

On Deck for Treasury: The Inflation Reduction Act's New Approach to Clean Electricity Tax Credits

Issue Brief 24-02 by **Aaron Bergman** and **Kevin Rennert** — May 2024

For decades now, the heart of US federal policy support to reduce greenhouse gas (GHG) emissions has been a set of tax incentives for producing clean electricity and putting into service new clean electricity generators. These tax credits, along with state-level policies to require renewable and low-carbon electricity, are widely credited as the fundamental driver of emission reductions in the United States over the past decades. But they've always had some issues. They were inconsistent, being extended for short periods and at times expiring completely, leading to considerable investment uncertainty for developers. The credits themselves varied by technology and could be hard to monetize. And the rules were pretty inflexible: in order for a new technology to be eligible for the credit, it had to be named in the statute, requiring an act of Congress.

The Inflation Reduction Act (IRA) sought to address many of these issues by transitioning in 2025 to a new set of technology-inclusive credits for electricity: the “clean energy production credit” (26 USC 45Y) and the “clean energy investment credit” (26 USC 48E). Instead of listing various technologies, in these new provisions, the IRA allowed technologies to qualify if they satisfy one seemingly simple condition: that their emissions are at most zero.

Multiple model projections of the IRA ([see here](#) and [here](#)) have suggested that these tax credits are the single most important driver of IRA-attributable emissions reductions over the next decade, so much of the success of the IRA in reducing emissions hinges on their successful implementation by the US Department of the Treasury. Despite this significance and the looming deadline for the transition, however, there has been relatively little public discussion around their

implementation, even as there are some potentially complicated issues for Treasury to work through. This situation stands in contrast to **the robust conversation** that's been had over design of the 45V production tax credit for hydrogen, among others. In this issue brief, we give an overview of the tax credits and some potential challenges we see for their implementation in the hopes of stimulating timely discussion on issues Treasury will likely need to address in its forthcoming guidance.

1. How Do the 45Y and 48E Tax Credits Work?

The new tax credits simplify the tax code in two major ways. First, the 45Y and 48E tax credits set a primary condition that a facility generates electricity without any GHG emissions to be eligible for the credits. Second, instead of having a fixed end date, the credits phase out once the emissions from electricity generation in the United States are below 25 percent of 2022 levels. In this section, we give an overview of what it means to be zero-emission and the value of the tax credits.

1.1. What Is a Zero-Emissions Facility?

The condition of being a zero-emissions electricity facility differs according to two process categories. For technologies that neither combust fuel nor gasify fuel, such as wind, solar, and nuclear power, the emissions from the *generation* of the electricity must be zero. For these technologies, the new tax credits are generally expected to serve as a straightforward, long-term extension of the former tax credits with which the industry is familiar.

If the electricity is generated either through combustion or gasification (a process where a solid fuel like coal or biomass is converted to a gas that can be burned), however, the statute requires that the total *lifecycle* emissions must be zero. This requirement means that the emissions calculation must also include any upstream emissions, positive or negative, in addition to any emissions from generation. Upstream emissions can include emissions from methane leakage or negative emissions from carbon dioxide pulled out of the air to make biomass, as well as the upstream emissions associated with any electricity consumed while producing the fuel. In addition to biomass-derived fuels, this provision also applies to electricity generation from burning hydrogen. Energy storage technologies, both electric and thermal, are also eligible for 48E.

Unlike the tax credit for hydrogen production, for which lifecycle emissions are determined on a facility-by-facility basis, for the 45Y and 48E tax credits, the US Secretary of the Treasury will produce a list of emissions rates for “types or categories of facilities.” Those deploying generation technologies not on this list can apply for a provisional emissions rate until their technology is added to the list.

1.2. What Is the Value of the Tax Credit?

Under 45Y, the production tax credit (PTC), a qualifying generator receives around 2.8 cents per kilowatt-hour of electricity generated, rising with inflation. For 48E, the investment tax credit (ITC), the credit is 30 percent of the capital investment. Each of these values is reduced by a factor of five if the generator does not satisfy certain wage and apprenticeship requirements. However, additional credit value may also be unlocked by using domestic content in the generator as well as for building in energy communities. Each of these bonus provisions adds 10 percent to the value of the PTC and *10 percentage points* to the value of the ITC and may be stacked. There are further potential bonuses for the ITC if the facility is constructed in low-income areas, although there is a limited pool of these bonuses available.

Both tax credits are available to any generator (or energy storage for the ITC) that starts service in or after 2025 or to any additional capacity added to an existing facility after that date. The IRA also extended the existing versions of the PTC and ITC to any plant that starts construction before 2025, which will lead to certain plants being eligible for both the pre-IRA and post-IRA versions of the tax credit. However, the law is clear that generators can’t “double dip” and get both versions at the same time. Similarly, generators taking 45Y or 48E can’t simultaneously receive several other tax credits, including the advanced nuclear tax credit (26 USC 45J), the carbon oxide sequestration credit (26 USC 45Q) or the existing nuclear tax credit (26 USC 45U).

The PTC is available for ten years, while the ITC is issued as a single tax credit. If a facility has an emissions rate of over 10 g CO₂e/kWh during the five years after the ITC is issued, however, a fraction of the tax credit will be “recaptured” by the Internal Revenue Service. These tax credits are also eligible for the transferability and direct pay provisions from the IRA.

2. Key Issues for Consideration

Even as these tax credits provide a substantial simplification from the existing code, there are still substantive issues Treasury will need to address in its forthcoming guidance. We review some of them here.

2.1. What Constitutes a Facility?

For this tax credit, Treasury will issue a list of emissions factors for different types of “facilities” instead of making a case-by-case determination. Such generalized categorizations will be complicated by the fact that the same type of generator can often burn many types of fuels with different upstream emissions. For example, hydrogen and biomass can have very different upstream emissions depending on how they are made. To account for this, Treasury may need to consider subclassifying different categories of facilities based on the fuel used, even potentially for fuels that are chemically identical.

2.2. What Is an “Expansion of Facility”?

In addition to new facilities, sections 45Y and 48E allow credit for additions to existing facilities. These provisions allow a tax credit for the extra electricity produced either by a “new unit” or “any additions of capacity.” Treasury has a longstanding [“80/20” guidance](#) that it will likely follow to allow 20 percent of the value of a facility to be from an existing facility while still counting the facility as new. Some have expressed a desire to allow avoided retirements or license renewals for existing nuclear reactors to qualify for the tax credit, but that seems challenging to square with the explicit legislative language.

2.3. Will Geothermal Energy Qualify?

Geothermal energy is a low-carbon, renewable source of baseload electricity (i.e., it isn’t intermittent like wind and solar energy). Historically, geothermal energy has been considered in a similar manner to solar and wind under the tax code and has been eligible for tax credits. Geothermal electricity isn’t always zero-emissions, however: certain types of geothermal power can release carbon dioxide that was already underground. These emissions can be small, but they are not zero, raising the potential question of eligibility under 45Y and 48E.

Though the text of the law clearly refers to zero emissions as the threshold for eligibility, congressional intent is also clear that geothermal should qualify for these tax credits. This intent was set out in a [colloquy](#) in the US Senate between Senator Ron Wyden, the current chair of the Senate Finance Committee, and Senator Cathy Cortez Masto. In the colloquy Senator Wyden referred to geothermal emissions as “de minimis” and stated that “all geothermal energy is included among the resources meeting the definition of ‘qualified facility.’” In light of these statements, Treasury could choose a de minimis level of emissions such that most geothermal would qualify, though that could have implications for other aspects of implementation. Treasury could also view these emissions as not being “emitted into the atmosphere by a facility in the production of electricity.” Or it may end up that, Senate colloquies notwithstanding, some geothermal power simply won’t qualify for the credits without further efforts to abate its emissions.

2.4. What Is the Emissions Rate of Biomass?

The assessment of the correct emissions intensity for burning biogenic fuels has long been **controversial**. The IRA refers to the part of the Clean Air Act (42 USC 7545) that governs the renewable fuels standard (RFS) for the determination of the lifecycle emissions, so Treasury could delegate this determination to the US Environmental Protection Agency (EPA). EPA discusses its procedures for [lifecycle analysis here](#) and gives the [emissions intensity for various fuels here](#). However, there may be differences between the solid and gaseous biogenic fuels used in electricity generation and the liquid fuels EPA considers for the RFS.

Since these tax credits are based on a threshold of zero emissions, any choice in the scope of the lifecycle assessment could easily render biomass ineligible for the credit. For example, including emissions from transporting biomass or emissions from the consumption of grid electricity in the lifecycle assessment would lead to a positive emissions rate. As with geothermal, a de minimis provision may avoid some of these difficulties. Even with such a provision, given the different considerations between these tax credits and the RFS, Treasury could decide to blaze its own path rather than follow in EPA’s well-trodden footsteps.

2.5. Can Generators Use Environmental Attributes for Biogenic Fuels?

Fuels can be chemically identical (or at least interchangeable) but have different lifecycle emissions, leading to other challenges. For example, low carbon-intensity hydrogen and renewable natural gas (RNG) can be mixed in a pipeline with higher emitting variants, and it would be impossible to know whether the high- or low-emissions fuel is being consumed. This situation is analogous to what happens with electricity: there is no way to say whether a given kilowatt-hour consumed comes from any particular grid-connected source. Treasury could require a direct connection with the fuel producer to qualify as zero-emissions for the tax credit, but just as in the case of electricity, this would be very limiting. Instead, Treasury **could allow** electricity

producers to purchase the “environmental attributes” of the fuel, similar to the purchase of an energy attribute credit for electricity. But, as we’ve seen with the 45V tax credit, the precise design to allow the trading and use of these energy attributes can be **challenging and controversial**.

2.6. Can Facilities Use Negative Emissions to Offset Positive Emissions?

Another challenge familiar from the 45V tax credit discussion is assigning negative emissions to renewable natural gas. RNG generally arises from the capture of methane that would have otherwise been vented to the atmosphere. In that sense, it represents a negative source of emissions because the methane that would have been vented has a higher global warming potential than the carbon dioxide released from its combustion. Assigning negative emissions values to RNG could allow a blending of RNG and fossil-fuel natural gas to still have zero net emissions. Besides the difficulties of getting a good handle on the extent to which RNG is truly negative-emissions, such an approach could also have the perverse effect of incentivizing the creation of more biogenic methane solely so that it can be captured.

2.7. Will Stacking Tax Credits Lead to a Perverse Outcome?

It seems likely that the final guidance for the 45V hydrogen production tax credit will deem certain ways of producing hydrogen to have zero lifecycle greenhouse gas emissions. If that, in turn, leads to a zero emissions rate for the purposes of the PTC and the ITC, generating hydrogen from electricity could receive two tax credits, 45V and either 45Y or 48E. Furthermore, if the electrolyzer is directly connected with a clean generator, the final production of electricity could receive three tax credits: the 45Y or 48E credit twice and the 45V hydrogen production tax credit once. But generating hydrogen from electricity and using that hydrogen to generate electricity only makes sense if the hydrogen is used to store the energy, particularly for medium- and long-term storage. Otherwise, it is effectively throwing away energy for no benefit.

Treasury included an “anti-abuse” provision in its 45V guidance that would stop the most egregious abuses of this tax credit stacking, but inefficient use of hydrogen can arise naturally in ways that could be challenging to regulate. For example, an electrolytic hydrogen producer could produce hydrogen that receives the full value of the 45V tax credit. This hydrogen could be injected in a pipeline and sold on the open market. If an electric generator sees that the price of hydrogen is sufficiently low (on a kilowatt-hour basis), it will want to purchase that hydrogen rather than natural gas to save money and to receive the PTC or ITC. All actors in this scenario would be following the incentives resulting from the policy, but the outcome would be wasted energy.

Whether such a scenario comes to pass will depend on the relative prices of hydrogen and natural gas, but if a goal is the efficient use of taxpayer dollars to reduce emissions, it is definitely an outcome to be avoided. Leakage of hydrogen—an indirect GHG—could be used by Treasury as the basis for assigning all hydrogen, including hydrogen that qualifies as zero-emissions for 45V, a positive emissions rate. This approach could avoid the potential for perverse outcomes from credit stacking.

3. Conclusion

With the enactment of sections 45Y and 48E, the IRA has brought a welcome stability to the tax code for clean electricity production and can be expected to provide a much more flexible and predictable economic environment for deploying clean generation for years to come. Modeling has shown that these tax credits are foundational to realizing projected emissions reductions from the IRA, underscoring their importance to the Biden administration’s efforts to decarbonize the power sector.

Given the tight timing for the transition to these tax credits in 2025 and the need for advance planning by developers, Treasury will need to publish guidance in the very near term to make good on the promise of a stable investment environment. The need for expediency, along with the complexity of some of the issues we have identified in this issue brief, suggest that issuing guidance on 45Y and 48E may be no small task for Treasury, especially in light of other required **IRA-related guidance** on its plate. One option for Treasury could be

to offer near-term initial guidance on less complicated aspects, such as the eligibility of wind and solar technologies, while seeking public comment on some of the more complicated aspects.

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