The Importance of Tax Credits for U.S. Leadership in New Nuclear Energy

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Introduction

U.S. nuclear energy leadership depends on the success of the early mover projects that are just getting under way. Project capital is essential to transition from initial to fully mature products and projects. These early mover projects are seen as risky investments by financiers. Policies that reduce the financial and technological risk are critical to realizing the economic, national security, and environmental advantages that nuclear power provides.

One such policy with a successful track record is the use of tax credits to encourage the commercialization of technologies important to U.S. interests. Tax credits can significantly reduce the risk associated with early mover projects. These credits provide investors with greater confidence in the profitability of a project.

This document serves as a companion to the previous work that NIA has done on clean energy tax credits.[1] It discusses several important credits and their implications for commercializing advanced nuclear reactors in the United States.

Important Credits for Nuclear Energy

Technology-Neutral Production Tax Credit (PTC) and Investment Tax Credit (ITC) (45Y and 48E of the U.S. tax code[2])

The technology-neutral 45Y and 48E are directly important for new nuclear projects. The PTC (45Y) tax credit is 1.5 cents/kWh of electricity produced in the first 10 years of a project that meets prevailing wage and apprenticeship requirements. The ITC (48E) provides a credit of 30% of the capital cost for a project that meets the prevailing wage and apprenticeship requirements. A project is only eligible for an ITC or a PTC, not both. Projects that are located within energy communities[3] or that use domestic materials during construction are eligible for 10% bonuses added to the tax credit value. The credits are set to be phased out in 2032 or when U.S. carbon emissions are reduced below 25% of the 2022 level.

NIA demonstrated that the ITC could reduce levelized cost of electricity on a nuclear project by 23%-30%. For a nuclear energy asset that runs for 60+ years, a savings of around 30% translates to a significantly lower bill for ratepayers.

[1] See Advanced Nuclear Energy Tax Provisions in the Inflation Reduction Act of 2022 | NIA and Implications of Inflation Reduction Act Tax Credits for Advanced Nuclear Energy | NIA

[2] 26 U.S. Code Sections 45Y and 48E

[3] See IRS issues guidance for energy communities and the bonus credit program under the Inflation Reduction Act | Internal Revenue Service for definition of energy communities

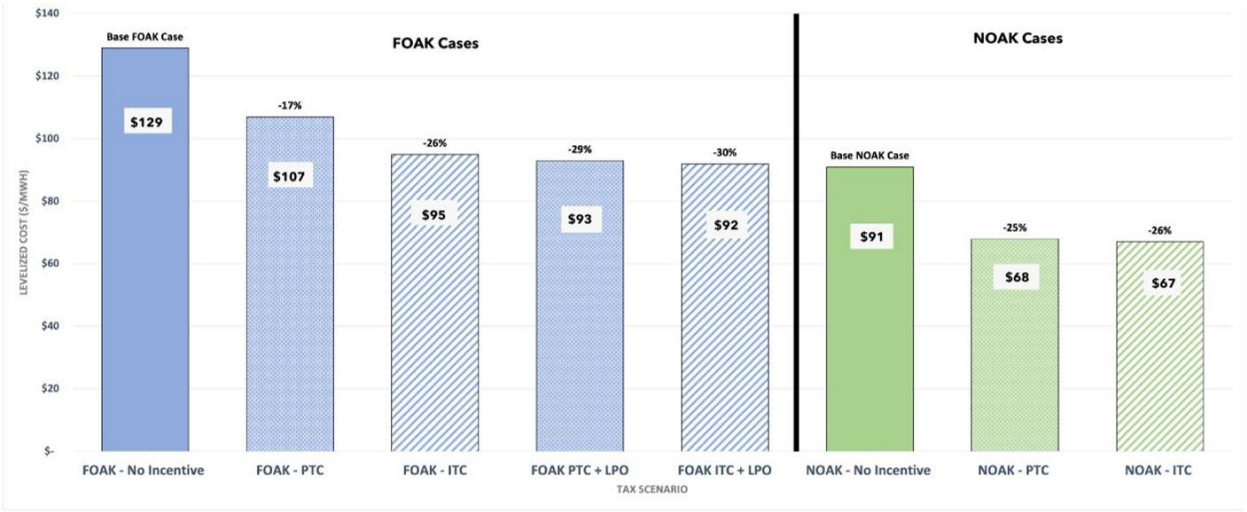

Figure 1: Summary of 48E ITC and 45Y PTC benefits.[4]

These tax credits not only help the overall competitiveness of nuclear electricity prices but also reduce the uncertainty in financing the project in the first place. These tax credits create certainty that a transferable, monetizable amount of funds is available upon project completion or, in the case of the PTC, during the first 10 years of operation. Without this certainty, attracting project financing for early projects will be even more difficult.

It should also be noted that the bonuses provide incentives for nuclear projects to benefit U.S. domestic workers, communities, and industry. The domestic content bonus encourages these projects to buy American steel, concrete, and manufactured goods, thus reducing a project's reliance on foreign supply chains. The energy community bonus can help communities impacted by retirements of energy assets to use a nuclear project to reinvigorate local economies and job markets. This effect is currently being observed in Kemmerer, Wyoming with Terrapower's Natrium project.[5]

Advanced Energy Project Credit (48C[6])

A robust U.S. manufacturing supply chain is paramount for delivering domestic nuclear reactor projects in a timely fashion. The 48C credit provides an investment tax credit for 30% of the capital cost of a manufacturing project if the prevailing wage requirements are met.

Projects from three categories are eligible for the credit: clean energy manufacturing, industrial decarbonization or critical materials. The IRS explicitly includes "specialized components and equipment for nuclear power reactors or their fuels (e.g., including components and equipment for fabrication of fuels, and manufacturing of equipment for conversion, enrichment, and deconversion)" as eligible facilities.[7]

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[4] See Implications of Inflation Reduction Act Tax Credits for Advanced Nuclear Energy | NIA for methodology and assumptions behind figure

[5] See PacifiCorp, TerraPower Evaluating Deployment of Up to Five Additional Natrium Advanced Reactors

[6] 26 U.S. Code Section 48C

[7] See page 5: Notice 2024-36, Appendix A and B

The 48C tax credit is available at an opportune time for the nuclear industry. Small modular and micro reactor developers are setting up manufacturing facilities for their reactor component and fuel fabrication facilities. The credit is already making a positive impact on nuclear energy commercialization; for example, X-energy was awarded $145m for their TRISO-X fuel manufacturing facility in Oakridge Tennessee.[8]

This credit requires an application to the IRS, making it unique among the tax credits discussed in this document. There is also a set funding limit at $10b for all credits awarded under 48C.

Zero-Emission Nuclear Power Production Credit (45U[9])

The zero-emission nuclear power production credit is available for nuclear plants that were placed in service prior to December 31, 2023. An existing nuclear plant can receive up to 1.5 cents/kWh of electricity sold if labor provisions are met when repair or alteration work is done on the facility. The credits can be taken until the phase out date in 2032 or when U.S. carbon emissions are reduced below 25% of their 2022 level.

A nuclear facility with a revenue of up to 2.5 cents per kWh of electricity sold can receive the full 1.5 cents/kWh credit. If revenue, also termed gross receipts, is between 2.5 cents/kWh and 4.375 cents/ kWh then the facility receives partial credit on a sliding scale. This phaseout is shown in Figure 2. The phaseout ensures that nuclear plants in competitive markets receive compensation for the reliability and other services that they provide, while avoiding unnecessary payments to nuclear plants that operate with sufficient revenue in expensive electricity markets.

[8] X-energy Awarded $148.5 Million Investment Tax Credit for First-of-a-Kind TRISO-X Fuel Fabrication Facility — X-energy

[9] 26 U.S. Code Section 45U

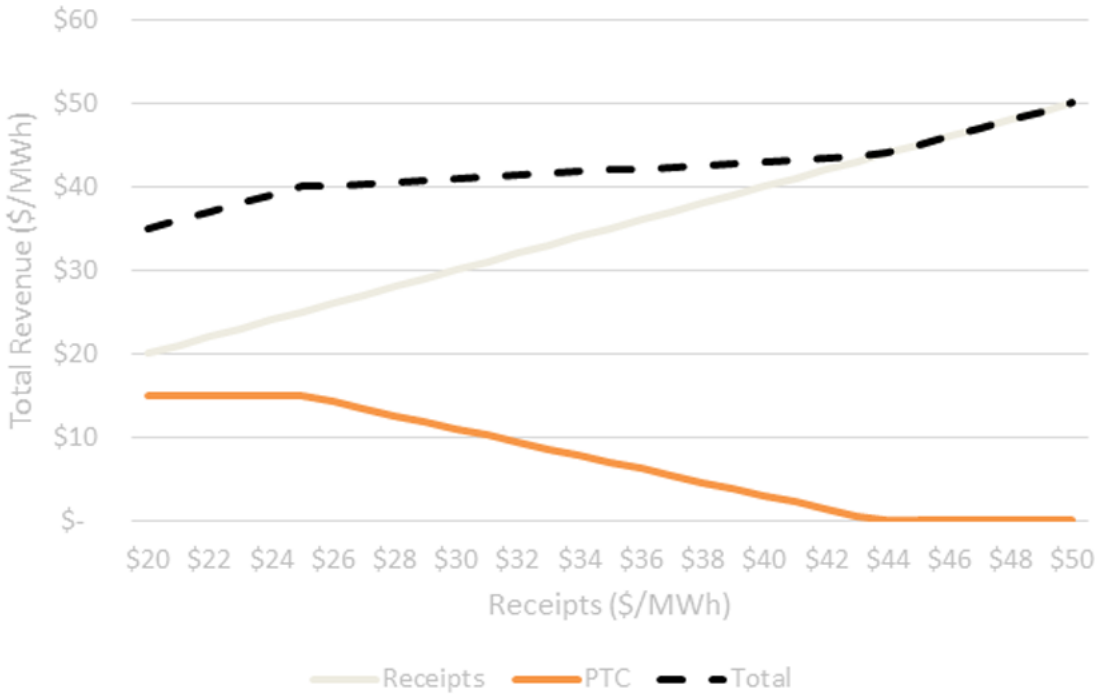

Figure 2: Demonstration of the 45U credit reduction as gross receipts increase.[10]

As of the writing of this report, the IRS still has not issued final guidance for the 45U credits. The timely release of this guidance will be important for existing nuclear plants moving forward as they evaluate plant profitability and capital improvements.

Hydrogen Production Tax Credit (45V[11])

Additionally, the hydrogen PTC can provide benefit to both new and existing nuclear energy. The value of the hydrogen PTC is $3/kg of hydrogen ($H_2$) for zero-emission projects. The IRS guidance on 45V stipulates that providing up to 200MW of electricity from an "economically imperiled" nuclear plant that is sent to a hydrogen production facility will qualify as additional clean energy. This means the nuclear + hydrogen combination is eligible for the maximum credit of $3/kg H_2 PTC on hydrogen sold. Hydrogen produced with energy from new nuclear facilities, regardless of capacity, will qualify for the full $3/kg H_2. These credits are set to be phased out in 2032 or when U.S. carbon emissions are reduced below 25% of their 2022 level, whichever is later.

Several nuclear facilities are seeking to co-locate hydrogen production, which could serve as a key commodity that nuclear plants can produce if electricity sales alone are not sufficiently profitable.[12]

[10] Plot reproduced from Assessing the Impact of the Inflation Reduction Act on Nuclear Plant Power Uprate and Hydrogen Cogeneration, page 4.
[11] 26 U.S. Code Section 45V
[12] 5 Nuclear Energy Stories to Watch in 2025 | Department of Energy

Important Features of Credits for Nuclear Energy

Many of the above tax credits were added or extended to include nuclear energy as part of the 2022 Inflation Reduction Act. The act also added several features of these credits that are important to the nuclear industry.

Transferability and Direct Pay

Chief among these features is the ability to transfer tax credits. The credits are applied as a reduction in tax liability in a given year to reduce the holding entity's tax burden. A nuclear project will likely be held by a special purpose vehicle (SPV), or in some cases a developer/vendor, that does not have revenue and thus does not have a large enough tax burden to claim all these credits. The credits may be pushed forward to subsequent tax years if they are not claimed in full, but this significantly reduces their value for the project. The value is maximized when the credit can be claimed as early as possible.

The ability of the nuclear project owner to sell, or transfer, makes these credits much more valuable to the project. A company with a significant tax liability can "buy" the credits from the project SPV. The company will pay somewhere between $0.85 and $0.96 per dollar of tax credit value. The SPV receives a monetized cash amount as soon as the credit is claimed and traded and the buying company receives the tax reduction benefit on their balance sheet, creating a win-win scenario. The market for transferring other types of energy tax credits has grown significantly from just $9b in 2023 to over $30b in deal volume in 2024.[13] Nuclear energy tax credits will play a large impact in that growth moving forward.

Another important feature of these tax credits is direct pay (also termed elective pay), where the project owner receives the value from the U.S. Treasury directly as a payment instead of as a tax credit. Tennessee Valley Authority (TVA), electric cooperatives, Alaska native corporations, and tribal organizations are eligible for direct pay. These institutions receive the tax credit benefit despite being tax-exempt organizations.

Direct pay and transferability are paramount for nuclear energy projects. Some projects could take advantage of more complex mechanisms, like tax equity structures, but those will be difficult to implement based on the expected total value of nuclear credits relative to the size of the tax equity market. Because of their size, nuclear projects could receive much larger total value in ITCs than renewable projects, and quickly saturate tax equity markets. Without transferability or direct pay, these tax credits' value to nuclear energy would be greatly diminished, if not eliminated entirely. Reducing barriers to transferability and direct pay will maximize the effectiveness of the tax credits and deploy more nuclear power projects.

Timing and Phaseout of Credits

The credits instituted in the Inflation Reduction Act are set to phase out in 2032 or after U.S. carbon emissions are reduced to 25% of 2022 emissions levels. Keeping these credits through the late 2020s and into the 2030s is crucial for nuclear energy, especially in the case of the technology-neutral ITC and PTC. Early nuclear projects are nearing deployment, but large buildouts of many

[13] Crux launches debt capital marketplace | Latitude Media

reactors are not expected until the early 2030s. The technology-neutral credits will be key to setting up an orderbook of reactor projects and so should remain available into the early 2030s.

Potential Improvements in the Nuclear Energy Tax Credits

In addition to the features described above, there are potential further improvements. Reductions in barriers to claiming the credit could increase the positive effect that these credits have on nuclear projects. For example, expanding the types of entities eligible for direct pay would be very valuable. Another option would be to clarify the effect of Qualified Project Exemptions (QPE) on the 48E ITC or other ITCs such as 48C.

QPEs are a mechanism in the tax code (26 CFR § 1.46-5) that allows projects to claim portions of the tax credits during construction and prior to the asset being placed in service. Guidance around how a QPE could be used for the 48E and 48C ITCs and if credits received via QPE claims would be eligible for transfer or direct pay would be helpful to tax equity investors.[14]

Another small adjustment that would significantly improve an ITC's value to nuclear projects would be to allow regulated utilities to opt out of normalization when they claim the credit. Normalization is a requirement for regulated utilities to spread out tax benefits received from a project over the life of the that asset. Requiring normalization means a utility would have to service debt or pay for capital more slowly than if the credit was allowed to be captured entirely at the end of construction. In the case of these ITCs, normalization would ultimately cost ratepayers more money. Currently, battery projects are allowed to opt out of normalization when receiving an ITC. This opt out should be extended to nuclear energy projects.[15,16]

Conclusion

The current investment and production tax credits outlined here have a material impact on the competitiveness of nuclear energy and the industry's ability to commercialize technologies and reach maturity. Without these credits, or without features like transferability, there would be significant headwinds to early-mover nuclear projects. Raising private financing would become more difficult because financiers would take longer to recoup investment. Maintaining these credits and retaining or improving their key features demonstrates U.S. support for nuclear energy, in turn increasing investor confidence, and catalyzing U.S. leadership in new nuclear energy.

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[14] In theory, QPEs could reduce the amount of financing a project would need. In practice, there is significant risk associated with claiming QPEs because of the "recapture" requirement to pay back the credits if the project fails. There is also a question of transferability when QPEs are claimed. Currently, there is no option to transfer credits during construction. For reasons explained in the previous section, the ability to transfer credits is critical to their value to nuclear projects.

[15] Battery storage tax credit opportunities and development challenges | Norton Rose Fulbright - November 2022

[16] For more on normalization, see: 19.3 Normalization