used in wind turbines, for example, are eligible for a flat credit of 2 cents per blade. Polymeric backsheets (which insulate the backs of solar panels) are eligible for a credit of 40 cents per square meter, and torque tubes (which are used to cojoin and support solar panels) are eligible for a credit of 87 cents per kilogram.
- *Critical minerals and electrode active materials* are eligible for credits equal to 10% of the production costs of the given mineral or material. According to a final rule released by the IRS in October 2024, the costs of extracting, acquiring, processing, purifying, refining, and converting critical minerals and electrode active materials are considered qualifying production costs.

One exception to these general rules is that *offshore wind vessels*—vessels used to transport and install turbines at offshore wind farms—are eligible for a credit equal to 10% of the vessel's sales price. Sales prices are not used to calculate credit amounts for any other good. A second exception is that solar-grade polysilicon, which is arguably more similar to a critical mineral than a subcomponent part, is eligible for a credit of \$3 per kilogram.

To qualify for the credit, goods generally must be sold by producers to “unrelated persons,” a term interpreted by the IRS to mean individuals and organizations not under common control. However, 26 U.S.C. §45X(a)(3)(B)(i) states that “[a]t the election of the taxpayer ... a sale of components by such taxpayer to a related person shall be deemed to have been made to an unrelated person.” Based on its interpretation of this language, the IRS created a Related Persons Election (RPE) in its final rule. Under the RPE, a taxpayer may receive the 45X credit if “the taxpayer produces and then sells an eligible component to a related person, who then integrates, incorporates, or assembles the taxpayer's eligible component into another complete and distinct eligible component that is subsequently sold to an unrelated person.” This allows certain intercompany sales to qualify for the credit, which is consistent with the IRS's interpretation of Section 45X as “contribut[ing] to the development of secure and resilient supply chains.”

Section 45X credits are calculated based on the year a product is sold, which may differ from the year it is produced. Businesses may receive full credits for goods sold from 2023 through 2029, then may receive 75% of normal credit amounts for goods sold in 2030, 50% for goods sold in 2031, and 25% for goods sold in 2032. The credit expires for most 45X credit-eligible products in 2033. Neither the phaseout nor the expiration apply to the credits for critical minerals.

Production facilities that have previously been awarded a qualifying advanced energy project tax credit (26 U.S.C. §48C) are not eligible for the 45X credit. A facility that has been awarded a Section 48C credit for some but not all of its production units may claim the 45X credit for production units not used to claim the 48C credit.

Budgetary Cost and Economic Impact

According to estimates published by the Joint Committee on Taxation (JCT) in December 2023, the 45X credit is projected to reduce federal revenues by \$72.7 billion between FY2023 and FY2027. Of the 41 energy tax expenditures studied by the JCT, the 45X credit had the highest projected five-year cost.

The 45X credit could potentially bolster domestic clean energy supply chains, which could lead to lower greenhouse gas (GHG) emissions, increased energy security, and more domestic manufacturing jobs. The credit's impact on clean energy output and domestic onshoring depends on its ability to change producers' behavior. If the credit increases the number of clean energy manufacturing facilities or the amounts produced at existing facilities, it could increase domestic manufacturing and decrease GHG emissions. If the credit is instead claimed by producers who would have manufactured their products absent the credit, then Section 45X mainly provides

windfall benefits to producers. Likely due to the recent enactment of the credit, a CRS search did not identify any published studies attempting to estimate its economic and environmental effects.

Investment in manufacturing facilities for batteries, solar energy, wind energy, and critical minerals has increased since the enactment of the IRA. Between the second quarter of 2022 and the second quarter of 2024, such investment increased by 686% in inflation-adjusted dollars. It is not clear how much of this increase is due to the 45X credit as opposed to other policy reforms or nonpolicy factors. The increase may partially owe to technological and economic trends predating the IRA, as investment in the previously mentioned types of manufacturing facilities grew 169% between the second quarter of 2020 and the second quarter of 2022. Total investment in such facilities was \$17.1 billion (in 2023 dollars) as of the second quarter of 2024.

Section 45X credits subsidize the production of *intermediate clean energy goods*. Producers use *intermediate goods* to produce *final goods* sold to consumers. Critical minerals, wind turbine blades, and other items subsidized under Section 45X are generally used to produce or transmit electricity (the final good, in this case). Traditional economic theory suggests that taxing or subsidizing intermediate goods is less economically efficient than taxing or subsidizing final goods because it distorts the choice of inputs. The 45X credit may be a less efficient means of cutting greenhouse gas emissions than credits that directly subsidize zero-emissions electricity production. (Studies find that tax credits targeted at renewable energy production are a cost-efficient means of reducing GHG emissions.)

Direct Payments and Credit Transfers

The 45X credit is eligible for two new programs known as *direct payments* and *credit transfers*. Both programs apply exclusively to tax credits enacted or modified by the IRA.

Direct payments, sometimes called *elective payments* or *direct cash payments*, allow certain untaxed organizations to receive cash payments of equivalent value to 12 energy tax credits. Because tax credits are traditionally used to reduce the amount of taxes an organization owes, untaxed entities—including 501(c)(3) organizations and rural electricity cooperatives—have no use for such credits. The direct payments program, however, provides incentives for untaxed entities to undertake clean energy investments, regardless of their non-tax-paying status.

Credit transfers were enacted under the IRA to provide an incentive for clean energy investments among entities with low tax liabilities. With credit transfers, businesses may buy and sell certain IRA tax credits in exchange for cash. With an ordinary (nonrefundable) tax credit, if the value of the credit exceeds a company's tax liability, the company does not receive a refund for the excess credit amount. For example, if a business owes \$40,000 in taxes but is eligible for a credit worth \$65,000, the credit reduces the business's tax liability to \$0, but the government does not send the business a check for the remaining \$25,000. (The remainder can offset tax liabilities up to 20 years in the future, but companies that consistently have credits in excess of their liabilities can still have unused credits over the long term.)

Under the credit transfers program, the hypothetical company described above could sell its credit for a price between \$40,000 and \$65,000, while the credit buyer could benefit by reducing its tax liabilities by \$65,000 after having bought the credit for less than that amount. Firms purchasing 45X credits cannot receive them as direct payments.

Unlike with most IRA energy credits, the 45X credit can be claimed as a direct payment by any entity, including for-profit businesses, for up to five years. In effect, this allows all organizations to receive maximum-value 45X credits. When the JCT estimated the 10-year cost of the IRA in August 2022, it projected that direct payments would constitute 48% of the credit's cost.

Nonetheless, the 45X credit has also been among the most highly traded IRA credits. Trading the 45X credit would generally seem unnecessary, given that businesses may already receive the full credit amount in the form of a direct payment. One possible explanation for this phenomenon is timing: Businesses may only receive direct payments after filing their taxes, but credits may be sold for cash at any time. When financing new expenses, businesses may prefer to sell their 45X credits at less than their full value instead of taking out interest-bearing loans. Research shows that 45X credits generally traded at 92-95 cents on the dollar in the first half of 2024, suggesting that 45X credit sellers are unwilling to sell the credit far below its maximum value.

Legislative Reform Proposals

Goods qualifying for the 45X credit must be produced in the United States, but there are no prohibitions on foreign ownership of the companies receiving the credits. Various legislative proposals aim to reduce the potential influence of *foreign adversaries* or *foreign entities of concern* on 45X credit-eligible supply chains. The Protecting American Advanced Manufacturing Act (H.R. 6762; S. 3486) would prohibit companies from receiving the 45X credit if they are “associated with foreign adversaries,” including companies that have 10% or higher ownership from Chinese, Iranian, Russian, or North Korean nationals, or companies that have debt, leasing, or manufacturing arrangements with entities linked to those countries. The American Tax Dollars for American Solar Manufacturing Act (S. 4873) would disallow 45X credits for goods produced by foreign entities of concern, including entities “owned by, controlled by, or subject to the jurisdiction or direction of” the governments of China, Iran, Russia, and North Korea. H.R. 9338 would impose the same restriction and would also remove 45X credit eligibility for battery components “produced using technology designed, developed, manufactured, licensed, or supplied by a foreign entity of concern.”

The Nuclear USA Act of 2024 (H.R. 9201) would add uranium to the list of eligible critical minerals. Uranium is the primary mineral used in nuclear power plants, whereas the current list of eligible critical minerals targets those used in batteries and renewable energy equipment.

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